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GENDER, SKILL AND EARNINGS INEQUALITY

by

GAIL FAWCETT, B.A., M.A.

A dissertation submitted to
the Faculty of Graduate Studies and Research
in partial fulfilment of
the requirements for the degree of
Doctor of Philosophy
Department of Sociology and Anthropology

Carleton University

Ottawa, Ontario

August 19, 1994

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submitted by

Gail Fawcett, B.A. M.A.

in partial fulfilment of the requirements
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Chair, Department of Sociology and Anthropology

Thesis Supervisor

External Examiner

Carleton University

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Abstract

The gender gap in earnings is investigated using a multi-stage earnings determination model that includes measures of individual attributes as well as job skill requirements. Using the Canadian Class Structure Survey, 1982, new measures of job skill requirements are generated through exploratory factor analysis for use in the earnings model.

Women and men are employed in jobs which have very similar requirements for cognitive complexity and manual skills. While there is evidence that women are hired for jobs with moderately lower requirements for autonomy, this is not why they earn substantially less than men. Using regression analysis, a multi-stage earnings determination model is developed. A decomposition procedure reveals that very little of the earnings gap can be attributed to gender differences in the level of job skill requirements. However, a major portion of the gender gap in earnings is explained by gender differences in the rate of return to autonomy requirements. For every increase in the level of autonomy requirements, men earn significantly more than women.

It is also demonstrated that women are hired for jobs which have significantly lower on-the-job training opportunities and this results in much lower levels of earnings. In addition to this, women are rewarded at a significantly lower rate of return for the on-the-job training

opportunities that they do have. Both these factors contribute a substantial amount to the earnings gap.

While women have slightly higher levels of education, they have significantly lower on-the-job training opportunities than men. These lower on-the-job training opportunities for women are particularly disadvantageous to women with lower levels of education. While men with lower levels of education have on-the-job training as a 'safety net' which increases their earnings and improves their chances of obtaining jobs with higher skill requirements, their female counterparts have few opportunities to improve their labour market situation.

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"It has been said that, while economics is the study of choices people make, sociology is the study of why people do not really have any choices. If that is true, then human capital theorists need to learn more sociology." (Faia, 1981: 1093)

CHAPTER 1

INTRODUCTION, THEORETICAL CONSIDERATIONS AND PAST RESEARCH

1.1 Introduction

One of the major changes in the world of work in the Western World since the end of World War II, in 1945, has been the increasing proportion of workers in the paid labour force who are women. One of the major characteristics of this change has been the differential reward for work received by women and men. Understanding this differential has been the cause of considerable research.

One of the more recent trends in the study of the gender gap in earnings has been a focus on the role of the skill requirements of jobs in the determination of earnings (see, for example, England Chassie and McCormack, 1982; England and McLaughlin, 1979; Kilbourne, England, and Beron, 1991; Hunter, 1988a; and Treiman, Hartmann, and Roos, 1984). This increased attention to the role of skill requirements in earnings inequality can be traced to two parallel literatures. On the one hand, research from the human capital perspective has evolved to the point where a focus on skill requirements is the logical next step in an effort to address criticisms at the theoretical and methodological level. On the other hand, the feminist-based literature on comparable worth¹ has forced an examination of skill requirements in the earnings

¹ Also known as equal pay for work of equal value and pay equity.

determination process as various policy-related issues are debated.

Two basic questions are investigated in this recent research. First, do men have higher earnings than women because they are employed in jobs which require higher levels of skill? Theoretically, this question is derived from the old human capital model which postulates that the higher earnings of men are due to their superior skill and productive potential (which is properly matched with jobs having high skill requirements). Second, do women have lower earnings than men because they are rewarded at a lower rate for the same job skill requirements? This question is central to the comparable worth literature which debates the value of policies directed at ensuring the same rate of reward for the same skill requirements.

Hunter (1988a), using data from the Social Change in Canada Survey (1977 wave) merged with the worker trait information (from the Canadian Classification and Dictionary of Occupations--CCDO), found evidence to indicate that a significant portion (up to one quarter) of the earnings gap between women and men could be attributed to the higher average skill levels of the occupations for which men are recruited. This suggests that the wage gap could be reduced if women were employed in occupations with the same skill

requirements as men.² Others, however, have found that gender differences in skill requirements are not at the heart of the wage gap (see England, Chassie and McCormack, 1982; England and McLaughlin, 1979; and Treiman, Hartmann and Roos, 1984). In fact, England, Chassie and McCormack (1982) maintain that, given the gender differences they found in the earnings determination process, the wage gap would actually increase if both sexes were to have the same occupational skill requirements. Such a finding supports the need for comparable worth legislation.

In this dissertation, I continue this investigation of the role of skill requirements in the gender gap in earnings. I go beyond the research outlined above in that I am able to increase the precision of the unit of analysis from the skill requirements of occupations³ to the skill requirements of

² Policies in the affirmative action mould, which are designed to facilitate the access of women to certain jobs, would be consistent with this finding.

³ There can be a great deal of heterogeneity within occupational groupings with respect to skill requirements. The level of the job, however, is the basic unit identifying a unique constellation of skill requirements. Within occupational groupings, there are a variety of different jobs--each having different skill requirements. The skill requirements of each occupational grouping represent an average of all the jobs contained therein. When there is great variation, this average may not be very meaningful. A further complication arises when differences in the skill requirements of jobs within an occupational grouping cut across gender lines.

jobs using the Canadian Class Structure Survey.⁴ I also employ a different methodology in my research which, I believe, allows us to better understand the seemingly contradictory results of Hunter (1988a) and England, Chassie and McCormack (1982). One of the contributions of this dissertation is the development of new measures of the skill requirements of jobs presented in Chapter 2. These new measures are subsequently used in the investigation of my central research questions in Chapter 3.

Armed with new job-level data and new measures of skill, I return to the following questions as my central research agenda: (1) do women earn less than men because they are hired for jobs which have lower skill requirements; or (2) do

⁴ The Canadian Class Structure Survey (to be referred to hereafter as CCSS), is a national survey conducted by Canada Facts (under the supervision of the Professors John Myles and Wallace Clement at the Department of Sociology/Anthropology, Carleton University) during the fall and winter of 1982-83. Funded by the Social Sciences and Humanities Research Council of Canada, this project is part of an international effort which includes the United States, Great Britain, Sweden, Finland, Italy, Australia, Norway, Denmark, Japan, West Germany (with similar efforts underway in Greece, Hungary, New Zealand, Poland, Taiwan, Turkey, Spain, and the former Soviet Union). Much of the data used in this study (data on skill and training) is unique to the Canadian survey--making international comparison impossible.

A multi-stage probability sample in all ten provinces of Canada was used in the collection of these data; this sample was stratified by region and community size. Interviews were completed in 76 percent of the total eligible households (Black and Myles, 1985:7-8). The survey involved personal interviews with approximately 2600 persons across Canada. Information was produced for 1785 employed subjects (as well as 649 unemployed, but available for work subjects and 143 persons engaged in unpaid domestic labour who were not available for work in the paid labour force).

women earn less than men because they receive a lower rate of return to the same skill requirements that men do? In Chapter 3, I demonstrate that the gender gap in earnings has little to do with the fact that women are employed in jobs with slightly lower skill requirements. A major portion of the earnings gap, however, results from the fact that women are not rewarded at the same rate as men for the same skill requirements.

In addition to these two central questions relating to skill requirements, I investigate gender differences in on-the-job training opportunities and the impact that these differences have on the gender gap in earnings. On-the-job training is considered to be of prime importance in at least three competing research perspectives on earnings inequality: human capital theory, the job competition model, and the new-structuralism. According to traditional human capital theory, job skills are acquired through both formal education and on-the-job training. The job competition model, however, views on-the-job training as the primary method of skill acquisition; education merely enhances one's chances of obtaining on-the-job training. Finally, even the new structuralist models assign a key role to on-the-job training as a benefit of internal labour markets leading to higher earnings.

While the main contribution of this dissertation is an analysis of the skill requirements of jobs and the gender gap

in earnings, an additional contribution involves questions related to the skill acquisition of individuals. I include on-the-job training requirements in my analysis of the gender gap in earnings. In doing so, I address several of the methodological problems involved in past research. In the past, an individual's work experience was typically used as a proxy for amount of on-the-job training.⁵ However, not all experience is equally enriching. In this dissertation, I employ a direct measure for on-the-job training requirements. As with skill requirements, I ask: (1) do women earn less than men because they are hired for jobs which have lower on-the-job training requirements; or (2) do women earn less than men because they receive a lower rate of return to the same on-the-job training requirements that men do? In Chapter 3, I show that women are employed in jobs with lower levels of on-the-job training and that this is responsible for a large portion of the earnings gap. However, an equally large portion of the earnings gap is due to the fact that women are also rewarded at a significantly lower rate of return to the same level of on-the-job training requirements.

After dealing directly with gender differences in the role of skill and on-the-job training requirements in the gender gap in earnings in Chapter 3, I examine gender differences in the process by which men and women enter into

⁵ Sometimes even age has been used as a proxy for on-the-job training.

on-the-job training opportunities and jobs with varying levels of skill requirements. While the main research agenda deals with inequality in the reward process, this sub-agenda focuses on gender differences in the opportunity structure leading up to earnings. This sub-agenda results from conceptualizing earnings determination as a multi-stage process (Figure 1.1). The initial stage of the model can be regarded as the skill acquisition period of an individual. Skills are acquired in school and during on-the-job training. They are practised and honed during work experience. If men and women do not have equal opportunity to acquire and hone skills during this initial period, one would expect such disadvantage to follow through to the stage where individuals are matched to specific job requirements and, ultimately, to the reward stage.

The primary question of this sub-agenda is: "do women and men have equal opportunities to acquire skill?" According to the job competition model, education acts as a signal to employers trying to estimate the cost of providing on-the-job training. Higher education is associated with lower training costs and, therefore, greater on-the-job training opportunities. But does education help men and women equally to obtain jobs with high on-the-job training requirements? In Chapter 4, I demonstrate that, at every level of education, men are selected for jobs carrying greater amounts of on-the-

job training than their female counterparts.⁶ The lower on-the-job training opportunities of women, therefore, are not due to any deficiency in the educational attainment of women.

Finally, this sub-agenda is extended into Chapter 5 where I examine the implications of these gender differences in training opportunities for the skill-matching stage. I ask the question: Are education, experience, and on-the-job training equally important selection criteria for the entry of women and men into jobs with varying levels of skill requirements? According to human capital theory, individuals are matched with suitable jobs (carrying specific skill requirements) on the basis of their education and experience. In Chapter 5, however, I demonstrate that women and men are subject to a different process of selection into job skill requirements. Formal education is a relatively more important criterion for the allocation of women (than men) into jobs with high knowledge-based skill requirements. As well, the impact of formal education on the selection into jobs requiring high knowledge-based skills is more direct for women than it is for men. Since education brings greater opportunities for on-the-job training (Chapter 4) to men than women, a greater proportion of the effect of education on the job allocation process is indirect (through on-the-job training) for men.

⁶ As learned in Chapter 3, lower levels of on-the-job training for women make a major contribution to the gender gap in earnings.

FIGURE 1.1
THE MULTI-STAGE EARNINGS DETERMINATION PROCESS:
OPPORTUNITY AND REWARD

SKILL ACQUISITION STAGE MATCHING STAGE REWARD STAGE

In this first chapter, I begin my research project with a review of the theoretical models and past research that leads up to the agenda followed in this dissertation. I start with a discussion of the theoretical orthodoxy in the study of gender inequality in earnings--human capital theory. By summarizing the critiques of human capital theory, I demonstrate the logic of introducing an earnings model that contains the skill requirements of jobs and a direct measure for on-the-job training. I go on to explain that the role of skill requirements in the study of the gender gap in earnings has also been brought into focus by the burgeoning literature on comparable worth.

An important point to remember in the study of gender inequality in earnings is the fact that earnings determination is a multi-stage process. Gender differences in the opportunity structure that connects these stages can have important implications for the earnings of women and men. The traditional human capital model is based on a wage competition framework where individuals choose to acquire a certain level of skill and then compete on the open market for wages matching their skills. The job competition model, however, frames this process quite differently. According to this model, individuals compete for jobs which carry varying levels of on-the-job training. Both achieved (education) and ascribed characteristics act as signals to employers as they select individuals for these opportunity structures. These

opportunities, ultimately, lead to jobs with varying levels of skill requirements. Earnings are based primarily on these job requirements. Using a discussion of the job competition framework, the remainder of this chapter provides the context for conceptualizing earnings as a multi-stage process.

1.2 Human Capital Theory--The Basic Model

In his famous book, The Wealth of Nations (originally published in 1776), Adam Smith described the 18th Century European approach to the differentiation of workers as follows:

The policy of Europe considers the labour of all mechanics, artificers, and manufacturers, as skilled labour; and that of all country labourers as common labour. . . . The laws and customs of Europe, therefore, in order to qualify any person for exercising the one species of labour, impose the necessity of an apprenticeship, though with different degrees of rigour in different places. They leave the other free and open to everybody. During the continuance of the apprenticeship, the whole labour of the apprentice belongs to his master. In the meantime he must, in many cases, be maintained by his parents or relations, and in almost all cases must be clothed by them. Some money, too, is commonly given to the master for teaching him his trade. They who cannot give money give time, or become bound for more than the usual number of five years; a consideration which, though it is not always advantageous to the master, on account of the usual idleness of apprentices, is always disadvantageous to the apprentice. In country labour, on the contrary, the labourer, while he is employed about the easier, learns the more difficult parts of his business, and his own labour maintains him through all the different stages of his employment. It is reasonable, therefore, that in Europe the wages of mechanics, artificers, and manufacturers, should be somewhat higher than those of common labourers. They are so accordingly, and their superior gains make them in

most places be considered as a superior rank of people. . . . Their employment, indeed, is more steady and uniform, and the superiority of their earnings, taking the whole year together, may be somewhat greater. It seems evidently, however, to be no greater than what is sufficient to compensate the superior expense of their education. (Smith, 1986:204-205)

Evident in Smith's work is the foundation for human capital theory. According to Smith, workers who invest in education become more skilled; and skilled workers are "accordingly" rewarded with higher wages and "superior rank". This notion has dominated classical and neo-classical economic thought since Smith's time. The link between education, skill, and wages has appeared in the work of a variety of different authors over the years. The term "human capital", however, is typically credited to Gary Becker (1957). Mincer and Polachek (1980) have provided one of the more recent and more vigorous treatments of human capital theory. (See also: Kamalich and Polachek, 1982; Mincer and Ofek, 1982; Mincer and Polachek, 1978; Polachek, 1976; Polachek, 1981; Polachek, 1985; and Shaw, 1984.)

Human capital theory has dominated the literature on gender inequality in earnings for the last three decades.⁷ The basic tenet of human capital theory is that people invest differently in human capital (defined as productivity

⁷No discussion of the literature on the gender gap in earnings would be complete without mentioning the new structuralism which represents one of the major challenges launched against human capital theory. The new structuralism is summarized in Appendix A.

enhancing activities such as education, on-the-job training, and labour force experience, etc.), developing different productive capacities and skills, and, consequently, receiving differential rewards in the labour market. Mincer and Polachek (1974) note that the decision to invest in human capital involves a consideration of foregone earnings (opportunity cost) in one's best alternative occupation (without such human capital investment), as well as any outlay of finances to 'purchase' the opportunity of obtaining this human capital (i.e., tuition, etc.). This, of course, sounds very much like Adam Smith's description of the investment in apprenticeship (see earlier quote). The returns involve the greater earnings obtained throughout one's working life (beyond what would have been obtained without the investment).

In short, the amount of time spent in the labour force affects the return on this investment. The less time in the labour force, the lower the overall return to human capital. According to the theory, individuals make choices about investing in human capital based upon this trade-off, with anticipated time in the labour force as an influencing factor (Mincer and Polachek, 1974). Women are thought to invest differently than men due to their often discontinuous nature in the labour force as a result of child rearing and domestic responsibilities. Women, according to this model, anticipate spending less time in the labour force than men; thus, there

is a much lower incentive to invest in human capital for women than for men.⁸

⁸ There have been a number of critiques of this particular set of assumptions (most of them coming from the feminist camp). The model is overly 'voluntaristic' in its view of the labour force behaviour of women and fails to provide solid evidence as to why these 'choices' are truly economically rational (see England, 1982; Welch, 1977; Boyd, 1983; Burris and Wharton, 1982).

In addition to direct criticisms of human capital theory, another literature has developed which integrates domestic labour into a model of gender inequality. McAllister (1990) provides a brief summary of two decades of domestic labour debates. According to McAllister (1990), three different theoretical perspectives "have been influential in conceptualizing household labor" (McAllister, 1990: 81).

In the first model, it is argued that "the male utilizes his power within the family to minimize commitment to household labor on the grounds of lack of time" (McAllister, 1990: 81). The second theory relies upon the Marxist theory of capitalist development. Typically, some sort of marriage between capitalism and patriarchy is viewed as the driving force for women's domestic labour. (Also see a collection of essays in both "Hidden in the Household" edited by Fox, 1980, and "Feminism and Materialism" edited by Kuhn and Wople, 1978, which provide a treatment of the subject from this perspective.)

The third (and most recent) theoretical trend in the literature is the 'new household economics' (McAllister, 1990; England and Farkas, 1986: 95). As noted by England and Farkas (1986: 95): "The new home economics applies microeconomic reasoning to household decision making." This perspective looks within the family unit for mechanisms which will affect the earnings potential of its members in paid employment outside the home. "This view predicts that the relative potential wage of husbands and wives will be an important predictor of their division of labor." (England and Farkas, 1986: 95) This new perspective would appear to represent a return to 'supply side' explanations of inequality--only much more steeped in feminist thought. There have been several recent examples of research on the gender gap in earnings from this perspective (see, for example, Shelton and Firestone, 1989; Hersch, 1991; Coverman, 1983). Not surprisingly, the performance of unpaid domestic labour appears to be inversely related to labour force earnings. Although this literature is relatively new, even its proponents acknowledge the need to control for job dimensions. This points to the necessity of understanding the relationship between skill and earnings.

As noted by Boyd and Humphreys (1979:7), the human capital model predicts that women and men should receive the same "return to income relevant characteristics". Overall gender differences in earnings should be due to gender differences in the amount of human capital possessed and not due to differences in the rate at which such human capital is rewarded. However, research has indicated that women and men do not enjoy the same return to income relevant characteristics. Not only do women receive lower, overall earnings than men when such characteristics are controlled, they do not receive the same rate of return to individual characteristics. (See, for example, Abowitz, 1982; Bibb and Form, 1977; Blinder, 1973; Boyd and Humphreys, 1979; Denton and Hunter, 1982; Fawcett, 1990; Goyder, 1981; Gunderson and Jain, 1980; Holmes, 1976; Hudis, 1976; Oaxaca, 1973; Robb, 1978; Suter and Miller, 1973; and Treiman and Terrell, 1975.)⁹

Becker (1985) has also attempted to incorporate domestic labour into his basic model by adding 'effort' to the equation. He maintains that due to their extra duties in the household, women have less energy to perform their paid labour; women, therefore, put in less effort than men for every hour of paid work.

⁹ Goldin and Polachek (1987) respond to evidence indicating that the portion of the gender gap due to differences in the earnings determination process (as opposed to differences in human capital possession) may be getting larger over time (according to human capital theory, men and women should have the same earnings determination process--just different amounts of human capital). Traditionally, the portion of the gender gap in earnings that is due to differences in the process of earnings determination is attributed to discrimination (which should, over time, be

Contrary to what human capital theory would predict, this suggests that women and men have a very different process of earnings determination regardless of any differences in the amount of human capital possessed. However, is it possible that these findings are due to a misspecification of the model?

1.3 Human Capital Theory's Major Flaw--Individuals -vs- Jobs

The basic unit of analysis in human capital theory is the individual--therein lies its major flaw. Granovetter (1985:483) succinctly notes that human capital theorists operate "with an atomized, undersocialized conception of human action." Their view of the exchange relationship between workers and their employers exemplifies this. By 'atomizing' and isolating this exchange relationship from its organizational context, human capital theorists have less difficulty in arguing that productive potential (human capital) can be sold for a reward that reflects the value of its marginal product. The meritocratic ideal is upheld in this vision of rational workers making informed choices regarding the sale of their labour power. Employers are

eliminated by market forces according to pure human capital theory). Goldin and Polachek (1987) argue that the mounting evidence that this portion is actually growing over time should not be interpreted as evidence of increasing discrimination. They argue instead that this is simply an artifact of the increasing heterogeneity of women in the paid labour force.

viewed as "price-takers" (Blau and Jusenius:1976; Gordon, 1976:239).

The problem with the human capital conceptualization of the exchange relationship is more evident when the analysis is returned to the organizational arena where work for reward is actually carried out. Within an organizational context, one is forced to recognize that employers are not brokers for individual workers; jobs and their attendant reward structures are not tailored to suit the human capital attainments of individuals. Baron (1984) reminds us of Thurow's appropriate deduction that "instead of people looking for jobs, there are jobs looking for . . . 'suitable' people" (Baron, 1984:59). Employers determine their goals and organize work in an effort to meet these goals. This organization necessarily results in a constellation of jobs which must fulfil specific tasks. Wages should be determined by the characteristics of the job and by the importance of those characteristics in the proper performance of the job.¹⁰

¹⁰ At least this is what neo-classical logic would predict. Wages are viewed as being set in an objective manner according to the value of the skills required and to the laws of supply and demand. Critics of this school of thought (feminist scholars in particular) would also argue that skills are 'socially constructed' and, therefore, that the value attached to those skills by employers is very subjective (Acker, 1987 & 1989; Attewell, 1990; Form, 1987; Jenson, 1989; Milkman and Pullman, 1991; Spenner, 1990; Walby, 1990).

While indicators of human capital may be important in an employer's attempt to match a worker with a specific job, "possession of human capital cannot be equated with its use" (Spenner, 1983:827) (see also Rumberger, 1981:578). A worker may possess more or less human capital than is required to perform the job that she/he holds. As Spenner (1983) points out: "the work place and jobs are imperfect translators of human ability and potential (i.e., education) into reality" (Spenner, 1983:827).

1.4 Human Capital Theory and Assumed Self-Selection

Implicit in human capital theory is the assumption that individuals are properly matched with jobs on the basis of their skill possession. This assumption is exemplified in Paglin and Rufolo's (1990) study of gender differences in earnings. Responding to the kind of criticism of human capital theory summarized in the previous section, Paglin and Rufolo attempt to distinguish different types of human capital.¹¹

Paglin and Rufolo (1990) acknowledge that human capital possession "cannot be equated with its use" (Spenner, 1983:827) when they note that "a particular skill or

¹¹ It is beyond the scope of this discussion to provide a complete treatment of all the criticisms that have been levelled at neo-classical theory (human capital theory in particular). See Blaug (1976) for an excellent (although early) overview of the problems with human capital theory. See also: Blau and Jusenius (1976); Boyd (1983); Cain (1976); England (1982); Ornstein (1982).

attribute may be very valuable in some occupations and of no value in others" (Paglin and Rufolo, 1990:124). However, instead of examining returns to skill requirements of jobs, they maintain their focus on returns to skills of individuals. Their contribution to the human capital literature lies in the fact that they include a more direct measure of skill than education or experience. Paglin and Rufolo (1990) maintain that individuals sort themselves with respect to type of education they pursue and the occupation they choose according to their innate abilities and strengths. (See also Oosterbeek, 1990, for a model including education, intelligence, and social background in The Netherlands.)

In their sample of recent college graduates, Paglin and Rufolo (1990) use the mean starting salaries of graduates in some 98 different disciplines as the dependent variable in a regression analysis. The mean GRE scores (Graduate Record Exam Scores)--both the mathematical and verbal component--of graduates in each discipline are then entered as the independent variables. These scores are thought to represent mathematical skills and verbal skills of the individuals. Paglin and Rufolo (1990) find very similar rates of return for women and men to these 'skills' in their study. The higher earnings of males is explained in terms of their higher average scores on the mathematical component of the GRE--which is rewarded more highly than verbal skills because of the laws of supply and demand. Paglin and Rufolo (1990) argue that

these skills are valued more highly because they are relatively scarce. They make the assumption that men and women enter occupations that are most suited to their natural abilities.

1.5 Human Capital and Measures of Job Requirements

There are examples of earnings determination models that are a hybrid of human capital theory and an attempt to incorporate measures of job requirements. In his examination of gender differences in earnings and discontinuity in the labour force, Gronau (1988) employs a human capital model with a difference. Added to the traditional human capital earnings equation is the concept of 'skill intensity' of the job. By including both individual attainments (such as education and experience) and job requirements in his model, Gronau (1988) addresses some of the criticisms of human capital theory described earlier. He finds that women are located in jobs that have significantly lower levels of skill intensity (defined as on-the-job training requirements) and that this explains a major portion of the wage gap. This finding supports the need for a respecification of the earnings model adopted from human capital theory; this respecification should recognize that skill possession is not always accurately matched with skill requirements.

In the past, the critical underlying question in human capital theory, with regard to gender inequality, was: do women earn less than men because they possess lower levels of

skill (measured by education and experience)? The critical question inspired by an earnings model that includes job skill requirements is: do women earn less than men because they are employed in jobs that have lower skill requirements? This is one of the central questions I ask in Chapter 3. I demonstrate that, while women are employed in jobs with lower levels of some skill requirements, this is not a major source of the earnings gap.

1.6 Comparable Worth and the Skill Requirements of Jobs

While the next logical step arising from the shortcomings in the human capital literature is a focus on the role of the skill requirements of jobs in the gender gap in earnings, a similar focus is adopted in a parallel literature on comparable worth. This burgeoning literature has grown out of the policy debates over equal pay for work of equal value legislation. Comparable worth (a.k.a. pay equity and equal pay for work of equal value) should be distinguished from equal pay for equal work.¹² Equal pay for equal work

¹² Another policy aimed at eradicating gender inequality in the labour force is affirmative action. Affirmative action strategy is based upon a recognition of the importance of systemic discrimination. In an effort to overcome this, it seeks to redistribute target groups throughout the system in a manner which would reflect the absence of any such discriminatory barriers (either overt or systemic). This strategy essentially accepts basic organizational structures as they are, but seeks to peel away the unnecessary institutionalized barriers that have created segregation of certain groups. This is consistent with the liberal feminist tradition; the goal is redistribution in a more equitable manner within, basically, the same structure. This approach challenges the inequality of distribution, but not the structures themselves. Affirmative action is designed

developed as a policy objective on the international scale in the late 1940s under the wing of the United Nations (Canada ratified this agreement in 1948). This policy called for women and men to receive the same wages for the same jobs. As Armstrong and Armstrong (1990) point out, "equal pay for equal work legislation became a reality" in Canada "only in the late 1960s" (Armstrong and Armstrong, 1990:31). This type of policy involves the comparison of "identical or substantially identical work" (Armstrong and Armstrong, 1990:31). As Armstrong and Armstrong (1990:31) note, the penalties for violating equal pay laws were low and the onus fell upon the individual to bring forward a complaint.

The lack of dramatic results from equal pay for equal work policies has shifted the focus to a more radical policy--equal pay for work of equal value (also known as comparable worth). This policy calls for equal pay for women and men who may perform jobs with substantively different content but similar value. Steinberg (1990:468-69) notes that comparable worth gained strength as a 'political demand' only in the early 1970s. Steinberg (1985:45) describes the process as being a little like "nutritionists comparing apples and oranges."

Although the literature on comparable worth legislation is rooted in liberal feminism, there has been a great deal of

primarily to tackle occupational segregation--not earnings inequality. However, it was hoped that if women had equal access to higher-paying men's jobs, the wage gap would narrow.

input from feminists outside the 'liberal' camp.¹³ Comparable worth legislation requires the definition and measurement of skills. Feminists of all stripes have argued that our attitudes towards skill are gender-biased and socially constructed (Armstrong and Armstrong, 1990; Blum, 1987; Boyd, 1983; Brenner, 1987; Canadian Dimension, 1986; England and Dunn, 1988; Jenson, 1989; Marshall and Paulin,

¹³ Liberal feminism dates back as far as traditional liberal political theory. Jaggar (1983) describes liberal feminism as operating "on the progressive edge of liberal thought." Gender inequality is viewed as the result of sexual discrimination which leads to inequality of opportunity. Liberal feminists have promoted legislation which grants women and men the same rights. During the resurgence of the women's movement in the 1960s, an important focus of liberal feminists became gender inequality in the workplace (Jaggar, 1983). Marxist feminists, on the other hand, adhere to traditional Marxist class theory and view gender inequality as a by-product of class struggle. Traditional Marxist theory, though, has been criticized as being 'sex-blind' (Hartmann, 1981).

The more recent socialist feminist approach attempts to place the oppression of women at the centre of the model. Although not fully developed (Jaggar, 1983:123), socialist feminism recognizes that the study of oppression "must give us a way of understanding sexuality, childbearing, childrearing and personal maintenance in political and economic terms" (Jaggar, 1983:124). As Jaggar (1983:125) notes: "Socialist feminism claims . . . that our 'inner' lives, as well as our bodies and behavior, are structured by gender . . .". I believe that the 'new household economics' (McAllister, 1990; England and Farkas, 1986) may be another important step in bringing socialist-feminist ideas into research on gender inequality. The new household economics (described in footnote 7) recognizes that the supply of labour is also a gendered process. The skill-based perspective described here might be thought of as recognizing that the demand for and reward of labour is a gendered process. Ultimately, research should incorporate both perspectives. At this point in history, however, neither perspective is well-developed. Perhaps additional research in both areas will provide frameworks that can be integrated in a meaningful way. Perhaps future data sets will also reflect the need for both types of data.

1985; Mitchell, 1988; Steinberg, 1985 and 1987; Walby, 1990). It is necessary, therefore, that we understand the nature of this gender bias if we are to remove it.

There is a growing body of research in the literature on comparable worth [see, for example, the collection of essays edited by Remick (1984); see also Acker, 1987 & 1989; Armstrong and Armstrong, 1990; Blum, 1987; Brenner, 1987; Ehrenberg and Smith (1987); England & Dunn (1988); Feldberg, 1987; Kemp & Beck (1986); Marshall and Paulin, 1985; Mitchell, 1988; Steinberg, 1985, 1987 & 1990; Treiman & Hartmann (1981); and Warskett, 1990]. Much of this literature describes various job evaluation schemes that have been proposed or provides a critique of these schemes. From these criticisms it is hoped that a new job evaluation plan will emerge in which gender bias will be eliminated.

Comparable worth has concentrated on improving schemes within the present structure rather than radically changing the structure of the evaluation of worth. As Steinberg (1990:450) points out, "conventional definitions of skill have been challenged in the labor market by the policy goal of equal pay for work of comparable worth." The comparable worth literature is one of the richest sources of the analysis of skill available. Conventional definitions of skill have been vague and unmeasurable. Comparable worth forces an intimate look at the structure of skill and job dimensions and their relationship with earnings.

By the time the comparable worth movement gained momentum, job evaluation schemes (see Appendix B for a discussion of the job evaluation literature and the feminist critique) were well established. These schemes legitimated pay differences based upon power and skill hierarchies established by employers (in some cases based upon a compromise of employer and union). The values attached to the skills and job characteristics outlined in job evaluation plans were generally accepted as rational outcomes of supply and demand. Job evaluation schemes are quite consistent with human capital theory (England and Dunn, 1988). Owing to the neo-classical climate of the 1960s, it is not surprising that comparable worth policies appropriated the existing job evaluation literature to gain support. In fact, the comparable worth debate has been fought essentially on a neo-classical playing field where the meritocratic ideal of human capital theory reigns supreme. While conducting the debate on these terms would seem anathema to many feminists (Marxist, socialist, and radical feminists in particular), they have participated in great numbers and even publicly supported comparable worth policies. (Blum, 1987; Mitchell, 1988; Steinberg, 1987; Warskett, 1990)

One of the central arguments of feminist researchers in the area of comparable worth is that many of the skills involved in 'women's work' are invisible (Steinberg, 1990:460-463) and are left out of job evaluation schemes. These skills

are necessary to the proper performance of the job and should be recognized and compensated accordingly. Yet many job evaluation plans concentrate on skills that are typically associated with 'men's work'. Skill is socially constructed and reflects the dominant power group (Armstrong and Armstrong, 1990; Blum, 1987; Steinberg, 1990: 453; Warskett, 1990).

A prime example of this argument is social skills. Social skills are typically defined in terms of managerial or supervisory functions in most job evaluation plans. Since women are less well represented in these roles than men, they do not qualify as having high levels of social skills in such plans (Armstrong and Armstrong, 1990:40-42; Steinberg, 1990; and Warskett, 1990;68). At the same time, the social skills typically used by women on the job are often ignored. Steinberg (1990:462-467), for example, points out that nurses must have high interpersonal skills to deal with patients and the families of patients (often under difficult circumstances). Women are often over represented in jobs which require dealing with the public (service jobs) and dealing with children (teaching and day care). Yet few job evaluation plans include these kinds of social skills. The social skills that are considered valuable are those that involve controlling people rather than caring for people (Warskett, 1990:69). (See Appendix B for more of the feminist critique of the job evaluation literature.)

Another major thrust of the comparable worth literature has been the comparison of similar skills in substantively different kinds of work. In an effort to compare the 'worth' or 'value' of jobs that are substantively different, it is necessary to examine the process by which employers determine the monetary value of jobs. This shifts the focus of the analysis away from earnings as a function of individual skill possession (as in traditional human capital research) to an examination of earnings as a function of job requirements. While human capital theory postulates that men have higher earnings because they have higher skill levels (and assumed to be employed in jobs requiring higher skill levels), the comparable worth literature looks at the 'other side of the coin'. The critical question asked in the comparable worth literature is: do women earn less than men because they are rewarded at a lower rate when they are employed in jobs with the same level of skill requirements? This is another central question that I ask in Chapter 3. I provide evidence to confirm that a major portion of the earnings gap can be attributed to women being rewarded at a lower rate for the same level of skill requirements.

1.7 How Are We to Measure Skill?

The increased focus on the skill requirements of jobs in the study of gender inequality of earnings leads to another dilemma. How should skill requirements of jobs be defined and

measured? Since the mid-1980s, there has been an outpouring of concern over the lack of definition given to the concept of skill in the past. This concern extends to difficulties encountered in the measurement of skill as well. (See Attewell, 1990; Boyd, 1990; Form, 1987; Kalleberg and Leicht, 1986; Spenner, 1983 and 1990; Vallas, 1990; and Wajcman, 1991.) As Spenner points out, skill "is a concept for which the meaning is ostensibly obvious, so often it is neither defined nor measured" (Spenner, 1983:827).

Skill has often been operationalized using 'non-measures' (Spenner, 1990:407) or indirect measures. The use of value judgments to categorize jobs as unskilled, semi-skilled, or skilled is particularly common in the early literature on deskilling. Indirect measures of skill involve the use of proxies such as level of earnings (Colclough and Tolbert II, 1990, for example)¹⁴ or occupational classifications (such as Littek and Heisig, 1991; and Milkman and Pullman, 1991). Direct measures of skill are most often obtained in survey research (where respondents are asked specific questions designed to tap skill) (Boyd, 1990; Spenner, 1990). A popular

¹⁴ Also included in this type of indirect measure would be Myatt and Murrell's (1990) use of the Laspeyres index approach using 1971 and 1981 Canadian Census data. Myatt and Murrell (1990) construct a measure of skill for each (CCDO) occupation group using the product of a 'quality ratio' (average yearly wage for the given occupation group divided by the average yearly wage for all occupations taken together) and a measure of the education levels within that occupation group. The resulting skill index is, therefore, a composite of both wage rates and education levels.

source of data for direct measurement of skill has become the worker-trait data in the CCDO (Canadian Classification and Dictionary of Occupations) or the DOT (Dictionary of Occupational Titles in the United States). In both Canada and the United States, information has been gathered by teams of evaluators (employed by federal government departments) on a variety of aspects of task dimensions for each occupation in the respective national occupational coding systems. Information concerning specific activities, general education development requirements, specific vocation preparation, and complexity of work with data, things, people, etc., was gathered. It should be noted, however, that a number of studies have tested the ratings given to certain occupations for potential gender bias (under the DOT) (Steinberg, 1985). In many instances, these studies indicate that the original evaluators undervalued jobs requiring traditionally 'female' skills. "The job evaluators did not regard these as job-related skills but rather as qualities intrinsic to being a woman." (Steinberg, 1985:47) As well, these worker trait scores were last updated in the mid-1970s. The feminist-based literature on comparable worth has been invaluable in its critique of existing definitions and measurements of skill.

One of the major drawbacks of past research has been the lack of data which can be used to directly measure the skill requirements of jobs. Data, such as the CCDO and DOT worker trait information, is often at the level of occupational

grouping. Within occupational groupings, there may be a variety of jobs which have a great deal of variation in the skills required.¹⁵ In Chapter 2, I develop a new set of measures for skill requirements based upon job level data. These data are taken from the Canadian Class Structure Survey and represent one of the richest sources of job-level data gathered in Canada to date. The advantages of the CCSS data and my skill measures will be discussed further in Chapter 2 along with a more detailed discussion of the literature on skill. The skill measures developed in Chapter 2 will be used throughout the subsequent chapters to answer the central questions and investigate the sub-agenda outlined at the end of this chapter.

1.8 Research on Skill and the Gender Gap in Earnings

Although scarce, there has been some research on the gender gap in earnings which maintains a focus on the skill requirements of jobs. One of the major obstacles with this new research front has been the lack of available data on specific skill requirements of jobs themselves. Despite the problems already cited, the worker trait information attached to the CCDO in Canada and DOT in the United States has been

¹⁵ For example, at the four-digit level of the CCDO all commissioned officers in the Canadian Armed Forces are included in a single occupational classification. Within this one occupational grouping are officers from the rank of Second Lieutenant to General. It is likely that there is a broad range of skill types and levels required within this classification. In the worker trait information, however, they share a common set of skill ratings.

the foundation for the research performed up to this time. Unfortunately, only a few research studies have focused specifically on the problem of the gender gap in earnings from this perspective. Hunter's (1988a) path breaking work in this area represents the only Canadian effort to date from this new research orientation. The other contributors have looked exclusively at American data (England, Chassie and McCormack, 1982; England and McLaughlin, 1979; Treiman, Hartmann and Roos, 1984).

Hunter (1988a), using data from the Social Change in Canada Survey (1977 wave) merged with the worker trait information (from the CCDO), found evidence to indicate that a significant portion (up to one quarter) of the earnings gap between women and men could be attributed to the higher average skill levels of the jobs for which men are recruited. This suggests that the wage gap could be reduced if women were employed in jobs with the same skill requirements (and job dimensions) as men. The American studies, however, have found that gender differences in skill and job dimensions are not at the heart of the wage gap (see England, Chassie and McCormack, 1982; England and McLaughlin, 1979; Treiman, Hartmann and Roos, 1984). In fact, England, Chassie and McCormack (1982) maintain that, given the gender differences they found in the earnings determination process, the wage gap would actually increase if both sexes were to have the same skill requirements and job dimensions. Such a finding supports the

need for equal pay for work of equal value legislation as it suggests that women are not rewarded at the same rate for the same skills and job dimensions.

How can we reconcile the differences in these findings? The discrepancy may be due to differences between Canada and the United States. More likely, the answer lies in differences in methodology. Hunter's (1988a) measures of skill requirements were derived from a factor analysis of the CCDO Worker Trait Information. Factor analysis (described in more detail in Chapter 2) is a data reduction technique often used to reduce the CCDO or DOT Worker Trait Information to a smaller, more manageable group of measures.¹⁶ Along with information relating to specific skills and job dimensions, Hunter included special vocational training in his analysis. His measures of skill requirements, therefore, were influenced by training requirements. Special vocational or on-the-job training are widely used as proxies for the skill requirements of jobs (see: Boyd, 1990; Form, 1987; and Gronau, 1988). According to Form (1987:32), the "best indicator" of skill requirements is probably "the total preparation time a job requires for an average worker to attain an average level of performance."

England, Chassie and McCormack (1982) did not use factor analysis to reduce the data from the DOT Worker Trait

¹⁶ Worker Trait Information has been used in research outside the gender gap in earnings. Factor analysis is typically employed as a reduction technique.

Information. Their measures of skill, therefore, were not composites of task requirements and training requirements. The differences in Hunter's (1988a) and England, Chassie and McCormack's (1982) findings may reduce to the different treatment of training requirements in their earnings models.

In my analysis of the role of skill requirements in the gender gap in earnings, I keep training requirements separate from task requirements. I invoke a multi-stage model of earnings determination (Figure 1.1) in which training requirements are treated as part of the skill acquisition stage along with schooling and prior work experience. In my findings, the relative importance of these three arenas for skill acquisition as selection criteria in the job matching stage (where individuals are matched with the skill requirements of jobs) differs between women and men. In Chapter 5, I demonstrate that education is a more important criterion in the selection of women for jobs with high knowledge-based skill requirements; on-the-job training is relatively more important as a selection criterion for men. Given this finding, the inclusion of on-the-job training in skill measures may tend to underestimate the skill requirements of women.

In my analysis, I include on-the-job training requirements as an independent variable, separate from skill requirements, in the earnings determination model. The secondary questions asked in Chapter 3 are: (1) do women earn

less than men because they are hired for jobs which have lower on-the-job training requirements; or (2) do women earn less than men because they receive a lower rate of return to the same on-the-job training requirements that men do? I demonstrate that both factors contribute in almost equal measure to the gender gap in earnings.

The inclusion of on-the-job training and prior work experience as independent variables separate from skill requirements serves another purpose. On-the-job training can be difficult to measure. Experience is often used as a proxy for on-the-job training. However, this may tend to overestimate the amount of actual training women receive on-the-job. Not all job experience is equally skill-enriching (Spaeth, 1985; and Taylor, 1985). The direct measure of on-the-job training available in the CCSS allows a more accurate analysis of the role of on-the-job training in gender differences in earnings.

The findings that gender differences in level of on-the-job training requirements and rates of return to on-the-job training requirements play a major role in the earnings gap points to the importance of investigating the opportunity structures faced by women and men in a multi-stage earnings process. Gender differences in on-the-job training opportunities have a large impact on the earnings gap. How are women and men differentially selected for such training opportunities?

1.9 Wage Competition -vs- Job Competition

Most of the research from the human capital perspective has been both theoretically and methodologically consistent with the wage competition model. As described by Thurow (1975), wage competition is based on a number of assumptions. It is assumed, for example, that workers absorb the cost of their own skill acquisition and that employers will pay workers the marginal product for their skills--matching skill possession in workers with skill requirements of jobs. Human capital theorists locked solidly in the neo-classical tradition maintain that, in a state of equilibrium, workers are rewarded for their skills based upon the value of their skills. Therefore, differences in earnings are due to differences in skills (and to minor fluctuations in the market in the short run).

Under wage competition, skills are typically viewed as being acquired exogenous to the labour market itself--primarily in the formal schooling system (Thurow, 1975:78). The preoccupation with the role of education in both human capital and comparable worth research is a prime example of this influence. It is assumed that workers arrive in the market place with specific skills and compete for wages based upon those skills. Given these assumptions, it is understandable that education has been so easily accepted as a proxy for skill.

Thurow (1975) proposed an alternative framework known as the job competition model. Although the job competition model is not inconsistent with human capital theory, it does address a number of the criticisms described in earlier sections of this chapter. At the heart of this framework is an acceptance that possession of human capital cannot be equated with the use of human capital--workers are rewarded for the skill requirements of their jobs and not, necessarily, for the skills they may possess. Additionally, the job competition model views skill acquisition as endogenous to the labour market. Skills that will be used on-the-job are primarily learned on-the-job according to this framework. "Thus, the labor market is not primarily a bidding market for selling existing skills but a training market where training slots must be allocated to different workers." (Thurow, 1975:76) Workers compete for jobs associated with different training opportunities (resulting in different earnings levels) rather than directly for wages. Employers allocate workers into these training slots based upon the expected cost of training¹⁷ and not based on marginal productivity. In an effort to assess training costs in a world of imperfect knowledge, employers rely upon background characteristics of workers to estimate training costs. This practice of statistical discrimination results in certain groups being

¹⁷ Under wage competition, training costs are thought to be borne by the workers. Under job competition, it is assumed that employers bear the cost of training.

associated with higher training costs than others. Women, in particular, are viewed as having high training costs due to their domestic responsibilities outside the workforce. Workers are slotted in a labour queue based upon their estimated training costs; women are assigned to positions at the bottom of the queue. Workers at the top of the queue are chosen first for jobs associated with high training opportunities. Accordingly, men will be chosen first for jobs with high levels of training attached. As their career progresses, they will have access to a path of jobs with training opportunities. Training is thought to be conducted in stages and jobs structured around these stages. Once training for an entry level job is complete, the success or failure of the worker to perform will determine the worker's access to additional training. By designing jobs in this type of internal labour market, employers take on minimal risk for training costs. Workers at the bottom of the labour queue are disadvantaged early in the game--the effects of this disadvantage, however, are multiplied over time as they are cut off not only from initial training but from successive training opportunities throughout their entire careers.

I find that men have greater opportunities for on-the-job training than women; but, they do not have higher, overall, levels of education. In Chapter 4, I demonstrate that education does have a significant effect on on-the-job training opportunities. However, this effect tends to be

greater for men than for women at most levels of education. When women leave the formal school system, they possess very similar levels of education. This does not translate into similar opportunities for on-the-job training. I speculate that these differences could be due to the gendered structure of skill acquisition or to statistical discrimination.

1.10 Summary

The purpose of this dissertation is to examine the gender gap in earnings using a multi-stage earnings determination model. This earnings determination model includes measures for the skill requirements of jobs as well as the traditional measures of the skill attainments of women and men. There are two central questions in this dissertation:

- (1) Do women earn less than men because they are hired for jobs which have lower skill requirements?
- (2) Do women earn less than men because they receive a lower rate of return to the same skill requirements that men do?

There are two additional secondary questions:

- (3) Do women earn less than men because they are hired for jobs which have lower on-the-job training requirements?
- (4) Do women earn less than men because they receive a lower rate of return to the same on-the-job training requirements that men do?

Finally, as part of the sub-agenda of this dissertation, I investigate gender differences in the opportunity structure leading up to earnings. I ask:

(5) Do women and men have equal opportunities to acquire skill?

(6) Are education, experience, and on-the-job training equally important selection criteria for the entry of women and men into jobs with varying levels of skill requirements?

In order to investigate these questions, however, I develop job-level measures of skill requirements using data from the Canadian Class Structure Survey. The construction of these measures is described next in Chapter 2.

CHAPTER 2

JOB SKILL REQUIREMENTS--DEVELOPMENT OF MEASURES

2.1 Introduction

In this dissertation, I investigate the gender gap in earnings using a multi-stage earnings determination model that includes the skill requirements of jobs. A necessary first step in my research, therefore, is the introduction of new direct measures of the skill dimensions of jobs. Using exploratory factor analysis, I develop six measures of skill dimensions from the Canadian Class Structure Survey data (1982/83). **Cognitive complexity** is a measure of the degree of cognitive difficulty involved in the performance of the job. **Autonomy** is a measure of the independent judgment and initiative required on the job. **Manual skills** measure the degree to which an individual's job requires the use of hands. **Social skills** measure the degree to which an individual's job requires dealing with people. **Organizational skills** measures the degree to which one's job requires a knowledge of the organization and the work of others within the organization. Finally, **mechanical routinization** is a scale for the degree to which machinery/equipment influences the nature of the task, the pace, the method, and general routine on-the-job.

One of the contributions of this dissertation is the construction of direct skill requirement measures. Rather than examining an earnings model using the education level of

individuals as proxies for the skill requirements of the jobs they possess¹⁸, I develop more direct measures of the skill requirements of jobs using the extensive set of questions on job skills and dimensions from the Canadian Class Structure Survey (to be referred to in future as the CCSS). While most research on the gender gap in earnings has involved the typical human capital measures of education and experience as proxies for skill, there have been attempts to examine skill requirements of jobs directly. Such research, however, has limitations. A major drawback is the lack of data that allows for the direct measurement of skill. The Worker Trait Data attached to the CCDO has been the main source of direct skill data utilized in the past in Canada (similar research in the U.S. relies on the American equivalent found in the DOT).¹⁹

As discussed earlier, at least two problems exist with the use of these data. Gender bias may be built into the

¹⁸ This practice is based upon two assumptions:

- that education is a measure of the level of skill possessed by an individual; and
- that people and jobs are properly matched according to skill attainments and requirements.

¹⁹ In both Canada and the United States, information was gathered by teams of evaluators (employed by federal government departments) on a variety of aspects of task dimensions for each occupation in the respective national occupational coding systems (Canadian Classification and Dictionary of Occupations and the Dictionary of Occupational Titles in the United States). Such information as complexity of work with data, things, people, specific activities, general education development requirements, specific vocation preparation, etc., was gathered.

skill ratings of the worker trait data attached to the CCDO and DOT (Steinberg, 1985:47). As well, CCDO-based trait information is available only for rather broad occupational categories which contain a variety of jobs that may be quite heterogenous with respect to skill dimensions.²⁰

The Canadian Class Structure Survey is ideal for a more developed analysis of skill requirements and the gender gap in earnings since it contains one of the richest sources of information on job skill requirements gathered to date. These data provide several advantages. First of all, the CCSS contains extensive information on the skill and training requirements of jobs and job content (as well as a great deal of other information relevant to a study of gender differences in earnings). This information was gathered in face-to-face interviews with respondents. The information on skill and other job dimensions comes from the respondents themselves--not separate evaluators (as is the case with the Worker Trait Data based on the CCDO which stands as the only other major national level source of such information). The data contained in the CCSS is at the level of the respondent's job, allowing for more precision than the occupation-based measure.

²⁰ On a methodological note, many of the ratings contained in the Worker Trait Data attached to the CCDO are dichotomous in nature. Typically, factor analysis has been used as a form of data reduction to develop composite measures of skill/job dimensions. Dichotomous variables, however, present major methodological problems for factor analysis.

This chapter begins with a discussion of the literature on skill dimensions in order to situate the measures used in this dissertation within the wider body of research on skill. In the final sections of this chapter, I describe the six skill dimensions developed here and compare them with the measures used by other researchers.

2.2 The Literature on Skill/Job Dimensions

Discussions of skill can be found in a number of literatures and the concept is often ill-defined. Within the last decade or so, there has been an increased attention to the concept of skill and how it should be measured. Despite many differences among the definitions of skill in the literature, there are some common themes. In the following sub-sections I summarize some of the more common definitions of skill. In the final section of this chapter, I use this discussion as a reference to situate my own skill measures within the wider body of literature.

Skill As Complexity

There is a general acceptance that skill is multi-dimensional. The commonest skill dimension described in the literature is a construct involving complexity. There are several conceptual variations of the complexity variable and an assortment of measurement techniques used.

Two of the most noted versions of skill as complexity are found in the work of Spenner (1979, 1980, 1983, 1990) and Kohn and Schooler (1983). Both label this complexity dimension of

skill as 'substantive complexity'. Both view substantive complexity as multi-dimensional in terms of task content. Spenner (1990:402) defines substantive complexity as:

. . . the level, scope, and integration of mental, manipulative, and interpersonal tasks in a job. The subdimensions of mental, interpersonal, and manipulative refer to the classic functional foci of "data, people, and things" as dimensions of interface between a person and a task. (Spenner, 1990:402)

Kohn and Schooler (1983:106) explain their conception of substantive complexity in a similar way:

By the substantive complexity of work we mean the degree to which the work, in its very substance, requires thought and independent judgment. Substantively complex work by its very nature requires making many decisions that must take into account ill-defined or apparently conflicting contingencies. Although, in general, work with data or with people is likely to be more complex than work with things, this is not always the case, and an index of the overall complexity of work should reflect its degree of complexity in each of these three types of activity. (Kohn and Schooler, 1983:106)

Spenner (1979) measured his version of substantive complexity using the information in the DOT regarding level of complexity with PEOPLE, THINGS, and DATA. He reports that information on GED (General Educational Development) and SVP (Special Vocational Preparation) are often used by others to measure substantive complexity.²¹ He warns, however, that

²¹ Special Vocational Preparation refers to the amount of time an average individual would require to learn the skills required for a particular job. SVP is measured on a 9 point scale with categories ranging from 'a short demonstration' to 'over 10 years'. This is very similar to the measure of on-the-job training from the CCSS used here.

recent evidence suggests that the use of GED may constitute a "serious validity problem" (Spenner, 1990:413). The use of GED to measure substantive complexity in deskilling -vs- upgrading research seems to lead to more 'upgrading' conclusions than the use of any other measure (Spenner, 1983:831-834). Spenner (1983 and 1990) cautions against the use of GED, noting that the upgrading pattern is somewhat suspicious. Spenner (1980:247) explains that the evaluators in charge of determining GED may have actually been rating the 'social standing' of the occupations. The high correlations between GED and prestige scores (Spenner, 1980; Temme, 1975) are cited as support for this claim. Jones (1980) found a similar high correlation between prestige scores and GED in Canada, but provides a different interpretation of the finding. He suggests that the ordering dimension on which prestige scores are based might be skill (this assumes, of course, that those who rated the GED were not influenced by the prestige scores--which is Spenner's interpretation).

Kohn and Schooler (1983) operationalize substantive complexity using a questionnaire which asks questions about

General Educational Development is measured on a scale with increasing requirements for reasoning, mathematics, and language. At the bottom of the scale, only basic powers of reasoning (such as applying common sense and carrying out one or two step instructions), basic mathematics (such as simple addition or subtraction), and basic language development (such as writing basic information like names, addresses, etc.) are required. At the top of the scale, a higher degree of development is required on all fronts (for example: abstract thought, advanced mathematics, and communication on highly technical subjects).

the complexity of work with people, data, and things. The questionnaire also provides an estimate of overall complexity (without references to people, data, or things) and an estimate of time spent working with each of the three items (people, data, and things). Factor analysis is used to develop one score for substantive complexity from these seven indicators.

Spaeth (1979) views complexity in a less multi-dimensional manner than Spenner and Kohn & Schooler. Spaeth's (1979) version of complexity involves only the cognitive processes of complexity. The involvement of people and things are excluded from this definition of skill as complexity. Involvement with people is seen as part of another dimension (authority) and involvement with things was dropped due to methodological problems (the same problems that affected Kohn & Schooler--however, they managed to correct the problem in order to remain true to their conceptualization of complexity). Spaeth (1979) measures complexity using the DOT information on involvement with data, GED, and SVP.

Kalleberg and Leicht (1986) follow Spenner's definition of substantive complexity. They also explain that substantive complexity can be defined in terms of the amount of time required to learn how to do the job and acquire the necessary base of knowledge (this is reminiscent of Form's, 1987, suggestion for the measurement of substantive complexity noted earlier). In a questionnaire using employee self-reports,

Kalleberg and Leicht (1986:274) measure substantive complexity by factor analyzing information on: (1) the amount of time required to train for job; (2) degree of opportunity to learn new things; (3) degree of task variety; and (4) general overall skill level of job. Although this does not provide information on people, things, and data (the well-rounded aspect of substantive complexity), the concept described by Kalleberg and Leicht (1986) follows Spenner's definition.

Substantive complexity is split into a cognitive, social, and manual component in other research. England, Chassie, and McCormack (1982) propose five skill categories. Training requirements (measured with GED and SVP) represent an overall, general complexity. Cognitive skills (measured with information from the DOT on intelligence, verbal aptitude, numerical aptitude, complexity of task with data) represent the mental sub-dimension of substantive complexity (using Spenner's and Kohn & Schooler's conceptualization); manual skills (measured with information from the DOT on motor coordination, finger dexterity, manual dexterity, eye-hand-foot coordination, strength, complexity of task with things) and social skills (measured using information in the DOT on complexity of the task with people) round out the other portion of traditional substantive complexity. In addition, England, et al (1982) include perceptual skills (measured using information on spatial form and colour perceptions, etc.). England, et al (1982) do not factor analyze the

information in the DOT; instead, they include all the indicators as separate sub-dimensions of the five skill categories noted. They also integrate some of the knowledge gained from their research on comparable worth. They note the distinction between managerial and non-managerial social skills that is so important in the recognition of skill differences between women and men.

The splitting of substantive complexity is further seen in England and McLaughlin (1979) who investigate three separate dimensions of skill: cognitive, manipulative, and social skills. As well, Cain and Treiman (1981) use factor analysis to obtain six factors: (1) substantive complexity; (2) motor skills; (3) physical demands; (4) management; (5) interpersonal skills; and (6) undesirable working conditions. Cain and Treiman's (1981) version of substantive complexity is actually closer to cognitive complexity.

Finally, Hunter (1988a & 1988b) and Hunter and Manley (1982 & 1986) provide a conceptualization of skill using eight separate categories (derived from a factor analysis of CCDO worker trait data--using SVP, GED, and task requirement information). This body of research represents one of the most comprehensive approaches to skill dimensionality in Canada to date. In addition to splitting the traditional concept of substantive complexity into its cognitive, social, and manual components, this research makes another distinction. A factor labelled 'cognitive complexity'

represents the depth or intensity of skill, while a factor labelled 'task diversity' (originally labelled 'routine activity') represents the breadth or extent of skill (Hunter, 1988a:757).

Hunter (1982:11) argues that his version of cognitive complexity is similar to Kohn's substantive complexity. There is, however, one important difference. Kohn and Schooler (1983) view complexity in a more multi-dimensional and traditional way. Kohn and Schooler (1983) integrate mental, manual, and social complexity in one measure of substantive complexity. Hunter's (and Hunter and Manley's) work dissects this notion.

Hunter's work is significant for another distinction that is made between sub-dimensions. Manual skills are split into gross motor skills and fine motor skills. This is a particularly important distinction to make when studying gender differences.²² Research on comparable worth has sensitized us to the fact that fine motor skills are typically

²² The eight factors in Hunter and Hunter & Manely's work are:

(1) cognitive complexity; (2) task diversity (also called routine activity in early version); (3) responsibility (defined in managerial terms); (4) verbal activity (involves talking, listening, dealing with people); (5) gross motor skills; (6) fine motor skills; (7) persuasion; and (8) creativity.

It is interesting to note that these factors fit in well with the discussion of comparable worth. As expected, women are in jobs that have higher levels of verbal activity (these are the nurses, the teachers, the comforters, etc.), fine motor skills (typists, etc.), and persuasion (possibly capturing the element of informal authority) (Spenner, 1988b).

associated with the work that women are hired into, while gross motor skills are typically associated with the work that men do. Proponents of comparable worth argue that gross motor skills tend to be considered more valuable and are rewarded more highly than fine motor skills because of this split.

Another important dimension of skill that is common in the literature revolves around the concept of skill as autonomy or control. While there is often a cognitive aspect to this dimension, it encompasses a range of additional elements as noted below.

Spenner's Autonomy/Control

In addition to his definition of skill as substantive complexity, Spenner (1979, 1980, 1983, 1990) has proposed the additional dimension of autonomy/control. Spenner's conceptualization of autonomy/control is rooted in his extensive review of the early literature:

The other strong theme across these studies is the notion that the structure of work roles provides more or less room for the worker to initiate and conclude action, to control the content, manner, and speed with which a task is done. Skill as autonomy-control is to be distinguished from formal authority or supervisory position in a hierarchy, yet the two concepts are related. Formal authority denotes position in a much larger network while autonomy-control designates the discretion, bounds, and leeway for action within a work role as provided by the structure of the role and work arrangements. (Spenner, 1983:829)

Kalleberg and Leicht (1986) followed Spenner's conceptualization of autonomy/control (in the first part of their paper using job level data). As mentioned above, they

also followed Spenner's definition of substantive complexity. Kalleberg and Leicht (1986) developed a measure for autonomy/control using a factor analysis of three items (taken from their questionnaire): (1) control over speed of work; (2) freedom in carrying out job tasks; and (3) degree of freedom from close supervision (Kalleberg and Leicht, 1986:274). Spenner (1990:402), however, maintains that his version of autonomy/control does not include closeness of supervision. On this point, Kalleberg and Leicht differ from Spenner.

Myles and Fawcett (1990) introduced two measures for autonomy: conceptual autonomy and task autonomy. Conceptual autonomy is defined as "the requirement in a job to conceptualize or design important aspects of a product or service" (Myles and Fawcett, 1990:26). Task autonomy involves "the conditions under which the task is actually accomplished" (Myles and Fawcett, 1990:26).

No discussion of autonomy would be complete without introducing Kohn and Schooler's (1983) seminal research on work and personality, in which they develop an overarching skill dimension known as occupational self-direction. While occupational self-direction, as described below, is related to autonomy it is far more encompassing.

Kohn and Schooler's Occupational Self-Direction

Kohn and Schooler (1983) view substantive complexity as but one component of 'occupational self-direction'.

Occupational self-direction is conceptualized as "the initiative, thought, and independent judgment in work" (Kohn and Schooler, 1983:127). While some may think that this sounds like Spenner's autonomy/control, it is actually more complex and encompassing. In addition to substantive complexity, occupational self-direction is facilitated by two other 'job conditions': closeness of supervision and routinization.

Occupational self-direction can be limited by closeness of supervision. Kohn and Schooler (1983:127) describe closeness of supervision in terms of whether an individual has the freedom to negotiate with his/her supervisor what work is to be done and how to do it. Routinization can also limit occupational self-direction. Routinization involves the performance of repetitive and predictable tasks (Kohn and Schooler, 1983:127).

Overall, Kohn and Schooler's occupational self-direction is bound up in a multi-dimensional model of complete skill. One dimension not directly described by Kohn and Schooler, however, is that of authority (although authority would certainly impact on the elements contained within occupational self-direction). Skill as authority is most prominent in the work of Spaeth (1979 and 1985).

Spaeth's Authority Dimension

For Spaeth (1979 and 1985), the two major dimensions of skill are complexity (already discussed) and authority.

Authority is defined as having two sub-dimensions: (1) authority over others (control of the work of others); and (2) authority over financial resources (economic control).

In Spaeth's work, social skills or skills in dealing with people are not considered a dimension in and of themselves. Any information on skill in dealing with people is included in the sub-dimension 'authority over others' and demands that an element of authority be included. Research on comparable worth indicates that women typically have a very high social element in their work (dealing with patients, students, customers, etc.). However, women are also less likely to be located in jobs where they have authority over others or over economic resources. This, of course, renders the non-authority related social skills, often exercised by women, invisible under Spaeth's definition.

Summary of Skill Literature

The study of skill has progressed from assumed definitions and non-measures to multi-dimensional concepts and sophisticated measurement techniques. However, there exists no true consensus about which job dimensions are important to study or about how these dimensions should be defined and measured.

One of the major drawbacks of existing research which measures skill and job dimensions is the lack of data at the level of the job. Most of the research has utilized the worker trait data from the CCDO in Canada or the DOT in the

United States. As already mentioned, there are a number of problems with these measures. There is great potential for gender bias as already stated. As well, the level of analysis is the occupation--not the job. A number of different jobs (with very unique skill profiles and reward structures) can be classified under each occupational grouping found in these data. Precision is lost when the analysis moves from job level data to occupational grouping level data. Furthermore, much of the information contained in the worker trait data is in dichotomous form--which poses a worrisome threat to many of the methods which have been used in past research (i.e., factor analysis). There also exists a number of surveys which have gathered more complete data on job dimensions, but these typically have been limited to specific regions or institutions (particularly those associated with pay equity plans).

In the next sections of this chapter, I describe the construction of the skill/job dimension measures that I use in this dissertation. There are many similarities between the six skill/job dimensions that I develop here and the skill/job dimensions just described. Where applicable, these similarities are discussed.

The skill/job dimension measures that I develop here provide a unique opportunity to reexamine the gender gap in earnings using an earnings determination model that accounts for the both the characteristics of individuals and the

requirements of the jobs they possess. The skill/job dimensions used here have several advantages over other measures that have been used in the research on skill.

As noted earlier, the data source for my research is the Canadian Class Structure Survey (CCSS). The CCSS data used for the construction of skill/job dimension measures employed here are at the 'job level'. This is an improvement over the occupational group level data available in the worker trait information attached to the CCDO. As noted previously, there can be a great deal of variation in skill requirements among jobs that are located under the same occupational grouping. The job level data available in the CCSS allows greater precision in the construction of skill/job dimension measures.

The worker trait information used in most current national level research on skill/job dimensions contains ratings assigned by separate evaluators who may not have known a great deal about all the occupations they were required to judge. As noted previously, there have also been numerous criticisms of gender bias in the rating scheme. The job related information in the CCSS was given by individuals actually employed in the jobs--not separate evaluators who might be inclined to bring systematic bias into their judgement of skill levels (as noted in Chapter 1). Of course, there is a danger that the individual respondents may be subject to their own set of biases. Individuals may be inclined to inflate or deflate the skill level of the jobs

they hold. This inflation or deflation may even cut across gender lines. These possibilities are considered in the interpretation of the analytical results. Nonetheless, these data provide an opportunity to look for relevant skill/job dimensions from a different pool of information.

Another advantage of the CCSS over the worker trait data attached to the CCDO is the level of variable measurement. As noted previously, much of the worker trait information is measured in dichotomous form. Most of the information in the CCSS is rated on five-point scales. This type of measurement scale lends itself to factor analysis which is the data reduction method employed here and in most research on skill/job dimensions. Variables at the dichotomous level, however, violate the basic assumptions of this method.²³

2.3 The Six Skill/Job Dimensions

Factor analysis was used as a method of data reduction of the skill requirement information contained in the CCSS to produce six skill requirement variables for use in subsequent chapters. The six dimensions developed are: autonomy, mechanical routinization, manual skills, social skills, organizational skills, and cognitive complexity. Of these six

²³ Most research that has been done using the dichotomous variables in the worker trait information from the CCDO and the DOT use the proportion in each occupational group with a particular characteristic as a score for the entire group. In this way, a dichotomous level variable is converted into a continuous level variable.

dimensions, only autonomy, cognitive complexity, and manual skills are statistically significant variables in the earnings determination models examined in Chapter 3. While the discussion of skill requirements in subsequent chapters focuses primarily on these three dimensions, all six are discussed in this chapter.

There are many questions in the CCSS which were designed to tap skill and job dimensions. An analysis of each of these questions would be difficult and unruly. The use of all of this information in regression and path analysis would also result in problems of multi-collinearity. Some form of data reduction technique is required to utilize this information. Exploratory factor analysis was chosen as the method of data reduction. It is a 'data-driven' technique and is ideally suited to a situation where there is no strong theoretical reason for deciding the following: (1) how many underlying factors exist; (2) what are the underlying factors; and (3) which individual indicators (questions) contribute to (or 'load on') these underlying factors. As noted in the theoretical discussion, there is a great deal of disagreement in the literature over the relevant skill dimensions. Since the purpose of this research is not to test any specific model, but rather to develop a new one, exploratory factor analysis is used as a method of data reduction to produce a scale on which to measure specific skill dimensions. The exploratory factor analysis procedure in SPSS-PC+ is employed.

Which Variables Will Be Included?

It is important to discuss which variables will be entered into the analysis. I believe that the discrepancies mentioned earlier between Hunter's (1988a) research findings and those of England, Chassie, and McCormack (1982) may reduce to differences in methodology.

England, Chassie, and McCormack (1982) did not use any form of data reduction technique. Their conclusions were based upon the patterns found for approximately 17 separate variables taken from the worker trait data of the DOT. Hunter's (1988a) work utilized exploratory factor analysis. Included in his factor analysis with some 41 different worker trait scores (from the CCDO) were measures for GED (General Educational Development) and SVP (Special Vocational Development). By including variables related to education and training with those related purely to job content, Hunter (1988a) generated factors that are a composite of training/education and task requirements. This could well account for the differences in results.

In this dissertation, I treat formal schooling and on-the-job training as arenas for skill acquisition. On-the-job training, therefore, is not included in the factor analysis of questions relating to skill requirements.

It is also important to discuss the difference between skill level and skill type (or job dimension) at this point. The information utilized in this study (as with the worker

trait information from the CCDO and DOT utilized in the studies outlined earlier) taps both skill level and skill type. The distinction between the two will be discussed more thoroughly in the final analysis; however, in the initial stages of this study, I simply use the term 'skill'.

The CCSS contains numerous questions which tap skill dimensions. Unfortunately, some of these questions do not produce information suitable for factor analysis. Some of the questions yield answers in dichotomous form. Where possible, this information is integrated into the analysis separately in the substantive chapters. In other cases, the distributions are so badly skewed that their inclusion in the factor analysis creates problems for the entire procedure. In the end, 19 items (at the level of individual jobs) were deemed fit for factor analysis. Two of these items were variables constructed from several other questions. These 19 items are discussed below. In some cases, paraphrasing of the questions is used; in other cases, the exact wording of the questions is used.

Constructs Relating to Autonomy

The two items which were constructs using information from several questions were conceptual autonomy and task autonomy. Conceptual autonomy was constructed on the basis of two criteria: (1) a direct question asking the respondent if she/he has a job in which she/he is required to design

important aspects of her/his own work and to put her/his ideas into practice; and (2) a question asking the respondent to provide an example of how she/he designs her/his own work. The example was coded by the CCSS research team on a six point scale for the degree of autonomy expressed in the example given, providing a more objective assessment of the respondent's autonomy level. The combination of these two sources of information produced a measure of conceptual autonomy.

Task autonomy was developed from the following five-part question coded on a dichotomous scale (yes=1;no=0):

"Here are a number of different work activities. For each one, please tell me if you can do this on your job, either officially or unofficially."

- (a) "Decide when to come to work and when to leave work"
- (b) "Take a day off from work without losing pay or having to claim vacation time, sick leave or put in compensatory time"
- (c) "Considerably slow down your pace of work for a day when you want to"
- (d) "Decide on your own to introduce a new task or work assignment that you will do on your job"
- (e) "Decide on your own how to go about doing your job"

This information was used to form an additive scale to measure task autonomy. Despite the problems involved in purely additive scales, the use of this information to construct a five-point measure enhanced the identification of underlying factors in the subsequent factor analysis.

Items Relating to Machinery and Equipment Use

Several questions involve the use of machinery or equipment:

- "Some types of equipment or machinery have a great influence on the way that people go about doing their work, while in other jobs the equipment is more under the control of the operator. We would like to know about your job. How much would you say that the equipment or machinery which you work with influences . . . ?" (4 point scale each)
 - (a) "The pace or amount of work that you do each day"
 - (b) "The specific tasks or jobs you will do during the day"
 - (c) "The way you go about doing your job"
- "How closely do you follow a fixed routine when working with this equipment or machinery?" (4 point scale)

Items Relating Directly to the Use of Hands

At least two questions dealt directly with the use of hands on the job.

- How much does your job require you to be skilled in using hands? (5 point scale)
- How important is working with your hands--operating a tool, moving furniture, or playing an instrument? (5 point scale)

Items Relating Directly to Interaction with People

At least two questions dealt directly with interpersonal interaction.

- How much does your job require an ability to communicate with other people? (5 point scale)
- How important is dealing with people--discussing the job, selling a product, advising a client, or teaching? (5 point scale)

Items Relating Directly to Cognition

The following items dealt directly with cognition:

- How important is working with information--reading blueprints, writing memos, or drafting a report? (5 point scale)
- How much does your job require you have abstract knowledge about the ideas behind your work such as the application of general principles or theories to solve a problem? (5 point scale)
- Which statement best describes the thought and attention your job normally demands of you: (5 point scale as follows)

My job requires:

Little thought and attention (my work is usually routine, and problems seldom arise)	1
Some thought and attention (problems which arise normally require straightforward solutions)	2
Simple problem solving (unforeseen problems arise which require some practical experience)	3
Difficult problem solving (difficult problems arise which require considerable experience and careful analysis to solve)	4
Complex problem solving (highly complex problems arise which require a high level of abstract knowledge and theory to solve)	5

Miscellaneous Items

The following items tap a variety of concepts:

- How much does your job require you to have knowledge of the work going on around you? (5 point scale)
- How much does your job require creativity, such as thinking of new or different ways to do things? (5 point scale)
- How much does your job require understanding based upon experience? (5 point scale)
- How much does your job require an ability to make decisions? (5 point scale)

- How much does your job require an ability to direct the work of other people? (5 point scale)
- How much skill would you say your job requires? (5 point scale)

Extraction of Factors

Six factors were considered stable over different types of extraction and rotation methods. A variety of solutions were tried selecting a range of factors from two to eight. The six factor solution was chosen for a number of reasons. There is a levelling off of eigenvalues after the fifth factor (Figure 2.1).²⁴ Past research and theory, however, indicates that autonomy/control should be separated from cognitive complexity (see Spenner); yet it is typically found that these two are highly correlated. In this analysis, autonomy and cognitive complexity separate into distinct factors only after the selection of a six factor solution. The six factor solution also yielded factors that were easily interpreted. The selection of fewer factors provided solutions that were not quite so straightforward. The selection of more factors created a problem with under-identification.

²⁴ Figure 2.1 represents a plot of the eigenvalues of the unaltered correlation matrix. In descending order, the value of the eigenvalues plotted in Figure 2.1 are: 6.14385; 4.02256; 1.29992; .91470; .75404; .75038; .65019; .56237; .51014; .48890.

FIGURE 2.1
PLOT OF EIGENVALUES

Diagnostics also suggested this six factor solution to be sound. For example, Bartlett's test of sphericity--to test if the correlation matrix is an identity matrix (i.e., the correlations between variables too low for factor analysis)--yielded a high score of 17111.232 (significant at .00000). The Kaiser-Meyer-Olkin--measure of sampling adequacy is .90640. Described by Kaiser (1974): .905 marvellous/.800 meritorious/.700 middling/.600 mediocre/.500 miserable/below .500 unacceptable. A number of other diagnostic tests were performed and similarly favourable results were obtained.

The final solution chosen involved unweighted least squares (ULS) extraction and Oblimin rotation. Unweighted least squares minimizes sum of squared difference between observed and reproduced correlation matrices. ULS does not make assumptions about normality. Some variables used here are not optimally normal. Oblimin rotation was used since some of the factors are clearly not orthogonal (particularly cognitive complexity, autonomy, and organizational skills). In the construction of the actual scores, Bartlett's method was used. Bartlett's method of score construction takes sampling variability into account.

Actual factor scores were obtained for each individual in the survey using SPSS-PC+. When entered into subsequent regression and path analyses, the actual individual factor scores are used. When used in tabular analysis, the scores are rounded to the nearest integer.

A Note on Gender

A separate factor analysis was performed for women and for men. The results of these separate analyses were surprisingly similar to those found for both sexes together. This adds a high degree of confidence in the scores obtained. It was thought that some factors might appear for one sex that did not appear for the other--reflecting the societal gender bias which tends to ignore the skills of women (captured in the self-reports of respondents). In this particular analysis, however, the solutions appeared remarkably similar for women and men.

The Six Skill/Job Dimensions

The six skill/job dimensions obtained in the factor analysis of the 19 items from the CCSS are: autonomy, mechanical routinization, manual skills, social skills, organization skills, and cognitive complexity. This six factor solution is revealed in the factor pattern matrix (Table 2.1).

TABLE 2.1
FACTOR PATTERN MATRIX*

Observed Variables	Aut.	Mech-Rout.	Manual Skills	Social Skills	Org. Skills	Cog. Complex
Creativ.	.665	-.002	.112	-.003	-.176	-.033
Con. Aut.	.657	-.060	-.094	.035	.018	-.140
Task Aut.	.635	-.011	-.061	-.052	.064	.041
Dir.Other	.301	.003	.009	-.191	-.143	-.205
MachTask	.030	.958	-.031	.014	-.026	.018
MachPace	.050	.917	-.013	-.022	.053	.032
MachMeth	.002	.902	-.006	.032	-.008	-.025
MachRout	-.123	.704	.078	.000	-.024	-.034
HandSkill	-.049	-.033	.825	.025	-.145	.105
HandImp	.006	.082	.790	.006	.128	-.059
Commun	.002	.013	-.058	-.776	-.148	.084
DealPeop	.048	-.060	.024	-.698	.115	-.172
UnderEx	.010	.013	-.026	-.083	-.684	-.058
OvAllSk1	.099	.005	.061	-.005	-.520	-.180
DecMaking	.350	.016	.015	-.177	-.391	-.048
Other'sWk	.037	.070	.126	-.186	-.345	-.059
Info	.001	-.006	-.007	-.091	-.001	-.658
Tho/Atten	.126	.014	-.079	.008	-.209	-.493
Abstract	.226	-.000	-.001	-.035	-.291	-.387

*Numbers rounded to three decimal places.

The final factor to be extracted is cognitive complexity. As noted previously, six factors were extracted despite a levelling off of eigenvalues after the fifth factor. This was done in order to separate one large factor into a cognitive complexity component and an autonomy component. The concern is that autonomy and cognitive complexity may be so highly correlated that multi-collinearity may present a problem with regression analysis. However, the correlation between autonomy and cognitive complexity is only .405 for men and .438 for women [Tables 2.2(A)&(B)]. This is not high enough to present a problem with the analysis performed in the following chapters.

TABLE 2.2(A)²⁵
CORRELATION MATRIX OF SIX FACTORS
FOR MEN

	Aut.	Mech Rout	Manual Skills	Social Skills	Org. Skill	Cog. Com.
Aut.	1.000					
MechR	-.225	1.000				
ManSk1	-.306	.555	1.000			
SocSk1	.466	-.094	-.109	1.000		
OrgSk1	.274	.139	.104	.368	1.000	
CogCom	.405	-.068	-.052	.386	.255	1.000

²⁵ The astute reader will notice that in Tables 2.2(A)&(B) (and all subsequent tables based on gender comparison) the data for men appears before the data for women. There are two basic reasons for this choice. First, there is a rich literature on gender inequality which holds men as the advantaged group against which women, the disadvantaged group, are compared. The underlying motivation of this dissertation is concern over the economic disadvantage that women suffer in the labour market. It is, therefore, not unreasonable to use men as the baseline for comparison. Second, it is necessary to choose some recognizable code for ordering columns and table sections. The alphabet is, perhaps, one of the most basic criteria used for developing such codes. Since the referent population in this analysis is the adult population, the correct terms for the two groups in question would be 'men' and 'women'. Using the alphabet as an ordering criterion, therefore, men appear before women. This reasoning is followed in the presentation of tables throughout this dissertation.

TABLE 2.2(B)
CORRELATION MATRIX OF SIX FACTORS
FOR WOMEN

	Aut.	Mech Rout	Manual Skills	Social Skills	Org. Skill	Cog. Com.
Aut.	1.000					
MechR	-.113	1.000				
ManSk1	-.185	.362	1.000			
SocSk1	.369	-.072	.015	1.000		
OrgSk1	.333	.073	.109	.319	1.000	
CogCom	.438	.005	-.042	.378	.247	1.000

Autonomy

The first factor to emerge loads highly on both 'task' and 'conceptual autonomy',²⁶ as well as on 'creativity'. This factor loads moderately on 'decision making' and 'directing the work of others'. The most obvious interpretation for this factor is autonomy. This variable represents a composite of Myles and Fawcett's (1990) task autonomy and conceptual autonomy. It appears to be very much like Spenner's (1979, 1980, 1983, 1990) version of autonomy/control in which the employee is able to "control the content, manner, and speed with which a task is done"

²⁶ Task autonomy involves "the conditions under which the task is actually accomplished". (Myles and Fawcett, 1990:26) It includes autonomy to decide such things as: working hours, pace of work, how to do a particular job, etc. Conceptual autonomy involves "the requirement in a job to conceptualize or design important aspects of a product or service" (Myles and Fawcett, 1990:26).

(Spenner, 1983:829). Spenner (1983) also notes that while autonomy/control is separate from managerial functions, it is a related concept. The moderate loading on both 'decision making' and 'directing the work of others' found in this factor solution reflects this as well.

There are also elements of this measure of autonomy that can be likened to Kohn and Schooler's (1983) occupational self-direction. Kohn and Schooler's occupational self-direction includes a number of components and is conceptualized as "the initiative, thought, and independent judgment in work" (Kohn and Schooler, 1983:127). As noted earlier, one component of occupational self-direction is substantive complexity which includes mental, manual, and social complexity. My measure of autonomy might be likened to the portion of occupational self-direction left over after substantive complexity has been removed and separated into its three elements. The autonomy variable described here is certainly a measure of initiative and independent judgment. Kohn and Schooler argue that occupational self-direction is facilitated by two job conditions: closeness of supervision and routinization. The high loadings involving task autonomy summarized in Table 2.1 are indicative of these conditions being associated with my measure of autonomy. The similarities between Kohn and Schooler's measure of occupational self-direction and my autonomy variable are not surprising. Some of the questions in the CCSS questionnaire

were adopted from Kohn and Schooler's earlier survey on work and personality.

Mechanical Routinization

The second factor loads very highly on four of the observed variables dealing with the use of machinery and equipment on the job. This factor is best interpreted as a measure of mechanical routinization. A surprising number of respondents work with equipment or machinery of some sort on the job; and, for many, this equipment or machinery influences the nature of the task performed, the pace of performance, the method of performance, and the general routine performed on the job. Mechanical routinization can be thought of as the degree to which equipment or machinery controls one's work at a variety of levels. There is no true precedent in the literature for this skill/job dimension. The closest thing to mechanical routinization would be Kohn and Schooler's (1983) concept of routinization which is only part of occupational self-direction. Kohn and Schooler (1983), however, do not introduce machinery into their definition. In view of the increasing concern over the influence of technology on the labour process, this dimension provides an interesting addition to the existing literature on skill/job dimensions.

Manual Skills

The third factor obtained is best thought of as a measure of manual skills. This factor loads highly on both the 'importance of using hands on-the-job' and the 'degree of

skill in using hands'. This factor should be interpreted more as a measure of the degree to which manual skills are used on the job rather than as a measure of one's proficiency at any particular manual skill. As such, it is less true to the more romantic notion of the craftsman's skill than many of the non-measures described in the literature review. This factor is similar to the measures for motor skills developed by Cain and Treiman (1981) and Hunter (1982) using worker trait data (from the DOT and CCDO respectively). Hunter (1982), however, was able to distinguish between fine and gross motor skills. The CCSS does not allow for this distinction to be made.

Social Skills

The fourth factor loads highly on the 'importance of communication on the job' and the 'degree to which one's job requires dealing with people'. The most obvious interpretation is that this factor represents social skills. As with manual skills, however, this dimension should be interpreted as the degree of importance of the social dimension on the job rather than the degree of proficiency of social skills required. It goes without saying, however, that jobs which require a high degree of social functioning should also require a high degree of proficiency in this particular dimension. This dimension is similar to the measure developed by Cain and Treiman (1981) (called interpersonal skills). This factor also loads slightly on 'directing the work of others', 'decision making', and 'knowledge of the work of

others required'. This suggests that there may be an underlying element of the managerial component of social skills included in this measure.

Organizational Skills

The fifth factor loads highly on 'understanding through experience', 'overall skills level', 'decision making', and 'knowledge of the work of others'. It loads slightly on 'thought and attention' and on 'abstract knowledge'. This factor is the most difficult to interpret of the six. It appears to represent a measure of one's knowledge of the organization and the position of one's job within that overall picture. There is obviously a cognitive element involved, yet there is more. A knowledge of the structure of the organization is required and there is also a managerial element involved. This factor loads very slightly on the same variables as social skills as well as on 'directing the work of others' and invokes images of managers who are trained at performing a wide variety of jobs within the organization so that they can better supervise the work of others. Loading very slightly on the same variables as manual skills, this factor cannot be interpreted as a pure measure of managerial skills. It is best thought of as organizational skills--the degree to which one's job requires a knowledge of the organization and the ability to make decisions about the work

of others in that organization. There is no true precedent in the literature for this particular factor.

Cognitive Complexity

The final factor loads highly on 'working with information', 'abstract knowledge', and 'thought and attention'. This factor is easily interpreted as cognitive complexity. Unlike Kohn and Schooler's and Spenner's substantive complexity, this factor is limited to the cognitive component of complexity. This concept of cognitive complexity is closest to that of Spaeth (1979), Cain and Treiman (1981), England and McLaughlin (1979), and even Hunter (1982). This dimension involves the measure of the level of cognitive functioning required in one's job; it might also be thought of as the degree of mental skills required.

2.4 Summary

Three of the six skill/job dimensions developed here, using the CCSS, can be considered true skill measures. My measure for cognitive complexity provides a scale for the degree of cognitive difficulty involved in the performance of a particular job. The cognitive complexity variable developed here is akin to that developed by Cain and Trieman (1981), England and McLaughlin (1979), Hunter (1982), and Spaeth (1979). Unlike the complexity measures developed by Kohn and Schooler (1983) and Spenner (1979, 1980, 1983 & 1990), this variable is limited to the cognitive component of complexity.

Another skill measure based upon varying levels of importance or excellence is autonomy. This version of autonomy encompasses both conceptual autonomy and task autonomy and is very similar to Spenner's (1979, 1980, 1983, 1990) autonomy/control in which a worker is able to "control the content, manner, and speed with which a task is done" (Spenner, 1983:829). It can also be likened to an element of Kohn and Schooler's (1983) occupational self-direction--that portion of occupational self-direction that is left after substantive complexity is removed. This involves initiative and independent judgment as key dimensions.

Organizational skills can also be thought of as involving varying levels of importance or excellence. The variable developed here refers to the degree to which one's job requires a knowledge of the organization, the ability to make decisions about the work of others in the organization, and can be considered a measure of overall skill level. This measure of organizational skills has a cognitive component, but covers a wider range of activities than cognitive complexity. Organizational skills are relational in nature in that they involve having knowledge of and making decisions about the work of others within the organization. Positions requiring a high level of organizational skills might be thought of as jobs requiring versatility and a wide base of knowledge. There is no precedent in the literature for this type of job dimension.

The other three job dimensions developed here measure qualitative differences in jobs without reference to actual degree or level of skill requirement. Manual and social skills are broad measures of the degree to which an individual's job requires that individual to be involved with using their hands and dealing with people (respectively). The measure for manual skills developed here is akin to Cain and Treiman's (1981) motor skills. Similarly, the social skills variable created can be likened to Cain and Treiman's (1981) interpersonal skills.

Finally, there is another job dimension developed here which has no real precedent in the literature. This dimension represents a concept which has not been investigated before. Mechanical routinization is a scale for the degree to which machinery/equipment influences the nature of the task, the pace, the method, and general routine on-the-job.

These skill/job dimensions are used in the following chapters. In Chapter 3, I investigate the earnings gap using autonomy, cognitive complexity, and manual skills as new measures of job skill requirements. The analysis is limited to autonomy, cognitive complexity, and manual skill since these are the only three dimensions that are statistically significant in the estimated earnings models. In Chapter 5, I examine how men and women utilize education and on-the-job training to enter jobs with specific skill requirements.

CHAPTER 3

THE GENDER GAP IN EARNINGS

3.1 Introduction

In the previous chapter, I described the development of new measures of the skill requirements of jobs through the factor analysis of data taken from the Canadian Class Structure Survey. In this chapter, I utilize these new measures of skill requirements as I investigate my two central research questions:

- (1) Do women earn less than men because they are hired for jobs which have lower skill requirements?
- (2) Do women earn less than men because they receive a lower rate of return to the same skill requirements that men do?

The two secondary research questions are also investigated in this chapter. As previously explained, these questions are derived from a conceptualization of earnings determination as a multi-stage process where education, experience, and on-the-job training are part of the skill acquisition stage and separate from (though related to) skill requirements. While on-the-job training requirements are often used as a proxy for skill requirements or are factor analyzed with task requirement data to produce measures of skill requirements, I investigate their role in the earnings gap separately:

(3) Do women earn less than men because they are hired for jobs which have lower on-the-job training requirements?

(4) Do women earn less than men because they receive a lower rate of return to the same on-the-job training requirements?

In this chapter, I use a multi-stage earnings determination model that includes measures of individual attainments and direct measures of job skill requirements to examine the gender gap in earnings. These direct measures of job skill requirements include three skill requirements developed in the previous chapter (autonomy, cognitive complexity, and manual skills) and on-the-job training requirements.

In the past, research using the human capital model has concentrated on the human capital possession of individuals using education and experience as proxies. Education and experience are thought to increase the skill and knowledge levels of individuals making them more productive to their employer. Higher levels of skill and knowledge, in turn, are rewarded by employers in the form of higher earnings.

The human capital model, however, requires the assumption that the skills and knowledge possessed by individuals will actually be realized on the job. As noted in Chapter 1, this is not always a sound assumption. The value of an individual's skills and knowledge to an employer depends upon

the employer's requirement for those skills and that knowledge. This is one of the central problems with human capital theory--the human capital possession of an individual does not always match the skill requirements of the job she/he holds. In an effort to address this problem, I have constructed a model which includes measures of the attainments of individuals²⁷ and the skill requirements of the jobs they hold.

Human capital theory postulates that the earnings gap is due to differences in the amount of human capital possessed by men and women. Translating this into a model which also accounts for skill requirements of jobs, this postulate implies that a sizeable portion of the earnings gap should be due to differences in the skill requirements of the jobs held by women and those held by men. However, in this chapter, I show that very little of the gender gap in earnings can be attributed to gender differences in the level of job skill requirements.

²⁷ The skills and knowledge of an individual may still be important even if they are not required on-the-job. In some instances, individuals may be hired for their potential to occupy positions requiring greater levels of skill. An example of this is the case of the military where individuals are expected to be able to carry out the tasks of the rank above with a moment's notice. Another example might be an entry position in an internal labour market. The individual's skill possession may be greater than that required by the immediate job; however, the individual is being groomed for positions several rungs up the ladder which might make use of those skills.

The literature on comparable worth focuses on the rate at which women and men are rewarded for the same level of skill requirements. In this feminist-based literature, it is argued that women are often not rewarded at the same rate for the same skill requirements as men. In this chapter, I demonstrate that a major portion of the gender gap in earnings is due to the fact that women don't receive the same rate of reward for the same skill requirements.

On-the-job training requirements also help us to understand more about the gender gap in earnings. Experience has often been used in past human capital research to measure the skill and knowledge level of individuals. This assumes that individuals acquire skills and knowledge over time while on the job. However, the use of experience to measure the extent of such skill and knowledge acquisition is problematic. Not all experience is equally skill enriching. The introduction of on-the-job training in this chapter represents an effort to measure more precisely the human capital possession derived from time on the job. Time spent actively training should enhance skills more than time simply spent doing a job. Furthermore, the training variable used in this chapter measures the training requirements that are attached to the job. This suggests that the skills learned during this training are used on the job.

Another reason for focusing on on-the-job training in this study of the gender gap in earnings is to separate the

effect of such training from that of skill requirements. On the-job training is often used as a proxy for skill requirements or is factor analyzed along with data on task requirements to produce a measure for skill requirements. As explained earlier, this practice could explain some of the contradictions in past research regarding the effect of skill requirements on the gender gap in earnings (see discussion in Section 1.8 of Chapter 1).

According to human capital theory, women have less on the-job training than men.²⁸ This results in lower levels of skill possession, which result in lower earnings. In this chapter, I look at the impact that the lower level of on-the-job training of women have on the earnings gap. I also look at 'the other side of the coin'--whether or not women are rewarded at the same rate for the same on-the-job training requirements. I maintain that women are doubly disadvantaged with respect to on-the-job training requirements.

First, a sizeable portion of the earnings gap is due to the fact that women rarely have access to jobs that provide high levels of on-the-job training. Second, an equally large portion of the earnings gap results from the fact that women

²⁸ Human capital theory regards on-the-job training (like education) as an investment that men and women choose based upon their expected time in the labour force. This view of on-the-job training as a voluntary investment is at odds with the feminist-based literature on comparable worth where on-the-job training is regarded as an opportunity that is offered by the employer.

2

PM-1 3½"x4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

PRECISIONSM RESOLUTION TARGETS

are rewarded at a significantly lower rate for the same level of on-the-job training.

I begin this chapter with a discussion of the relevant literature that leads up to this research. In order to demonstrate the answers to the central and secondary questions outlined earlier in the introduction, I continue with an examination of the earnings determination model using regression analysis. These earnings models will help to answer the questions relating to gender differences in the rate of reward to the same skill and on-the-job training requirements. The questions derived from human capital theory's contention that the earnings gap is due to gender differences in the level of skill possession and job requirements are pursued using tabular analysis to summarize the gender differences that exist with respect to these independent variables. Finally, the average impact of gender differences in rate of return and gender differences in level of skill attainments and job requirements are illustrated and compared using a decomposition procedure which summarizes the average dollar effect of both on differences in earnings.

3.2 Statement of the Problem

In the past, research from the human capital perspective has used years of education and work experience as proxies for the skill attainments of individuals. Such research has also been based upon the assumption that the skill attainments of individuals are properly matched with skill requirements of

the jobs they hold. The methodological and conceptual criticisms of this research were discussed in Chapter 1 (Section 1.2 through 1.5).

Most of the research from the human capital perspective has employed multiple regression analysis to estimate an earnings model using education and experience (often using age as a proxy for experience) as the key independent variables. Under human capital theory, the gender gap in earnings should be largely explained by gender differences in educational attainment and experience. Women and men should receive similar 'rates of return' to each of these independent variables (in a state of equilibrium the rate of return should be identical)--in other words, women and men should receive the same amount of money for each unit increase in education or work experience. However, there has been a great deal of research which has failed to support this (Abowitz, 1982; Bibb and Form, 1977; Blinder, 1973; Boyd and Humphreys, 1979; Denton and Hunter, 1982; England, et al, 1982; Fawcett, 1990; Goyder, 1981; Gunderson and Jain, 1980; Holmes, 1976; Hudis, 196; Oaxaca, 1973; Robb, 1978; Suter and Miller, 1973; Treiman and Terrell, 1975).

While women are always found to have overall lower levels of earnings, an increasing number of researchers have found that women actually receive a higher rate of return to education (Gunderson and Jain, 1980; Gunderson, 1982; Holmes, 1976; Goyder, 1981; Fawcett, 1990). Such findings pose a

dilemma. Not only do they fail to conform to the human capital model which postulates similar rates of return to education, they defy the popular notion of how sex discrimination operates. Under a discrimination model, one would expect men to receive higher rates of return to education.²⁹ It should not be forgotten, however, that these higher rates of return to education do not translate into overall higher earnings being received by women compared to men. Quite the opposite is true. Overall, such findings simply suggest something about gender differences in the earnings determination process and the role of education in that process.

So how do we reconcile higher rates of return to education for women with the lower levels of earnings of women? Education may simply be a more important criterion in the determination of earnings for women than it is for men. Obviously there are other factors which account for the earnings gap. Has the traditional human capital model using education and experience been a truly good test of the underlying theory? Years of education and experience may be bad proxies for skill attainments. Furthermore, skill

²⁹ In fact, some researchers have found that men have higher rates of return to education (Bibb and Form, 1977; Blinder, 1973; Hudis, 1974; Miller and Suter, 1973; and Oaxaca, 1973). These higher rates were interpreted as evidence of discrimination. It should be noted that these studies use data which is older than that used in the research indicating women having higher rates of return to education. This could reflect a change in the earnings determination process over time.

attainments may not be properly matched with skill requirements as assumed under traditional human capital models. As noted in Chapter 1, a tentative trend exists in the literature toward focusing on the skill requirements of jobs rather than on individual attainments when dealing with earnings differences.

Despite these moves toward direct measures of job requirements, there is still no consensus in the literature regarding the role played by job skill requirements in the earnings gap. Using measures of occupational skill requirements (taken from the worker trait information attached to the CCDO) as the critical independent variables, Hunter (1988a) found that up to one quarter of the earnings gap between women and men could be attributed to the higher average skill levels of the jobs for which men are recruited. In the human capital tradition, this means that if women were in jobs with greater human capital requirements, their earnings would be much more similar to that of their male counterparts. England, Chassie, and McCormack (1982), however, find quite different results in a similar exercise using measures of occupational skill requirements taken from the worker trait information attached to the DOT. England, et al (1982) find that the wage gap would actually increase if both sexes were to have the same skill requirements and job dimensions. They attribute the wage gap to gender differences in the role of skill requirements in the earnings

determination process--that is to say that men have a higher rate of return to occupational requirements.

In addition to using a new source of data, I follow a different methodology than that used by either England, et al (1982) or Hunter (1988a). England, et al (1982) did not use any form of data reduction technique. They entered some 15 different measures of skills. Some of these skill types were very similar and some were quite different. As a result, multicollinearity presented a problem, limiting their "confidence in the relative size of the slopes of highly correlated measures" (England, et al, 1982). As noted in the previous chapter, the skill measures used here are obtained using factor analysis which reduces the data to a manageable number of skill dimensions and automatically weights the source data in the construction of these dimensions.

Hunter (1988a) did perform factor analysis of the worker trait data to construct his skill measures. However, he included training and educational requirements with requirements for specific tasks in his analysis. The resulting measures, therefore, are a composite of education, training, and skill requirements. In my analysis, education, training, and skill are treated separately. In fact, I view them as different stages in the path from school to earnings. I also find that education, training, and skill requirements have quite different impacts on the gender gap in earnings.

3.3 The Earnings Determination Model

Regression analysis is used to estimate an earnings determination model which includes education, on-the-job training, and skill requirements [Tables 3.2(A)&(B)]. This analysis is limited to full-time, full-year employees 18 years of age and older.³⁰

³⁰The CCSS contains information on persons 18 years of age and above. Certain segments of the CCSS sample are excluded from my analysis for a variety of reasons. Only respondents who were employed at the time of the questionnaire or had been unemployed for less than one year are included in this analysis. Those unemployed over a year are excluded from the analysis since there is incomplete information on many of the key variables.

Only those working full-time (defined as 30 hours per week or more) and full-year (defined as non-seasonal workers) are included in the analysis. This exclusion of part-time and part-year workers recognizes that these workers may face an earnings determination process that is fundamentally different from that faced by full-time/full-year workers. As noted by White (1983:13-14), part-time workers receive considerably lower wages (per hour) and benefits than full-time workers, even in similar occupations. The phenomenon of part-time work is a topic worthy of separate analysis. The number of part-time workers in these data is so low that a meaningful separate analysis is not possible. Since women are overrepresented in part-time work and gender comparison is key to this analysis, the inclusion of this group could bias the coefficients downward in regression analysis using earnings for women; this would inflate the gender gap. A more conservative approach (and one that is not confounded by part-time work) is to compare full-time workers only.

Since the object of this analysis is to examine differences in the path of opportunity that women and men face in the transition from school to work and differences in the reward structure applied to women and men, there is a focus on the behaviour of employers in extending those opportunities and creating the reward structures. Therefore, only respondents who are employees are included in the analysis. Those who are self-employed or make their living employing others are excluded from the analysis. Gender differences in the economic outcomes of the self-employed/employer classes are complicated by a different set of issues than those of concern here. There is also likely to be less of a link between schooling/training and earnings for this group

Initially, all six skill dimensions developed in Chapter 2 were included in the analysis of the earnings gap. However, only autonomy, cognitive complexity, and manual skills were found to be statistically significant in the earnings determination process. The other three dimensions (organizational skills, social skills, and mechanical routinization) were subsequently dropped from the analysis and are not addressed in this chapter.

While there is little difference with respect to the mechanical routinization of the jobs that women and men have, there are large differences in the organizational skill requirements and social skill requirements of the jobs men and women are hired to perform. Men are hired into jobs that have higher levels of organizational skill requirements than those of women; and women are hired into jobs that have higher levels of social skill requirements than those of men.

Mechanical routinization is a factor in the working lives of a very high proportion of women and men. There is a high degree of variation in the type of machinery/equipment that is used on the job. Individuals of both sexes are routinized by

(Wright, 1979; Eno, 1985). (See Appendix C for attrition of cases due to each selection procedure.)

Finally, the data are weighted (unless otherwise stated) in the analysis to adjust for the following: deliberate oversampling of certain regions, community sizes (urban -vs- rural), household size, age, and sex. The weighting procedure employed adjusts for the above-noted problems to obtain a more representative sample and then downweights this representative sample back to the original sample size (to prevent inflation of the t-statistics).

the use of machinery ranging from assembly line equipment to computers. This great variation may be responsible for the fact that mechanical routinization is not significant in the earnings process.

In an earnings model with only the six skill requirements as independent variables, organizational skills have a statistically significant effect on earnings for both women and men (very similar effect). However, when on-the-job training requirements are added to the model, the effect of organizational skills disappears for men. Men with high organizational skills are men with high levels of on-the-job training. It is the training, not the organizational skill requirements, that has the effect on earnings for men. For women, the addition of education to the earnings model makes the effect of organizational skills disappear. It is education, not organizational skill requirements, that has the effect on earnings for women.

Finally, social skills are not significant for either men or women in an earnings model containing only the six skill requirements. The measure of social skills developed here is not limited to the managerial aspects of social skills as in many job evaluation schemes (see Appendix B). Social skill requirements are higher in the jobs that women are hired to perform. The lack of significance of this skill requirement on earnings may be an example of one of the most cited

feminist critiques of existing job evaluation plans--they overlook the skills used by women on-the-job.

Why Four Equations? Equation 1 in Tables 3.2(A)&(B) represents an updated version of the traditional human capital model which limits the independent variables to the education and experience of individuals. I include these variables in my final models (Equations 3 and 4) as measures of individual attainments.³¹ I begin with this model to demonstrate what the estimated earnings determination process would look like for men and women under a modified version of the traditional human capital methodology (using educational attainments and work experience as proxies for human capital possession). I then add on-the-job training requirements (Equation 2) as another measure of skill possession and look for gender differences in the effect of this addition on education and experience. This provides some insight into how education is differentially used to select men and women into jobs with varying levels of training opportunities. While on-the-job training requirements are used as a measure of human capital

³¹ A separate regression (not shown here) using job requirements alone (autonomy, cognitive complexity, manual skills, and on-the-job training requirements) as the independent variables does not yield any more information about the relationship between job requirements and earnings than that reported here. In other words, the gender differences found in the regression equations using only job requirements are not diminished by inclusion of education and experience attainments of individuals. Over and above the effect of the job requirement variables, however, there are still rewards for education and experience (and significant gender differences with respect to these rewards).

acquisition by individuals, these training requirements are directly linked with the jobs held by those individuals. This means that the skills and knowledge acquired through this on-the-job training are required in the job.

Subsequently, I build upon Equation 2 by adding skill requirements (Equation 3). Once again, gender differences in the effect of this addition on the coefficients for education, experience, and on-the-job training point to differences in the way education, experience, and training are used to hire women and men into jobs with specific skill requirements. This will be discussed more thoroughly in Chapter 5.

Finally, Equation 4 adds three control variables (unionization, firm size, and percent female in occupation) and deletes one dummy variable for education (completed vocational high school) for the final specification of the earnings models.

In Equation 4, most of the education and experience variables remain in the equation since they have significant effects over and above the new job requirement variables (on-the-job training and skill requirements) for either women or men (or both). Only the dummy variable for 'completed vocational high school' has been deleted because it is not statistically significant for either men or women in this final equation. The base category for education then becomes those with incomplete high school or lower and those with completed vocational high school.

The object of this exercise is not to simply replace variables relating to individual human capital possession with those relating the skill requirements of the job, but rather to specify better the earnings model by including job requirements as well as individual attainments.

While this analysis is not intended to test any structural theories, I have added firm size to the final equation in an attempt to control for the structural differences in earnings determination that have been shown to exist between large and small firms.³² Unionization is another variable that is believed to affect the reward structure and is added to the final equation for control purposes (unions believed to add a premium to the earnings of their membership and women, typically, less likely to be unionized). As well, many believe that there is a penalty applied to occupations that are stereo-typed as 'female occupations' (Bibb and Form, 1977; England, et al, 1982; England and Farkas, 1986; England and McLaughlin, 1979; Gaskell, 1991; and Treiman and Hartmann, 1981). For this reason, percent female in the occupation is also included in the model as a control.

³² Earnings are believed to be higher in large firms and training is believed to be more likely in large firms (see Baron, Davis-Blake and Bielby, 1986; Barron, Black, and Loewenstein, 1987; Brown, 1989; Hodson, 1987; Oi, 1990; Pearce, 1990; Villemez and Bridges, 1988) (but see Granovetter, 1984 and 1986, for a different conclusion).

What Are These Variables? Multiple and dummy variable regression is used to estimate an earnings determination model for men and women. In this section I briefly discuss the variables used in this analysis to familiarize the reader with them. An in-depth discussion of the variables and a table of variable means can be found in Appendix C. Additional variable explanation is found in footnotes or in Chapter 2 (in the case of the skill measures).

Education is represented by a series of dummy variables which tap information about specific types of education (i.e., vocational -vs- academic) as well as levels of education. I use a series of dummy variables based upon credentials to measure education instead of years of education as typically used in the past. Increasingly, researchers are paying more attention to the value of specific educational credentials (as opposed to and in addition to years of education) in obtaining specific labour force rewards (Anisef, Ashbury, and Turritin, 1992; Faia, 1981; Hunter and Leiper, 1993; Leiper and Hunter, 1990; Spilerman and Lunde, 1991). Six credential-based levels of schooling are identified in this study. The base category in dummy variable regression is 'less than completed high school'. Six credential-based levels of schooling are entered as dummy variables: completed academic high school; completed vocational high school; incomplete post-secondary school; completed non-university post-secondary; lower level

university; and upper level university. The number of men and women in each category is summarized in Table 3.1.

TABLE 3.1
NUMBER OF MEN AND WOMEN WITH EACH LEVEL
OF SCHOOLING

Level of Schooling	Number of Men	Number of Women
LessCompletedHiScl	251	136
CompletedHiSclVoc	55	28
CompletedHiSclAcad	132	121
IncompletePostSec	79	59
NonUniverPostSec	113	107
LowerUniversity	87	100
UpperUniversity	55	26
Total	772	577

Note: Full-Time, Full-Year Employees 18 Years and Older
Source: Canadian Class Structure Survey

These six categories can be described as follows:

1) **Completed Academic High School:** This category includes all those who have successfully completed the requirements for high school in an academic program.

2) **Completed Vocational High School:** This category includes all those who have successfully completed the requirements for high school in a vocational program.

3) **Incomplete Post-Secondary:** This category includes all those who have successfully completed high school and gone on to attend some sort of post-secondary institution without successfully completing the requirements. No distinction is made between type of post-secondary institution attended since some of the sub-categories in this level contain few respondents. This level does not properly represent a credential (as the others do), but rather an attempt to obtain a credential.

4) **Completed Post-Secondary Non-University:** Included in this level are all those who have successfully completed the requirements of a non-university post-secondary institution. This includes completion of programs at the following: business or trades schools, community colleges, CEGEP, college classique, and technical institutes. While many of these programs are vocationally oriented, some (like the CEGEP and many colleges in Western Canada) are in the university preparation/transfer stream. A distinction is made between lower level university and non-university post-secondary schooling. It is suggested by Anisef, et al (1992) that there is a distinction made by employers with respect to the value of college -vs- university education in Canada. Anisef, et al (1992) found lower average occupational status outcomes for college graduates. This does not necessarily mean that there are differences in the value of education from these two types of institutions, merely that there is evidence to suggest that

this might be the perception of employers. Since employers largely control decisions over on-the-job training and earnings, these perceptions are important whether they represent real differences or not.

5) **Lower Level University:** This level includes all those who have completed post-secondary programs at a university at the following levels: bachelor degrees, nursing degrees, and teaching degrees.

6) **Upper Level University:** This level includes all those who have completed an advanced university program in the following categories: master's degree, doctorate, professional degree (MA, MSc, MPA, MBA, LLB, etc.).

This credential-based measure of education was chosen for a number of reasons. Past research using years of education has left a wake of conflicting results as described in an earlier section of this chapter. Gunderson (1982) found evidence that the relationship between gender, school, and earnings may change at a certain level of schooling (completion of high school); such a change is better captured using levels of education. In this analysis, I find that the credential-based measure of education provides more explanation of the process of earnings determination; for example, the effects of high school vocational education and non-university post-secondary education on training, skill, and earnings is noticeably different for men and women. This type of difference is not picked up with the use of years of

education.³³ In Chapter 4, I return to this discussion of the credential-based measure of education as I discuss the advantages of using this measure over years of education in an analysis of the effect of education on on-the-job training opportunities.

I use two distinct types of experience variables: (1) work experience prior to present job; and (2) tenure in present job (see Appendix C for details of variable construction). Prior experience refers to work experience that occurred before tenure in present job (the job to which training and skill requirements are attached). Such experience may have influenced the acquisition of present job and the training opportunities and skill demands that go with it. Tenure (experience in present job), however, is likely to have a more direct influence on earnings. In this analysis, however, both have a healthy direct effect on earnings. The separation of these two types of experience eliminates speculation about whether the effect of experience is due to a reward for sticking with the same job for a prolonged period

³³ It should be noted that the entire analysis in this chapter and subsequent chapters which includes education was repeated using years of education instead of the credential-based measure reported. Ultimately, however, there is little change in the story that comes out of the analysis using years of education from the one presented here. However, some of the nuances of the education/training/skill/earnings nexus are not evident when years of education is used.

In addition, a number of equations were estimated using a combination of the credential-based measure and years of education. In these equations, years of education was not statistically significant.

of time or for a value that is placed upon general experience. Both are rewarded.³⁴

On-the-job training requirements refer to the amount of training 'normally' required to be able to do the individual's job. Included in this measure are apprenticeships. A more in-depth discussion can be found in Appendix C.

As discussed in Chapter 2, the measure of autonomy developed here is one that is most consistent with Spenner's (1979, 1980, 1983, 1990) conceptualization of skill as autonomy/control. Spenner (1983:829) maintains that "... autonomy-control designates the discretion, bounds, and leeway for action within a work role as provided by the structure of the role and work arrangements." This represents a composite of the measures used by Myles and Fawcett (1990) who introduced a dual conception of autonomy. Myles and Fawcett (1990) measured 'conceptual autonomy' which involved "the requirement in a job to conceptualize or design important aspects of a product or service" (Myles and Fawcett, 1990:26). They also measured 'task autonomy' which involved "the conditions under which the task is actually accomplished" (Myles and Fawcett, 1990:26). The measure of autonomy used

³⁴ Both experience-related variables are entered as quadratics (prior experience and prior experience squared/tenure and tenure squared). The squared term is known as a decay term. Past research suggests that the benefit of labour force experience decreases over time (more precisely the rate of return decreases over time--additional years of experience may still increase earnings, but at a decreasing rate) (Blinder, 1973 & 1976; Boyd and Humphreys, 1979; Denton and Hunter, 1982; and Lloyd and Niemi, 1979).

here can also be likened to certain elements Kohn and Schooler's (1983) occupational self-direction. While the substantive complexity elements of Kohn and Schooler's occupational self-direction are measured as separate dimensions here, the overarching dimensions of initiative and independent judgment are present in my measure of autonomy.

Cognitive complexity can be likened to a requirement for the use of mental skills (such as working with information, abstract knowledge, and exercising a high level of thought and attention on the job). Manual skills in this analysis does not necessarily refer to the degree of excellence or proficiency in the use of one's hands. Manual skills refer to the degree to which one is required to use one's hands on-the-job. All three skill measures are described in detail in Chapter 2.

Firm size is an estimate of the number of persons employed at the individual's work location.³⁵ Unionization is entered into this model as a dummy variable (the base category being 'not unionized'). 'Percent female' refers to the percentage in the occupational group who are female.³⁶

³⁵ This is based on a rank ordinal measure.

³⁶ This information is not available in the CCSS at the job level. A CCDO code for occupational group was attached to each job. The percent female employed in each of these occupational groups was taken from the 1981 Census and attached to the CCSS by CCDO code. While the occupational level does not provide the refinement of the job level data available for skill and training, this does provide a measure of the degree to which the work might be thought of as being 'female'. It is the predominance of women in a given

Finally, earnings is operationalized using a question in the CCSS which asks respondents to indicate their 'personal income before taxes'. Since the purpose of this study is to examine the rewards that accrue to women and men for the jobs they perform in the paid labour force, 'earnings' (as opposed to income) is the variable of concern; however, the CCSS did not contain a question which specifically asked the respondents to list their earnings. While income and earnings are theoretically different concepts, the income information actually tapped by the CCSS appears to correspond very closely with the concept of earnings. The rationale for this conclusion is discussed in detail in Appendix C. The 'income' data in the CCSS was also used to represent earnings by Rosenfeld and Kalleberg (1988). After performing a number of 'tests' on the data, Rosenfeld and Kalleberg came to the same conclusion that I do in Appendix C. Earnings are measured in dollar values and are not transformed for this analysis. A more in-depth discussion of the earnings variable appears in Appendix C.

occupation that is often believed to lead to sex-role stereotyping and devaluation of the work performed by women.

TABLE 3.2 (A)
UNSTANDARDIZED COEFFICIENTS OBTAINED FROM REGRESSIONS OF
EARNINGS ON EDUCATION ATTAINMENT, PRIOR EXPERIENCE,
TENURE, ON-THE-JOB TRAINING, SKILL REQUIREMENTS,
FIRM SIZE, PERCENT FEMALE IN OCCUPATION, UNIONIZATION
MEN ONLY

	Equation 1	Equation 2	Equation 3	Equation 4
HiSchlVoc	5358*	2318	1857	
HiSchlAcad	7602*	5662*	3968*	2813*
IncomPS	10218* g	7641* g	5172*	5764* g
NonUPS	5566*	1892	- 878 g	- 1947
LowerUniv	15779*	12748*	6614*	6646*
UpperUniv	21390*	18278*	11067*	9910* g
PriorEx	928* g	791* g	678*	623*
PriorExSq	- 20*	- 18*	- 16*	- 14*
Tenure	853*	763*	772*	555*
TenureSq	- 14*	- 13*	- 15*	- 10
OJT		1224* g	844*	768* g
Autonomy			2126* g	2605* g
CogCom			1432*	1395*
ManualSkill			- 1499*	- 1692*
FirmSize				1678*
PercentFem				- 97*
Unionized				- 457
Constant	8732*	6058*	1483	- 52
Adj.R2	.27214	.33793	.38763	.43677

* Significant at .05 or better

g Gender difference in coefficients [between Table 3.1(a) and 3.1(b)] statistically significant at .05 or better

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

TABLE 3.2(B)
UNSTANDARDIZED COEFFICIENTS OBTAINED FROM REGRESSIONS OF
EARNINGS ON EDUCATION ATTAINMENT, PRIOR EXPERIENCE,
TENURE, ON-THE-JOB TRAINING, SKILL REQUIREMENTS,
FIRM SIZE, PERCENT FEMALE IN OCCUPATION, UNIONIZATION
WOMEN ONLY

	Equation 1	Equation 2	Equation 3	Equation 4
HiSchlVoc	4685*	3974*	2822	
HiSchlAcad	4090*	3334*	2060*	1600
IncomPS	4357* g	3022* g	617	451 g
NonUPS	6222*	5319*	4165* g	3682*
LowerUniv	12145*	11168*	7624*	6702*
UpperUniv	22641*	21548*	16408*	15235* g
PriorEx	492* g	433* g	394*	368*
PriorExSq	- 12*	- 11*	- 9*	- 9*
Tenure	608*	527*	522*	421*
TenureSq	- 11*	- 9*	- 9*	- 6
OJT		665* g	457*	363* g
Autonomy			668* g	882* g
CogCom			1241*	1304*
ManualSkill			- 1439*	- 1218*
FirmSize				1174*
PercentFem				- 43*
Unionized				1710*
Constant	6182*	5174*	4620*	3321
Adj.R2	.39203	.42007	.47140	.53205

* Significant at .05 or better

g Gender difference in coefficients [between Table 3.1(a) and 3.1(b)] statistically significant at .05 or better

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

3.4 The Findings from the Earnings Models

The unstandardized regression coefficients summarized in the earnings models [Tables 3.2(A)&(B)] represent the rate of return to each variable included in the model. In other words, each unit increase in the level of each variable results in an increase or decrease in earnings by the amount of the coefficient. In the case of the dummy variables (the education levels and unionization), the coefficients represent the total amount contributed to earnings by having a particular level of education (an individual will only have one level of education contributing to earnings) or being unionized. The coefficients provide a measure of the role played by each variable in the earnings determination process.

In the analysis of Tables 3.2(A)&(B) that follows (and the analysis of regression results throughout this dissertation), I discuss gender differences in education coefficients that are not statistically significant as well as those that are. Some gender differences with respect to the education dummy variables are statistically significant and some are not. The use of six dummy variables for education captures many nuances of the relationships under study; however, it also creates a situation where statistical significance of gender differences is more difficult to achieve with the sample size of the CCSS (numbers on which the coefficients are based are lower than if fewer dummy variables had been used). While the gender difference in some education

dummy coefficients are not statistically significant, there is an undeniable, overall pattern that exists. These non-statistically significant gender differences are mentioned in the following discussion so that this overall pattern is not lost.

The Traditional Human Capital Model: As mentioned earlier, Gunderson (1982) found that women have a lower rate of return to education at lower levels of schooling but have a higher rate of return at more advanced levels. In my version of the traditional human capital model (with the credential-based measure of education and experience as the only independent variables), a similar pattern is found. This equation represents the 'traditional' method of testing the human capital model. There is, however, one modification. The use of credential-based measures of schooling allow us to see the differences that occur in the gender-education-earnings relationship at particular levels of education. For schooling levels of 'incomplete post-secondary' and lower, education adds more to the earnings of men (the gender difference for incomplete post-secondary being statistically significant). Women have higher rates of return to non-university post-secondary education and upper level university

education; these differences are not statistically significant in this particular model (Equation 1).³⁷

It is also evident that men receive a higher rate of return to both prior experience (almost double that of women-- a statistically significant difference) and tenure (not statistically significant) (Equation 1). This finding raises the speculation that men might have a higher rate of return to experience variables because they have more on-the-job training. In other words, the work experience of men may be more skill enriching and, therefore, rewarded at a higher rate.

Men Have a Higher Rate of Return to On-the-Job Training:

Men add more to their earnings for each increment in on-the-job training requirements regardless of educational attainments and job experience (Equation 2). For each level of on-the-job training men add about \$1,224 to their earnings; women add only about half that amount (\$665) (this difference is statistically significant). While the addition of on-the-job training decreases the coefficient for both experience

³⁷ This finding might suggest something about the lack of consistency found in the past when comparing the rate of return to education for women and men. The education level of both sexes has been increasing over time. The earlier studies typically indicated that men had a higher rate of return to education. These studies may have simply been focusing on gender differences in the relationship between education and earnings at the lower levels of education. The more recent studies (which tend to support the view that women have a higher rate of return to education) may be focusing on gender differences in this relationship at the higher levels of education.

variables somewhat for both sexes (men having higher rates of return than women--gender difference for prior experience still statistically significant), it is apparent that the effect of experience on earnings is not entirely due to on-the-job training. Perhaps, as suggested by Becker (1975:74), 'practice makes perfect'; the experience variable may be picking up the "effect of practice on earnings" (Becker, 1975:74). This also indicates that experience is not a very good proxy for on-the-job training.

Rate of Return to Autonomy Three Times Greater for Men:

The findings discussed up to this point, however, are based on a model which does not include skill requirements (i.e., Equation 1 and 2). As noted in Chapter 1, on-the-job training is an arena for skill acquisition. Because the training is attached to a particular job,³⁸ it is assumed that the skills learned during the training will be used on-the-job. It is to be expected, therefore, that some of the effect of on-the-job training on earnings is actually due to the skill requirements to which it leads. This assumption is partially supported when the three skill requirement measures are added to the earnings model (Equation 3). The coefficient for on-the-job training decreases for both men and women as the three skill measures are added--indicating that some of the effect of on-the-job training on earnings is through the skill

³⁸ Unlike the skills acquired in the formal school system which may never be used on-the-job.

requirements to which it leads. However, there is still a statistically significant effect of on-the-job training on earnings over and above that of the skill requirements to which it leads for both sexes. Furthermore, men still have a rate of return to on-the-job training that is almost double that of women (844 compared with 457--this difference is not quite statistically significant).

Human capital theory postulates that there should be little gender difference in the rate of return to skill possession. Since skill possession is assumed to be properly matched with skill requirements, there should be no gender differences with respect to the rate of return to skill requirements either. In my findings, there is little gender difference in the rate at which cognitive complexity is rewarded (men add about \$1,432 and women about \$1,241 for every level of cognitive complexity). There is also little gender difference in the rate of return to manual skills. Both sexes are penalized for manual skill involvement almost equally (a coefficient of -1,499 for men and -1,439 for women). The value of knowledge-based skills in the earnings determination process for both sexes is evident in the coefficients attached to these two skill measures.

While there is little gender difference in the role played by cognitive complexity and manual skills in the earnings determination process, there exists a very large gender difference in the role played by autonomy. Men add

over three times the amount to earnings for every increment in level of autonomy (a coefficient of 2,126 for men and 668 for women--gender difference is statistically significant).

Gender Differences in the Path from School to Skill

Requirements: Another finding that emerges from this analysis relates to gender differences in the path from school to skill requirements. The addition of on-the-job training to the traditional human capital model (education and experience as independent variables) changes the coefficients for education for both sexes. [Tables 3.2(A)&(B)] While the coefficients for the education levels of women are reduced somewhat by the addition of on-the-job training, the change is fairly uniform for each level of education. For men, however, there are noticeably greater reductions in the coefficients for 'completed vocational high school' and 'completed non-university post-secondary school'. This suggests that a major portion of the effect of these levels of education on earnings for men is through the greater access to jobs that provide on-the-job training. This possibility will be explored more fully in the following two chapters.

Similarly, when skill requirements are added to the model (with education, experience, and on-the-job training), there is a reduction in most of the other coefficients³⁹ for both

³⁹ Less of a reduction for prior experience and tenure for both sexes than any of the education variables or on-the-job training.

sexes. However, there is a pattern to this reduction. For both men and women, a major portion of the effect of lower and upper level university on earnings is due to the skill requirements to which they lead. For women, almost all of the effect of 'incomplete post-secondary' education on earnings is through the skill requirements to which this uncompleted credential leads. Men, however, are rewarded for this uncompleted credential directly (over and above any indirect effect through on-the-job training or skill requirements). These findings imply some important differences in how women and men acquire on-the-job training and jobs with specific skill requirements. This is investigated further in Chapters 4 and 5.⁴⁰

Finally, Equation 4 [Tables 3.2(A)&(B)] represents the final earnings determination model (complete with control variables) that is used to measure the average dollar amount contributed to the gender gap in earnings by each variable

⁴⁰ Although not presented here, path analysis was used to estimate the proportion of direct and indirect effects of education on earnings. In general, the direct effect of education on earnings is higher for women than men. Men have a higher indirect effect of education through on-the-job training alone than women. For women, the greatest indirect effect of education on earnings is through skill requirements. Education increases the earnings of women directly (direct effect of education on earnings increases with education level) and by helping them acquire jobs with higher skill requirements. For men, the situation is a little more complex. Education affects the earnings of men directly, indirectly through on-the-job training, and indirectly through skill (as well as on-the-job training and skill). For men, the indirect effect of education through on-the-job training alone is greater at the lower earnings levels. See Table D-1 and Table D-2 in Appendix D.

(Section 3.6). The addition of extra control variables does not affect the analysis of the main variables just discussed.

3.5 What About Gender Differences in Level of Requirements?

The previous discussion was limited to gender differences in the role of each variable in the earnings determination process. Contrary to the human capital assumptions, men add significantly more to their overall earnings at each level of autonomy requirements and on-the-job training requirements. However, overall differences in earnings depend on gender differences in two areas. Gender differences in the rates of return to each variable are only one part of the story. Also contributing to the overall gender gap in earnings are gender differences in the amount of each independent variable (i.e., the level of autonomy and cognitive complexity requirements).

Men are more concentrated in jobs with higher levels of autonomy requirements than women (this difference is statistically significant). (Table 3.3) While men are slightly more concentrated in jobs with higher levels of cognitive complexity, this difference is not statistically significant. There is no gender difference for manual skill requirements. Given the greater rate of return that men receive for autonomy requirements, these distributional differences can have a rather large impact on the earnings gap

overall.⁴¹ The size of this impact is illustrated in Section 3.6 where I estimate the average effect of each variable on the earnings gap using dollar values.

Gender differences with respect to level of on-the-job training are even more pronounced (and statistically significant) than those just noted for skill requirements (Table 3.4). Men have higher levels of on-the-job training than women. Over a third of all men are in jobs with over one year of on-the-job training requirements; only 18 percent of the women are in this category.⁴² Women are more concentrated at the lower levels of training requirements with 46 percent having 30 days or less (compared with 32 percent of the men). Once again, with the lower rate of return to on-the-job training requirements, these lower levels of training requirements can have a fairly great impact on the earnings gap as illustrated in the following section.

⁴¹ Men and women have very similar levels of manual skill requirements. However, past research suggests that there may be significant gender differences with respect to gross-vs-fine manual skills (Baron & Bielby, 1987; Hunter, 1988; Steinberg, 1990; and Steinberg & Haignere, 1987). The CCSS data do not permit a distinction to be made between fine and gross motor skills when looking at manual skills in general. However, using factor estimates from Hunter and Manley's (1986) analysis of the full set of worker trait data from the CCDO (attached by occupational groups to the CCSS) for gross and fine motor skills, men are employed in jobs with higher levels of gross motor skills. Women are employed in jobs with higher levels of fine motor skills. However, the gender differences are less pronounced with respect to jobs with fine motor skills than those with gross motor skills.

⁴² On-the-job training requirements have been collapsed in Table 3.4 into five categories for ease of presentation.

TABLE 3.3
AUTONOMY, COGNITIVE COMPLEXITY, AND MANUAL SKILL⁴³
REQUIREMENTS BY GENDER
(Percent)

	1 (Low)	2	3	4 (High)	Total
AUTONOMY					
Men	21	27	22	31	101*
Women	28	29	20	24	100
Diff.	- 7	- 2	2	7	
COG. COMPLEXITY					
Men	20	21	29	30	100
Women	24	23	28	25	100
Diff.	- 4	- 2	1	5	
MANUAL SKILLS					
Men	26	23	30	22	101*
Women	24	22	32	22	100
Diff.	2	1	- 2	0	

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

* Error due to rounding

Gender differences in distributions for Manual Skill and Cognitive Complexity Requirements not statistically significant.

Gender differences in distribution for Autonomy Requirements statistically significant at .0009 or better (Mann-Whitney and Kolmogorov-Smirnov).

⁴³ The skill measures that are used in regression analysis are the actual factor scores. Theoretically, it is possible for each individual in the survey to have a unique score for each skill measure. While this kind of continuous level variable is ideal for regression analysis, it is quite inappropriate for tabular analysis. Therefore, the skill measures are divided into scales containing four categories for ease of reporting in tabular analysis.

TABLE 3.4
ON-THE-JOB TRAINING BY GENDER
(Percent)

	Short Demo.	Up to 30 Days	1-3 Months	3-12 Months	Over 1 Year	Total
Men	18	14	13	21	34	100
Women	27	19	22	14	18	100
Diff	- 9	- 5	- 9	7	16	

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

Gender difference in distribution statistically significant at .0001 or better (Mann-Whitney and Kolmogorov-Smirnoff).

3.6 The Two Central and Two Secondary Research Questions

How do these findings help us to answer the two central research questions? In order to demonstrate the impact of gender differences in rates of return and gender differences in levels of skill requirements and on-the-job training requirements, I perform a wage decomposition procedure (Table 3.5).⁴⁴ Using the full regression equations (with control variables), I estimate the average dollar value contribution

⁴⁴ This procedure follows Gunderson and Reid (1981):

(1) The Amount Due to Difference in Rates=
 $b\bar{m}\bar{X}_w - b\bar{f}\bar{X}_w$

(2) The Amount Due to Difference in Levels=
 $b\bar{m}\bar{X}_m - b\bar{m}\bar{X}_w$

where b is the unstandardized regression coefficient;
 $\bar{X}$ is the mean of the variable in question;
 m is for men; and
 w is for women

made by each of the independent variables to the gender gap in earnings. This contribution is divided into: (1) the portion due to the fact that women and men have different levels of skill requirements, on-the-job training requirements, etc.; and, (2) the portion due to the fact that women and men are rewarded at a different rate for the same level of on-the-job training and some skill requirements.⁴⁵

It is important to note that some variables actually reduce the earnings gap (for example: manual skill requirements, non-university post-secondary education, lower university; and unionization).⁴⁶

⁴⁵ It should be noted that these represent the average amounts for women and men as a group. In the calculation of these amounts, the average level of the education and unionization (all dummy variables) actually represents the proportion of each sex with each level of education and the proportion of each sex who are unionized.

⁴⁶ As well, a simple addition of the amounts in each column (to compare total amount due to rates and total amount due to levels) would be meaningless since this model does not account for the entire gap in earnings (see also the differences in the constant terms in Equation 4).

TABLE 3.5
DECOMPOSITION OF GENDER GAP IN AVERAGE EARNINGS BY SELECTED
VARIABLES INTO AMOUNT DUE TO:
DIFFERENCES IN RATES OF RETURN AND
DIFFERENCES IN LEVEL OF VARIABLES

Variable	Amount of Gender Gap Due to Different Rate of Return (Coefficients)	Amount of Gender Gap Due to Different Level of Variables	Total Contribution of Each Variable to Gender Gap
Autonomy	\$ 5,981.59	\$ 661.77	\$ 6,643.36
CogCom	416.24	212.07	628.31
ManualSkls	- 1,622.18	218.32	- 1,403.86
OJT	1,432.13	1,214.52	2,646.65
HiSchlAcad	254.77	- 135.04	119.73
IncompletePS	568.47	- 28.82	539.65
NonUPostSec	- 1,120.25	99.31	- 1,020.94
LowerUniver	- 10.27	- 332.29	- 342.56
UpperUniver	- 271.56	327.02	55.46
PriorEx	973.87	980.55	1,954.42
PriorExSq*			
Tenure	606.40	700.29	1,306.69
TenureSq*			
FirmSize	1,478.48	382.65	1,861.13
%Female	- 3,615.89	4,116.42	500.53
Union	- 554.80	- 13.72	- 568.52

Note: Full-Time, Full-Year, Employees 18 Years and Older
Source: CCSS

* The amount entered is the sum of either (Prior Experience and Prior Experience Squared) or (Tenure and Tenure Squared). Since the decay term has been factored into the amount that appears here, this represents the total contribution of this variable to the average earnings gap.

Do women earn less than men because they are hired for jobs which have lower skill requirements? While the findings presented in the previous section demonstrated that women are hired for jobs with overall lower levels of autonomy requirements (Table 3.3), this only contributes an average of about \$662 to the gender gap in earnings (Table 3.5). There is no statistically significant difference in the cognitive complexity and manual skill requirements of women and men (Table 3.3). Contrary to what human capital theory would predict, gender differences in the level of skill requirements are responsible for only a very small portion of the gender gap in earnings.

Do women earn less than men because they receive a lower rate of return to the same skill requirements that men do? Women receive a significantly lower rate of return to the same autonomy requirements than men [Tables 3.2(A)&(B)]. This difference contributes an average of about \$5,982 to the gender gap in earnings (Table 3.5). This is, by far, the single greatest contribution to the earnings gap. If women had the same average level of autonomy requirements as men, they would still lose \$5,982 (on average) because of the different value placed upon autonomy requirements in the jobs they perform. This is net of the penalty involved in being employed in occupations which are stereotyped 'female occupations' (i.e., occupations which employ a high percentage of women). The gender gap in average earnings in these data

is \$9,540 (men have mean earnings of \$26,682 and women of \$17,142); gender differences in the reward structure for autonomy alone contribute to over half this amount.

What about gender differences in the rate of return to the other skill requirement measures? The earnings gap is lessened by the fact that women are penalized at a lower rate than men for involvement in manual skills (this amounts to an average reduction of the gap by \$1,622--the gender difference is not statistically significant) (Table 3.5). There is only a small, statistically non-significant gender difference in the rate of return to cognitive complexity.

While women and men are being rewarded fairly evenly for cognitive complexity requirements, they are being rewarded at a much lower rate for autonomy requirements. This leads to much lower earnings for women.

Do women earn less than men because they are hired for jobs which have lower on-the-job training requirements? In the previous section, I demonstrated that women are hired into jobs that have significantly lower levels of on-the-job training opportunities. These lower levels of on-the-job training opportunities contribute about \$1,215 to the earnings gap. This means that even if women and men were rewarded at the same rate for on-the-job training (which they are not), women would lose an average of \$1,215 due to lower training levels. However, this must be considered in combination with the amount of the gap that is due to differences in the rate

at which men and women are rewarded for their on-the-job training requirements.

Do women earn less than men because they receive a lower rate of return to the same on-the-job training requirements? Women receive a significantly lower rate of return to the same on-the-job training requirements [Tables 3.2(A)&(B)]. This lower rate of return translates into lower average earnings. If women had the same average on-the-job training requirements as men, they would still lose an average of \$1,432 due to differences in the manner in which training is rewarded (Table 3.5).⁴⁷

3.7 Discussion

Skill Requirements: The only significant gender differences with respect to skill requirements and the earnings gap involve autonomy requirements. Men and women have fairly similar levels of cognitive complexity and manual skill requirements; and there are no statistically significant differences in the rate at which they are rewarded for these requirements. There are, however, significant differences connected with autonomy requirements.

⁴⁷A major contribution is made to the gender gap in earnings by gender differences in the average level of prior experience and tenure (\$981 and \$700 respectively) as well as by gender differences in the rate of return to prior experience and tenure (\$973.87 and \$606 respectively). Women lose, relative to men, for having less work experience; however, they lose almost as much for the lower value placed upon the experience they do have (Table 3.5).

Men are hired into jobs which have, overall, higher levels of autonomy requirements than those into which women are hired. A 'human capital inspired' explanation for this might be that men acquire more of the relevant skills for autonomy and are, therefore, matched accordingly. In Chapter 4, I investigate gender differences in opportunity at the skill acquisition stage. I demonstrate that women have less opportunity to acquire on-the-job training despite very similar levels of education. In Chapter 5, I show that these differences in on-the-job training opportunities translate into lower levels of autonomy requirements.

The largest portion of the gender gap in earnings is due to differences in the rate of return to autonomy when men and women have the same level of autonomy requirements. Why is there such a large gender difference in the rate of return to autonomy? Before this question can be addressed, it is necessary to discuss just what the autonomy variable used here actually measures. The measure of autonomy used here loads on: conceptual autonomy, task autonomy, creativity, directing the work of others, decision making, thought and attention, and abstract thought. While there is a cognitive element to jobs with high autonomy, there is something more fundamental that makes these jobs different. These jobs require independent thought and action, initiative, and decision making. This would be something akin to Kohn and Schooler's occupational self-direction (with the purely cognitive,

social, and manual elements measured in separate variables) or Braverman's (1974) unity of conception and execution. For men, the elements embodied in the autonomy requirements measure yield a very high rate of return [Equation 3 in Table 3.2(A)].

Erik Olin Wright's (1979:80-91) thesis of social control and class position provides one interpretation of the reward structure attached to autonomy requirements. Wright proposes that employers use different methods of social control on different classes of employees to bring about the kind of behaviour and work they require of each. This 'carrot -vs- stick' argument, involves repressive control mechanisms being used on the working class and inducements being used on semi-autonomous workers and the managerial class.⁴⁸ The kind of self-motivation and creativity required by the latter two classes; Wright proposes, may be best encouraged by rewards rather than threat of punishment. One of the rewards that Wright (1979) assumes would be used for these two classes is steep earnings gradients. These same elements of self-

⁴⁸ Workers are those who "are excluded from control over authority relations, the physical means of production, and the investment process" (Wright, 1979:25). The managerial class has some degree of control over the physical means of production, over the labour power of others, and, for some, over the investment process and management of resources. While this class is like workers in that they sell their labour power and, in most cases, do not enjoy legal ownership of the means of production, its occupants will tend to identify more with owners. Semi-autonomous workers are those who sell their labour power like workers and, yet, have a fair degree of control over their own labour process.

motivation and creativity are found in the measure of autonomy requirements used here.⁴⁹

The reward structure for autonomy requirements involves much steeper earnings gradients for men than for women. The kinds of high autonomy jobs that women have access to are subject to a different reward structure than the high autonomy jobs occupied by men. For women, gaining access to jobs requiring higher levels of self-motivation, creativity, independent thought and action, decision making, etc., moves them up an earnings gradient that is only half as steep as that travelled by men. If steep earnings gradients are a form of social control for men to encourage effective use of autonomy on the job, then how can this same behaviour be secured from women at one third of the rate?

There is another angle that must be considered in the interpretation of these findings. A feminist perspective would situate the analysis in a discussion of power relations and class domination. In arguments reminiscent of the deskilling debate, the argument could then be made that reward is based upon power and not skill. The image of skill is used to legitimate higher rewards. However, it is really the power that is bound up with those skills that is being rewarded.

⁴⁹ In fact, the CCSS questions used to construct conceptual and task autonomy (my measure of autonomy loads heavily on both) were developed in conjunction with Erik Olin Wright to identify his class positions.

There are certainly elements of the autonomy measure used here that might be thought of as indicators of power as well as of skill. Both the items relating to directing the work of others and to decision making are indicators of power within an organization. As well, many of the items in the task autonomy scale might be thought of as privileges that go with power (i.e., deciding working hours and pace of work). It is this added dimension of power that separates autonomy requirements from the other skill measures. Is it possible that the large gender differences in rate of return to autonomy have as much to do with socially constructed attitudes toward women in positions of power as with unequal reward levels for the actual job skills involved?

On-the-Job Training: Regardless of whether autonomy requirements capture skill or power or both, my results show that the reward structure attached to autonomy is very different for men and women. The reward structure attached to on-the-job training requirements also differs significantly by gender. Men are rewarded at a much greater rate than women for being in jobs with high on-the-job training. This could be due to discrimination⁵⁰, real differences in the nature

⁵⁰ The on-the-job training of men may be more highly valued by employers since it is associated with men.

of the training for women and men⁵¹, or it may reflect differences in the importance of on-the-job training as a reward criterion in the earnings process of men and women.

Earlier it was noted that researchers have been finding a higher rate of return to education for women than men (see Section 3.2). While these higher rates of return to each increment in education for women do not translate into overall higher levels of earnings, this finding is at odds with commonly held ideas about discrimination and the meaning of regression coefficients in an earnings equation. In my findings, women have a greater rate of return than men to higher level educational credentials (only upper level university is statistically significant) [Tables 3.2(A)&(B)]. Such findings can be reconciled with the lower overall levels

⁵¹ The measure of on-the-job training requirements used here taps only the dimension of time involved in the training process. With these data, therefore, it is impossible to determine differences in the nature of the training for men and women.

It is possible that women and men are trained in very different areas. If so, gender difference in the rate of return to training may reflect different values being applied to different types of training that cut along gender lines. This would mean that a man and a woman being trained for the same period of time for different tasks would receive different rewards for that training due to different values being placed upon those tasks. This raises questions about the quality and nature of the training men and women receive. Do men receive better quality training than women in the same period of time? Are men trained in areas that are in higher demand than those in which women are trained? These questions are inspired by neo-classical thought and cannot be answered using the CCSS data. Questions regarding gender differences in the nature of training could be investigated using the Adult Education and Training Survey (Statistics Canada, 1992 & 1994).

of earnings for women by viewing education (part of the skill acquisition stage) as one criterion that is used by employers for selecting individuals into specific jobs and their attendant reward structures. Using this framework, on-the-job training (also part of the skill acquisition stage) may be another selection criterion. Formal education may be a more important selection criterion for women and on-the-job training may be a more important selection criterion for men.

In Chapter 5, I investigate the relative importance of education, on-the-job training, and experience (all arenas for skill acquisition and practice) as allocative criterion into specific skill requirements for women and men. This provides a better understanding of the multi-stage earnings determination process as a structure of opportunity. Men have more opportunities to acquire on-the-job training (see Chapter 4) and this translates into more opportunities to be considered for jobs with high knowledge skill requirements.

In Chapter 4, I investigate whether women and men have equal opportunities to acquire on-the-job training. Specifically, I ask whether differences in education can explain the lower levels of on-the-job training found for women. Women are not disadvantaged with respect to the amount of education they attain. According to the job competition model proposed by Thurow (1975), education acts as a signal to employers about potential training costs. Higher levels of education suggest lower training costs; therefore, individuals

with higher education are more likely to be placed at the head of training queues. Education, however, does not appear to be giving off the same signals for women as it does for men. The result is that women have significantly lower levels of on-the-job training requirements. As learned in the previous section, lower levels of on-the-job training requirements account for a large portion of the gender gap in earnings. In fact, an almost equal contribution is made by differences in the level of on-the-job training as is made by gender differences in the rate of return to on-the-job training.⁵²

⁵²Another large contribution to the gender gap in earnings is made by gender differences in personal attributes of men and women. In particular, prior experience and job tenure account for a major portion of the earnings gap. Women have lower levels of both types of experience and suffer the consequences of lower earnings as a result. The lower levels of prior experience and job tenure of women add an average of about \$1,681 to the gender gap (Table 3.5). In addition to this, women are rewarded at a significantly lower rate of return for each year of either type of experience. These differences in rate of return to prior experience and job tenure, on average, add an additional \$1,580 to the gender gap (Table 3.5).

The contribution of gender differences in prior experience and tenure to the earnings gap is over and above that made by gender differences in on-the-job training. One might speculate that men are more highly rewarded for their job experience because they are more likely to receive skill enriching on-the-job training. However, with the effects of on-the-job training entered into the model separately, the gender differences in the reward structure surrounding experience remain. It is not merely that men are receiving more training during their labour force experience that brings them a higher rate of return to time spent in the labour market.

Becker (1975:75) proposes that there is a 'practice effect' of experience on earnings. As an individual gains experience (regardless of any training that may take place at the same time) on the job, that individual simply gets better at doing the job. This increases productivity, according to Becker; which, in turn, is rewarded more highly by the

employer. If this is the case, then employers are evaluating the 'practice effect' of men and women quite differently.

Only the gender difference in rate of return to prior experience is significantly different (statistically speaking). The gender difference in rate of return to tenure is not statistically significant. Therefore, the greatest inequality stems from differences in the way men and women are rewarded for the work experience they had before entering their present job. One factor that might have an impact on this is the greater discontinuity of women due to childbearing responsibilities. Perhaps women are being penalized for this discontinuity in experience (see Robinson, 1986, for support of this hypothesis). The CCSS sample size is too small to allow a meaningful investigation of this possibility.

CHAPTER 4

GENDER DIFFERENCES IN ON-THE-JOB TRAINING OPPORTUNITIES

4.1 Introduction

In the last chapter, we learned that gender differences in level of job skill requirements contribute very little to the gender gap in earnings. In fact, women and men are hired into jobs with very similar requirements for cognitive complexity and manual skills; and, while women are selected for jobs with lower autonomy requirements than men, this contributes only a small amount to the gender gap.⁵³ A large contribution is made to the earnings gap, however, by the fact that women have lower on-the-job training opportunities.⁵⁴

In this chapter, I address the link between formal education and on-the-job training in an effort to understand more fully how men and women end up in jobs with such different levels of on-the-job training requirements. I demonstrate that formal schooling signals different levels of on-the-job training opportunities for men and women.

⁵³ Of course, a major portion of the earnings gap can be traced to the finding that women are rewarded at a significantly lower rate of return to the same level of autonomy requirements.

⁵⁴ This is compounded by the finding that women are also rewarded at a lower rate of return to the same level of on-the-job training.

According to Thurow's (1975) job competition model, education acts as a signal to employers about potential training costs. Higher education is associated with lower training costs. Lower estimated training costs result in a more favourable position in the training queue. Although increasing level of education does increase the likelihood of on-the-job training for both women and men, it is more effective for men overall. At every level of education, women have lower levels of on-the-job training opportunities. These lower levels cannot be explained by gender differences in experience either. Is education a less powerful signal for women or do other characteristics related to gender intervene? While these data cannot be used to answer this latter question, I speculate that gender itself is an important criterion in the queuing order for on-the-job training (i.e., women are not selected as often as men for positions which include on-the-job training).

The lower levels of on-the-job training of women cannot be blamed on deficiencies in education; women compare quite favourably with men with respect to their educational attainments. They are simply unable to trade on these attainments as effectively as men for additional skill acquisition. This results in lower levels of on-the-job training and, ultimately, lower earnings as discovered in the previous chapter.

I begin this chapter with a discussion of Thurow's (1975) job competition model to explain the importance of the link between education and on-the-job training. This is followed by an examination of the effect of different levels of education on on-the-job training opportunities. Regression analysis is used to compare the magnitude of this effect for women and men. I then demonstrate that at every level of education, men have higher levels of on-the-job training opportunities. In an effort to eliminate other possible explanations for this phenomenon, I investigate the possible role played by gender differences in experience on the education/on-the-job training relationship. A variety of other possible explanations were pursued, to no avail, and are summarized in footnotes where relevant. Finally, I discuss statistical discrimination as a possible explanation for the gender differences in on-the-job training opportunities.

4.2 The Role of Formal Education

Much of the research on the gender gap in earnings has focused on the role of educational attainment. Human capital theory postulates that men and women invest differently in education due to differences in expected labour force participation. Underlying this model is the assumption that men and women are properly matched with jobs based upon their educational attainments. Human capital theory, therefore, is predicated upon the notion that individuals compete for wages

directly based upon their educational attainments and labour force experience.

Thurow's (1975) 'job competition model', however, frames the role of education in the earnings determination process somewhat differently. Under the job competition model, individuals do not compete directly for wages on the basis of education; rather, they compete for training slots. Job skills are learned mostly on-the-job, not in school. According to Thurow (1975:76), "the labor market is not primarily a bidding market for selling existing skills but a training market where training slots must be allocated to different workers." People are rewarded for the characteristics of the jobs they perform and not for their educational attainment.

Under the job competition model, educational attainment is thought to be important in helping people compete for certain jobs. However, employers place these competing individuals into a queue based upon their expected training costs. While education is one factor in calculating potential training costs⁵⁵, there are other characteristics of

⁵⁵ The cost of training may go down for a number of reasons. Education provides a basic foundation of knowledge and skills upon which on-the-job training can build. Education also teaches an individual how to learn new things; it is at least expected that higher educations suggest that an individual has a capacity for such learning. Some would argue that education teaches individuals how to be a part of an organization and conform to certain standards--making training easier and less expensive. Education may also be important as an arena for screening in its own right (Stiglitz, 1975). The process of education is thought to screen out the less able

individuals that are considered. The expected discontinuity of women (due to family responsibilities), for example, may result in the placement of women at the end of the job queue. Also implicit in the job competition model is the notion that not all job experience is equally enriching. The key factor in determining the value of job experience is how much training is attached to a particular job.

Under human capital theory, individuals bargain their education and experience directly for earnings in the labour market. The job competition model, however, views the link between education and earnings as a multi-stage process. Education is used as a signal by employers to select individuals for certain training slots. Skills are learned in those training slots and it is those skills that are rewarded by earnings.

In this dissertation, I treat earnings determination as a multi-stage process. In the early stage of the process, the skill acquisition stage, education and experience affect on-the-job training opportunities (in addition to having direct effects on skill requirements and earnings). Gender differences in opportunities in the early stages of the process can influence earnings through a number of paths. Do women have the same on-the-job training opportunities that men have? Can women's lower levels of on-the-job training be

individuals. Higher educations suggest successful passage through increasingly more intense screening. This screening process is simply appropriated by employers.

explained by deficiencies in education? The answer to both questions is no.

4.3 Converting Education into On-the-Job Training

Opportunities: Methodological Reminders

The effect of education (and experience) on on-the-job training requirements is estimated here using regression analysis. As in the previous chapter, a credential-based measure of education is used instead of years of education. This credential-based measure of education is entered into the regression equation as a series of dummy variables. The base category represents those who have less than completed high school. The following dummy variables are entered: (1) completed high school vocational; (2) completed high school academic; (3) incomplete post-secondary; (4) completed non-university post-secondary; (5) completed lower level university degree (bachelor's level, teacher's college, nursing school); and (6) completed upper level university degree (graduate degree, professional degree).

The credential-based measure of education, rather than education measured in years, is chosen for this analysis for a number of reasons (see Chapter 3). I return to that discussion now to refresh the reader's memory and to add some additional explanation.

While most researchers have adhered to the strict linear model where the effect of years of education on earnings is

tested, there have been those who have argued that education credentials should also be considered (Arrow, 1973; Dougherty, 1987; Faia, 1981; Hunter and Leiper, 1993; Leiper and Hunter, 1990; Spence, 1974; Stiglitz, 1975; implied in Thurow, 1975; Wiles, 1974).

Credentials are typically viewed as a screening or signalling device for employers⁵⁶ and have been found to be

⁵⁶ There are a variety of opinions, however, as to just what signal is sent to employers by such credentials. For some the signal is related to productivity (Arrow, 1973; Spence, 1974). While pure human capital theory dictates that years of education increase the actual productivity of the worker, these screening/signalling theories propose that education credentials provide a method of predicting the productivity of a potential employee when no concrete information about that individual's value actually exists. Typically, it is believed that an employer's past experience with employees of differing credential levels (and other characteristics) is used to make this judgment. Arrow's (1973) version of this general model is referred to as the 'filter theory of education'; Spence (1974) called his variant the 'job market signalling game'.

Other credentialism models are even further distanced from human capital theory by dropping all references to productivity--real or predicted. Some maintain that educational certification is used to legitimate the social order in the workplace (Schelling, 1963; Wiles, 1974: 51-52). Credentials have also been viewed as a signal for proper job-socialization or character formation (Berg, 1970: 75-76; Jencks, et al, 1979: 115; Wiles, 1974: 50-51) and as evidence of an individual's ability to think (education is an exercise that develops the brain like a muscle) (Wiles, 1974: 51). Credentials may act as signals to groups other than employers as well. Unions and occupational/professional associations can also use educational credentials to limit competition, justify wage increases, and otherwise control the flow of individuals into certain job structures (Wiles, 1974: 52). All of these credentialism models depart from human capital theory in that they view credentials as a signal to be used by employers during the job matching stage rather than as a characteristic to be rewarded directly. Like the job competition paradigm, these models dictate that education is a selection criterion used by employers to place individuals into certain jobs.

significant in the earnings determination process. Anisef, Ashbury, and Turritin (1992) found that community college graduates in Ontario had fewer opportunities for advancement and economic prosperity than their university counterparts (despite spending a similar a number of years in school). There is no evidence that these differences are due to any deficiencies in college education (relative to university education). These findings reflect social attitudes in this country toward the status of the academically oriented university education compared with the more vocationally oriented college education.

Hunter and Leiper (1993) found evidence that credentials do influence earnings above and beyond the effect of mere years of schooling. Hunter and Leiper (1993) also discovered that both years of education and education credentials tend to increase the skill level of individuals.

If credentials are important in earnings, as past research suggests, it is reasonable to expect that education credentials would also be important in obtaining jobs with on-the-job training. The analysis presented in this chapter, therefore, relies on a credential-based measure of education.

Another advantage to using a credential-based measure of education is that it allows more information to be gathered. There are distinct differences between the effects of vocational and academic credentials, for example, even when the number of years required to obtain these credentials is

roughly the same. Some of these differences also cut across gender lines. This is valuable information that cannot be captured using years of education.⁵⁷

Prior job experience is also added as an independent variable to the model. Just as educational attainments might affect on-the-job training prospects, so too might one's past job experience. Essentially, school and prior job experience are the two arenas in which individuals can acquire human capital before entering into a specific training slot.

The on-the-job training variable used here is described in detail in Appendix C. This measure represents the amount of on-the-job training normally required by an individual's job. While this measure is attached to the job, not the individual, it is not unreasonable to make the assumption that, in most cases, the individual has had such training in order to be located in that job.⁵⁸

⁵⁷ As was true in my treatment of education in the earnings determination model in Chapter 3, the entire analysis presented in this chapter was also performed using years of education instead of the credential-based measure reported here. The basic conclusions regarding the link between education and on-the-job training for women and men remain the same. The measure reported here, however, captures the nuances of this link.

⁵⁸ In Appendix C, the problems encountered in measuring the on-the-job training variable are discussed. The question from which this variable was operationalized contained ordinal level categories. The analysis reported here is based upon the ordinal level categories outlined in Appendix C.

The feasibility of using the variable in this form was investigated using years of education as an independent variable and a variety of options for measuring on-the-job training as the dependent variable. Only with a continuous

The Findings

Does education have the same effect on on-the-job training opportunities for women and men? The unstandardized

level independent variable could the curvilinearity of the relationship be tested.

The first option involved using a continuous measure of OJT based upon a mid-point estimate (as described in Appendix C) of each category. The regression analysis performed using the mid-point option clearly produces a curvilinear function (when years of education are used as the independent variable). For the most part, the same relative gender differences that were discovered using the ordinal measure for OJT appear when the continuous mid-point option is used. The storyline is essentially the same. However, the extreme curvilinearity of the function makes it difficult to compare the effects of different levels of education on OJT within each function.

Subsequent options involved transformations of the continuous mid-point measure of OJT in an attempt to straighten out the curve. The use of the natural log transformation of the mid-point measure of OJT straightened the curve considerably and yielded regression coefficients for men that were surprisingly similar to the coefficients obtained using the ordinal measurement. For women, however, the natural log transformation fails to straighten the curve and the coefficients are difficult to interpret (they fail to match supporting tabular analysis). This is, no doubt, due to the low proportion of women at the high end categories of OJT coupled with the nature of the log function).

Finally, a square root transformation of the mid-point measure of OJT produced a straightening of the curve for both men and women. The coefficients obtained are surprisingly similar to those obtained using the ordinal measure for both men and women. The gender differences are slightly more pronounced however.

The ordinal level variable was chosen for presentation in this research for a number of reasons. Since the gender differences under this measurement were slightly smaller, it was felt that this would provide the most conservative test scenario. If significant gender differences are found using the more conservative test scenario, they are less likely to be an artifact of the measurement technique. The ordinal level measure is also easier to interpret than the square root transformation. Finally, the distortion due to the use of ordinal level data is unlikely to be any greater than the distortion due to the use of a mid-point estimation using categories of increasing and unequal size.

regression coefficients for the equation described above indicate that education does not have the same effect on on-the-job training opportunities for women and men (Table 4.1)

The coefficients for men in the regression model estimated are higher than those for women for every independent variable listed. This means that at every level of education, education has a stronger effect on on-the-job training requirements for men than for women. The gender differences for vocational high school, non-university post-secondary school⁵⁹, and lower level university are statistically significant. Education and prior experience are both more effective at giving men (than women) access to jobs that have high on-the-job training requirements. This leaves women with fewer options for gaining access to training on-the-job. The two most important achieved characteristics (education and experience) that can influence on-the-job training opportunities do not operate as effectively for women as they do for men.

⁵⁹ which, with the exception of CEGEP in Quebec and some western colleges, are typically thought of as solely post-secondary vocational institutions.

TABLE 4.1
UNSTANDARDIZED COEFFICIENTS OBTAINED FROM REGRESSION OF
ON-THE-JOB TRAINING REQUIREMENTS ON
EDUCATIONAL ATTAINMENT AND PRIOR EXPERIENCE
FOR MEN AND WOMEN

	Men	Women	% W/M
HiSchlVoc	2.029*g	.850g	42%g
HiSchlAcad	1.444*	1.016*	70%
IncomPS	1.886*	1.780*	94%
NonUPostSec	2.748*g	1.329*g	48%g
LowerUniv	2.270*g	1.382*g	61%g
UpperUniv	2.494*	1.451*	58%
PriorEx	.053*	.025	47%
Constant	3.099*	2.307*	74%
Adj.R2	.098	.041	

* Significant at .05 or better

g Gender difference in coefficients statistically significant at .05 or better.

Note: Full-Time, Full-Year, Employees 18 Years and Older (CCSS)

The on-the-job training variable used here is measured on a 12 point ordinal scale (representing levels ranging from short demonstrations to seven or more years of on-the-job training). A short exercise using the equations in Table 4.1 to estimate average on-the-job training requirements for men and women might help put the differences in coefficients into perspective.

Consider, for example, men and women with no prior work experience and completed non-university post-secondary schooling. On average, men with this profile enter jobs which require one to two years of on-the-job training (level six on the on-the-job training scale). Women with this profile, on average, enter jobs which require roughly three to six months of on-the-job training (level four on the on-the-job training scale).

These findings point to a much more favourable set of training opportunities for men at every education level. While training opportunities improve as education increases for both sexes, men at the lower levels of education still have fairly healthy prospects for on-the-job training. This conclusion is reinforced in the following section where I consider access to apprenticeships.

4.4 Apprenticeship Emphasizes the Point

While the measure for on-the-job training requirements includes time required in apprenticeship programs, there is a separate variable which identifies those who have completed an apprenticeship. Because of its formal nature (conferring certification that is usually transferable from employer to employer) and the frequent involvement of occupational and professional associations, it is important to investigate this component of on-the-job training separately.

TABLE 4.2
PERCENTAGE COMPLETED APPRENTICESHIP
BY EDUCATION AND GENDER

EDUCATION LEVEL	MEN % COMPLETED APPRENTICESHIP	WOMEN % COMPLETED APPRENTICESHIP
ALL EDUCATION LEVELS	24.0	8.6
ELEMENTARY SCHOOL OR LESS	21.9	2.5
SOME ACADEMIC HIGH SCHOOL	19.2	10.9
SOME VOCATIONAL HIGH SCHOOL	48.7	0.0
HIGH SCHOOL ACADEMIC	33.4	4.7
HIGH SCHOOL VOCATIONAL	35.7	16.3
INCOMPLETE POST SECONDARY	19.1	4.7
NON-UNIVERSITY POST SEC	31.6	9.4
LOWER UNIVERSITY (BACH/NURSE/TEACHING)	12.1	12.9
UPPER UNIVERSITY (GRAD/PROF DEGREE)	8.6	6.8

Note: Full-Time, Full-Year Employees 18 Years and Older
Source: Canadian Class Structure Survey

Overall, for all levels of education, 24 percent of the men have completed apprenticeships compared with only 8.6 percent of the women. The category of those with less than completed high school is broken down into three levels: elementary or less, some academic high school, and some vocational high school. Despite not completing high school, it appears that men still have a fairly good chance of

entering into apprenticeship programs. This option is not available to women to the same degree (note: there are few women in these lower education categories however). Apprenticeship for men is particularly important in the low to mid-range levels of education.

4.5 Gender Differences in Educational Attainments

While every level of education provides men with greater access to on-the-job training opportunities, men do not have overall higher levels of educational attainments. Men have, on average, 12.4 years of formal education; while women have, on average, 12.8 years of formal education. The use of years of education, however, can often obscure important differences in the nature of education.

TABLE 4.3
LEVEL OF EDUCATIONAL ATTAINMENT
BY GENDER

LEVEL OF EDUCATIONAL ATTAINMENT	MEN	WOMEN
(1) LESS THAN COMPLETED HIGH SCHOOL	32.5%	23.7%
(2) HIGH SCHOOL ACADEMIC COMPLETED	17.2%	20.9%
(3) HIGH SCHOOL VOCATIONAL COMPLETED	7.1%	4.8%
(4) INCOMPLETE POST-SECONDARY	10.2%	10.3%
(5) NON-UNIVERSITY POST SEC COMPLETED	14.6%	18.6%
(6) UNIVERSITY (BACH/NRS/TEACH) COMPLETED	11.3%	17.3%
(7) UNIVERSITY (GRAD/PROF DEGREE) COMPLETED	7.1%	4.4%
TOTAL %	100.0%	100.0%
TOTAL	774	577

Note: Full-Time, Full-Year Employees 18 Yrs & Older

Source: CCSS

Differences in distributions for women and men statistically significant at .000 (Mann-Whitney and Kolmogorov-Smirnov)

By reconceptualizing education in terms of specific credentials, a more obvious gender pattern appears. More men than women fail to complete high school (32.5 percent -vs- 23.7 percent)--leaving a greater proportion of men with the lowest level of education (Table 4.3). More women than men finish lower level university educations including bachelor degrees, nursing school, and teachers college (17.3 percent -vs- 11.3 percent). However, more men than women finish graduate school and professional degrees (7.1 percent compared with 4.4 percent).⁶⁰ Overall, women may actually have

⁶⁰ It is important to remember that the women in this analysis may not be representative of all working women. By restricting the analysis to full-time, full-year workers it is likely that the women with the best labour force opportunities

superior levels of education.⁶¹ Men tend to be overrepresented at both the highest and lowest levels of education. Women tend to be located more in the upper mid-range.

4.6 Gender Differences in On-the-Job Training

As described in Chapter 3, men have significantly higher levels of on-the-job training requirements (Table 4.4).⁶² Thirty-four percent of men are in jobs that require over one year of on-the-job training; this compares with only 18 percent of women. As we have just seen, this cannot be due to superior levels of education, since men do not have superior levels of education.

are proportionately overrepresented in the analysis (particularly given the high participation of women in part-time work). This is likely to mean that the education levels of women in this analysis are slightly elevated above that of the general population.

⁶¹ The educational distributions of women and men are different; this difference is statistically significant.

⁶² This table originally appeared in Chapter 3 as Table 3.3. It is repeated here for ease of reference.

TABLE 4.4
ON-THE-JOB TRAINING BY GENDER
(Percent)

	Short Demo.	Up to 30 Days	1-3 Months	3-12 Months	Over 1 Year	Total
Men	18	14	13	21	34	100
Women	27	19	22	14	18	100
Diff	- 9	- 5	- 9	7	16	

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

Differences in distributions for women and men statistically significant at .000 (Mann-Whitney and Kolmogorov-Smirnov)

Men have higher levels of on-the-job training opportunities at every level of education. For those who have less than completed high school, there is a significant difference in the on-the-job training opportunities for women and men. Almost half of the women with less than completed high school are in jobs requiring only a short demonstration; this is true of only a quarter of similarly educated men [Tables 4.5(A)].

TABLE 4.5 (A)
ON-THE-JOB TRAINING BY GENDER
FOR THOSE WITH LESS THAN COMPLETED HIGH SCHOOL
(Percent)

	Short Demo.	Up to 30 Days	1-3 Months	3-12 Months	Over 1 Year	Total
Men	25	16	21	19	19	100
Women	47	20	16	8	10	101*
Diff	-22	- 4	5	11	9	

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

* Error due to rounding

Differences in distributions for women and men statistically significant at .000 (Mann-Whitney and Kolmogorov-Smirnov)

TABLE 4.5 (B)
ON-THE-JOB TRAINING BY GENDER
FOR THOSE WITH COMPLETED HIGH SCHOOL
(Percent)

	Short Demo.	Up to 30 Days	1-3 Months	3-12 Months	Over 1 Year	Total
Men	16	16	13	22	34	101*
Women	21	25	22	18	15	101*
Diff	- 5	- 9	- 9	4	19	

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

* Error due to rounding

Differences in distributions for women and men statistically significant at .001 (Mann-Whitney and Kolmogorov-Smirnov)

TABLE 4.5(C)
ON-THE-JOB TRAINING BY GENDER
FOR THOSE WITH SOME POST-SECONDARY
(Percent)

	Short Demo.	Up to 30 Days	1-3 Months	3-12 Months	Over 1 Year	Total
Men	19	21	7	15	38	100
Women	12	14	36	8	31	101*
Diff	7	7	-29	7	7	

Note: Full-Time, Full-Year, Employees 18 Years and Older
Source: CCSS

* Error due to rounding

Differences in distributions for women and men not statistically significant (Mann-Whitney & Kolmogorov-Smirnov)

TABLE 4.5(D)
ON-THE-JOB TRAINING BY GENDER
FOR THOSE WITH NON-UNIVERSITY POST-SECONDARY
(Percent)

	Short Demo.	Up to 30 Days	1-3 Months	3-12 Months	Over 1 Year	Total
Men	10	6	7	25	53	101*
Women	22	16	27	12	23	100
Diff	-12	-10	-20	13	30	

Note: Full-Time, Full-Year, Employees 18 Years and Older
Source: CCSS

* Error due to rounding

Differences in distributions for women and men statistically significant at .000 (Mann-Whitney and Kolmogorov-Smirnov)

TABLE 4.5 (E)
ON-THE-JOB TRAINING BY GENDER
FOR THOSE WITH UPPER AND LOWER LEVEL UNIVERSITY
(Percent)

	Short Demo.	Up to 30 Days	1-3 Months	3-12 Months	Over 1 Year	Total
Men	15	9	9	23	45	101*
Women	24	16	16	22	22	100
Diff	- 9	- 7	- 7	1	23	

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

* Error due to rounding

Differences in distributions for women and men statistically significant at .000 (Mann-Whitney and Kolmogorov-Smirnov)

Among those with completed high school education, 34 percent of the men are in jobs requiring over one year of on-the-job training; this compares with only 15 percent of the women. At the same time, 21 percent of these women are in jobs requiring only short demonstrations (compared with 16 percent of the men) [Table 4.5(B)].

There is no statistically significant difference between the male and female distributions among those with incomplete post-secondary education. While there is a small difference in the percentage of men and women at the lowest and highest levels of training (men more highly represented in both), women are noticeably more represented in the mid-range of training (one to three months). One possible explanation for

this is that the men in this group may be very heterogenous. This group includes those who attempt post-secondary education and leave before obtaining their credentials. Those men who end up in jobs with low levels of on-the-job training may include those who left school due to failure (which would tend to decrease their likelihood of being chosen for training) or it may include those who were enroled in an area for which a recognized credential is required by governing professional/occupational associations or unions. Those men who are in jobs with high on-the-job training requirements may have left school because of these opportunities [Table 4.5(C)].

Over half of all men with non-university post-secondary education are in jobs requiring over a year of on-the-job training. Less than a quarter of their female counterparts have this level of training opportunity. Very few men with non-university post-secondary education have low levels of on-the-job training (only 10 percent have short demonstrations and only six percent have up to 30 days on on-the-job training). A considerably higher proportion of women in this group have the lowest levels of on-the-job training (22 percent with only a short demonstration and 16 percent with up to 30 days) [Table 4.5(D)].

Almost a quarter of all women with university education (all levels) are in jobs with only a short demonstration required as training; this compares with only 15 percent of

their male counterparts. Almost half of all men (45 percent) with university education have over a year of on-the-job training; less than one quarter (22 percent) of their female counterparts have this opportunity [Table 4.5(E)].

While it is obvious that education improves the chances of having high on-the-job training opportunities for both sexes, this advantage is much more pronounced for men than women. Non-university post-secondary education is particularly valuable to men as a passport to on-the-job training. With the exception of CEGEP in Quebec and some community colleges in western Canada,⁶³ the credentials obtained in this group are largely vocational in nature. This suggests that post-secondary vocational education acts as a gateway for training opportunities for men (much less so for women). Post-secondary vocational education may act as a signal to employers that training costs will be low (perhaps because some of the training has already taken place in school or because the candidate has displayed his capacity for learning by obtaining the credential). If training costs are low, the individual is placed near the top of the training queue and is more likely to be chosen for jobs that carry high on-the-job training. However, if the candidate is female,

⁶³ CEGEP and some western community colleges are more academically oriented and are, in fact, university transfer streams.

this signal seems to be subject to some interference. There are two possible explanations for this.

The Gendered Structure of Skill Acquisition: The type of non-university post-secondary education that women and men pursue is likely to be very different.⁶⁴ The curriculum of women in this group may be in areas where all the necessary training required to function in the workplace is taught in school (such as clerical and secretarial programs). When these women enter the labour force, they are hired for the skills they already have (Hall and McFarlane, 1963). Employers need not pay the cost of training these women since the women themselves and the state have already borne that cost. Men in this group may also acquire vocationally relevant skills; however, they are hired for their potential to learn additional skills at the expense of the employer (Hall and McFarlane, 1963). Examples of this are community college programs in certain trades (such as carpentry, automechanics, machining, etc.) which are dominated by male students. While these programs provide skills and knowledge, they are typically linked with apprenticeships that take place outside the school system.

As argued by Gaskell (1992), the school system itself (particularly vocational schooling) is set up in such a way

⁶⁴ An investigation of the subject areas studied by this group indicates that there are major differences in the curriculum. The subject areas for both, however, are too heterogenous and the sample size too small to provide a meaningful analysis using these data.

that it perpetuates the inequality of skill acquisition in the labour market. Training for secretarial and clerical work became "lodged in public schooling" (Gaskell, 1992:130), while "apprenticeships continued outside the school" (Gaskell, 1992:130). Because the skills required in secretarial and clerical work are learned before entering the labour force, they become invisible in the labour force. Young women, of course, dominate these programs and enter this type of work. Young men dominate programs that lead to apprenticeships. The skill involved in the trades to which the apprenticeships lead are not invisible. Since employers are bearing the cost of much of the training, it is much more difficult to ignore these skills.

This structure of skill acquisition and recognition is a product of politics and power. 'Progressive reformers' at the turn of the century argued that:

. . . an 'academic' curriculum was elitist and that schooling had to be adapted to the needs of working-class children. They also argued that vocational courses would make pupils more productive and well-paid workers, and would mesh schooling with the economy to make it more efficient. (Gaskell, 1992:129)

Employers were only too eager to have the state assume the cost of training young people for work. Labour "was split" (Gaskell, 1992:129) on the issue. Some trades managed to "consolidate their positions enough to limit, regulate and enforce apprenticeships" (Gaskell, 1992:122). By keeping apprenticeship out of the school system, such trades managed

to maintain control over the skill acquisition process and ensure recognition of those skills.

Statistical Discrimination: Another explanation for these findings lies in the concept of statistical discrimination. Statistical discrimination involves using a potential worker's gender as an indicator of the person's potential productivity and organizational behaviour based upon statistical averages for the entire group. With regard to an employer's decision concerning whether to offer on-the-job training, women may be considered a more costly group to train due to their discontinuity related to childbearing responsibilities.⁶⁵ If a woman undergoes training then leaves to raise a family, the employer has less time in which to recover his/her training costs. This may indicate that, as a group, women have higher training costs. This will have the effect of placing them at the end of the training queue. (England and Farkas, 1986:125-126 & 130-131).

These two explanations are not mutually exclusive. It is likely that both contribute to the findings outlined above. In fact, they might be thought of as very complementary. Statistical discrimination limits opportunities for skill acquisition at the workplace for women; at the same time, the structure of the education system offers them complete training before they even enter the workplace. Of course,

⁶⁵ Of course, men who are trained may be just as likely to leave an employer to move to a better job.

basic discrimination by employers (and even unions) could play a role in the lower training opportunities faced by women.

4.7 Experience and On-the-Job Training Opportunities

Next to education, work experience is probably the most important achieved characteristic that is considered to have an influence on on-the-job training opportunities. The fact that women have less work experience, on average, could have some bearing on the findings outlined above.

Before entering their present job, men have an average of nine years of prior work experience and women have an average of six years of prior work experience.⁶⁶ Prior work experience has a stronger impact on obtaining a job with on-the-job training for men than for women (Table 4.1). Could this be due to the lower levels of prior work experience of women? Is it possible that a certain amount of experience is required before one can be considered for on-the-job training? Since women have less prior experience, they may be less likely to reach this 'threshold' and this could account for the lower overall effect of prior experience on on-the-job training found for women.

In an effort to find out if such a threshold effect can explain the lower levels of on-the-job training found for women, I generated a number of on-the-job training

⁶⁶Women have an average tenure in present job of about seven years, while men have an average tenure of about ten years.

distributions for women and men at different levels of prior work experience. Within every level of prior work experience, women have significantly lower levels of on-the-job training. As an example of this exercise, I present a comparison of the on-the-job training requirements of women and men with five years or less of prior work experience [Table 4.6(A)] and of women and men with over five years of prior work experience [Table 4.6(B)].

Among those with five years or less prior work experience, men have significantly higher levels of on-the-job training opportunities than women. In this group, 32 percent of the men are in jobs with over a year of on-the-job training; only 20 percent of the women have jobs with that much training attached [Table 4.6(A)]. Among those with over five years of prior work experience, the same gender pattern is found. In fact, the gender differences are slightly more pronounced. In this group, 35 percent of the men have over one year of on-the-job training compared with only 18 percent of the women. At the same time, 31 percent of the women are in jobs requiring only a short demonstration compared with only 19 percent of the men [Table 4.6(B)]. Women cannot be blamed for their lower on-the-job training opportunities because they have less experience than men.⁶⁷

⁶⁷ A number of structural explanations were investigated in the same manner as level of experience. Each investigation asked the question: Can on-the-job training differences between women and men be explained by their overrepresentation in certain structures? In this line of inquiry, I compared

TABLE 4.6 (A)
ON-THE-JOB TRAINING BY GENDER
FOR THOSE WITH FIVE YEARS OR LESS PRIOR WORK EXPERIENCE
(Percent)

	Short Demo.	Up to 30 Days	1-3 Months	3-12 Months	Over 1 Year	Total
Men	15	14	19	21	32	101*
Women	18	22	22	19	20	101*
Diff	- 3	- 8	- 3	2	12	

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

* Error due to rounding

Differences in distributions for women and men statistically significant at .0001 (Mann-Whitney and Kolmogorov-Smirnov)

TABLE 4.6 (B)
ON-THE-JOB TRAINING BY GENDER
FOR THOSE WITH OVER FIVE YEARS PRIOR WORK EXPERIENCE
(Percent)

	Short Demo.	Up to 30 Days	1-3 Months	3-12 Months	Over 1 Year	Total
Men	19	14	12	21	35	101*
Women	31	18	21	12	18	100
Diff	-12	- 4	- 9	9	17	

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

* Error due to rounding

Differences in distributions for women and men statistically significant at .000 (Mann-Whitney and Kolmogorov-Smirnov)

on-the-job training opportunities of men and women within firms of various size and within industries. As with education and experience, the same gender pattern appears within every structure. Also examined were promotional ladders. I constructed a variable that measured the degree of promotional opportunities attached to an individual's job. The categories of this variable were: no promotional ladder; weak promotional ladder; moderate promotional ladder; and strong promotional ladder. Even in jobs with strong promotional ladders, women have significantly less on-the-job training opportunities.

4.8 Summary

Education leads women and men into jobs with different on-the-job training requirements. Every level of education has a stronger positive effect on on-the-job training requirements for men than women. Vocational education, in particular, seems to act as a signal to employers to select men for jobs carrying high levels of on-the-job training requirements. The result is that men are located in jobs which have substantially higher on-the-job training requirements. This is particularly important for men at the low end of the educational scale. A higher proportion of men than women have less than completed high school. Yet these men have a high rate of apprenticeship and other training opportunities. If men fail to acquire human capital in school, they get a second chance. This safety net does not exist for women to the same degree. Men seem to be plugged into a learning structure within their labour market experience.

If Thurow's job competition model is an accurate view of how the labour market operates, one might conclude that women are placed at the bottom of the training queue. According to Thurow, position within the training queue depends upon the return on investment in training. Education is thought to be used as an indicator of training costs and potential return on investment. The higher the education, the lower the expected training costs and the higher the expected return. Under

these conditions, women should do very well with respect to training opportunities since they have, overall, higher levels of education than men. Yet women do very poorly with respect to training opportunities compared with men. Not even their lower levels of experience can explain their training disadvantage. Education and experience are considered the two most important achieved characteristics that affect one's position in the training queue. Yet neither of these characteristics help to explain why women have lower on-the-job training opportunities.

One might argue that there are certain background characteristics that are tied to gender like intelligence, ability, stability, etc., that might explain the gender differences in expected training costs and expected return on investment. But how are these measured by employers during the hiring process. Do these differences reduce to discriminatory attitudes toward the ability and intelligence of women on the part of employers?

Women as a group have a history of lower participation rates and a higher rate of discontinuity due to childbearing and rearing responsibilities (Ostry, 1968; Robinson, 1986). In an imperfect world, employers need some signal about potential training costs. Discontinuity in the labour market raises the financial risk involved in providing training for women. The amount of time available to realize the returns from investment in on-the-job training may be lower for women

as group. Statistical discrimination based upon the discontinuity and lower participation rate of women as a group may be at the heart of the gender differences in training prospects. Unwilling to take a chance on women, employers may be more inclined to place men at the head of the queue for training slots. Women are left to acquire their training outside the labour market.

There is also a gendered structure to the linkage between school and work. This structure accommodates the statistical discrimination described in the previous paragraph quite nicely. Power and politics are woven into the history of the modern day school curriculum. Skills required for some jobs are taught entirely within the school system (Gaskell, 1992; Hall and McFarlane, 1963). This is a product of attempts to reduce the elitist nature of school and improve the efficiency of the economy. Supported by employers who stood to benefit from having the state absorb some of their training costs and opposed by some labour groups who feared loss of control, this move toward vocational schooling resulted in a reflection of the power structure of the time. The linkage between school and work still reflects this power structure. Apprenticeships remained outside the school system; this reflects the organized power of men in trades. Clerical and secretarial skills are taught within the school system; this reflects the lack of power wielded by those who use these skills on the job--predominantly women.

In this chapter, I have demonstrated that women have much more limited opportunities to acquire skills than men do. For women, the formal education system is the main arena for skill acquisition; if they fail to acquire skills in school, they have little chance of making up for it. Men, however, have a built-in safety net with their significantly greater opportunities for on-the-job training. What are the implications of these differences for the way women and men are matched to skill requirements of jobs?

In the next chapter, I extend this analysis by examining gender differences at the job matching stage. Just as women and men acquire skills in different arenas, they are selected for jobs on the basis of different criteria. Education is a relatively more important criterion for the selection of women into high knowledge-based skilled jobs (autonomy and cognitive complexity). Men, however, are selected for these jobs on the basis of a greater mix of criteria; this mix includes education, experience, and on-the-job training. Higher levels of schooling increase the chances for both sexes of being chosen for high skilled jobs (autonomy and cognitive complexity). For men with lower levels of education, on-the-job training is particularly important in the matching process. Women with lower levels of education, however, have no alternative selection criterion on which they can rely.

CHAPTER 5

EDUCATION, EXPERIENCE, AND TRAINING: SKILL SORTING BY GENDER

5.1 Introduction

In my analysis, I have shown that men are more likely than women to be employed in jobs with high autonomy but that there is very little difference in the cognitive complexity and manual skill requirements of the jobs performed by women and men (Chapter 3). In the previous chapter, we learned that, despite bringing overall higher levels of education to the labour force, women are not chosen for jobs that carry high levels of on-the-job training to the same degree that men are. Not even their lower levels of prior job experience can explain the disadvantage that women face with respect to on-the-job training opportunities. We also know that these lower levels of on-the-job training for women have a significant impact on the gender gap in earnings (Chapter 3).

In this chapter, I focus on the skill matching stage of the earnings determination process--the stage where skills acquired are matched with skills required. Since men have significantly greater opportunities to acquire skill, one might expect that they would end up in jobs requiring significantly greater levels of skill. However, men and women are employed in jobs that have very similar requirements for cognitive complexity and manual skills; and men are hired into jobs that have only moderately higher requirements for

autonomy than the ones into which women are hired. In this chapter I ask: are education, experience, and on-the-job training equally important selection criteria for the entry of women and men into jobs with varying levels of skill requirements?

I demonstrate that women and men are subject to a different process of selection into job skill requirements. Formal education is a more important criterion for the allocation of women into jobs with high knowledge-based skill requirements (cognitive complexity and autonomy) than it is for men. While education is also an important criterion for the selection of men into such high-skill jobs, its effect on the matching process is more indirect. Higher education on its own signals a match between men and jobs with high autonomy and cognitive complexity requirements. However, for men at the lower end of the educational scale, schooling brings on-the-job training. This on-the-job training is an important selection criterion into jobs with higher levels of autonomy and cognitive complexity requirements for men. Since women do not have the same opportunities to acquire on-the-job training, as demonstrated in the last chapter, they must rely relatively more on the skills acquired in the formal school system when seeking work. I begin this chapter by reviewing the level of job skill requirements of women and men presented earlier. This review establishes the fact that women and men have very similar cognitive complexity and

manual skill requirements and that men have moderately higher levels of autonomy requirements. This is followed by a gender comparison of the skill matching process.

Comparing the effects of education, experience, and on-the-job training on skill requirements (for autonomy, cognitive complexity, and manual skills), for women and men, I demonstrate that, overall, education has a stronger positive effect on the selection of women (than men) into knowledge-based skill requirements (autonomy and cognitive complexity) and a stronger negative effect on the selection of men (than women) into manual skill requirements.

While on-the-job training increases the likelihood of being selected for jobs with high autonomy requirements for both sexes, men are in a much better position to take advantage of that effect due their greater on-the-job training opportunities. With the use of path analysis, I compare the proportion of the effect of education on skill requirements that is direct and indirect (through on-the-job training) for women and men. This analysis shows that for selection into jobs with high autonomy and cognitive complexity requirements, the effect of education is more direct for women than for men. For men, education is an important selection criterion; however, on-the-job training is also an important selection criterion. Since men have greater on-the-job training opportunities at every level of education (than women), a

higher proportion of the effect of education on skill requirements is indirect through on-the-job training.

Finally, this suggests that the matching process for women and men is different. Skills acquired directly in formal schooling may be relatively more important in the matching process for women; and skills acquired on-the-job may be relatively more important in the matching process for men. These differences are largely a result of unequal opportunity for on-the-job training. If women and men were subject to the same selection process for on-the-job training, the average autonomy and cognitive complexity requirements of their jobs would be higher. Men and women are subject to a different balance of selection criteria that leads them into surprisingly similar levels of skill requirements (only autonomy requirements are moderately higher for men). I conclude this chapter with a discussion of the possible implications of this for the value that is ultimately placed upon the skill requirements of their jobs in the earnings determination process. If women acquire their skills in school and are hired into job requirements on the basis of their formal education, is it more likely that their skills will be less visible on-the-job? If men acquire a large share of their skills on-the-job and are hired into job requirements on the basis of their on-the-job training, is it more likely that their skills will be more visible on-the-job?

5.2 Review of Job Skill Requirements

As discussed in Chapter 3, men are hired into jobs with moderately higher levels of autonomy requirements; however, the cognitive complexity and manual skill requirements of men's and women's jobs are very similar (Table 5.1).⁶⁸ We know from previous chapters that women have slightly higher levels of education overall, but that men have significantly greater on-the-job training opportunities and more job experience. In the next section, I examine how these differences in the skill acquisition stage of men and women result in the pattern of job skill requirements described here.

⁶⁸ Table 5.1 originally appeared as Table 3.3 in Chapter 3.

TABLE 5.1
AUTONOMY, COGNITIVE COMPLEXITY, AND MANUAL SKILL
REQUIREMENTS BY GENDER
(Percent)

	1 (Low)	2	3	4 (High)	Total
AUTONOMY					
Men	21	27	22	31	101*
Women	28	29	20	24	100
Diff.	- 7	- 2	2	7	
COG. COMPLEXITY					
Men	20	21	29	30	100
Women	24	23	28	25	100
Diff.	- 4	- 2	1	5	
MANUAL SKILLS					
Men	26	23	30	22	101*
Women	24	22	32	22	100
Diff.	2	1	- 2	0	

Note: Full-Time, Full-Year, Employees 18 Years and Older

Source: CCSS

* Error due to rounding

Gender differences in distributions for Manual Skill and Cognitive Complexity Requirements not statistically significant.

Gender differences in distributions for Autonomy Requirements statistically significant at .009 or better (Mann-Whitney and Kolmogorov-Smirnov)

5.3 The Skill Matching Process

Education, experience, and on-the-job training are all important selection criteria for employers matching individuals with job skill requirements. However, for men and women the relative importance of these variables to employers in the matching process differs.

Using regression analysis, I compare the effect of each of these variables from the skill acquisition stage on skill requirements (for autonomy, cognitive complexity, and manual skill requirements) for women and men. As in Chapters 3 and 4, education is entered into the model as a series of dummy variables in order to capture the nuances of different levels of education. Prior experience is also entered into the equation and refers to experience obtained before entering present job. Prior experience may be important in helping a person obtain a job with specific skill requirements. Two equations are estimated for women and men for each of the three skill requirements. In the first equation, only education and prior experience are entered. The second equation adds on-the-job training to the variables in Equation 1. From this, we develop a rough idea of the amount of the effect of education and experience that is due to the intervention of on-the-job training.

Autonomy Requirements: When looking at the regression of autonomy requirements on education and experience, the coefficients for education are higher for women than men

(except for non-university post-secondary) (only the gender differences in incomplete post-secondary coefficients are statistically significant). The coefficient for prior experience is higher for men than women (gender difference is statistically significant). This suggests that education is more important for women than men in the matching stage; similarly, prior experience is more important for men than women. (Equation 1, Table 5.2)

TABLE 5.2
UNSTANDARDIZED COEFFICIENTS OBTAINED FROM REGRESSION OF
AUTONOMY REQUIREMENTS ON
EDUCATIONAL ATTAINMENT, PRIOR EXPERIENCE
AND ON-THE-JOB TRAINING
FOR MEN AND WOMEN

	Men Equation 1	Men Equation 2	Women Equation 1	Women Equation 2
HiSchlVoc	.166	- .016	.505*	.400
HiSchlAcad	.346*	.216	.514*	.388*
IncomPS	.548*g	.379*	1.021*g	.801*
NonUPostSec	.803*	.557*	.672*	.507*
LowerUniv	1.488*	1.284*	1.692*	1.521*
UpperUniv	1.629*	1.405*	1.889*	1.709*
PriorEx	.014*g	.009*	.000g	.003
OJT		.090*		.124*
Constant	3.021*g	2.743*g	2.674*g	2.388*g
Adj.R2	.223	.280	.241	.302

* Significant at .05 or better

g Gender difference in coefficients statistically significant at .05 or better

Note: Full-Time, Full-Year, Employees 18 years and Older

Source: CCSS

The addition of on-the-job training requirements in Equation 2 has a more noticeable effect on the coefficients of the lower education levels for men than for women (Table 5.2). The coefficient for high school vocational education for men is reduced considerably (from .166 to -.016) with the addition of on-the-job training to the model. Likewise, the coefficient for high school academic is rendered statistically non-significant by the addition of on-the-job training (from .346 to .216). While on-the-job training also reduces the education coefficients for women, the difference is less pronounced. This suggests that for men at the lower levels of education, a substantial portion of the effect of education on autonomy requirements is through on-the-job training.

Although it appears that less of the effect of education on autonomy requirements is through on-the-job training for women, on-the-job training is just as significant a selection criterion into jobs with high autonomy requirements for women as it is for men (on-the-job training coefficient for men is .09 and for women is .124). If women can get on-the-job training, it acts as an effective signal to employers to hire them for jobs with increasing requirements for autonomy. Unfortunately, as we learned in the previous chapter, women don't often have this opportunity.

Cognitive Complexity Requirements: A similar examination of the impact of education, experience, and on-the-job training on the selection into jobs with varying levels of

cognitive complexity requirements reveals the same gender patterns (Table 5.3). Again, the education coefficients for women are higher (gender difference statistically significant for high school academic and lower level university) (Equation 1, Table 5.3). The addition of on-the-job training (Equation 2) to the model increases the gender difference in education coefficients (particularly high school academic). This suggests that, for men with lower levels of education, education is important in the matching process because of the on-the-job training opportunities that it brings.

While prior experience has no significant effect on the matching of individuals to the cognitive complexity requirements of jobs for either sex, on-the-job training has a significant effect for both women and men (coefficient of .122 for men and .121 for women). However, as noted in an earlier paragraph, women get so little on-the-job training that they are unable to take full advantage of this.

TABLE 5.3
UNSTANDARDIZED COEFFICIENTS OBTAINED FROM REGRESSION OF
COGNITIVE COMPLEXITY REQUIREMENTS ON
EDUCATIONAL ATTAINMENT, PRIOR EXPERIENCE
AND ON-THE-JOB TRAINING
FOR MEN AND WOMEN

	Men Equation 1	Men Equation 2	Women Equation 1	Women Equation 2
HiSchlVoc	.752*	.505*	.857*	.754*
HiSchlAcad	.346*g	.170g	.792*g	.669*g
IncomPS	.760*	.530*	1.148*	.933*
NonUPostSec	.906*	.572*	1.056*	.895*
LowerUniv	1.118*g	.842*g	1.826*g	1.659*g
UpperUniv	1.423*	1.120*	1.495*	1.319*
PriorEx	.003	.003	.009	.005
OJT		.122*		.121*
Constant	4.093*g	3.717*	3.547*g	3.268*
Adj.R2	.145	.251	.225	.283

* Significant at .05 or better

g Gender difference in coefficients statistically significant at .05 or better

Note: Full-Time, Full-Year, Employees 18 years and Older

Source: CCSS

Manual Skill Requirements: Neither prior experience or on-the-job training have a significant effect on selection into jobs with high manual skill requirements for either sex. For men, education reduces the likelihood of being hired for jobs with manual skill requirements. University education has a particularly strong negative effect on being hired into jobs with manual skill requirements. For women, only incomplete post-secondary education and upper level university have a significant (negative) effect on being hired into jobs with

manual skill requirements. As with men, these levels of education reduce the likelihood of women being hired for jobs with high manual skill requirements (Table 5.4).

TABLE 5.4
UNSTANDARDIZED COEFFICIENTS OBTAINED FROM REGRESSION OF
MANUAL SKILL REQUIREMENTS ON
EDUCATIONAL ATTAINMENT, PRIOR EXPERIENCE
AND ON-THE-JOB TRAINING
FOR MEN AND WOMEN

	Men Equation 1	Men Equation 2	Women Equation 1	Women Equation 2
HiSchlVoc	.274	.325	.076	.068
HiSchlAcad	- .592*g	- .556*	- .142g	- .151
IncomPS	- .424*	- .377*	- .447*	- .463*
NonUPostSec	- .374*g	- .305*g	.237g	.225g
LowerUniv	-1.340*g	-1.283*g	- .299g	- .311g
UpperUniv	-1.691*	-1.629*	- 1.689*	- 1.702*
PriorEx	- .008	- .007	.007	.006
OJT		- .025		.009
Constant	3.874*	3.952*	3.551*	3.530*
Adj.R2	.187	.190	.100	.098

* Significant at .05 or better

g Gender difference in coefficients statistically significant at .05 or better

Note: Full-Time, Full-Year, Employees 18 years and Older

Source: CCSS

5.4 The Direct and Indirect Effect of Education

The key to understanding the gender differences in the coefficients for education and on-the-job training just discussed (Tables 5.2 through 5.4) lies in Chapter 4. In Chapter 4, we learned that at every level of education men have greater on-the-job training opportunities than women. A quick glance at the equations in Tables 5.2 and 5.3 tells us that the education coefficients are higher for women than men and that there is no significant difference in the coefficients for on-the-job training. Given the fact that women have, overall, higher levels of education, this might suggest that women are selected for jobs with higher autonomy and cognitive complexity requirements than men. Yet we know that women are in jobs with lower autonomy requirements than men, and there is almost no difference in cognitive complexity requirements. These findings, however, must be interpreted in conjunction with the findings in Chapter 4. While there does not appear to be a great disadvantage for women with respect to the role of education and on-the-job training in the job matching process itself (Tables 5.2 and 5.3), the disadvantage that they face in the skill acquisition stage (lower on-the-job training opportunities) carries through to the job matching stage and, ultimately, to the reward stage.

Using path analysis, I decompose the effect of education on the three skill requirements (autonomy, cognitive complexity, and manual skills) into three parts: direct

effect, indirect effect (through on-the-job training), and correlated effects (due to the correlation between education and prior experience).⁶⁹ (Table 5.5)

For women the effect of education on both autonomy and cognitive complexity is overwhelmingly direct (ranging from 73 percent direct for completed high school academic to 90 percent direct for lower level university on autonomy and ranging from 80 percent direct for incomplete post-secondary to 90 percent direct for lower level university on cognitive complexity). For men, however, there is a much greater indirect effect through on-the-job training opportunities (ranging from 13 percent indirect for upper level university to 85 percent indirect for completed high school vocational on autonomy and ranging from 21 percent indirect for upper level university to 50 percent indirect for completed high school academic on cognitive complexity). These gender differences are particularly pronounced at the lower levels of education. (Table 5.5)

⁶⁹ The path models include the education dummy variables, on-the-job training requirements, and experience (where experience and education are correlated).

TABLE 5.5
PERCENTAGE DIRECT, INDIRECT, AND CORRELATED
EFFECTS OF EDUCATION ON SKILL REQUIREMENTS
FOR MEN AND WOMEN

	Men % Direct	Men % Indir*	Men % Corr**	Women% Direct	Women% Indir*	Women% Corr**
Autonomy						
HiSchlVoc	6%	85%	9%	75%	20%	5%
HiSchlAcad	60%	35%	5%	73%	24%	3%
IncomPS	65%	29%	6%	78%	21%	1%
NonUPostSec	68%	30%	2%	74%	24%	2%
LowerUniv	85%	14%	1%	90%	10%	0%
UpperUniv	86%	13%	1%	89%	9%	1%
Cog. Com.						
HiSchlVoc	67%	33%	1%	85%	12%	4%
HiSchlAcad	48%	50%	2%	82%	15%	2%
IncomPS	69%	30%	2%	80%	19%	1%
NonUPostSec	63%	37%	1%	83%	15%	2%
LowerUniv	75%	24%	1%	90%	9%	0%
UpperUniv	78%	21%	0%	86%	11%	2%
Manual Skls						
HiSchlVoc	83%	13%	4%	67%	7%	26%
HiSchlAcad	92%	6%	2%	86%	5%	9%
IncomPS	84%	10%	6%	95%	3%	2%
NonUPostSec	80%	18%	3%	90%	5%	6%
LowerUniv	95%	4%	1%	94%	4%	2%
UpperUniv	96%	4%	1%	98%	1%	1%

* Indirect effect through on-the-job training

** Correlated effect through prior experience and on-the-job training

Note: Full-Time, Full-Year Employees 18 Yrs & Older

Source: CCSS

Skills are acquired through education, work experience, and on-the-job training. Women have slightly more education, less work experience, and less on-the-job training than men. With regard to being hired for jobs having higher levels of cognitive complexity and autonomy requirements, education is a relatively more important selection criterion for women than it is for men. This suggests that women learn the skills that are required for the jobs they are selected to perform largely in school. If women have low levels of schooling, their chances of being selected for jobs with high skill requirements are greatly reduced. For men, however, because they have greater on-the-job training opportunities at all levels of education, skills are acquired in school and during on-the-job training. Both education and on-the-job training are important selection criteria for men when it comes to being hired for jobs with higher levels of cognitive complexity and autonomy requirements. For men with lower levels of education, there are alternate paths to skill acquisition (on-the-job training) and these alternate paths are important selection criteria when being considered for jobs with higher skill requirements.

The matching process for women and men is different. Skills acquired directly in school may be relatively more important in the matching process for women; and skills acquired during on-the-job training may be relatively more important in the matching process for men. This is

particularly true of women and men with lower levels of schooling and is largely the result of unequal opportunity for on-the-job training. If women and men were subject to the same selection process for on-the-job training, the average autonomy and cognitive complexity requirements of women's jobs would be higher.⁷⁰

5.5 Summary

In this chapter we have learned that skills acquired in the formal school system are relatively more important in the selection of women (than men) for jobs with varying levels of autonomy and cognitive complexity requirements. While education is also important in the matching of men to job skill requirements, its effect is both direct and indirect. Men have significantly greater on-the-job training opportunities at every level of education than women and this on-the-job training is another important criterion used to match men with job skill requirements. This is particularly important for men with lower levels of education since lower

⁷⁰ Using the regression equation for the effect of education and experience on on-the-job training for men, I estimated new on-the-job training levels for women. If women had the same process of selection into on-the-job training that men have (men equation) and their own education and experience levels, their on-the job training would increase. Using these predicted average levels of on-the-job training, I estimated average autonomy requirements for women (assuming that they maintained their own process of selection into autonomy requirements). Under these circumstances, women would be selected for jobs with the same average level of autonomy requirements (autonomy score of 3.7 for both sexes).

levels of education make both sexes less likely to be chosen for jobs with high autonomy and cognitive complexity requirements. Women at these lower levels of education can do little to improve their chances of being selected for high skill jobs. Their male counterparts, however, have an alternate path of opportunity. This alternate path results from their greater on-the-job training opportunities.

If women acquire their job skills in school and are hired into job requirements largely on the basis of their formal education, what are the implications of this for the value placed upon those skills? If training is done outside the workplace, are the skills it imparts less visible within the workplace? As noted by Gaskell:

Training for clerical work is available widely in the public high schools, at community colleges and in private training 'colleges'. It must be acquired by an employee at her own expense before entrance to the job. The location of training in public high schools is very important in making it universally accessible at an early stage in the educational process. . . . The result is a large pool of labour so identified with women that the assumption that all women can type becomes prevalent. Clerical skills become part of every woman's skills, along with the ability to manage her personal appearance, support the men around her and handle interpersonal relations. The training does not appear scarce, long and arduous, but easy, taken for granted (as long as you are female) and thus no skill at all. At the same time, men do not have these skills . . . (Gaskell, 1992:125)

If women acquire the skills to be able to exercise independent thought and judgement in school, will they be rewarded for them on the job? The much lower rate of reward to autonomy for women found in Chapter 3 may be a reflection of where

women learn the skills that comprise the autonomy measure used here. While women exercise these skills on the job, their skills are often invisible (Gaskell, 1992; Jenson, 1989). Jenson (1989) reminds us that a distinction is often made between the "talents of women and the skills of men". She notes that "frequently, the work which women perform is classified as non-skilled because it is considered too 'natural' and/or 'merely dexterous'." (Jenson, 1989:151)

In the last two chapters, we have learned that skill acquisition is a gendered process and that this carries over into the process by which individuals are selected for jobs with specific skill requirements. In Chapter 6, the final chapter, I return to an examination of the earnings determination process. I summarize the findings of this dissertation and discuss some of the issues that were raised in the previous chapters.

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CHAPTER 6

CONCLUSIONS

6.1 Introduction

In this dissertation, I investigated the gender gap in earnings using a multi-stage earnings determination model that included measures of individual attributes as well as measures of job requirements. I posed two central questions:

- (1) Do women earn less than men because they are hired for jobs which have lower skill requirements?
- (2) Do women earn less than men because they receive a lower rate of return to the same skill requirements that men do?

In the previous chapters, I demonstrated that men are hired for jobs which have moderately higher requirements for autonomy than those for which women are hired (Chapter 3). The measure of autonomy used here encompasses: the use of initiative, independent thinking, creativity, decision making, controlling the manner in which a task is performed, controlling the conditions under which a task is performed, and controlling the conceptualization of the task. While women are hired for jobs with lower requirements for autonomy, this explains very little of the gender gap in earnings.

I also demonstrated that women and men are hired for jobs with very similar requirements for cognitive complexity and manual skills (Chapter 3). Cognitive complexity requirements

refer to the degree of cognitive difficulty involved in the performance of a particular job. Manual skill requirements refer to the degree to which a particular job requires an individual to be involved with using her/his hands on the job. Again, this does not explain the gender gap in earnings.

While there is some evidence that women are hired for jobs with lower skill requirements in certain areas, this is not why they earn substantially less than men. This finding contradicts one of the core arguments of human capital theory. Human capital theory postulates that women have lower levels of skill than men and, therefore, earn less. An implicit assumption of human capital theory is that women and men are properly matched with skill requirements of jobs on the basis of the skills they possess. Attacking this assumption, I examined an earnings determination model that included measures of individual attributes as well as measures of skills required on the job. The fact that both sets of measures have significant effects on earnings for both sexes is an indication that a properly specified earnings determination model includes both types of measures.

The feminist-based literature on comparable worth has focused attention on the fact that even when women and men are in jobs requiring the same level of skill, women are not rewarded at the same rate for that skill. While I found that women and men have fairly similar rates of return to cognitive complexity requirements, women are, nevertheless, rewarded at

a much lower rate of return to autonomy requirements (Chapter 3). For every increase in the level of autonomy requirements, men earn significantly more than women. This inequity explains a major portion of the gender gap in earnings.

In this dissertation, I posed two additional (secondary) research questions:

(3) Do women earn less than men because they are hired for jobs which have lower on-the-job training requirements?

(4) Do women earn less than men because they receive a lower rate of return to the same on-the-job training requirements that men do?

It has been demonstrated that the answer to both these questions is 'yes' (Chapter 3). Women are hired for jobs which have significantly lower on-the-job training opportunities and this results in much lower earnings. At the same time, women are rewarded at a significantly lower rate of return for the on-the-job training opportunities that they do have. Again, this results in much lower earnings for women.

Examining earnings as a multi-stage process, I investigated two final questions as part of a sub-agenda. This sub-agenda involved a focus on gender differences in the opportunity structure leading up to earnings. Specifically, I asked:

(5) Do women and men have equal opportunities to acquire skill?

(6) Are education, experience, and on-the-job training equally important selection criteria for the entry of women and men into jobs with varying levels of skill requirements?

In an attempt to answer these questions, I demonstrated that women and men do not have equal opportunities to acquire skill (Chapter 4). While women have slightly higher levels of education, they have significantly lower on-the-job training opportunities than men. Every level of education has a stronger positive effect on the on-the-job training prospects of men than of women. Vocational education, in particular, seems to act as a signal to employers to select men for jobs carrying high levels of on-the-job training. The result is that men are located in jobs which have substantially higher on-the-job training requirements. This is particularly important for men at the low end of the educational scale. If men fail to acquire skills in school, they have a safety net in the form of on-the-job training. This safety net does not exist for women to the same degree.

These lower on-the-job training opportunities for women have implications for the skill requirements of the jobs they are hired to perform and, ultimately, have direct and indirect effects on earnings. Women and men, it appears, are selected for jobs on the basis of a different mix of criteria (Chapter 5). Education is a relatively more important criterion for the selection of women into jobs with high autonomy and

cognitive complexity requirements. Men, however, are selected for these jobs on the basis of a greater mix of criteria; this mix includes education, experience, and on-the-job training. Higher levels of schooling increase the chances for both sexes of being chosen for high skill jobs (autonomy and cognitive complexity). For men with lower levels of education, on-the-job training is particularly important in the matching process. Women with lower levels of education, however, have no alternative selection criterion on which they can rely.

In the examination of these questions and the interpretation of the findings, a number of additional issues arose. In this chapter, I return to a discussion of some of those issues.

6.2 Why Are Men Hired for Jobs with Higher Autonomy Requirements?

One of the findings of this research project is that men are hired for jobs which have moderately higher autonomy requirements than those for which women are hired. This may be partly due to the fact that men have greater on-the-job training opportunities. If women were able to translate their education and experience into on-the-job training at the same rate as men, they would be located in jobs with the same average level of autonomy requirements as men.⁷¹

⁷¹Using the regression equation for men to predict a new level of on-the-job training (substituting in the average education level and experience of women) for women under the

There are two additional possibilities that should be addressed with regard to the higher levels of autonomy requirements for men: (1) this could be an artifact of the self-reporting nature of the questions relating to skill requirements in the Canadian Class Structure Survey; and (2) this could be bound up in gender differences in power rather than gender differences in skill.

The skill requirement measures used here are derived from a factor analysis of information obtained in the Canadian Class Structure Survey on job skill requirements. This information is at the level of the individual's job and relies on ratings given by the individual herself/himself. While there has been widespread criticism of the gender bias found in the 'expert' rating of the occupational skill requirements (Worker Trait) attached to the CCDO and DOT in past research (Steinberg, 1990), there is also room for gender bias to creep into ratings provided by the job incumbents themselves. As noted by Cuneo (1990:109): "Men often overdescribe their job skills, while women often underdescribe theirs." (See also Gaskell's (1992) discussion of young women's attitudes toward

assumption of equal opportunity for on-the-job training, I then predicted a new average level of autonomy requirements for women. This involved substituting the new predicted level of on-the-job training (plus their own average education and experience) for women into the regression equation for women to predict autonomy requirements. If women had the same opportunity to use their education and experience to acquire on-the-job training as men do, their average level of autonomy requirements would be 3.7. The average level of autonomy requirements for men is 3.7 on the autonomy scale constructed here.

the skill requirements of their jobs.) If this is the case, it may be possible that the higher level of autonomy requirements of men are not real, but rather an artifact of the rating methodology. Under these conditions, the higher rate of return to autonomy requirements found for men would be even more pronounced than these findings indicate.

Finally, the higher level of autonomy requirements found for men may have more to do with gender differences in power relations than with skill. The dominant theme of the feminist-based literature on comparable worth is that skill is a concept that is socially constructed. It is argued that reward is based upon power and not skill. In certain occupations, some groups of workers (typically male craft workers or those represented by strong unions) were able to retain the 'image of skill' (Warskett, 1990:60-63) through the exercise of power. The image of skill is used to legitimate higher rewards. Differences between women and men in autonomy requirements may not be due to differences in the amount of skill required on the job, but rather to differences in the degree of power or authority to which women and men are granted access. As noted by Hall (1964:29), authority relations on the job are a reflection of status differences in society. Given the lower status of women in society, they are not considered appropriate incumbents in positions of authority, particularly when that authority is exercised over men. As a result, women are less likely to be considered for

such positions. The lower levels of autonomy requirements found for women may simply be due to the power/authority component of the autonomy measured here and the fact that women are seldom considered for positions of power/authority.⁷²

6.3 Why Do Men Receive a Higher Rate of Return to Autonomy Requirements?

As noted in the previous section, the measure of autonomy used here may be bound up with gender differences in power. There are elements of the autonomy measure used here that pertain directly to the performance of the job (such as: initiative, creativity, independent thought and action, etc.); other elements of autonomy might be considered indicators of power (such as: directing the work of others). While women have to exercise similar levels of initiative, creativity, and

⁷²In an effort to separate the effects of a possible 'power' dimension from this measure of autonomy, I investigated a series of earnings determination models which added various 'power-related' dummy variables to the existing model. Dummy variables for supervisory status, policy making authority, and task authority proved to be statistically non-significant for both sexes (leaving the earnings determination model presented here with few changes). Only the dummy variable for 'decision-making authority' was statistically significant for men (not significant for women). While decision-making authority adds to the earnings of men, it does very little to change the coefficient for autonomy described here (the greatest change in the existing earnings model is in the intercept). The gender differences in the autonomy coefficients remain relatively unchanged by the addition of 'decision-making authority' to the model. While this tends to suggest that autonomy may not be bound up with power for men, it should be noted that the dummy variables just described may not measure all forms of power.

independent thought, they may not have the power and prestige that goes with it. Women may be rewarded for the performance of these skills; men may be rewarded a premium for the power.⁷³ Steinberg provides an example of this:

Male managers are perceived as running offices and departments. Yet the daily work of the secretary in passing on messages, responding to emergencies, training new employees, and coordinating schedules for meetings and other activities remains invisible, especially if she performs these responsibilities competently. So too is the authority and coordination involved in the provision of services, where teamwork requires that the work get performed without resorting to formal authority. Thus the invisibility of women's work may extend beyond job tasks to alternative forms of work organization. (Steinberg, 1990: 459)

While the male manager and the female secretary may perform similar tasks (and have similar autonomy scores here), the male manager will be paid a premium for the formal authority that is attached to his position. While there may be greater responsibility attached to that authority, it is important to remember that authority may be one facet of autonomous work to which women have limited access.

Also tied to this 'power -vs- skill' critique, is the notion that the skills of women simply are not as visible as those of men even when they are performing the same tasks. This is particularly important to remember when women and men acquire their skills and perform these tasks in separate arenas. Steinberg (1990:464) notes that registered nurses are

⁷³ Men may also be paid a premium as a result of historic customs that are attached to their work (Steinberg, 1990:454).

usually given lower scores in most job evaluation plans on decision-making complexity than most 'first line supervisors'. Yet, the decision-making complexity of their job is hidden in the female preserve of nursing. Steinberg (1990:464) points out that "RNs must regularly make sophisticated technical decisions in emergency situations, including the decision of when to call the physician".

Women acquire their skills primarily in school (Chapters 4 and 5). The school system is so efficient at training young women for certain types of work (clerical and secretarial in particular), that these skills are often overlooked as simply part of being female (Gaskell, 1992; Steinberg, 1990). When skill is not acquired on the job, it may be less visible. However, when employers must extend an organization's resources to train an individual (usually male), these skills are more likely to be visible. Gender differences in on-the-job training opportunities, therefore, may have an effect on the rate at which certain skills are rewarded for women and men. If this is the case, the inclusion of on-the-job training in composite measures of skill requirements is likely to inflate the skill requirements of men.

6.4 What About Skills that Are Not Significant in the Earnings Determination Process?

Six skill requirement measures (autonomy, cognitive complexity, manual skills, social skills, organizational skills, and mechanical routinization) were generated to aid in

my analysis (Chapter 2). After testing a number of earnings models that included all six skill requirement measures, I continued my analysis with only the three measures that were statistically significant for earnings for at least one sex. The three non-significant skill measures were discussed previously (Chapter 3, Section 3.3). I return to this discussion now in an effort to demonstrate that there could be even more gender inequality in the earnings determination process than my models indicate.

While I outlined a number of methodological reasons why neither mechanical routinization or organizational skills were significant in the full earnings determination model, I was unable to explain the lack of significance of social skills in the earnings process in any of the earnings models tested. Women are hired for jobs that have significantly higher social skill requirements than those for which men are hired. This is a common finding in the literature on comparable worth. Yet social skills, are not significant in the earnings models estimated here.

This finding is quite consistent with another important feminist critique of job evaluation and process of earnings determination. Certain skills are performed primarily by women and are not rewarded for either sex. The factors typically chosen for analysis in job evaluation plans, for example, tend to reflect the skills and job dimensions associated with 'men's work' (Acker, 1987 & 1989; Armstrong

and Armstrong, 1990; England and Dunn, 1988; Steinberg, 1990; Steinberg and Haignere, 1987; and Warskett, 1990). Many of the best known and most frequently used job evaluation plans are known to have an extreme managerial bias (see Appendix B for discussion of job evaluation plans and the feminist critique). Most of these plans include factors measuring degree of managerial responsibility. Women are under represented in managerial jobs. There are, however, other skills involving interpersonal relations and responsibility that are very characteristic of 'women's work' (and not so characteristic of 'men's work'). Steinberg (1990:462-467), for example, points out that nurses must have high interpersonal skills to deal with patients and the families of patients (often under difficult circumstances). Women are often over represented in jobs which require dealing with the public (service jobs) and dealing with children (teaching and day care). Yet there are few job evaluation plans that examine these types of social skills as important factors in earnings.

6.5 Women with Lower Levels of Education Are Most Disadvantaged by the Gender Differences in the Multi-Stage Earnings Process:

One of the findings of this research is that education becomes a more important selection criterion for high skill jobs as level of education increases for both sexes. As level of education increases, it also brings greater direct rewards

in the form of earnings (over and above its indirect effect through on-the-job training and skill requirements). While women have lower on-the-job training opportunities at every level of education, this disadvantage has more serious consequences for women with lower levels of education.

At lower levels of education, on-the-job training becomes an important selection criterion for men into high skill jobs and brings direct rewards in the form of earnings. Women do not have this 'safety net'. If they fail to obtain a good education, there is little else on which they can rely to obtain high skill jobs or improve their earnings. The result of this is that the gender gap in earnings is greatest at the lowest levels of education. Among those with less than completed high school, women earn 57 percent of what men earn; among those with upper level university, women earn 85 percent of what men earn (Table 6.1). These findings are consistent with Ted Wannell's analysis of the earnings gap for university graduates in Canada. Wannell (1990) found that the gender gap in earnings was smaller for university graduates than for their peers without university degrees. He also found that the gap was lowest among graduates of doctoral programs (only a one percent difference).

TABLE 6.1
WOMEN'S AVERAGE EARNINGS AS A PERCENTAGE OF
MEN'S AVERAGE EARNINGS BY LEVEL OF EDUCATION

Less than Completed High School	57%*
High School Vocational	63%*
High School Academic	56%*
Some Post-Secondary	61%*
Non-University Post-Secondary	68%*
Lower Level University	63%*
Upper Level University	85%

Note: Full-Time, Full-Year Employees 18 Yrs and Older

Source: CCSS

* Gender difference statistically significant at .01 or better.

The gender gap in earnings varies by education level. It is important to remember that a number of factors that contribute to the gap also vary by education level. By substituting average levels of the independent variables in the earnings regression equation introduced in Chapter 3 (Equation 4) for each level of education for men and women, the contribution of gender differences in each variable to the earnings gap can be estimated for each level of education (Table 6.2). One of the most interesting findings of this exercise is that at lower levels of education, women are employed in occupations that are highly segregated by sex. This results in a much greater contribution to the overall gap in earnings by the percentage female in an occupation for lower levels of education.

Among those with vocational high school and less than completed high school, the employment of women in occupations that are highly segregated contributes about \$1,049 to the gender gap in earnings; for those with academic high school the figure is \$1,342; and for those with non-university post-secondary schooling it is \$1,264. Meanwhile, women with university education are employed in less sex segregated occupations and this actually lessens the gap (by \$654 for lower level university and by \$663 for upper level university). Both men and women suffer a penalty for being employed in occupations that have a high proportion of women.⁷⁴ However, since men are rarely employed in highly segregated 'female' occupations, particularly at lower education levels, they lose very little in earnings overall. (Table 6.2)

The employment of women with lower levels of education in highly sex segregated occupations is not independent of their lower opportunities for on-the-job training. In the absence of such training, these women rely predominantly on their education to acquire jobs. As pointed out by Hall and McFarlane (1963:65), "school is a feminine world in the vocational sense" (see also Gaskell, 1992). School prepares women for jobs that are highly sex-typed (such as clerical work). Employers hire from this large pool of trained labour.

⁷⁴ In fact, men are penalized at a slightly higher rate for every increase in percent female.

The lack of alternatives at the skill acquisition stage, leads women into jobs that are highly segregated by sex; for this, women suffer an additional wage penalty.

TABLE 6.2
CONTRIBUTION TO GENDER GAP IN AVERAGE EARNINGS OF SELECTED
VARIABLES FOR SIX LEVELS OF EDUCATION

Vars.	Less HiScl	Acad HiScl	Incom PSec	NonU PSec	Lower Univ.	Upper Univ.
Aut	\$5,824	\$6,009	\$6,115	\$7,509	\$8,190	\$8,447
CogCo	1,014	564	437	1,116	212	1,031
ManSk	-1,932	-1,372	-1,977	-1,294	- 163	-1,239
OJT	2,088	2,579	2,388	3,608	3,224	3,051
PrEx*	2,196	1,955	1,063	2,765	1,916	1,921
Ten*	1,588	1,365	1,463	496	970	1,606
FmSiz	1,623	1,730	2,149	1,797	1,680	2,636
%Fem	1,049	1,342	- 987	1,264	- 654	- 663
Union	-577	- 470	- 191	- 553	- 486	- 665
Const	-3,373	-3,373	-3,373	-3,373	-3,373	-3,373
EdLev	---	1,213	5,313	-5,629	- 56	-5,325
Total	9,498	11,542	12,400	7,707	11,461	7,428

Note: Full-Time, Full-Year, Employees 18 Years and Older
Source: CCSS

* The amount entered is the sum of either (Prior Experience and Prior Experience Squared) or (Tenure and Tenure Squared). Since decay term has been factored into the amount that appears here, this represents the total contribution of this variable to the average earnings gap.

The gender gap in earnings is a complex phenomenon. Men and women acquire skills and are matched with jobs within gendered structures. The result is that women and men have different opportunities at different stages in the earnings determination process. Ultimately, earnings inequality is a product of these differences in opportunity and of an evaluation system that arises out of the same gendered structures. Inequality is so deeply embedded in every stage of the earnings determination process that it is impossible to completely isolate any single cause.

Any strategy for eliminating the gender gap in earnings, must address this complexity from all angles. As argued by Gaskell (1992), the seeds of inequality in the labour force are sewn in the formal education system which continually reproduces gender inequality. As we have seen in this research, the lower levels of formal schooling prepare women for highly sex-segregated jobs and cut them off from jobs which provide on-the-job training.

Women must have increased access to jobs which offer training and lead to positions of power and authority. While women perform jobs that have high skill requirements, they are not rewarded for it equally with their male counterparts. This may be due to the invisibility of women's skills and/or it may be due to gender differences in the power and prestige that is attached to these skill requirements. Training women in the same arena as men (on-the-job), might improve the

visibility of the skills required in the jobs women perform. If there is a premium attached to power and authority (over and above the tasks required to exercise that power and authority), then women need access to jobs that carry power and authority if they are to be rewarded equally for the skills they exercise on the job.

Finally, the findings presented throughout this study also confirm that women have lower levels of work experience than men and that this contributes to the gap in earnings. This statistical fact may also contribute to the lower on-the-job training opportunities of women. Employers may be less likely to hire women for jobs that carry on-the-job training due to the fact that, historically, women have tended to be more discontinuous in the labour force due to their childbearing and childrearing responsibilities. Employers expect to earn a return on their investment in training. Workers who are likely to leave their employment for a period of time, may be viewed as poor investments. Such statistical discrimination, may be a contributing factor to the lower on-the-job training opportunities of women. Policies that facilitate a woman's ability to operate uninterrupted in the labour force (such as affordable day care) could be effective over time. Only a combined set of policies aimed at a number of facets of this complex problem are likely to eradicate the gender gap in earnings completely.

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Appendix A

The New Structuralism

A complete discussion of research on gender inequality in earnings should mention the literature on the new structuralism. This literature challenged the dominant human capital approach by suggesting that "structure is both more important than and logically prior to individual attainment" (Baron and Bielby, 1980:737). This literature focuses on the demand side of the capital/labour relationship, assumes that people face certain demand-oriented structures in the world of work which segment the labour force into non-competing groups. The structuralist perspective has spawned research based upon: industrial or economic sectors (eg., Averitt, 1968; Bluestone, 1970; Connors and Kemp, 1987; Hannan, Schomann, Blossfeld, 1990; Hodson, 1978, 1984a; Hodson and England, 1986; Kalleberg, Wallace, and Althauser, 1981; O'Connor, 1973; Wallace and Kalleberg, 1981); labour market segments (e.g., Boyd and Humphreys, 1979; Doeringer, 1967; Doeringer and Piore, 1971; Piore, 1975, 1983; see Coverdill, 1988, for excellent overview of labour market segmentation research on gender differences in earnings; see also Althauser, 1989, for review of literature on internal labour markets); and even class structure (Abowitz, 1982; Eno, 1985; Fawcett, 1990; Koo and Hong, 1980; Marks, Western, and Western, 1989; McNamee and Vanneman, 1987; Wright, 1978, 1979). There is an increasing acceptance, however, among the new-structuralists

that multiple structures affect individuals and that some structures operate within others.

Research in the structuralist tradition typically has approached inequality in earnings by use of a compositional argument. It is assumed that there is a different earnings determination process inherent in each structure. This results in some structures having greater opportunities for earnings. It is further assumed that some groups (typically women and minorities) tend to be over represented in those structures where earnings opportunities are lowest. One would, therefore, expect that the earnings of these groups overall would be based proportionately more upon the earnings determination process found within these less desirable locations. It follows from this that the gap in earnings between groups should decrease substantially when examined within each structure separately. Research does not tend to support this claim (see, for example: Coverman, 1986; Fawcett, 1990; Parcel and Mueller, 1983; Pfeffer and Ross, 1990; Tienda, et al., 1987; Ward and Mueller, 1985) (but see Wright, 1979, for research supporting this claim; also see Boyd and Humphreys, 1979, where a narrowing of the gap was found within the core sector).

While the relationship between the new structuralism and human capital theory is essentially adversarial in nature, many of the new structuralists have curiously adhered to a method of inquiry inspired by the human capital model. Much

of the research conducted on earnings inequality, for example, still relies upon an earnings function made up of the typical human capital variables (i.e., education, experience, job tenure) with controls for the effects of occupation defined in terms of status attainment scores (i.e., Duncan or Blishen points). Typically, returns and rates of return to these variables are determined separately for different labour markets, industrial/economic sectors, or classes. (See, for example: Bibb and Form, 1977; Denton and Hunter, 1982; Eno, 1985; Fawcett, 1990; Hodson, 1984a; Osterman, 1975; Wright, 1978 & 1979; Zucker and Rosenstein, 1981.)

Just as the new structuralism is methodologically quite similar to human capital theory, there is also the same realization that attention needs to be paid to 'the job' itself as a unit of analysis. For structuralist, however, this realization is framed somewhat differently than for those coming from the human capital tradition. While peeling back layers of relevant structures, the new structuralists acknowledge the need to examine the most basic structure of all--the job.

Regardless of which structural dimension is examined, the link between macro-structures and worker outcomes is the most 'taken-for-granted' structure of all--the job itself. After all the macro structures have been considered, it is still acknowledged that earnings differences will naturally exist between different types of work activities. Early in the

structural research, controlling for occupation was common (often using prestige ratings obtained through status attainment research). (See, for example: Beck, Horan, and Tolbert II, 1978; Eno, 1985; Wright, 1979; Zucker and Rosenstein, 1981.) More recently, there has been increasing evidence to suggest that there are large differences in the work performed within occupations (Bielby and Baron, 1986a; England, 1985). Again, this suggests that skill levels and other job dimensions are really what should be controlled. A more intimate look at the work performed by workers is warranted.

The debate between the neo-classical literature and the new structuralism has taken us to a new place on the road to understanding inequality. We have seen a curious synthesis of two seemingly adversarial approaches. Both have reached a point in research where the introduction of skill and job dimensions is the most logical next step.

Appendix B

The Job Evaluation Literature and the Feminist Critique

Job Evaluation:

Job evaluation plans have existed for over a century. Beatty and Beatty (1984:67) credit Frederick Taylor with the design of the first formal job evaluation system back in the 1880s. Taylor's job evaluation plan for a steel company provided a "formal, systematic way of assigning pay to jobs" (Beatty and Beatty, 1984:67) (see also Kaufman, 1986:3). Job evaluation plans provide a rationale and justification for wage differences between workers. It is not surprising, therefore, that Kaufman (1986:3) notes that unionization was a key factor in the introduction of job evaluation plans by employers. Kaufman also points out that in North America "the most influential event in promoting the use of job evaluation was the introduction of wage controls during the second World War." (Kaufman, 1986:3)

In Canada, there is no comprehensive research available that allows us to estimate the number of employers who actually use job evaluation plans; however, a variety of small studies using selected samples indicate that the majority of employers may utilize such plans (Kaufman, 1986:3).⁷⁵

⁷⁵ In 1972, Paterson claimed that roughly two thirds of the employed population in the USA and one third in Britain were covered by job evaluation schemes, while almost all of the employed population in Holland was covered by one national level scheme (Paterson, 1972:xi).

However, even within a particular company or firm only a portion of the employees may actually be covered by the plan. The studies suggest that less than half of the employees of a company or firm using a job evaluation plan are covered by the system (Kaufman 1986:3-4). Furthermore, a company or firm may employ one or more plans within the workplace. Different groups of employees may be covered by different plans and some may not be covered at all (Kaufman, 1986; Beatty and Beatty, 1984; Paterson 1972). Job evaluation schemes can be divided into two basic groups:

(1) **Qualitative Schemes:** These rely upon judgment values alone and include ranking and classification.

(2) **Quantitative Schemes:** These rely upon judgment values that are quantified and two of the best known types are the factor comparison method and the point factor method (Beatty and Beatty, 1984; Paterson, 1972; Kaufman, 1986).

Qualitative Job Evaluation Schemes

The qualitative schemes involve assessing the overall worth of a job and subsequently placing the job in an ordered or hierarchical job structure.

Ranking methods require evaluators to rank order jobs. The order of ranking may reflect the level of overall difficulty of the jobs or the value of the jobs to the firm. While this method is attractive to smaller firms (because of

the ease and low expense involved in its implementation), it can be problematic. In addition to being very subjective, this method cannot easily accommodate changes made to job descriptions (Beatty and Beatty, 1984; Kaufman, 1986; Paterson, 1972).

Classification methods require the specification of a certain number of job grades or classes. Within each grade or class, a description must be provided that distinguishes one grade from another and allows jobs to be identified as belonging to a particular grade. Pay rates are assigned by grade according to an overall assessment of the value of each grade. Often specific factors will be listed as important in the classification system (education, skill, responsibility, judgment, etc.). The assessment will be made, however, considering all factors simultaneously (Beatty and Beatty, 1984; Kaufman, 1986; Paterson, 1972).

Quantitative Job Evaluation Schemes

Quantitative methods of job evaluation rely upon the segmentation of jobs into specific factors and a method of yielding a score on the basis of these factors.

Factor comparison relies upon the selection of factors which are thought to be important in the overall worth of a job. Typically, anywhere from four to seven factors are used (Beatty and Beatty, 1984:70; Kaufman, 1986:13). A sample of 'benchmark' jobs is drawn from the firm (Beatty and Beatty, 1984:70; Kaufman, 1986:13). It should be generally agreed

that these jobs are fairly priced (that the wages attached to them reflect their value in a stable marketplace).⁷⁶ These jobs are ranked based upon some assessment of their value (wage rates are a common criterion for ranking purposes). The jobs are then assigned a dollar value for each factor (indicating the contribution of each factor to the total worth of the job). The dollar values of each factor are summed for each job. The jobs are again ranked on this basis. The ranking order obtained through this process is compared with the original ranking order. Discrepancies are "resolved" "judgmentally" (Kaufman, 1986:13). The other jobs in the firm are then judged "factor by factor" (Kaufman, 1986:14) by comparing them to these benchmark jobs.

The factor-comparison method dates back to 1926 (Paterson, 1972:82). It is not the most popular method of job evaluation due to the obvious complexity of its method (Beatty and Beatty, 1984:70; Kaufman, 1986:14). The original version of this scheme, proposed by Eugene Benge, made use of the following five factors: mental requirements, skill requirements, physical requirements, responsibility, and working conditions (Paterson, 1972:82-83). It is curious that mental requirements are considered separate from skill requirements. Paterson (1972:82) provides the following definition for mental requirements:

⁷⁶This procedure is obviously highly subjective.

. . . the mental abilities brought by a person to his job, judgment, patience, capacity to get on with others (and personality traits of a like nature) intellect, acquired knowledge about the job to be undertaken, and, with that, education. (Paterson, 1972:82)

Similarly, skill requirements are defined as:

. . . of a variety of kinds based on learning by doing. There are sensori-motor skills, e.g. manual, acquired by practice. Similarly, experience in doing a job develops a skill such as decision-making which is a mental exercise. Sub-divisions are time required to gain skill and also prior experience necessary to take on the job. (Paterson, 1972:82)

While these two factors cover a fairly wide range of dimensions (from social skills to intellectual skills and from manual skills to decision-making), there is also some overlap ("acquired knowledge about the job to be undertaken" and "prior experience necessary to take on the job"). This ultimately leads to 'double counting' of these skills (Steinberg, 1990:466).

Once again we see the lack of precision in defining skill and job dimensions. Not only are the factors open to rather wide interpretation, the potential for highly subjective judgments is also obvious. Additionally, this method accepts the value placed upon the benchmark jobs; if there is any bias involved in the value assigned to these jobs, this bias will be carried over into the rest of the evaluation procedure.

The point factor evaluation scheme also relies upon sets of factors that are thought to be important in the setting of wages. The importance of each factor to the overall wage rate

is weighted. Each factor is divided into levels or degrees (ranging from the lowest amount of the factor possible to the highest amount of the factor possible). Typically, each factor will have five to seven levels or degrees (Kaufman, 1986:14). Each level within each factor is then assigned points. The jobs are then evaluated factor by factor. The sum of the points for each job is taken. The total value will allow the employer to rank the jobs and assigned wages accordingly. This is the most popular of the quantitative schemes. (Beatty and Beatty, 1984; Kaufman, 1986; Paterson, 1972)

There are a variety of factors that have been considered in such point factor schemes. Paterson (1972:63-64) lists the following four factors (with sub-factors listed in parentheses): (1) 'skill (education, experience, and initiative and ingenuity)'; (2) 'effort (physical & mental/visual demand)'; (3) 'responsibility (for equipment or process, for material or product, for safety of others, for work of others)'; and (4) 'job conditions (working conditions and unavoidable hazards).' (Paterson, 1972:63-64) The influence of neo-classical theory is obvious in this rendition of skill (i.e., education and experience). Kaufman (1986:16) provides an example of a more updated point factor plan that contains the following factors: 'knowledge required by the position; supervisory control guidelines; complexity; scope

and effect; personal contact; purpose of contact; physical demand; and work environment.'

There are three basic ways in which bias and inequity can enter into job evaluation plans: (1) in cases where some employees of a firm are subject to a job evaluation scheme and others are not; (2) in cases where employees of the same firm are subject to different schemes; and (3) in cases where the value judgments made within the plan itself are biased. Vague definitions and measures of skill and other job dimensions leave the door open to bias in job evaluation plans. While employees have often asked for the implementation of a job evaluation scheme (in an effort to prevent inequities), employers have been able to use the schemes to rationalize, justify, and institutionalize their employment practices with regard to wages. The most important and thorough critique of job evaluation schemes comes, perhaps, from the feminist camp.

The Feminist Critique

There have been many feminist critiques of job evaluation in the literature on comparable worth. There are essentially three main ways that bias can creep into job evaluation. Often, only certain groups of employees in a given firm will actually be covered by the job evaluation plan. This results in different standards of evaluation for different groups in the firm. Related to this, is the 'multiple plan' problem where different groups of employees within a firm are covered by different job evaluation plans and, therefore, are subject

to different standards of evaluation. England and Dunn (1988:234) believe that "the use of multiple plans or pay lines is the single most important reason why job evaluation, though potentially helpful to women's relative wages, has had little impact on them." (See also: Steinberg and Haignere, 1987; and Warskett, 1990.) Finally, bias can enter into the system through the process of job evaluation itself. The most popular form of job evaluation has been the point factor scheme. There are three essential steps in the process of job evaluation in this type of plan. First, a set of relevant factors must be chosen for analysis. Second, factor weights must be applied to each factor to signify the importance of the factor to the total worth of the job. Third, salary levels must then be decided. Bias can enter the process during each of the three steps.

Which Factors Will Be Examined?

The first step in job evaluation (under the point factor system) involves the choosing of factors to be examined. The factors should reflect all those skills and job dimensions that are important in the performance of the job and the value assigned to it. Critics of job evaluation have argued that skill is socially constructed to reflect the values of the dominant power group (Armstrong and Armstrong, 1990; Blum, 1987; Steinberg, 1990:453; Warskett, 1990).

There is abundant evidence that women and men are concentrated in different kinds of jobs. This gender

segregation is at the root of comparable worth. If women and men worked in the same jobs, equal pay for equal work would be the policy of greatest concern. There are women's jobs (job groups where women represent the vast majority of incumbents) and there are men's jobs (job groups where men represent the vast majority of incumbents). It is argued that many of the skills involved in 'women's work' are invisible (Steinberg, 1990:460-463) and are left out of job evaluation schemes. It is further argued that these skills are necessary to the proper performance of the job and should be recognized and compensated accordingly. The factors typically chosen for analysis in job evaluation plans tend to reflect the skills and job dimensions associated with 'men's work'. (Acker, 1987 & 1989; Armstrong and Armstrong, 1990; England and Dunn, 1988; Steinberg, 1990; Steinberg and Haignere, 1987; Warskett, 1990.) The disadvantage of this practice for women is obvious.

The literature is filled with examples of job evaluation plans that rely on a set of factors biased in favour of men. One of the most important examples involves the absence of factors to measure interpersonal skills of a non-managerial nature and the overwhelming presence of factors measuring managerial responsibility. Many of the best known and most frequently used job evaluation plans are known to have an extreme managerial bias (for example: the Hay Guide Chart, the Aitken Plan and the Willis Plan). Most of these plans

include factors measuring degree of managerial responsibility. This is typically defined as the responsibility to control the work of others (Canadian Dimension, 1986; Steinberg, 1990; Warskett, 1990) or responsibility for financial assets (Steinberg, 1990:463). Women are under represented in managerial jobs. There are, however, other skills involving interpersonal relations and responsibility that are very characteristic of 'women's work' (and are not so characteristic of 'men's work'). Steinberg (1990:462-467), for example, points out that nurses must have high interpersonal skills to deal with patients and the families of patients (often under difficult circumstances). Women are often over represented in jobs which require dealing with the public (service jobs) and dealing with children (teaching and day care). Yet there are few plans that examine these types of social skills as factors.

When social skills are included, it is usually defined in a managerial or supervisory capacity (thereby excluding most women who are in jobs which demand high social skills). (Armstrong and Armstrong, 1990:40-42; Steinberg, 1990; Warskett, 1990:68) Warskett (1990:69) maintains that interpersonal skills considered by job evaluation plans (she uses the Willis Plan as an example) have "more to do with controlling others than caring for them." In fact, Warskett (1990:69) describes the human relations skill factor found in the Willis Plan and points out that the highest rating is for

"motivating others or getting them to do something that they might not do otherwise." The social skills of women (like many other types of skills) are often overlooked because they are thought of as "qualities intrinsic to being a woman" (Jensen, 1989; Steinberg and Haignere, 1987:165). These kinds of skills are also absent from many of the job evaluation plans because these plans were originally designed solely for managerial employees (typically male) but have been extended to other groups without appropriate modification (Acker, 1989; Steinberg, 1990:458).

Job evaluation plans often include factors for responsibility. However, responsibility is typically "oriented toward scope of financial assets" (Steinberg, 1990:463). Women are seldom found in jobs where they have responsibility over financial assets. However, they are over represented in jobs where they have the "responsibility of caring for troubled, sick, or dying patients" (Steinberg, 1990:463). Steinberg (1990:463) argues that most plans rate responsibility for human life below fiscal responsibility. While there are attempts to distinguish between degrees of responsibility for financial assets, little has been done to integrate a scale that would recognize varying degrees of responsibility for human life (i.e., how severe is the patient's condition, etc.).

Another factor that is typically excluded from job evaluation plans is fine motor skills (Steinberg, 1990:462;

Steinberg and Haignere, 1987:165). Bielby and Baron (1987) discovered that women were over represented in jobs requiring fine motor skills (finger dexterity), while men were over represented in jobs requiring physical strength (see also Hunter, 1988). 'Natural' finger dexterity is often a mentioned as a reason for hiring women to perform jobs involving fine motor skills; yet, it does not count as skill at evaluation time. This is another example of skills that are dismissed as qualities naturally held by women (Steinberg, 1990:462).

Most job evaluation plans allow compensation for unpleasant or dangerous working conditions. Such factors are often defined as lifting heavy objects and working out of doors--characteristics associated with male-dominated jobs. Ignored are conditions such as the use of VDTs, exposure to disease (health care workers), exposure to open office concepts, and exposure to patient waste material--all of which are associated with female-dominated jobs (Armstrong and Armstrong, 1990; Steinberg, 1990; Steinberg and Haignere, 1987).

The factors chosen for evaluation should reflect the full range of skills utilized by all employees covered by the plan. Yet as many of the critics demonstrated, there is a tendency to overlook the skills required of jobs dominated by women and an equal tendency to include skills required of jobs dominated by men. One of the most striking points made in the

literature is the distinction between interpersonal skills defined in terms of managerial responsibilities and interpersonal skills defined in terms of caring for, serving, and teaching others (particularly when those others are of relatively low status--i.e., patients, children, etc.). Also significant is the distinction between responsibility for fiscal assets (male dominated jobs) and responsibility for people (female dominated jobs). These points will be important as we consider further the dimensions important in defining the concept of skill.

What Weights Will Be Applied To The Factors?

Once the factors have been chosen for analysis, job evaluation plans must have a weighting scheme that reflects the relative value of each factor to the worth of the job as a whole. As with the selection of factors, there is much evidence that weighting schemes have been slanted in favour of males.

As mentioned in the last subsection, gender bias enters into the process of job evaluation when the factors for interpersonal skills are defined in terms of managerial responsibility (without mention of caring for, serving, or teaching people). This bias is further compounded when such factors are awarded unusually high weights. Typically, managerial skills and technical skills are awarded the highest weights (Canadian Dimensions, 1986; Steinberg, 1990:466; Steinberg and Haignere, 1987:170). The weights awarded to

these factors are often in the order of five and seven times the value awarded to other factors. An additional problem involves "double counting". This often happens when plans have factors that overlap. Typically, the area of overlap involves managerial skills. In such cases, more than one factor taps managerial skills--in effect, counting the same skills twice (see Steinberg, 1990:466; Steinberg and Haignere, 1987:167).

Factor weights can be decided upon in at least two distinct ways. Weights can be decided "a priori" using values determined by the evaluation committee. Weights can also be determined empirically in a "policy capturing" approach (Steinberg and Haignere, 1987). A sample of 'benchmark' jobs (defined earlier) is drawn and regression analysis is performed using actual wages as the dependent variable with the chosen factors as independent variables. The regression coefficients become the weights. The wage information might be limited to the particular firm under study or it might include wages from firms in a similar environment. Bias can enter into either approach. Just as value judgements affected the choice of factors, they can affect the weights decided upon in an 'a priori' method. The 'policy capturing' method merely institutionalizes whatever biases exist in the marketplace evaluation of the factors. If the intent of the job evaluation plan is to eliminate the discrimination in the marketplace (as with comparable worth), this approach makes

little sense. (England and Dunn, 1988; Steinberg, 1985 and 1990; Steinberg and Haignere, 1987)

Also important to note is the potential for gender bias that can result from the range of possible points assigned to each factor. The range of possible points for each factor should allow for adequate distinctions to be made between existing levels of the factor (skill or job dimension). Where there are too few levels (a limited range of points), the importance of the factor may be underestimated despite the weights assigned. (Acker, 1989)

Setting Salaries

The final stage in job evaluation involves two distinct processes. First, a score is developed for each job based upon the factors chosen and the weights awarded. This is dependent upon an accurate and complete description of the jobs in question. If information regarding skills and other job dimensions are missing from the description obtained by the evaluation committee, then there may be a failure to award points on some factors. There is evidence that the description obtained for female dominated jobs is often not complete and often underestimates the degree of skill or job dimension involved (England and Dunn, 1988:232-233; Steinberg, 1990:467).

As with factor weights, salaries can be assigned 'a priori' or using the 'policy capturing' approach. Again, as

with factor weights, bias can enter into the equation using both methods.

The Social Construction of Power as Skill

The dominant theme in the feminist critique of comparable worth is that skill is a concept that is socially constructed. The goal of comparable worth is to modify job evaluation plans in a manner that will eliminate the kind of gender biases discussed in the earlier sub-sections. It is still too early to accurately assess the success of comparable worth as a policy.

There are those who have grave concerns about the potential of comparable worth to begin with (Armstrong and Armstrong, 1990; Blum, 1987; Warskett, 1990). These researchers reject the neo-classical premise of job evaluation (that skill and job worth are being rewarded). Instead, they return the analysis to a discussion of power relations and class domination. In arguments reminiscent of the deskilling debate, these researchers argue that reward is based upon power and not skill. In certain cases, some groups of workers (typically male craft workers or those represented by strong unions) were able to retain the 'image of skill' (Warskett, 1990:60-63) through the exercise of power. The image of skill is used to legitimate higher rewards. The strong emphasis on managerial skills in the job evaluation literature is seen as further evidence that the hierarchy is based upon power and not skill.

Appendix C
Methodological Concerns

Selection Procedure

The attrition of cases after the various selections is as follows (non-weighted sample):

<u>Selection</u> <u>Procedure</u>	<u>Cases Left After Selection Procedure</u>		
	<u>Males</u>	<u>Females</u>	<u>Total</u>
Presently Employed & Unemployed 1 yr. or less	1203	836	2039
Employees Only	950	758	1708
Full-Year Only	821	664	1485
Full-Time Only	780	515	1295

This analysis utilizes the method of listwise deletion of missing data; listwise deletion ensure that "all means, standard deviations, and correlations are based on the same universe"(Nie, et al, 1975:353).

On-the-Job Training

On-the-job training is operationalized from Question 66 of the CCSS questionnaire which asks: "Beyond formal schooling, how much on-the-job training, apprenticeship training or job experience is now normally required for people who do your type of work?" The response categories available are:

- (1) Short Demonstration Only
- (2) Up To 30 Days

- (3) One To Three Months
- (4) More Than 3 Months Up To 6 Months
- (5) More Than 6 Months Up To 1 Year
- (6) Twelve To 23 Months
- (7) Two Years
- (8) Three Years
- (9) Four Years
- (10) Five Years
- (11) Six Years
- (12) Seven Years Or More

There is an assumption, of course, that the respondent has received the requisite amount of training. In fact, the information containing on-the-job training actually deals with the training that is attached to the job and not the employee. This question also specifically asks for the training "now normally required"; this represents an attempt to standardize training times across cohort groups.

The major difficulty encountered with the on-the-job training variable involves the level of measurement. On-the-job training can be treated as a rank ordinal variable (with 12 levels). Given the uneven length of each of the 12 categories mentioned above, such a treatment would not result in a truly interval level variable (most desirable for regression and path analysis which is used extensively in the analysis). The underlying variable of 'on-the-job training', however, is continuous in nature (using some measure of time

such as months or years). A variety of researchers have argued that the biases resulting from the inclusion of ordinal data when using multivariate methods designed for interval data are actually quite small (Labovitz, 1967 & 1970; Borgatta, 1968; Kim, 1975 & 1978; Allan, 1976).

On-the-job training can also be treated as a rank category variable where some point (such as the mid-point) in each of the 12 categories is chosen to represent the entire category resulting in an estimate of an interval level variable. This option best suits the assumptions of regression and path analysis. However, there are problems with this option as well.

When estimating a value to represent an interval for rank category variables, there are a number of potential complications. There is the potential for grouping error. Grouping error "occurs when a limited number of categories are used to represent a large number of underlying values. Since a range of values is represented by one value, some of the true scores will be under- or over-represented" (Johnson and Creech, 1983:399). The size of the errors introduced in this manner depend on: (1) the distribution of the underlying variable (how are the values represented by the category distributed within the interval of the category?); (2) the number of categories; (3) the size of the interval within each category; and (4) the number of cases within each category.

(Johnson and Creech, 1983; O'Brien, 1981, 1982, 1983; Winship and Mare, 1984)

Distortion from grouping error can be lessened by increasing the number of categories of the variable in question. Johnson and Creech (1983) found that for a sample of 500, distortion was quite pronounced when there were only five or fewer categories. The on-the-job training variable discussed here has 12 categories--over twice as many as the critical number identified by Johnson and Creech (1983) (female sample size is 515 and male sample size is 780).

As the value of on-the-job training increases, so does the size of the category interval being represented. This results in a situation where distortion is a greater problem as on-the-job training level increases. In regression analysis, heteroscedasticity is one potential problem arising from such a situation. In this particular case, the first six categories of the variable represent ever increasing intervals of time from several days to a year. The final six categories represent a constant interval of one year each--resulting in a greater degree of stability in interval size than would be the case if the category interval kept increasing.

The number of cases within each category can also be a factor in the degree of distortion. If the categories which are prone to distortion (for example, those with the largest interval size in a case where the underlying distribution within each category is not well represented by the chosen

value) are also the categories where the largest proportion of cases are located, then the distortion will be magnified. The largest interval size occurs in the final six categories of the on-the-job training variable. Yet only a minority (20 percent) of the cases are located in the last six categories. Thus the distortion due to larger category intervals at higher levels of on-the-job training is minimized as fewer and fewer cases are located in these intervals.

On-the-job training can be measured as an interval level variable by taking the mid-point of each interval in months. The upper category, however, is open ended. A mid-point cannot be obtained for an open-ended category; therefore, some representative point must be chosen to represent this interval. The interval level form of this variable uses seven years or 84 months to represent the open-ended category. Given the nature of the category (seven years or more), the estimate of training time will be low for some people. However, the decision to use seven years was made for the following reasons:

- (1) Of the 48 respondents entering the analysis in this upper category, only 1 is female. To increase the estimate for this category above seven would have the effect of possibly inflating gender differences. The use of seven years for this category provides a more conservative approach to the gender analysis.

(2) Of the 48 respondents in this category, 11 acquired their on-the-job training (all males) through formal apprenticeships. In Canada, formal apprenticeships in most trades typically last two to five years, but vary from province to province (Economic Council, 1992; Akyeampong, 1991; Ontario Ministry of Skills Development, 1991). Despite provincial variations and differences over time in length of apprenticeships, it is unlikely that the training period for these 11 respondents would greatly exceed the seven year parameter of this category.

Both methods of measuring on-the-job training were investigated in this study. Additionally, transformations of the interval-level version were examined and the results are summarized as footnotes in the relevant chapters. The ordinal level version appears in most of the main body of the analysis. It is important to note, however, that regardless of which version is used (or which transformation), the results of the gender comparisons remain the same. This suggests that, although the measurement of this variable is slightly problematic, those problems do not present a major obstacle.

Education

The education variable reported throughout this analysis is a credential-based measure. The entire analysis was repeated using years of education. No difference in the conclusions of this study were found using years of education.

The reasons for the use of the credential-based measure are discussed in Chapters 3 and 4. The measure is described in Chapter 3.

Prior Experience, Experience and Tenure

Job experience is a variable that should reflect the amount of time an individual has been active in the labour force. It is often difficult to operationalize as not all workers have continuous work histories. In the past, the operationalization of this variable has often created problems since many data sets do not provide the type of detailed information required about labour force exits and re-entries. Many researchers have found themselves in the unenviable position of having to estimate job experience using age due to data set limitations. Age as a proxy for labour force experience poses considerable problems when gender comparisons are a key component of the analysis. Age is a fairly accurate proxy for labour force experience for men; however, it fails to capture the labour force discontinuity more often found in females due to domestic and child rearing responsibilities. This has the effect of over estimating the labour force experience of women (which can bias regression coefficients representing the rate of return to experience downward for women or reduce the significance of this variable altogether). The CCSS, however, contains much more detailed information about labour force entry, exits, and re-entries than most data

sets. The following information is available: (1) the year the respondent first began working full-time; (2) the amount of time the respondent was unavailable for work (up to a maximum of three possible periods); (3) the number of times the respondent was unemployed; (4) the length of the period of unemployment for those unemployed only once; and (5) for those unemployed more than once, the length of the period of unemployment for the most recent and for the longest period of unemployment. Information is also available on when the respondent began working at her/his present job. This allows for the construction of three experience related variables. Job tenure is operationalized as the amount of time the respondent has been employed in her/his present job. Prior experience is operationalized at the total amount of labour force experience obtained prior to tenure in present job. Job experience is operationalized as the total amount of time spent in the labour force (tenure and prior experience combined).

Job experience is operationalized by the following equation:

$$\begin{aligned} \text{JOB EXPERIENCE} = & \text{SURVEY DATE} - \text{DATE STARTED WORK} - \text{TOTAL TIME} \\ & \text{UNEMPLOYED} - \text{TOTAL TIME VOLUNTARILY OUT OF} \\ & \text{LABOUR FORCE} \end{aligned}$$

A very slight amount of error may be introduced into the operationalization of experience, however, by the fact that we have incomplete information regarding the exact length of time

out of the labour force (both voluntary and unemployment) for some respondents. With regard to the amount of time unavailable for work, there is information regarding only three periods. We know nothing about a possible fourth (fifth, sixth, etc.) period out. However, a very small percentage of the total sample used in this analysis (1.7 percent) were actually unavailable for work for three periods; this means that information regarding any possible fourth (or more) period could be unavailable for a maximum of 1.7 percent of the total sample (it is more likely that only a fraction of those unavailable for work three times would have also been unavailable for work for four or more times--thus reducing the possible error for this part of the measure even more).

Unfortunately, the amount of known error introduced as a result of unemployment information is slightly larger. Approximately 53.18 percent of the sample entering the analysis have never been unemployed; a further 27.15 percent have been unemployed only once (complete information exists for both these groups)--accounting for a total of 80.33 percent of the sample entering the analysis. Only 19.67 percent of the sample could have some incomplete information concerning length of time unemployed. Since there is information on the longest period of unemployment, it is possible to calculate further the magnitude of error possible on this variable due to lack of data. Since 98 percent of the respondents in the analysis who were unemployed more than once

were unemployed for a year or less during their longest streak of unemployment, only about .4 percent in the total analysis could have underestimated amount of time spent unemployed (it is likely to be even less than this)--thereby overestimating job experience. Therefore the maximum effect of incomplete information on this variable is extremely slight.

Earnings

Earnings is operationalized using a question in the CCSS which asks the respondent to indicate her/his "personal income before taxes for 1981". Unfortunately, the CCSS did not include a question specifically targeting earnings. The information contained within the survey deals with income from a variety of sources (including government transfers, property income, and investment income, etc.). Since the purpose of this study is to examine the rewards that accrue to women and men for the jobs they perform in the paid labour force, 'earnings' (as opposed to income) is the variable of concern. The measure of income obtained in the CCSS, however, appears to correspond very closely with the concept of earnings.

The income question (1981 personal income before taxes) appears in the CCSS after a long series of questions pertaining to work history. Several questions asking specifically about other sources of income (government transfer payments and investment income, etc.) appear after this main question. An investigation of the answers provided by the respondents to these questions suggests that these

additional types of income may not have been considered by most when answering the question regarding personal income (i.e., respondents may have been answering based upon earned income from the job alone). There is a very high rate of non-response when asked what percentage of total family income that these additional types of income comprised. If a respondent is unable to estimate the amount of money earned from these additional sources, one might conjecture that she/he would not have been able to add such income to wages/salary when responding to the earlier questions regarding personal and family income. Of those who did report a figure for the percentage of total family income from these additional sources, most estimated that it was under 10 percent. This analysis employs personal income as a proxy for personal earnings. This is based upon the assumption that the income information in the CCSS is a good proxy for earnings (in fact, earnings may actually have been the concept that was tapped in the questionnaire).⁷⁷

⁷⁷ Rosenfeld and Kalleberg (1988) came to a similar conclusion about the use of 'income' data to represent 'earnings' using the CCSS. Rosenfeld and Kalleberg (1988) conducted a number of tests of their own before determining that the data for income is a reasonable proxy for earnings in this data set. In one test, they entered a series of dummy variables for the receipt of income sources other than earnings. They found that these dummy variables acted more as indicators of family economic status than controls for additional income. In another test, they adjusted incomes by subtracting amount of government income from total income. This procedure was plagued by the high missing rates that I found. It also yielded adjusted incomes that were below zero. This supports my conclusion that many individuals did not consider sources of income other than earnings when asked

As with on-the-job training, the information on income (being used as a proxy for earnings) in the CCSS is rank category where the categories are of unequal intervals. The following 12 categories (expressed in 1981 Canadian dollars) are available:

- (1) No earnings
- (2) Under \$5000
- (3) \$5001 to \$7500
- (4) \$7501 to \$10 000
- (5) \$10 001 to \$15 000
- (6) \$15 001 to \$20 000
- (7) \$20 001 to \$25 000
- (8) \$25 001 to \$35 000
- (9) \$35 001 to \$50 000
- (10) \$50 001 to \$75 000
- (11) \$75 001 to \$100 000
- (12) Over \$100 000

The problems involved with estimating an interval level variable from rank categories was discussed under on-the-job training. The same concerns apply to the earnings variable. In this case, the underlying concept is continuous and can be measured in dollars. In an effort to create an interval level variable from these rank categories, a value must be chosen to represent each interval. As discussed in an earlier section,

their total income--even when they had such additional sources.

the use of one value to represent an entire interval is not without problems. In the case of earnings, one of the most worrisome potential problems involves the possibility that women and men may have very different distributions within each interval. Given the lower earnings of women overall, it is reasonable to suspect that women may have earnings that are clustered closer to the lowest parameter of each interval than those of men. Some method of estimating the distribution of values within each interval for women and men was required to determine whether this differential clustering actually existed.

The 1981 Canadian Census (Public Use Sample tape) were used to supplement information on income for this study. The 1981 Public Use Sample tape contains precise information on wages/salaries for the reference year 1980. The income (earnings) categories from the CCSS were deflated from 1981 to 1980 values using the Consumer Price Index inflation rate for that period. After defining a universe that was the same as that being used in this study (i.e., full-time, full-year, employees 18 years and over, etc.), the distribution of earnings within each of the CCSS dollar intervals was examined for women and men. The distributions and measures of central tendency were surprisingly similar for women and men within each interval. The skewing pattern within each interval was also remarkably similar for the sexes. There were, however, few women located in the higher earnings intervals--too few to

allow for a separate reliable estimate for women and men within each interval based upon the Census distributions. Given the low numbers of women at the high intervals and the remarkable similarity of the distributions within each interval for the sexes, it was decided that one value within each interval would be chosen for both women and men.

A number of possible values could have been selected to represent each earnings interval (for example: the mid-point, the mean, the median, etc.). The skewing pattern (for both women and men) within each interval suggested that the median might be the most representative measure to use for this purpose. At the lower earnings categories, there was negative skewing (the bulk of cases tend to be located in the high end of the interval). At the higher earnings categories, there is positive (and larger in magnitude as well) skewing (the bulk of the cases tend to be located in the low end of the interval). Although the mean and the median were actually quite similar in most intervals (male and female also quite similar to each other), there were at least two intervals where skewing was slightly greater--with the mean noticeably higher than the median due to a few extremely high values. Given this pattern, it was felt that the median was, overall, the most representative measure to use to represent each interval. When compared with the mid-point of the intervals (median inflated back to 1981 levels to match the CCSS 1981 dollar categories), the following pattern appeared. The

median tended to be higher than the mid-point at the lower earnings categories and lower than the mid-point at the higher earnings categories. This suggest that the use of the mid-point might tend to underestimate earnings at the low end and overestimate earnings at the high end (possibly inflating the range of earnings for both men and women). In view of all of this, the median of each interval (inflated back to 1981 dollars to match the CCSS) for women and men taken together was chosen to represent each earnings category.⁷⁸

The final difficulty in dealing with the measurement of earnings involves the upper open-ended category of 'over \$100 000'. There are only four respondents who enter the analysis located in this category and all are male. To over-estimate the point representing this interval would be to inflate the gender gap in earnings. A detailed profile of these four individuals suggests that for two of them, their reported personal income may include income from sources other than their job earnings (such 'other sources' of income are much less common at the lower income levels). Property rental or investment income are reported by these two as part of family income; since family income and personal income are both in

⁷⁸ A similar decision was made by Boyd and Humphreys (1979) using 1971 Census data to estimate a representative point for earnings intervals in the 1973 Canadian National Mobility Survey data. They, too, found the distribution of earnings within intervals to be very similar for women and men. As well, they encountered too few women at the high earnings levels to use separate estimates for women and men. They also opted to use the median value for both sexes.

the upper open-ended category, there is some uncertainty as to whether these 'other' sources of income are included in personal income or not. It is possible that one or both individuals have personal job earnings of over \$100 000 in addition to income from 'other' sources; however, it is more likely that this 'other' income is being considered as part of personal income augmenting job earnings of less than \$100 000 to place them in the over \$100 000 category overall. The other two individuals in this category have great inconsistencies in the occupation and income information provided. These two cases are suspected of mis-reporting. Given the uncertainty as to the accuracy of the personal earnings information for these four cases and the dangers of artificially inflating the gender gap (since they are all male), all four were excluded from the earnings portion of the analysis.

TABLE C-1
TABLE OF VARIABLE MEANS AND STANDARD DEVIATIONS⁷⁹

Variable	Mean for Men	S.D. for Men	Mean for Women	S.D. for Women
Prior Ex.	9.277	9.962	5.933	8.412
Tenure	9.569	8.930	6.933	6.891
QJT	5.118	3.459	3.537	2.500
Autonomy	3.724	1.218	3.470	1.202
CogComplexity	4.711	1.209	4.559	1.206
ManualSkills	3.289	1.299	3.418	1.231
Unionized	.286	.452	.256	.437
%Female	24.722	25.205	67.335	28.146
FirmSize	3.158	1.550	2.930	1.514
Earnings	26,682	15,352	17,142	9,385

Note: Full-Time, Full-Year Employees 18 Years and Older
Source: CCSS

⁷⁹Number of cases for education dummy variables appears as Table 3.1 in Chapter 3.

Appendix D
TABLE D-1 MEN ONLY
PERCENT DIRECT AND INDIRECT EFFECTS OF LEVEL OF EDUCATION
ON EARNINGS

	% Indirect Effect Thru Skills	% Indirect Effect Thru OJT Alone	% Direct Effect	Total Net Effect
HiSchlAcad	38%	25%	37%	.145
HiSchl Voc	47%	49%	4%	.053
Incomp PS	44%	25%	30%	.115
NonUPstSec	34%	37%	29%	.077
Lower Univ	52%	17%	31%	.305
Upper Univ	41%	12%	47%	.375

TABLE D-2 WOMEN ONLY
PERCENT DIRECT AND INDIRECT EFFECTS OF LEVEL OF EDUCATION
ON EARNINGS

	% Indirect Effect Thru Skills	% Indirect Effect Thru OJT Alone	% Direct Effect	Total Net Effect
HiSchlAcad	52%	19%	29%	.124
HiSchl Voc	46%	13%	40%	.052
Incomp PS	54%	26%	20%	.132
NonUPstSec	26%	14%	60%	.215
Lower Univ	45%	6%	49%	.452
Upper Univ	25%	5%	70%	.517

Note: Full-Time, Full-Year Employees 18 Yrs & Older
Source: CCSS

END

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