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**Canada**

**A Theoretical and Empirical Analysis of  
Income Distribution and Inequality  
Canada 1971-1986**

by

Sadegh Bakhtiari

Thesis

Presented to the School of Graduate Studies of  
the University of Ottawa in Partial Fulfillment of the  
Requirements for the Degree of Doctor of Philosophy

in

Economics

Ottawa 1993

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ISBN 0-315-89618-3

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## Acknowledgement

This thesis was prepared under the direction and supervision of Professor Camilo Dagum. I would like to express my great appreciation and gratitude for his knowledge, encouragement and intellectual guidance that were of great help. His deep interest in both the qualitative and quantitative aspects of the study has been most valuable.

I am deeply indebted to Professor Gilles Grenier for his interest, insightful comments and suggestions to improve this study throughout its preparation. I would like to thank him for his generous help during my difficult times. Additional thanks for granting permission to use his own Census Data tapes.

I would like to express my appreciation to professors Mario Seccareccia, Andre Plourde, and David Gray, members of my thesis committee for their valuable comments, and thanks to my friend Troy Joseph whose editorial assistance at various stages of this study was invaluable.

The work is dedicated to my late father who was the first to encourage me to study economics and whose concern about inequality has inspired this study.

Finally, very special thanks to my wife, and my children for their patience, understanding and providing moral support.

## ABSTRACT

This study focuses on the measurement and factors underlying the unequal dispersion of income among individuals. The first part of this study is devoted to a theoretical discussion of inequality and a survey of income distribution theories. In the methodological part it is indicated that, for a variety of reasons, it is desirable to use a well fitted model to describe the observed income distribution in order to analyze the extent and sources of inequality. Such a model is proposed as a tool to describe the observed income distribution of Canada. The robustness of the specified model is supported by several goodness of fit indicators including the comparative analysis of different measures of income inequality in parametric and non-parametric forms.

By using data from three Canadian censuses (1971, 1981 and 1986), the distributions of total annual money income and of wages and salaries among Canadian males and females are examined. The study is carried out for different levels of education and goods and service producing occupations and industries too. The processes of income polarization and the decline of the middle class are also studied in the Canadian context.

Statistical synthesis of the findings indicates that inequality in total income and earnings has increased. Concerning sex, it is shown that inequality among the female population was larger than inequality within the male population; however the income differentials between males and females declined over time showing a narrowing trend of the income gap by sex. In terms of education, generally, income inequality among individuals with elementary schooling is greater than for individuals with secondary schooling, and university graduates have a lower level of inequality than the two other educational groups. Income inequality in service producing sectors is greater than in goods producing sectors.

The study indicates that the change in inequality is the outcome of several socioeconomic, technological, institutional and demographical processes. By discussing some of the possible explanations for the Canadian income inequality during the 1971-1986 period, it is found that among the main determinants we identify (i) the industrial occupational employment shift from goods to services, (ii) the increase in part-time work, and (iii) increased female labour force participation.

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# Introduction

One fundamental characteristic of human society is the way its product is ultimately distributed among its members. A basic concern associated with the distribution of income is the amount of concentration or dispersion of income, or more generally, the degree of income inequality.

Questions relating to income distribution and inequality are matters of concern for different reasons. From an efficiency point of view, the poor, because they are often unemployed, uneducated and likely to be unhealthy, constitute a cost for the society and, in that sense, a burden for the wealthier and more productive members of society. In addition, if human resources are more fully and efficiently employed, the incomes of the poor increase, thereby improving the purchasing power of consumers and enhancing social welfare.

In the study of income distribution and inequality, the conceptual problems are not trivial. To begin, it is necessary to be precise in defining income

and the recipient units that together form the income distribution to be studied. For example, data on income can take the form of total money income, employment income, income from investment, etc. Obviously, distributional trends vary according to the type of income under consideration. The concept of income by itself is very crucial. The time period covered by the data is also important. This could be hourly, daily, weekly, monthly, annually or lifetime. Concerning the population of income receivers, some researchers are interested in the distribution of family income, while others focus on individuals' income. In addition, there are many other conceptual problems which should lead one to be very cautious in interpreting, generalizing or comparing the results of different studies.

The existence of large income disparities can have important social and political implications. Historically, revolution has often occurred when there existed a wide gap between an extremely wealthy and powerful class and the poor masses who confronted daily the problems associated with poverty.

Another concern about income distribution and inequality is related to the Kuznets argument or what is called the Inverted U Hypothesis. Based on this hypothesis, in the early stage of economic growth, the distribution of income will tend to worsen, while at later stages it will improve. But the realities of the 1970's and 1980's at least in the United States and Canada,

showed an opposite trend. For these two countries, the evidence indicates that there has been some income polarization, declining middle class, and increasing overall inequality, at least over the past three decades.

The major purpose of the theoretical part of this study is to search for suitable theories of income distribution and to discuss some theoretical issues in the analysis of personal income distribution. Since long ago, economists have bewailed the lack of a satisfactory theory of income distribution. Fisher, at the beginning of the this century, argued that there was no other economic problem with so great human interest as the distribution of income and that so far very little had been done on this issue and the subject needed further scientific study.<sup>1</sup> Atkinson closed his book with the comment " ...far too little is known about this central subject. ... There are fascinating and important questions to be answered."<sup>2</sup>

The quantitative study and modelling of personal income distribution began in 1895 when Pareto formulated his now famous Pareto Laws. The study of income distribution and inequality measurement has developed mainly from the use of probability density functions and inequality measures derived from them. Since Pareto, scores of models have been proposed

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<sup>1</sup>Fisher, I.(1913), p. 477.

<sup>2</sup>Atkinson, A.(1975), p. 258.

in the literature to fit the observed distribution of income. So it seems that there is a need to discuss the foundations of income distribution model specifications and the basic properties that they should satisfy to be considered appropriate models to describe, and hence fit, observed income distributions.

One of the realities in the modern economics is a major shift in employment toward the service industries and the growth of work arrangements that differ from traditional full-time employment. Since nonstandard employment, especially part-time work, is generally concentrated most heavily among young, less educated and female workers, it is expected to have some negative effect on the distribution of income and inequality. These issues are discussed in this thesis.

The study consists of six chapters to be presented in the following order:

- The first chapter outlines some of the reasons why we might be concerned about income inequality and presents some of the conventional arguments on the subject.
- The second chapter is devoted to a survey of relevant theories of personal distribution of income.
- The third chapter discusses the methodology of analysis to provide a solid framework to study the problems related to the distribution of

income and inequality.

- The fourth chapter examines some of the potential reasons for increasing inequality, particularly, the employment shift from goods to services and the increase in part-time work.
- In the fifth chapter, we examine the distribution and inequality of total annual money income, as well as the distribution of wages and salaries (employment income) among Canadian males and females, at different levels of education and in different forms of occupations and industries (goods and services) with data from the 1971, 1981 and 1986 Canadian censuses. Since the phenomena of income polarization and the decline of the middle class have a direct impact upon income inequality, we study these processes in the Canadian context.
- Finally, the last chapter presents the conclusions and some policy implications.

# Chapter 1

## The Concern about Income Distribution and Inequality

### 1.1 Economic Considerations

Contemporary modern societies, with their political and social institutions, provide universally distributed rights and privileges that usually proclaim the equality of all citizens. But their economic institutions rely on market determined income generation with substantial disparities in living standards and initial endowments among citizens.

Views on the optimal distribution of income in society are diverse and

often contradictory. There is disagreement as to the fairness or justice of greater equality of earnings. Those who are opposed to egalitarian policies often claim that there is a sharp distinction between considerations of fairness and considerations of equality, while egalitarians argue that justice involves equality, and greater fairness involves a low level of inequality. At many points along the path of development and growth, society confronts choices that offer somewhat more equality at the expense of efficiency or somewhat more efficiency at the expense of more equality.

In recent years, economic analysis has tended to concentrate more on efficiency than equity. This was justified on the grounds that, unlike equity, efficiency analysis can be value free. The basic argument in this equity-efficiency dichotomy is in parallel with the means vs. ends debate. Equity decisions concern the ends of the economy and the ranking of competing ends is inevitably based on value judgments. Efficiency decisions on the other hand, concern the means used to achieve the economy's end. The idea of efficiency, or simply the idea that more is better, would seem to be non-controversial, and as long as economic analysis concerns itself with producing more aggregate income, the equity question of who should get what can be left in the hands of political scientists, theologians and other scholars that feel more at ease with value judgments. There are some logical flaws in this argument and as Thurow pointed out, means and ends are hopelessly scrambled. He argues that "even if this common perception of efficiency as value free were correct which it is not, it would still be impossible to avoid

the concept of equity in an analysis of the mechanisms of income distribution. Means and ends are hopelessly scrambled. Often our value judgments attach more importance to the means by which incomes are distributed (fascism, communism, capitalism, welfarism) than to the ultimate distribution of prizes. The means are in fact ends in themselves. For many, anything produced by the desired mechanism is fair.”<sup>1</sup>

Modern economic theory has concentrated on the pursuit of efficiency rather than equity. Harry Johnson has dismissed concern for questions of equity in economics as a type of neurosis, attributing such misguided preoccupations to a “naive and basically infantile anthropomorphism.”<sup>2</sup> Milton Friedman has discarded the goal of equity and substituted that of freedom; “The heart of the liberal philosophy is a belief in the dignity of the individual, in his freedom to make the most of his capacities and opportunities according to his own lights, subject only to the proviso that he not interfere with the freedom of the individuals to do the same.”<sup>3</sup>

The Classical School of thought in economic theory was well aware of the linkage between distribution and production. Ricardo defined the laws that regulate income distribution as the “principal problem in political economy” not only because of the significance of distributional shares per se but because

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<sup>1</sup>Thurow, L.(1975), p. 21.

<sup>2</sup>Johnson, H.(1973), p. 54.

<sup>3</sup>Friedman, M.(1962), p. 195.

the theory of income distribution held the key to an understanding of the production system.<sup>4</sup>

The main criticism of welfare economics is that it avoids judgments on the distribution of income altogether. Amartya Sen argued that “we do not seem to get very much help in studying inequality from the main schools of welfare economics, old and new, the literature on Pareto optimality (including the famous ‘basic theorem’ of ‘new’ welfare economics) avoids distributional judgment altogether. The standard approach of social welfare functions, because of its concentration on ordering of individuals only (without any use of interpersonal comparisons of levels and intensities) fails to provide a framework for distributional discussions.”<sup>5</sup> Take the concept of Pareto optimality, a cornerstone of welfare economics. There is an infinite set of Pareto optimal points open to society, each point characterized by a distinct distribution of income. The theory does not tell us how to distinguish between the various Pareto optimal points, it only guarantees that each point represents a position from which no change is possible such that someone could become better off without making someone else worse off. As an illustration, a decision to cut into the affluence, to make the lot of the poor better off can lead to a Pareto inferior situation, although that may bring a more equitable distribution and an increase in general economic well being.

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<sup>4</sup>Sraffa, P.(1962), p. 5.

<sup>5</sup>Sen. A.(1973) p. 23.

Another often used measure of social welfare is the level of GNP and its rate of growth. GNP is merely the money measure of the overall annual flow of goods and services in the economy which totally ignores the distribution of national output. A larger output does not necessarily mean prosperity for all. It is possible to have a situation in which the mass of the population receives stagnant or falling incomes, but GNP continues to increase due to the enhanced prosperity of a rich minority. This is what happened in Canada and the United States during the 1970s and 1980s. So maximizing the rate of growth of GNP totally disregards the personal distribution of national product and would suggest that GNP is a useless criterion for measuring or judging equity. The relative neglect of the equity issue may not be intentional or it could be for some consciously planned reasons. The rationale for why some might plan for unequal distribution has been pointed out by Gunnar Myrdal. "People who are better off usually have done their best to keep their minds off the equality issues ... In every country, there have been whole systems of psychological and ideological barriers protecting the well-to-do classes from knowledge of social facts which would be embarrassing to them."<sup>6</sup>

Another argument concerning inequality is Kuznets' argument that inequality increases in the early stages of economic growth when the transition from the pre-industrial to industrial society is most rapid, then stabilizes for

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<sup>6</sup>Myrdal, G.(1957) p. 123.

a while and finally declines in the later stages of growth.<sup>7</sup> In the decades following World War II, policy makers of developed countries, especially in the United States, noted that the distribution of income was becoming more equal. The gap between rich and poor seemed to be narrowing and more people were joining the middle class. The existence of a large and increasing middle class was a primary motivation for Kuznets' hypothesis. He explains the difference between less developed and developed countries in this way: "The former have no "middle" class: there is a sharp contrast between the preponderant proportion of population whose average income is well below the generally low countrywide average and a small group with a very large relative income excess. The developed countries, on the other hand, are characterized by a much more gradual rise from low to high income shares, with substantial groups receiving more than the high countrywide income average, and the top groups securing smaller shares than the comparable ordinal groups in underdeveloped countries."<sup>8</sup>

Recently, things have followed an opposite trend. Income in the United States, by almost any measure of the distribution of income among families, has become more unequal in the past two decades. The distribution of income among individual workers, which became less unequal through the 1960s and the first half of the 1970s, has become more unequal ever since.<sup>9</sup>

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<sup>7</sup>Kuznets, S.(1955), p.18.

<sup>8</sup>Ibid, p.22.

<sup>9</sup>Among many others Kuttner, R.(1983), B. Blackburn and D. Bloom (1987), Tilly,

According to the Economic Council of Canada: "In Canada less attention has been paid to the issue [of income inequality and distribution]. Early analyses were inconclusive, generally conceding a modest tendency towards increased earning inequality and polarization, ... more recent work in Canada, however, has been more supportive of the declining middle/polarization thesis particularly for individual earnings."<sup>10</sup>

## 1.2 Humanitarian and Social Considerations

Some people worry about income distribution and inequality for humanitarian reasons. In its simplest form, the readiness to improve the incomes of those most in need is evoked by a general sense of altruism. Religions have played a major role in the shaping of humanitarian beliefs. For example, we may infer from Christianity and Islam that those who give generously to others will find that their gifts are returned in good measure. However, their outlook on wealth and poverty is not very clear.

On the one hand, we may conclude that the poor can more easily satisfy the requirements of Godliness because they are not burdened by worldliness. On the other hand, since the industrial revolution, Christianity at least based on the Protestant work ethic, has placed more emphasis on the materialistic

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Bluestone, and Harrison (1986), Bradbury, K.(1986)

<sup>10</sup>Economic Council of Canada, (1991), p. 140.

view. Wealth in this ethic, results from hard work and thrift and is considered an external manifestation of internal goodness. The path to a heavenly reward is clearly marked with signs of success, prestige, and high incomes. The poor were deprecated as idle wastrels who squandered what little money they did earn. This line of thought contributed greatly to the rise and continuance of capitalism, since it brought about a synthesis of business and religious values.

Phelps Brown argues that "Christianity itself and the views on wealth and income that came drawn from it, did not challenge the inequality of the secular world. They rather upheld it. In this they followed the main drift of the Pagan philosophers."<sup>11</sup>

From a sociological point of view, income distribution obviously has substantial impact upon the tone of society. Both the very rich people and the very poor people live in worlds alien to the mass culture. Sometimes both extremes create social problems, both have value systems, backgrounds and beliefs not generally shared by the rest of society and that create conflicts. Tocqueville argued that inequality was the main reason for social problems and it was always the fundamental basis for the world's great social convulsion.<sup>12</sup> Or as McGuire and Pichler argued "if two large and expanding groups at the extremes of the income distribution share a belief that idle-

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<sup>11</sup>Brown, H.(1988), p. 33.

<sup>12</sup>Tocqueville, A.(1954), p. 266.

ness is their right and privilege, and if they believe that income comes from sources other than work (from government or from "daddy", from crime or from inheritance), and if they can convince many others of the propriety of their claims, then the social fabric is weakened. Most disruption at present, it would seem, are the alien social values that grow out of poverty and discrimination."<sup>13</sup>

### 1.3 Political Considerations

Since the time of Aristotle, political thinkers have posited that inequality is a primary impetus for social revolution. It was often argued that social unrest, crime, riots, etc. could be cured by improving the distribution of income between the various classes of society. One of the factors contributing to the political stability in the United States, Canada and in many Western European nations has been the large size of the middle class and so the declining middle class should be considered a threat to the present political stability. Although wide income disparities alone cannot cause revolution, it does serve as a catalyst. Infusion of revolutionary ideas, the role of elites, government inefficiency and external influence all play important parts in the revolutionary process. Nevertheless, it seems that inequality is a necessary

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<sup>13</sup>McGuire, J. and J. Pichler (1969), p. 4.

condition for revolution. A spark could be caused by any unexpected event, but without the necessary condition, it would not bring about a revolutionary flame. Midlarsky in his "Inequality and Contemporary Revolutions" collects a series of studies on contemporary revolutions in Central America, Rhodesia, Poland, Iran and refers to many older revolutions in which inequality has played a major role. For example, Roberts and Midlarsky (1986) show how unequal land distribution in Central America forms and structures revolutionary movements specifically in Nicaragua and El Salvador. According to them, the greater the degree of land scarcity, the greater the inequality and social unrest and hence the greater the possibility of revolution. They argue that the French, Russian and Chinese revolutions were all preceded by such increases in inequality attendant upon increased land scarcity.<sup>14</sup>

## **1.4 Historical and Philosophical Considerations**

In this part, we do not aim to present an exhaustive survey of notions relating to inequality throughout economic history nor a detailed philosophical analysis of the subject. But, some relevant and relatively more important ideas will be briefly discussed. The idea of equality and inequality probably started with the city-states of old Greece. The democracy of Athens achieved

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<sup>14</sup>Midlarsky, M.(1986) p. 6.

an equality of citizenship that has remained an inspiration ever since. But later, the Greeks differentiated between different type of persons and felt it was only right and proper to treat them differently. This inequality of treatment they endorsed in the name of justice. But they saw a persistent source of disruption in the juxtaposition of wealth and poverty side by side within the state and some proposals were made to limit the extent of inequality. For example Aristotle, more than 2000 years ago pointed out that:

Now in all states there are three elements: one class is very rich, another is very poor, and a third is a mean. It is admitted that moderation and the mean are the best, and therefore it will clearly be best to possess the gifts of fortune in moderation;.....He who greatly excels in beauty, strength, or wealth, or on the other hand who is very poor, or very weak or very much disgraced, finds it difficult to follow rational principle..... On the other hand, the very poor who are in the opposite extreme, are too degraded. So that the one class cannot obey, and can only rule despotically; the other knows not how to command and must be ruled like slaves. Thus arise a city, not of free men, but of masters and slaves, the one despising, the other envying; and nothing can be more fatal to friendship and good flowship in states than this: for good flowship springs from friendship; when men are at enmity with one another, they would rather not even share the same path.<sup>15</sup>

He believed that "Justice is equality; and so it is, but not for all persons, only for those that are equal. Inequality also is thought to be just; and so it is, but not for all, only for the unequal."<sup>16</sup>

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<sup>15</sup>Aristotle, *Politics*, trans. Benjamin Jowett, New York: Modern Library, 1943, pp. 190-191.

<sup>16</sup>Ibid. p. ix.

The scholars of the Middle Ages developed a positive view of inequality. St. Thomas Aquinas in the Thirteenth Century developed a model in which he looked at society as an organism. For him, inequality was not very important because, just as different parts of the body have different functions, the question is not whether one is greater than another, but how they are to cooperate for the good of the whole body.

Another way of looking at the problem of inequality or thinking about society can be seen in the work of Sir Thomas More. In his Utopia, he pictured a society in which consumption and production are communal on an egalitarian basis; they are for use and not profit. In his Utopia, households in groups of thirty dined at a common table. The standard housing units were assigned by lot, and every ten years they were reassigned.

According to him, the main reason for inequality and injustice is private ownership and money. In his words,

I don't see how you can ever get any real justice or prosperity, so long as there's private property, and if everything's judged in terms of money -unless you consider it just for the worst sort of people to have the best living conditions, or unless you're prepared to call a country prosperous, in which all the wealth is owned by a tiny minority- who aren't entirely happy even so, while everyone else is simply miserable. I'm quite convinced that you'll never get a fair distribution of goods, or a satisfactory organization of human life, until you abolish private property altogether. So long as it exists, the vast majority of human race, and the vastly superior part of it, will inevitably go on labouring

under a burden of poverty, hardship, and worry.<sup>17</sup>

According to More, as long as private ownership exists, the vast majority of human beings will inevitably live under a burden of poverty, hardship and worry.

Concerning money, he argued that "At the moment money goes, you can also say goodbye to fear, tension, anxiety, overwork and sleepless nights. Why, even poverty, itself, the one problem that has always seemed to need money for its solution, could promptly disappear if money ceased to exist."<sup>18</sup>

Adam Smith looked at the problem of income inequality from different angles. According to him the apparent differences are mainly based on their occupation rather than abilities. The difference "between a philosopher and a common street porter, for example, seems to arise not so much from nature, as from habit, custom, and education. When they came into the world and for the first six or eight years of their existence, they were, perhaps very much alike, and neither their parents nor playfellows could perceive any remarkable difference. About that age, or soon after, they come to be employed in very different occupations."<sup>19</sup> Smith made another contribution to the explanation of inequality in society when he pointed to the human willingness to admire riches and crave for them. He said that there is an irregularity in human

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<sup>17</sup>Cited in Brown, H.(1988), p. 42.

<sup>18</sup>Ibid. p. 43.

<sup>19</sup>Smith, A.(1937), Chap. I, p. 15.

nature, in that we sympathize with joy more readily than with sorrow and admire the rich more than pity the poor.

Smith rejected the idea that wages must be kept low for economic growth, and by so doing, avoiding more unemployment. He raised the question and then answered "Is this improvement in the circumstances of the lower ranks of the people to be regarded as an advantage or as an inconvenience to the society? Servants, labourers and workmen of different kinds, make up the far greater part of every great political society but what improve the circumstances of the greater part can never be regarded as inconvenience to the whole. No society can surely be flourishing and happy, of which the far greater part of the members are poor and miserable."<sup>20</sup>

Marx and his followers have emphasized that the capitalist class owns all of the productive facilities and resources, while the working class owns only its own labour power. Under these conditions, capitalists receive a large share of national income through the extraction of surplus from workers and the process of capital accumulation resulting in larger and larger income inequality. We shall discuss these views later in more detail in our discussion of the Radical Theory of income distribution.

Rawls (1971), tries to establish a framework to rationalize the natural equality of human beings and the optimum distribution of income. He at-

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<sup>20</sup>Smith, A.(1937), Chap. I, p. 8.

tempts to demonstrate that there is only one structure of economic rewards that everyone would be willing to accept. This structure is based on the maximin principle (maximizing the minimum prize). Rawls tried to outline a social theory of justice which would reconcile the liberal tradition of citizenship with a social conception of economics.

Rawls argued that a just society would involve the maximization of equal basic liberties where the liberty of one person would not conflict with the liberty of others, and he outlined a set of proposals which would establish a sense of justness and fairness with respect to social and economic inequalities. These inequalities are to be arranged so that they contribute the greatest benefit to the least advantaged groups within the society.<sup>21</sup> Rawls' general conception of social justice was that all essential social goods should be distributed equally among all unless an unequal distribution would be to the advantage of the least-favored members of society. For him the principle is that inequality above the median income is socially just only when it helps to reduce the inequalities which exist below the median.

Rawls' theory of justice has been influential in the development of both political and economic thinking about social inequality. Rawls' main goal is to reconcile the utilitarian approach with the ideas of liberalism, inequality and redistribution. Within Rawls' framework, equality is desirable because there is a moral argument in favour of fairness and because this particu-

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<sup>21</sup>Rawls, J.(1971), p. 302.

lar principle of justice brings about an increasing benefit to all members of society, especially those who are least favoured.

As already discussed, social equality is a basic condition for political and social stability. In this respect, socio economic equality may be more significant than the political equalities of citizenship. A reduction of inequality reduces the level of social conflict and tension, encouraging greater cooperation between social groups and developing a widespread sense of the legitimacy of the society which acts to reduce the level of political tension and violence within the social system.

Basically, to refuse inequality and appeal to equality has a philosophical foundation that takes equality as a natural point from which all others are deviations. However, it is difficult to accept this generalized idea of equality in economics. For instance, Isaiah Berlin (1961) states this idea as:

No reason need be given for... an equal distribution of benefits for that is 'natural', self evidently right and just, and needs no justification, since it is in some sense conceived as being self justified... The assumption is that equality needs no reasons, only inequality does so; that uniformity, regularity, similarity, symmetry,... need not be specially accounted for, whereas differences unsystematic behaviour, changes in conduct, need explanation and, as a rule, justification. If I have a cake and there are ten persons among whom I wish to divide it, then if I give exactly one tenth to each, this will not, at any rate automatically, call for justification; whereas if I depart from this principle of equal division I am expected to produce a special reason. It is some sense of this, however latent, that makes equality an idea which

has never seemed intrinsically eccentric.<sup>22</sup>

Gillespie (1980b) refers to the ethical foundation of equality, when he defends the Gini-Lorenz 45-degree line of equality. According to him "It is important to be clear about the major ethical implications underlying this normative model. Income is not redirected to the elderly because they are old and have made an economic contribution in the past. Income is not redirected to the young to permit them to acquire working skills which will command a price in a future market (when they will be making a future contribution)... Rather income is distributed equally to all regardless of age, expenses, deservingness, skin colour or sex because of the inherent value of each person. It is a consistent set of ethical beliefs about how income ought to be distributed and it implies a precise definition of a standard of equality the 45 degree line."<sup>23</sup>

## 1.5 Conceptual Considerations

In the empirical section of this study, we shall analyze the Canadian income distribution and inequality in different occupations and industries by sex and education. Occupations and industries are aggregated into goods producing and service producing activities, so in this part, first we shall present a

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<sup>22</sup>Berlin I.(1961), p. 131.

<sup>23</sup>Gillespie, W. I.(1980b), p. 562.

theoretical discussion on the concept of income as well as goods and services. Then the concept of income and classification of goods and services in the Canadian context will be presented.

### **1.5.1 Definition of Income**

Any discussion of income distribution and inequality must begin explicitly or implicitly with a definition of income, which raises many problems from the beginning. Economic theorists have not agreed on the definition of income, and there is an extensive and tedious amount of literature on the subject. Many economists have undertaken to formulate a definition for income, especially in the field of finance and in discussions of justice in taxation and the choice of a fair tax base.

Most of these discussions are based on the principle that income must be conceived as something quantitative and objective. Therefore, it must be measurable. But as we shall see, it involves considerable normative aspects which are very difficult to measure.

One of the classical definitions of income that has received a lot of support from economists is one developed by Simons (1938). He states that:

Personal income may be defined as the algebraic sum of (a) the market value of rights exercised in consumption (b) the change in the value of the store of property rights between the beginning

and the end of the period in question. In other words, it is merely the result obtained by adding consumption during the period to *wealth* at the end of the period and then subtracting wealth at the beginning.<sup>24</sup>

This definition can be summarized in the following two statements,

- 1- Increase in command over resources.
- 2- Increase in wealth.

The first significant feature of this definition is its comprehensiveness, but it contains some ambiguities such as the lack of distinction between money income and income in kind, while one should differentiate between the two.

Another well-known definition of income is from Irving Fisher. According to him, a stock of wealth existing at a given time is called capital, while a flow of benefits from wealth through a period of time is called income. According to Fisher's definition, income consists of benefits accruing from the use of wealth during a particular period of time. So inheritance, gifts and so on, fall outside his concept of income.

Income, as defined by Fisher, is what others called consumption, because to him, income is of no use until it is spent. In his own words "...dividend cheque becomes income in the ultimate sense only when we eat the food, wear the clothes or ride in the automobile which are bought by the cheque."<sup>25</sup> According to Fisher, income is equivalent to consumption, regardless of whether

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<sup>24</sup>Simons, H.(1938), p. 50.

<sup>25</sup>Fisher, I.(1969), p. 38.

spending is financed out of current earning or by using up capital. Thus he ignores the role of saving, and this raises a lot of debate in the literature. For example, Kaldor denies that the concept of consumption and income are the same. He points out that:

If we defined income as consumption we should still require another term to denote as potential income, the consumption that would obtain if saving were not zero. Hence, apart from the trivial question of which is the right use of words, it is evident that income and consumption (as ordinarily used) do not refer to the same thing, but to two different things; and if we reserved the term income for consumption we should still need another term for what would otherwise be called income; and we should still be left with the problem of how to define the latter.<sup>26</sup>

Although Simons' definition is very popular, the same definition was already introduced by Haig in 1922. Haig states that income is the increase or accretion in one's power to satisfy his wants in a given period in so far as that power consists of:

- a) money itself, or,
- b) anything susceptible of valuation in terms of money.

More simply stated, the definition of income which Haig offers is the "money value of the net accretion to one's economic power between two points of time."<sup>27</sup> He emphasized that this definition of income is in terms of the power and based on that, income should be considered when the power is

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<sup>26</sup>Kaldor, N. (1965), p. 164.

<sup>27</sup>Haig, R. (1921), p. 7.

obtained, and not when it is exercised. In this way, Haig in his definition includes savings as well as consumption.

Haig argues that income is a flow of satisfaction of intangible psychological experiences. He points out that if one receives a dollar, he receives something which he ordinarily can and does spend, perhaps for a dinner. Is his income the dollar, or is it the dinner which he buys with the dollar. Or is the bottom line the satisfaction of his wants which he derives from eating the dinner - the comfort and sustenance it yields him? According to him, people strive for the satisfaction of their wants and desires, and not for the objects for their own sake.<sup>28</sup> He pointed out that economic goods are not ends in themselves, but means to the end of satisfying wants. We desire things because of the utility or the satisfaction which is brought about. This satisfaction or the pleasurable sensations are our true income. In practice, it is difficult or impossible to find or define a common unit based on utility, especially when there is a comparison involved. For example, how is it possible to compare one's satisfaction with a book with another man's satisfaction with his dinner?

Taussig, among many others, argues that "for almost all purposes of economic study, it is best to content ourselves with a statement, and an attempt at measurement, in terms not of utility, but of money income."<sup>29</sup>

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<sup>28</sup>Haig, R.(1959), p. 55.

<sup>29</sup>Taussig, F.(1939), p. 134.

### 1.5.1.1 Non-Monetary Forms of Income

In some jobs, there are payments, not only in cash, but in non-monetary forms, usually called fringe benefits. There are serious problems of valuation because in some cases, it is difficult since they are not marketable, and when they are, still different people may have different valuations. Simons gives a good example: "If we assume two officers with the same nominal salary but one of them working and accompanying the prince to the theater and opera and in general lives royally at no expense to himself and is able to save generously from his salary. But suppose as a possible complication, that this officer detests opera and hunting!"<sup>30</sup> Simons' definition refers to market value, but this does not mean that the consumption must arise through a market transaction. The consumption of home produced output represents a command over resources and should be taken into account. Generally, the non-market sector of the economy is larger for the poor than the rich and in rural than in urban areas and in developing than in developed economies. Klein Wachter points out that "the poorest families might be shown to have substantial incomes if one went far in accounting for instruction, nursing, cooking, maid service and other things which the upper class obtains by purchase."<sup>31</sup>

Another example of income in kind which does not arise through a

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<sup>30</sup>Simons, H.(1938), p. 51.

<sup>31</sup>Quoted from Simons, H.(1938), p. 52.

market transaction is the rent which should be imputed for physical capital which is owned by persons and yields services. In this regard, the problem associated with the non-taxation of imputed rental income is well known. In a static model, home-owners can be thought of as paying rent to themselves, and that can be considered as unreported income. In a dynamic model, assume that two individuals have the same net wealth and labour earnings. Individual A invests in a form of asset which yields a financial return, while B purchases a home and receives housing services. Since A's financial return is included in the income measure, and B's imputed rent is excluded, B's income is incorrectly understated relative to A's and these equally endowed individuals are recorded as being unequal.

How does inclusion of imputed rent alter the size distribution of income? There is not enough evidence to conclude that the inclusion of imputed rent has disequalizing effects on the measurement of inequality. The impact of imputed rent on distribution of income is not straightforward. For the period 1919-38, Kuznets showed that inclusion of imputed rent led to a fall in the United States share of the top five percent. For England, estimates were made by Stark<sup>32</sup> but were presented in combination with fringe benefits. He showed that the Gini coefficient rises by some two percentage points as a result of this adjustment. But this result cannot be expected all the time because it depends on which category of income units receive the fringe benefits and non-monetary income. For example, if the top quintiles are the

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<sup>32</sup>Stark, T.(1972), p. 27.

ones who receive the benefits it will have highly disequalizing effects.

Concerning the imputed income, the main difficulty arises in deciding how far to go in including non-money imputed items. As Gillespie (1980a) pointed out "Should the imputed value of owned assets, other than homes, be included? Should the imputed value of home-makers' services be included? Ultimately, where to stop is in part a question of judgment and in part a question of available data."<sup>33</sup>

#### 1.5.1.2 The Underground Economy

Recently economists have paid attention to the underground economy, which is a growing sector and potentially an enormous segment of the economy that may engender significant bias in the measurement of both the size and distribution of national income. Besides income from unreported production, this sector includes income from such illegal activities as gambling, the drug trade, etc. These and other activities that theoretically should be included in GNP are either under reported or totally excluded. Mirus and Smith<sup>34</sup> estimated 28.1% of Canadian GNP in 1967 was in the underground economy. These authors, in another study published in 1989, pointed out that the unobserved sector has shown considerable fluctuations over the 1972-1982, period and that it currently may amount to 10% of observed GNP. But it

<sup>33</sup>Gillespie, W. I.(1980a), p. 26.

<sup>34</sup>Mirus, R. and R. Smith (1989), p. 267.

seems that these estimates are far from precise and little is known about their confidence interval. However, 10% of GNP in 1989 (which is likely an underestimation of the size of the underground economy) in Canada would amount to more than 65 billion dollars. The new GST is another factor that may further stimulate the underground economy in the future.

To answer the question, "What is the effect of the underground economy on income distribution?", first we should ask "Who has the incentive to generate underground income?" Of course this would include those facing high positive marginal tax rates, namely wealthy people, and poor people who are facing strong negative tax rates. Individuals in the upper tail of income distribution would have large financial incentives to barter services and use other means to generate income that is not reported to tax authorities. In the same way, poor individuals, who receive substantial income transfers, would have strong incentives to earn nonreported income. By this logic, underground income would increase disproportionately at the opposite ends of the distribution and it is unclear what would be the effect of its inclusion on an overall measure of income inequality.

Capital gains and losses are other items that should be considered as part of income. Based on the Haig-Simons definition, whether the gains or losses are realized by the sale of the assets or not is not important. In other words, according to them, this capital gain or loss even if not realized by sale, should be regarded as part of income (positive or negative). Fluctuations in

the interest rate is another source of capital gains and losses because it affects future yields that are discounted.

There is considerable economic, as well as philosophical, debate in the literature concerning what should be regarded as income. Discussing these debates is out of scope of this analysis. Basically, everybody agrees that individual or family resources should be measured comprehensively and current money income does not tell the whole story, although it constitutes the most important part. The comprehensive nature of the definition of income that would come close to measuring flows of economic welfare, is extremely difficult to measure in a statistical survey. In practice, we have to use money income due to the unavailability of other (potentially better) measures. However, if omissions at the upper end of the income scale do not balance the omissions at the lower end of income, then published statistics on money income may be misleading.

### **1.5.1.3 Definition of Income Used by Statistics Canada**

According to Statistics Canada's definition, total income of an economic agent may consist of income from the following sources:

#### **1) Wages and Salaries**

Gross wages and salaries before any deduction for items such as income taxes, unemployment insurance and pension plans. This excludes fringe benefits, imputed rent and all other income in kind such as meals, living accomoda-

tions, etc.

2) Net Income from Self-employment

Net income (gross income minus expenses) received from self-employment either on its own economic account or in partnership in an unincorporated business or in independent professional practice as well as roomers and boarders.

3) Investment Income

This kind of income includes bond interest, dividends, mortgage interest, bank interest and other investment income.

4) Government Transfer Payments

All social welfare payments from federal, provincial and municipal governments, such as family allowances and old age securities.

5) Pensions

Such as retirement pensions, annuities and superannuation.

6) Miscellaneous Income

such as scholarships, alimony, and other items not specified or included in the other categories.

As mentioned, Statistics Canada estimates *money income* or receipts from wages and salaries, net income from self-employment, investment income, pensions and miscellaneous incomes. The main exclusions are gambling gains and losses, inheritance, gifts, capital gains or losses, the value of fringe benefits, income in kind, and the value of services received from the employer.

In the empirical part of this thesis we shall be examining the distribution

of total income as well as the distribution of wages and salaries (employment income) among Canadian individual workers. Total income in our study has exactly the same definition as that accepted by Statistics Canada meaning that total income is the total annual money income from all the above sources. Concerning wages and salaries, we are considering only positive earnings. In other words, in our sample, the individuals who were assigned zero wages and salaries in the censuses are excluded.

### **1.5.2 Concept of Goods and Services**

More than half a century ago, Colin Clark (1940) developed a model of stages of economic growth. He described the production of raw materials as the primary sector, the production of goods, as secondary sector, and services, the tertiary. Giving the name of tertiary to service production, consciously or unconsciously, he probably assigned a lower order of importance to the service sector at that time due to its dependence on primary and secondary output. According to Clark, services are a residual after agriculture, mining, and manufacturing; in other words, based on his classification, services can be defined as those economic activities that are not agriculture, mining or manufacturing. So to construct a more adequate definition of service industries, we could use definitions of two other economic sectors as models. Extractive industries are the retrieval of raw materials from the physical environment so that they can be used as supplies for other economic activities.

In the same way, manufacturing industries could be defined as the production of tangible goods from raw materials which then serve as equipment and supplies for other economic activities and final consumption.

All attempts to define services rigorously and simply appear to suffer the same fate. If they are rigorous, they become unmanageably complex because they need to consider too many exceptions to general principles. If they are simple and general, they are either too broad, and thus include goods, or too narrow and thus exclude some activities which are accepted to be services.

Economists have traditionally distinguished between goods and services. This distinction was emphasized by Adam Smith and regarded as a matter of great importance by classical economists. Some of the differences between goods and services which are mentioned in the literature are:

- 1-Services are intangible, while goods are tangible.
- 2-Services cannot be stored, while goods can be stored.
- 3-Services cannot be either transported or transferred. They are produced and consumed simultaneously while goods can be stored.
- 4-Goods tend to be produced by firms employing a considerable amount of equipment.
- 5-Services are typically less standardized, and the firms that produce them are usually located close to the markets they serve, often in congested urban areas, while goods are typically produced away from cities. Clearly, activities commonly described as services vary widely, such as legal and accounting

services but other forms of services, such as communications and utilities, are heavily capital intensive. These one dimensional aspects of definitions are highly questionable. Some of these characteristics can be criticized because they cannot be generalized for both goods and services. In addition, some of them may have been true in the past, but with development of modern information technology, those distinctions do not seem to be valid any more.

Sometimes, it is argued that a necessary condition for an item to be a good or a service is that it must be capable of being the subject of a transaction between two or more different economic units. But an essential feature of a good is that it is a physical object which, once produced, is capable of being traded and retraded. For goods, unlike services, there is a clear separation between the process of production and their ultimate consumption. We shall see later that this argument is highly questionable.

It is sometimes argued that small alterations of a product, which do not make a new product from the old one, should be treated as services; on the other hand, large alterations which create new products from the old ones should be considered a production of goods. On this basis, for example, repairs are treated as a service, but tailoring should be considered a production of new goods. But in many cases it is difficult to determine whether an alteration is small or large.

Based on Hill (1977), a service may be defined as "a change in the condition of a person, or of a good belonging to some economic unit, which

is brought about as the result of the activity of some other economic unit."<sup>35</sup> This definition is often quoted in the related literature,<sup>36</sup> but falls short of distinguishing services from goods because what constitutes a change to the conditions of a person or a good is open to different interpretations. For example some services, such as police or fire protection, are in fact trying to prevent change from taking place in the conditions of a good or a person.

Rapid change in the nature of service activities has been brought about by technological change, for example, by innovations in computers and communications such as computer software. These kinds of services can be put in physical form and stored for future use or by improvement in communication systems; many services do not require direct contact between producer and the consumer. But in spite of the fact that the distinction between goods and services is blurred, both of them require the inputs of capital, labour technologies, and other goods and services at an intermediate stage of production. In terms of consumption, both goods and services may be consumable directly or serve as inputs for further production. From the consumer theory point of view, both final goods and services provide utility and raise welfare. Regarding the tangibility of goods, one could argue that at the end of many services activities there is something tangible available. However the tangible characteristic of some goods can be questionable.

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<sup>35</sup>Hill, T.(1977), p. 318.

<sup>36</sup>See Grubel, H. and M. Walker (1988), Drechsler, L.(1990) and H. Postner (1991).

Postner (1991) pointed out that today, the product of many business information services - computer software, advisory consultants' reports, audiovisual presentations - can be put in physical form and stored for future use. Telecommunications per se and its utilization in service industries implies that the provision of many services no longer requires "direct contact" between producer and consumer. And many so-called "personal services" discussed in the literature can be provided in rigid standardized form with characteristics similar to goods (e.g. fast-food operations or automated tellers).<sup>37</sup> Another example of how goods are becoming more like services and services are becoming more like goods can be seen in the following quotation:

Software products are classified in the service sector as part of business services. For close to a decade one has been able to observe that. ... service purchased in small packages by consumers from computer stores or complex operating systems arriving at business sites in trucks. Blank storage media are treated as goods ... This present odd distinction between goods and services will vanish in the future as software products are delivered electronically to users.<sup>38</sup>

It seems that today, in advanced economies, many service outputs are indeed becoming storable and transferable and do not necessarily require direct contact between producer and consumer. The standard distinction of intangibility cannot be generalized any more and probably in the near future we shall have "a new generation of services statistics featuring inventories of

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<sup>37</sup>Postner, H.(1991), p. 8.

<sup>38</sup>Cole, R.(1990), Quoted from Postner, H.(1991), p. 9.

services, capital formation with respect to services, unfilled orders, and work in progress related to service output, arbitrage and exchange operations for service commodities, and a more pure international trade with respect to services."<sup>39</sup>

Part of the empirical analysis of this study is devoted to the analysis of income distribution and inequality in goods and service producing occupations as well as industries based on data from three Canadian censuses. The concepts of goods and services for this study are consistent with the Canadian classification of goods and services which is based on the classical separation of the two sectors. The following section presents a brief review of these two concepts in the Canadian context.

#### **1.5.2.1 Goods and Service Activities Based on Canadian Classification**

After the Second World War, when the United Nations Statistical Commission was established, it produced an International Standard Industrial Classification (ISIC) which was adopted and circulated to member countries for use in assembling statistics at the international level. In connection with these recommendations, the Economic and Social Council approved a resolution that all member governments make use of the International Standard

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<sup>39</sup>Postner, H.(1991), p. 13.

Industrial Classification of Economic Activity by:

a - adopting this system of classification as a national standard, or

b - rearranging their statistical data in accordance with this system for purposes of international comparability.<sup>40</sup> Classification of Economic Activities was adopted by Canada in 1948, and the first Canadian Standard Industrial Classification was provided in the same year and has undergone several revisions since. The first version was designed with a bias towards the collection of data from goods producing industries at the expense of the service sector. This bias may stem from the historically common view that service production is less valuable than goods production. The growth of the service sector has led to efforts for an expansion and revision of its coverage in the SIC system.

The SIC system contains data at several levels of aggregation and groups the industrial classes according to an activity structure (e.g. agricultural industries, forestry industries, manufacturing industries, etc.). The highest level of aggregation is the division, each division representing one of these broad types of activity. The second level of aggregation is the major group, the third level is the industry group, and the fourth level is the industry class.

In the empirical part of this study, we have used the 1970's Standard Classifications of Occupations and Industries. Accordingly, goods producing

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<sup>40</sup>United Nations, (1990), p. 2.

industries are: Agriculture, Forestry, Fishing and Trapping, Mining, Manufacturing and Construction. Service producing industries include: Transportation, Communication and Other Utilities, Trade (wholesale and retail trade), Finance, Insurance and Real Estate, Education and related services, Health and Welfare services, Amusement and Recreation services, Personal services, Accommodations and Food services, Miscellaneous services, Public administration and Defence.

Under the SIC system, an occupation is defined as a collection of jobs sufficiently similar in their main tasks to be grouped under a common title for classification purposes. A job, in turn, encompasses all the tasks carried out by a particular worker to complete her/his duties.<sup>41</sup> Occupations are therefore identified and grouped primarily in terms of the work usually performed, this being determined by the tasks, duties and responsibilities of the occupation. Thus within each group, the occupations are almost unique and related to each other by similarity of kind of work performed. This approach to the grouping of occupations ensures a certain homogeneity within groups and permits a distinction between groups. At the highest level of aggregation of occupations termed "major groups", very broad fields of work are identified rather than indicating the types of work performed. The classification structure of SOC consists of three levels of occupational categories

a- the major group

b- the minor group

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<sup>41</sup>Ibid. p.11

c- the unit group.

The occupational groupings are such that, within each major group, one or more minor groups are identified and within each minor group one or more unit groups are identified.

In terms of occupations, in this study, we are following the 1970's SOC. Therefore, the following are considered goods producing occupations: Farming, Horticulture and Animal Husbandry, Other primary occupations, Processing occupations, Machining and Product Fabrication, Construction, Transport Equipment Operating. Service producing occupations are: Managerial, Administrative and related occupations, Occupations in Natural Sciences, Engineering and Mathematics, Occupations in Social Sciences and related fields, Occupation in Religion, Teaching and related occupations, Occupations in Medicine and Health, Artistic, Literary, Recreation and related occupations, Clerical and related occupations, Sales occupations, and Other service occupations.

## Chapter 2

# Major Theories of the Personal Distribution of Income

Economists have devoted considerable attention in providing theories to explain the main forces determining the distribution of income. Many theories have been suggested. Particularly during the 1960's and 1970's a large amount of research was done on the nature and consequences of income distribution, income inequality, poverty and challenging the theoretical works. As Sahota (1978) pointed out "a number of distribution theories have been developed, some rival, others complementary; some normative, others positive; some refutable, others untestable; some rigorously formulated, others only weakly specified; and so on. There are schools within schools and over-

lapping theories.”<sup>1</sup>

The purpose of this chapter is not to undertake an exhaustive survey of the entire literature on theories of the personal distribution of income. We intend to concentrate on those theories which we believe are more appropriate to explain the changes that have taken place in the distribution of income in Canada over the last two decades. In particular, we consider the change in the labour force composition and shift to a service based economy. The following three groups of theories will be examined.

a-Human Capital Theories

b-Structural Theories

c-Multifactor Theories.

We shall discuss these groups of theories in turn.

## **2.1 Human Capital Theory**

Human capital theory refers to the analysis of the productive capacities of human beings as income generating agents in the economy. The justification for the expression “human capital” is that investment in skills, talents and knowledge, like other physical assets, contributes to the production of future income.

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<sup>1</sup>Sahota, G.(1978), p. 2

Human capital is the stock of skills and productive knowledge embodied in people. It is "human" because it is an integral part of a person. It is a form of capital because it is a source of earnings both now and in the future. Like physical capital, human capital can be augmented. Human and non-human capital differ in the nature of property rights. Ownership of human capital is restricted to the person in whom it is embodied. Investment in human capital can conventionally be classified into investment in schooling, vocational training, formal on-the-job training, learning by doing, medical care, migration, and acquiring information.

The theoretical issues of particular interest are the relationship between investment in human capital and income distribution. The field of human capital studies is a broad area in economics. Schultz (1972)<sup>2</sup> presents a long list of subfields that could be viewed either as falling within or as overlapping the boundaries of the domain of human capital.

Although we are not going to present an exhaustive historical analysis of human capital, it will be shown, in essence, that the concept of human capital was somewhat prominent in economic literature. Since the days of Sir William Petty, many economists have included human beings in the concept of fixed capital. Kiker (1972)<sup>3</sup> points out that statisticians and actuaries have developed a scientific procedure for estimating the money values of

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<sup>2</sup>Schultz, T.(1972), p. 4.

<sup>3</sup>Kiker. B.(1972), p. 5.

either a human being or the population of a nation. Petty, around 1690, used the notion of human capital in attempts to demonstrate the power of England, the economic effects of migration, the money value of human life destroyed in war and the monetary loss to a nation resulting from deaths. Petty estimated the value of the stock of human capital by capitalizing the wage bill to perpetuity, at the market interest rate. He considered the wage bill as the difference between national income and property income.<sup>4</sup>

Adam Smith included in a country's stock of fixed capital the "acquired and useful abilities of all the inhabitants or members of the society." He did not consider the human being per se as capital, but in a logical framework he suggested that these skills and abilities (now often called human capital) represent

The acquisition of such talents, by the maintenance of the acquirer during his education, study or apprenticeship, always costs a real expense, which is a capital fixed and realized as it were, in his person. Those talents as they make a part of his fortune, so do they likewise of that of the society to which he belongs. The improved dexterity of a workman may be considered in the same light as a machine or instrument of trade which facilitates and abridges labour, on which, though it costs a certain expense, repays that expense with a profit.<sup>5</sup>

According to Smith, the skills of a man may be compared to a machine in that each has a genuine cost and returns a profit. Smith, however, at one

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<sup>4</sup>Ibid., pp. 108-110.

<sup>5</sup>Smith, A. (1937), p. 266.

point, drew an analogy between men and machines, where the acquisition of skills was viewed as an investment.<sup>6</sup>

McCulloch clearly defined human beings as capital. He states that "man himself should be considered as forming a part of the national capital."<sup>7</sup> Furthermore he stated that "there is a close analogy between conventional and human capital. An investment in a human being should yield a rate of return consistent with other investment, plus a normal rate of return determined by the market interest rate, during the probable lifetime of the individual."<sup>8</sup> Von Thunen pointed out that if during a war the capital embodied in human beings were included in the concept of capital, many social injustices would be avoided. He pointed to the irony, for example, that a hundred men might be sacrificed in battle in order to save one cannon with capital value 20 times less than the capital value of the men. Thus physical capital, it would seem, is valued more highly than human beings. McCulloch suggests that the state should compensate the soldier (or their families if killed) based on the earnings forgone and the cost of education. If his suggestion were carried out, he concludes that "thereby wars would become unendingly costly, but this would work to the welfare of mankind."<sup>9</sup> Alfred Marshall contended that

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<sup>6</sup>Ibid. p. 101.

<sup>7</sup>Cited in Kiker, B.(1972), p. 58.

<sup>8</sup>Ibid., p. 58.

<sup>9</sup>Thunen, V.(1960), p. 359.

“the most valuable of all capital is that invested in human beings”<sup>10</sup> but he disregarded the entire notion on the basis that it would be out of touch with the market place to treat man as capital in practical studies.

Leon Walras denotes all persons capable of yielding personal income as a class of capital called “personal capital”. According to him, “although personal capital is not subject to purchase and sale, labour or personal services are offered and demanded every day on the market.”<sup>11</sup> Walras’ capital theory was adopted by Irving Fisher who presents an all-inclusive definition of capital. He brought the human component of capital fully into consideration. For him, resources spent on education, among other things, are investments in the acquisition of potential future income, whether looked at from the individual or from the societal point of view. Fisher defined “capital” as any stock that yields a flow of services over time. His definition includes machines, buildings, raw material, natural resources and human skills. He defines “income” as the surplus of these services above those necessary to maintain and replace the stock of wealth.<sup>12</sup> The logical outcome of this view, as Blaug (1985) stated, is that “capital is the only factor of production, that all distributive income consists of interest, wages being merely the interest payments on the stock of human capital and that the national in-

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<sup>10</sup> Marshall, A. (1938), p. 564.

<sup>11</sup> Walras, L. (1954), p. 216.

<sup>12</sup> Fisher, I. (1969), pp. 33-35.

come consists entirely of consumption and expenditures."<sup>13</sup> Despite Fisher's interpretation of capital, due to the highly respected reputation of Alfred Marshall, most economists after him (until the late 1950s) have shown a tendency to use the concept of capital only for the non-human portion of capital.<sup>14</sup>

As mentioned above, although classical economists referred to the concept of human capital in their works, the concept was not analyzed in either the Classical or Marxian tradition. Samuel Bowles argues that "the absence of any systematic treatment of human capital in either the classical or the Marxist scheme results from the fact that both Marx and the Classical writers defined their factors of production in terms of the way they perceived the class structure of the period . . . is a result of a conscious attempt to portray the class structure as they saw it, coupled with the fact that the role of education and skill was considerably less than today."<sup>15</sup>

Thurow (1970) argues that nineteenth century economic ideas were formed in the wake of the industrial revolution. As a result of that revolution, machines were identical and their parts became easily interchangeable. In a similar sense, unskilled labour was also identical and interchangeable.

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<sup>13</sup>Blaug, M.(1985), p. 583.

<sup>14</sup>Schultz, T.(1961) argues that among the many economists who have looked upon human beings as capital, there are three distinguished names, Adam Smith, Von Thunen and Irving Fisher. See: Schultz, T.(1961), p. 3.

<sup>15</sup>Cited in Schultz T.(1972), p. 6.

In fact, many of the problems occupying economists of the time period were based on a functional distribution of income. During that period, one of the central questions was "How should output be divided among labour, capital and land?". Differences among individuals could be ignored since labour was treated as homogeneous. So as Thurow pointed out "the fact that individuals had different amounts of human capital had no effect on the fundamental problem."<sup>16</sup>

Schultz (1972), among others, argued that this notion of labour as homogeneous is not correct. The knowledge and skill of labour have an economic value which is in great part the product of human investment. Although the concept of human capital was considered by the classical school, human capital has not played an important role in the development of economic thought, since labour was treated as an homogeneous input. Following Keynes' tradition, and putting emphasis on investment, specifically investment in the production of physical product of goods, the process of growth was explained entirely by the amount of physical capital and its rate of increase. In the last 30 years, emphasis has been put on the problem of economic growth and economists have considered that human capital in the form of skills, knowledge and talents could prove to be a major contributor to economic growth. In fact, the modern vintage of the human capital theory was conceived and developed starting from 1960 by Theodore Schultz and two years later when the *Journal of Political Economy* published its October 1962

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<sup>16</sup>Thurow, L.(1970), pp. 5-6.

Supplement Volume on "Investment in Human Beings" with preliminary chapters of Becker's (1964) book, *Human Capital*. The fundamental conceptual framework of analysis for almost all subsequent works in this area was provided by Becker (1964), who not only organized the emerging empirical observations, but also provided a systematic method for seeking new results and implications of the theory.

Becker (1964), Becker and Chiswick (1966), Chiswick (1974), and especially Mincer (1962) and Mincer (1974), provided the theoretical and empirical development of human capital theory. They clarified the relevant costs of the human investment process including the cost of time. They also advanced the optimizing decision rules for such investment and derived implications for earning differences among different skills, across occupations, and over age categories. Becker made a distinction between human capital that is specific to its current employment in a firm and that which has more general value over a broader set of employments. Becker argues that human capital theory provides some explanations for the fact that the distribution of income is skewed. Becker reasoned that people with more ability earn a higher rate of return on their human capital, hence they invest more in themselves relative to people with less ability, so the correlation between investment in human capital and its rate of return produces a skewed distribution of income.

Mincer (1974) argues that in an earnings function in which earnings are logarithmic, the experience-earning profile is increasing. He suggests the

following earning function which is parabolic in the experience term:<sup>17</sup>

$$\ln Y_0 = \beta_0 + \beta_1 S + \beta_2 X + \beta_3 X^2 + U_0 \quad (2.1)$$

where:

$Y$  = annual earning after completion of schooling,

$S$  = years of schooling,

$X$  = years of experience,

$U_0$  = error term.

$\beta_1$  is the schooling coefficient; it provides an estimate of the rate of return to education which is assumed to be constant in this specification. The concavity of the observed earnings profile is captured by the quadratic experience terms,  $X$  and  $X^2$  whose coefficients,  $\beta_2$  and  $\beta_3$  are proposed to be respectively positive and negative. In this model schooling is assumed to begin at age ( $A$ ) 6 and experience is based on length of labour force experience ( $X = A - S - 6$ ). He implicitly assumes that a worker begins full-time work immediately after completing his education and that the age at school completion is ( $S + 6$ ). There is considerable debate about this form of specification; for example Willis (1986), points out that "as an empirical tool the Mincer earning function has been one of the great success stories of modern labour economics. It has been used in hundreds of studies using data from virtually every historical period and country for which suitable data exist."<sup>18</sup> Griliches, among others, presents a list of questions concerning the specifica-

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<sup>17</sup>Mincer, J.(1974), p. 84.

<sup>18</sup>Willis, R.(1986), p. 526.

tion of an econometric model of earnings of this type. Some of his questions are: <sup>19</sup> What is income? What is schooling? Why should the equation have this particular functional form? What other variables should be included in the equation? Why should there be a relation like that in the first place? In other words:

1. What interpretation can be given to such an equation?
2. What interpretation can be given to the estimated  $\beta$  coefficients?
3. Can one expect it to be stable across different samples and time periods?

Given answers to the previous questions, how should it be best estimated?

Who cares?

Among the many objections raised against the human capital theory, the followings are the major ones:

1. While income maximization considerations may play some role in determining the amounts of education and of some forms of training, there are many technical and institutional factors which are also important.

Sahota (1978) points out that:

The discounted-value maximization behavior is too far-fetched.  
While some lifelong economic considerations do play a part in

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<sup>19</sup>Griliches, Z.(1977), p. 1.

individuals' lives and the permanent-earnings concept makes good sense, the postulate of a maximization of discounted life time earnings at uniform discount rates is unrealistic<sup>20</sup>

2. It may be acceptable to assume that a rational person will acquire training to the point where the marginal return equals the marginal costs, if that person actually makes the decisions involved. But if someone else makes the decision, the answer is not clear. Some economists<sup>21</sup> were concerned that parents make human capital decisions for their children, but do not have to bear the consequences of those decisions. And decisions made during early ages are usually made by parents not children.
3. Human capital theory is limited to an explanation of wage earnings, while property ownership has significant effects on total income. Furthermore, from an income inequality point of view, property income is more unequally distributed than earnings and thus has greater impact on inequality. So human capital theory should not be considered a general theory of income distribution. In most of the developed countries, education seems to account for only a small part of the dispersion of income.
4. On-the-job training, or more generally, learning by doing may account for at least as much or more than is explained by formal education.

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<sup>20</sup>Sahota, G.(1978), pp. 14-16.

<sup>21</sup>For example Pigou, A.(1932), p. 493.

5. Most of the human capital models consider only the supply side of a market. At the same time, they assume that workers know present and future facts about the labour, education and capital markets. Furthermore, these markets always are in equilibrium.
6. Even those human capital models which consider both the demand and supply sides assume that both workers and firms know or can identify costlessly each worker's marginal product while this is rarely the case in practice, especially for occupations in which workers are interdependent, such as a position on an assembly line in which the failure of any one worker on the line will reduce or destroy the output of other workers. Sahota (1978) in a discussion of human capital theory concluded that:

An overall conclusion ..... is that the human capital theory has brought about a revolution in economic thought. As a theory and methodology it remains unscathed from multidirectional attacks. Its proponents have so far soared higher with each gust of counterwinds. The main weakness of this theory is its overemphasis on formal schooling and its neglect of an endogenization and formal integration of *preschool* and *informal* family investment into a more complete theory of human capital, even though piecemeal studies of such investment are being made largely by human capitalists. The productivity of preschool investment, which comes before schooling and post school investment, is believed to be very high, ... Such an extension of the definition of human investment need not involve going out of the human capital framework. But it does imply opening all doors, such that other theories, including those of inherited fortunes, have equal chance of being tested. That is a common ground for the rival the-

ories to meet.<sup>22</sup>

7. Human capital theory has been criticized by the proponents of the screening/signaling hypothesis.<sup>23</sup> According to this approach, education may act only to screen out the less able workers rather than enhancing productivity directly.

Human capital theory might shed some light on the process of income distribution and inequality, but it lacks the analytical power to explain the new trends concerning increases in the female participation rate, the increase in part-time work and the employment shift from goods to services.

## 2.2 Structural Theories

Some argue that based on the human capital theory, poverty and inequality are mainly the result of the individuals's acquisition of inadequate or inefficient investment in human capital. Another line of argument is the structuralists' argument. The structuralist tradition emphasizes the role of institutions, customs and socio-political factors. The old phase of this view can be seen in the work of authors such as Lester (1946) who attacked the assumptious and abstractions of Neoclassical economics with emphasis on

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<sup>22</sup>Sahota. G.(1978), p. 18.

<sup>23</sup>Among many others, Stiglitz, J.(1975), Berg, I., M. Freedman, and M. Freeman (1978).

marginal analysis. Structuralists argue that poverty and inequality are not simply the result of the individual's failure, but stem from some larger institutional structure over which the individual has little control. Human capital theory has originated from the philosophy of individualism and, assuming a competitive market it is based on individuals' characteristics. Structuralists place more emphasis on the social system, so according to them, inequality is the outcome of the functioning of society's institutions. Based on the structuralist's view, theories of the causes of poverty and inequality fall into two categories (i) dual labour market theory, (ii) radical labour market theory.

### 2.2.1 Dual Labour Market Theory

This perspective was extensively discussed during the 1970's. It is a continuation of the view that had emphasized the importance of noneconomic factors in the labour market. Doeringer and Piore are the leading economists in dual labour market analysis and this approach has been discussed extensively in many of their studies. According to them,

Jobs in the primary market possess several of the following characteristics: high wages, good working conditions, employment stability, chances of advancement, equity and due process in the administration of work rules. Jobs in the secondary market, in contrast, tend to have low wages and fringe benefits, poor working conditions, high labour turnover, little chance of advancement, and often arbitrary and capricious supervision.<sup>24</sup>

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<sup>24</sup>Doeringer, P. and M. Piore (1971), pp. 166-167.

The idea of segmentation of the labour market is not a new formulation, but rather a resurrection of older theoretical concepts that for many decades have been largely overlooked. For instance, John Stuart Mill and Cairnes explicitly rejected Adam Smith's essentially competitive conception of the labour market in favour of noncompeting groups.<sup>25</sup> Also it can be founded in some different way in Marx's conception of two distinct classes of income recipients, namely the working and the capitalist classes. Furthermore, there is an extensive body of literature in development economics that discusses the concept of dualism, the existence and persistence of increasing divergences between the rich and poor on various levels (internally as well as internationally).

There are a variety of forces creating and sustaining the segmentation between the primary and secondary labour markets. Among them we mention only the stability of demand, bureaucratic control, institutional and legal factors.

### **Demand Stability**

Technological change makes possible capital intensive methods of production. However, employers are unwilling to undertake large-scale investment when product demand is unstable and unpredictable. Firms that face unstable demand operate in the secondary market, while firms that enjoy stable product demand create employment in the primary sector.

### **Bureaucratic Control**

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<sup>25</sup>Smith, D.(1976), p.6 and Wachtel, H.(1984), p. 209.

Radical economists focus on changing systems of organization within the capitalist firm. According to them forces which led some employers to create primary jobs begin with the emergence of large corporations. In giant corporations, employers turn to bureaucratic control which provides job-security and career prospects in order to win the loyalty of employees.

### **Other Institutional and Legal Factors**

Unions, professional associations, and legal factors can create barriers to entry and prevent competition via occupational licensing. These barriers might foster segmentation in the labour market. Sometimes, it is argued that discrimination creates barriers between the primary and secondary sectors because employers in the secondary sector will favour the perpetuation of discrimination in order to increase the size of the labour force and lower wages, while workers in the primary sector will favour discrimination in order to restrict the supply of labour and raise wages. In addition, these barriers can be intensified with trade union organization and activity imposing restrictions directly upon the employer through collective activity at the work place, or through the legislative and political processes.

Once the market becomes segmented, for whatever reason, there are some tendencies to sustain the segmentation. With respect to the wage determination process, Doeringer and Piore argue that "any wage rate, set of wage relationships, or wage setting procedure which prevails over a period of time tends to become customary; changes are then viewed as unjust or inequitable, and the work group will exert economic pressure in opposition

to them.”<sup>26</sup> They argue that in a static world, custom would come to centre upon the actual wage rate paid for each kind of job but an industrial economy does not experience this kind of stability, and custom tends to grow around wage relationships rather than around specific wage rates.

Recall that the primary sector is governed by a set of rules, which constitute an internal labour market. This internal labour market has rules for promotion, layoffs, and other personnel decisions. Once hired, a person is presumed to have some minimal rights to the job.

What is crucial for entry into this sector is the firm’s subjective perception of how well the prospective employee will perform in the internal labour market of the firm. Especially regarding decisions of investment in human capital, firms consider the worker’s attachment to the firm, because such investment would be squandered if the individual left the firm. Decisions are evaluated beyond the short term, as the prospective employee is evaluated in terms of how well he or she will fit into the firm’s internal labour market. This kind of discrimination is called “pure discrimination” and is discussed in detail by Becker (1971).

The second type of discrimination, is called “statistical discrimination” in which employment decisions are based on some subjective considerations. A firm may block certain workers from entering its work force based on the

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<sup>26</sup>Doeringer, P. and M. Piore (1971), p. 85.

colour of skin, sex, accent, education and so forth. The result of statistical discrimination is that minority workers, for example, become concentrated in the secondary sector. There, they develop traits associated with high job turn-over, lack of work discipline and limited opportunities for advancement.

The dual labour market theory incorporates both types of discriminations, but as Doeringer and Piore pointed out, the principal emphasis is placed on statistical discrimination. They argue that a consideration of the factors generating internal labour market suggests that some discrimination is best understood in terms of the costs to employers of screening, recruitment, and training, whereas other forms of discrimination can be traced to attempts, for example, by white workers to enhance their job security and economic opportunity at the expense of black workers.

### **Policy Implications of Dual Labour Market**

According to dual labour market analysis, income inequality arises because workers in the secondary market tend to be disadvantaged workers, often caught in a vicious circle of poverty, and experiencing other problems associated with discrimination and poor working conditions. Dual labour market theory suggests that public policies should focus on the structure of labour demand with less emphasis on policies affecting the level of demand (such as macroeconomic full-employment policies) as well as the structure of labour supply (such as human capital theory). Doeringer and Piore stated "expansion in aggregate demand will not necessarily solve the problem of the disadvantaged. This kind of policy helps mostly primary workers and perhaps a

few secondary workers, who are close to obtaining primary employment."<sup>27</sup>

Proponents of dual labour market theory usually give the following two recommendations:

a- Extend working conditions in the primary labour market to workers in the secondary labour market. The policy recommendation could be through equal pay, minimum wages laws and encouragement of unionization and collective bargaining in the secondary labour market.

b- Break down the barriers that prevent movement from the secondary to the primary labour market, using policies such as anti-discrimination laws and the removal of unnecessary educational or occupational licensing requirements. However, even if these policies are necessary, they may not be sufficient. In addition, some of the protective policies are desirable and removing those features create more serious problem for society. Intervention on the supply-side of the market, particularly the human capital investment programs of education, training, and job search assistance is reemphasized.

#### **Dual Labour Market Theory and Canada**

Dual labour market theory was developed in the United States in a series of studies of the urban working poor. It is claimed to be widely applicable by providing new insights into the problems of disadvantaged workers. But to my knowledge, little has been done on the dual labour market in the Canadian context. Concerning the implications of dual labour market theory in Canada, Smith (1976) argued that:

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<sup>27</sup>Ibid., p. 178.

Dual labour market theory does not appear to provide important new insights into the Canadian unemployment problem and the appropriate direction of macro full-employment policies in the post World War II period has not lowered the permanent unemployment rate in Canada: indeed, it is sometimes argued that an upward shift in this rate may have occurred, that a decade ago three percent unemployment was a reasonable target for full-employment but not now...<sup>28</sup>

However, there are reasons for the relevance of the dual labour market theory in recent years. One of them is related to the recent employment shift from goods producing activities to service producing activities. The evidence confirms the shift toward a service dominated economy (not only for Canada but for almost all of the developed economies). In a recent study by the Economic Council of Canada, employment in the service economy is considered to provide good jobs while employment in the goods economy is considered to provide bad jobs.

...employment is becoming increasingly polarized into two categories good jobs and bad jobs. This is most apparent when we look at trends in the distribution of employment income: over the past two decades, there has been a notable decline in the share of the work force with middle level earnings. At the same time, the growth in nonstandard employment forms is leading to the emergence of a related dichotomy within the labour force: workers with well-paid, relatively stable jobs and with extensive legal protection; and workers in employment forms that are often more tenuous, usually less well-compensated, and nearly always less protected.<sup>29</sup>

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<sup>28</sup>Smith, D.(1976), p. 28.

<sup>29</sup>Economic Council of Canada (1990), p.26.

Gera and Grenier (1991), in their study on interindustry wage differentials, argue that noncompetitive aspects of the labour market may be more relevant at the present time, especially by considering wage polarization and segmentation in the labour market that have been observed during the last decade. "Thus we are in the presence of a labour market increasingly segregated into two distinct segments- 'good' jobs and 'bad' jobs- a situation that cannot be explained easily by competitive factors."<sup>30</sup> According to them, the analysis of interindustry wage differentials based on an efficiency-wage model has implications for the dual labour market theory since:

It can be argued that the primary sector pays efficiency wages, while the secondary sector does not. Therefore, the analysis is relevant to the definition of the dual labour market. A very important conclusion for our analysis is that interindustry wage differentials are very similar for various groups of workers, such as white - and blue - color, unionized and nonunionized, young and old, etc. This observation may be an argument in favour of defining the primary and secondary markets on the basis of industry. That is so because in high-wage industries *all* [italic in original] kinds of employees receive higher-than-average wages, given their skills, while the converse is true of low wage industries. In this perspective, it makes sense to equate the primary sector with high-wage industries and secondary sector with low wage industries.<sup>31</sup>

Some studies define the primary and secondary sectors on the basis of wages in industries. For example, Gera and Grenier (1991) equate the

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<sup>30</sup>Gera S. and G. Grenier (1991), p. 33.

<sup>31</sup>Ibid. p. 34.

primary sector with the high wage industries and the secondary sector with the low wage industries, but they argue that "it is probably more fruitful to think of the dual labour market in terms of two extreme cases - the primary sector at one end, and the secondary sector at the other - but allowing for the possibility that some workers may be found between those two extremes."<sup>32</sup>

The presence of interindustry wage differentials has led economists to propose different alternatives to explain labour market behaviour. Based on one argument, a worker possesses different abilities and the wage represents the sum of payments for these abilities. Since these abilities are embodied in the worker as a fixed package, the proper use of them depends on the worker's occupation or industry. This might be a reason for wage differentials. Levy and Murnane (1992) explain the idea with the following simple example: "Within a steel mill, we expect workers to be paid on the basis of their physical strength and ability to tolerate a hot, noisy, and dangerous workplace. Steel workers may vary in their ability to talk in a pleasing way, but we would not expect this variation to have much effect on their wages. When the same workers are placed in retail trade, however, their ability to talk in a pleasing way may have a great deal to do with their wages, while their tolerance for dangerous situations may be irrelevant."<sup>33</sup>

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<sup>32</sup>Gera, S. and G. Grenier (1991), p. 27.

<sup>33</sup>Levy, F. and R. Murnane (1992), p. 1374.

Heckman and Sedlacek (1985) and Heckman (1987) provided an empirical equilibrium model in the labour market which tries to deal with "ability bias". Finding suitable data for empirical examinations is one of the main difficulties in dealing with this form of modelling in the labour market.

### 2.2.2 Radical Theory

Another major view is provided by the radical economists. These economists can be considered neo-Marxians in the sense that they emphasize the role of class and class conflict in determining the nature of labour market. Radical theory is based on some hypotheses about capitalist economies. The radical theory of income distribution and income determination cannot adequately be understood without first understanding certain basic concepts and hypotheses. Following Gordon (1972), we shall present some of the most important hypotheses based on the radical economic literature. These topics are discussed among many others in the work of Bowles (1972), Edwards, Reich and Weisskopf (1972), Harrison (1972), Dobb (1963), Thompson (1966), and Mandel (1968). Radical theory begins with five following generalizations or hypotheses about capitalist economies.

### 2.2.2.1 Modes of Production

Every economic mode of production is characterized by a division of work responsibilities among different social groups. The mode of production reflects the social relations of production in an economy. Maurice Dobb (1963) elaborates on this definition as follows:

By mode of production he [Marx] did not refer merely to the state of technique - to what he termed the state of the productive forces - but to the way in which the means of production were owned and to the social relations between men which resulted from their connections with the process of production.<sup>34</sup>

### 2.2.2.2 Class Conflict

The social division of labour, characterized by social relations of production, creates a division of society into economic classes. These classes inevitably clash with each other, and the course of history is determined through the growth and resolution of the conflicts. According to Thompson (1966):

By class I understand a historical phenomenon, unifying a number of disparate and seemingly unconnected events, both in the raw material of experience and unconsciousness. I emphasize that it is an historical phenomenon. I do not see class as 'structure', nor even as a 'category', but as something which in fact happens (and can be shown to have happened) in human relationships. More than this, the notion of class entails the notion of historical

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<sup>34</sup>Dobb, M.(1963), p. 7.

relationship. Like other relationship, it is a fluency which evades analysis if we attempt to stop it dead at any given moment and anatomize its structure.<sup>35</sup>

### 2.2.2.3 Capital Accumulation

Radicalists pay special attention to the process of accumulation, meaning the unceasing and continuous attempt by owners of capital to increase their absolute and relative share of capital by nearly any means, especially by the division of labour and through a system of complex productive institutions.

Ernest Mandel (1968) describes it:

Under the lash of competition, the capitalist mode of production thus becomes the first mode of production in the history of mankind the essential aim of which appears to be "*Unlimited increase in production*". [italics in the original] Constant accumulation of capital by the capitalization of the surplus value produced in the course of production itself.<sup>36</sup>

Dobb (1963) argues that capitalism is not simply a system of production for the market but a system under which labour power becomes a commodity bought and sold on the market like any other object of exchange.<sup>37</sup>

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<sup>35</sup>Thompson, E. P.(1966), pp. 9-10.

<sup>36</sup>Mandel, E.(1968), p. 133.

<sup>37</sup>Dobb, M.(1963), p. 7.

#### 2.2.2.4 The State

The state, in the radical view, operates ultimately to serve the interests of the ruling class, which based on this view, is the capitalist class. Paul Sweezy summarized the radical view of the state

Let us summarize the principles underlying the use of the state as an economic instrument within the framework of Capitalism. In the first place, the state comes into action in the economic sphere in order to solve problems which are posed by the development of capitalism. In the second place, where the interest of the capitalist class are concerned, there is a strong predisposition to use the state power freely. And, finally, the state may be used to make concessions to the working class provided that the consequences of not doing so are sufficiently dangerous to the stability and functioning of the system as a whole. <sup>38</sup>

#### 2.2.2.5 Internal Contradiction

According to the Radical view, owners of capital in a competitive situation seek consistently to improve efficiency and increase their control over the work process by specialization and mechanization. As the division of labour proceeds, workers become more alienated from the production system and increasingly oppressed by the contradiction between specialization, new technology and desire for participation in a creative production system. According to Radical theory, since dissatisfaction of workers cannot continue

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<sup>38</sup>Sweezy, P.(1968), p. 249.

for ever, the capitalist system provides some form of compensatory satisfaction for the workers. Radical economists argue that the increase in public goods and rise of social welfare programs might create the possibility to cease class conflict.

Gordon (1972) summarizes the radical view of income distribution as

In radical theory, there are two stages to the determination and distribution of income. First, a complex set of individual, social, economic, and technological forces determines an individual worker's productivity (expressed as average productivity) on a specific job. This average productivity varies both with the workers "capacities" and with the characteristics of this job. Second, the relative power of employers and employees determines the share of the worker's total product paid to the worker in wages. He receives some of the product as wages and the employer receives the rest as surplus product. The worker's final wage thus depends *both* on his individual productivity *and* on the relative power of the class to which he belongs. [italics in the original] The radical theory thus combines the radical concept of class with the orthodox notion of supply and demand.<sup>39</sup>

If we want to provide a summary of this view, it should be mentioned that, following Marx, radicals emphasize that economic classes emerge as a result of the capitalist mode of production. Because of technological change and growth, an economic surplus is created; all class conflict arises over the division of this economic surplus. Under the capitalist system, this economic surplus is mainly absorbed by the capitalist owners of the means of produc-

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<sup>39</sup>Gordon, D.(1972), pp. 64-65.

tion and they use this surplus and all the instruments of the state to ensure that effective power remains in their hands. According to the radical view, over time, competition, by its internal contradictions, contains the seed of its self-destruction. Bowles (1972) argued that the effect of human capital on income is very small, when the concept of "social class" is taken into account. Becker (1972) claims that the evidence presented by Bowles is rather shaky and that the term "social class" is not sufficiently accurate to support a Marxist interpretation of income inequality. Marshall, Cartter and King (1976) claim that the radical approach is not amenable to empirical verification, because it is based on a dialectical interpretation of history. Therefore, it is impossible to either prove or disprove the validity of the radical theory. Radical economists emphasize the importance of the development of class consciousness among workers and argue that traditional policy recommendations or policies suggested by dual labour market theorists are ineffective without radical changes in power relationships. However, policies to change these power relationship are not spelled out clearly in their studies.

## 2.3 Multifactor Theories

### 2.3.1 Socio-cultural Theory

It has been long recognized that many different factors are likely to play a role determining the distribution of income . According to this view, many factors influence the distribution of income and they all should be considered, for example, age, sex, race and religion, geographical location, industry, education, ability of various kinds, genetic inheritance, family background and the cultural group.

A good summary of this approach is provided by Lydall (1976). He has taken into account many of these factors in order to explain the skewness and dispersion of income distribution. Apart from all these factors, there is an important element of luck. He argued that a major reason why luck should not be excluded is that the labour market is not a perfect market. For example, when a vacancy occurs in a firm, in a school, or in a training course, the person who gets the job or the entry to the course is often the person who is among the first to hear about it, or who has the right contacts to one of those making the selection and so forth. This sort of luck might have a decisive influence on a person's career, because the entry to a job or school may open the door to other opportunities which consequently affect permanent income. Lydall presents the interrelationship of these factors in

the following Figure 2.1. The arrows represent the major directions likely to influence income and the letters are defined as follows:

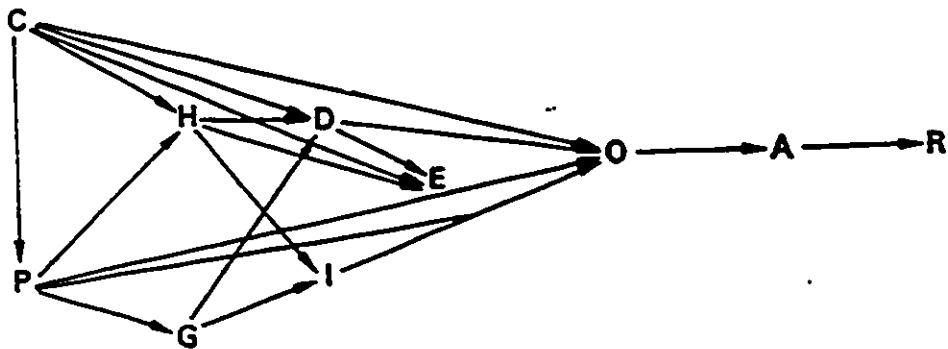


Figure 2.1: Factors Affecting Individuals' Earning

Source: Lydall, H. F.(1976), p. 26.

C = cultural influences- social religious, racial,

P = parents' characteristics, genetic and cultural,

G = genetic endowment,

H = home environment,

I = cognitive ability,

D = d-factor (drive, dynamism, determination and discipline),

E = education and full-time training,

O = occupation,

A = age,

R = responsibility, or hierarchy effect,

L = luck.

Lydall believes that cultural influences are dominant in determining the D factor which is so important for economic and almost any other kind of success in life. He claimed a close relationship between the D factor and Keynes' "animal spirit".<sup>40</sup> Lydall has shown lines of influence running from C directly to P, H, D, E, and O and indirectly to other variables. Lydall points out that, if it is accepted that all the above mentioned factors affect earnings, either directly or indirectly, it is possible to offer the simple explanation for the shape of the observed distribution. The explanation given states that since a number of the factors are likely to combine multiplicatively rather than additively (due to the fact that many of them are positively skewed), there are ample grounds for expecting the distribution of earning to be positively skewed.

Brittain (1978) suggested that one cause of the inequality of income is the degree of privilege conferred by ones' socioeconomic background and other parental influences, since every child starts with the economic status of his parents. In another line of argument, even educational attainment is related to family environment. For example, the Coleman Report in an

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<sup>40</sup>Lydall, H.(1976), p. 43.

extensive and detailed analysis of factors affecting educational attainment in the United States, concluded that the most important influence was socioeconomic background and not school. In this study, it is argued that for most minority groups and most particularly blacks in the United States, schools provide little opportunity for them to overcome this initial deficiency. The authors of the Coleman Report presented considerable information showing blacks were farther behind the white majority, in the development of several skills which are critical to participate fully in modern society. According to this report "non-school factors like poverty, low educational level of parents, family environment, community attitudes . . . put minority children at a disadvantage even when they enter the first grade."<sup>41</sup> Siedule (1992), based on the Canadian evidence, provides a similar conclusion and argues that based on the data in 1986, socioeconomic background (like value of dwelling, family size, family status and living arrangement, ethnic origin, etc.) had a profound influence on educational attainment of the children. In his words:

The findings not only authenticate the correlation between educational attainment and socioeconomic status, but also quantify the effect of low socioeconomic status on individual's education ... If the country is interested in raising the educational standard of all Canadians, then, in addition to the perennial search for a more efficient education system, policy makers have to find ways to alleviate some of the unfavourable social and economic influence on the less fortunate youths.<sup>42</sup>

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<sup>41</sup>Coleman, J. et al.(1966), p. 21.

<sup>42</sup>Siedule, T.(1992), p. xi.

Another interesting multifactor theory in providing explanation for personal distribution of income is the one introduced by Canterbury (1979) and is called the vita theory.

### 2.3.2 Vita Theory

Vita theory is an integration of labour market theory, a modified human capital theory, and the results of the discrimination and migration literature. The theory assumes that one labour market exists for each general human capital classification, and the individual's quantity of human capital determines which labour market the individual enters. An individual qualifies for a particular labour market by the state of his or her vita at that point in time. In this way, the vita theory is a description of the process by which individuals attempt to move towards a higher income. Canterbury (1979) argued that an individual has some control over his or her vita and it may be augmented during a life-span by education, other training and experience.

In Canterbury's model, there are many qualitative variables which are not easy to measure or give proxy measures which could accurately capture them. He applied his model for white U.S. males in 1964 and all his findings provided support for affirming the vita theory hypothesis. He concluded that:

Inherent capabilities and family environment have important im-

pacts upon the life plans that culminate in occupational selection and personal incomes. The advantageous *birth vita* starts the individual on the optimum *vita* path, aiding the selection of the "optimum" years of schooling and other training. Genetic and family endowments directly and indirectly affect occupational choice and thus earnings. In the mature *vita*, the genetic code can impinge again in the way of job and wage discrimination.<sup>43</sup>

Based on this theory, once placed on the track, an individual proceeds to accumulate human capital which prepares him or her for a particular stratum in the labour force. Human capital determines the slotting process, but the wage and salary differentials are determined by the character of different labour markets. Both human capital and labour market structures are important for understanding income distribution. The characteristics of labour markets sets the boundaries on incomes earned for individuals in a particular labour market. By affecting the available labour market strata, human capital influences income possibilities for an individual, while the labour market sets the context for the earning in the first instance.

Canterbery concludes that if the *vita* inequality (unequal *birth vita*) leaves the society with unacceptable income and wealth inequalities "more equal distribution could only be achieved by such direct redistributive policies as John Stuart Mill's inheritance tax proposal and Friedman and Tobin's negative income tax."<sup>44</sup>

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<sup>43</sup>Canterbery, R.(1979), pp. 44-45.

<sup>44</sup>Ibid. p. 45.

## 2.4 Concluding Remarks

A large number of studies have been done to explain changes in income distribution. Among them, we selected a group of theories which we believe are most relevant to the distribution of income in Canada, particularly by considering the effects of sex, education and occupation.

Human capital theory tries to explain mainly differences in employment income. But despite its popularity, it can be considered only a partial theory, because even though it is potentially relevant in some cases, it would still omit many other factors. Human capital theory and its earning function are based on some unrealistic assumptions and it is subject to much criticism.

Among Structural theories, the Radical approach is not very helpful because it is based on a dialectical interpretation of history and cannot be verified empirically.

Multifactor theories, especially Vita's approach, is very useful if one is interested in understanding the mechanics of the growth of income of a particular group in the economy. But they have many qualitative variables which are not easy to quantify.

Dual labour market theory and its empirical testing are controversial since the line between the primary and secondary sectors is difficult to draw.

If any conclusion can be drawn from this chapter, it is that no single theory can explain the entire process of income distribution and inequality. Change in inequality is the outcome of several socioeconomic, technological, institutional and demographical processes and each part may be explained by related theories. While there is no consensus as to which theory provides the best explanation, particularly with respect to new trends in the labour force such as the increase in the female participation rate, the increase in part-time work and the employment shift from goods producing to service producing activities, the insights from all the theories are useful. However, by considering the problems which are associated with human capital theory, radical theory and multifactor theories, probably dual labour market theory is a better candidate to explain the new trends in the Canadian labour force and consequently income distribution and income inequality.

## Chapter 3

# Methodology of Analysis

The purpose of this chapter is to provide a methodology upon which the process of income distribution and inequality can be analyzed. To better understand the issues of changes in income inequality and the process of income polarization, particularly with respect to the employment shift from goods to services and the change in the composition of the labour force, the first step is to provide suitable tools which we shall deal with in this part of the study. In this chapter, we refer first to the theoretical background of the measurement of inequality in the distribution of income. Then we examine income distribution models ( Pareto, Lognormal, Gamma, Singh-Maddala and Dagum) with a discussion of some basic properties, methods of parameter estimation and comparisons among them. The chapter follows with classification and properties of income inequality measures with reference to

the index decomposition procedure.

The issues of income distribution and economic inequality have occupied a place in economic literature for a long time. It is generally considered that the quantitative study and modelling of personal income distribution began in 1895 when Pareto formulated his famous Pareto's Laws. Since then, the availability and accuracy of statistical data on income distribution have improved continuously. The development of measures of inequality has progressed in parallel with both the development of data and with theorizing about the significance and determinants of the distribution. Basically, economists have discussed the issue of income inequality from two points of views, normative and positive. Traditional welfare economists show that the economic system will reach an equilibrium at a Pareto optimal point, that is, at a distribution or allocation from which the economy cannot move without making someone worse off. Welfare economists assume that moving to a Pareto optimal point from a non-optimal point always makes society better off. Meanwhile, more efficiency, which is defined as moving to a Pareto optimal point (from a non-optimal point) is always desirable.

Since the economy may be in equilibrium at an infinite number of Pareto optimal points which correspond to different distributions of income, there is no way to choose among them on the basis of efficiency alone. Thus the optimum distribution must also be based on value judgments and normative criteria. In formulating welfare criteria, there are some generally acceptable

principles such as the aversion-to-inequality principle, which states that a society prefers less inequality, or the aversion-to-poverty principle, which indicates that a society prefers larger average incomes. But these principles are based on value judgments and normative criteria as well. Concerning income inequality measures, some of them catch the extent of inequality in a somewhat objective sense. Positive measures of inequality either have statistical bases or informational bases. On the other hand, normative measures try to establish indices for measuring inequality in terms of some normative notion of social welfare. In this approach, a higher degree of inequality corresponds to a lower level of social welfare for a given level of income and vice versa. In this sense, inequality measures are welfare-related measures, which usually can be linked by suitable assumptions to a social welfare function. Usually, this kind of index of inequality describes the performance of a given income distribution relative to the maximum welfare that could be derived from the total available income.

In another form of classification, one can argue that from the time of the landmark study by Pareto, the study of income inequality measurement has developed in two ways:

a- Parametric form: By the use of income distribution models, where the frequency of economic units (e.g. families, individuals, males, females) at each level of income is represented through the use of a probability density function (PDF), and from the representative PDF, income inequality measures are derived.

b- Non-parametric form: This approach involves the use of one or more indicators that measure inequality from the observed income data, without the use of a probability density function.

Both of these approaches have been developed considerably, offering on the one hand a great number of inequality measures without any relation to a particular function, and on the other hand, scores of models that have been proposed to fit the observed distribution of income. The discussion will follow by examining income distribution models.

### 3.1 Income Distribution Models

Income distribution models have been specified since Pareto (1895) to describe the observed distribution of income and to simplify the problem of comparing distributions in different populations, or examining the evolution of a distribution over time. However, there are problems in using observed income distribution in grouped data, such as the implicit assumption that incomes are the same for all agents in each class.<sup>1</sup> By using a well fitting income distribution model, these kind of problems can be solved. This approach allows us, once the specification of the model and the estimation of parameters have been done, to deduce some of the income inequality measures such as

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<sup>1</sup>Stark T.(1972), argues that income inequality measures are not comparable when the number of classes is different for each distribution.

the standard deviation, the coefficient of variation, the Gini coefficient, etc. If a function can be specified which provides a reasonably close approximation to the true distribution, one can obtain a device for interpolation within income classes and for extrapolation in the lowest and highest classes. This approach enables one to calculate the number of recipients in an arbitrarily selected income bracket and their income.

Another advantage of a well fitted income distribution model is that its parameters can be used within the framework of a macroeconomic model. This could be done as a planning tool where the target income distribution is predetermined and to be achieved within a certain period of time. The target income distribution could be represented as well in terms of an associated income inequality measure over time such as a reduction of a percentage point in the Gini coefficient, or an increase of a percentage point in the share of the poorest 20% of the population. In the same way, the parameters of the model can be used to forecast income distribution in the future. Also, a well fitting model may be used to smooth out irregularities in the observed income distribution caused by the misreporting of income.

### **3.1.1 Pareto Model**

As mentioned the systematic quantitative analysis of personal distribution of income was initiated by Pareto (1895), motivated by his ideological polemic

with the Italian and French socialist schools concerning ways and means to achieve a less unequal distribution of income. The latter were pressing for institutional reforms to reduce the inequality whereas Pareto argued that income inequality can only be reduced by sustained economic growth and not by redistributing actual incomes.

In pursuing this line of thought, Pareto arrived at the specification of his model, the Pareto type I, that played a central role in his elaboration and conclusions. Pareto specified his model based on assumptions stemming from the observed regularity and permanence of the elasticity of the upper tail of the distribution of income among the middle and high income groups. The Pareto model is still considered to be the best one in terms of describing high income groups, however, it is inadequate in dealing with the lower and middle income groups. His first specification ( Pareto type I) was:

$$S(y) = \left(\frac{y}{y_0}\right)^{-\alpha} \quad (3.1)$$

where  $S(y) = P(Y > y)$  is the survival distribution function.<sup>2</sup> In this model, the income elasticity of the survival distribution function is constant.

$$\frac{d(\log S(y))}{d(\log (y))} = -\alpha \quad (3.2)$$

$$\alpha > 1 \text{ and } 0 < y_0 < y .$$

where  $y_0$  and  $\alpha$  are the parameters of the model.  $y_0$  can be considered any

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<sup>2</sup>By definition a Cumulative Distribution Function is  $F(y) = P(Y \leq y)$  and a Survival Distribution Function is  $S(y) = 1 - F(y) = P(Y \geq y)$ .

positive (but not zero) value of income, in fact it gives the lower income limit for which the distribution is defined. Pareto type II is deduced after replacing  $y$  by  $(y - \theta)$  :

$$S(y) = \left(\frac{y - \theta}{y_0 - \theta}\right)^{-\alpha} \quad (3.3)$$

$$0 < \theta < y_0 < y .$$

By multiplying the type II by  $\exp(-\beta y)$  where  $\beta > 0$ , the Pareto type III is obtained:

$$S(y) = \left(\frac{y - \theta}{y_0 - \theta}\right)^{-\alpha} \exp(-\beta y) , \quad (3.4)$$

where  $\alpha$ ,  $\beta$  and  $\theta$  are the parameters of the model. These three types of models are strictly decreasing functions.

Pareto's contribution stimulated further research in the specification of new models to fit the whole range of the income distribution. Several probability distribution functions were specified as models of income distribution. Among them, we shall discuss the Lognormal, Gamma, Singh-Maddala and Dagum models.

### 3.1.2 Lognormal Model

The lognormal distribution has received considerable attention in the past. Sometimes it is argued that in economics, skew frequency curves are the rule rather than exception, so the lognormal distribution is one of the best ways

to represent the positive skewed distribution through the use of a probability distribution function. The idea here is that the changes in people's incomes can be linked to a systematic process such that, at each point in time a person's income increases or decreases by a certain proportion, where the proportional change is determined by chance. If the distribution of the logarithm of these proportional changes follows the normal law, the overall distribution of income approaches lognormality.

Aitchison and Brown (1957) pointed out that if we consider a positive variate  $Y(0 < Y < \infty)$  such that  $X = \log Y$  is a normally distributed with mean  $\mu$  and variance  $\sigma^2$ , we can say that  $Y$  is lognormally distributed or that  $Y$  is a  $\lambda$ -variate and write  $Y$  is  $\lambda(\mu, \sigma^2)$  and correspondingly  $X$  is  $N(\mu, \sigma^2)$ . The probability density function of the lognormal model is given by:

$$f(y) = \frac{1}{\sqrt{2\pi} \sigma y} \exp\left(\frac{-1}{2\sigma^2}(\log y - \mu)^2\right). \quad (3.5)$$

Cowell (1977), who favours the lognormal distribution, by pointing out some of its attractions, argued that since the change in people's income can be likened to a systematic process, the overall distribution of income approaches lognormality.<sup>3</sup> However, the poor fit of the estimated lognormal distributions resulted in research on alternative models of income distribution.

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<sup>3</sup>Cowell F.A.(1977), p. 82.

### 3.1.3 Gamma Model

The Gamma function is a contribution of Euler in the 18th century. It is defined by the integral

$$\Gamma(n) = \int_0^{\infty} e^{-y} y^{n-1} dy \quad (3.6)$$

where  $n > 0$ .

It is a continuous function of the parameter  $n$  and has continuous derivatives of all orders. A generalized gamma distribution was developed by L. Amoroso in 1925 and applied to describe income distribution in Germany.<sup>4</sup>

Its generalized probability density function is given by

$$f(y; \lambda, p, s) = \frac{\lambda^p}{|s|\Gamma(p)} (y - y_0)^{p-1} \exp\{-\lambda(y - y_0)^{\frac{1}{s}}\} \quad (3.7)$$

$$0 < y_0 \leq y, \alpha = \frac{p}{s} \neq 0, \lambda > 0.$$

The gamma probability density function is a particular case of the generalized gamma, obtained when  $\lambda = s = 1$  and  $y_0 = 0$ .

Many researchers fitted the gamma function to income distributions of different countries. Among them, Salem and Mount(1974) fitted this model to income data from the United States. Bartels (1977) made a detailed comparative study of the Gamma, Lognormal, Champernowne and other probability density functions as models of income distribution.

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<sup>4</sup>Cited in Dagum C.(1990), p. 6.

### 3.1.4 Singh-Maddala Model

Singh and Maddala (1976) developed a model based on the concept of hazard or failure rate, which has been widely applied to deduce distribution in reliability theory and distribution of life time. They suggested as a useful functional form, the following general distribution:

$$F(Y) = 1 - (1 + a_1 y^{a_2})^{-a_3} \quad y \geq 0, \quad (3.8)$$

where  $a_1, a_2, a_3$  are positive parameters.

### 3.1.5 Dagum model

Based on the characteristics of regularity and permanence of the observed income distributions, Dagum (1977) specified his model based on economic and stochastic foundations. Dagum's specification is in line with the Pareto's explorations in the field of income distribution. Pareto saw that the income elasticity of the Survival Distribution Function (SDF) for high income groups is constant and, based on this assumption, he derived his model of income distribution

Benini (1906)<sup>5</sup> observed that in the double logarithmic representation, observed income distributions present a curvature for high income values.

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<sup>5</sup>Cited in Dagum, C.(1980b, 1983a).

Based on his empirical observation, he proposed a modified version of the Pareto type I model:

$$S(y) = \left(\frac{y}{y_0}\right)^{-\alpha \log y_0} \quad (3.9)$$

$$0 < y_0 < y \quad \text{and} \quad \alpha > 0.$$

Dagum (1977) observed that the income elasticity of the Cumulative Distribution Function (CDF) was a decreasing and, in general, a concave function of  $F(y)$ . That is, for a given constant proportional rate of growth of income, there corresponds a decreasing proportional rate of growth of the CDF, which depends on the size of  $F(y)$  itself. Dagum, argues that this stable pattern of regularity can be observed for the categories of economic units (such as families, unattached individuals, individuals with income) and for the such populations of economic units partitioned according to some socioeconomic attribute such as sex, education and race. Dagum, by this assumption, takes into account the fact that income distributions are positively skewed.

The mathematical representation of this argument is given by the following differential equation:

$$\frac{d \log (F(y) - \alpha)}{d \log y} = \beta \delta \left\{ 1 - \frac{(F - \alpha)}{(1 - \alpha)} \right\}^{\frac{1}{\beta}}. \quad (3.10)$$

It should be mentioned that Dagum (1983a) argues that his specification is a member of his generating system of income and wealth distributions satisfying:

$$\frac{d \log (F(y) - \alpha)}{d \log y} = \phi(y) \varphi(F(y)) \quad (3.11)$$

where

$$\begin{aligned}
 & 0 \leq y_0 < y < \infty \\
 & \alpha < 1 \qquad \phi(y) > 0, \qquad \varphi(F) > 0, \\
 & \frac{d\phi(y)\varphi(F)}{dy} < 0 \qquad \text{and} \qquad F(y_0) = \alpha .
 \end{aligned}$$

For each specification of  $\phi(y)$  and  $\varphi(y)$  satisfying the conditions mentioned, we shall identify a CDF as an income distribution model. In other words, the solutions to this differential equation gives us income distribution models.

Dagum's income distribution model is generated when

$$\phi(y) = \alpha \qquad \text{and} \qquad \varphi[F(y)] = 1 - \left(\frac{F-\alpha}{1-\alpha}\right)^\beta .$$

Table 3-1 presents a selection of income distribution models belonging to this generating system.

For each model, the columns in Table 3-1 specify the mathematical forms of  $\phi(y)$  and  $\varphi(y)$ , and the values of their parameters compatible with the constraints of the system . It can be proven that each model included in Table 3-1 is the solution to the Dagum differential equation (3.12) after replacing  $\phi(y)$  and  $\varphi(y)$  by their corresponding mathematical specifications stated in the table. The CDF, corresponding to the Dagum model is given by the solution of the differential equation specified above, i.e.

$$F(y) = \alpha + \frac{(1-\alpha)}{(1+\lambda y^{-\delta})^\beta} \tag{3.12}$$

Table 3.1: A Selection of Income Distribution Models Deduced from the System Specified by Dagum.

Income Distribution	$\varphi(y)$	$\phi(F)$	$\delta^*$	$(\alpha, \beta)$	$y$
Pareto Type I(1895)	$\delta$	$(1 - F)/F$	$> 1$	$(0,0)$	$> y_0 > 0$
Pareto Type II(1896)	$\frac{\delta y}{(y-c)}$	$(1 - F)/F$	$> 1$	$(0,0)$	$> y_0 < 0$
Pareto Type III(1896)	$\beta y + \frac{\delta y}{y-c}$	$(1 - F)/F$	$> 0$	$(0,+)$	$> y_0 > 0$
Benini(1906)	$2\delta \log y$	$(1 - F)/F$	$> 0$	$(0,0)$	$> y_0 < 0$
Weibull(1951)	$\beta y(y - c)^{\delta-1}$	$(1 - F)/F$	$> 0$	$(0,+)$	$> c$
Loglogistic(Fisk, 1961)	$\delta$	$(1 - F)$	$> 1$	$(0,0)$	$> c$
Singh-Maddala (1976)	$\delta$	$\frac{1-(1-F)^\rho}{F(1-F)^{-1}}$	$> 0$	$(0,+)$	$> 0$
Log-Gompertz	$-\log \delta$	$-\log F$	$0 < \delta < 1$	$(0,0)$	$> 0$
Dagum Type I(1977)	$\delta$	$1 - F^{\frac{1}{\beta}}$	$> 1$	$(0, +)$	$> 0$
Dagum Type II(1977)	$\delta$	$1 - (\frac{F-\alpha}{1-\alpha})^{\frac{1}{\beta}}$	$> 1$	$(+, +)$	$> 0$
Dagum Type III(1980)	$\delta$	$1 - (\frac{F-\alpha}{1-\alpha})^{\frac{1}{\beta}}$	$> 1$	$(-, +)$	$> y_0 > 0$

\*The condition stated for  $\delta$  in this column is required for the existence of the mathematical expectation, hence the Lorenz curve.

Source: Dagum, C. (1990)

where:

$$(\beta, \lambda, \delta) > 0 .$$

The differential equation is specified in such a way that the elasticity converges to a positive value  $\beta\delta$  when income tends to zero and it converges to zero when income tends to infinity. It can be proven that, when  $\beta\delta > 1$ , the distribution is unimodal and when  $0 < \beta\delta \leq 1$ , the distribution is zeromodal.

The corresponding density function is equal to

$$f(y) = \begin{cases} \alpha & \text{if } y = 0, 0 < \alpha < 1, \\ (1 - \alpha)\beta\lambda\delta y^{-\delta-1}(1 + \lambda y^{-\delta})^{-\beta-1} & \text{for all } y > 0 \text{ and} \\ 0 & \text{for all } y < 0. \end{cases}$$

Unlike the lognormal and gamma functions, the Dagum model converges to the Pareto law and has an explicit mathematical solution for its cumulative distribution function.

Another advantage of the Dagum model is that it generates useful summary measures which includes mode ( $y_M$ ), median ( $y_m$ ),  $p$ th percentile ( $y_p$ ), root of the cumulative distribution function  $y_0$ , and  $r$ th moment about the origin  $E(Y^r)$ .

The mathematical expressions of Pareto, Lognormal, Gamma, Singh-Maddala and Dagum models are as follows:

1) Pareto model (type I)

$$S(Y) = \left(\frac{y}{y_0}\right)^{-\alpha} \quad (3.13)$$

2) Log-normal model

$$f(y) = \frac{1}{\sqrt{2\pi} \sigma y} \exp\left(\frac{-1}{2\sigma^2}(\log y - \mu)^2\right) \quad (3.14)$$

3) Gamma model

$$f(y) = \frac{\alpha^\lambda}{\Gamma(\lambda)} y^{\lambda-1} \exp^{-\alpha y} \quad (3.15)$$

4) Singh-Maddala model

$$f(y) = a_1 a_2 a_3 y^{a_2-1} (1 + a_1 y^{a_2})^{-a_3-1} \quad (3.16)$$

5) Dagum model

$$F(y) = \alpha + (1 - \alpha)(1 + \lambda y^{-\delta})^{-\beta}. \quad (3.17)$$

The latter generates 3 sub-cases:

$$\left\{ \begin{array}{lll} \text{type I} & \alpha = 0 & 3 \text{ parameters} \\ \text{type II} & 0 < \alpha < 1 & 4 \text{ parameters} \\ \text{type III} & \alpha < 0 & 4 \text{ parameters} \end{array} \right.$$

The above succinctly illustrates the need to search for an analytical distribution function. The question that arises is “how can one select the analytical distribution functions and the criteria that may be used in this selection process?”. To answer this, we turn to the analysis of the properties of income distribution models.

## 3.2 Some Basic Properties of Income Distribution Models

Dagum (1977, 1980b, and 1983a) introduces and analyzes a set of properties for income and wealth distribution models. Following him, we shall present a set of properties that are generally considered the most essential to be fulfilled by income distribution models.

### 3.2.1 Model Foundation

Model specifications purporting to describe and/or explain basic features of scientific reality, in this case, economic reality, have to have a theoretico-empirical foundation. According to the existence or inexistence of economic foundations, income distribution models can be classified into ad-hoc models, models by analogy, and models with economic and stochastic foundation.

#### **Ad-hoc Models**

Ad-hoc model specifications come from researchers conjecture's that a positive asymmetric probability distribution function is a good candidate to fit an income distribution. Examples of ad-hoc income distribution models are the Beta and Gamma models.

#### **By Analogy**

A model specification can be the outcome of a formal or substantive analogy.

In the former case, the specified model is a formal adaptation or an economic translation of the variables of a well established model developed in another discipline. For example, the Singh and Maddala (1976) model arises from a formal analogy of the concept of hazard or failure rate and lifetime distribution in reliability theory.

### **Economic and Stochastic Foundation**

An Income Distribution Model has economic and stochastic foundations when it is supported by an economic foundation and its mathematical form is based on an a priori set of probability assumptions.

### **3.2.2 Economic Significance of the Parameters**

A good model of income distribution is the outcome of an accurate inference of observed economic process. It can be used for further analysis, interpretation and socioeconomic research and policy on income distribution. In particular, its parameters enter in a meaningful way in the specification of macroeconomic models dealing with business cycles, economic growth and development planning. Therefore, good models of income distributions should allow an explicit economic interpretation of their parameters. They belong to the following two categories: (1) scale parameters, which are functions of the variable monetary unit of measurement, and (2) inequality parameters, which are dimensionless and synthesize the degree of inequality of income distributions.

### 3.2.3 Convergence to the Pareto Law

It is generally accepted that the Pareto model fits best for high income groups. So it is desirable to have a model with convergence to the Pareto model for the high income groups. Benoit Mandelbrot, one of the chief proponents of the Pareto Distribution, has shown that the Pareto convergence property or “weak Pareto law” as he called it,<sup>6</sup> requires that income distribution models converge to the Pareto law for high levels of income. In symbols,

$$\lim_{y \rightarrow \infty} \frac{1 - F(y)}{(y/y_0)^{-\alpha}} = 1, \quad (3.18)$$

where  $F(y)$  stands for the CDF of the entertained model and the denominator is the Pareto SDF with parameter  $\alpha > 1$ .

### 3.2.4 Existence of Only a Small Number of Finite Moments

Empirical evidence shows that income distributions are low-order contact (heavy tail) curves, i.e. their PDFs slowly converge to zero when the corresponding variables tend to infinity. Given a non-negative random variable, it can be proven<sup>7</sup> that if the  $r$ th moment  $\mu_r$  of a PDF exists, then any moment of order  $s < r$  also exists. Conversely, if the  $r$ th moment does not exist (is

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<sup>6</sup>Mandelbrot B.(1960), p. 811.

<sup>7</sup>Cramer, H.(1946), pp. 70-71.

infinity), then any moment of order  $s > r$  is also infinite. Hence, if a distribution has infinite variance, then all moments of order greater than two will also be infinite. The higher the value of  $r$  for which the  $r$ th moment  $\mu_r$  is infinite, the higher the speed of contact of the distribution to the abscissa when  $y$  tends to infinity. In the limit we have models such as the lognormal and gamma that have finite moments of all orders. Therefore the tails of these distributions are high-order contact curves. They do not converge to the Pareto law and do not fulfill the property of income distributions of having a small number of finite moments.

### 3.2.5 Model Flexibility

Since World War II, the income distributions of all developed countries and of a large number of developing countries are unimodal. Poor and highly populated countries still have zeromodal income distributions as a consequence of their highly unequal distribution of income. For these reasons, a good model of income distribution should be able to fit both unimodal and zeromodal distributions.

### 3.3 Method of Parameter Estimation

There are various methods for parameter estimation of nonlinear functions. Among them are the method of moments, the maximum likelihood method, the chi-square method and the least squares method. The econometric package which is chosen for our empirical analysis, EPID,<sup>8</sup> is designed to apply the least squares method in estimating the parameters of income distribution models. EPID is based on Birta's (1976) algorithm for unconstrained function minimization. In fact, it minimizes the squared differences of two vectors, one vector is the observed income distribution data and the other one is provided by the non-linear theoretical function or the income distribution model. EPID will be used to estimate the parameters of four of the aforementioned income distribution models i.e. Gamma, Singh-Maddala, Lognormal and different types of the Dagum model. EPID estimates also the mean and median of the fitted distributions, and the Gini ratio for measuring intra-income inequality. It calculates the sum of squared errors for both the cumulative and density functions. Furthermore, it estimates the inter-income inequality measure or income differential ratio which is important for our analysis.

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<sup>8</sup>*Econometric Package of Income Distribution Models*, Statistics Canada, Time Series Research and Analysis Division. 83-01-003-E.

### 3.4 Comparison Between Income Distribution Models

The advantages of using a well-fitted model of income distribution were already discussed. Furthermore, for reasons of confidentiality, sometimes, observed data are truncated in the upper level of income. At the lower end, it is likely more people with zero income are reported than those who in fact have no income. For example, in Canada, all individuals immigrating to Canada in the year prior to the census, were reported as having zero income, or all individuals in Hutterite colonies were assigned zero income. So, it seems that we cannot rely only on observed data, especially when our major concern is the upper and lower limits for income polarization purposes. One way to overcome these problems is the use of an income distribution model that would fit the whole range of the income distribution. For this purpose, we have chosen, four income distribution models that, given their properties, would help us derive various income inequality measures. To this end, we have tried to make a comparison between these four models to select the best one for our empirical studies. We have compared these models based on (i) the sum of the squared errors (SSE), (ii) Kolmogrov-Smirnov (K-S) statistics, (iii) the deviations between the observed and estimated means, and medians.

Goodness-of-fit is one of the best criteria because if a model does not

fit the whole range of the observed income distribution well, it will lose its analytical power. For this purpose, the Kolmogorov-Smirnov test of the goodness-of-fit can be calculated based on the closeness of the fit of the income distribution model in comparison to the actual frequencies. Frank Massey (1951) provides an explanation of the K-S test. He constructs a table presenting the critical values of  $\alpha(N)$  of the maximum absolute differences between the sample and population cumulative distributions. With the use of this table, and knowing both the sample size ( $N$ ) and the level of significance  $\alpha$ , we are able to accept or reject the hypothesis of having a well-fitted model. If at any given level of income, the maximum absolute deviation between the observed and the estimated value exceeds the value of the K-S with a particular level of significance and a given sample size, the estimated distribution should be rejected based on this criterion.

Upon comparing the sum of squared errors, the K-S test and deviation between observed means and medians for more than 50 distributions, we observe that in general the Gamma model fits better than the Lognormal model, the Singh-Maddala model, better than both, and the Dagum model has a better fit than the other three. Some of these results are reported in the Appendix A (Tables A1-A3) and Appendix B (Figures B1-B3).

The results of a better performance of the Gamma model over the Lognormal distribution is in accordance with the results of Salem and Mount (1974) for the United States, and Bartels (1977) for the Netherlands. Better

performance of Singh-Maddala model over Gamma and Lognormal models are given by Singh-Maddala (1976). Dagum (1977) showed that his model gave a better fit than than that of Singh-Maddala in different empirical studies for Argentina, Canada, Sri Lanka and the United States in different years. Also our finding concerning the superior performance of the Dagum model is in accordance with a recent study for the Phillipines which has been done by the Phillipines' International Convention Center.<sup>9</sup> So in the empirical part of the study, the Dagum model is selected as a mechanism to describe the personal distribution of income.

## **3.5 Income Inequality Measures**

### **3.5.1 Graphical Representation of Inequality**

Sometimes, it is argued that a picture is worth a thousand words. For representing inequality in pictorial form, there are several useful methods, although some of them are not very precise. The most popular ways are Pen's parade, the frequency curve, the Lorenz curve and logarithmic representation which we discuss in turn.

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<sup>9</sup>Phillipines' International Convention Center (1990).

### 3.5.1.1 Pen's Parade

To get a first impression of the shape of income distribution, Pen (1971) draws an analogy between the distribution and a parade of people. In Pen's parade (Fig. 3.1), income before tax represents the 'height' of the person. Thus in this way, the person with average income will be of average height. At the head of the parade, there are some individuals walking upside down, representing those with negative income followed by the poor only a few centimeters tall and finally at the end, the very rich, measuring several kilometers high. Pen explains his parade for the United Kingdom in the following way: "In the first seconds a remarkable thing already happens... we see a

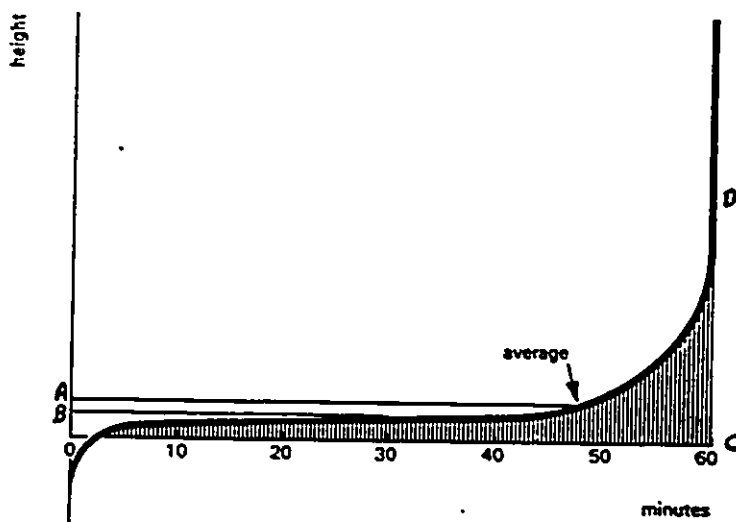


Figure 3.1: Pen's Parade

number of people of negative height passing..... After this tragi-comic open-

ing we see tiny gnomes pass by, the size of a matchstick, a cigarette ... It takes almost fifteen minutes before the passing marchers reach the height of substantially more than four feet... But a new surprise awaits us here. We keep on seeing dwarfs... We know the parade will last an hour, and perhaps we expected that after half an hour we would be able to look the marchers straight in the eye, but that is not so... about twelve minutes before the end the average income recipients pass by.... After the average income recipients have passed, the scene changes rather quickly. The marchers' height grows.... In the last few minutes giants suddenly loom up.”<sup>10</sup> Pen's parade may easily be converted into a graph by letting the horizontal axis represent time and the vertical axis denote the heights of the passing marchers. Equivalently, the values along the horizontal axis can be taken as the cumulative portion of income receivers when ordered from the poorest to the richest and the vertical axis as the corresponding incomes. The whole parade passes in the interval represented by OC within let us say one hour. The man with median income will be met when half the parade has gone by. Let us assume the median income is represented by the height A and mean income by OB. In order to keep the diagram on the page we have plotted the point D in a position that would be far too low in practice.

In fact, Pen's parade is another form of representating the cumulative distribution function. If we change the positions of the abscissa and ordinate, Pen's Parade will convert to the cumulative distribution function.

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<sup>10</sup>Pen J. (1971), pp. 49-51.

### 3.5.1.2 Frequency Distributions

Graphical representation can be made in order to transform the statistical information into an aggregate representation using a relative frequency curve. The frequency curve shows what is happening in the different ranges of income. The horizontal axis represents the income in money units and the vertical axis is for the percent frequency of the population. Every point

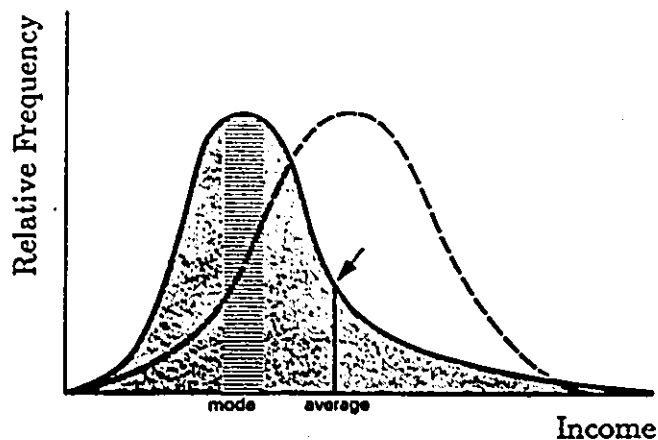


Figure 3.2: Frequency Curve

on the frequency curve represents a combination of income and its relative frequency. The relationship  $f(y)$  charted by this curve is the density function (Fig. 3.2), where the scale is chosen such that the area under the curve is standardized at unity. One of the weaknesses of the graphical representations is that while they show what is happening in the middle income ranges

clearly, but what is happening in the upper tail is not so readily apparent because of the larger incomes which cannot be depicted in the horizontal axis (due to the income unit constraint on the abscissa).

### 3.5.1.3 Lorenz Curve

A common way to represent income distribution data is to graph the Lorenz curve (Fig. 3.3). If the cumulative percentage of economic units (ordered by increasing size of income) is measured along the horizontal axis and the cumulative percentage of income which is received by those units is measured along the vertical axis, then the Lorenz curve is simply the plot of points indicating the actual cumulative shares of income possessed by the cumulative percentage of the population. In other words, any point on the Lorenz curve indicates the percentage of the total aggregate income that is held by a specified percentage of the total population. If the curve follows the 45 degree line, it shows perfect equality of income, namely every 10 percent of the population receives 10 percent of the income. At the other extreme, when all income is received by one person, the Lorenz curve takes an inverted L-shape. The actual distribution of income lies somewhere between these two extremes. Based on the Lorenz curve we can assess the degree of income inequality through the closeness of the curve to the 45 degree line.

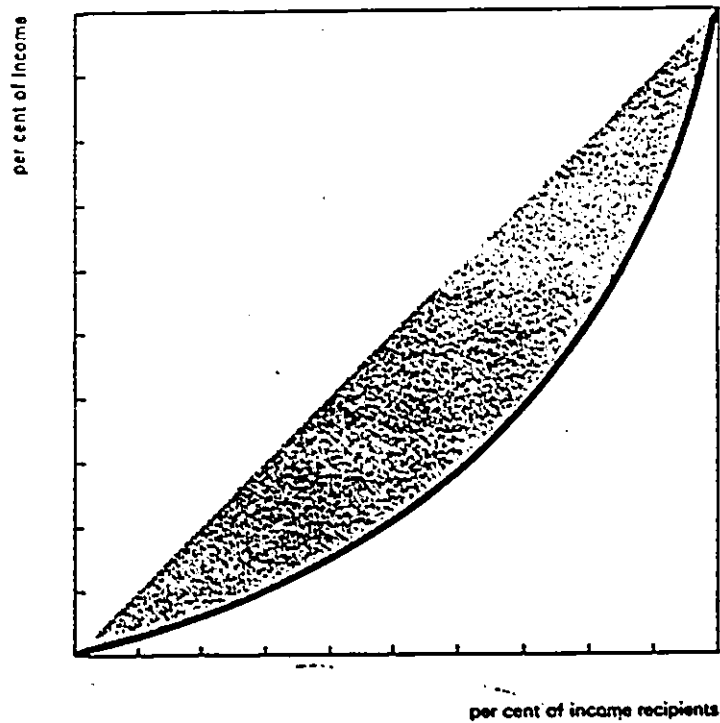


Figure 3.3: Lorenz Curve

#### 3.5.1.4 Logarithmic Representation

Pareto (1895) specified his income distribution model as

$$X = AY^{-\alpha} \quad (3.19)$$

where;  $Y$  = level of income,  $X$  = proportion of income receivers with income equal or greater than  $y$ , and  $A$  is constant. By taking the logarithm of both sides, we have:

$$\log X = \log A - \alpha \log Y . \quad (3.20)$$

Pareto represented the income distribution graphically through the use of double logarithmic paper. When the aforementioned function is plotted on double log paper (i.e. the horizontal axis for the logarithm of income and the vertical axis for the logarithm of the number of individuals attaining the given level of income or higher), this Pareto distribution becomes linear. The more equal is the distribution of income the greater is the value of  $\alpha$  or the steeper the line. Pareto's empirical estimates for various countries were between 1.5 and 1.7. The modification of Pareto's idea concerning the parameter ( $\alpha$ ) as an income inequality measure was proposed by Gini which will be discussed later.

### **3.5.2 Intra-Distribution Inequality Measures (Intra-DIMs)**

A first indication of properties of a given probability distribution may be obtained from the location parameters. Mean, median and mode (among others) are considered location parameters. These parameters do not provide a direct indication of income inequality. However, by combining several location parameters, some measures of inequality can be obtained. For example Champernowne (1974) proposed a measure of inequality which is the difference between the arithmetic and geometric mean divided by the arith-

metric mean:

$$I = \frac{\mu - \mu_g}{\mu} = 1 - \frac{\mu_g}{\mu} \quad (3.21)$$

where  $\mu$  is the arithmetic mean and  $\mu_g$  is the geometric mean.

Among the more frequently used measures of dispersion in the analysis of income distribution, the most common are mean logarithmic deviation, coefficient of variation and the Gini coefficient.

### 3.5.2.1 Mean Logarithmic Deviation

This statistical measure can be obtained by calculating the total absolute deviations (above and below the mean income) divided by the mean. The *MLD*, which was used by Theil and others, has the following form:

$$MLD = \frac{\sum_{i=1}^n (\ln \mu - \ln y_i)}{n} \quad (3.22)$$

or:

$$MLD = \frac{1}{n} \sum \ln\left(\frac{\mu}{y_i}\right) = \ln \frac{\mu}{\mu_g} \quad (3.23)$$

where  $y_i$  is income of individual  $i$ , and  $n$  is the total number of income receivers. In other words, the mean logarithmic deviation simply can be defined as the natural logarithm of the ratio of the arithmetic mean to the geometric mean.

### 3.5.2.2 Coefficient of Variation

Variance, a common statistical measure of variation, is the sum of the squared deviations of income from the mean, divided by the number of income receivers:

$$V = \frac{\sum_{i=1}^n (y_i - \mu)^2}{n} . \quad (3.24)$$

From the variance, some indicators of inequality can be obtained. The most commonly used are:

a- Standard deviation or the square root of the variance (SD)

$$SD = \sqrt{\frac{\sum_{i=1}^n (y_i - \mu)^2}{n}} . \quad (3.25)$$

b- Coefficient of variation (CV), a measure of dispersion, which is a standardized form of standard deviation. The standardization is achieved by dividing SD by the arithmetic mean, i.e.,

$$CV = \frac{\sqrt{\frac{\sum_{i=1}^n (y_i - \mu)^2}{n}}}{\mu} \quad (3.26)$$

Some of the criticisms of CV are “Why should the difference be squared?” and “Why should the difference be from the mean?”. Probably, it is better to carry out the comparison between every pair of incomes rather than from the mean only.<sup>11</sup>

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<sup>11</sup>Sen A.(1973), pp. 27-28.

### 3.5.2.3 Gini Coefficient

Gini, in 1912, introduced his measure of dispersion, the Gini Mean Difference. Through this measure, he wanted to take into account the differences between all pairs of income. If we sum all the differences of the pairs of income and divide this total by the number of combinations, we obtain the absolute mean difference,

$$\Delta = \frac{\sum_{j=1}^n \sum_{i=1}^n |y_j - y_i|}{n(n-1)}. \quad (3.27)$$

Gini (1912) introduced the relative mean difference by dividing the absolute mean difference by the average income. Gini interprets  $\Delta$  as an income inequality measure which he labelled the “concentration ratio”. A statistical measure commonly called the Gini Coefficient is equal to one half the Relative Mean Difference

$$G = \frac{1}{2n(n-1)\mu} \sum_{j=1}^n \sum_{i=1}^n |y_j - y_i| \quad (3.28)$$

Gini (1914) proved that his ratio was equal to twice the area between the equi-distance line and the Lorenz Curve.  $\Delta$  is an increasing function of the degree of income inequality, and Gini ratio in simple form is:

$$G = \frac{\Delta}{2\mu} \quad (3.29)$$

where:

$$0 \leq G \leq 1.$$

Many other inequality measures have been proposed in the literature. Among them we shall discuss the Theil's Index, Zenga Ratio, and Atkinson's Index.

### 3.5.2.4 The Theil Index of Inequality

Theil (1967) has proposed a measure of inequality based on the concept of entropy in information theory.<sup>12</sup> When the appropriate income data are available, the Theil index of inequality is calculated as:

$$T = \frac{1}{n} \sum_{i=1}^n \frac{y_i}{\mu} \log \left( \frac{y_i}{\mu} \right)$$

or

$$T = \frac{\sum_{i=1}^n y_i \log \left( \frac{y_i}{\mu} \right)}{n\mu} . \quad (3.30)$$

In continuous form:

$$T = \int_{i=0}^{\infty} \frac{y_i}{\mu} \log \frac{y}{\mu} dF(y) \quad (3.31)$$

where:  $y_i$  represents the income share of class  $i$  .

### 3.5.2.5 Zenga Ratio

Zenga (1990) presented a concentration curve and a measure of inequality based on the comparison of the inverse of the cumulative distribution  $F^{-1}(p)$  and the inverse first moment distribution function  $F_1^{-1}(p)$ .

$$Z = \frac{F_1^{-1}(p) - F^{-1}(p)}{F_1^{-1}(p)} = 1 - \frac{F^{-1}(p)}{F_1^{-1}(p)} \quad (3.32)$$

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<sup>12</sup>Theil, H.(1967), p. 4.

In fact, the Zenga function gives the contribution for inequality at each percentile of the distribution. According to Equation 3.33 , the Zenga function represents the difference between the income and the population percentile values to the income percentile, and the Zenga ratio is the weighted average of the Zenga function. In technical terms, the Zenga measure of inequality can be defined as the integral with respect to the  $p$  values in the interval  $(0 , 1)$ , where  $p$  is the independent variable of the Zenga function, hence  $p$  is the cumulative distribution function  $F(y) = p$ .<sup>13</sup>

### 3.5.2.6 Atkinson's Measure

Atkinson (1970), has criticized some measures of inequality on the grounds that the underlying social welfare functions are either difficult to define or theoretically unrealistic. Atkinson defines a measure based on what he called “the equally distribution equivalent income  $y_e$ ”. He defines  $y_e$  as the level of per capita income which, if enjoyed by everybody would make total welfare exactly equal to the total welfare generated by the actual income distribution.

$$U(y_e) = \frac{1}{n} \sum_{i=1}^n U(y_i) . \quad (3.33)$$

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<sup>13</sup>For more information concerning this measure and its interesting characteristics see Dagum C.and M. Zenga (1990).

Atkinson's inequality measure is defined as

$$A = 1 - \frac{y_\epsilon}{\mu} \quad (3.34)$$

where; If income is equally distributed then  $y_\epsilon = \mu$  and Atkinson's measure becomes zero.

For any distribution,  $A$  will be between zero and one. Atkinson has argued that since value judgments are unavoidable, we should make them more explicit, namely we should specify our social welfare function. According to him, the measure depends crucially on the social welfare function with which  $y_\epsilon$  is defined. In his framework, Atkinson suggests that any income inequality measure introduces these distributional objectives through the use of an explicit parameter  $\epsilon$  (degree of inequality aversion) which represents the weight attached by a society to the inequality in the distribution.  $\epsilon = 0$  means that the social welfare function is linear in income and distribution does not matter (i.e., society is indifferent to inequality). As  $\epsilon$  increases, the measure is more sensitive to transfers to the lowest income group. So the value of  $\epsilon$  between these two extremes (0 and infinity) depends on the importance attached to redistribution towards the lower income groups. For a specific form of the utility function, Atkinson obtained:

$$A_\epsilon = 1 - \frac{1}{n} \sum_{i=1}^n \left( \frac{y_i}{\mu} \right)^{\frac{1}{\epsilon}} \quad (3.35)$$

or in continuous form:

$$A_\epsilon = 1 - \frac{1}{\mu} \left\{ \int_0^\infty y^r dF(y) \right\}^{\frac{1}{r}} \quad (3.36)$$

where;  $r = 1 - \epsilon < 1$ .

One of the critiques of Atkinson's measure is that his social welfare function is required to be additively separable and symmetric, namely social welfare depends only on the individual's income and not on that of others.

### 3.5.3 Properties of Intra-DIMs

Different authors have used different criteria in the selection of appropriate inequality measures. Following Dalton(1920) and Dagum (1983b) we can present the following properties.

#### **Principle of Transfers**

If we assume there are only two income receivers, and a transfer of income takes place from the richer to the poorer, the inequality measure (intra-DIMs) should be reduced. Of course the transfer should not be so large that it reverses the relative position of the two income receivers;

#### **Principle of Proportional Addition to Incomes or Principle of Scale Independence**

This principle states that proportionate additions to, or subtractions from, all incomes will leave inequality unaffected. Since it can be argued that there has been no essential alteration in the income distribution, the value

of inequality measure should remain the same.

**Principle of Equal Addition to Incomes**

This principle states that equal additions to all incomes reduce inequality and equal subtractions increase it.

**Principle of Proportional Addition to Persons**

The inequality measure should be invariant to proportionate additions to the population of income receivers.

**Principle of Anonymity**

The inequality measure should be invariant to any permutation of income among the income receivers.

**Principle of Operationality**

The income inequality measure should provide a unique, straightforward, and unambiguous estimate of the income inequality by all researchers using the same observed or fitted income distribution, independent of their subjective inequality aversion.

**Principle of Normalization**

The income inequality measure should take values in the unit interval  $\{0, 1\}$ , with zero for perfect equality and 1 for absolute inequality.

### 3.5.4 Inter-Distribution Inequality Measures (Inter-DIMs) or Income Differential Ratios

The Inter-DIM or income differential ratio is a scalar representation of the income inequality between the population of income receivers. It provides a scalar measure of the relative degree of affluence of one population with respect to another. Thus, while intra-DIMs account for the degree of inequality within a given population of economic units, the inter-DIMs measure the degree of inequality between income distributions. In order to do so, the population of economic units must be partitioned by some relevant socio-economic or geographical characteristics such as sex, race, education, occupation, etc. Dagum (1980c) presents a class of ratios that measure the income differential between two income distributions or the degree of affluence of one population with respect to another which he defines as economic distance ratio ( $D$ ). Dagum (1983b, 1987) provided more elaboration on the new concept. In order to use this measure, the population of economic units must be partitioned by some relevant socioeconomic or geographical characteristics according to which income is believed to be unequally distributed such as sex, race, education, occupation etc. In its simplest form, the Income Differential Ratio ( $D$ ) can be presented in the following way:

$$D = \frac{d_1 - p_1}{\Delta}, \quad (3.37)$$

where:  $d_1$  is the weighted average of the income difference for each income  $y_j$  of a member of one distribution with higher mean income greater than an

income of a member of another distribution ( $x_i$ ) with lower mean income:

$$d_1 = \sum_{j=1}^k \sum_{x_i < y_j} (y_j - x_i) p(x_i, y_j) \quad (3.38)$$

$p(x_i, y_j)$  is the joint probability of observing  $x_i$  and  $y_j$ .

where  $p_1$  is the weighted average of the income difference for each income of a member of the distribution with lower mean income greater than an income of a member with higher mean income;

$$p_1 = \sum_{i=1}^h \sum_{y_j < x_i} (x_i - y_j) p(x_i, y_j), \quad (3.39)$$

and  $\Delta$  = the Gini mean difference which is the average of the absolute income differences between the income variables  $X$  and  $Y$ ,  $h$  and  $k$  are the sizes of the population with incomes  $x_i$  and  $y_j$  respectively. It can be proven (Dagum, 1987) that

$$\Delta = d_1 + p_1. \quad (3.40)$$

The Income Differential Ratios can be applied directly to the observed income data (distribution-free form) or estimated from an income distribution model (parametric form).

### 3.6 Income Inequality Measures and Social Welfare Functions

One way of introducing social values concerning inequality is to use a social welfare function. It simply ranks all the possible states of society in the order of society's preferences. Probably Dalton (1920) was the first to discuss the social welfare evaluation of income inequality measures. He pointed out that "if we assume any precise functional relation between income and economic welfare, we can deduce a corresponding measure of inequality."<sup>14</sup> Atkinson (1970) followed Dalton's approach by considering the relation between inequality and social welfare.

The key assumption of Dalton and Atkinson about social welfare is that social welfare increases whenever the income received by any member of society increases. According to them, social welfare is the sum of individual utility functions that are identical for all individuals. Dagum (1990) argued that the individualistic view of utility function is not consistent with social values because in this form of specification, the income of other society members are ignored. According to Dagum, the basic principles dealing with income inequality and social welfare are: (i) the social and individual aversion to poverty (APP), (ii) the social aversion to inequality (AIP), (iii) the interpersonal comparisons of utilities.

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<sup>14</sup>Dalton H.(1920), p. 349.

The first principle states that a society prefers larger average income. Any increase in income of any individual will increase, *ceteris paribus*, the individual's utility. However, when the income increase is located in the highest income group, social welfare might not increase if the utility function depends on the whole distribution of income.

The second principle states that a society prefers less inequality. According to the Pigou-Dalton principle of transfer, any transfer of income from an economic unit  $a_i$  to an economic unit  $a_j$ , such that  $y_i \leq y_j$ , will increase income inequality. From this generally accepted principle, one can deduce that a society will prefer a more equal distribution of income to unequal distribution of income.

The Theil, Atkinson and Pareto inequality measures correspond to individualistic utility and disutility functions. They are functions only of the income of the corresponding economic units and ignore the income of other members of society. The Gini and Zenga ratios fulfill the interpersonal comparisons of utility and disutility principle (i.e., they depend not only on the income of economic units but also on the income of all other economic units).

To sum up, almost all inequality indicators which have been reported satisfy the following basic properties; (i) invariant to proportional increases to persons, (ii) decreasing by equal addition to all income, and (iii) invariant to proportional increase to income receivers. In addition to these characteristics, the Gini ratio considers all possible income differences of all binary

combinations of economic units and has a clear geometrical representation based on the Lorenz curve, and is supported by a social welfare function in which each economic unit takes into account his own income as well as the income of all other units. For the aforementioned reasons, in the empirical part of our analysis, we rely more on the parametric form of the Gini ratio, however we shall use some other inequality indicators as well.

### 3.7 Index Decomposition

One aspect of income distribution data is the heterogeneity of the population, especially over time. Income receivers are different with respect to age, education, occupation, major source of income, etc. One argument against the use of an overall inequality index, such as the Gini ratio, is that, since the number of income receivers with particular sets of attributes is changing over time, an overall inequality index is not a good representative of the change in inequality. In response to this argument, different approaches have been proposed.

One approach is to compute inequality indices for more homogeneous groups that can be grouped according to some socio-economic or demographic criteria. This is the approach used used in this study. Another approach consists of replacing the reference line of equality in incomes by another alternative standard that reflects some important characteristics of

the population over which the Gini ratio is calculated. Paglin (1975, 1977) proposed such a procedure. Paglin suggested that the 45 degree line implicitly assumes that each income receiver should have equal income in every year during his/her lifetime. He argued that the profile of earnings by age is an inverted U shape. Paglin constructed a special Gini index which he called the "Age Gini" index and, by subtracting the Age Gini from the standard Gini, obtained another index which is called the "Paglin-Gini". He believes that his Paglin-Gini index is a better measure of income inequality on a life-time income basis. Paglin's proposal has been strongly criticized and adverse comments can be seen in Danziger et al. (1977), Johnson (1977), Kurien (1977), Minarik (1977), Nelson (1977), and Gillespie (1978, 1980b).

Some authors have attempted to measure the contribution of various components to total inequality by disaggregating inequality measures. Bourguignon (1979) defined a decomposable inequality measure as "a measure such that the total inequality of a population can be broken down into a weighted average of the inequality existing within subgroups of the population and the inequality existing between them."<sup>15</sup> In other words, index decomposition means that if the population of income receivers is divided into a certain number of subgroups based on demographical or socio-economic characteristics, the inequality measure for the total population can be expressed as the sum of the inequality measures "within" its subgroups, weighted by coefficients depending on their aggregate characteristics, and of the inequality

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<sup>15</sup>Bourguignon, F. (1979), p. 901.

existing between them.

Usually two general types of decomposition can be found; (i) decomposition by subgroups (ii) decomposition by income source. We are not going to discuss the different techniques for index decomposition. Pyatt (1976) Love and Wolfson (1976), Henderson and Rowley (1978) and Shorrocks(1980) are among those who attempted to decompose the Gini coefficient using alternative approaches. However, there are different views with respect to the decomposability of the Gini index; for example, Bourguignon (1979) presented a proof of its non-decomposability.<sup>16</sup> Pyatt (1976) presented conditions for decomposition of the Gini<sup>17</sup>, and Henderson and Rowley (1978) argued that “unfortunately, while it seems that the Gini coefficient can be *disaggregated*, [italic in the original] it cannot be exactly disaggregated to account simply for the distribution of families according to socio-economic or demographic criteria and then reconstituted using an uncomplicated formulation.”<sup>18</sup>

Among the inequality measures, the Theil index and the coefficient of variation are the two measures that easily can be decomposed.

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<sup>16</sup>Bourguignon, F. (1979), pp. 911-912.

<sup>17</sup>Pyatt, G.(1976), pp. 247-249.

<sup>18</sup>Henderson, D. and R. Rowley (1978), pp. 14-15.

### 3.8 Concluding Remarks

As mentioned, for our purpose, the parametric form is more appropriate than direct use of observed data, because when we are concerned with the distribution of income at two extremes, namely the poorest and richest groups, the observed data, which are usually truncated, do not represent the whole range of income, while using a parametric form enables one to calculate the number of recipients and their income shares in an arbitrarily selected income bracket. However, in this study we have used both approaches. In non-parametric form, we employed the Gini ratio, the Theil index, the mean logarithmic deviation, the coefficient of variation and the percentage of income going to each of the quintiles (quintile shares). In parametric form, we have tested the Gamma, Lognormal, Singh-Maddala and Dagum models. Then based on the best fitted model, some income inequality measures, such as the Gini ratio and quintile shares are calculated.

In terms of data, there are three sources of income distribution data in Canada: Survey of Consumer Finance (SCF), Revenue Canada, and Census. One of the limitations of the SCF published data is that those cannot be disaggregated based on characteristics such as occupations or industries. In SCF, the calculation of imputed income for non-respondents to income questions changed in 1977. This change might have affected the measured trend of inequality, specially when there is a comparison between income inequality before and after 1977. The SCF excludes the residents of the Yukon, the

Northwest Territories, Indian Reserves, inmates of institutions, members of the Armed Forces and Canadian residents living abroad.<sup>19</sup>

Revenue Canada data are based on the definition of income according to the tax laws and a major draw-back of these data is that the definition of income has changed over time. During the period of analysis, one of the major redefinition of income occurred in the tax reform of 1972 when various social security benefits, such as family allowances, and transfers that had previously not been taxable were included in the income definition. In addition capital gains also became taxable. The number of individuals filing returns depends on the exemption limit, thus an individual who has zero taxable income under one limit and is not obliged to file, would be required to file if the exemption were set at a lower level. In tax data, there is always the suspicion that people understate their actual income to avoid taxes.

Census data provide public use micro data file on households as well as individuals. These tapes contain a wide range of statistical data for Canadian individuals. These data which are based on a large sample size provide extensive demographic, social and economic information. They allow us to return to the base unit of the Census and group them according to the requirement of the research. The relatively larger sample size of the Census is likely to provide a more accurate estimation for different income groups. For

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<sup>19</sup>For further information concerning the differences between SCF and the Census, especially in terms of concepts and coverage, see Rashid, A.(1986), pp. 46-47.

1986, it is a sample size of five hundred thousand individuals. In this study by using microdata, the individuals' total income as well as individuals' earnings are disaggregated based on sex, education, occupation and industries.

In our analysis, we distinguished only three educational groups, that is, those with: elementary schooling (up to grade 8), secondary schooling (from grade 9 to high school graduates with grade 13), and university graduates (with a bachelor degree or higher).

To analyse the effects of education and occupation for a homogenous population, persons under 25 and those over 65 years of age are excluded.

Although concerns about income inequality, the declining share of the middle class and income polarization are interrelated, they involve separate issues. These three issues are related in that changes in income inequality result from underlying changes in the way in which income is distributed among the population. Throughout this study, the term "increasing income polarization" is used to designate bottom-to-top movements in income and the term "declining middle class" refers to the declining income share of the middle 60 percent of the income distribution, i.e., the middle three quintiles. While both changes act to increase income inequality, a declining income share of the middle class arouses more concern from the general public, while increasing income polarization worries those concerned with poverty occurring at the lower end of the income distribution.

As mentioned, in this study, different income inequality measures have been employed. Following Dagum's terminology,<sup>20</sup> we have used both Intra and Inter-Distribution Inequality Measures. From the first group, the mean logarithmic deviation, the coefficient of variation, the Gini ratio and the Theil index and from the second group the income differential ratio have been used.

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<sup>20</sup>Dagum C.(1983b). p. 34.

## Chapter 4

# Employment Shifts and Other Potential Factors Increasing Income Inequality

The purpose of this chapter is to discuss the process of the employment shift from goods to services in recent decades and examine some of the potential factors increasing income inequality. First, we explain the potential causes for the employment shift and the consequences that should be expected. Then we discuss different views concerning the effects of this shift on income inequality. Based on one argument, the link between the employment shift and increasing inequality is due to the rising proportion of part-time jobs. We try to elaborate on this view and examine the evolution of part-time work

in the light of Canadian data. In addition, we discuss some other potential explanations for increasing income inequality.

There have been two fundamental turning points in the history of human beings. The Neolithic revolution began thousands of years ago and made the transition from nomadic pastoral life to life in settlements revolving around agricultural activities. The industrial revolution began in 1780 and involved three distinct though related technological revolutions, each of which brought fundamental changes to the economy, the relationships among people and work, family organization and the like.

1. The first phase primarily involved the application of steam power to industries such as textiles, mining, manufacturing and transportation.
2. The second stage of the industrial revolution was marked by a significant cluster of inventions and discoveries: the use of oil and electricity as energy sources for industry and transportation, the telephone and telegraph, automobiles, airplanes and so on.
3. The third phase, which is still in progress, involves the major technical breakthroughs. This third phase of the industrial revolution is giving way to a new era. Whereas employment throughout the industrial revolution was dominated by manufacturing, the new era is characterized by a shift in employment toward service occupations and the collection, storage and dissemination of information.

This section focuses on some of the details of the shift toward service industries, its causes and implications for income inequality.

## 4.1 The Employment Shift and Potential Causes

The study of goods and services industries in advanced economies has been motivated by widespread concern over the continuous growth of the service sector and the resulting employment shift from goods producing industries to service producing industries. The historical statistics of most developed countries after World War II show a shift from the goods to the services sector. Table 4.1 shows the distribution of jobs between the goods and services sectors in some developed countries.

In all the countries surveyed, the service sector's share increased during this period. Based on annual data collected by Statistics Canada in the Labour Force Survey since the end of the Second World War, Canada has also experienced a major shift to service industries. Figure 4.1 shows the trend towards service employment from 1946 to 1992. The service sector's share of total employment rose from about 41 percent in 1946 to 72 percent in 1992. By 1986, 70 percent of Canadian workers were employed in the service sector. Why has the service sector's share of employment grown so rapidly? This question is not easy to answer and has attracted much attention in the literature to identify its causes. In this part, we discuss

Table 4.1: Distribution of Employment by Sector in Some Advanced Countries

Country	Year	% Goods	% Services	% Total
France	1962	55.9	44.1	100
	1973	48.7	51.3	100
	1984	39.6	60.4	100
West Germany	1961	61.4	38.6	100
	1973	53.9	46.1	100
	1984	46.8	53.2	100
Japan	1960	62.5	37.5	100
	1973	50.9	49.1	100
	1984	42.9	57.1	100
United Kingdom	1960	51.2	48.8	100
	1973	44.6	55.4	100
	1984	35.2	64.8	100
United States	1960	38.9	61.1	100
	1973	33.6	66.4	100
	1984	28.2	71.8	100
Sweden	1963	52.3	47.7	100
	1973	42.3	57.7	100
	1984	33.7	66.3	100

Source: Estimated from Tables D3-D16 in Elfring, T.(1988).

some potential explanations for this shift to clarify the possible effects of this shift on income distribution and inequality. Among others, the following explanations delineate the forces underlying the employment shift from good to service industries. Consumer demand for services has increased faster than for goods. Labour productivity growth has been slower in services than in goods. Goods producers now are contracting out for services that were formerly supplied by them or performed at home. Intermediate demand for services as inputs to the production process has grown, so employment in the

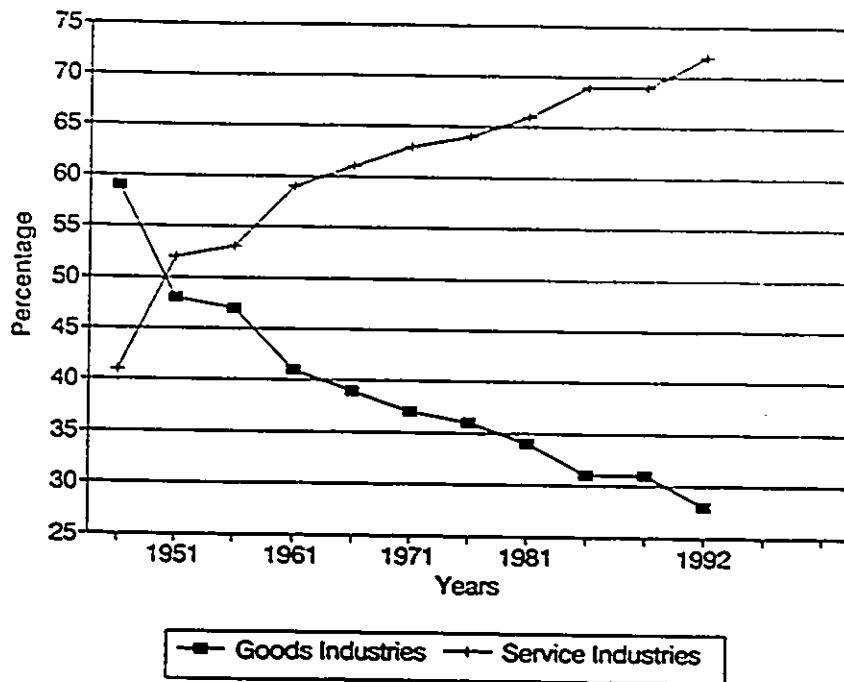


Figure 4.1: Historical Employment Shares

Source: *Historical Statistics of Canada* 1983, p. 354, and *Historical Labour Force Statistics* 1992, p. 46.

in the service sector has increased. In this part, the aforementioned reasons will be discussed in more detail in the Canadian context.

#### 4.1.1 Growth in Consumer Demand

Proponents of this explanation argue that as incomes rise, consumers tend to spend proportionately more on services than on goods. Grubel and Walker

(1988) analyse consumer expenditures on nine types of services in 1974 and 1984, and conclude that “ the income elasticity of demand for services is not high; on average it is about one.”<sup>1</sup> If this generalization is correct and holds in the future, consumer spending on services may be expected not to provide much stimulus for demand and output, even if Canadian incomes on average continue to rise.

Among the different types of services which have been discussed by the authors, restaurant food services have the highest income elasticity and absorbed the greatest proportion of total spending in 1974 and 1984.<sup>2</sup>

#### **4.1.2 Sectorial Differences in Productivity Growth**

The rapid postwar growth in service employment can be attributed to relatively slow growth in the labour productivity of the service industries compared to goods industries. The basic argument here is that if productivity, expressed as either output per person or output per person-hour, increased at a slower rate in the service sector compared to other sectors, this would imply that for any given increase in output, the service sector would require a larger amount of labour relative to the goods sector.

Chand (1983) found that output per person in Canada increased by

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<sup>1</sup>Grubel, H. and M. Walker (1988), p. 87.

<sup>2</sup>Ibid. p. 86.

about 2.2 percent annually from 1950 to 1980, while, the annual growth in output per person was approximately 4.3 percent in agriculture, 3.1 percent in the manufacturing, and it was only about 1 percent in the service sector during this period. According to him, the differences in productivity trends between goods and services are the major reason for substantial growth in the service sector.<sup>3</sup>

When the labour productivity growth performance of goods and service industries are averaged over the period 1967-1989, the annual rate of growth in output per employee for the goods sector was 1.8 percent while for the service sector it was only 1.4 percent.<sup>4</sup> However, conceptual and statistical problems in measuring productivity in the service sector are much more complicated than in the goods sector, specifically when we consider the large quantities of services which are provided by the government for which no useful units of output exist.

### **4.1.3 Contracting Out**

Contracting out describes a process which, through time, results in service functions previously performed in-house or inside a goods-producing industry eventually being bought from outside suppliers. There may be many

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<sup>3</sup>Chand R.(1983), p. 28.

<sup>4</sup>Economic Council of Canada (1990), p. 33.

different reasons for contracting out, among them are the following:

a- Monitoring the performance of employees becomes more difficult in complex business operations, so it becomes more profitable to contract out some of the services which are produced by the firm.

b- Some of the professional skills required by firms have become so specialized that a single firm cannot afford to create a full-time job for them but, in a region, there may be enough demand that a person or firm with such expertise is fully employed.

c- Provisions for paid holidays, sick leaves, lengthy notices before lay-off, etc. raise the total cost to a large firm of hiring unionized internal workers so large firms find it advantageous to buy from outside these kind of services which would be subject to union rules if produced internally.

d- Improvements in communication and information networks result in lower transaction costs of obtaining services in the market place.

Empirical testing of the contribution of the various factors to contracting out is very difficult due to the lack of suitable data. One empirical test of the effects of unionization by McFetridge and Smith (1988), found that unionization seemed to have no influence on contracting out in Canada. They cautiously concluded that, in general, there is evidence of some but not very much contracting out in Canada in recent years. Statistics Canada recently conducted an experimental survey of the contracting out phenomenon for services together with the own-account aspect of the problem. The survey showed that both total value of purchased (contracted-out) business services

and total consumption of own-account business services grew over the time period covered by the survey.<sup>5</sup>

#### 4.1.4 Growth in the Intermediate-Demand for Services

The production of any industry requires labour, raw material, energy, services and various capital items. These typically involve purchases from other industries which are generally referred to as “demand for intermediate inputs”. Since the economy as a whole has grown over time, then the total demand for services as intermediate inputs also must have increased in absolute terms. The intermediate demand argument focuses on changes in the relative demand by individual producers for services as intermediate inputs. Specifically, more service inputs are required today to produce one unit of output than in the past. Usually, intermediate demands are analyzed through an input-output model. Picot and Lavallee (1986) show that during the period of 1971-1981, shifts in the demand for intermediate inputs towards the type of commodities and services produced by the service sector rather than those by the goods producing sector is responsible for one third of the employment shift.

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The Economic Council of Canada (1987) analyzed the effects of the

<sup>5</sup>Cited in Postner, H.(1990), p. 184.

aforementioned factors for 39 industries and 85 occupations during the period of 1971-1981. According to this study, the total industry employment increased by almost 30 percent during this period. The change in the level of final demand accounts for more than 37 percent of the increase. Change in labour productivity is responsible for a 10 percent drop in employment. Increases in intermediate demand account for a 2 percent increase.

According to this study, the single most important source of employment growth is the overall growth of the economy as measured by the change in the level of final demand. Other factors, however, played an important role in particular industries or occupations. The study shows that for many individual industries and many individual occupations, there are some unique features characterizing the sources of employment change. This study provides different tables to show the effects of different sources for employment change and pointed out that there are 39 distinct "stories" of employment change for the Canadian business sector (one "story" for each industry, each of them different).<sup>6</sup>

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<sup>6</sup>Economic Council of Canada (1990), p. 25.

## 4.2 Effects of the Employment Shift on Income Distribution and Inequality

In spite of the reasons behind the employment shift, the major concern from our point of view is about the impact of these occupational employment shifts on income distribution and income inequality. The concern is that the recent growth in the service sector changes the pattern of income distribution. There are two different views in the literature.

According to one view, the basic characteristics of work in the newly emerging service economy is the knowledge-intensive character of work, better work conditions and consequently a new distribution of income with less inequality.<sup>7</sup> Another view points to the rapid growth in the low-wage, low-skill personal service industry and argues that the employment in services is resulting in a bifurcation with more and more workers at the two extremes, holding either well-paying, prestigious jobs or poorly-paying, unrewarding jobs with little security and few benefits. According to this view, expansion of the service sector results in more inequality.<sup>8</sup> In this section, we shall try to elaborate on these two views.

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<sup>7</sup>Among others Bell, D.(1973) and Mark, J.(1987).

<sup>8</sup>Among many others see: Stanback, T. et al.(1981), Kuttner, B.(1982), Jones, B.(1982) and Leontief, W.(1982, 1983, 1986).

### 4.2.1 Views on Decreasing Income Inequality

Some experts have attributed technological changes for the shift to services and they argued that these changes are beneficial for all groups in society by generating more equal distribution of income. According to this view, technological change ultimately creates more jobs than it eliminates. Affected workers are more likely to transfer to better new jobs and consequently they earn more income. The chief proponent of this view is Daniel Bell. Bell (1973), in his seminal work, began the use of the term “post-industrial sector” to refer to the service sector and the term “post-industrial society” to refer to one in which the service sector is dominant. According to Bell (1973), “a post-industrial society is based on *services*. Hence, it is a game between persons. What counts is not raw muscle power, or energy, but information. The central person is the professional, for he is equipped, by his education and training, to provide the kinds of skill which are increasingly demanded in the post-industrial society.”<sup>9</sup> In Bell’s study, the post-industrial society is a knowledge-based society. In this respect, agriculture, perhaps the oldest economic calling, is today’s classic post-industrial sector. It is excessively technology-intensive, an immense infrastructure of scientific talents studying weather, pesticides, fertilizers, disease control, land and soil conditions, employing the most sophisticated technologies and scientific machinery known to human beings.

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<sup>9</sup>Bell, D.(1973), p. 127.

According to Bell, in a pre-industrial society, the labour force is engaged overwhelmingly in the extractive industries: mining, fishing, forestry and agriculture. Life is primarily a game against nature. For industrial societies, among the many characteristics he mentioned are those that are goods producing societies, the machine predominates, and energy has replaced raw muscle and provides the power that is a basis of productivity.

Based on Bell (1973), the structure and problems of post-industrial society are as presented in Table 4.2. Each of these surges in inventions and technological growth had major implications for the economy and for individuals within society and might have affected the distribution of income and inequality.

Bell and other proponents of this view believe that the change from the industrial to post-industrial society is more evolutionary than revolutionary in nature. According to them, this change is beneficial for all groups since technological change creates more good jobs and it eliminates bad jobs. Consequently, technological change can create more income for everybody and decrease overall inequality.

Mark (1987) refers to a study which has been done by the United States' Bureau of Labor Statistics concerning the implications of automation in the United States. The study began by an evaluation of the likely effects of diffusion of electronic computers and other changes to explore the effects of

Table 4.2: Structure and Problems of the Post-industrial Society

AXIAL PRINCIPLE	THE CENTRALITY AND CODIFICATION OF THEORETICAL KNOWLEDGE
Primary institutions:	University Academy institutes Research corporations
Economic ground:	Science-based industries
Primary resource:	Human capital
Political problem:	Science policy Education policy
Structural problem:	Balance of private and public sectors
Stratification: Base- Access-	Skill Education
Theoretical issue:	Cohesiveness of new class
Sociological reactions:	The resistance to bureaucratization The adversary culture

Source: Daniel Bell. (1973), p. 118.

these emerging technologies on productivity, employment and job skills. One of its major findings is that “ in general, relatively few employees have been laid off because of technological change.”<sup>10</sup>

The introduction of new technology, especially during the expansion period in which more investment in new technology takes place, can be consistent with even higher levels of employment. Mark pointed out that “when

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<sup>10</sup>Mark, J.(1987), p. 27.

computers were introduced for office data applications in the United States in the 1950's, predictions that large numbers of clerical and kindred workers would be displaced were voiced by some experts; and that job opportunities for millions of people in what is one of the largest occupational employment categories, could be curtailed. Yet, over the last three decades, employment of clerical workers has continued to increase."<sup>11</sup> In addition, the computer led to job opportunities in new occupations such as systems analysts, programmers, key punch operators, and tape librarians. New industries to manufacture the computer and its related equipment and furniture were formed, resulting in employment for many workers in all types of occupations.

#### **4.2.2 Views on Increasing Income Inequality**

Some studies have presented evidence which implies that in the United States, low-skill, and high-skill positions in the service sector are replacing well-paying middle class blue collar employment. According to this line of research, the relative decline of middle income careers is attributed to service sector growth, as it has resulted in the rapid expansion of work requiring low skills which correspondingly pay low wages.

According to this view, for the most part, new technologies, are reducing jobs and wages. In this part, we are elaborating on some of these views. Barly

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<sup>11</sup>Ibid. p. 27.

Jones refers to technological change as the main reason for the reduction of labour in the goods producing sector:

The cost of technology has fallen dramatically relative to the cost of human labour. Despite inflation and the rising cost of resources the price of each unit of performance in micro-technology is 100,000 times cheaper than it was in 1960 "Miniaturization" has destroyed the historic relationship between the cost of labour and the cost of technology, permitting exponential growth with insignificant labour input. It is now possible (for the first time) to maximize two advantages - high outputs and low inputs - at once, which will lead to the reduction of labour in all high-volume process work.<sup>12</sup>

The elimination of jobs because of superautomation is not limited to industrial factories. In agriculture, there are robot fruit pickers, sheepshearers, computerized irrigation systems that use sensors to calculate water and fertilizer needs in different parts of a field, and automated chicken houses. Retail stores, bankers, and brokerage houses use on-line transaction processing to obtain instant information and to conduct transactions.

Today's technology is different from that occurring at other stages in history. Barly Jones argues that we now have smart machines. "The new technology, for the first time in human history, does not merely extend or replace physical capacity but may also extend or replace human mental capacity .... Computers can be programmed to parallel human mental processes

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<sup>12</sup>Jones, B.(1982), p. 3.

including the exercise of judgment and intuition. Machines have never before posed a challenge to mental (or white-collar) work: no steam engine could play chess and no slide rule could converse.”<sup>13</sup> Throughout history, technological changes have tended to increase overall productivity, and although there were considerable dislocations of workers in some fields, employment actually increased overall.

In the past, the introduction of machines extended the capacity of the labour force. Machines such as sewing machines, typewriters, etc., were designed to have at least one operator per machine, and they required other workers to make, sell and maintain them. Now, however, there has been a significant shift toward labour-displacing technology in which machines are designed to reduce, if not eliminate, human labour. Jones points out that much technological innovation in the past was labour-complementing, it extended the capacity of the existing labour force, and machines themselves changed the nature of work. But there has been a significant shift to ‘labour-displacing’ technology, where low cost machines are specifically intended to reduce, labour inputs.<sup>14</sup>

Leontief (1983) quotes the following description of a modern spinning mill in Japan from an expert who visited the plant:

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<sup>13</sup>Ibid. p. 37.

<sup>14</sup>Ibid. p. 39.

It is pitch dark... Robots have no eyes, so they need no light. Malfunctions are signalled to a control centre. The problem spot is then lit and a qualified engineer fixes the snag. ... No more than ten people, boss included, are needed per shift to run the 30,000 ring spindles that represent \$22 million investments.<sup>15</sup>

Leontief (1982, 1983) and Leontief and Duchine (1986) discussed the relationship between technological change and income inequality. Leontief pointed out that after the great industrial revolution, private enterprise, operating within the framework of a competitive pricing mechanism, promoted an unprecedented growth in total output, and by the end of the last century brought about a system of income distribution that enabled average workers in Western Europe and the United States to share the fruits of that progress. Leontief and Duchine argued that labour's role as an indispensable factor of production will progressively diminish.<sup>16</sup>

Furthermore, there is a major difference between the great industrial revolution and recent change because technological change during a period of industrialization essentially involves machines assuming many of the physical activities traditionally performed by people. Since people were needed to perform mental functions, wage rates and employment rates remained high. But the main characteristic of recent technological change is that machines are increasingly assuming mental functions as well. They argued that

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<sup>15</sup>Leontief, W.(1983), p. 408.

<sup>16</sup>Leontief, W. and F. Duchine (1986), p. 35.

the process of progressive introduction of new computerized, automated and robotized equipment in reducing the role of labour is similar to the process by which the introduction of tractors and other machinery first reduced, and then completely eliminated, horses and other draft animals in agriculture. Leontief predicts that income inequality will increase in the future tending to a socially unacceptable level and the new technology will diminish the role of human labour in production to such an extent that it is bound to bring about long-term technological unemployment.

Leontief's prediction that the diffusion of modern technology will lead to the virtual elimination of the labour force is an excessive pessimistic view. For his argument that modern technology will lead to an increase in income inequality, he did not specify exactly how. Blackburn and Bloom (1987) argued that the complex equipment is most productively used when operated by someone who exercises independent thought so as to make strategic intervention in the productive process. They claim that in as far as machines are still greatly inferior to human beings in the flexibility of their responses to a variety of situations, the demand for labour will remain strong. It is quite possible that the declining need for labour to perform some routine functions may ultimately be offset by an increasing need for labour to solve more challenging problems.

When Kuttner (1983) introduced the idea of declining middle class for the first time in the United States, he dealt with the impact of some inter-

related factors, such as deindustrialization, technological change and deunionization, on increasing income inequality and the declining share of the middle class. He argued that:

As the economy shifts away from its traditional manufacturing base to high-technology and service industries, the share of jobs providing a middle-class standard of living is shrinking. An industrial economy employs large numbers of relatively well-paid production workers. A service economy, however, employs legions of keypunchers, salesclerks, waiters, secretaries, and cashiers, and the wages of these jobs tend to be comparatively low.<sup>17</sup>

Another aspect of the employment shift which contributed to increasing income inequality is rising part-time jobs in the service economy. Reasons for the use of more part-time work include (i) demand side factors such as increase in demand for services that have less standard working hours. (ii) supply side factors, such as increases in female and youth participation rates, and (iii) cyclical factors, such as hiring part-time workers to maximize flexibility with minimum cost. However, most of the part-time workers earn less than full-time workers and since they were growing in number, this explains an expansion of the lower income group at the expense of the middle income earners. In addition, the reasons explained for the shift to services provided an environment which is more suitable for using part-time jobs. In the following section we shall discuss the issue of part-time work in more detail.

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<sup>17</sup>Kuttner, B.(1983), p. 60.

### 4.3 Part-time work and Increasing Income Inequality

In recent years, issues relating to part-time workers have received considerable attention. New technologies based on automation, growing emphasis on information-based work, unavailability of full-time jobs for everybody and, finally, looking for a more flexible work schedule and opportunities in job choice are some of the reasons for the relatively rapid expansion of part-time work in Canada. The increase in part-time work was one of the most significant labour market trends over the past 30 years and it is now a significant feature of the labour force.

The trend toward automation and an information-based economy in Canada and other developed economies is well documented and, according to the Economic Council of Canada, "over half of Canadians are now employed in occupations that are primarily concerned with the creation and use of data and knowledge. This information-based employment is especially prevalent in the service sector, where it accounts for nearly two thirds of all jobs."<sup>18</sup> Another study concerning the current transition to computer technology, states:

For many economic and social reasons, part-time work has been increasingly important in this industrial transition period. It can

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<sup>18</sup>Economic Council of Canada(1990) p.13.

be a means of rationalizing job functions whose labour content has declined, and also is a way to share diminishing employment.<sup>19</sup>

To discuss the issues of part-time work, first it should be clarified what we mean by part-time work.

### 4.3.1 What Is Part-time Work?

The most widely accepted definition of part-time employment is based on the proposal made by the International Labor Organization (ILO). According to this definition, part-time employment is work “on a regular, voluntary basis for a daily or weekly period of substantially shorter duration than normal hours of work.”<sup>20</sup> Based on this definition, temporary, casual involuntary, and part-year workers are excluded. The Organization for Economic Cooperation and Development (OECD) in their study of part-time employment adopted the ILO definition, but this study made a distinction between part-time and casual employment.

We were frequently compelled in the course of our survey to contrast part-time with casual employment, that is to say intermittent work lasting a few days, weeks or months. By definition, casual employment is limited in time, when a casual worker signs on he knows that his job will be ephemeral, regardless of whether

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<sup>19</sup>Menzies, H.(1981), p. 60.

<sup>20</sup>Cited in Coats, M.(1988), p. 5.

he works full-time or part-time. Examples of a casual employment are students who seek work during vacations, mothers who look for a job for three or four months while a relative looks after the children, or pensioners who do odd jobs for three or four hours a day for a few weeks.<sup>21</sup>

Statistics Canada defines full-time and part-time employment as

Full-time employment consists of persons who usually work 30 hours or more per week, plus those who usually work less than 30 hours but consider themselves to be employed full-time; part-time employment consists of all other persons who usually work less than 30 hours per week.<sup>22</sup>

This definition of 'employed part-time' includes regular and involuntary part-time workers but does not make a distinction between seasonal and temporary part-time, and also does not include part-year workers or persons who work more than 30 hours per week and consider themselves to be employed part-time. Furthermore, someone who works a total of 30 hours or more at two, or more, part-time jobs is considered to be a full-time worker.

A definition that is not based solely on the number of hours worked per week, or weeks per month, and takes into account persons working part-time hours for numerous reasons was adopted by the Commission of Inquiry into Part-time Work. The Commission recommended the following definition:

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<sup>21</sup>Hallaire, J.(1968), p. 4.

<sup>22</sup>Statistics Canada (1980), p. 105.

A part-time worker is one who works less than the normally scheduled weekly or monthly hours of work established for persons doing similar work.<sup>23</sup>

This definition seems to be more comprehensive because it covers regular part-time employees, casual or temporary employees and seasonal employees. Census data define different variables for different kinds of labour force activity. Concerning full-time and part-time work, one of the variables, which seems consistent with the broad definition of part-time work and has been used in this study, is weeks worked during the year before the Census. According to this definition, 'full-time' refers to persons 15 years of age and over who reported the majority of their weeks-worked involved full-time work. And 'part-time' refers to those who worked part-time for most of the weeks. Part-time work is work which is less than the normally scheduled weekly hours of work performed by persons doing similar jobs. Persons with a part-time job for part of the year and a full-time job for another part of the year are classified according to the kind of work they performed the most weeks.

#### **4.3.2 Major Studies of Part-time Work in Canada**

Part-time work has been a growing phenomenon throughout the industrial world since the end of the Second World War. At the international level,

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<sup>23</sup>Commission of Inquiry into Part-time Work, (1983), p. 29.

part-time work was first placed on the agenda of the International Labor Organization in its 1949 conference where it was discussed in relation to the post-war employment of women. The first major international study of part-time work in 50 countries was conducted by the ILO in 1963.

In Canada, part-time work attracted much attention. As Reid and Swartz (1982) have pointed out:

Part-time employment is an important phenomenon...Part-time employment growth has consistently exceeded that of full-time employment over the last quarter century and if the trend continues part-time employment will become even more important in the economy.<sup>24</sup>

The Royal Commission on the Status of Women, in 1970, recommended that "the federal government undertake a study of the feasibility of making greater use of part-time workers in the Canadian Economy."<sup>25</sup> In 1980, the Canada Employment and Immigration Advisory Council addressed the issue of part-time employment and released its report *Element of a Policy on Part-time Employment*, in 1981. This report predicted the increased use of part-time labour in the Canadian economy. The Council advised that part-time employment should not be expanded at the expense of full-time employment.

The second important Canadian study on part-time work was the out-

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<sup>24</sup>Reid, F. and G. Swartz (1982), p. 3.

<sup>25</sup>Quoted from Commission of Inquiry into Part-time Work (1983), p. 19.

come of the Commission of Inquiry into Part-time Work (the Wallace Commission) established by the Minister of Labour in April 1982. This commission, with the cooperation of many experts, analyzed the available information, including its own questionnaires and released its final report in 1983. It concluded that part-time work in Canada is not a short-term phenomenon, it is important and will continue to be an important part of the Canadian labour market. According to this study, the definition of part-time work must be broad in order to encompass the variety of work schedules in part-time jobs.

The report of the Boyer Committee on Equal Rights (October 1985) also accepted a definition of part-time work to cover all categories of part-time workers. For this committee, a part-time worker is "one who works fewer than the normally scheduled weekly or monthly hours of work established for persons doing similar work."<sup>26</sup> It recommended that federal employment standards legislation and policies should be amended to ensure that part-time and seasonal workers receive the same statutory benefits on a prorated basis as full-time workers.<sup>27</sup>

The Boyer report summarizes the circumstances of part-time workers in Canada as:

-They are frequently paid less per hour than their full-time coun-

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<sup>26</sup>Boyer, J.(1985), p. 100.

<sup>27</sup>Ibid. p. 100.

terparts;

- they may not qualify for unemployment insurance benefits;
- they may not be eligible for sick leave, paid vacation or statutory holidays; and
- they may not be entitled to participate in the Canada or Quebec Pension Plans.<sup>28</sup>

In 1983, Julie White completed a study for the Canadian Advisory Council on the Status of Women, called *Women and Part-time Work*. She emphasized the inequality between full-time and part-time work and pointed out that the lower wages for comparable work, insecurity of employment, lower wages and lack of promotional opportunities are some of the characteristics of part-time work in Canada.

### **4.3.3 Growth of Part-time Work in Canada: Some Key Statistics**

As can be seen in Table 4.3 and is well documented in different studies, the expansion of part-time work is an important trend in the Canadian labour force. But the reasons for this expansion are complex. No single factor can be responsible for the increase in part-time work. Several interrelated developments must be considered. Nollen, Eddy and Martin (1979) gave the following reasons for the use of part-time work from the employers' point of view:

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<sup>28</sup>Ibid. p. 96.

1. General or specific labour shortages,
2. Peak load coverage,
3. Extended hours of operation,
4. Jobs that do not require full-time attention or special services,
5. Retaining experienced workers no longer able or willing to work full-time,
6. Higher productivity of part-time workers,
7. The ability to pay lower wages to part-time employees,
8. Reducing absenteeism,
9. Increased participation of women in the labour force and awareness of the needs of women, students, and older workers for specialized hours.

Because of data limitations, it is not possible to test these factors empirically. Statistics Canada provided information from employees' point of view. The reasons for voluntarily part-time employment include (i) personal or family responsibilities, (ii) going to school, (iii) did not want full-time work and (iv) other reasons. Table 4.4 shows the distribution of part-time workers based on the aforementioned reasons in 1986 and 1992.

Obviously, these reasons are not comprehensive. Probably that was a reason that the Commission of Inquiry into Part-time Work suggested that "Statistics Canada should examine in more detail the reasons people work part-time at different stages of their life cycle. Of particular interest is a clearer distinction between involuntary and voluntary part-time work and

Table 4.3: Part-time and Full-time Employment in Canada, 1955-1992

(figures are in 1000s)

Year	Total	Full-time			Part-time			Part-time as % of total
		Both Sexes	Men	Women	Both Sexes	Men	Women	
1955	5364	5139	4049	1091	225	80	145	4.2
1960	5965	5565	4234	1331	400	134	266	6.7
1965	6862	6205	4631	1573	657	210	446	9.6
1970	7879	6908	4978	1931	9717	332	639	12.3
1975	9308	8072	5620	2446	1236	390	845	13.3
1975	9284	8296	5602	2694	988	301	687	10.6
1976	9479	8432	5659	2773	1047	306	741	11.0
1977	9648	8519	5702	2817	1129	329	800	11.7
1978	9972	8764	5805	2959	1208	342	865	12.1
1979	10369	9068	5982	3086	1301	365	935	12.5
1980	10655	9268	6048	3220	1387	382	1005	13.0
1981	11006	9519	6146	3373	1487	413	1074	13.5
1982	10644	9110	5823	3287	1534	431	1103	14.4
1983	10734	9083	5765	3318	1651	475	1177	15.4
1984	11000	9311	5878	3433	1689	489	1200	15.3
1985	11312	9555	6014	3541	1757	493	1263	15.5
1986	11634	9824	6132	3688	1810	520	1290	16.0
1987	11861	10057	6199	3858	1804	510	1294	15.2
1988	12245	10363	6350	4013	1882	527	1355	15.4
1989	12485	10597	6441	4156	1888	536	1352	15.1
1990	12572	10640	6387	4253	1932	561	1371	15.4
1991	12340	10317	6154	4163	2023	597	1425	16.4
1992	12240	10182	6054	4128	2058	618	1440	16.8

Source: Statistics Canada, *The Labour Force*, Dec. 1975, p. 68, *Historical Labour Force Statistics* 1986, pp. 69,70,78,79,84,85, and *Historical Labour Force Statistics* 1992, pp. 60,62,74,76,86,87.

Note: The 1955-1975 data relate to the old Labour Force Survey in which part-time employees are those who usually work less than 35 hours per week. The 1975-1986 data relate to the revised Labour Force Survey in which part-time employees are those who usually work less than 30 hours per week.

Table 4.4: Reasons for Voluntary Part-time Employment, 1986-1992  
(percentage)

	Personal or family responsibilities		Going to school		Do not want full-time work		Other reasons	
	1986	1992	1986	1992	1986	1992	1986	1992
Both sexes	12.0	12.0	46.1	50.0	39.6	35.0	2.3	3.0
Male	1.4	1.0	77.8	79.0	18.1	16.0	3.7	4.0
Female	16.3	17.0	33.3	38.0	48.7	43.0	1.7	2.0

Source: Statistics Canada, *The Labour Force*, Dec. 1986, p. 159 and Dec. 1992. p. B.34.

the relationship between household income and the age of part-time workers. The "other" reasons should be investigated more carefully."<sup>29</sup>

Ernest Akycampong (1986) examined the growth in the number of people working part-time because they could not find full-time employment. According to this study, between 1975 and 1985, 20 percent of the growth in employment was due to an expansion in involuntary part-time work. The largest increases took place during the recession of 1982-1983.

Jean-Marc Levesque (1987), in a study for Statistics Canada, examined the growth of part-time employment between 1975 and 1986 to determine

<sup>29</sup>Commission of Inquiry into Part-time Work (1983), p. 32.

whether it was due to trends towards part-time work within industries or to structural changes in the economy. The study confirmed that the service sector (specifically the community, business and personal service industry) experienced greater relative growth in employment than any other sector. Moreover since these industries employ a higher proportion of part-time workers than do other sectors, there was a rise in overall part-time employment. The study indicates that despite a shift in employment towards those industries with a high concentration of part-time workers, less than one-fifth of the growth in employment was attributable to changes in the industrial structure of employment. This means that over 80 percent of the growth was due to changes within industries, particularly services.

The main objectives of firms in their employment strategies are to maximize flexibility and minimize their production costs. One way to achieve these objectives is through the expansion of their part-time labour force. The advantage for employers of pursuing a strategy of employment of part-time workers is the minimization of termination costs during economic downturns or when labour-saving technology is introduced. Low wages and benefit coverage for part-time workers allow a firm to reduce unit labour costs.<sup>30</sup>

Since 1953, the first year in which Statistics Canada collected data on part-timers, part-time employment has increased from 3.8% of total employment to 10.6% in 1975 , 13.5% in 1981 , 16% in 1986 and about 17% in 1992.

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<sup>30</sup>Economic Council of Canada (1991), P. 86.

The analysis of the part-time issue is somewhat hampered by the variation in its definitions. While Statistics Canada used to define a part-time worker as one who usually works less than 35 hours a week, in 1975 this definition was changed to less than 30 hours per week. For consistency and comparability reasons, the data since 1975 will be analyzed. As can be seen in Table 4.5, during this period, full-time employment increased by 18%, and part-time employment increased by 83%. For part-time workers, voluntary part-time employment grew by 47% and involuntary part-time employment jumped by 372%. More or less, the same trend can be seen during 1986 and 1992; part-time work rose faster than full-time work and among part-time workers, involuntary-work has grown much faster than voluntary work.

In 1975, approximately 1 in 85 workers were employed part-time involuntarily in all industries. This ratio was 1 in 65 and 1 in 250 for service and goods sectors, respectively. By 1986, this ratio has risen to 1 in 18 for all industries, 1 in 16 for services and 1 in 64 for goods sectors. As can be seen from Table 4.5, most of the involuntary workers are concentrated in the service sectors. Unfortunately, 1992 data on part-time workers are not disaggregated by voluntary and involuntary in goods and service industries.

When we consider the distribution of workers in goods and service industries by sex and type of work, again it can be seen that during 1979-1992 period, some full-time jobs changed to part-time jobs. (In 1979, for the first time, Statistics Canada provided data for full-time and part-time em-

Table 4.5: Part-time and Full-time Employment in Different Industries  
Canada, 1975-1992

(figures are in 1000s)

Industry	1975			1986			1992		
	part-time		full-time	part-time		full-time	part-time		full-time
	vol.	invol.		vol.	invol.		vol.	invol.	
All industries	880	109	8296	1296	514	9824	1516	665	9969
Services	752	95	5260	1213	517	6619	1944		7032
Goods	128	13	3036	156	53	3206	237		2937

Source: Statistics Canada, *The Labour Force*, Dec. 1986, pp. 117, 158 and Dec. 1992, p. B.34.

ployment by sex and industry). Table 4.6 shows that the share of part-time workers for males and females in both goods and services industries increased. It seems that the rates of increase of part-time workers in goods industries were greater than in the service industries.

Table 4.7 shows part-time employment by sex, age and education. Involuntary workers are concentrated among women aged 25-54 and among youth aged 15-24. In terms of educational levels, part-time involuntary workers are concentrated among individuals with elementary and high school education and occur least among university graduates.

Table 4.6: Percentage Distribution of Workers in Goods and Service Industries by Sex and Types of Work

	Goods				Services			
	1979	1981	1986	1992	1979	1981	1986	1992
<b>Males</b>								
Full-time	98	97.6	96	95	92	90	88	87
Part-time	2	2.4	4	5	8	10	12	13
<b>Females</b>								
Full-time	91	89.6	84	83	74	72	71	70
Part-time	9	10.4	16	17	26	28	29	30

source: Statistics Canada, *The Labour Force*, Dec. 1979 p. 101, Dec. 1981, p. 56, Dec. 1986 p. 58, and Dec. 1992. p.B.33.

In terms of compensation, as might be expected, hourly earnings of part-time workers tend to be less than full-time workers and most part-time workers earn lower wages than equally skilled full-time workers in the same industry and region. Hewitt Associates, in a report for Labour Canada in 1985, indicate that the following benefits were available to over 90 percent of full-time employees of larger firms but to less than one quarter of employees who work fewer than 20 hours per week: life insurance, pension plans, long-term disability insurance, supplemental medical insurance, dental treatments, and payment of provincial medicare premiums where applicable.<sup>31</sup> The average hourly wage rate for a female part-time worker in 1984 was \$7.63 compared to \$6.40 for males. The hourly wage rate for a unionized

<sup>31</sup>Quoted in Economic Council of Canada (1991), p. 190.

Table 4.7: Percentage Distribution of Involuntary and Voluntary Part-time Workers, by Sex, Age and Level of Education: Canada, 1975-1992

	Part-Time Workers					
	1975		1986		1992	
	Voluntary	Involuntary	Voluntary	Involuntary	Voluntary	Involuntary
<b>Sex</b>						
Male	30.3	31.7	26.5	32.0	30.0	30.0
Female	69.5	68.3	73.5	68.0	70.0	70.0
<b>Sex and Age</b>						
15-24 Years						
Males	22.8	19.5	19.7	17.3	21.7	10.7
Females	23.4	30.0	23.4	24.4	26.3	12.9
25-54 Years						
Males	2.7	8.6	2.4	12.5	3.0	13.4
Females	39.0	33.5	41.5	39.4	27.5	38.5
55 Years and Over*						
Both sexes	12.1	8.4	13	6.3	21.3	24.2
<b>Education**</b>						
0-8 Years of School	13.3	17.9	9.1	10.0		
High School	59.4	58.9	55.4	58.3		
Post-Secondary	22.0	18.3	27.2	24.5		
University Degree	5.3	4.9	8.2	7.2		

Source: Statistics Canada, *The Labour Force*, Dec. 1986, p. 158,159, Dec. 1992, p. B.33.

\* For 1992, 45 years and over.

\*\* There is no published data on part-time workers by education in 1992.

part-time worker was \$10.96 and \$12.40 for a unionized full-time worker while wage rates were \$6.17 for a non-unionized part-time worker and \$9.82 for a non-unionized full-time worker.<sup>32</sup>

The major reason for hourly wage differentials between part-time and full-time workers in Canada according to the Commission of Inquiry into Part-Time workers are: "Part-time workers are more concentrated within a narrow range of industries and occupations which pay less-than-average wage."<sup>33</sup> In a recent study by the Economic Council of Canada concerning the growth of nonstandard employment, it is concluded that "nonstandard employment tends to be characterized by inferior compensation and job and income security: to put it bluntly, many nonstandard jobs are 'bad jobs'. Together these findings point out a troubling conclusion: a large number of the jobs being created in today's labour market are, on a number of different levels *substandard* as well as nonstandard."<sup>34</sup>

In spite of the reasons behind the income differential between full-time and part-time workers, all the above information indicates that full-time jobs possess the following characteristics: high wages, good working conditions, more employment stability, chance of advancement, while part-time jobs in contrast tend to have low wages and fringe benefits, poor working conditions,

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<sup>32</sup>Statistics Canada, Unpublished data from the Survey of Union-Membership, a supplement to the Labour Force Survey, Dec 1984, Cited in Coates, M.(1988), p. 27.

<sup>33</sup>Commission of Inquiry into Part-time Work, (1983), p. 75.

<sup>34</sup>Economic Council of Canada (1991), p. 86.

there is little chance of advancement and so on. So in terms of our analysis, it can be argued that increase in part-time work and the substitution of well paying full-time jobs with less advantageous part-time work can be considered a potential factor for increasing overall income inequality.

#### **4.3.4 Some Other Potential Explanations for Increasing Inequality**

##### **4.3.4.1 Business Cycle Effects**

Concerning the distributional effect of macroeconomic fluctuations, a considerable body of literature has developed since the “trickle down” debate of mid 1960’s. Proponents of the business-cycle interpretation argue that the recessionary effects of high unemployment have significant negative effects on the distribution of income which act to widen the degree of inequality.

Hollister and Palmer (1972) analyzed how an expanding economy even with inflation, helps the poor and might decrease income inequality. The study examined the effect of expansion on labour market income, the real value of assets and the price of the consumption goods for the poor. They argue that the labour-market earnings of the poor increase relative to the average in a period of expansion because the poor are more likely to get a job, or their hours of work increase and their wages rise faster than average.

According to this study, the real value of the assets of the poor does not decrease much as a result of inflation because the poor have few assets. The few assets they have tend to increase in value with inflation because the poor tend to be net debtors rather than creditors. Also, the prices of goods consumed by the poor do not increase by as much as the average price level in a period of inflation. Although the poor are adversely affected by inflation, they benefit more from the improved employment opportunity than they lose as a result of inflation. Finally, "because the relative position of the poor seems to improve during inflationary periods and overall real income gains per capita occur during such periods, the poor as a whole must be gaining both absolutely and relatively in economic well being during periods in which inflationary process operate."<sup>35</sup>

Blinder and Esaki (1978) run simple ordinary least square regressions over the period 1948-83 for the United States, where the dependent variables are a set of quintile shares and regressors are the overall unemployment rate and rate of inflation (as measured by the GNP deflator) and a linear time trend. They estimate that each one percentage point rise in the unemployment rate takes about 0.26%-0.30% of the national income away from the lowest 40% of the income distribution and gives it to the richest 20%. That is, in recessionary periods, the poor lose more than the rich such that, considering their respective shares, the rich came to about a 0.26%-0.30% higher share per unit of unemployment at the expense of the poor. Inflation is a

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<sup>35</sup>Hollister, R. and J. Palmer (1972), p. 270.

slightly progressive tax in that the poor and middle classes lose relatively less than the rich. More to the point, the effects of inflation on income distribution simply are much less important than those of unemployment.<sup>36</sup>

Blank and Blinder (1986), using updated data, came to a similar conclusion. They indicated that "low-income households should be more concerned with rising rates of unemployment than with rising rates of inflation, but for the high-income households the opposite is true."<sup>37</sup> To sum up their findings, the lower quintiles systematically lose from unemployment and gain relatively from inflation. Unemployment is similar to a regressive tax and inflation to a progressive one; high unemployment redistributes income away from the poor to the rich, while inflation redistributes away from the rich to the poor.

In the Canadian context, among others, Beach and Macwatters (1990), using SCF data over the period 1965-1987 and regression analysis, found that a rising unemployment rate will increase significantly the share of the top quintile while it has a negative effect on the share of the other quintiles. They conclude that "business-cycle effects do show some significance through the unemployment rate."<sup>38</sup> Perron and Vaillancourt (1988), arguing in favour of a trickle-down effect in Canada, conclude that an increase

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<sup>36</sup>Blinder, A. and H. Esaki. (1978), pp. 607-608.

<sup>37</sup>Blank, R. and A. Blinder. (1986), p. 189.

<sup>38</sup>Beach, C. and C. Macwatters (1990) p. 127.

in the unemployment rate increases poverty and “cyclical recoveries seem to be associated with decreased inequality while cyclical recessions are accompanied with increased inequality in the distribution of income . . . These compounding effects are beneficial over cyclical recoveries but more harmful over cyclical downturns.”<sup>39</sup>

Since our data are based on the 1971, 1981 and 1986 Censuses, we are not in the position to test this hypothesis, but we should consider the stages of the business cycles in these years to have a better understanding of the change in inequality. In general, it can be said that there was a contraction between 1969-1970 and from 1979 through 1983. Probably the troughs were reached in 1970 and 1982. (According to Statistics Canada recession started in July 1981 and ended in December 1982)<sup>40</sup> Since the business cycles in Canada had more or less the same pattern and duration as in the United States, the American economy in those years had peaks in December 1969 and July 1981 and had troughs in November 1970 and November 1982.<sup>41</sup>

After the last trough in 1982, an expansion began which continued up to 1988. During this period, there were some short-term fluctuations. As can be seen in Table 4.8 and Figure B.7 in Appendix B, in 1970 and 1980, we were more or less at the same stage of the business cycle. So the data

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<sup>39</sup>Perron, P. and F. Vaillancourt (1988), p. 53.

<sup>40</sup>Statistics Canada (1985), p. xxiv.

<sup>41</sup>NBER data, Cited in Plocck, J.(1991), p. 304.

for these two years are reasonably comparable and according to our previous discussion, inequality should have increased if the hypothesis put forward is true.

Table 4.8: Some Statistics for Canada in 1970-1992

Macro Econ. Var.	1970	1980	1985	1991	1992
GDP at 1986 prices					
annual % change	2.6	3.7	4.8	-0.5	-1.7
Total Unemployment Rate	5.7	7.5	10.5	8.1	10.3
Male Unemployment Rate	5.6	7.0	10.3	8.1	10.8
Female Unemployment Rate	5.8	8.4	10.3	8.1	12.8
Consumer Price Index	30.0	67.2	96.0	119.5	126.2
Total Participation Rate	57.8	64.1	65.3	67	66.3
Males Participation Rate	77.8	78.4	76.6	75.9	74.8
Females Participation Rate	38.3	50.4	54.6	58.4	58.2

Source: Statistics Canada *Historical Statistical Supplement 1991/1992*, Catalogue # 11210 pp. 7,38,50.

But in 1985, which was an expansionary phase, we would expect less inequality due to cyclical factors. If we had larger inequality, it would mean that the other inequality determinants have stronger effects than the cyclical factors.

#### 4.3.4.2 Unionization

The impact of unions on workers' income has received considerable attention in the literature. Unions are often credited with increasing the income of their

members and changing aggregate wage levels and dispersion. Unions might influence employment inequality in the following ways: unions decrease the dispersion of blue-collar workers by standardizing within-firm wages, unions decrease blue-collar wage dispersion among unionized firms by establishing common wage scales and unions increased the union-non-union wage differential.

The extent of union organization varies considerably by industry, occupation, sex, region and full-time or part-time position of workers. About one half of full-time workers in blue-collar occupations were union members in 1981. The proportion was lower in white-collar occupations: managerial and professional (37%), clerical (29%), service (27%) and sales (9%). In almost all occupations, the proportion of females who were union members was substantially lower than for males. Grant and Vanderkamp (1980), MacDonald and Evans (1981), Robinson and Tomes (1984), Kumar and Stengos (1985) and Simpson (1985) estimated the union/non-union wage differential based on different forms of Canadian data for different time periods. Their findings indicate that the average differentials or the earning premium for being unionized in Canada are generally within the 10-25 percent range. In Robins and Tomes (1984), the difference is 34%. With respect to the overall degree of inequality, the evidence indicates that unions in fact reduce earning inequality and thus are potentially important in the struggle to alleviate inequality and labour-market related poverty. Since the employment shifts from goods-producing to service-producing activities are well documented

and the employment shifts are associated with the unions' decline, the overall effect is increasing inequality.

Blackburn, Bloom and Freeman (1990), in a detailed study for white American males between 25-65 years old, examined the declining economic position of less skilled workers and provided explanations for the change in their wage structure. In this study, least-skilled workers include those who have not completed high school and among them the authors compared the wages of operatives, handlers, and service workers with earnings of managers and professional workers. They found that over the last 20 years and especially during the 1980s, the wages of unskilled workers dropped substantially relative to those received by highly skilled workers. Their analysis suggests that between 16 to 33 percent of the declining wage gap between skilled and less skilled workers were due to industrial shifts on the demand side. Concerning the effect of supply-side factors, they considered the falling supply of college-graduated young men and the influx of women into the job market. According to their estimation, these supply-side factors could explain between 13 to 30 percent of the gap in earnings between skilled and less skilled workers.

The authors showed that the share of the US work force belonging to unions has fallen over time. This trend continued through the 1970s and 1980s and was mainly concentrated among workers without a high school diploma. They found that declining unionization might account for 15 to 20

percent of the drop in relative wages received by the less skilled workers.

#### 4.3.4.3 Globalization of the Economy and the New International Division of Labour

Another aspect of the demand-side explanation for increasing inequality is the new international division of labour or globalization of the economy. New technologies facilitating world-wide communication and transportation have changed the classical division of labour between advanced industrialized and Third World countries. Canadian industries no longer compete only against American, European, or Japanese companies, but rather against companies whose headquarters are in the United States or Canada and whose production facilities are in Taiwan, Hong Kong, Malaysia and a marketing force is spread across many nations. More to the point, today, workers are increasingly part of an international labour market, encompassing Asia, Africa and the rest of the world. Corporations can with relative ease, relocate their production centres and alter their international lines of communications and transportation to take advantage of low wages, low levels of taxes and non-unionized labour forces. These relocations and capital mobility have consequences for individuals, families and communities. Workers in affected plants can become suddenly unemployed and also at risk are those whose jobs are directly or indirectly tied to these plants in subsidiary roles, such as in transportation, supply and services, etc. Furthermore, traditional forms

of administration and the need for face-to-face supervision formerly required most office functions to be in the same location as key decision makers, so there was a demand for different forms of clerical, administrative and professional employments. But rapid decline in the costs of transferring information makes these increasingly “footloose” employment opportunities. On the other hand, shareholders and the owners of the firm who are mainly from the top earning quintile of the population receive more and more income in a global economy, so the final effect of the new international division of labour is more income inequality in society. It is expected that this phenomenon will continue and become more pronounced in the future.

#### **4.3.4.4 Increased Vertical Disintegration**

Vertical disintegration, or the practice of contracting out, is a method whereby an employer turns over part of his operation to another firm. In the wake of the recession of the early 1980s, many firms have adopted this new strategy aimed at minimizing costs and maximizing flexibility. The trend toward vertical disintegration of firms by relying more and more on the supply of inputs by many small firms minimizes the loss for the big firms but increases the unemployment in the small subsidiary firms during recessionary years. The practice of subcontracting is not confined to private industry alone; there has also been a rapid increase in using subcontractors for the performance of some public services. During this process, well-paying jobs in the public

sector and big firms are replaced by low-paying jobs in small firms. Specifically, in the private sector, employers avoid the responsibility of adhering to a union contract by turning over part of the operations to another firm, usually a non-unionized firm.

#### 4.4 Concluding Remarks

In this chapter, potential causes for increasing inequality were discussed. However, it is very difficult to differentiate and identify the effect of each factor independently. Employment shifts from goods to services are well documented and this appears to have altered the distribution of income and increased income inequality. The increase in inequality might have resulted for several reasons. For example, the shift in employment from more concentrated goods industries to more competitive service industries might have increased the number of low wage workers. This increased inequality and decreased the income share of workers at the bottom of the distribution scale. Unionization in the goods-sector has exceeded unionization in the service-sector. By considering the continuing decline in unionization, particularly among workers in the service sector, and the existence of a large earning gap between union and non-union workers, it can be argued that the decline in unionization was a potential reason for increasing income inequality.

In terms of part-time work, it is well documented that the majority

of part-time workers that are employed in the traditional service sector are either young or female, or both. By comparison with their full-time counterparts, part-time workers are much more likely to be nonunionized, they are less likely to be covered by a range of employee benefits, and in general they earn less than full-time workers performing similar kinds of work. It is a fact that part-time work increased during the period under consideration, so it can be argued that the increase in part-time work was another potential factor increasing income inequality.

Other potential factors which were discussed and might be reasons for increasing inequality were the new international division of labour, cyclical recessions and increased vertical disintegration.

In the following chapter, we shall deal more specifically with the income distribution and inequality in Canada.

## Chapter 5

# Income Distribution and Inequality in Canada

### 5.1 Some Canadian Empirical Studies

Several studies have focused on changes in the level of economic inequality in the United States but there are not many studies for Canada. For the most part, these studies are concerned with family income inequality. To my knowledge, only a few studies analyze inequality that exists among the income of individuals. In this section, we briefly review the most relevant literature on inequality trends in Canada.

Henderson and Rowley (1977), in a detailed analysis using the Survey of Consumer Finances (SCF), investigate family income inequality based on certain characteristics of Canadian families during the period 1965-1973. They found that money income was more equally distributed among families in 1965 than it was in 1973. According to their findings, about 60 percent of the increase between 1967 and 1973 in the inequality of the distribution of total income among all family units can be associated with changes in the size of the family unit, the age and education of the head, and the number of male and female earners in the family unit.

Wolfson (1986), using six Surveys of Consumer Finance (from 1965, 1971, 1975, 1979, 1982 and 1983) and using different income concepts such as total money income, after-tax disposable income and some equivalent adjustments like total money income per equivalent adult unit and total money income per family unit, studied the evolution of family income inequality in Canada. His results suggest that inequality rose from 1965 to 1970 (in accord with Henderson and Rowley), fell to a low in 1975 and then increased up to 1983. In this analysis, he uses income share within quintile, the Gini coefficient, the coefficient of variation and the exponential measure.<sup>1</sup> He points out that the change in the size and structure of families and the rise in the female labour force participation rate were among the major factors leading

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$${}^1EXP = \frac{1}{n} \sum_{i=1}^n e^{-y_i}$$

where:  $n$  is the number of individuals within the family and  $y$  is the family's income. He used a standardization procedure in which the mean income was set equal to one.

to increased family income. The trend for baby boomers to establish their own separate households and increased divorce and separation rates tended to increase the number of small family units with low incomes, which may have acted to increase income inequality. He argued that recessions have some equalizing effects on income distribution. But high inflation, which usually coincides with high interest rates, could benefit the elderly among whom there is a large concentration of saving. This view that recessions have equalizing effects is very debatable; many empirical studies show the opposite. Samuelson (1983), Blackburn and Bloom (1985) and Belous et al. (1985), among others, maintain that a depressed economy reduces the incomes of the lower ranks of the income distribution since it deprives these poorer families of a substantial source of income, that is, employment earnings.

Buse (1982) uses micro level data from individual tax returns for the period 1947-1987. He uses regression models in which the dependent variable is the Gini index or an income share and the explanatory variables include various cyclical indicators such as the unemployment rate, inflation and the labour force participation rate. He finds that the unemployment rate is positively related to inequality and the labour force participation rate is negatively correlated to inequality. He argues that "taking the evidence as a whole we can state that, with the exception of the first and last decile, the size distribution for tax filers is insensitive to the major cyclical variables,

unemployment and inflation but it is sensitive to participation rates.”<sup>2</sup> A problem with this study is that there was not a stable definition of income over this relatively long period of time, and so changes in the definition of income over the period may have affected the findings.

Dagum (1985), in a theoretical study, provided a framework for presenting an integrated model of income distribution. In the last section of his study, he applies the methodology developed in the preceding sections to the analysis of Canadian income distribution by sex according to four levels of education and estimates the income inequality within each distribution and between male and female distributions. Dagum used published data of the SCF for individual male and female income recipients, by level of education in 1965, 1967, 1969, 1971, 1973, 1975, 1979 and 1981. He used the Gini ratio as a measure of inequality within each distribution of income by sex and education, and his economic distance ratio (D) for estimating the income inequality between male and female subpopulations.

According to his findings, generally, female subpopulations had higher income inequality than male subpopulations. The male-female income differentials showed a downward trend, indicating a narrowing of the relative degree of economic affluence of the male income recipients with respect to females at all levels of education.

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<sup>2</sup>Buse, A.(1982) p. 203.

Dooley (1986), using SCF data from 1971, 1973, 1975, 1977, 1979 and 1981, analyzes the relationship between annual earnings and two individual characteristics, age and education, during the period 1971 to 1981. He set out to analyze the relationship among the earnings of male workers and their ages and levels of education. In terms of education, he focuses on two categories, specifically, male individuals with nine to thirteen years of schooling and males with a university degree. His findings suggest a relatively stable age-earning relationship in the 1970s and a decline in relative earnings differentials, particularly between individuals with a university degree and those with secondary education. A problem with this study is that the income and education data obtained from Statistics Canada Census family micro data tapes provided information only for the head of the census family and spouse; adults who lived with their parents and were never married or adults who lived together were excluded thereby introducing a bias in the results.

Myles, Picot and Wannell (1988), in their study of the changing wage distribution of jobs over the period from 1981 to 1986, found that during this period, there was an increase in the percentage of workers with jobs that pay very low wages and very high wages. Their results indicate a modest decline in the share of employment in the middle of the income distribution, and a larger decline in the lower-middle group. Wage earnings were converted to full-time, full-year equivalents. Each job was given a weight based on the hours worked on the job divided by 2080 (the number of hours worked during

a year in a 40 hour per week job). They placed all full-time equivalent jobs into 10 groups which they ranked by the wage level. To them, the change in inequality over the period is not clear. Their main conclusion was that the distribution of wages (across all age groups) did become somewhat more polarized over the period.

Leckie (1988) tried to examine the effect of technological change on the declining middle class. The data he used were from Statistics Canada's input/output structure, the 1971, 1981 Censuses of Canada and for selected years between 1971 and 1984, from the Survey of Consumer Finances. He converted the family data from family-based to an individual-based format by splitting family records containing both head and spousal information into two records. Income-receiver units are those who had earnings at least 2.5% of the mean industrial wage and the middle class is comprised of those individuals whose income is within 25 percent of the mean. He used the Gini ratio as a measure of inequality and  $(PLTM - ILTM)/Gini$  as a measure of polarization, where PLTM is the population share with income less than mean income, and ILTM is the income share of those whose income is less than the mean income.

His findings indicate that inequality of income among full-time workers, part-time workers, goods-producing industries as well as service-producing industries increased during the 1975-1985 period.<sup>3</sup> The findings of this study

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<sup>3</sup>Leckie N.(1988), p. 68.

do not support the idea of income polarization. One possible reason for this conclusion might be the exclusion of many low income individuals from the sample (such as working children that live at home, unemployed individuals and those who earned less than 2.5 per cent of the mean industrial wage).

Blackburn and Bloom (1990) compare the distribution of family incomes and of male earnings in Canada and the United States in 1979 and 1987. They used SCF as the source of data for Canada and their study shows that income inequality among families increased in the U.S., while in Canada there was no clear change in inequality.

Love and Paulin (1991), using SCF and after tax income shares of families, show that the share of the lowest decile increased from 2.5% in 1980 to 2.9% in 1989 and the share of the highest decile increased from 21.7% to 22% in the same period. According to them, even though the variations in income shares were not large, the pattern of change suggests that income inequality increased during the first three (or four) years of the decade, followed by a declining inequality trend.<sup>4</sup>

Beach and Macwatters (1990) used SCF and examined Canadian family income inequality as well as the share of the middle class income in Canada over the period 1965-1987. On the basis of time series regressions of quintile shares on unemployment, male and female participation rates and the infla-

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<sup>4</sup>Love, R. and S. Paulin (1991), p. 8.

tion rate, they show that the share of the middle class is positively correlated with the unemployment rate and the male participation rate but is negatively related to the female participation rate. A reduction in the unemployment rate is estimated to benefit the top and bottom ends of the distribution and reduce the middle-class share. According to their findings, inflation and shifts in employment from manufacturing to service sectors have only limited effects, though estimates of the latter effect do suggest a slight decline in the share of the middle class.<sup>5</sup>

One potential problem with some of the studies that used Survey of Consumer Finance is that prior to 1977, Statistics Canada did not make available public use samples with information on income of non-respondents, and since 1977, they have imputed income values for non-respondents to income questions. This, as pointed out by Dooley (1986) and Blackburn and Bloom (1990) may create biased conclusions regarding the trend in inequality over the late 1970s.

As mentioned, almost all empirical studies have used data from the SCF and most of them have used the family as the economic unit of analysis.

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<sup>5</sup>Beach and Macwatters (1990), p. 131.

This study is different from the other studies in the following ways: it is mainly based on parametric form (to my knowledge almost all other studies were using directly observed data), in terms of source of data it is based on census data rather than SCF, and economic units are individuals rather than families.

## 5.2 The Empirical Results

As mentioned, in this study, various inequality measures in parametric and non-parametric forms (based on observed data) are employed. The results from applying different inequality measures were more or less the same, no matter which approaches were used. The results are presented in the Tables C1 to C16 in Appendix C.

The analysis of this part is based on parametric forms and applies the Gini ratio, quintile shares and the top-to-bottom share.<sup>6</sup> Quintile share distributions indicate the share of income received by each fifth of the population. Perfect equality would be obtained if each member of the population receives the mean income, hence each fifth (quintile) of the population receives one fifth of the income, in which case the Gini ratio would be equal to zero and the top-to-bottom share ratio would be one. The top-to-bottom

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<sup>6</sup>According to the discussion in Chapter Three, these measures are calculated based on the Dagum model.

Table 5.1: Gini Ratio and Selected Income Shares for All Individuals' Total Income

Year	percentage of income going to								Gini	$\frac{Q5}{Q1}$
	Quintiles					top	top	MC		
	Q1	Q2	Q3	Q4	Q5	5%	1%			
1971	3.3	11.6	17.8	24.7	42.6	16	5	54.1	0.391	12.9
1981	3.8	10.9	17.1	24.4	43.8	16.7	5.2	52.4	0.400	11.5
1986	3.7	10.5	16.9	24.6	44.3	17	5.3	52.0	0.407	12

share ratio shows distributional shifts in favour of the top quintile (income polarization). It indicates how many times larger the income of the average individual belonging to the richest quintile is than the income of the average individual belonging to the poorest quintile. A decrease of the middle three quintile shares over time (MC) shows a loss in the income share of the middle part of the population (declining middle class). Q1 to Q5 show the quintile shares or the percentages of income going to each quintile of the population from poorest to the richest. For example, Q1 is the percentage of income going to the poorest 20% and Q5 is the percentage of income going to the richest 20% of the population. MC indicates the middle class share or percentage of income going to the three middle quintiles (MC= Q2 + Q3 + Q4). To have a better understanding of what had happened to the upper group, the percentages of income going to the top 5% and top 1% are shown separately.

Table 5.2: Gini Ratio and Selected Income Shares for All Individuals' Employment Income

Year	percentage of income going to								Gini	$\frac{Q_5}{Q_1}$
	Quintiles					top	top	MC		
	Q1	Q2	Q3	Q4	Q5	5%	1%			
1971	3.8	12.2	18.4	25.0	40.6	14.5	4.2	55.6	0.367	10.6
1981	3.6	10.9	17.8	25.5	42.2	15.1	4.5	54.2	0.390	11.7
1986	3.3	10.3	17.5	25.8	43.1	15.8	4.4	53.6	0.404	13.1

Table 5.1 shows the trend in income inequality for all individuals between 25 and 65 years of age using data for their total income in 1971, 1981 and 1986. As can be seen from Table 5.1, the Gini ratio has increased by four percent which indicates a slight increase in inequality during the period 1971-1986. The share of the middle class declined by three percent during the 1970's and by less than one percent between 1981 and 1986. The top-to-bottom share ratio declined by 11 percent during the 1970's but shows a 4 percent increase between 1981-1986. The share of the top 5 percent as well as the share of the top 1 percent has increased, which further indicates increasing income polarization.

Table 5.2 shows the same trends for individuals' employment income. The Gini ratio rises by more than 10 percent. The levels of the Gini ratio for employment income are smaller than the Gini ratio for total income, in

particular for 1971 which indicates that employment income is distributed more equally than total income. When we compare the Gini ratio for total income with the Gini ratio for employment income for only full-time workers, the rate of increase in inequality is even larger (6% and 13% respectively). The employment income of full-time workers has the most equal distribution of income. The share of the middle class in employment income was 55.6 percent in 1971, which declined steadily to 53.6 percent in 1986. The top quintile share, as well as the share of the top 5 percent, has risen during this period, which indicates increasing polarization. The top to bottom share ratio was 10.6% in 1971 which indicates that the average income belonging to individuals from the richest group was almost 11 times larger than the average income of a representative individual from the poorest group. This ratio increased to about 13 in 1986 which indicates a twenty-four percent increase during the period.

### **5.2.1 Results by Sex**

Tables 5.3 shows the distribution of employment income for males and females. As can be seen, the distribution of employment income among the female population is more unequal than among males. The Gini ratios for males are in the 0.3 range, while for females they are in the 0.4 range which indicates greater inequality among the female population. The Gini ratio which was 0.298 for males in 1971 has risen to 0.323 in 1981 and 0.347 in

1986 which represents 8.4 and 7.4 percent increases, respectively.

Table 5.3: Gini Ratios and Selected Income Shares for the Males' and Females' Employment Income

Sex Year	percentage of income going to								Gini	$\frac{Q5}{Q1}$
	Quintiles					top	top	MC		
	Q1	Q2	Q3	Q4	Q5	5%	1%			
<b>Male</b>										
1971	6.8	14.2	18.6	23.6	36.8	15.0	3.9	56.4	0.298	5.4
1981	5.7	12.3	18.6	24.3	38.1	13.3	3.9	56.2	0.323	6.7
1986	4.7	12.4	18.6	25.1	40.0	15.5	3.8	56.1	0.347	8.5
<b>Female</b>										
1971	2.4	10.2	18.2	26.3	42.9	15.0	4.3	54.7	0.412	17.8
1981	2.8	9.6	16.5	24.9	46.2	17.8	5.6	51.0	0.436	16.5
1986	2.8	9.2	16.5	25.3	46.2	17.3	5.3	51.0	0.443	16.5

The top-to-bottom share ratio for males has risen from 5.4 in 1971 to 8.5 in 1986, meaning that in 1986, the average income of a Canadian male belonging to the richest quintile was more than 8 times greater than the average income of a Canadian male belonging to the poorest quintile. This share ratio has increased more than 24 percent during the 1970's and 27 percent between 1981-1986. This measure is higher for females, but declining over time because of a 16 percent decline in the poorest quintile share in the first period and 18 percent during the second period compounded by a 9 percent increase in the share of the richest quintile. In fact, polarization

has taken place mainly from the bottom to the top and the share of the middle class slightly declined (less than 1 percent for the whole period). As indicated, the Gini ratio for females' employment income is generally higher than the male Gini ratio. It is tending to increase, but the rate of increase is less than that for the male employment income's Gini ratio. Also in this subgroup, the share of the middle-class declined in the first period but remained the same in the second period. The top-to-bottom share ratio for the first period declined by 7 percent but it did not change in the second period. The share of the top 5 percent and 1 percent have risen during 1970's but fell slightly in the 1981-1986 period.

Table 5.4: Income Differential Ratio (D) and the Mean of the Total Income and Employment Income by Sex

Income & Year	Income Diff. ratio	Mean Income	
		male	female
<b>Total Income</b>			
1971	0.810	8344	3665
1981	0.731	21706	10815
1986	0.661	30124	16432
<b>Employment Income</b>			
1971	0.812	7783	3643
1981	0.735	19831	10297
1986	0.659	27652	15633

According to the estimated results, it appears that persistent income differentials between males and females exist. The income differential ratio

(Table 5.4) was 0.810 in 1971, by 1986 it had decreased by 18 percent. In spite of this decline, by 1986 the mean income of a female was 55 percent of the mean male income, whereas in 1971 it was only 44 percent. In 1971, the mean employment income for females was only 47 percent of the males, but in 1986 this proportion increased to about 57 percent. The male-female differential in employment income has declined by more than 18 percent during the whole period. However, as can be seen, the male-female employment income differential is about the same as the male-female total income differential.

The marked and steady rise in the female participation rate has had some distributional effects. In Canada, in 1971, women's participation rate was 39.4%, in 1981 it was 51.7%, by 1986 the rate was 55.3% and in 1992 it was 57.6%.<sup>7</sup> It is well established that, on average, women have earned less than men; however, the gap did narrow between 1971 and 1986.

#### **5.2.1.1 Potential Reasons for the Change in Female Labour Force Participation and Its Impact on Income Inequality**

During the past three decades, females' participation and their real wages increased in absolute terms as well as relative to men. In 1971, only about six women in ten received any income at all; by 1986, the proportion had risen to eight in ten. During this period, the proportion of men with income

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<sup>7</sup>Source: Statistics Canada, Historical Labour Force Statistics 1992, p. 304.

remained stable at over nine out of ten. At the same time, the average income of women who had income rose from 42% of the male average in 1971 to 55.6% in 1986. One result of these trends is that women's share of total income has increased; by 1986, their share had grown to more than 34%. The relative proportion of women enrollment at the colleges and universities increased during the period under consideration.<sup>8</sup>

One of the potential reasons for increasing female labour force participation is based on the relative costs and benefits of labour-market activities. Higher wages increased the benefits from labour-market participation and the opportunity cost of home production. As the benefits to market participation increased with increased female wages, women increasingly entered the labour market and spent less time out of the labour force after childbirth. In addition, by considering demographic indicators, as can be seen in Table 5.5, during the period under consideration, the number of marriages, the average number of children per family and the average family size all declined, while divorce rates increased very fast, particularly during the 1971-1981 period. All these trends indicate that more time and opportunities were created for women to enter the labour force and this increased their participation rates.

West (1988) pointed out that "by 1986, four out of ten graduate students were women compared with three out of ten a decade earlier. In the same

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<sup>8</sup>The numbers are from the Statistics Canada (1990) pp. 45-46. The ratios calculated from our sample are very similar.

Table 5.5: Some Canadian Family Indicators in 1971, 1981 and 1986

	1971	1981	1986
Average Family Size	3.8	3.3	3.2
Average Number of Children (Per family)	1.7	1.3	1.2
Divorce Rates (per 100,000)	621	1229.2	1255.2
Marriage Rates (per 1000)	72.4	52.6	45

Source: Statistics Canada (1990), pp. 16-18.

year, 51 percent of the students in community colleges were women and 49 percent of full-time undergraduates were female. Women accounted for 46 percent of all part-time graduate students in 1986 a 16 percentage point increase over the decade"<sup>9</sup>

Concerning the impact of these changes on income inequality, it can be argued that increases in female participation during that period is a statistical fact. At the same time, on the one hand, the number of female university graduates rose faster than that of males and more women entered into technical and well paying jobs. On the other hand, with the employment shift from goods to services and the dramatic employment growth in areas of traditional female employment (such as clerical, sales, etc.), a large proportion of the growing female labour force has gone to fill part-time and/or low pay-

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<sup>9</sup>West E.(1988), p.1.

ing jobs in the service sector. So increasing the number of female workers at both extremes of the pay scale (low paying jobs as well as high-paying jobs) can be considered a potential reason for increasing overall inequality.

To estimate the impact of female participation on income inequality, we calculate the Gini ratio for male workers only, and for all workers (males and females). Results shown in Table 5.6 indicate that with the inclusion

Table 5.6: Gini Ratio For Individuals' Income Canada:  
1971, 1981, 1986

Income & Sex	Year		
	1971	1981	1986
<b>Total Income</b>			
Males	0.323	0.343	0.360
Males and Females	0.391	0.400	0.407
<b>Employment Income</b>			
Males	0.298	0.323	0.347
Males and Females	0.367	0.390	0.404

of females, inequality increased in all three years, for both total income and employment income, so we can conclude that the rise in the female participation rate is one of the reasons that contributes to an increase in overall inequality.

### 5.2.2 Results by Education

To see the effects of education on income inequality, it seems that employment income better represents the impacts of acquiring human capital on earnings, so our analysis in this section is confined to the effect of employment income on income distribution and inequality for individuals with three different levels of education, that is, elementary, secondary and university degree.

To examine the effects of education, the aforementioned six inequality measures have been used and all of them show the same trend but, as mentioned, our reported results are based only on the Gini ratio parametric form.

As can be seen in Table 5.7, this ratio for individuals with elementary schooling increased by 16% for secondary schooling it increased by 12% during the whole period. For university graduates it declined by 6% in the first period and increased 4% in the second period so that for the whole period there was a decline of 2%. From these figures, it can be inferred that while inequality among individuals with elementary and secondary schooling increased, for university graduates inequality in 1986 is not more than what it was in 1971.

When we consider full-time workers only, the trend is still the same but with a higher rate of change. Inequality among individuals with elementary

Table 5.7: Gini Ratios for Individuals' Employment Income at Different Levels of Education

	Gini Ratios		
	1971	1981	1986
<b>All Workers</b>			
Elementary Schooling	0.342	0.373	0.397
Secondary Schooling	0.348	0.371	0.390
University Degree	0.338	0.318	0.332
<b>Full-time Workers Only</b>			
Elementary Schooling	0.299	0.331	0.356
Secondary Schooling	0.293	0.321	0.343
University Degree	0.313	0.283	0.290

and secondary schooling increased by 19% and 17%, respectively, for the whole period while inequality among university graduates declined by 7%. When we look at the distribution of income among all full-time workers separating them by sex and education (Table 5.8), the same trend can be seen.

Inequality among males with elementary and secondary schooling increased (by 17% and 22%) but for university graduates declined 12% in the first period and increased by 4% in the second period. For female full-time workers, inequality increased by 11% and 15% for elementary and secondary schooling for the whole period, but for university graduates, it declined by 4% in the first period and increased by 2% in the second period.

Table 5.8: Gini Ratios for Individuals' Employment Income by Sex at Different Level of Education, Full-time Workers

	Gini Ratios		
	1971	1981	1986
<b>Males</b>			
Elementary Schooling	0.265	0.283	0.310
Secondary Schooling	0.244	0.265	0.299
University Degree	0.302	0.267	0.278
<b>Females</b>			
Elementary Schooling	0.313	0.328	0.347
Secondary Schooling	0.289	0.311	0.333
University Degree	0.278	0.266	0.271

Table 5.9 presents the income differential ratio or inter-income distribution measure of inequality between male and female income receivers by educational category. These ratios are higher for the income recipients with elementary and secondary schooling. For university graduates, the ratios are lower than the others, which probably indicates expansion in university education during the period under consideration. This provided a larger supply of the male and female labour forces with university degrees, resulting in declining income inequality among them.

The findings are consistent with the fact that part-time workers and females have mainly elementary or secondary schooling, so when there is a rapid increase in the number of female and part-time workers, one should expect an increase in inequality. In addition, Canada, in 1972, signed the

Table 5.9: Male-Female Employment Income Differential Ratios

	Elementary Schooling	Secondary Schooling	University Degree
<b>All Workers</b>			
1971	0.845	0.868	0.707
1981	0.802	0.828	0.680
1986	0.750	0.743	0.664
<b>Full-time Workers</b>			
1971	0.898	0.906	0.797
1981	0.777	0.782	0.629
1986	0.725	0.690	0.598

International Labour Organization Convention 100 concerning pay equity legislation, which possibly affected university graduates more than workers with elementary or secondary schooling. As discussed already, there is some evidence<sup>10</sup> which supports the idea that unionization is a positive factor helping to close the wage gap between men and women and trying to apply the principle of equal pay for work of equal value. During this period, more workers came under the unions' coverage, and more university graduates were working in occupations with strong unionization. However, one should not expect too much from pay-equity legislation in reducing inequality, because when we look at the data, "only 3.7 percent (45 out of 1231) of the contracts running from 1986 to 1988 and filed with Labour Canada's Bureau of Labour Information included pay-equity clauses (that is, either equal pay for equal

<sup>10</sup>See, among many others Grant, E. and J. Vanderkamp (1980), Macdonald, G. and J. Evans (1981), Kumar, P. and T. Stengoes(1985) and Simpson, W.(1985)

work or equal pay for work of equal value). These contracts covered all industries in Canada having 500 or more employees, plus those under federal jurisdiction covering 200 to 499 employees.”<sup>11</sup>

The large discrepancy between the male and female income distributions shows a downward trend. It is declining at a lower rate for elementary and secondary recipients. Again, one possible explanation for a downward trend of the income differential ratio for university graduates might be the better educational opportunities for women attaining this level of education; this group of highly educated women may be entering into more technical and advanced careers. The university education system, by itself, can be a factor for increasing overall inequality, especially when the users of higher education are mainly from the higher income groups to begin with. The Macdonald Commission Report has paid attention to inequality in the Canadian system and concluded that “the principal net gainers from the university system are the middle and upper income groups at the expense of the lower income groups. In this sense the university system is a large public expenditure programme in which the relatively poor groups tend to subsidize the relatively rich”.<sup>12</sup>

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<sup>11</sup>Marcotte, M.(1987), p. 34.

<sup>12</sup>Cited in West, E. (1990), p.109.

### 5.2.3 Results by Occupations and Industries

As mentioned in Chapter 4, the study of goods and services sectors has been motivated by widespread concern over the continuous growth of service sectors and the employment shift from goods-producing sectors to service-producing sectors. To analyze the impact of this shift on income distribution and income inequality, employment income is most appropriate because the employment shift from goods to services is more or less related to the impact of technological change on the labour market and such change has an important effect on workers' income. It seems that the employment income of individuals is probably the best type of income to use for this analysis. Furthermore, since employment income is the greatest single source of income, a change in the distribution of employment income is likely to have a large impact on overall income inequality.

To address the issues of income inequality among goods and service producing occupations as well as industries, several inequality measures have been employed. The results found by examining the various indicators were more or less the same, so only the Gini ratios for different employment income receivers are reported.

Table 5.10 shows that, income inequality in the service-producing industries is greater than inequality in the goods-producing sector and employment income is distributed more equally than total income. Full-time workers had

Table 5.10: Gini Ratios for Different Income Recipient Groups  
in Goods and Service Producing Sectors

	Goods Producing			Service Producing		
	1971	1981	1986	1971	1981	1986
All Workers	0.323	0.354	0.388	0.391	0.407	0.412
Full-time Workers	0.300	0.332	0.365	0.333	0.354	0.358
Part-time Workers	0.506	0.526	0.536	0.577	0.562	0.482
Male Workers	0.287	0.309	0.349	0.305	0.325	0.336
Males Full-time	0.273	0.296	0.332	0.292	0.311	0.322
Males Part-time	0.482	0.503	0.523	0.505	0.559	0.486
Female workers	0.355	0.366	0.396	0.44	0.448	0.450
Females Full-time	0.330	0.331	0.361	0.331	0.379	0.373
Females Part-time	0.583	0.476	0.477	0.721	0.573	0.565

a more equal distribution of income than all workers. This probably indicates that increases in part-time work was one of the potential reasons for increasing inequality.

Since service sectors always had greater income inequality than goods sectors and employment shifted from goods to services industries, we should expect an increase in overall income inequality over time. In almost all cases we have studied, the Gini ratio, as well as other inequality measures, shows that overall inequality is greater than inequality in the goods producing sector. This is true for total income, employment income, and for all workers as well as full-time workers.

In terms of sex, again, we can see in Table 5.10 that males have a more equal distribution of income than the females in both the goods and service sectors. Male full-time workers in the goods-producing industries have the most equal distribution of income, and female part-time workers in the service producing industries have the most unequal distribution of income. In 1986, women represented 43.3% of workers in all occupations but they were concentrated mainly in lower-paying clerical (78.9%), sales (45.4%), and service (54.9%) jobs, although the broad occupational groupings also mask considerable occupational segregation within each group. As Gunderson et al. (1990) pointed out "women tend to dominate in the lower-paying positions. For example, in the managerial and administrative categories, females tend to occupy the administrative, not executive positions; in teaching they occupy the lower-paying elementary school positions, not the higher-paying principal jobs; and in medicine and health they tend to be nurses, not doctors."<sup>13</sup>

However, the male/female differential in both goods and service industries declined over time (Table 5.11) and, as expected, the differentials in the goods-producing industries are larger probably because most of the jobs in this sector are male-dominated, particularly in the upper employment group. One possible reason for the declining trend of the male-female income ratio is that in spite of the existence of occupational segregation, women were moving into non-traditional occupations, because they were receiving a bet-

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<sup>13</sup>Gunderson, M. et al. (1990), p. 93.

Table 5.11: Goods-Services Employment Income Differential Ratio (D)  
and Gini Ratios by Sex and Industries  
Full-time Workers Only

	Goods Industries			Service Industries		
	Gini Ratio		D	Gini Ratio		D
	Male	Female		Male	Female	
1971	0.273	0.330	0.840	0.292	0.331	0.769
1981	0.296	0.331	0.787	0.311	0.379	0.666
1986	0.333	0.361	0.716	0.322	0.373	0.589

ter and more specialized education than in the past, and this is helping to narrow the gender-earnings gap.

The reason for the more equal distribution of income in goods-producing sectors might be the existence of stronger unionization in the goods sector, especially among full-time workers. Another reason, as indicated earlier, part-time workers and women are more concentrated in the service sector. Employment income shows a consistent increase in inequality in both sectors. However, the rates of increase in goods-producing sectors are larger than in service-producing sectors.

To see what has happened to the middle class, Table 5.12 shows some results for goods and service producing occupations and industries, in particular the important issue of income polarization.

Table 5.12: Distribution of Employment Income Shares for Goods and Service Producing Sectors by Income Class

	Goods Producing			Services Producing		
	1971	1981	1986	1971	1981	1986
<b>Industries</b>						
<b>All Workers</b>						
Lower Income Class	5.2	4.4	3.7	3.3	3.2	3.1
Middle Income Class	57.2	56.1	54.2	54.4	53.3	53.4
Upper Income Class	37.6	39.5	42.1	42.3	43.5	43.5
<b>Full-time Workers</b>						
Lower Income Class	6.4	5.3	4.5	6.0	5.1	4.6
Middle Income Class	57.1	56.4	54.7	54.6	54.4	55.2
Upper Income Class	36.5	38.3	40.8	39.4	40.5	40.2
<b>Occupations</b>						
<b>All Workers</b>						
Lower Income Class	5.5	4.6	3.9	3.0	3.2	3.1
Middle Income Class	59.2	58.3	56.8	52.7	52.4	52.7
Upper Income Class	35.3	37.1	39.3	44.2	44.4	44.2
<b>Full-time Workers</b>						
Lower Income Class	6.8	5.5	4.6	5.7	4.9	4.6
Middle Income Class	59.0	58.7	57.6	53.0	53.9	54.7
Upper Income Class	34.2	35.8	37.8	41.3	41.2	40.7

Note: Lower Income Class are the poorest 20% of the population,  
Middle Income Class are the next 60% of the population,  
Upper Income Class are the richest 20% of the population.

The observations point to the fact that between 1971 and 1986, shifts did indeed take place in the distribution of employment income in both goods and service-producing occupations. As can be seen, middle class income in the goods-producing sector declined in the whole period and income polarization has taken place because during the entire period, the decline in the income generated by the middle and lower classes shifted to the upper income groups in both occupations and industries. In the service sector, the results are not conclusive; there are some changes in the distribution of income, but the changes are very small. However, the service producing industries present a slight shift from the poorest to the richest group.

#### **5.2.4 Results by Age Structure**

Income varies dramatically with age. An increase in the size of the labour force is associated with changes in the population age structure. The change in age category comes from fluctuations in the birth rate and increasing life expectancy. The most pronounced increase in births since 1946 was from the baby-boom generation.

The baby-boom generation is defined as a large generation preceded and followed by smaller generations.<sup>14</sup> This process happened in the United States and Canada during 1946-1965, the baby-boom generation encom-

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<sup>14</sup>Russel, L.(1982), p. 173.

passes the people born during this period. For the United States, some studies indicate the entrance of the large number of baby-boomers into the labour market increased income inequality. Lawrence<sup>15</sup>, among others, claims that the baby-boom effect led to increasing inequality due to the inflow of young workers with relatively low incomes. Canada is a country that experienced a baby-boom like the one in the United States, with the same pattern of births, and the same factors underlying that pattern.<sup>16</sup>

One of the factors related to increasing inequality and the decline of the middle class might be the effect of the large influx of labour into the market as the baby-boomers reached working age. The large influx of young workers with little labour-market experience reduced the wages of workers in the early stages of their careers and widened skill differentials and wages and led to increasing inequality. Young cohorts may also experience higher amounts of unemployment, thus further widening annual age-earnings differentials in the economy.

Butz and Ward (1979) posit that fertility is increased with increases in husbands' income and fertility is reduced with increases in wife's income. Increased husband's income increases the couple's ability to afford children which they called the "income effect", while increased wife's income increases the opportunity cost of raising a child, called the "substitution effect". The

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<sup>15</sup>Lawrence, R.(1984), p. 7

<sup>16</sup>See Russel, L.(1982), p. 173-176

baby-boom may have resulted from post-war affluence with increased husband's income and low female labour force participation rates, whose effect was to create little opportunity cost to childbearing. The baby bust resulted from increased female labour force participation, increasing the cost of childbearing, and decreased real wages associated with the baby-boomers' labour-market entrance.

We did an analysis by age for two different age groups, prime-age (aged 25-45) and those aged 46 to 65. We applied different inequality measures for total income and employment income. Table 5.15 shows the Gini ratios.

**Table 5.13: Gini Ratios for Individuals' Total Income and Employment Income for Different Age Groups**

	Gini Ratios		
	1971	1981	1986
<b>Total Income</b>			
All Workers	0.391	0.400	0.407
<b>Age Groups</b>			
25-45	0.378	0.393	0.397
46-65	0.418	0.413	0.427
<b>Employment Income</b>			
All Workers	0.367	0.390	0.403
<b>Age Groups</b>			
25-45	0.355	0.383	0.397
46-65	0.389	0.401	0.420

The results are similar to the finding of Leckie (1988) who did a similar

study based on SCF data for the years 1971 and 1984. He used the prime age (25-to-44 years old) to identify the “baby-boomer” workers. As can be seen in Table 5.15, inequality as measured by the Gini coefficient increased for the two age groups during the period. Furthermore inequality was higher for the age group 46-65 than the age group 25-45, although the age groups 25-45 presents a larger increase in the total and employment income in Canada than the age groups 45-65. However, to accept or reject the effects of baby boomers on income inequality, some stronger tests are needed, because the change in inequality is the outcome of several socioeconomic, technological, institutional and demographic processes.

## Chapter 6

# Conclusions and Policy

# Implications

The purpose of this thesis was to outline the theoretical foundations of income distribution and inequality analysis, and to present some empirical observations about the evolution of income inequality in the Canadian economy. Chapter One raised the point that the subject is complicated by a great variety of conceptual, definitional and technical problems. For example, when the definition of income is based on money income, which obviously is not a comprehensive definition, there is no reason to assume that the omissions at the upper end of the income scale (such as capital gains and executive perks) balance omissions at the lower end of the income scale (such as medical services received by the elderly). The results probably give an underestimate

of inequality, and this should be taken into consideration in interpreting the results.

In the theoretical part of the thesis (Chapters 2 and 3), it was indicated that the process of income distribution and income inequality cannot be explained by any single theory. Each theory, at most, can explain only part of the problem. As Sahota (1978) pointed out, it would be futile to expect a general theory and agreement on such a complicated topic which has been the source of ideological wars and political revolutions,<sup>1</sup> or as Sen (1973) confessed " . . . it is an exceedingly complex notion which makes statement on inequality highly problematic and it has been, therefore, the subject of much research by philosophers, statisticians, political theorists, sociologists and economists."<sup>2</sup>

In Chapter 3, it was argued that, for a variety of reasons, it is preferable to use a well fitted model to describe the observed income distribution in order to analyze the extent and sources of inequality. Such a model was proposed as a tool to describe the observed income distribution of Canada. The robustness of the selected model was supported by several goodness of fit indicators, including the comparative analysis of different measures of income inequality in parametric and non-parametric forms.

The main objective of the empirical part of the thesis (Chapters 4 and

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<sup>1</sup>Sahota, G.(1978) p. 1.

<sup>2</sup>Sen, A.(1973), p. vii.

5) was to investigate the changes occurring in income inequality, income polarization, and the income share of the middle class by considering sex, education, occupation and industries in Canada during the period 1971-1986. The second objective was to examine the factors behind the change. The results showed that, during the period under consideration, there has been increasing overall inequality in total income as well as employment income, and this coincided with a decline in the income share of the middle class. At the same time, the growth in female labour market participation and part-time work, and the employment shift from goods-producing to service-producing activities, led to the emergence of a related dichotomy in the labour force: workers with well-paid, relatively stable jobs and with extensive legal protection versus workers concentrated in usually less well-compensated and nearly always less protected jobs. Part-time workers are predominantly female, non-unionized and concentrated in the trade and service industries.

The employment shift from goods sectors to services sectors and from blue-collar to white-collar jobs was another potential reason for the increase in income inequality and income polarization. The shift has displaced skilled workers from jobs without reemployment opportunities at equivalent wage levels. Concurrent slowdowns in productivity growth and declines in union strength have further eroded wage growth. New job creation has expanded job opportunities at the high and low end of the earnings distribution. If these changes were destroying middle-class jobs and reducing the share of the poorest group, as most of the studies have found, then obviously there

is a need for government intervention. The young, the old, and women, especially part-time workers, are among those who need more supportive action in the form of anti-discrimination policies, more training and more retirement assistance.

In addition, the shift has important implications for economic growth. A successful economic strategy must recognize the contribution of services to overall economic growth. It was mentioned that service industries are important sources of employment and output. The Economic Council of Canada, in a statement about employment in the service economy, pointed out that "the efficiency and the quality of the service industries themselves must become a key focus on economic development policy. Policies that identify and foster linkages between goods and service producers, and that improve the quality and effectiveness of those linkages, should be encouraged."<sup>3</sup>

Throughout this study, we have identified that the income earned by women tends to be considerably less than that of men and the income differential ratio has decreased slightly, but women on average still earn 40 percent less than men . Many women are in part-time and low-paying service jobs. Women also have tended to enter fields of study that typically led to lower-paying careers. However, differences in labour-market activity explain only part of income differential between men and women. Most studies in this area attribute an important part of the wage gap to discrimination. By

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<sup>3</sup>Economic Council of Canada (1990), p. 28.

reducing discrimination against females, as well as against new immigrants and ethnic groups, clearly overall inequality will decline.

Concerning part-time work, the heightened awareness of its importance has been reflected in the conclusions and recommendations of several studies, reports and Royal Commissions. But it seems that in spite of several recommendations, still there is no comprehensive policy on part-time work in Canada, and few public policies protect or promote equal treatment of part-time employees.

Following White (1983), the following recommendations are the minimum requirement to improve the situation of part-time workers in Canada to reduce overall inequality. Part-time workers should benefit from the same rights accorded to full-time workers, under the law and collective agreements. Pay for part-time workers should be prorated as pay for full-time workers in equivalent jobs. Part-time workers should have priority to transfer to full-time jobs within the work place. Such transfers should be voluntary, and a worker's refusal of such transfer should not be a reason for dismissal. Overtime for part-time workers should not reach the usual full-time hours.

Finally, in addition to reform in formal education, governments should expand their training programs, particularly for the new skills that come with new technology, and in areas that would benefit low wage workers. Training should be considered an important mechanism to increase workers' income, achieve fairness and equity in the labour market and efficiency and growth

for the entire economy. The Economic Council of Canada, in one of its recent studies on the new face of poverty, concluded that if many Canadians who are willing and able to work on a full-time basis are unable to find a suitable job, this is the result of "shortcomings in the primary and secondary school systems, which have not satisfactorily prepared their students for employment in today's workplace."<sup>4</sup> Although this statement is debatable from different points of view, official statistics mention that close to one fifth of the adult population is functionally illiterate, and the secondary-school drop out rate is nearly 30 percent. Furthermore, as discussed in Chapters 4 and 5, other indicators such as the employment shift to services, female participation rate and proportion of part-time in the labour force are all increasing. So it seems that the process of increasing inequality will continue at least in the near future.

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<sup>4</sup>Economic Council of Canada, (1992), p. 53.

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# Appendix A

## Comparison Among Models

Table A.1: Analysis of Variance of Residual Sums of Squares and % Differences Between Observed and Estimated Mean and Median of Employment Income

Year & Model	SSE		% of dif. bet.		K-S in %
	Cumu.	Dens.	Obs. & Esti. Mean	Med.	
<b>1971</b>					
Singh-Maddala	0.00617	0.00356	-0.3	3.2	4.02
Lognormal	0.15230	0.00990	-47.2	-10.7	12.4
Gamma	0.03787	0.00485	-12.3		7.68
Dagum (3p)	0.00177	0.00105	-0.2	0.9	2.08
Dagum (4p)	0.00061	0.00048	0.04	0.3	0.88
<b>1981</b>					
Singh-Maddala	0.00713	0.00142	59.8	0.1	3.21
Lognormal	0.10923	0.00444	-41.9	-4.9	9.82
Gamma	0.01713	0.00196	-6.9		4.23
Dagum (3p)	0.00054	0.00046	-0.5	-1.5	0.81
Dagum (4p)	0.00027	0.00049	-0.7	-1.7	0.62
<b>1986</b>					
Singh-Maddala	0.00858	0.00138	71.4	2.4	2.67
Lognormal	0.17338	0.00421	-43.9	-9.4	10.18
Gamma	0.02093	0.00187	-9.2		4.39
Dagum (3p)	0.00023	0.00048	-0.5	-0.6	0.69
Dagum (4p)	0.00028	0.00048	-0.5	-0.6	0.69

Sample Sizes:

1971: 48511

1981: 74429

1986: 79156

Table A.2: Analysis of Variance of Residual Sums of Squares and % Differences Between Observed and Estimated Mean and Median of Total Income

Year & Model	SSE		% of dif. bet.		K-S in %
	Cumu.	Dens.	Obs. Mean	Esti. Med.	
<b>1971</b>					
Singh-Maddala	0.00738	0.00399	1.9	3.9	4.48
Lognormal	0.15858	0.00955	-44.8	-10.7	12.3
Gamma	0.03788	0.00494	-9.5		7.66
Dagum (3p)	0.00268	0.00153	1.4	1.9	2.72
Dagum (4p)	0.00093	0.00045	1.4	1.1	0.88
<b>1981</b>					
Singh-Maddala	0.00474	0.00109	62.2	1.3	2.47
Lognormal	0.07423	0.00319	-31.8	-4.4	7.34
Gamma	0.00823	0.00155	-1.3		3.10
Dagum (3p)	0.00093	0.00048	0.2	-0.1	1.33
Dagum (4p)	0.00031	0.00029	-0.2	-0.2	0.50
<b>1986</b>					
Singh-Maddala	0.00320	0.00082	72.9	-0.1	1.97
Lognormal	0.11515	0.00255	-32.0	-8.3	8.6
Gamma	0.01252	0.00116	-2.3		3.58
Dagum (3p)	0.00049	0.00039	-0.1	-1.4	1.06
Dagum (4p)	0.00034	0.00027	-0.2	-1.3	0.65

Sample Sizes:

1971: 52786

1981: 82187

1986: 87898

Table A.3: Analysis of Variance of Residual Sums of Squares and  
% Differences Between Observed and Estimated  
Mean and Median of Employment Income  
(Full-time Workers only)

Year & Model	SSE		% of dif. bet.		K-S in %
	Cumu.	Dens.	Obs. & Esti. Mean	Med.	
<b>1971</b>					
Singh-Maddala	0.00296	0.00145	-0.2	0.5	2.44
Lognormal	0.05142	0.00353	-29.8	-7.4	7.49
Gamma	0.01147	0.00197	-4.1		4.23
Dagum (3p)	0.00093	0.00054	-0.4	-0.6	1.39
Dagum (4p)	0.00043	0.00031	-0.2	-0.6	0.75
<b>1981</b>					
Singh-Maddala	0.00370	0.00099	0.3	0.3	2.45
Lognormal	0.06838	0.00258	-29.6	-4.6	7.88
Gamma	0.01193	0.00146	-3.6		4.38
Dagum (3p)	0.00085	0.00059	-0.7	-0.8	1.29
Dagum (4p)	0.00034	0.00062	-1.0	-0.8	0.78
<b>1986</b>					
Singh-Maddala	0.00541	0.00117	29.3	-1.1	2.40
Lognormal	0.15792	0.00282	-33.2	-10.1	10.4
Gamma	0.03617	0.00158	-6.1		5.70
Dagum (3p)	0.00067	0.00062	-0.4	-2.9	0.92
Dagum (4p)	0.00040	0.00048	-0.5	-2.8	0.92

Sample Sizes:  
1971: 42185  
1981: 63313  
1986: 66494

# **Appendix B**

## **Graphical Illustrations**

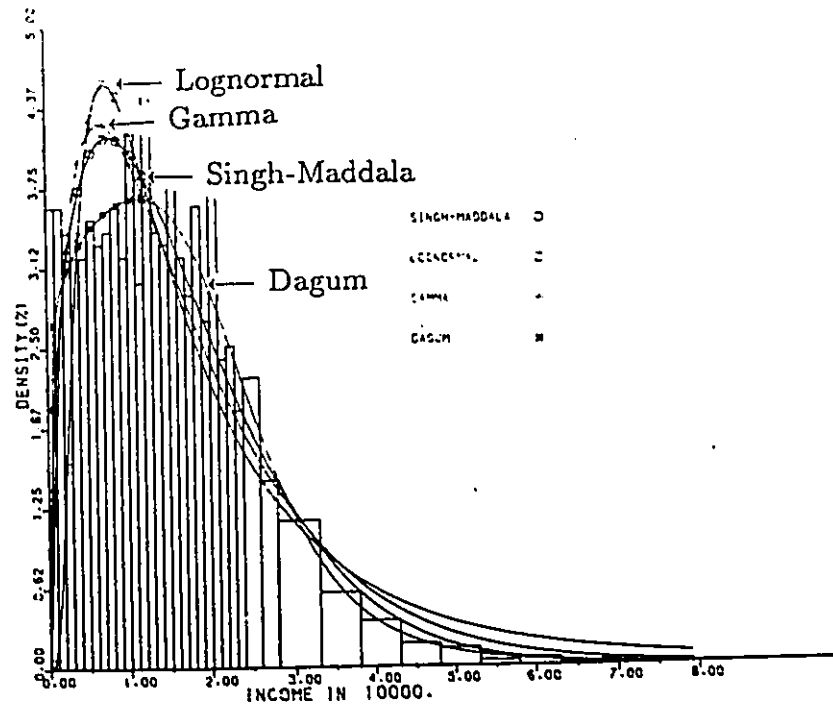


Figure B.1: Observed and Fitted Employment Income Distributions, 1981

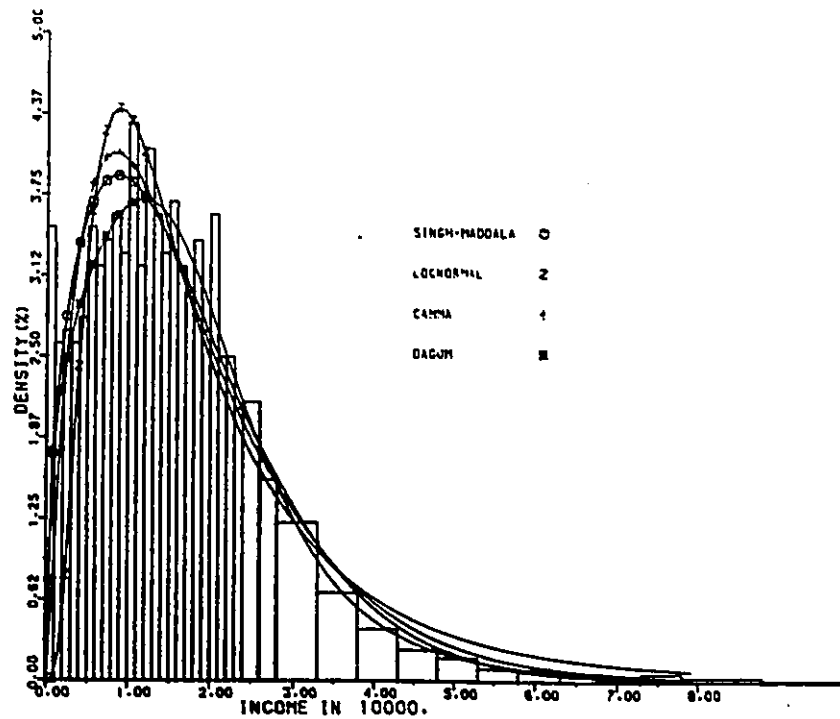


Figure B.2: Observed and Fitted Total Income Distributions, 1981

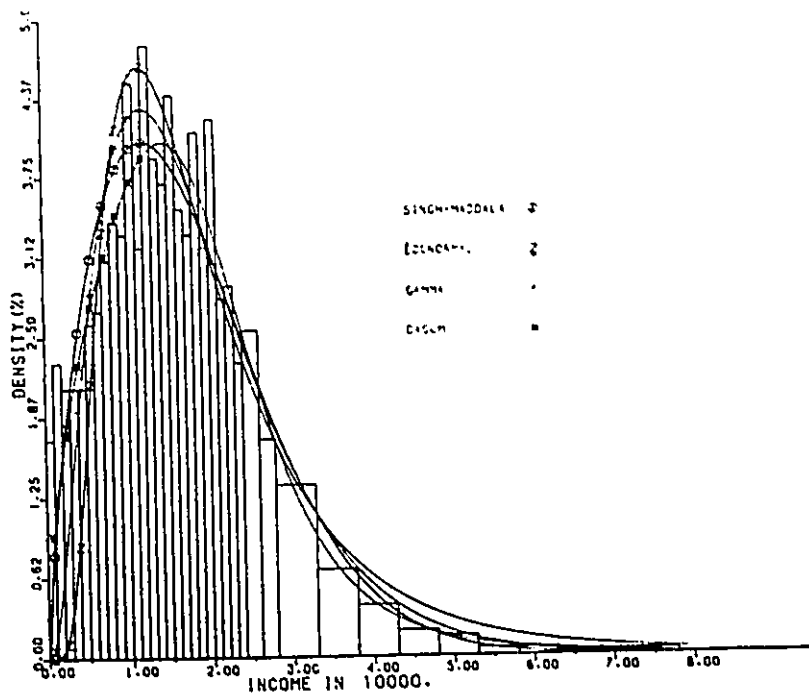


Figure B.3: Observed and Fitted Employment Income Distributions  
(Full-time Workers), 1981

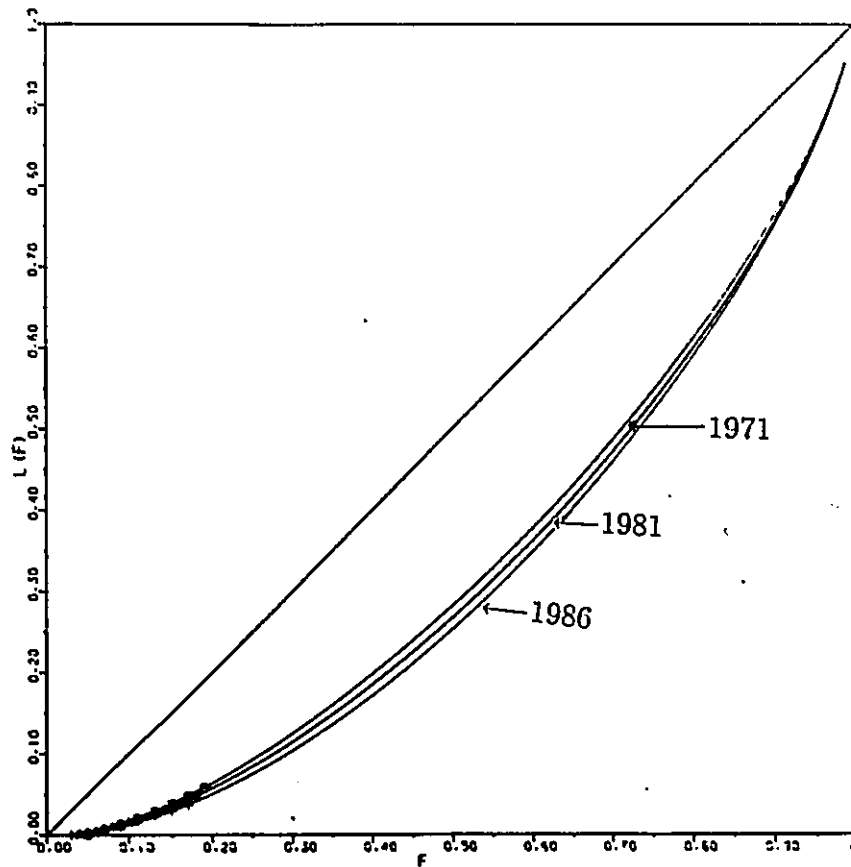


Figure B.4: Lorenz Curves of Employment Income: 1971, 1981, 1986

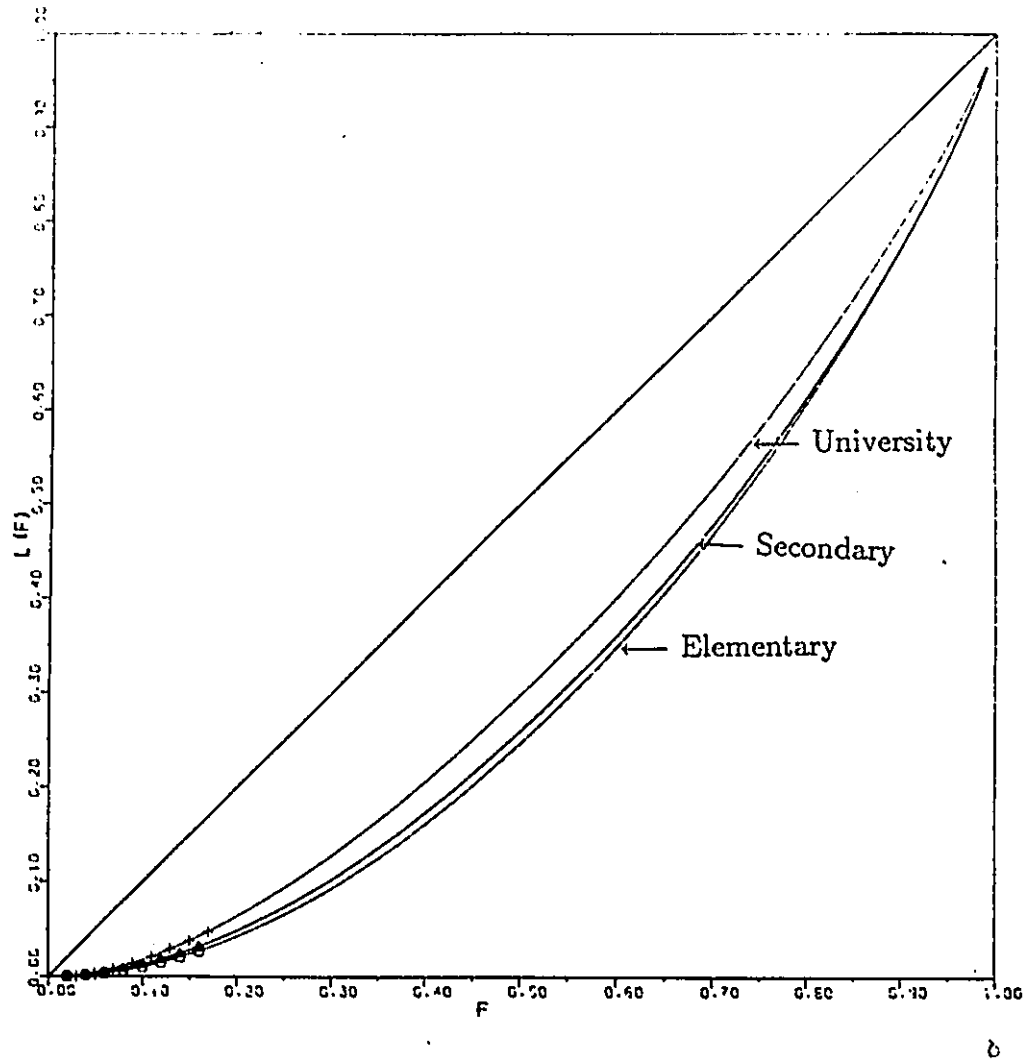


Figure B.5: Lorenz Curves of Employment Income, by Different Level of Education, 1986

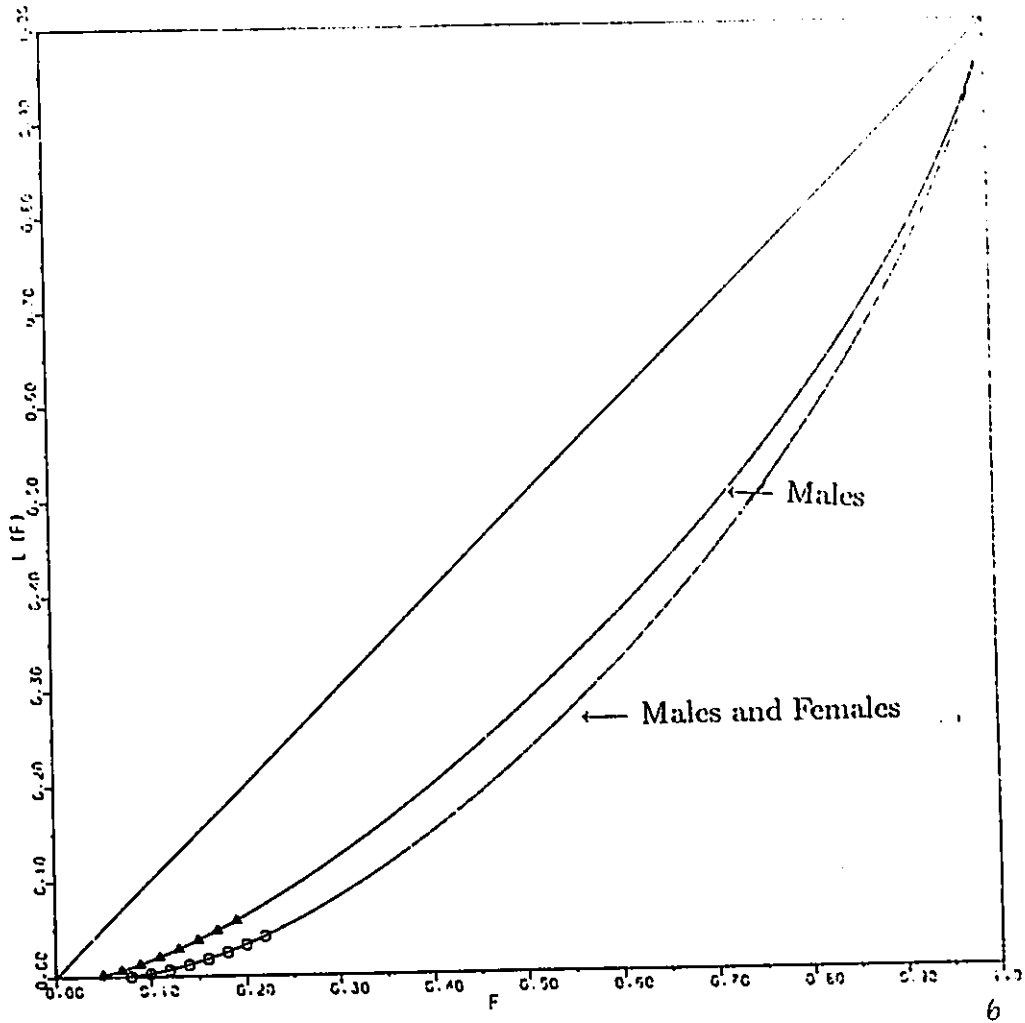


Figure B.6: Lorenz Curves of Employment Income for All Workers (Males and Females), and Males Only, 1986

Table B.1: Annual Percentage Changes in GDP at 1986 Prices

Year	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Annual Change	6.7	6.6	6.8	2.9	5.4	5.4	2.6	5.8	5.7	7.7
Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Annual Change	4.4	2.6	6.2	3.6	4.6	3.9	1.5	3.7	-3.2	3.2
Year	1984	1985	1986	1987	1988	1989	1990	1991		
Annual Change	6.3	4.8	3.3	4.2	5.0	2.3	-0.5	-1.7		

Source: Statistics Canada, *Historical Statistical Supplement 1991/1992*,  
 Catalogue # 11-210, p. 7.

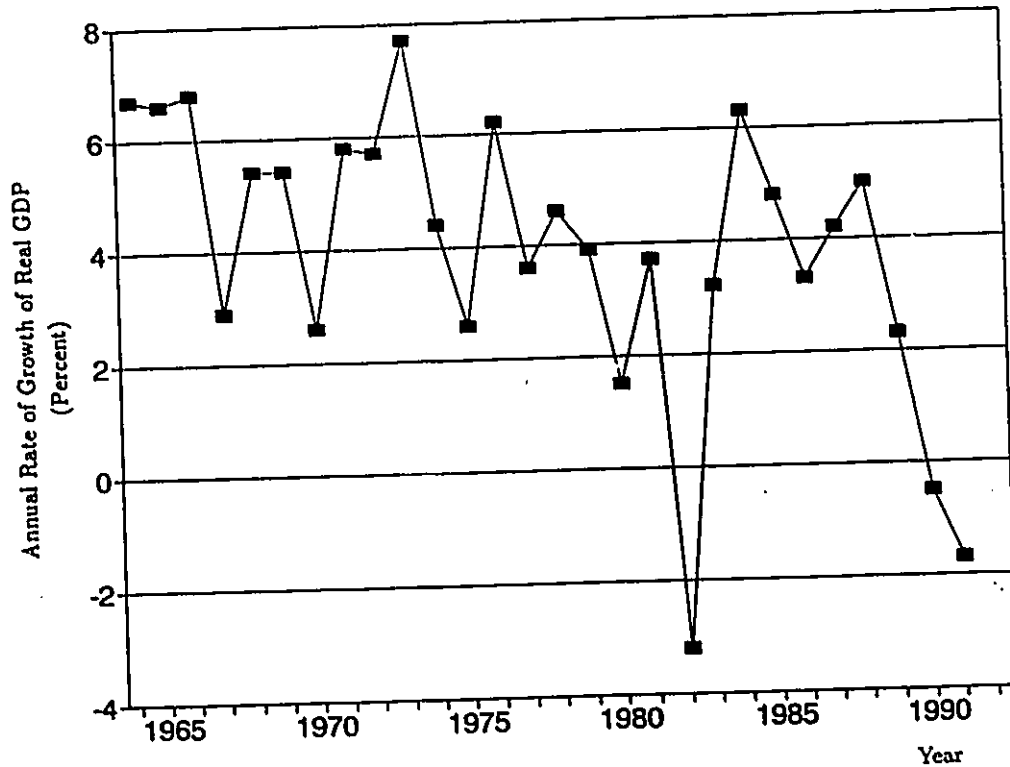


Figure B.7: Growth of Real GDP in Canada; 1965-1992

# Appendix C

## Indices of Inequality

Table C.1: Total Income Indices of Inequality

	All Workers		
	1971	1981	1986
Gini Ratio(Parametric)	0.391	0.400	0.407
Gini (Non-parametric)	0.394	0.396	0.404
Zenga Ratio	0.433	0.435	0.453
Mean Logarithmic Deviation	0.336	0.353	0.360
Theil Index	0.275	0.276	0.280
Coefficient of variation	0.778	0.818	0.823

Table C.2: Employment Income Indices of Inequality

	All Workers		
	1971	1981	1986
Gini Ratio (Parametric)	0.367	0.390	0.404
Gini Ratio (Non-parametric)	0.369	0.393	0.399
Zenga Ratio	0.390	0.423	0.441
Mean Logarithmic Deviation	0.332	0.373	0.401
Theil Index	0.248	0.267	0.285
Coefficient of Variation	0.702	0.755	0.781

Table C.3: Total Income Indices of Inequality

	Full-time Workers Only		
	1971	1981	1986
Gini Ratio (Parametric)	0.351	0.365	0.373
Gini Ratio (Non-parametric)	0.356	0.360	0.376
Zenga Ratio	0.363	0.383	0.396
Mean Logarithmic Deviation	0.248	0.275	0.292
Theil Index	0.227	0.229	0.236
Coefficient of Variation	0.718	0.748	0.756

Table C.4: Employment Income Indices of Inequality

	Full-time Workers Only		
	1971	1981	1986
Gini Ratio (Parametric)	0.320	0.348	0.362
Gini Ratio (Non-parametric)	0.323	0.348	0.360
Zenga Ratio	0.310	0.353	0.374
Mean Logarithmic Deviation	0.229	0.275	0.300
Theil Index	0.193	0.210	0.229
Coefficient of Variation	0.667	0.673	0.700

Table C.5: Male Employment Income Indices of Inequality

	Males		
	1971	1981	1986
Gini Ratio (Parametric )	0.298	0.323	0.347
Gini Ratio (Non-parametric)	0.287	0.333	0.367
Zenga Ratio	0.277	0.315	0.352
Mean Logarithmic Deviation	0.206	0.251	0.299
Theil Index	0.174	0.189	0.218
Coefficient of Variation	0.652	0.653	0.680

Table C.6: Female Employment Income Indices of Inequality

	Females		
	1971	1981	1986
Gini Ratio (Parametric)	0.412	0.436	0.443
Gini Ratio (Non-parametric)	0.405	0.409	0.411
Zenga Ratio	0.459	0.502	0.500
Mean Logarithmic Deviation	0.399	0.428	0.438
Theil Index	0.281	0.303	0.308
Coefficient of Variation	0.769	0.802	0.800

Table C.7: Indices of Employment Income Inequality  
by Different Levels of Education

	All Workers		
	1971	1981	1986
<b>Elementary Schooling</b>			
Gini Ratio (Parametric)	0.342	0.373	0.397
Gini Ratio (Non-parametric)	0.337	0.370	0.390
Zenga Ratio	0.345	0.388	0.423
Mean Logarithmic Deviation	0.293	0.351	0.388
Theil Index	0.214	0.245	0.269
Coefficient of Variation	0.679	0.713	0.746
<b>Secondary Schooling</b>			
Gini Ratio (parametric)	0.348	0.371	0.390
Gini Ratio (Non-parametric)	0.349	0.378	0.392
Zenga Ratio	0.359	0.394	0.418
Mean Logarithmic Deviation	0.318	0.363	0.380
Theil Index	0.224	0.254	0.267
Coefficient of Variation	0.702	0.732	0.747
<b>University Degree</b>			
Gini Ratio (Parametric)	0.338	0.318	0.332
Gini Ratio (Non-parametric)	0.333	0.323	0.336
Zenga Ratio	0.344	0.309	0.330
Mean Logarithmic Deviation	0.298	0.272	0.307
Theil Index	0.219	0.190	0.209
Coefficient of Variation	0.699	0.613	0.648

Table C.8: Indices of Employment Income Inequality  
by Different Levels of Education

	Full-time Workers		
	1971	1981	1986
<b>Elementary Schooling</b>			
Gini Ratio (Parametric)	0.299	0.331	0.356
Gini Ratio (Non-parametric)	0.295	0.330	0.357
Zenga Ratio	0.275	0.325	0.364
Mean Logarithmic Deviation	0.211	0.296	0.310
Theil Index	0.167	0.196	0.220
Coefficient of Variation	0.612	0.638	0.671
<b>Secondary Schooling</b>			
Gini Ratio (Parametric)	0.293	0.321	0.343
Gini Ratio (Non-parametric)	0.291	0.326	0.343
Zenga Ratio	0.267	0.311	0.344
Mean Logarithmic Deviation	0.201	0.252	0.285
Theil Index	0.163	0.189	0.208
Coefficient of Variation	0.615	0.635	0.658
<b>University Degree</b>			
Gini Ratio (Parametric)	0.313	0.283	0.290
Gini Ratio (Non-parametric)	0.312	0.288	0.296
Zenga Ratio	0.299	0.253	0.264
Mean Logarithmic Deviation	0.218	0.198	0.216
Theil Index	0.182	0.150	0.191
Coefficient of Variation	0.645	0.553	0.575

Table C.9: Indices of Employment Income Inequality by Sex and Education, Full-time Workers Only

	Males		
	1971	1981	1986
<b>Elementary Schooling</b>			
Gini (Parametric)	0.265	0.283	0.310
Gini (Non-parametric)	0.255	0.285	0.316
Zenga Ratio	0.234	0.254	0.295
Mean Logarithmic Deviation	0.199	0.245	0.294
Theil Index	0.153	0.174	0.201
Coefficient of variation	0.549	0.564	0.560
<b>Secondary Schooling</b>			
Gini Ratio (Parametric)	0.244	0.265	0.299
Gini Ratio (Non-parametric)	0.246	0.279	0.305
Zenga Ratio	0.195	0.226	0.278
Mean Logarithmic Deviation	0.159	0.212	0.264
Theil Index	0.133	0.157	0.188
Coefficient of Variation	0.545	0.551	0.589
<b>University Degree</b>			
Gini Ratio (Parametric)	0.302	0.267	0.278
Gini Ratio (Non-parametric)	0.302	0.267	0.282
Zenga Ratio	0.281	0.229	0.246
Mean Logarithmic Deviation	0.236	0.208	0.240
Theil Index	0.189	0.151	0.170
Coefficient of Variation	0.631	0.525	0.552

Table C.10: Indices of Employment Income Inequality by Sex and Education, Full-time Workers Only

	Females		
	1971	1981	1986
<b>Elementary Schooling</b>			
Gini Ratio (Parametric)	0.313	0.328	0.347
Gini Ratio (Non-parametric)	0.304	0.320	0.342
Zenga Ratio	0.305	0.325	0.353
Mean Logarithmic Deviation	0.351	0.373	0.399
Theil Index	0.259	0.259	0.279
Coefficient of Variation	0.643	0.622	0.667
<b>Secondary Schooling</b>			
Gini Ratio (Parametric)	0.289	0.311	0.333
Gini Ratio (Non-parametric)	0.281	0.308	0.333
Zenga Ratio	0.266	0.300	0.329
Mean Logarithmic Deviation	0.379	0.388	0.395
Theil Index	0.252	0.266	0.274
Coefficient of Variation	0.534	0.610	0.630
<b>University Degree</b>			
Gini Ratio (Parametric)	0.278	0.266	0.271
Gini Ratio (Non-parametric)	0.275	0.269	0.273
Zenga Ratio	0.251	0.232	0.229
Mean Logarithmic Deviation	0.383	0.327	0.210
Theil Index	0.232	0.205	0.335
Coefficient of Variation	0.511	0.491	0.495

Table C.11: Indices of Employment Income Inequality by Industry

	All Workers		
	1971	1981	1986
<b>Goods Producing</b>			
Gini (Parametric)	0.323	0.354	0.388
Gini (Non-parametric)	0.328	0.365	0.386
Zenga Ratio	0.318	0.363	0.417
Mean Logarithmic Deviation	0.257	0.317	0.366
Theil Index	0.200	0.233	0.269
Coefficient of variation	0.681	0.711	0.772
<b>Service Producing</b>			
Gini (Parametric)	0.391	0.407	0.412
Gini (Non-parametric)	0.390	0.407	0.405
Zenga Index	0.430	0.448	0.452
Mean Logarithmic Deviation	0.372	0.403	0.417
Theil Index	0.275	0.283	0.291
Coefficient of variation	0.810	0.775	0.786

Table C.12: Indices of Employment Income Inequality by Industry

	Full-time Workers		
	1971	1981	1986
<b>Goods Producing</b>			
Gini (Parametric)	0.300	0.332	0.365
Gini (Non-parametric)	0.305	0.342	0.361
Zenga Ratio	0.278	0.328	0.381
Mean Logarithmic Deviation	0.210	0.270	0.316
Theil Index	0.175	0.206	0.239
Coefficient of variation	0.645	0.671	0.727
<b>Service Producing</b>			
Gini (Par)	0.333	0.354	0.358
Gini (Npar)	0.334	0.351	0.358
Zenga Ratio	0.330	0.363	0.369
Mean Logarithmic Deviation	0.241	0.278	0.301
Theil	0.205	0.211	0.222
Coefficient of variation	0.611	0.672	0.686

Table C.13: Indices of Employment Income Inequality by Occupation

	All Workers		
	1971	1981	1986
<b>Goods Producing</b>			
Gini (Parametric)	0.300	0.330	0.362
Gini (Non-parametric)	0.299	0.338	0.366
Zenga Ratio	0.281	0.325	0.372
Mean Logarithmic Deviation	0.228	0.292	0.336
Theil Index	0.163	0.202	0.231
Coefficient of variation	0.569	0.633	0.677
<b>Service Producing</b>			
Gini (Parametric)	0.411	0.416	0.420
Gini (Non-parametric)	0.410	0.415	0.418
Zenga Ratio	0.464	0.464	0.463
Mean Logarithmic Deviation	0.396	0.415	0.425
Theil Index	0.299	0.293	0.299
Coefficient of variation	0.757	0.793	0.801

Table C.14: Indices of Employment Income Inequality by Occupation

	Full-time Workers		
	1971	1981	1986
<b>Goods Producing</b>			
Gini (Parametric)	0.276	0.307	0.338
Gini (Non-parametric)	0.271	0.307	0.340
Zenga Ratio	0.241	0.289	0.335
Mean Logarithmic Deviation	0.183	0.245	0.288
Theil Index	0.139	0.175	0.202
Coefficient of variation	0.530	0.591	0.632
<b>Service Producing</b>			
Gini (Parametric)	0.353	0.362	0.363
Gini (Non-parametric)	0.346	0.360	0.356
Zenga Ratio	0.365	0.376	0.377
Mean Logarithmic Deviation	0.259	0.285	0.304
Theil Index	0.225	0.218	0.227
Coefficient of variation	0.656	0.686	0.697

Table C.15: Indices of Employment Income Inequality by Sex and Industry, Full-time Workers Only

	Males		
	1971	1981	1986
<b>Goods Producing</b>			
Gini (Parametric)	0.273	0.296	0.333
Gini (Non-parametric)	0.275	0.311	0.334
Zenga Ratio	0.239	0.274	0.331
Mean Logarithmic Deviation	0.202	0.252	0.310
Theil Index	0.165	0.189	0.228
Coefficient of variation	0.603	0.614	0.674
<b>Service Producing</b>			
Gini (Parametric)	0.292	0.311	0.322
Gini (Non-parametric)	0.295	0.311	0.320
Zenga Ratio	0.265	0.294	0.311
Mean Logarithmic Deviation	0.208	0.246	0.287
Theil Index	0.179	0.186	0.209
Coefficient of variation	0.546	0.600	0.628

Table C.16: Indices of Employment Income Inequality by Sex and Industry, Full-time Workers Only

	Females		
	1971	1981	1986
<b>Goods Producing</b>			
Gini (Parametric)	0.330	0.331	0.361
Gini (Non-parametric)	0.290	0.326	0.351
Zenga Ratio	0.282	0.331	0.378
Mean Logarithmic Deviation	0.302	0.337	0.368
Theil Index	0.215	0.237	0.268
Coefficient of variation	0.574	0.630	0.690
<b>Service Producing</b>			
Gini (Parametric)	0.331	0.379	0.373
Gini (Non-parametric)	0.320	0.357	0.366
Zenga Ratio	0.330	0.411	0.393
Mean Logarithmic Deviation	0.422	0.449	0.452
Theil Index	0.297	0.317	0.312
Coefficient of variation	0.624	0.669	0.663