Applied Research Branch
Strategic Policy
Human Resources Development Canada

Direction générale de la recherche appliquée
Politique stratégique
Développement des ressources humaines Canada

An Index of Economic Well-Being for Canada
R-99-3E
by
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December 1998

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Publishing Date/Date de parution - Internet 1999

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Abstract

The objective of this paper is to develop an index of economic well-being for Canada for the period 1971 to 1997 using a framework originally laid out by Lars Osberg (1985). Although the economic well-being of a society depends on the level of average consumption flows, aggregate accumulation of productive stocks, inequality in the distribution of individual incomes and insecurity in the anticipation of future incomes, the weights attached to each component will vary, depending on the values of different observers. It is argued that public debate would be improved if there were explicit consideration of the aspects of economic well-being which are obscured by average income trends and if the weights attached to these aspects were explicitly open for discussion.

The four components of economic well-being are:

(1) effective per capita consumption flows, which includes consumption of marketed goods and services, and effective per capita flows of household production and other unmarketed goods and services;

(2) net societal accumulation of stocks of productive resources, including net accumulation of tangible capital and housing stocks and net accumulation of human capital and R&D investment; net changes in the value of natural resources stocks; environmental costs; and net change in level of foreign indebtedness;

(3) poverty and inequality, as indicated by the Gini index of inequality, and depth and incidence of poverty; and

(4) indicators of insecurity, particularly economic security from unemployment, ill health, single parent poverty and poverty in old age.

Estimates of the overall index and the sub-components are presented for 1971-1997 for Canada. The index is compared with other measures of economic welfare such as GDP per capita.

Résumé

Le présent document vise à élaborer un indice de mieux-être économique au Canada pour la période s'échelonnant de 1971 à 1997 à partir d'un cadre qui avait d'abord été mis de l'avant en 1985 par Lars Osberg. Bien que le mieux-être économique d'une société s'articule autour du niveau de flux moyen de consommation, de l'accumulation globale des stocks de production, des disparités dans la répartition des revenus des particuliers et des revenus précaires anticipés, la pondération accordée à chacune de ces composantes diffère selon les valeurs qu'y rattachent les différents intervenants. D'aucuns soutiennent qu'un examen explicite des éléments du mieux-être économique que masquent les tendances moyennes en matière de revenu et qu'une discussion franche de la pondération rattachée à ces éléments permettraient d'enrichir le débat à cet égard.

Voici les quatre composantes du mieux-être économique :

(1) le flux réel de consommation par habitant, qui comprend notamment la consommation de biens et de services mis en marché, ainsi que le flux réel par habitant de production domestique et d'autres biens et services non commercialisés;

(2) l'accumulation nette pour l'ensemble de la société des stocks de ressources de production, y compris l'accumulation nette du stock de logements et l'accumulation nette d'actifs humains et d'investissements de recherche-développement; les écarts nets de la valeur des stocks de ressources naturelles; les coûts reliés à l'environnement; l'écart net de la dette étrangère;

(3) la pauvreté et la disparité telles que définies à l'indice d'inégalité de Gini, ainsi que l'étendue et la fréquence de la pauvreté;

(4) les indicateurs d'insécurité, notamment l'insécurité économique en raison du chômage, du mauvais état de santé, de la pauvreté chez les familles monoparentales et de la pauvreté chez les personnes âgées.

Le présent document présente des estimations de l'indice global et les sous-composantes pour les années 1971 à 1997 au Canada. Cet indice est ensuite confronté à d'autres indicateurs du bien-être économique, tels que le PIB par habitant.

Acknowledgements

Earlier versions of this paper were presented at the annual meeting of the Canadian Economics Association, May 29-31, 1998, University of Ottawa, Ottawa, Ontario; the Centre for the Study of Living Standards (CSLS) Pre-conference on the State of Living Standards and Quality of Life in Canada project, June 1-2, 1998, Lord Elgin Hotel, Ottawa, Ontario; the 25th General Conference of the International Association for Research in Income and Wealth, Cambridge, England, August 23-29, 1998; and the CSLS Conference on the State of Living Standards and Quality of Life in Canada, October 30-31, 1998, Ottawa, Ontario.

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Executive Summary

The objective of this paper is to develop an index of economic well-being for Canada for the period 1971 to 1997 using a framework originally laid out by Osberg (1985). It is argued that the economic well-being of a society depends on the level of average consumption flows, aggregate accumulation of productive stocks, inequality in the distribution of individual incomes and insecurity in the anticipation of future incomes. The weights attached to each of these components of economic well-being will vary, depending on the values of different observers. It is argued that public debate would be improved if there is explicit consideration of the aspects of economic well-being obscured by average income trends and if the weights attached to these aspects were explicitly open for discussion.

The four components or dimensions of economic well-being in the proposed index of economic well-being are:

- effective per capita consumption flows;

- net societal accumulation of stocks of productive resources;

- poverty and inequality; and

- economic security from job loss and unemployment, illness, family breakup, poverty in old age.

Consumption flows encompasses marketed personal consumption flows, adjusted for the underground economy, the value of increased longevity, changes in family size which affect the economies of scale in household consumption, and regrettable or intermediate consumption goods (cost of commuting, household pollution abatement, auto accidents, and crime); government services; and the value of unpaid work.

Stocks of wealth include the net capital physical stock, including housing stocks; the stock of research and development; value of natural resources stocks; the stock of human capital; the level of foreign indebtedness; and the net changes in the value of the environment due to CO_2 emissions.

The inequality component of the index consists of income inequality, defined as the Gini coefficient for after-tax household income and the intensity of poverty (incidence and depth),

defined as the product of the poverty rate and the poverty gap, that is the difference between the average income of those in poverty and poverty line divided by the poverty line. The poverty line is defined as one half median adjusted household income.

The insecurity component of the index is based on the change over time in the economic risks associated with unemployment, illness, "widowhood" (or single female parenthood) and old age. The risk of unemployment is determined by the employment / population ratio, the employment insurance coverage of the unemployed, and the benefits ratio. The risk of illness is modeled as the percentage of disposable income devoted to health costs. The risk of single parent poverty is determined by the divorce rate and poverty intensity of single parent families. The risk of poverty in old age is a function of the poverty intensity of the elderly population.

Trends in the index are determined by the choice of variables that are included in the index, the trends in those variables and the weights given these variables. Since the four main dimensions of economic well-being are separately identified, it is easy to conduct sensitivity analyses of the impact on perceived overall trends of different weighting of these dimensions. For discussion purposes, consumption flows have been given a weight of 0.4, wealth stocks a weight of 0.1, and inequality and economic insecurity have each been given weights of 0.25.

The sub-components of the consumption flows and wealth stocks are expressed in constant dollars on a per capita basis. There consequently is no need for explicit weighting as these dollar values represent implicit weights. In terms of the inequality/poverty sub-components, a Rawlsian perspective assigns greater importance to poverty than to overall inequality trends, and a weight of 0.1875 has therefore been given to poverty intensity and 0.0625 to the Gini coefficient. In other words, poverty is given three times the weight of inequality. The sub-components of the economic security index are weighted by the relative importance of the specific population at risk in the total population.

The overall index of economic well-being for Canada showed no overall trend in the 1970s, rose in the 1980s to a peak of 1.1644 in 1989 (1971=1.00), and has fallen continually in the 1990s, reaching 1.0625 in 1997.

Some of the year-to-year movement in the index reflects the sensitivity to the business cycle by certain components of the index. For example, consumption flows depend on personal income,

which is determined largely by demand-driven employment levels. Wealth stocks include the capital stock which is determined by cyclically-sensitive investment, and the value of natural resources, which reflects cyclical commodity prices. The two inequality measures (poverty intensity and Gini coefficients) are influenced by the state of the economy. Finally, a number of the components of the economic security index are also very sensitive to the business cycle, such as the employment/population ratio.

Trends in the index are, not surprisingly, very sensitive to the weighting given the four components. When consumption flows are given a weight of 0.7 and the other three components' weights of 0.1, a different pattern emerges during certain periods. While the two indexes tracked each other in the early years of the 1970s, they diverged in mid-decade, with the index with the higher consumption weight stable and the index with the lower weight declining. From the late 1970s to the late 1980s, the indexes again tracked one another. Then in the 1990s, they diverged again, with the high-consumption-weighted index falling slightly and the high-equality and security-weighted index falling much more.

Over the 26-year period from 1971 to 1997 covered by the time series, the economic security component experienced the largest change of any of the four components of the index, down 49.8 per cent. This change reflected the large increase in the risk of illness and of single-parenthood. There were improvements in all the other components of well-being, with consumption up 36.7 per cent, wealth stocks up 34.3 per cent and equality up 4.3 per cent.

The absolute decline in the index in the 1990s reflects fall in the indexes for consumption, equality, and security. The latter index fell 44.9 per cent due to large increases in the risks associated with unemployment and illness.

The index of economic well-being tracked real GDP per capita in the first half of the 1970s, and then fell behind, with the gap growing greatly over time. By 1989, the GDP per capita index had reached 158.8, compared to 116.8 for the index of economic well-being, indicating growth of this conventional measure of economic welfare had been more than three times as fast as the index of economic well-being over the 1971-89 period (2.8 per cent per year versus 0.9 per cent). In the 1990s, GDP per capita fell, but by 1995 had regained its 1989 pre-recession level. The index of economic well-being has also fallen in the 1990s, but in contrast to GDP per capita has

not rebounded and in 1997 was 8.6 per cent below the 1989 peak. Over all the 1971-97 period, real per capita GDP was up 58.3 per cent, nearly 10 times the rate of advance of the index of economic well-being (6.7 per cent).

The divergence between growth in GDP per capita and the economic well-being index since 1971 is partly explained by slower growth in per capita consumption and stocks of wealth, but more importantly by the failure of economic equality to increase and the large fall in economic security.

The paper also compares the trend in the index of economic well-being with that of the Genuine Progress Indicator (GPI), the Measure of Economic Welfare (MEW), and the Index of Social Health (ISH). Between 1971 and 1995 (the most recent year for which data are available) the GPI increased 11.7 per cent, the sustainable MEW 23.1 per cent, and the ISH 14.3 per cent. Thus the 8.7 per cent increase in the index of economic well-being between 1971 and 1995 represented a smaller increase than that experienced by three other alternative indicators.

1.   Introduction

Has the economic well-being of Canadians increased or decreased in recent years? How would one know and why might it be useful to know?

In modern democracies, national systems of social and economic statistics have become a crucial part of the informational feedback loop of public policy. By providing measures of social and economic outcomes, statistical agencies provide decision-makers and voters with the information that often defines the success or failure of public policies. Evidence on such successes or failures can be used to reallocate resources, or to replace governments, hence the calculation of measures of economic well-being is an important issue.

However, the core problem of statistical agencies is that of deciding what information to record and how to present it. Knowing that all statistics summarize a complex reality, and that there are wide variations among the public in which aspects of social reality are considered to be of greatest importance, statistical agencies still have to decide what to count, and what not to count, as part of a measure of economic well being.

For many years, the System of National Accounts (SNA) has been the accounting framework within which most discussions of trends in economic well- being have been conducted, and Gross Domestic Product (GDP) per capita has been an often used summary measure of economic trends.[1] The compilers of the national accounts have often protested that their attempt to measure the aggregate value of marketed economic output was never intended as a full measure of economic well-being. Nevertheless, it has often been used as such, and the GDP accounting exercise has attracted a great deal of criticism as being a misleading indicator of economic well-being (e.g. Waring, 1988). Dissatisfaction with the GDP as a measure has led to a number of proposals for substitute measures (e.g. the Genuine Progress Indicator).

However, summarizing the economic well-being of a complex society inevitably requires a series of ethical and statistical judgements. There are many different dimensions to well-being, which are valued to different degrees by different observers. The problem with any single index

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[1] Keunig (forthcoming) reviews the contributions of Dawson (1996) and Kendrick (1996) and the most recent (U.N. 1993) revisions to the SNA

number is that it is often difficult to disentangle the relative importance of value judgements in the construction of the index. Furthermore, in thinking about the appropriate public policy response, it is not particularly useful to know only that well-being has gone "up" or "down," without also knowing which aspect of well-being has improved or deteriorated.

The construction of measures of economic well-being can be seen as a problem in the optimal aggregation of information. If the objective is to improve the quality of public decision making and political debate, excess aggregation is not helpful, because it does not enable value judgements and statistical judgements to be separated. Furthermore, excess aggregation offers no guide to policy priorities.

Osberg (1985) therefore proposed that an index of economic well-being should be based on indices of consumption, accumulation, inequality and insecurity, with the explicit recognition that the weights attached to each component will vary, depending on the values of different observers.[2] The underlying hypothesis is that public debate is likely to be improved if issues of fact, analysis and values are as clearly separated as possible. Measurement of the current level, or trend, of economic well-being can be seen as the first stage of a three stage discussion in which a society asks: (1) Where are we? (2) Do we want to go somewhere else? (3) How do we get there? Issues of measurement, of values and of analysis may be conceptually distinct, but in a single index of economic well-being, they often become hopelessly entangled. If the democratic debate on economic policy is to be fruitful, it would seem desirable to separate issues of measurement from the debate on values.

If the discussion is organized in this way, those people who fundamentally care most about a particular aspect of well being can discuss the facts about that aspect of well being and the most desirable way of improving it, without confusing the discussion with other issues. (For example, those who are concerned most with the bequest that this generation will leave for the future can discuss whether the best way to safeguard sustainability is to emphasize environmental regulation, or capital accumulation, without simultaneously involving distributional issues.)

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[2] By specifying additive sub-indices, we are implicitly assuming that preferences for social outcomes are separable in their components (e.g. that the weight placed on consumption does not depend on the weight placed on inequality). We do not explicitly constrain the weights to be assigned to each component of well being, since we think of them as the preferences of different observers. However, some observers may, if they are consistent, have linked preferences – for example, if attitudes to insecurity are driven solely by risk aversion (but see Osberg (1998)),

Such discussions of measurement issues are of a fundamentally different nature from discussions of values – which aspect of economic well being should receive greatest weight.

This basic framework - that a society's well-being depends on societal consumption and accumulation and on the individual inequality and insecurity that surround the distribution of macro economic aggregates - is consistent with a variety of theoretical perspectives. We therefore avoid a specific, formal model.[3]

As part of a larger project on the state of living of standards and the quality of life in Canada, the Centre for the Study of Living Standards (CSLS) has constructed the index of economic well-being proposed by Osberg over a decade ago for Canada and for all provinces and for the United States. This paper provides estimates for Canada of the index.

The paper is divided into two main parts. Part one discusses estimates of the four key components or dimensions of the index- consumption flows, stocks of wealth, inequality, and insecurity. Part two presents estimates of the overall index.

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then the weight an individual places on inequality, and the weight they place on insecurity, will both depend on the second derivative of their utility function.

[3] However, a sufficient (but not necessary) set of conditions for the index of economic well-being we propose would be that societal economic well-being can be represented as the well-being of a "representative agent", assuming that (1) such an agent has a risk-averse utility function (i.e. diminishing marginal utility); (2) from behind a "veil of ignorance" as to his/her own characteristics, each person draws an individual income stream (and prospects of future income) from the actual distribution of income streams; (3) each person has a utility function in which both personal consumption and bequest to future generations are valued; (4) individual income streams are exposed to unpredictable future shocks; (5) capital markets and public policies do not always automatically produce a socially optimal aggregate savings rate.

2.   The Components of Economic Well-Being

GDP is a measure of the aggregate marketed income of a society and most of its proposed substitutes (such as the GPI) are also primarily measures of adjusted average annual "income" flows [where the adjustments are meant to capture issues (such as environmental degradation) that GDP now ignores]. However, "income" is a flow variable that does not directly consider the aggregate value of the bequest which this generation will leave to its descendants. Although those Canadians now alive clearly care about the level of their own consumption, they also care (in varying degrees) about the well-being of future generations. Furthermore, although trends in average income are important, individual Canadians are justifiably concerned about the degree to which they personally will share in the prosperity of the average, and the degree to which their personal economic future is secure. The four components or dimensions of economic well-being in the proposed index of economic well-being are, therefore:

- effective per capita consumption flows (discussed in section 2.1 below)

   - includes consumption of marketed goods and services, and effective per capita flows of household production, leisure and other unmarketed goods and services

- net societal accumulation of stocks of productive resources (section 2.2)

   - includes at this stage net accumulation of tangible capital, housing stocks and consumer durables, net accumulation of human capital, social capital and R&D investment, net changes in the value of natural resources stocks; environmental costs, and net change in level of foreign indebtedness

   - to be included at a later stage of development: stocks of consumer durables

- poverty and inequality (section 2.3)

   - includes the intensity of poverty (incidence and depth) and the inequality of income

- insecurity (section 2.4)

   - economic security from job loss and unemployment, illness, family breakup, poverty in old age

   - to be included at a later stage of development: personal security from crime and ill health (including workplace injury) and the impact of unanticipated inflation.

A fuller discussion of the rationale for this framework of average consumption flows, aggregate bequest, inequality and insecurity can be found in Osberg (1985). The reason for focussing on

these four main dimensions of economic well-being is to enable persons with differing value judgements (e.g. a greater or less preference for intergenerational bequest, or for the reduction of poverty, compared to increases in average consumption) to account explicitly for those values. Each dimension of economic well-being is itself an aggregation of many underlying trends, on which the existing literature is sometimes spotty.[4] However, it is surely a bad approximation to implicitly set the weight of a variable to zero, thus ignoring entirely its influence.

2.1   Average Consumption Flows

2.1.1   Marketed personal consumption

The starting point for this component of the index is aggregate real personal consumption per capita,[5] readily available from the national accounts. This measure rose from $9,657 (1992 dollars) in 1971 to $15,548 in 1997, a 61.0 per cent increase (Table 1). (All dollar values in this paper are expressed in terms of 1992 constant dollars.)

This estimate is of course sensitive to the price series used to deflate nominal consumption. In the national accounts, the consumer expenditure deflator is used, which differs slightly from the Consumer Price Index. Bias in price series obviously biases estimates of average real consumption flows. The recent debate on CPI bias is thus directly relevant to the estimation of real consumption flows. The Boskin Commission (Boskin et al., 1996) estimated that the US CPI had an upward bias of 1.1 per cent, largely due to the failure of prices indexes to capture the welfare effects of new goods and the quality improvements in existing products (Nordhaus, 1996). The Bank of Canada estimates that CPI bias in Canada is less than 0.5 per cent. In this paper, we do not make an adjustment for this bias.

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[4] Since a great deal of work has been done on the valuation of household production, there is at least a clearly defined range of estimates. However, economists have paid very little attention to the measurement of insecurity (see Osberg, 1998) and the measures of economic insecurity are correspondingly underdeveloped.

[5] Consumption can also be calculated on a household basis. As the rate of growth of households has been faster than that of the overall population since 1971, consumption flows based on the number of households would have risen at a slower pace than that based on population.

Table 1: Canada, Components of Personal Consumption

Year	Personal Consumption per capita (1992 $)	% of Underground Consumption	Index of Life Expectancy 1971=1.00	Index of Equivalent Income 1971=1.00	Adjusted Personal Consumption per capita including regrettables (1992$)	Total Regrettable Cost Per Cap. (1992 $)	Adjusted Personal Consumption Per Cap. (1992 $)	Index of Adjusted Personal Consumption 1971=1.00
	A	B	C	D	E=A*(1+B/100)*C*D	F	G=E-F	G'
1971	9,657	2.595	1.000	1.000	9,907	1,164	8,743	1.0000
1972	10,103	2.647	1.006	0.995	10,377	1,329	9,047	1.0348
1973	10,676	2.700	1.011	0.990	10,978	1,364	9,613	1.0995
1974	11,072	2.754	1.017	0.985	11,397	1,312	10,085	1.1535
1975	11,368	2.809	1.023	0.980	11,715	1,354	10,361	1.1851
1976	11,821	2.865	1.014	0.975	12,029	1,440	10,590	1.2112
1977	12,031	2.978	1.020	0.970	12,264	1,514	10,749	1.2295
1978	12,312	3.060	1.026	0.966	12,568	1,568	11,000	1.2582
1979	12,533	3.070	1.032	0.961	12,802	1,563	11,239	1.2855
1980	12,626	3.063	1.037	0.956	12,904	1,497	11,407	1.3047
1981	12,657	3.099	1.035	0.951	12,844	1,473	11,371	1.3006
1982	12,196	3.234	1.041	0.946	12,399	1,425	10,974	1.2552
1983	12,417	3.333	1.047	0.942	12,643	1,476	11,168	1.2773
1984	12,852	3.316	1.052	0.937	13,092	1,566	11,526	1.3183
1985	13,390	3.316	1.058	0.932	13,648	1,636	12,013	1.3740
1986	13,784	3.228	1.047	0.928	13,822	1,629	12,193	1.3946
1987	14,175	3.263	1.053	0.923	14,228	1,618	12,610	1.4423
1988	14,600	3.298	1.059	0.918	14,668	1,659	13,009	1.4879
1989	14,863	3.209	1.065	0.914	14,929	1,655	13,274	1.5183
1990	14,832	3.332	1.071	0.909	14,924	1,708	13,216	1.5116
1991	14,448	3.451	1.066	0.905	14,411	1,655	12,756	1.4590
1992	14,499	3.500	1.068	0.900	14,423	1,695	12,728	1.4558
1993	14,574	3.668	1.070	0.896	14,477	1,735	12,743	1.4575
1994	14,847	3.688	1.072	0.891	14,705	1,775	12,930	1.4789
1995	14,921	3.671	1.074	0.887	14,731	1,783	12,948	1.4809
1996	15,098	3.848	1.077	0.882	14,903	1,810	13,093	1.4976
1997	15,548	4.143	1.079	0.878	15,340	1,839	13,501	1.5442

Sources: Appendix Tables A1, A2, A5, A26

Adjustments to marketed personal consumption flows

The System of National Accounts provides a strong basis for estimating the consumption of marketed goods and the cost of providing government services, and there have been enough studies of the value of household production to enable some confidence as to the range of reasonable values. Estimates are more imprecise when one considers the value of a number of other factors that also influence consumption flows, such as leisure, regrettables, the underground economy and life expectancy. These factors are discussed below, with approximate estimates of their value, in some cases. At this stage in the development of the index of economic well-being, our inclination is to include, rather than exclude, imprecise measures on the principle that an imprecise measure is likely to embody a smaller error than omitting a variable, which would implicitly set its value to zero. However, subsequent versions of this paper will undoubtedly revise these estimates somewhat.

The underground economy

There has been much discussion in recent years about the growth of the underground economy. However, estimates of the value of goods and services produced, but not captured in official statistics, have ranged widely. The most comprehensive study, by Statistics Canada (1994), calculated that in Canada in 1992 consumption expenditure was underestimated by 3.5 per cent.

Since there always has been some level of "underground" activity, the issue for the measurement of trends in well-being is whether or not the prevalence of the underground economy has changed substantially over time. Rising tax rates may have increased the incentive to go underground, but the increased penetration of franchise systems in the small business sector and the greater computerization of business records may have also made it more difficult to escape detection.

For the purposes of this paper, the aggregate value of unrecorded consumption expenditure has been benchmarked at the 1992 Statistics Canada estimate. As the self-employed have more opportunity to engage in unreported economic transactions than paid workers, we have assumed that the size of this unrecorded consumption expenditure has varied over time in proportion to

the percentage of self employed in total employment.[6] This share has risen from 11.2 per cent in 1971 to 17.9 per cent in 1997, a 59.7 per cent increase. This factor was applied to the 3.5 per cent benchmark figure for 1992. This meant that underground consumer expenditure was equivalent to 2.60 per cent of recorded consumption in 1971, with the proportion rising to 4.14 per cent in 1997 (Table 1). Personal consumption has been adjusted for this upward trend in underground activity.

The value of increased longevity

The life expectancy of Canadians has increased significantly in recent years, and we have every reason to believe that having a long life is an important component of the well-being of Canadians. Between 1971 and 1997 average life expectancy at birth increased 5.6 years from 73.0 years to 78.7 years, a 7.8 per cent rise[7] (Table A6). It is interesting to note that the rate of increase in life expectancy has not slowed down over the last 25 years. The 0.3 per cent average rate of increase in life expectancy over the 1971-97 period is the same as that experienced between 1951 and 1971 (although the rate appears to have decelerated to 0.2 per cent in the 1990s). The economic value of these extra years of life should be included in the total consumption flows of individuals, since presumably people care both about how much they consume per year, and how many years they get to consume it.[8]

Years of life are one thing, and years of healthy, enjoyable life are a slightly different thing. A full appraisal of the value of increased longevity should consider trends in morbidity and health-adjusted life expectancy (HALE),[9] as well as easier-to-measure trends in longevity.

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[6] A recent study by Schuetze reported by Little (1998) found that the opportunity to underreport income has fuelled the growth of self-employment.

[7] Male life expectancy increased 6.3 years or 9.1 per cent from 69.4 to 75.7. Female life expectancy increased 5.0 years or 6.5 per cent from 76.5 to 81.5. The greater rise in male life expectancy increased from 90.7 per cent to 92.8 the average life span of men relative to women. It is interesting to note that the rate of increase in life expectancy has not slowed down over the last 25 years. The 0.3 per cent average rate of increase in life expectancy over the 1971-96 period is the same as that experienced between 1951 and 1971.

[8] Dan Usher (1980) of Queen's University has developed a methodology for the estimation of the value of increased longevity.

[9] Wolfson (1996) found for 1990-92 that the HALE for 15 year olds was 7.8 years less than life expectancy (55.6 versus 63.4 years). However, since there is no time series on health-adjusted life expectancy for Canada, we do not know if the rate of increase in the HALE has been greater than life expectancy over time.

However, in considering either, one has to face the issue that the value of more years of life may look very different, the closer one actually is to death. Changes in life expectancy are occurring "in real time" and are affecting the well-being of all Canadians now alive. In aggregating over the population of Canadians now alive, one is aggregating over individuals at very different points in the life course. Although the economist's reflex is to consider the discounted value of lifetime utility, it may be highly problematic to view the value of additional years of life as discounted to the point of view of a teenager. For the purposes of this paper, we adopt the simple expedient of considering an increase in consumption per year or consumption for an increased number of years to be equivalent – i.e. we add to consumption flows in each year the percentage increase in average life expectancy.[10]

For all years after 1971, personal consumption per capita is adjusted upward by the increase in life expectancy relative to 1971. For example, average life expectancy increased 7.8 per cent between 1971 and 1997, so average personal consumption is adjusted upward by 7.8 per cent in 1997 because of this development.

Reduced economies of scale in household consumption

When individuals cohabit in households, they benefit from economies of scale in household consumption. There is a large literature on the estimation of "equivalence scales", which attempt to account for the magnitude of such economies of scale in households of different sizes.[11] When comparing the average effective consumption of Canadians over time, the implication is that as households have shrunk in average size, economies of scale have been lost. Trends in average per capita consumption should therefore be adjusted for the average loss over time of economies of scale in household consumption.

Since economies of scale diminish with family size, the extent of change in economies of scale depends on where change occurs in the distribution of family sizes.[12] As a consequence, we use Osberg's (1997) estimates of equivalent income using the Statistics Canada LICO scales, which

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[10] Implicitly, this procedure ignores both the differential value which individuals might place on changes in mortality probability at different ages and the distribution, by age, of actual changes in mortality probability.

[11] See, for example, Burkhauser et al (1996) or Phipps and Garner (1994).

[12] Even though the impact on average household size is the same, the impact on average living standards of (for example) a five-person household splitting will differ from the impact of a two-person household splitting, since the latter change will imply a greater loss of economies of scale.

were calculated from 1975 to 1994 for all individuals in SCF micro-data. The ratio of aggregate equivalent income to aggregate money income is a measure of aggregate living standard gains due to household economies of scale – but these gains have been shrinking over time as household size has shrunk. We therefore scale average money income down by an (increasing) fraction to represent the percent of effective consumption lost to decreasing economies of scale, relative to a 1971 base year.

In Survey of Consumer Finance data, Osberg (1997) finds that average family size in Canada for all families fell from 2.83 in 1975 to 2.59 in 1984, to 2.51 in 1989, and to 2.41 in 1994 (a 20.3 per cent decline in family size). Equivalence scales are non-linear functions of family size. Using the OECD or the Statistics Canada scale, a decline of 14.8 per cent from 2.83 family members to 2.41 from 1975 to 1994 would (holding per capita money income constant) reduce equivalent income by about 10 per cent, or 0.50 per cent per year. This rate has been applied to the 1971-97 period, resulting in a reduction of effective consumption of about 12.2 per cent for the period as a whole.

Regrettables and intermediate consumer goods

It can be argued that certain types of economic activity included in GDP do not contribute to economic welfare, but rather are defensive expenditures, or intermediate inputs that individuals make in order to be able to produce or consume. The costs households pay in order to commute to work are considered in the GDP to be part of household consumption, but the expenses which firms incur to bring materials to the work site are seen as an intermediate input in production. Since intermediate inputs in the business sector are netted out in the calculation of value added, it can be argued that similar expenditures by households should be subtracted from marketed consumption to obtain a better estimate of true consumption flows. Similarly, if the good that individuals want to consume is "a crime free street", but it now takes a greater expenditure on police services to produce that good, this should not be counted as an increase in consumption.

The GPI has developed methodologies for estimating the costs of crime, cost of commuting, cost of pollution abatement, and the cost of auto accidents. Messinger and Tarasofsky (1997) have made estimates for these variables for Canada (Table A5). The costs of commuting are defined as the cost of travelling to and from work using either public transportation or a private vehicle, as well as an estimate of time use while commuting. The costs of crime and auto accidents are

defined as the costs associated with medical and legal expenses and expenditures related to lost or damaged property. The cost of household pollution abatement represents the expenditure on air and water filters and devices to improve air and water quality in the home.

Estimates of these costs, expressed in 1992 dollars per capita, are highlighted below.[13]

- The cost of commuting in 1971 was estimated at $600, increasing 61.5 per cent to $969 in 1997.

- The cost of home pollution abatement in 1971 was estimated at $29, increasing 65.5 per cent to $48 in 1997.

- The cost of auto accidents was estimated at $423 in 1971, increasing 57.2 per cent to $665 in 1997.

- The cost of crime in 1971 was at $112 per capita, rising 39.4 per cent to $156 in 1997.

These estimates are very likely too low in absolute terms, since there is no consideration of any indirect influences – e.g. the impact of crime on residential neighbourhoods. However, it is not so much the absolute level, but the lack of any overall trends that is significant for the measurement of trends in aggregate economic well-being. Taken together, the four regrettable discussed above totaled $1,164 per capita in 1971 (11.7 per cent of adjusted personal consumption excluding regrettables, that is consumption adjusted for the underground economy, life expectancy and family size) and $1,839 in 1997 (12.0 per cent). This represents a 58.0 per cent increase over the 1971-97 period, compared to 54.8 per cent for adjusted personal consumption excluding regrettables.

The values for the four regrettables have been subtracted from personal consumption after the adjustment for the underground economy, family size, and life expectancy (Table 1).

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[13] In addition to the four regrettables discussed in the paper, a number of other expenditures could be considered defensive in nature, but are not included. For example, we have not made any adjustment to the value of government expenditure on defense. Presumably, the desired good which defense expenditures are trying to produce is "national security", which does not increase during an arms race, even if defense expenditure does. However, expenditure on the Canadian Armed Forces is partly devoted to activities, such as disaster relief, which do correspond to greater utility for Canadians. We have not yet developed a way to disentangle the components of Canadian defense expenditures which do, and which do not, correspond to greater utility.

Leisure

With the increased employment/population ratio of the last two decades, the work-hours of Canadian families have risen substantially, and a decrease in leisure, everything else being equal, decreases economic welfare. The valuation of leisure poses a major challenge, although data on leisure time can be obtained residually from data on hours worked and directly from time-use surveys. It should be noted that the increase in unemployment and involuntary part-time unemployment during the 1980s and 1990s couldn't be considered an increase in leisure time.

The average work week for full-time workers has declined greatly in the first half of this century, but the fall has been much less since 1950, with little change in recent years. In 1870, standard weekly hours in manufacturing were 64.0 (Ostry and Zaidi, 1979: Table IV-1). This fell to 58.6 in 1901, 50.3 in 1921, 48.7 in 1946 and 43.6 in 1951. By 1976, it had only reached 39.4 hours. Labour Force Survey Data show that the average usual weekly hours of all workers only fell from 39.0 in 1976 to 37.8 in 1996 despite the growth in part-time employment. Average hours of full-time workers exhibited no downward movement. On a family basis, however, the last 25 years have seen a substantial increase in market work, as two parent families increasingly become two earner families.[14]

There are two main approaches to the valuation of leisure. The first approach used by Nordhaus and Tobin in the construction of the Measure of Economic Welfare (MEW) is to place a value on the total amount of leisure. The second, used by the Redefining Progress Institute (1995) in the construction of the Genuine Progress Indicator (GPI), is to value changes in leisure relative to the amount of leisure enjoyed in the base year.

Messinger and Tarasofsky (1997) estimated the value of leisure in Canada using both approaches. Based on the MEW approach, they impute a value of $518.5 billion (1986 dollars) to leisure in 1995, or $17,509 per capita, nearly one and one half times the value of marketed consumption. This is an increase of 5.2 per cent over the 1971 per capita valuation. Based on the GPI methodology, they value the loss of leisure time relative to the 1970 base at $16.7 billion (1986 dollars) in 1994, or $571 per capita.

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[14] Kilfoil (1998) notes that the husband/wife families in the top 5% of the earnings distribution worked an average of 3097 hours in 1975, but keeping the same position took 4026 hours of paid work in 1994 – while at the median of the household earnings distribution, the increase in average household hours was from 2500 to 3043.

Since the GPI methodology estimates there has been a fall in leisure equal in value to a 2.8 per cent cut in total consumption (i.e. personal consumption plus government services and unpaid work), while the MEW methodology indicates an increase in leisure equal to 4.5 per cent of the value of total consumption, clearly any perception of trends depends on the methodology chosen. Other estimates indicate that if the market and non-market work hours of Canadians aged 20 to 59 are added together, there is not much of any trend over time (Bittman, 1998).

Many Canadian families are feeling the time crunch of two demanding jobs, plus family responsibilities, but although some families are working more, there has also been a substantial trend to earlier retirement. Although work hours and leisure are unequally distributed among people and may be poorly distributed over the life cycle, there does not appear to be reliable evidence of a significant trend in the average. Hence, this paper will not attempt to assign a value to leisure, or to trends in its magnitude.

At this point, since our focus is on trends in *aggregate* consumption, we are concerned with the aggregate amount of leisure enjoyed by Canadians, as a part of aggregate consumption. The *distribution* of hours of leisure is another issue. Picot (1996) has pointed to the increase in the percentage of individuals working very short weekly hours *and* the increased percentage working very long hours – although the inequality of weekly working hours has increased, the average is nearly constant. At the family level, Kilfoil (1998) has emphasized that working age families have less leisure now than in the early 1970s, due to the increase in paid hours worked by married women entering the paid labour force over the period 1971-1996. However, the trend to earlier retirement also means that over the life cycle, Canadians are now enjoying more aggregate years of leisure, albeit in the latter part of their lives. Since there are offsetting trends in the distribution of leisure, near constancy in its aggregate level may mask declines in the utility derived from leisure, but we leave consideration of distributional issues to Section 2.3.

Positional goods

Positional goods can be defined as those goods in limited supply that provide utility only because they are inherently scarce. For example, only one type of motorcycle can be "the fastest in town", and if the point of the purchase of motorcycles is to be the fastest, increased competitive expenditures on horsepower generate no aggregate increase in utility. To the extent that individuals' overall satisfaction is related to the consumption of positional goods, increases in

aggregate consumption will raise economic well-being by less than the increase in dollar value of consumption. As it is unclear how to quantify the relative importance of positional goods and their implications for economic well-being, this aspect of economic well-being has not been developed in the current version of our work.

Table 2: Canada, Components of Total Consumption

Year	Adjusted Personal Consumption Per Capita (1992 $)	Government Real Current Expenditure Per Capita (1992 $)	Unpaid Work Per Capita (Replacement by generalist) (1992 $)	Total Consumption Flows Per Capita (1992 $)	Index 1971=1.01
	A	B	C	D=A+B+C	E=Index of D
1971	8,743	4,200	6,212	19,156	1.0000
1972	9,047	4,240	6,206	19,494	1.0176
1973	9,613	4,386	6,260	20,259	1.0576
1974	10,085	4,600	6,301	20,987	1.0956
1975	10,361	4,838	6,341	21,540	1.1244
1976	10,590	4,865	6,386	21,841	1.1402
1977	10,749	5,032	6,441	22,223	1.1601
1978	11,000	5,069	6,508	22,578	1.1786
1979	11,239	5,072	6,579	22,890	1.1949
1980	11,407	5,181	6,633	23,220	1.2122
1981	11,371	5,194	6,684	23,250	1.2137
1982	10,974	5,241	6,629	22,844	1.1925
1983	11,168	5,275	6,586	23,029	1.2022
1984	11,526	5,284	6,547	23,358	1.2194
1985	12,013	5,461	6,511	23,984	1.2520
1986	12,193	5,509	6,470	24,172	1.2619
1987	12,610	5,516	6,545	24,671	1.2879
1988	13,009	5,693	6,617	25,319	1.3217
1989	13,274	5,754	6,663	25,692	1.3412
1990	13,216	5,875	6,724	25,815	1.3476
1991	12,756	5,965	6,801	25,522	1.3323
1992	12,728	5,943	6,870	25,542	1.3334
1993	12,743	5,851	6,946	25,540	1.3333
1994	12,930	5,677	7,027	25,635	1.3382
1995	12,948	5,588	7,113	25,648	1.3389
1996	13,093	5,454	7,202	25,750	1.3442
1997	13,501	5,390	7,299	26,190	1.3672

Sources: A-Table 1, B - Appendix Table A2, C - Appendix Table A3.

2.1.2   Government services

The provision of non-marketed or heavily subsidized services by the government is part of the consumption flow of Canadians. These data are available from the national accounts. Current expenditure by all levels of government including defense and capital consumption allowances, but excluding debt service charges and transfer payments (which influence marketed consumption) are used. Current dollar data are deflated by the price index for government current expenditures on goods and services. This measure rose from $4,200 (1992 dollars) in 1971 to $5,390 in 1997, a 28.3 per cent increase (Table 2).

2.1.3   Unpaid work

Unpaid work contributes to economic welfare and thus should be included in an index of economic well-being. Unpaid work consists of both household work and volunteer work.[15] Statistics Canada (1996) has produced estimates of unpaid work for Canada and the provinces for the years 1961, 1971, 1981, 1986, and 1992, expressed in 1986 dollars. Data for other years have been interpolated or extrapolated. Estimates in 1986 dollars have been rebased to 1992 dollars with the CPI.

There are a number of methodologies for the valuation of unpaid work, including opportunity cost before tax or after tax, or at the replacement cost using a specialist or generalist. The value of unpaid work is not surprisingly greatest when it is valued on the basis of opportunity cost before taxes, followed by replacement cost using a specialist, opportunity cost after tax, and finally replacement cost using a generalist. The rate of growth over time however is not greatly affected by which valuation method is used.

This paper uses the value of unpaid work per capita based on replacement with a generalist – which amounts to $6,212 in 1971 (1992 dollars) and $7,299 in 1997, an increase of only 17.5 per cent (Table 2). Increased female and youth participation, the expansion in the range of personal services available to households provided by the market, and the increase in the number and

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[15] Statistics Canada has identified the following types of unpaid work: food and meal preparation; food or meal clean-up; cleaning; laundry and ironing; clothes repair and shoe care; home repair and maintenance; gardening and grounds maintenance; pet care; other domestic work, not elsewhere classified; physical care-children; education-children; medical care-children; other care-children; personal care-adults; medical care-adults; household management and administration; shopping for goods and services; transport-children; transport-all other household work; volunteer work; other help and care; and transport-other unpaid work. In 1992, household work represented 94 per cent of total unpaid work, with volunteer work the remainder.

quality of time-saving household production innovations such as the microwave oven may have tended to decrease the *relative weight* of unpaid household work.

2.1.4   Total consumption flows

Total per capita consumption is defined as the sum of personal consumption (adjusted for the growth of the underground economy, increased life expectancy, smaller household size, and certain regrettable expenditures), government services and unpaid work. In 1971, it amounted to $19,156 (Table 2). By 1997, it had reached $26,190, a 36.6 per cent increase. The slower per capita growth over the 1971-97 period of unpaid labour (17.5 per cent), meant that the rate of growth of total consumption flows was much less than adjusted personal consumption (a 54.4 per cent increase).

2.2   Wealth Stocks, Sustainability and the Intergenerational Bequest

In our view, measurement of trends in well-being should include consideration of changes in the well-being of generations yet unborn. This consideration of future generations can be justified either on the grounds that those Canadians now living care about the well-being of future generations or on the grounds that a concept of "Canadian society" should include both present and future generations. Either way, wealth accumulation by this generation of Canadians will increase the bequest left to future generations, and is an important component of well-being.[16] We would emphasize that this component of economic well-being consists of those stocks of real productive assets that can generate real income for future generations – not the financial instruments that will determine the allocation of the return from those assets. The stocks of "wealth" left to the next generation, broadly conceived to include environmental and human resources as well as physical capital stock, will determine whether Canadian society is on a long-run sustainable trajectory.

2.2.1   Physical capital stock

The physical capital stock includes both residential and non-residential structures as well as machinery and equipment, in both the business sector and the government sector. The greater the

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[16] If one could assume that income flows were always optimally divided between consumption and savings, one could omit separate consideration of consumption and wealth accumulation and concentrate on trends in average income. However, since aggregate wealth accumulation depends heavily on the political process, and because capital markets have significant imperfections, this seems far too hopeful. For further discussion see Osberg (1985).

capital stock, the greater is future productive capacity and future potential consumption flows, and economic well-being. The capital stock data are based on the perpetual inventory method where investment flows are accumulated over time, with depreciation rates applied to the different assets. Statistics Canada produces estimates of the various components of the capital stock in current and constant prices by province for the 1961-1997 period.

In 1971, the net non-residential capital stock per capita, expressed in 1992 dollars, was $11,548 (Table A7). By 1997, it had increased to $16,805, up 45.5 per cent. The per capita housing stock was $11,954 in 1971, rising 109.5 per cent to $24,990 in 1997. The total capital stock (residential and non-residential) was $23,502 per capita in 1971, rising 77.8 per cent to $41,795 in 1997 (Table 3).

2.2.2   Research and development capital stock

Closely related to the physical capital stock is the concept of the research and development (R&D) capital stock. In an era of rapid technological change, expenditure on R&D is a crucial ingredient in the ability of society to innovate and create wealth. Statistics Canada does not produce R&D stock data. The Center for the Study of Living Standards has constructed an R&D stock series for Canada and the provinces from Statistics Canada's annual flows of general domestic expenditure on research and development (GERD). The stock of R&D capital is valued at cost of investment, and a depreciation rate of 20 per cent on the declining balance is assumed.

The R&D stock more than tripled from $17,152 million (1992 dollars) in 1971 to $56,130 in 1997 (Table A8). On a per capita basis, the R&D capital stock rose from $788 in 1971 to $1,856 in 1997, a 135.5 per cent increase.

2.2.3   Value of natural resource stocks

The current consumption of Canadians could be increased by running down our stock of non-renewable natural resources or by exploiting our renewable resources in a non-sustainable manner, but this would be at the cost of the consumption of future generations of Canadians. A key aspect of the wealth accumulation component of economic well-being is net changes in the value of natural resources.

Table 3: Canada, Stocks of Wealth

Year	Total Per Capita Net Capital Stock (1992 $)	Per Capita Depreciated Accumulated Stock GERD (1992 $)	Total Real Per Capita Value of Nat. Res. (1992 $)	Human Capital per capita (1992 $)	Per Capita Real Net Int'l Investment Position (1992 $)	Per Capita Greenhouse Gas Emis-sion Cost (1992 $)	Total Real Per Capita Wealth (1992 $)	Index 1971 =1.00
	A	B	C	D	E	F	G=A+B+C +D+E-F	H-index of G
1971	23,502	788	15,170	52,654	-5,512	362	86,239	1.0000
1972	24,037	835	14,358	53,106	-5,560	364	86,412	1.0020
1973	24,900	872	14,810	53,642	-5,416	369	88,438	1.0255
1974	25,743	897	15,963	54,301	-5,217	379	91,308	1.0588
1975	26,562	918	16,905	54,936	-5,572	384	93,365	1.0826
1976	27,463	932	17,216	55,623	-6,123	391	94,719	1.0983
1977	28,320	951	17,189	56,400	-6,345	391	96,125	1.1146
1978	29,145	978	18,323	56,979	-7,562	393	97,470	1.1302
1979	30,064	1,011	22,729	57,490	-8,002	397	102,894	1.1931
1980	30,926	1,046	26,453	58,286	-7,610	396	108,704	1.2605
1981	31,972	1,098	21,777	59,167	-8,339	403	105,272	1.2207
1982	32,469	1,158	20,109	59,974	-7,634	387	105,689	1.2255
1983	32,934	1,208	20,615	60,972	-7,582	389	107,758	1.2495
1984	33,381	1,270	20,158	61,605	-7,772	396	108,246	1.2552
1985	34,044	1,342	18,265	62,363	-8,653	401	106,961	1.2403
1986	34,775	1,413	12,473	63,092	-9,222	400	102,132	1.1843
1987	35,703	1,465	13,472	63,751	-9,392	402	104,598	1.2129
1988	36,805	1,506	13,508	64,521	-9,005	402	106,934	1.2400
1989	37,854	1,535	13,897	64,482	-9,087	397	108,284	1.2556
1990	38,675	1,576	13,844	67,941	-9,452	388	112,196	1.3010
1991	39,311	1,613	10,617	68,625	-9,635	379	110,153	1.2773
1992	39,715	1,648	9,409	69,568	-10,447	376	109,518	1.2699
1993	40,021	1,695	8,578	70,768	-11,049	384	109,629	1.2712
1994	40,378	1,744	9,028	71,831	-11,227	400	111,355	1.2912
1995	40,821	1,786	9,546	72,260	-10,823	400	113,191	1.3125
1996	41,271	1,823	9,306	72,853	-10,369	400	114,484	1.3275
1997	41,795	1,856	9,159	73,964	-10,573	400	115,801	1.3428

Sources: A - Appendix Table A7, B- Appendix Table A8, C- Appendix Table A12,

D – Appendix Table A13, E – Appendix Table A14, F- Appendix Table A25.

From an intergenerational perspective, it is the value of the natural resources, not their physical extent, which counts. The valuation of these resources poses conceptual problems, but estimates certainly are possible. Statistics Canada (1997) has recently provided both physical and value estimates of natural resources such as forests, energy reserves, and minerals. [Data on the value of fish stocks have not yet been developed.]

The estimated market value is the price the resources would bring if sold on the open market. It is based on the difference between the annual cost of extraction of a given resource and the revenue generated from the sale of the resource. In other words, the total value or wealth associated with a stock is calculated as the present value of all future annual rent that the stock is expected to yield. This amount of rent is determined by the quality of the resources, the state of existing extraction technologies, the price of the resource, and factor costs.

Table A9 presents estimates of the current dollar value of timber stocks in Canada, and estimates of the per capita constant dollar value (the GDP deflator was used to deflate nominal values to 1992 dollars).[17] In 1971, the value of timber was $2,831 (1992 dollars) per capita. By 1997, it had risen to $3,527, a 24.6 per cent increase.

Table A10 presents estimates of the value of the five types of energy resources (crude oil reserves, natural gas reserves, crude bitumen reserves (tar sands), subbituminous coal and lignite reserves, and bituminous coal). It should be noted that this valuation is based on remaining established reserves, which represent only a small proportion of known reserves and ultimately recoverable resources.[18] The per capita value of energy resources has fluctuated dramatically over the 1971-97 period, going from $3,917 in 1971 to a peak of $14,410 in 1983, reflecting increased energy prices and rising proven reserves. By 1997, the per capita value had fallen to $2,789, which is 28.8 per cent below the 1971 level.

Table A11 presents estimates of the value of 10 minerals (copper, potash, silver, sulphur, uranium, gold, iron, nickel, lead, and molybdenum), again based on remaining established

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[17] The estimates are based on a positive return to produced capital. Statistics Canada also produces an estimate based on a zero return to produced capital.

[18] For example, based on the situation in 1992, Natural Resources Canada and the National Energy Board (see Statistics Canada, 1996:Table 6.1) provided the following estimates of the the remaining established reserves of energy resources, as a proportion of ultimately recoverable resources: crude oil (7.9 per cent); crude bitumen (0.98 per cent); Western Canada natural gas (26.5 per cent); frontier natural gas (0.11 per cent); and coal (8.3 per cent).

reserves. The per capita value of mineral deposits has fallen from $8,421 in 1971 to $2,843 in 1997, a 66.3 per cent decrease.

In addition to the data on the value of natural resources, Statistics Canada produces estimates of the physical size of the resources. Over the period for which data are available (which varies by resource), the physical extent of timber stocks has fallen slightly. Concerning the five types of energy resources for which data are available, stocks for three have increased (natural gas, bituminous coal, crude bitumen,) one is unchanged (subbituminous coal and lignite reserves), and one has fallen (crude oil). For the 10 minerals for which data on reserves are available, four have increased (uranium, sulphur, potash, gold) and six have decreased (silver, copper, iron, nickel, lead, molybdenum).

Table A12 and Table 3 aggregate the data on the value of timber, energy, and mineral resources into one global measure for the value of natural resources for Canada. Between 1971 and 1997, the total per capita value (1992 dollars) of natural resources fell 39.6 per cent from $15,170 in 1971 to $9,159 in 1997, largely due to the fall in the value of mineral resources. In 1997, timber represented 38.5 per cent of the total value of natural resources, followed by minerals at 31.0 per cent and energy at 30.5 per cent.

2.2.4   Stocks of human capital

The human capital accumulated by the workforce generates both current and future income. Trends in the stock of human capital, including both formal educational attainment levels and on-the-job training, are important determinants of current and future economic well-being. School retention and participation in post-secondary education have increased dramatically in Canada over the last three decades,[19] and there is a strong relationship between educational attainment and individual income.

One approach to the valuation of human capital is to estimate the returns associated with different levels of educational attainment of the population and compute the implicit present discounted value of education (Jorgenson and Fraumeni, 1992). [A major problem with this methodology, however, is that it imputes to education stocks any differential in the structure of wages that is correlated with education.] A second, input-based approach is to apply the

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[19] The increase has been particularly large in Atlantic Canada – see Osberg (1994).

perpetual inventory method of estimating the physical capital stock based on investment flows and depreciation assumptions to public and private expenditure on education and training (Kendrick, 1976). A third approach to human capital accounting is to develop methods for systematically evaluating and recording knowledge assets acquired through experience, education, and training (OECD, 1996).

Our approach in this paper is admittedly crude and incomplete and will be improved upon at a later date. We estimate the cost per year of education expenditures at the primary, secondary and post secondary levels and use yearly estimates of the distribution of education within the population to compute the total cash cost of production of human capital in education. Our estimates of the change over time in the value of human capital stocks are, therefore, under-estimates, since we do not yet account for the cost of student time in human capital production or for the value of experience or on-the-job training.

In 1992-93, the average cost of educating a student at the elementary-secondary level in Canada, calculated by dividing total expenditure at the level by enrolment, was $6,518,. At the community college level, the cost was $11,348 and at the university level $20,269.

The average number of years of education assumed for each educational attainment group are given below (with the average cost in 1992-93 of educating an individual at that level of educational attainment in brackets):

- for the 0-8 year group is 8 years ($52,144);

- for the some secondary education group 10 years ($65,180);

- for graduated high school 12 years ($78,216);

- for some post-secondary 12 years of elementary-secondary school and the average of one year of community college and one year of university ($94,025);

- for post-secondary certificate 12 years of elementary-secondary school and two years of community college ($100,912); and

- for university graduates 12 years of elementary-secondary school and five years of university (an average of four years of undergraduate study and one year of graduate or professional study) ($179,561).

The size of the population and stock of human capital by educational attainment is found in Table A13.

In 1971, human capital per capita, expressed in 1992 dollars, was $52,654. By 1997 the stock of human capital had reached $73,964, up 40.5 per cent. This was 77 per cent higher than the stock of physical capital and over eight times that of the stock of natural resources.

Like these other assets, the value of the human capital of living Canadians represents the future consumption that possession of such assets enables. The endogenous growth perspective has argued that the benefits of societal learning are partly the output such learning enables in the current generation and partly the fact that future generations can start learning at a higher level. As a consequence, higher levels of education produce a higher long run growth rate, as well as a higher current level of income [Galor and Zeira (1993), Eckstein and Zilcha (1994)]. If this is correct, a production cost valuation of human capital may underestimate considerably the value of the human capital stock investments.

2.2.5   Net foreign indebtedness

We do not count the gross level of government, or corporate, debt as a "burden" on future generations, and we do not count as part of the intergenerational bequest the value of paper gains in the stock market. In general, financial instruments represent both assets to their holders and liabilities to their issuers. The distribution of such assets/liabilities will play a major role in allocating the real returns to the future capital stock, but the issue at this point is the aggregate value of the intergenerational bequest.

However, net debt to foreigners is another issue. Since interest payments on the net foreign indebtedness of Canadians to other countries will lower the aggregate future consumption options of Canadians, increases in the level of foreign indebtedness reduce economic well-being. Unlike many of the other stock variables, well developed data are available. Statistics Canada publishes data on net foreign indebtedness for both direct foreign investment and portfolio investment. In this paper, we will not attempt any estimate of the more controversial aspects of the net costs of equity investments and foreign ownership (e.g. possible foreign sourcing of suppliers).

Table A14 gives estimates of the net international investment position of Canadians. On a per capita basis, with the figures expressed in 1992 dollars, Canada's net foreign debt nearly doubled from $5,512 to $10,573 between 1971 and 1997.

2.2.6   State of the environment and national heritage

Like the excess depletion of natural resources, the current consumption of Canadians can be increased at the expense of the degradation of the environment, reducing the economic well-being of future generations. Consequently, changes in the level of air and water pollution should be considered an important aspect of the wealth accumulation of Canadians.

Canadians pass on from generation to generation both a natural and made-made national heritage. If this heritage were damaged, the economic well-being of future generations of Canadians would be reduced. Since it is very difficult, if not impossible, to put a monetary value on, for example, the pristine condition of our national parks, or the Parliament Buildings, there will be no attempt to set an aggregate value to these assets. However, the issue of *trends* in well-being is the *change* in such assets, which is easier to measure and indexes of indicators of environmental quality can be developed.[20]

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[20] Environment Canada produces environmental indicators in a number of areas, including urban air and water quality, climate change, acid rain, toxic contaminants, and stratospheric pollutants (See the Environment Canada website (www.ec.gc.ca) for the National Environmental Indicator Series). No one indicator attempts to combine trends in these different areas, so it is difficult to identify an overall trend in environmental conditions.

What is interesting however is that many if not most environmental indicators have shown an improvement over time. A sampling of these developments is highlighted below:
- the concentration of DDE and PCBs in double-crested Cormorant eggs in different locations across Canada has decreased significantly since the first half of the 1970s;
- emissions of sulphur dioxide were cut in half in Eastern Canada between 1980 and 1994;
- the number of days in Canadian cities with airborne particles exceeding the national objective has fallen greatly since 1979;
- the average annual benzene concentrations in Canadian cities has fallen in the 1990s; and
- the proportion of the population with wastewater treatment in Canada increased from 70 per cent in 1983 to 90 per cent in 1994.

There have been however a number of negative developments, as noted below:
- the amount of greenhouse gas emissions in equivalent tones of carbon dioxide increased 8.3 per cent between 1981 and 1992, a negative development because of the implications for global warming (Table A16);
- the average amount of ozone in the atmosphere, measured in Dobson units, at three locations in Canada (Toronto, Edmonton, and Resolute) has fallen 6.8 per cent between 1971 and 1994, indicating a deterioration in air quality (Table A16); and
- over the past half century, Canada's average annual temperature has increased 0.4C.

The Fraser Institute has recently issued a report on environmental indicators for Canada and the United States (Hayward and Jones, 1998). It shows that for Canada over the 1980-95 period the relative severity of environmental problems in the areas of air quality, water quality, and natural resources improved, while it deteriorated for solid waste. Overall, there was a 10.8 per cent reduction in the severity of environmental problems.

Osberg (1985a) has argued that heritage preservation laws can be seen as an optimal intergenerational contract, which constrains the present generation not to despoil irreplaceable assets. In the presence of such constraints, the current generation still has to decide how large a bequest to future generations to leave in the form of replaceable assets, but the "national heritage" remains untouched. As a consequence, (like the family heirloom that is never priced because it will never be sold), trends in economic well-being can be evaluated without placing an explicit monetary value on irreplaceable environmental and cultural assets.

Probably the best-known environmental problem is global warning arising from increased emissions of greenhouse gases, the most common of which is carbon dioxide emissions. Fortunately, data are available on these emissions and it is possible to estimate the costs of these emissions. These costs can then be subtracted from the stock of wealth to obtain an environmentally adjusted stock of wealth.

Needless to say there are major conceptual issues to be deal with in estimating the costs of CO_2 emissions. These include whether the costs should be viewed from a global, national or sub-national perspective, whether the costs increase linearly with the levels of pollution, whether the costs should be borne by the producer or receptor of trans-border emissions, and whether costs should vary from country to country or be assumed the same for all countries. Since global warming affects all countries, we estimate world total costs of emissions and allocate these costs on the basis of a country's share of world GDP.[21]

Fankhauser (1995) has estimated that the globalized social costs of CO_2 emissions (with no adjustment for different national costs) at $20 US per ton in 1990 (or $24.40 Canadian based on Statistics Canada purchasing power parity estimate of 1.22). World Bank researchers (Atkinson et al, 1997) have applied this number to CO_2 emissions in developed countries to estimate the value of the loss of environmental services as a proportion of output and the measure of genuine saving.

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[21] Data on CO_2 emissions for Canada are published by Environment Canada (Jaques, 1997) and are currently available for the 1958-1995 period at the national level and for the 1990-95 period for the provinces. With the approach adopted in this paper, these data are not directly used for the calculation of the social costs of CO_2 emissions for Canadians. They do enter indirectly through Canada's contribution to world CO_2 emissions.

According to data from the International Energy Agency, world CO2 emissions in 1997 were 22,636 millions of metric tons (see Table A25). Based on the $24.40 Canadian per ton cost of CO2 emissions, the world social costs of CO2 emissions was $552,327 million. Given Canada's 2.1 per cent share of world GDP, our share of the world cost of CO2 emissions was 11,634 million or $400 per capita. As these costs represent a loss in the value of the services provided by the environment, they can be considered a deduction from the total stock of wealth of the society. In 1997, the overall value of stocks of wealth in Canada were reduced by 0.35 per cent from the social costs imposed by CO2 emissions according to this methodology.

2.2.7   Estimates of total wealth

As the estimates of the physical capital stock, the R&D capital stock, and natural resource wealth, human capital, net foreign debt, and environmental degradation are expressed in value terms, they can be aggregated and presented on a per capita basis (Table 3). Net foreign debt per capita is a negative entry, while the social costs of CO2 emissions are subtracted from the stocks of wealth.

In 1971, the value, on a per capita basis and expressed in 1992 dollars, of the stock of physical capital, R&D, and natural resources, minus debt foreign debt, was $86,239, with human capital constituting the lion's share of the wealth (61.1 per cent), followed by physical capital (27.3 per cent). By 1997, the value of the wealth stock had risen to $115,801, a 34.3 per cent increase.

2.2.8   Other wealth variables

Data for the above variables have been used in the construction of the index of economic well-being presented in this paper. In addition, a number of other variables, whose estimation may be more problematic, are discussed briefly below.

Consumer durables

The stock of consumer durables contributes directly to the well-being of Canadians. Statistics Canada's household facilities survey provides data on the ownership of a large number of items of household equipment. From these data, the Center for the Study of Living Standards has

constructed an index of household penetration for 14 types of household equipment over the 1968-95 period (Table A15).[22]

In 1971, the average household penetration rate for the 14 items of household equipment in the index was 40.5 per cent. By 1995 it had reached 75.0 per cent, an 81.0 per cent increase.

Given data on the number of households and the value of the 14 items of household equipment, an estimate of the total value of these consumer durables can be built up from the data on the penetration rates.

Social capital

It has been argued by a number of authors that "social capital" is highly important for economic productivity. Social capital can be taken to include the social institutions that produce habits of honesty and co-operation, a justifiable sense of mutual trust in business dealings and a willingness to compromise in negotiations – all of which clearly help to make economic transactions run more smoothly. Recently, Knack and Keefer (1997) have found that countries scoring higher on measures of social capital tend to grow more rapidly over time. Despite the potential importance of this variable, it is not included at this time.

2.3 Inequality and Poverty

The idea of a "Social Welfare Function" which is a positive function of average incomes and a negative function of the inequality of incomes has a long tradition in welfare economics. However, in measuring the level of social welfare, the exact relative weight to be assigned to changes in average incomes, compared to changes in inequality, cannot be specified by economic theory. Indeed, the measurement of inequality itself depends on the relative value which the observer places on the utility of individuals at different points in the income distribution. For a "Rawlsian," only changes in the well-being of the least well off matter, but

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[22] Items included in the index with the 1996 penetration rate given in brackets are: bath facilities (99.8 per cent), flush toilets (99.8 per cent), refrigerators (99.6 per cent), telephones (98.7 per cent), colour TVs (98.5 per cent), microwave ovens (85.3 per cent), video recorders (83.5 per cent), automatic washing machines (78.0 per cent), clothes dryers (76.5 per cent), one or more automobiles (73.6 per cent), freezers (57.1 per cent), dishwashers (47.7 per cent), home computers (31.6 per cent), and air conditioners (29.3 per cent).

others will admit some positive weight for the income gains of the non-poor,[23] and will assign some negative weight to inequality among the non-poor.

Since the economic well-being of the population is affected by inequality in the distribution of income and by the extent of poverty[24], there are two issues: 1) one's perspective on the importance of inequality/poverty compared to trends in average income; and 2) one's view of the relative weight to be placed on poverty compared to inequality. We therefore suggest that a compound sub-index to recognize explicitly these issues would place some weight (β) on a measure of inequality in the aggregate distribution of income and some weight ($1-\beta$) on a measure of poverty.

The most popular measure of inequality in the distribution of income is undoubtedly the Gini index. Statistics Canada has published Gini indices for three definitions of income: income before transfers, total money income, and income after tax (Table A17). For the purposes of the construction of the index of economic well-being, we have chosen the income after tax measure as it represents the best measure of purchasing power. This measure of income inequality for all persons has shown little fluctuation over the 1971-97 period.[25] In 1996, it was 0.362 down 2.9 per cent from 0.373 in 1971.

Recently, Osberg and Xu (1998) have noted that the Sen-Shorrocks-Thon measure of poverty intensity is both theoretically attractive as a measure of poverty, and also convenient, since it can be decomposed as the product of the poverty rate, the average poverty gap ratio and the inequality of poverty gap ratios. Furthermore, since, the inequality of poverty gap ratios is essentially constant, poverty intensity can be approximated as the product of the poverty rate and the average poverty gap ratio.

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[23] Jenkins (1991) surveys the issues involved in measurement of inequality.

[24] Wilkinson (1996) argues that greater inequality increases the mortality rate. Daly and Duncan (1998) argue that absolute deprivation reduces life expectancy and conclude that policies targeted at increasing the incomes of the poor are likely to have a larger effect on mortality risk than policies designed to reduce inequality more generally.

[25] Since there is no data available on inequality and poverty within families, we have no option but to follow the standard pattern of assuming that equivalent income is equally shared among family members. Sharif and Phipps (1994) have demonstrated that if children do not in fact share equally in household resources, inequality within the family can make a very big difference to perceptions of the level of child poverty – and the same implications would hold for gender inequalities. However, since the issue for this paper is the *trend* of poverty, our conclusions will hold unless there has been a systematic trend over time in the degree of inequality within families (e.g. if senior citizen families, whose share of the poverty population has fallen over time, have systematically different levels of within-family inequality than younger families).

An earlier version of this paper used Statistic Canada's low-income cutoffs (LICOs) as an indicator of poverty. Because of problems with consistency in the series over time (particularly before 1980) with the use of different base years, we have now adopted the Low Income Measure (LIM), defined as the proportion of the population with income below one half the median adjusted income.[26] This is consistent with the methodology of most international studies of poverty. In contrast, the LICO is a uniquely Canadian methodology, which includes both absolute and relative components of poverty.

The proportion of Canadians living below the LIM has been relatively stable over time, rising from 14.5 per cent in 1971 to a peak of 17.0 per cent in 1977, then falling to 15.1 per cent in 1985 (see Table A18). Since then it has shown extremely little annual variation, remaining in the 14.2-15.1 range.

The poverty gap is defined as the gap between the average income of those below the poverty line or LIM cutoff and the cutoff. The poverty gap ratio is this gap divided by the LIM cutoff (one half median income). This ratio also has *been relatively* stable over time, falling from 35 per cent in 1971 to 32 per cent in 1997, a 8.6 per cent decline.

The overall intensity of poverty is *approximately equal to* the product of the poverty rate and the poverty gap ratio, and registered a 4.8 per cent decline over the 1971-97 period.

The overall index of equality is a weighted average of the indexes of the poverty intensity for all units or households and the Gini coefficient for after-tax income, with the weights 0.75 and 0.25 respectively. The index is multiplied by –1 in order to reflect the convention that increases are desirable. Table 4 shows that the equality index increased from -1.0 in 1971 to -0.957 in 1997.

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[26] The poverty thresholds or levels for the LIM and LICO are quite similar. For example, the LIM threshold based on one-half median adjusted family unit income for a family of four in 1996 was $25,304 (1996 dollars). The LICO threshold for a family of four was $27,036 (1996 dollars), based on the non-weighted average for the five thresholds based on the population of the community of residence.

Table 4: Canada, Index of Economic Inequality

Year	Poverty Intensity	Poverty Intensity Index	Gini Coeff. (income after tax)	Gini Coeff. (income after tax), Index	Overall Index of Inequality
	A	A'	B	B'	C=-1*(A'*0.75+B'*0.25)
1971	0.051	1.000	0.373	1.000	-1.000
1972	0.051	1.000	0.368	0.987	-0.997
1973	0.051	1.000	0.368	0.987	-0.997
1974	0.055	1.084	0.363	0.973	-1.056
1975	0.059	1.170	0.364	0.976	-1.122
1976	0.061	1.205	0.374	1.003	-1.154
1977	0.063	1.239	0.362	0.971	-1.172
1978	0.060	1.192	0.367	0.984	-1.140
1979	0.058	1.145	0.355	0.952	-1.097
1980	0.055	1.075	0.358	0.960	-1.046
1981	0.051	1.008	0.351	0.941	-0.991
1982	0.050	0.990	0.353	0.946	-0.979
1983	0.052	1.027	0.363	0.973	-1.014
1984	0.054	1.065	0.359	0.962	-1.040
1985	0.050	0.982	0.358	0.960	-0.976
1986	0.048	0.940	0.359	0.962	-0.945
1987	0.046	0.914	0.357	0.957	-0.925
1988	0.045	0.886	0.355	0.952	-0.902
1989	0.044	0.867	0.352	0.944	-0.886
1990	0.048	0.940	0.352	0.944	-0.941
1991	0.047	0.933	0.357	0.957	-0.939
1992	0.047	0.933	0.356	0.954	-0.939
1993	0.047	0.916	0.358	0.960	-0.927
1994	0.046	0.898	0.354	0.949	-0.911
1995	0.048	0.952	0.357	0.957	-0.953
1996	0.048	0.952	0.362	0.971	-0.957
1997	0.048	0.952	0.362	0.971	-0.957

Sources: A - Appendix Table A18, B- Appendix Table A17.

Other indicators of inequality

By using measures of aggregate inequality, and aggregate poverty, we implicitly impose the ethical value of anonymity, and count the poverty of any person as being of equal social concern, regardless of their identity or such characteristics as age or gender. Those observers who consider the poverty of a particular group (e.g. women) to be of greater ethical concern, will want to calculate the poverty rate and average poverty gap ratio separately and aggregate them with differential weights. Such observers would also presumably want to use an index of inequality (such as the Theil index) which can be decomposed into between group and within group inequality. This has not been done in the current version of our work, but could be, if demand warranted.

Those who are concerned with norms of equity between groups may in addition wish to consider additional indicators of inequality, such as the earnings gap between men and women. In 1971, the earnings ratio between women and men for full-year, full-time workers was 59.7 per cent (Table A19). By 1995, it had risen 22.4 per cent to 73.1 per cent. Such differentials are reflected in the aggregate Gini index of all incomes, and in the rate and extent of poverty, but only enter our measures of poverty and inequality in so far as they affect those aggregate measures.

2.4 Insecurity

If individuals knew their own economic futures with certainty, their welfare would depend only on their actual incomes over their lifetimes, since there would be no reason to feel anxiety about the future. However, uncertainty about the future will decrease the economic welfare of risk averse individuals. Individuals can try to avoid risk through social and private insurance, but such mechanisms do not completely eliminate economic anxieties. Given the value Canadians place on economic security, insecurity reduces economic well-being.

Although public opinion polling can reveal that many Canadians feel themselves to be economically insecure, and that such insecurity decreases their subjective state of well-being, the concept of economic insecurity is rarely discussed in academic economics.[27] Consequently, there

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[27] To be precise, in the ECONLIT database from 1969 to December 1997, there are nine matches to the term "economic insecurity." A search of the Social Sciences Index from 1983, and the PAIS International and PAIS Periodicals/Publisher Index from 1972, yielded eleven matches. The Social Sciences Citation Index for the years 1987-1997 was similarly unproductive.

is no generally agreed definition of economic insecurity. Osberg (1998) has argued that economic insecurity is, in a general sense, "the anxiety produced by a lack of economic safety – i.e. by an inability to obtain protection against subjectively significant potential economic losses." In this sense, individuals' perceptions of insecurity are inherently forward looking, the resultant of their expectations of the future and their current economic context – hence only imperfectly captured by measures such as the ex post variability of income flows.[28] Ideally, one would measure trends in economic security with data which included the percentage of Canadians who have credible guarantees of employment continuity and the adequacy of personal savings to support consumption during illness or unemployment. However, such data are not available (the last survey of asset holdings in Canada took place in 1983/84). For these reasons, rather than attempt an overall measure of economic insecurity, this paper adopts a "named risks" approach, and addresses the change over time in four key economic risks.

Fifty years ago, the United Nations' Universal Declaration of Human Rights declared:

> Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other loss of livelihood in circumstances beyond his control. [Article 25][29]

For this paper, we construct measures of the percentage change over time in the economic risks associated with unemployment, illness, "widowhood" (or single female parenthood) and old age. In each case, we model the risk of an economic loss associated with the event as a conditional probability, which can itself be represented as the product of a number of underlying probabilities. We weight the prevalence of the underlying risk by the proportion of the population that it affects. The core hypothesis underlying the measure of economic insecurity proposed here is that changes in the subjective level of anxiety about a lack of economic safety are proportionate to changes in objective risk.

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[28] For example, a tenured professor with occasional consulting income may have a variable income stream, but feel little insecurity – and data only on individuals' income streams cannot reveal who had a long term employment guarantee (like tenure), and who sweated out a series of short term contract renewals.

[29] In the 1990s, the gender specificity of the language of 1948 will strike many people as odd – but Article 2 makes it clear that all Articles of the Universal Declaration of Human Rights are to be guaranteed to male and female persons equally.

2.4.1   Unemployment

The economic risk associated with unemployment can be modeled as the product of the risk of unemployment in the population and the extent to which people are protected from the income risks of unemployment. We have taken as a proxy for the risk of unemployment the employment rate (employment/population ratio).[30] Changes in this ratio reflect changes in the unemployment rate and changes in the participation rate (both cyclical and structural). The extent to which people have been protected by UI from the financial impacts of unemployment can be modeled as the product of: 1) the percentage of the unemployed who claim regular UI benefits (which has declined precipitously in recent years – from 83 per cent in 1990 to under 42 per cent in 1997); and 2) the percentage of average weekly wages replaced by UI.

The index of security from unemployment has shown considerable variation over the 1971-97 period (see Table 5). It doubled in the early 1970 with the increased generosity of UI. In the 1990s it has fallen by more than half due to the falling employment rate, reflecting higher unemployment and the falling participation rate, and cuts to the UI/EI program in both coverage and benefit levels.[31]

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[30] Readers who are familiar with our earlier papers will note that we have changed our measure of unemployment insecurity. In this paper, we essentially model "security" – we start from the employment/population ratio, the percentage of the unemployed who get benefits and the percentage of average earnings replaced. This is akin to looking at the glass as if it is "three quarters full", with the significant implication that a given absolute change in joblessness will have a smaller proportionate impact on the employment/population ratio. As a consequence, this paper shows a distinctly less sharp decline in security in the 1990s than our previous work. In our earlier papers, we emphasized "insecurity", and constructed a measure based on the percentage of the unemployed that do not get benefits, the percentage of the labour force unemployed, the percentage of average wages not replaced by UI/EI, etc. This change in the "framing" of unemployment and insecurity can be criticized on the grounds that anxiety is driven by changes in the probability of danger, rather than by the converse probability of safety (e.g. safety boards normally think of changes in the probability of an airplane crash, rather than the probability of safe arrival). We have changed to a focus on "employment" because the increased proportion of two earner households may have reduced insecurity by decreasing the probability that a household will lose all employment income due to unemployment. However, it is also true that households may depend on having two pay cheques to meet family needs, such as mortgage obligations – see Fortin (1995).

[31] For discussion of this issue, see HDRC (1998).

Table 5: Risk imposed by unemployment, Canada

Year	Employ-ment Rate	% of the Unemployed Receiving Regular Benefits	Average Weekly Benefits/ Average Weekly Earnings (%)	ER Index	UR Index	UI Coverage	Multipli-cative Index
	A	B	C	D= index of A	E=index of B	F=index of D	G=D*E*F
1971	54.5	73.71	31.25	1.0000	1.0000	1.0000	1.0000
1972	54.9	94.93	45.27	1.0073	1.2878	1.4486	1.8792
1973	56.4	107.40	46.64	1.0349	1.4570	1.4925	2.2504
1974	57.3	110.88	45.98	1.0514	1.5042	1.4714	2.3269
1975	56.9	98.03	45.51	1.0440	1.3299	1.4563	2.0220
1976	57.1	83.54	44.53	1.0477	1.1333	1.4250	1.6919
1977	57.0	76.09	44.18	1.0459	1.0322	1.4138	1.5262
1978	57.9	75.44	45.20	1.0624	1.0234	1.4464	1.5726
1979	59.2	70.97	41.19	1.0862	0.9628	1.3181	1.3785
1980	59.7	67.26	41.65	1.0954	0.9124	1.3328	1.3321
1981	60.4	66.61	40.14	1.1083	0.9037	1.2845	1.2864
1982	57.5	75.95	39.69	1.0550	1.0304	1.2701	1.3807
1983	57.1	74.58	40.19	1.0477	1.0118	1.2862	1.3634
1984	57.9	73.71	40.14	1.0624	1.0000	1.2846	1.3647
1985	58.9	74.12	40.96	1.0807	1.0055	1.3108	1.4244
1986	59.9	76.04	42.04	1.0991	1.0316	1.3453	1.5253
1987	60.8	75.61	42.42	1.1156	1.0257	1.3575	1.5533
1988	62.0	82.11	43.20	1.1376	1.1139	1.3825	1.7518
1989	62.4	83.78	43.88	1.1450	1.1366	1.4041	1.8273
1990	61.9	83.07	45.43	1.1358	1.1269	1.4538	1.8609
1991	59.8	77.92	46.17	1.0972	1.0570	1.4776	1.7137
1992	58.4	70.41	46.14	1.0716	0.9551	1.4763	1.5110
1993	58.2	65.45	45.89	1.0679	0.8879	1.4684	1.3922
1994	58.5	58.51	44.31	1.0734	0.7937	1.4179	1.2080
1995	58.6	52.06	44.09	1.0752	0.7062	1.4108	1.0713
1996	58.6	48.37	43.57	1.0752	0.6562	1.3941	0.9836
1997	58.9	42.25	41.74	1.0807	0.5731	1.3357	0.8273

Source: Table A24, Data on employment rate are from Historical Labour Force Survey 71F0004XCB.

2.4.2 Illness

Viewed from a longer-term perspective, the economic insecurities associated with illness in Canada certainly dropped considerably with the introduction of Medicare in the late 1960s. Since our other data series are often difficult to obtain prior to 1971, the period covered by the present study is 1971 to 1997, which therefore unfortunately largely omits the improvement in economic well-being that Medicare represented. Nevertheless, it is still of interest to examine how the economic insecurities associated with illness have evolved over the last quarter century.

We would emphasize that we do not attempt to model the psychological insecurities associated with health – just the economic risks. Recent decades have seen both substantial advances in medical technology and increased awareness of health hazards (such as Jakob-Kreutzfeld Syndrome -"mad cow disease") which were previously unimaginable. It is not clear whether subjective anxieties about health have increased or fallen as a result.

Our objective is only to model the trend in economic anxieties associated with ill health, but at this stage of our research, there is an important omission. The economic risks associated with illness are partly the risk of loss of earnings. Historically, a portion of the Canadian labour force have had some protection against such losses through sick leave provisions in their individual or collective employment contracts. One implication of the trend to short term contract employment and self employment in Canadian labour markets is an increase in the fraction of the population whose incomes ceases totally, in the event of ill health. This paper does not attempt to model such risks. Instead, we focus on the risk of large out of pocket health care costs.

Health Canada publishes a series on total health expenditures by sector (federal, provincial, municipal, workers' compensation, private). In 1991, net private expenditure was $16,848 million, or 25.4 per cent of total health expenditure. The 1992 Famex shows average household expenditure on health care of $1,035, broken down into $658 for direct costs to household ($233 for medicinal and pharmaceutical products, $138 for eye-care goods and services, and $184 for dental care) and into $378 for health insurance premiums ($174 for private health care plans). We exclude expenditure on private health insurance premiums (since these are in fact a way of avoiding health care cost risk) and express remaining private expenditures on health care (net of health insurance reimbursements) as a percentage of total after-tax personal income.

Table 6: Canada, Risk Imposed by Illness

Year	Medical Care Expenses, Percentage of Disposable Income	Index
1971	2.55	-1.000
1972	2.55	-1.000
1973	2.55	-1.000
1974	2.55	-1.000
1975	2.55	-1.000
1976	2.52	-0.988
1977	2.55	-1.000
1978	2.55	-1.000
1979	2.56	-1.004
1980	2.67	-1.047
1981	2.66	-1.043
1982	2.78	-1.090
1983	2.88	-1.129
1984	2.92	-1.145
1985	3.03	-1.188
1986	3.18	-1.247
1987	3.24	-1.271
1988	3.28	-1.286
1989	3.30	-1.294
1990	3.43	-1.345
1991	3.62	-1.420
1992	3.80	-1.490
1993	3.96	-1.553
1994	4.12	-1.616
1995	4.24	-1.663
1996	4.47	-1.753
1997	4.66	-1.829

Note: Data for 1996-1997 were extrapolated on the assumption of
constant growth from the 1990 to 1995 period.

Private expenditures on health have risen 82.7 per cent from 2.55 per cent in 1971 to 4.66 per
cent in 1997, with almost all the relative increase in the 1980s and 1990s. This increase has been
caused by a number of factors, including de-listing of certain medical services provided in the
past by provincial health plans, large increases in drug prices, the aging of the population,
supplier-induced increases in patient demand for health services, and medical advances that have
produced medical services not previously available.

However, to follow the convention that increases in the sub-components of the index of
economic security are improvements, we want an index of "security" and not an index of

"insecurity", hence we multiply the risk of illness where increases are negative for economic well-being by –1. A negative sign therefore indicates that an increased negative value represents a decline in well-being (and a decreased negative value an increase in well-being).

2.4.3   Single parent poverty

When the UN Universal Declaration of Human Rights was drafted in 1948, the percentage of single parent families was relatively high, partly as a result of World War II. At that point in time, "widowhood" was the primary way in which women and children lost access to male earnings. Since then, divorce and separation have become the primary origins of single parent families. However, it remains true that many women and children are "one man away from poverty," since the prevalence of poverty among single parent families is extremely high.

To model trends in this aspect of economic insecurity, we multiply (the probability of divorce) * (the poverty rate among single female parent families)[32] * (the average poverty gap ratio among single female parent families)[33]

We stress that in constructing a measure of the economic insecurity associated with single parent status, we are *not* constructing a measure of the social costs of divorce. Economic well being is only part of social well being, and divorce has emotional and social costs (e.g. for the involved children) that are not considered here. Arguably, over time the social costs associated with divorce (e.g. stigma) have changed, as the institution of marriage itself has changed – but such issues lie well beyond the scope of this paper.

Table 7 shows that the divorce rate has more than doubled over the period rising from an annual rate of 0.59 per cent per legally married couple in 1971 to 1.22 per cent in 1997. The poverty rate for households headed by lone-parent females, defined on a LIM basis, rose 10.9 per cent between 1971 and 1997 from 49.5 per cent to 54.9 per cent, while the average poverty gap ratio fell 22 per cent from 41 per cent to 32 per cent. The overall index 81.2 per cent, indicating a major increase in the risk of poverty for households headed by a lone female.

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[32] However, RATE= INCIDENCE x AVERAGE DURATION. Since the poverty rate among single parents is equal to the conditional probability that a single parent will enter poverty and the average duration of a poverty spell, we do implicitly account jointly for the duration of poverty spells and for their likelihood.

[33] This procedure effectively ignores single male parents. While the authors of this paper feel this is an important group, males comprise only about 10 per cent of the single parent population, and their income loss on divorce is considerably less than that of women.

Table 7: Canada, Risk Imposed of Single Parent Poverty

Year	% of Women and Children at risk of Widow-hood	Divorce rate (% of legally married couples) (A)	Poverty Rate (%) for Single Women with Children under 18 (B)	Poverty Gap/ Poverty Rate or Average Depth of Poverty (C)	Index of A (A')	Index of B (B')	Index of C (C')	Multiplicative Index (A'*B'*C')*-1
1971	57.73	0.585	49.5	0.41	1.000	1.000	1.0000	-1.0000
1972	57.50	0.631	49.5	0.41	1.079	1.000	1.0000	-1.0786
1973	57.28	0.706	49.5	0.41	1.207	1.000	1.0000	-1.2068
1974	57.05	0.854	52.8	0.40	1.460	1.066	0.9634	-1.4988
1975	56.83	0.947	56.0	0.38	1.619	1.131	0.9268	-1.6974
1976	56.60	1.001	55.5	0.41	1.711	1.121	0.9878	-1.8951
1977	56.38	1.010	55.0	0.43	1.726	1.111	1.0488	-2.0119
1978	56.15	1.032	54.8	0.45	1.764	1.107	1.0854	-2.1197
1979	55.93	1.064	54.6	0.46	1.819	1.103	1.1220	-2.2509
1980	55.70	1.095	52.7	0.45	1.872	1.065	1.0976	-2.1872
1981	55.48	1.180	50.8	0.44	2.017	1.026	1.0732	-2.2215
1982	55.25	1.215	45.2	0.39	2.077	0.913	0.9512	-1.8040
1983	55.03	1.171	51.0	0.38	2.002	1.030	0.9268	-1.9115
1984	54.80	1.103	56.8	0.37	1.885	1.147	0.9024	-1.9525
1985	54.58	1.040	57.1	0.39	1.778	1.154	0.9512	-1.9507
1986	54.35	1.302	56.1	0.37	2.226	1.133	0.9024	-2.2763
1987	54.13	1.586	55.8	0.38	2.711	1.127	0.9268	-2.8325
1988	53.90	1.367	54.4	0.37	2.337	1.099	0.9024	-2.3175
1989	53.68	1.312	53.7	0.35	2.243	1.085	0.8537	-2.0770
1990	53.45	1.263	59.0	0.36	2.159	1.192	0.8780	-2.2595
1991	53.23	1.235	58.1	0.36	2.111	1.174	0.8780	-2.1757
1992	53.00	1.258	54.7	0.34	2.150	1.105	0.8293	-1.9706
1993	52.78	1.238	53.7	0.31	2.116	1.085	0.7561	-1.7358
1994	52.55	1.246	54.4	0.32	2.130	1.099	0.7805	-1.8269
1995	52.33	1.222	54.9	0.32	2.089	1.109	0.7805	-1.8082
1996	52.10	1.225	54.9	0.32	2.093	1.109	0.7805	-1.8120
1997	51.88	1.225	54.9	0.32	2.093	1.109	0.7805	-1.8120

Note: Data for 1996, 1997 is assumed to be equal data for 1995.

Again, to follow the convention that increases in the sub-components of the index of economic security are improvements, we want an index of "security" and not an index of "insecurity", hence we multiply the risk of single-parenthood where increases are negative for economic well-being by –1. A negative sign therefore indicates that an increased negative value represents a decline in well-being (and a decreased negative value an increase in well-being).

2.4.4   Old age

Since income in old age is the result of a lifelong series of events and decisions, which we cannot hope to disentangle in this paper, we model the idea of "insecurity in old age" as the chance that an elderly person will be poor, and the average depth of that poverty.

The elderly poverty rate, defined on a LIM basis, fell from 26.5 per cent in 1971 to 9.6 per cent in 1997 (see Table 8). Moreover, the average poverty gap ratio declined from 25 per cent to 10. Consequently, the overall index of risk of poverty intensity fell 85 per cent between 1971 and 1997.

Again, to follow the convention that increases in the sub-components of the index of economic security are improvements, we multiply the risk of elderly poverty where increases are negative for economic well-being by –1. A negative sign therefore indicates that an increased negative value represents a decline in well-being (and a decreased negative value an increase in well-being).

2.4.5   Overall index of economic security

The four risks discussed above have been aggregated into an index of economic security (Table 9). The aggregation weights are the relative importance of the four groups in the population (Table A20).

- For unemployment, the proportion of the 15-64 population in the total population (66.8 per cent in 1997).

- For illness, the proportion of the population at risk of illness, which is 100 per cent.

Table 8: Canada, Risk Imposed by Old Age

Year	% 45-64 of Pop 18+	Elderly Poverty Rate (A)	Elderly Poverty Gap (% of Poverty Line) (B)	Poverty Intensity (C=A*B)	Poverty Intensity Index, C'
1971	28.60	26.5	0.25	0.0663	-1.0000
1972	28.41	26.5	0.25	0.0663	-1.0000
1973	28.21	26.5	0.25	0.0663	-1.0000
1974	28.02	32.0	0.27	0.0847	-1.2780
1975	27.82	37.4	0.28	0.1047	-1.5807
1976	27.63	38.1	0.30	0.1122	-1.6943
1977	27.33	38.7	0.31	0.1200	-1.8109
1978	27.03	37.4	0.29	0.1064	-1.6068
1979	26.73	36.0	0.26	0.0936	-1.4128
1980	26.43	33.4	0.24	0.0785	-1.1848
1981	26.13	30.8	0.21	0.0647	-0.9763
1982	25.98	22.8	0.18	0.0410	-0.6195
1983	25.98	21.4	0.18	0.0384	-0.5801
1984	25.78	19.9	0.18	0.0358	-0.5407
1985	25.59	17.5	0.17	0.0298	-0.4491
1986	25.39	18.9	0.16	0.0302	-0.4565
1987	25.46	17.0	0.16	0.0272	-0.4106
1988	25.53	20.4	0.16	0.0326	-0.4927
1989	25.59	19.7	0.14	0.0276	-0.4163
1990	25.66	17.2	0.13	0.0224	-0.3375
1991	25.73	12.7	0.12	0.0152	-0.2300
1992	25.80	11.7	0.12	0.0140	-0.2119
1993	25.87	12.5	0.15	0.0188	-0.2830
1994	25.93	9.9	0.13	0.0129	-0.1943
1995	26.00	9.6	0.10	0.0096	-0.1449
1996	26.07	9.6	0.10	0.0096	-0.1449
1997	26.14	9.6	0.10	0.0096	-0.1449

Note: Data on Poverty rate & Poverty Gap for 1996, 1997 is assumed to be equal data for 1995.
Poverty Intensity = Poverty rate * Poverty gap

Table 9: Index of Economic Security, Canada

Year	Index 1 Unemployed Risk	Index 2 Illness Risk	Index 3 Single Parent Poverty Risk	Index 4 Old Age Risk	Weight for Index of WAP (15+ Pop/ All Pop)	Weight for Index of Pop Under Risk for Health	Weight for Index of Women in Poverty	Weight for Index of Elderly Pop	Weighted Index 1 Unemploy-ment	Weighted Index 2 Health	Weighted Index 3 Women	Weighted Index 4 Old Age	Average Weighted Index
	A	B+2	C+2	D+2	E	F	G	H	I=A*E	J=B*F	K=C*G	L=D*H	M=I+J+K+L
1971	1.0000	1.0000	1.0000	1.0000	0.2635	0.4180	0.2413	0.0772	0.2635	0.4180	0.2413	0.0772	1.0000
1972	1.8792	1.0000	0.9214	1.0000	0.2640	0.4183	0.2405	0.0771	0.4961	0.4183	0.2216	0.0771	1.2132
1973	2.2504	1.0000	0.7932	1.0000	0.2663	0.4173	0.2390	0.0773	0.5994	0.4173	0.1896	0.0773	1.2836
1974	2.3269	1.0000	0.5012	0.7220	0.2690	0.4162	0.2374	0.0774	0.6259	0.4162	0.1190	0.0559	1.2170
1975	2.0220	1.0000	0.3026	0.4193	0.2717	0.4150	0.2359	0.0774	0.5493	0.4150	0.0714	0.0325	1.0682
1976	1.6919	1.0118	0.1049	0.3057	0.2703	0.4162	0.2356	0.0779	0.4572	0.4211	0.0247	0.0238	0.9269
1977	1.5262	1.0000	-0.0119	0.1891	0.2721	0.4157	0.2343	0.0778	0.4153	0.4157	-0.0028	0.0147	0.8429
1978	1.5726	1.0000	-0.1197	0.3932	0.2739	0.4151	0.2331	0.0778	0.4308	0.4151	-0.0279	0.0306	0.8486
1979	1.3785	0.9961	-0.2509	0.5872	0.2757	0.4147	0.2319	0.0776	0.3801	0.4131	-0.0582	0.0456	0.7806
1980	1.3321	0.9529	-0.1872	0.8152	0.2773	0.4146	0.2309	0.0772	0.3694	0.3951	-0.0432	0.0629	0.7842
1981	1.2864	0.9569	-0.2215	1.0237	0.2784	0.4147	0.2301	0.0768	0.3581	0.3969	-0.0510	0.0786	0.7826
1982	1.3807	0.9098	0.1960	1.3805	0.2788	0.4146	0.2291	0.0776	0.3849	0.3772	0.0449	0.1071	0.9141
1983	1.3634	0.8706	0.0885	1.4199	0.2794	0.4147	0.2282	0.0777	0.3809	0.3610	0.0202	0.1104	0.8725
1984	1.3647	0.8549	0.0475	1.4593	0.2798	0.4149	0.2274	0.0780	0.3819	0.3547	0.0108	0.1138	0.8611
1985	1.4244	0.8118	0.0493	1.5509	0.2802	0.4153	0.2266	0.0779	0.3991	0.3371	0.0112	0.1208	0.8682
1986	1.5253	0.7529	-0.2763	1.5435	0.2804	0.4157	0.2259	0.0779	0.4277	0.3130	-0.0624	0.1203	0.7986
1987	1.5533	0.7294	-0.8325	1.5894	0.2801	0.4168	0.2256	0.0775	0.4351	0.3040	-0.1878	0.1232	0.6745
1988	1.7518	0.7137	-0.3175	1.5073	0.2796	0.4175	0.2250	0.0779	0.4899	0.2980	-0.0715	0.1174	0.8337
1989	1.8273	0.7059	-0.0770	1.5837	0.2786	0.4187	0.2247	0.0780	0.5091	0.2955	-0.0173	0.1236	0.9109
1990	1.8609	0.6549	-0.2595	1.6625	0.2782	0.4193	0.2241	0.0784	0.5177	0.2746	-0.0582	0.1304	0.8645
1991	1.7137	0.5804	-0.1757	1.7700	0.2784	0.4193	0.2232	0.0791	0.4771	0.2434	-0.0392	0.1400	0.8212
1992	1.5110	0.5098	0.0294	1.7881	0.2779	0.4181	0.2216	0.0825	0.4199	0.2131	0.0065	0.1475	0.7870
1993	1.3922	0.4471	0.2642	1.7170	0.2782	0.4176	0.2204	0.0838	0.3873	0.1867	0.0582	0.1439	0.7761
1994	1.2080	0.3843	0.1731	1.8057	0.2781	0.4170	0.2192	0.0857	0.3360	0.1603	0.0379	0.1547	0.6889
1995	1.0713	0.3373	0.1918	1.8551	0.2778	0.4168	0.2181	0.0872	0.2976	0.1406	0.0418	0.1618	0.6419
1996	0.9836	0.2471	0.1880	1.8551	0.2778	0.4165	0.2170	0.0888	0.2732	0.1029	0.0408	0.1647	0.5817
1997	0.8273	0.1709	0.1880	1.8551	0.2779	0.4160	0.2158	0.0904	0.2299	0.0711	0.0406	0.1676	0.5092

Sources: Tables 5,6,7,8 for indexes, and Table A20 for weights.

- For single parent poverty, the proportion of the population comprised of married women with children under 18 (51.9 per cent in 1997).

- For old age poverty, the proportion of the population in immediate risk of poverty in old age, defined as the proportion of the 45-64 population in the total population (21.7 per cent in 1997).

The above proportions have been normalized for all years to one (Table A20), giving in 1997 the following weights-unemployment (0.2779), illness (0.4160), single parenthood (0.2158), and old age (0.0904).

In order that the base year for the indexes of all risks of economic security be the same at 1.000 in Table 9, the constant 2 has been added to the indexes of risk of illness, single parenthood, and old age, whose original base was –1.

Based on the above weights, the overall index of economic security declined 49.8 per cent between 1971 and 1997 (see Table 9 and Chart 1). The increased risk from unemployment was the driving force behind this development, both because of a rising unemployment rate and the reduced coverage provided by UI/EI. Increased private expenditure on health and increased risk of single parent poverty due to the doubling of the divorce rate and the increased poverty rate for single mothers also contributed to the rise. Canada's success story from an economic security perspective has been the fall in the poverty rate of the elderly – which has meant that those approaching old age have had a lower risk of indigence in old age to worry about.

2.4.6   Other aspects of insecurities

Unanticipated inflation

Anticipated inflation does not create "insecurity" since inflationary expectations become embedded in interest rates, which are known to both borrower and lender. Unanticipated inflation, however, causes unanticipated changes in the real value of money assets and liabilities and an unanticipated redistribution of real income. Since individuals worry about the possibility of such losses and gains, unanticipated inflation can also contribute to economic insecurity.[34]

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[34] A related issue is the belief by some that low inflation contributes more to economic well-being and economic security than moderate inflation because low inflation is associated with less price variability. But a recent Bank of Canada paper (Ragan, 1998) concludes "…the current state of economic research – both empirical and theoretical – provides little basis for believing in significant observable benefits of low inflation such as an increase in the growth

The absolute value of unanticipated inflation (actual-expected inflation) dropped from an average of 1.49 per cent in 1975-84 to 0.73 per cent in 1985-95 (Table A21). At this time, no estimates of the costs of unanticipated inflation made have been incorporated in the index.[35] However, given the relatively small absolute change in inflation uncertainty, we expect the influence of this variable to be small.

Personal security indicators

Freedom from economic catastrophe constitutes an element of economic security. Such catastrophes include crime, auto accidents and work accidents, which can cripple the ability of those affected to earn a living. The incidence of crime reported to police in Canada has increased significantly in recent years. The incidence of violent crime doubled from 491 incidents per 100,000 population in 1971 to 995 in 1995 (Table A22). The incidence of property crime rose 44 percent from 3,638 incidents per 100,000 in 1971 to 5,237 in 1995.

In contrast to rising crime trends, the probability of being killed in an auto accident or on the job has fallen. In 1971, 25.3 persons per 100,000 were killed in auto accidents (Table A23). By 1996, this had fallen 59.3 per cent to 10.3 per 100,000. The probability of being injured in an auto accident also fell, but only by 11.8 per cent. The probability of being killed or injured on the job has also declined, in part because of the employment shift to less dangerous service industries.

The Canadian Council for Social Development is currently development a personal security index, which may be useful as a sub-component of the economic security component of the index of economic well-being.

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rate of real GDP. Moreover, what observable benefits do exist are unlikely to justify a policy of disinflation, even if the transitional costs of disinflation are quite moderate."

[35] To calculate the unanticipated component of inflation, one must specify a model of inflationary expectations. Several such models exist and their virtues are arguable. In the future, we plan to adopt the simpler strategy of using the Iscan and Xu (1998) estimates of the variability of inflation as a proxy for unanticipated inflation. Since only the money denominated portions of personal wealth are exposed to inflation risk, we will multiply the year to year percentage change in inflation variability by the percentage of bonds in national balance sheets assets, weighted by the percentage of the population holding such assets.

3. Estimates of the Overall Index of Economic Well-Being for Canada

3.1 Weighting of Components

Trends in the index are determined by the choice of variables that are included in the index, the trends in those variables and the weights given these variables. Since the four main dimensions of average consumption, bequest, inequality/poverty and insecurity are separately identified, it is easy to conduct sensitivity analyses of the impact on perceived overall trends of different weighting of these dimensions. For discussion purposes, consumption flows have been given a weight of 0.4, wealth stocks a weight of 0.1, and equality and economic security have each been given weights of 0.25.

As the sub-components of the consumption flows and wealth stocks are expressed in dollars, there is no need for explicit weighting. Their dollar values represent implicit weights. In terms of the inequality/poverty sub-components, a Rawlsian perspective assigns greater importance to poverty than to overall inequality trends, and a weight of 0.1875 or (=0.25*0.75) has therefore been given poverty intensity and 0.0625 (=0.25*0.25) to the Gini coefficient. In other words, poverty is given three times the weight of inequality. The sub-components of the economic security index are weighted by the relative importance of the specific population at risk in the total population.

The weighting of components and sub-components of the economic well-being index are shown below and in Chart 1.

Chart 1: Weighting Tree

Index of Well-Being

Consumption Flows 0.4
- Market Consumption Per Capita (1992 $)
- Government Spending Per Capita (1992 $)
- Unpaid Work Per Capita (1992 $)

Wealth Stocks 0.1
- Capital Stock Per Capita (1992 $)
- R&D Per Capita (1992 $)
- Natural Resources Per Capita (1992 $)
- Human Capital (1992 $)
- less: Net Foreign Debt Per Capita (1992 $)
- less: Social Cost of Environmental Degradation (1992 $)

Equality 0.25
- Poverty Intensity 0.1875
- Gini Coefficient 0.0625 (income after taxes)

Economic Security 0.25
- Risk of Unemployment 0.0694
- Risk of Illness 0.104
- Risk of Single Parent Poverty 0.0540
- Risk of Old Age 0.0226

Table 10: Canada, Overall Well-Being Index

Year	Consumption Flows 0.4	Wealth Stocks 0.1	Inequality Measures	Equality Measures 0.25	Economic Security 0.25	Well-Being Index
	A	B	C	D=C+2	E	G=0.4*A+0.1*B+0.25*D+0.25*E
1971	1.0000	1.0000	-1.0000	1.0000	1.0000	1.0000
1972	1.0176	1.0020	-0.9966	1.0034	1.2132	1.0614
1973	1.0576	1.0255	-0.9966	1.0034	1.2836	1.0973
1974	1.0956	1.0588	-1.0565	0.9435	1.2170	1.0842
1975	1.1244	1.0826	-1.1218	0.8782	1.0682	1.0446
1976	1.1402	1.0983	-1.1542	0.8458	0.9269	1.0091
1977	1.1601	1.1146	-1.1722	0.8278	0.8429	0.9932
1978	1.1786	1.1302	-1.1398	0.8602	0.8486	1.0117
1979	1.1949	1.1931	-1.0966	0.9034	0.7806	1.0183
1980	1.2122	1.2605	-1.0464	0.9536	0.7842	1.0454
1981	1.2137	1.2207	-0.9912	1.0088	0.7826	1.0554
1982	1.1925	1.2255	-0.9791	1.0209	0.9141	1.0833
1983	1.2022	1.2495	-1.0138	0.9862	0.8725	1.0705
1984	1.2194	1.2552	-1.0395	0.9605	0.8611	1.0687
1985	1.2520	1.2403	-0.9764	1.0236	0.8682	1.0978
1986	1.2619	1.1843	-0.9452	1.0548	0.7986	1.0865
1987	1.2879	1.2129	-0.9250	1.0750	0.6745	1.0738
1988	1.3217	1.2400	-0.9022	1.0978	0.8337	1.1356
1989	1.3412	1.2556	-0.8865	1.1135	0.9109	1.1681
1990	1.3476	1.3010	-0.9406	1.0594	0.8645	1.1501
1991	1.3323	1.2773	-0.9392	1.0608	0.8212	1.1312
1992	1.3334	1.2699	-0.9385	1.0615	0.7870	1.1225
1993	1.3333	1.2712	-0.9271	1.0729	0.7761	1.1227
1994	1.3382	1.2912	-0.9107	1.0893	0.6889	1.1090
1995	1.3389	1.3125	-0.9534	1.0466	0.6419	1.0889
1996	1.3442	1.3275	-0.9567	1.0433	0.5817	1.0767
1997	1.3672	1.3428	-0.9567	1.0433	0.5092	1.0693

Sources: Tables 2,3,4,9

Table 11: Canada, Comparison of Index of Economic Well-Being to GDP per capita, MEW, GPI, and ISH Indexes

Year	Economic Well-Being Index	Sustainable MEW Index	GPI Index	ISH Index	GDP mil 1992$	Population thousands	GDP per Capita 1992$	GDP per Capita Index
1971	1.000	1.000	1.000	1.000	370859	21,780	17,028	1.0000
1972	1.061	0.877	0.985	1.190	390702	22,253	17,557	1.0311
1973	1.097	0.934	0.990	1.167	418797	22,521	18,596	1.0921
1974	1.087	0.833	1.045	1.381	436151	22,839	19,097	1.1215
1975	1.051	0.995	1.070	1.381	445813	23,169	19,242	1.1300
1976	1.016	1.131	1.091	1.524	470291	23,482	20,028	1.1762
1977	1.002	0.991	1.036	1.548	486562	23,764	20,475	1.2024
1978	1.018	0.833	1.104	1.548	506413	24,008	21,093	1.2387
1979	1.023	1.042	1.071	1.667	527703	24,245	21,765	1.2782
1980	1.049	1.067	1.130	1.643	535007	24,548	21,794	1.2799
1981	1.058	1.096	1.251	1.548	551305	24,864	22,172	1.3021
1982	1.083	0.947	1.233	1.357	535113	25,167	21,262	1.2487
1983	1.067	1.298	1.179	1.286	549843	25,425	21,626	1.2700
1984	1.063	1.141	1.037	1.310	581038	25,671	22,634	1.3292
1985	1.091	1.029	0.968	1.333	612416	25,912	23,634	1.3880
1986	1.081	1.072	1.109	1.310	628575	26,171	24,018	1.4105
1987	1.068	1.154	1.125	1.333	654360	26,503	24,691	1.4500
1988	1.131	1.108	1.179	1.381	686176	26,856	25,550	1.5005
1989	1.164	1.072	1.158	1.381	703577	27,318	25,755	1.5125
1990	1.145	1.006	1.151	1.310	705464	27,733	25,438	1.4939
1991	1.125	1.215	1.197	1.071	692247	28,086	24,648	1.4475
1992	1.116	1.200	1.085	1.214	698544	28,481	24,526	1.4404
1993	1.115	1.145	1.041	1.190	716123	28,858	24,815	1.4573
1994	1.101	1.233	1.117	1.167	744220	29,220	25,470	1.4958
1995	1.082	1.231		1.143	760309	29,574	25,709	1.5098
1996	1.070				769730	29,918	25,728	1.5110
1997	1.063				798183	30,241	26,394	1.5501

Chart 2: Total Economic Well Being Index

Legend:
- Well Being Index =0.4*Consumption+0.1*Wealth+025*Inequality+0.25*Security
- Well Being Index =0.7*Consumption+0.1*Wealth+0.1*Inequality+0.1*Security
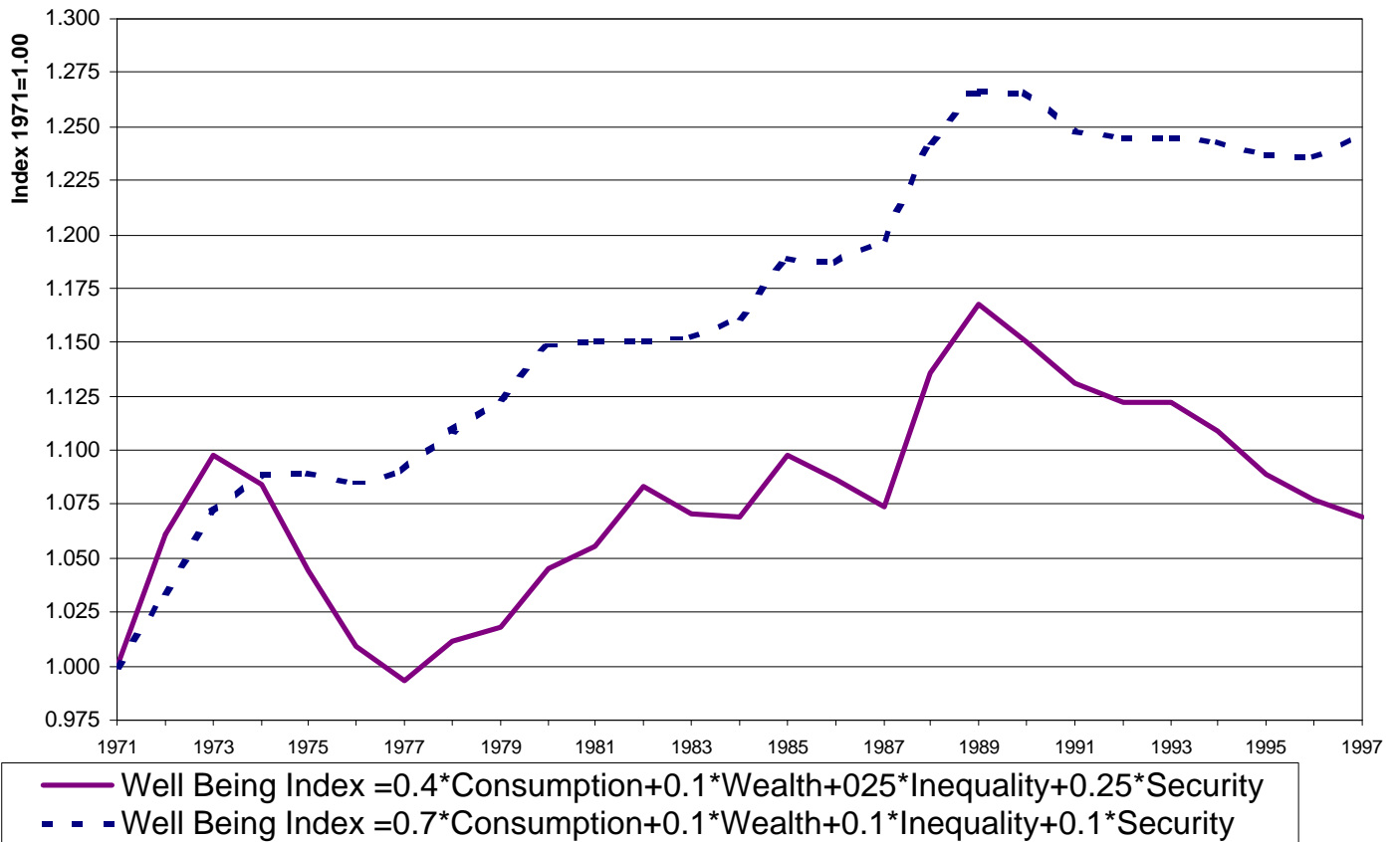
Table 12: Weighting of the Index of Economic Well-Being
(Weights of total index in brackets)

Basic Component	Sub-Components
Consumption Flows (0.40)	Real total consumption (dollars per capita) Real per capita current government spending excluding debt charges (dollars) Real current government spending on goods and services excluding debt service (dollars per capita) Real value of unpaid labour (dollars per capita)
Stocks of Wealth (0.10)	Real capital stock (including housing) (dollars per capita) Real R&D stock (dollars per capita) Real stock of natural resources (dollars per capita) Real human capital stock (dollars per capita) Real net foreign debt (dollars per capita) Real social cost of environmental degradation (CO2 emissions) (dollars per capita)
Equality (0.25)	LIM poverty intensity (0.1875) After-tax income Gini coefficient (0.0625)
Security[36] (0.25)	Risk of unemployment (0.0694) Risk of illness (0.1040) Risk of single parenthood (0.0540) Risk of old age (0.0226)

The formula for the overall index follows:

$$IEWB= (0.4)[C+G+UP]+ (0.1)[K+ R\&D+NR+HC-D-ED]+[(0.1875 \ (LIM)+(0.0625)Gini]+$$

$$[(0.0694)UR+(0.1040)ILL+(0.0540)SP+ (0.0226)OLD]$$

where

   IEWB= index of economic well-being

   C= real per capita adjusted personal consumption

   G= real per capita current government spending excluding debt charges

   UP= real value of per capita unpaid labour

   K= real per capita capital stock (including housing)

   R&D= real per capita stock of research and development

   NR= real per capita stock of natural resource wealth

   HC= real per capita stock of human capital

   D= real per capita net foreign debt

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[36] The weights are for 1997. The actual weights used vary by year.

ED= real per capita social costs of environmental degradation (CO_2 emissions)

LIM= poverty intensity

Gini= Gini coefficient for after tax income

UR= risk of unemployment

ILL= risk of illness

SP= risk of single parenthood

OLD= risk of old age

Table 10 shows the indexes for all four components of the index of economic well-being and the overall index. To put all the sub-components to a common base of 1, the constant 2 has been added to the index of inequality (Table 4) to convert it to an index where an increase corresponds to a rise in economic well-being.

3.2   Trends in the Overall Index of Economic Well-Being

The overall index of economic well-being for Canada showed no overall trend in the 1970s, rose in the 1980s to a peak on 1.1644 in 1989 (1971=1.00), and has fallen continually in the 1990s, reaching 1.0625 in 1997. (Actual data for a number of series for 1997 are not yet available and estimates have been used. For this reason, the index for 1997 is preliminary and subject to revision.)

Some of the year-to-year movement in the index reflects the sensitivity to the business cycle by certain components of the index. For example, consumption flows depend on personal income, which is determined largely by demand-driven employment levels. Wealth stocks include the capital stock that is determined by cyclically-sensitive investment, and the value of natural resources, which reflects cyclical commodity prices. The two inequality measures (poverty intensity and Gini coefficients) are influenced by the state of the economy (Sharpe and Zyblock, 1997). Finally, a number of the components of the economic security index are also very sensitive to the business cycle, such as the employment/population ratio.

Trends in the index are, not surprisingly, very sensitive to the weighting given the four components. As mentioned earlier, for discussion purposes our preferred weighting is the following: consumption 0.4, stocks of wealth 0.1, equality 0.25, and security 0.25. Chart 2 shows trends in the index with consumption flows given a much greater weight (0.7) and the other three

components each with weights of 0.1. This index exhibits a different pattern during certain periods. While the two indexes tracked each other in the early years of the 1970s, they diverged in mid-decade, with the index with the higher consumption weight stable and the index with the lower weight declining. From the late 1970s to the late 1980s, the indexes again tracked one another. Then it the 1990s, they diverged again, with the high-consumption-weighted index falling slightly and the high-equality and security-weighted index falling much more.

Table 13 and Chart 3 provide a breakdown of the changes in the four components of the index over the 1971-97 period and in the 1970s, 1980s, and 1990s. Over the 26 year period covered by the time series, the economic security component experienced the largest change of any of the four components of the index, down 49.8 per cent. This change reflected the large increase in the risk of illness and of single-parenthood (Table 9). There were improvements in all the other components of well-being, with consumption up 36.7 per cent, wealth stocks up 34.3 per cent and equality up 4.3 per cent.

The absolute decline in the index in the 1990s reflects fall in the indexes for consumption, equality, and security. The latter index fell 44.9 per cent due to large increases in the risks associated with unemployment and illness (Table 9).

Table 13: Trends in Components of the Economic Well-Being Index for Canada, 1971-97 (per cent change)

	1971-97	1971-80	1980-1989	1989-1997
Overall Index (1.0)	6.7	5.1	11.2	-8.6
Consumption Flows (0.4)	36.7	21.2	10.6	1.9
Wealth Stocks (0.1)	34.3	26.1	-0.4	6.9
Inequality (0.25)	4.3	-4.6	16.8	-6.3
Economic Security (0.25)	-49.8	-19.5	13.1	-44.9

Source: Table 10

3.3   Comparisons of Trends in the Index of Economic Well-Being with Other Indexes of Well-Being

Table 11 and Chart 4 show that the index of economic well-being tracked real GDP per capita in the first half of the 1970s, and then fell behind, with the gap growing greatly over time. By 1989, the GDP per capita index had reached 158.8, compared to 116.8 for the index of economic well-being, indicating growth of this conventional measure of economic welfare had been more than

three times as fast as the index of economic well-being over the 1971-89 period (2.8 per cent per year versus 0.9 per cent). In the 1990s, GDP per capita fell, but by 1997 had regained its 1989 pre-recession level. The index of economic well-being has also fallen in the 1990s, but in contrast to GDP per capita has not rebounded and in 1997 was 8.6 per cent below the 1989 peak. Over the entire 1971-97 period, real per capita GDP was up 58.3 per cent, nearly 10 times the rate of advance of the index of economic well-being (6.7 per cent).

The divergence between growth in GDP per capita and the economic well-being index since 1971 is partly explained by slower growth in per capita consumption and stocks of wealth, but more importantly by the failure of economic equality to increase and the large fall in economic security.

Chart 3: Total Economic Well Being Index and Components
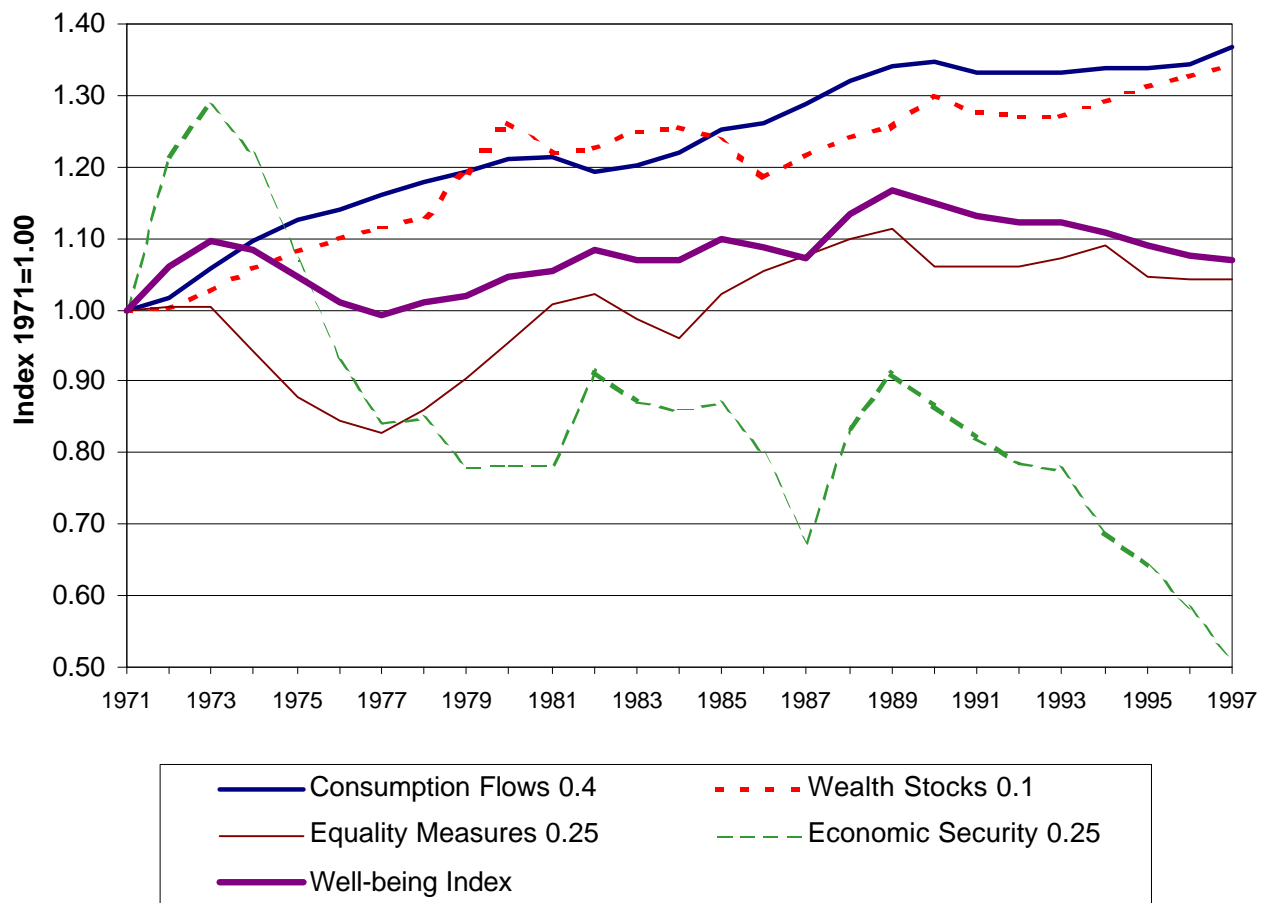
Chart 4: Trends in Economic Well-Being & GDP Per Capita Indexes
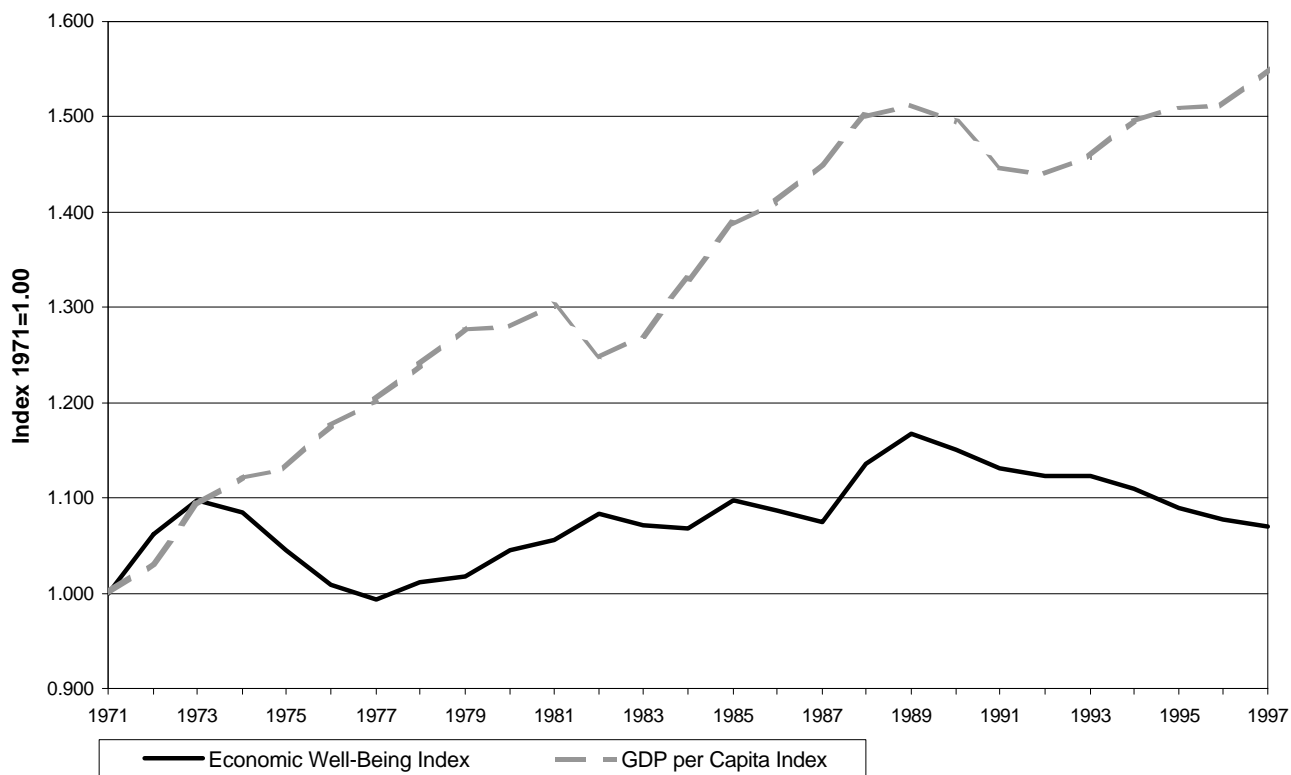
Table 11 and Chart 5 compare the trend in the index of economic well-being with that of the Genuine Progress Indicator (GPI) and the Measure of Economic Welfare (MEW), both of which Statistics Canada has estimated for Canada (Messinger, 1997), and the Index of Social Health (ISH), which Human Resources Development Canada has recently estimated for Canada and the provinces (Brink and Zeesman, 1997). The data that both the GPI, MEW and ISH are based upon are given in Tables A24-26.

Between 1971 and 1995 (the most recent year for which data are available) the GPI increased 11.7 per cent the sustainable MEW 23.1 per cent, and the ISH 14.3 per cent.[37] Thus the 8.7 per cent increase in the index of economic well-being between 1971 and 1995 represented a smaller increase than that experienced by the other three alternative indicators.

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[37] Both the GPI and the MEW are expressed in dollars. In 1971, the GPI was $8,018 per capita (1986 dollars) while the MEW was $27,466.

Chart 5: Trends in Economic Well-Being, Sustainable MEW, GPI, and ISH Indexes
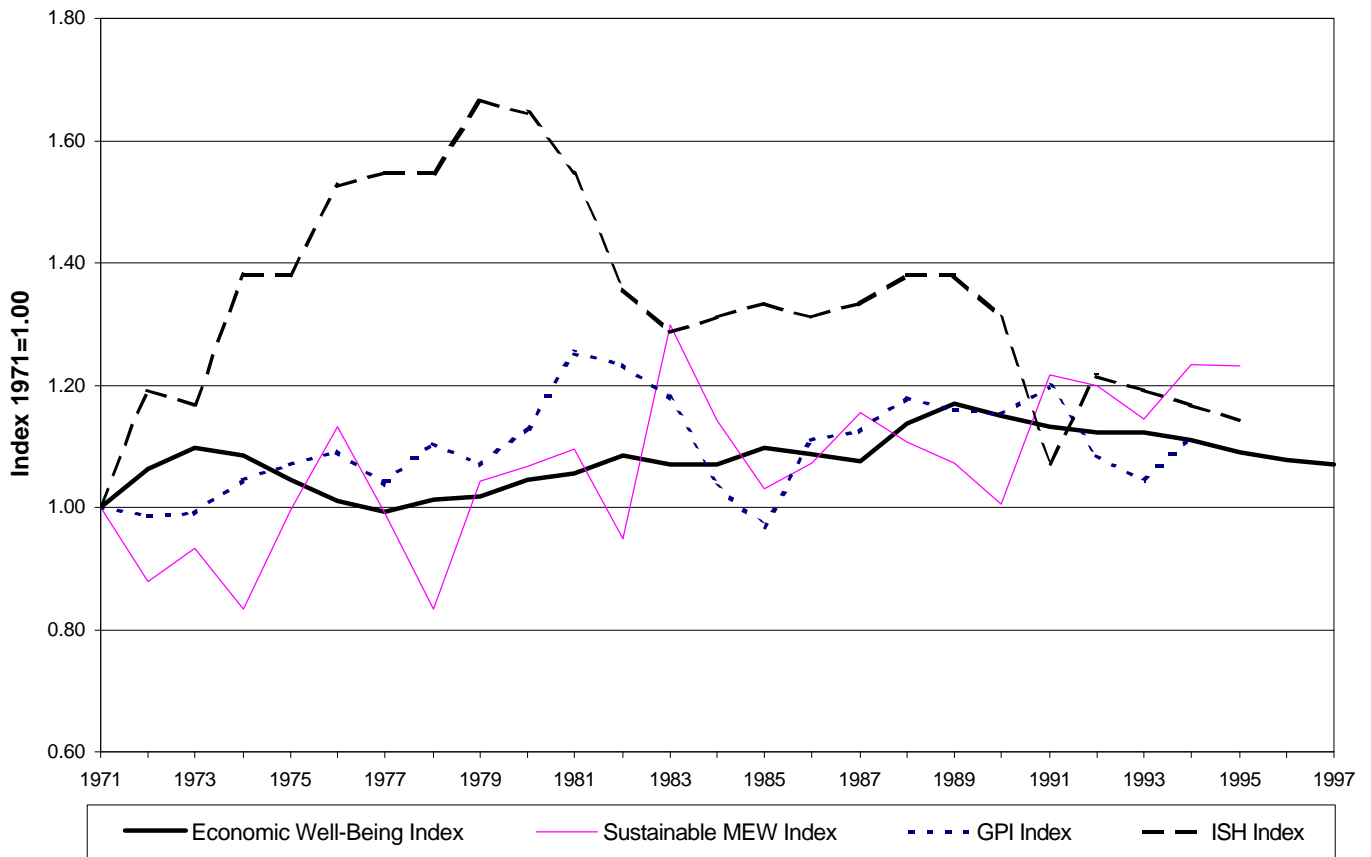
4. Directions for Future Research

There are a number of priorities for future development. For consumption flows, priorities include the inclusion of data on changes in the amount of leisure time (either an index or an adjustment to consumption); better data on the valuation of increased life expectancy (either index or adjustment to consumption); and more data on regrettables such as commuting and crime-prevention expenditure (adjustment to consumption).

For stocks of wealth, priorities include the inclusion of the stock of consumer durables or a household facility index; indexes of environmental quality and sustainability; better data on the stock of human capital; and data on the stock of social capital.

For the economic insecurity component, priorities for revision are the incidence of crime; and the insecurity created by unanticipated inflation (actual minus moving average of past inflation).

5. Conclusion

This paper has developed an index of economic well-being based on four dimensions or components of economic well-being, with the weight given each component in brackets-consumption flows (0.4), stocks of wealth including physical capital and natural resources (0.1), equality (0.25), and economic security (0.25). Estimates for the index for Canada for the 1971-97 period are given.

We argue that providing explicit weights of these components of well-being is important in enabling other observers to assess whether, by their values of what is important in economic well-being, they would agree with this assessment of trends in the Canadian economy.

A key finding is that the economic well-being of Canadians, at least as measured by the index constructed in this paper, has increased at a much slower rate over the last 25 years than real GDP per capita, a widely-used indicator of economic well-being. This result is consistent with the trend observed in other indexes of social and economic well-being such as the Genuine Progress Indicator and the Index of Social Health. The index also shows a large (10 per cent absolute deterioration of economic well-being in Canada in the 1990s.

Appendix

Table A1: Canada, Personal Consumption on Consumer Goods and Services

Measure	Personal Consumption (millions of 1992 $)	Population (persons)	Personal Consumption per capita (1992 $)	Index 1971=1.00
Matrix	6535	1		
Series	*d15372	*d1		
1961	134,009	18,238,000	7,348	0.761
1962	140,860	18,583,000	7,580	0.785
1963	146,731	18,931,000	7,751	0.803
1964	154,507	19,277,200	8,015	0.830
1965	163,548	19,633,500	8,330	0.863
1966	171,654	19,997,500	8,584	0.889
1967	178,057	20,363,700	8,744	0.905
1968	185,983	20,692,000	8,988	0.931
1969	195,023	20,994,200	9,289	0.962
1970	198,364	21,287,500	9,318	0.965
1971	210,322	21,779,600	9,657	1.000
1972	224,819	22,253,000	10,103	1.354
1973	240,443	22,521,300	10,676	1.431
1974	252,874	22,839,300	11,072	1.484
1975	263,377	23,168,800	11,368	1.524
1976	277,572	23,481,900	11,821	1.584
1977	285,897	23,764,100	12,031	1.612
1978	295,598	24,008,400	12,312	1.650
1979	303,855	24,245,300	12,533	1.680
1980	309,935	24,548,200	12,626	1.692
1981	314,720	24,864,400	12,657	1.696
1982	306,931	25,167,300	12,196	1.635
1983	315,693	25,425,200	12,417	1.664
1984	329,926	25,670,900	12,852	1.723
1985	346,955	25,912,100	13,390	1.795
1986	360,738	26,171,000	13,784	1.847
1987	375,678	26,502,500	14,175	1.900
1988	392,093	26,855,800	14,600	1.957
1989	406,034	27,318,300	14,863	1.992
1990	411,343	27,733,000	14,832	1.988
1991	405,783	28,085,700	14,448	1.936
1992	412,940	28,481,300	14,499	1.943
1993	420,595	28,858,300	14,574	1.953
1994	433,812	29,219,500	14,847	1.990
1995	441,263	29,573,600	14,921	2.000
1996	451,682	29,917,500	15,098	2.024
1997	470,177	30,241,100	15,548	2.084

Note: Population is the annual average number of persons for the quarterly estimates. For all Appendix Tables *D, *P numbers are CANSIM series numbers.

Appendix (Continued)

Table A2: Canada, Government Spending, All Levels

	Real Current Expenditure (mill. of 1992 $)	Population (persons) thousands	Real Current Expenditure Per Capita (1992 $)	Index 1971=1.00
Matrix	6522	1		
Series	*d14848	*d1		
1961	51557	18,238.0	2,826.90	0.6730
1962	53923	18,583.0	2,901.74	0.6908
1963	55760	18,931.0	2,945.43	0.7012
1964	58702	19,277.2	3,045.15	0.7250
1965	61356	19,633.5	3,125.07	0.7440
1966	66789	19,997.5	3,339.87	0.7951
1967	72649	20,363.7	3,567.57	0.8493
1968	77397	20,692.0	3,740.43	0.8905
1969	80760	20,994.2	3,846.78	0.9158
1970	87850	21,287.5	4,126.83	0.9825
1971	91485	21,779.6	4,200.49	1.0000
1972	94346	22,253.0	4,239.70	1.0093
1973	98782	22,521.3	4,386.16	1.0442
1974	105059	22,839.3	4,599.92	1.0951
1975	112092	23,168.8	4,838.06	1.1518
1976	114247	23,481.9	4,865.32	1.1583
1977	119590	23,764.1	5,032.38	1.1980
1978	121700	24,008.4	5,069.06	1.2068
1979	122979	24,245.3	5,072.28	1.2075
1980	127172	24,548.2	5,180.50	1.2333
1981	129157	24,864.4	5,194.45	1.2366
1982	131901	25,167.3	5,240.97	1.2477
1983	134119	25,425.2	5,275.04	1.2558
1984	135654	25,670.9	5,284.35	1.2580
1985	141501	25,912.1	5,460.81	1.3000
1986	144166	26,171.0	5,508.62	1.3114
1987	146180	26,502.5	5,515.71	1.3131
1988	152897	26,855.8	5,693.26	1.3554
1989	157195	27,318.3	5,754.20	1.3699
1990	162937	27,733.0	5,875.20	1.3987
1991	167541	28,085.7	5,965.35	1.4202
1992	169262	28,481.3	5,942.92	1.4148
1993	168864	28,858.3	5,851.49	1.3930
1994	165888	29,219.5	5,677.30	1.3516
1995	165244	29,573.6	5,587.55	1.3302
1996	163164	29,917.5	5,453.80	1.2984
1997	162988	30,241.1	5,389.62	1.2831

Note: Series d15599 is the Implicit price index, G.D.P., 1992 =100,
net government current expenditure on goods and services.

Appendix (Continued)

Table A3: Canada, Unpaid Work (Millions of 1992 $)

Year	Replacement Cost by Generalist	Population	Unpaid Work Per Capita (1986 $)	Unpaid Work Per Capita (1992 $)	Index 1971=1.00
1961	88,398	18,238.0	4,846.91	6,206.03	0.999
1962	89,990	18,583.0	4,842.59	6,200.50	0.998
1963	91,610	18,931.0	4,839.17	6,196.12	0.997
1964	93,260	19,277.2	4,837.84	6,194.41	0.997
1965	94,939	19,633.5	4,835.58	6,191.52	0.997
1966	96,649	19,997.5	4,833.05	6,188.29	0.996
1967	98,389	20,363.7	4,831.60	6,186.43	0.996
1968	100,161	20,692.0	4,840.57	6,197.91	0.998
1969	101,965	20,994.2	4,856.80	6,218.70	1.001
1970	103,801	21,287.5	4,876.14	6,243.46	1.005
1971	105,670	21,779.6	4,851.79	6,212.28	1.000
1972	107,866	22,253.0	4,847.27	6,206.49	0.999
1973	110,108	22,521.3	4,889.07	6,260.01	1.008
1974	112,397	22,839.3	4,921.20	6,301.15	1.014
1975	114,733	23,168.8	4,952.04	6,340.64	1.021
1976	117,117	23,481.9	4,987.56	6,386.12	1.028
1977	119,552	23,764.1	5,030.77	6,441.44	1.037
1978	122,036	24,008.4	5,083.07	6,508.42	1.048
1979	124,573	24,245.3	5,138.02	6,578.77	1.059
1980	127,162	24,548.2	5,180.10	6,632.65	1.068
1981	129,805	24,864.4	5,220.52	6,684.40	1.076
1982	130,291	25,167.3	5,176.99	6,628.67	1.067
1983	130,779	25,425.2	5,143.67	6,586.00	1.060
1984	131,268	25,670.9	5,113.51	6,547.38	1.054
1985	131,760	25,912.1	5,084.87	6,510.72	1.048
1986	132,253	26,171.0	5,053.42	6,470.45	1.042
1987	135,478	26,502.5	5,111.91	6,545.34	1.054
1988	138,783	26,855.8	5,167.70	6,616.77	1.065
1989	142,167	27,318.3	5,204.11	6,663.39	1.073
1990	145,635	27,733.0	5,251.31	6,723.83	1.082
1991	149,187	28,085.7	5,311.83	6,801.32	1.095
1992	152,825	28,481.3	5,365.80	6,870.42	1.106
1993	156,552	28,858.3	5,424.86	6,946.04	1.118
1994	160,370	29,219.5	5,488.47	7,027.49	1.131
1995	164,282	29,573.6	5,555.01	7,112.69	1.145
1996	168,288	29,917.5	5,625.08	7,202.40	1.159
1997	172,393	30,241.1	5,700.60	7,299.11	1.175

Source: Data for 1961, 1971, 1981, 1986, and 1992 are from Statistics Canada *Household's Unpaid Work: Measurement and Valuation* Cat. No. 13-603E. Data between these years are interpolated on assumption of constant growth between given years. Data for 1993 onwards are extrapolated on assumption of constant growth from the 1986 to 1992 period. Recalculation into 1992 dollars base has been done with CPI (P200000) 1992=100, 1986=78.1.

Appendix (Continued)

Table A4: Canada, Value and Losses of Leisure Time

Year	Imputation for Leisure (mil 1986$)	Per Capita Imputation for Leisure (1986$)	Index 1971=1.00	Loss of Leisure Time (bil 1986$)	Per Capita Loss of Leisure (1986 $)	Index 1971=1.00
1971	354,723	16,105	1.000	4.7	213	1.000
1972	370,980	16,647	1.034	6.7	301	0.710
1973	370,125	16,406	1.019	13.3	590	0.362
1974	384,245	16,798	1.043	13.8	603	0.354
1975	403,432	17,383	1.079	11.4	491	0.434
1976	431,272	18,338	1.139	11.1	472	0.452
1977	441,056	18,535	1.151	11.9	500	0.427
1978	432,009	17,973	1.116	17.1	711	0.300
1979	432,873	17,831	1.107	21.1	869	0.246
1980	448,714	18,246	1.133	19.1	777	0.275
1981	450,687	18,100	1.124	20.4	819	0.260
1982	468,031	18,571	1.153	6.3	250	0.854
1983	466,453	18,324	1.138	12.6	495	0.431
1984	464,272	18,064	1.122	17.7	689	0.310
1985	462,104	17,813	1.106	19.6	756	0.282
1986	457,219	17,448	1.083	21.0	801	0.266
1987	453,025	17,063	1.059	22.6	851	0.251
1988	453,326	16,855	1.047	25.4	944	0.226
1989	461,876	16,870	1.047	24.2	884	0.241
1990	468,015	16,841	1.046	20.9	752	0.284
1991	481,476	17,122	1.063	12.9	459	0.465
1992	504,447	17,674	1.097	12.6	441	0.483
1993	510,869	17,648	1.096	15.0	518	0.412
1994	527,729	18,038	1.120	16.7	571	0.374
1995	518,534	17,509	1.087			

Source: Hans Messinger, Statistics Canada, "Measuring Sustainable Economic Welfare: Looking Beyond GDP."
Note: Loss of Leisure time is the value of lost leisure in relation to the year of greatest leisure over the estimated time period (1950-94). Hours lost are valued by the average real wage rate.

Appendix (Continued)

Table A5: Canada, Costs of Various Regrettables

	Population (thousands) d1	Cost of Commuting (bil 1992 $)	Cost of Commuting Per Capita (1992 $)	Cost of Crime (bil 1992 $)	Cost of Crime Per Capita (1992 $)	Cost of House Pollution Abatement (bil 1992 $)	Cost of House Pollution Abatement Per Capita (1992 $)	Cost of Auto Accidents (bil 1992 $)	Cost of Auto Accidents Per Capita (1992 $)	Total Regrettable Cost Per Cap. (1992 $)	Index 1971=1.00
1971	21,780	13.1	600	2.4	112	0.6	29	9.2	423	1,164	1.000
1972	22,253	15.2	685	2.7	121	0.8	35	10.9	489	1,329	1.142
1973	22,521	16.1	716	2.8	125	0.9	40	10.9	483	1,364	1.172
1974	22,839	16.1	706	2.9	129	1.0	45	9.9	432	1,312	1.127
1975	23,169	16.1	696	3.1	133	1.3	55	10.9	470	1,354	1.163
1976	23,482	17.5	747	3.2	136	1.4	60	11.7	496	1,440	1.237
1977	23,764	18.8	792	3.2	135	1.5	65	12.4	523	1,514	1.301
1978	24,008	19.7	821	3.3	139	1.5	64	13.1	544	1,568	1.347
1979	24,245	20.4	840	3.5	143	1.5	63	12.5	518	1,563	1.343
1980	24,548	20.4	829	3.6	146	1.5	63	11.3	459	1,497	1.286
1981	24,864	20.7	834	3.6	144	1.8	72	10.5	422	1,473	1.265
1982	25,167	20.2	804	3.7	148	1.8	71	10.1	402	1,425	1.224
1983	25,425	21.5	846	3.7	146	2.2	86	10.1	398	1,476	1.268
1984	25,671	23.2	903	3.8	150	2.3	90	10.9	424	1,566	1.346
1985	25,912	24.5	944	4.0	153	2.4	94	11.5	445	1,636	1.405
1986	26,171	24.1	920	4.0	152	2.7	103	11.9	455	1,629	1.400
1987	26,503	24.2	913	4.1	155	2.3	87	12.3	464	1,618	1.390
1988	26,856	25.4	944	4.2	157	2.6	95	12.4	462	1,659	1.425
1989	27,318	26.1	956	4.4	159	2.2	80	12.5	459	1,655	1.421
1990	27,733	26.2	946	4.5	162	1.9	69	14.7	531	1,708	1.468
1991	28,086	25.2	898	4.5	160	1.4	50	15.4	547	1,655	1.422
1992	28,481	26.1	917	4.5	157	1.5	54	16.1	566	1,695	1.456
1993	28,858	27.0	936	4.6	160	1.5	53	16.9	586	1,735	1.490
1994	29,220	28.0	960	4.6	158	1.7	57	17.5	600	1,775	1.525
1995	29,574	28.2	952	4.6	157	1.5	51	18.4	622	1,783	1.532
1996	29,918	28.7	960	4.7	157	1.5	50	19.2	643	1,810	1.555
1997	30,241	29.3	969	4.7	156	1.5	48	20.1	665	1,839	1.580

Source: Hans Messinger, Statistics Canada, "Measuring Sustainable Economic Welfare: Looking Beyond GDP."

Note: Cost of commuting - cost of traveling to and from work using either public transportation or private vehicle, as well as an estimate of time use while commuting; cost of crime and automobile accidents - costs associated with medical and legal expenses, and expenditures related to lost or damaged property. Spending on crime prevention (alarm systems, locks etc.) are also deducted from consumer expenditures; cost of household pollution abatement - represents expenditures on air and water filters and devices to improve air and water quality in the home. Data for 1995 onwards are extrapolated on assumption of constant growth from the 1990 to 1994 period. Recalculation into 1992 dollars base has done with consumer prive index 1992=100, 1986=78.1, Source P200000.

Appendix (Continued)

Table A6: Canada, Life Expectancy at Birth

Year	Life Expectancy			Index
	Male	Female	Average	1971=1.00
1971	69.4	76.5	73.0	1.000
1972	69.8	76.9	73.4	1.006
1973	70.2	77.4	73.8	1.011
1974	70.6	77.8	74.2	1.017
1975	71.0	78.2	74.6	1.023
1976	70.3	77.7	74.0	1.014
1977	70.7	78.1	74.4	1.020
1978	71.1	78.6	74.8	1.026
1979	71.5	79.0	75.3	1.032
1980	71.9	79.4	75.7	1.037
1981	71.9	79.1	75.5	1.035
1982	72.3	79.5	75.9	1.041
1983	72.7	80.0	76.3	1.047
1984	73.1	80.4	76.8	1.052
1985	73.5	80.9	77.2	1.058
1986	73.0	79.8	76.4	1.047
1987	73.4	80.2	76.8	1.053
1988	73.8	80.7	77.3	1.059
1989	74.3	81.1	77.7	1.065
1990	74.7	81.6	78.1	1.071
1991	74.6	80.9	77.8	1.066
1992	74.8	81.0	77.9	1.068
1993	75.0	81.1	78.0	1.070
1994	75.2	81.2	78.2	1.072
1995	75.4	81.3	78.4	1.074
1996	75.7	81.5	78.6	1.077
1997	75.9	81.6	78.7	1.079

Source: Data for 1921, 1926, 1931, 1936, 1941, 1946, 1951, 1956, 1961, 1966, 1971, 1976, 1981, 1986, 1991, 1994, and 1995 are from Statistics Canada Births and Deaths, 1995, Cat. No. 84-210. Other years are interpolated on the assumption of constant growth between the benchmark years. Data for 1996 are from Statistics Canada Cat No. 91-209, 1997. Data for 1997 were extrapolated on the basis of constant growth in 1992 to 1996 period. The average is evenly weighted between both sexes.

Appendix (Continued)

Table A7: Canada, Net Year-End Capital Stock in Millions of 1992 K$

	population thousands	Canada non-res. (mil 1986 $)	Canada non-res. Per Capita (1986 $)	Canada non-res. Per Capita (1992 $)	Housing Capital Stock Cat. No. 13-568	Housing Per Capita Capital Stock (1986 $)	Housing Per Capita Capital Stock (1992 $)	Total Per Capita Net Capital Stock (1992 $)	Total Per Capita Net Capital Stock Index
Matrix	1	8590			13-568				
Series	d1	D886842			(mil 1986 $)				1971=1.00
1961	18,238	169,142	9,274	8,797	124,247	6,813	8,793	17,590	0.748
1962	18,583	175,408	9,439	8,953	129,929	6,992	9,025	17,978	0.765
1963	18,931	182,147	9,622	9,127	135,784	7,173	9,258	18,384	0.782
1964	19,277	191,490	9,933	9,422	142,879	7,412	9,567	18,989	0.808
1965	19,634	203,436	10,362	9,828	150,229	7,652	9,876	19,705	0.838
1966	19,998	218,389	10,921	10,359	156,991	7,851	10,133	20,492	0.872
1967	20,364	230,437	11,316	10,734	163,900	8,049	10,389	21,122	0.899
1968	20,692	239,556	11,577	10,981	172,254	8,325	10,745	21,726	0.924
1969	20,994	247,791	11,803	11,195	182,262	8,682	11,206	22,401	0.953
1970	21,288	256,202	12,035	11,416	191,105	8,977	11,587	23,003	0.979
1971	21,780	265,156	12,175	11,548	201,703	9,261	11,954	23,502	1.000
1972	22,253	273,593	12,295	11,662	213,343	9,587	12,375	24,037	1.023
1973	22,521	284,033	12,612	11,963	225,736	10,023	12,937	24,900	1.059
1974	22,839	295,393	12,934	12,268	238,434	10,440	13,475	25,743	1.095
1975	23,169	308,191	13,302	12,617	250,307	10,804	13,945	26,562	1.130
1976	23,482	318,439	13,561	12,863	265,610	11,311	14,600	27,463	1.169
1977	23,764	327,724	13,791	13,081	280,560	11,806	15,238	28,320	1.205
1978	24,008	335,901	13,991	13,271	295,266	12,298	15,874	29,145	1.240
1979	24,245	347,824	14,346	13,608	309,111	12,749	16,456	30,064	1.279
1980	24,548	363,393	14,803	14,041	321,113	13,081	16,884	30,926	1.316
1981	24,864	382,833	15,397	14,605	334,567	13,456	17,368	31,972	1.360
1982	25,167	392,481	15,595	14,792	344,665	13,695	17,677	32,469	1.382
1983	25,425	396,301	15,587	14,785	357,511	14,061	18,149	32,934	1.401
1984	25,671	399,943	15,580	14,778	369,987	14,413	18,603	33,381	1.420
1985	25,912	407,796	15,738	14,928	383,755	14,810	19,116	34,044	1.449
1986	26,171	414,910	15,854	15,038	400,193	15,291	19,737	34,775	1.480
1987	26,503	424,494	16,017	15,193	421,124	15,890	20,510	35,703	1.519
1988	26,856	440,701	16,410	15,565	441,931	16,456	21,240	36,805	1.566
1989	27,318	459,359	16,815	15,950	463,593	16,970	21,904	37,854	1.611
1990	27,733	474,284	17,102	16,222	482,430	17,396	22,453	38,675	1.646
1991	28,086	488,939	17,409	16,513	496,068	17,663	22,798	39,311	1.673
1992	28,481	497,077	17,453	16,555	511,060	17,944	23,161	39,715	1.690
1993	28,858	503,519	17,448	16,550	524,769	18,184	23,471	40,021	1.703
1994	29,220	511,285	17,498	16,598	538,341	18,424	23,781	40,378	1.718
1995	29,574	518,717	17,540	16,637	554,111	18,737	24,184	40,821	1.737
1996	29,918	526,620	17,602	16,697	569,593	19,039	24,574	41,271	1.756
1997	30,241	535,773	17,717	16,805	585,507	19,361	24,990	41,795	1.778

Note: Housing stock for 1995-1997 is computed using assumption of constant growth rate for 1990-1994. Recalculation into 1992 dollars base for housing stock has been done with IPI, GDP gross fixed capital formation: residential structures 1992=100, 1986=77.48, Source D15602. Recalculation into 1992 dollars base for non-residential stock has been done with IPI, GDP gross fixed capital formation: non-residential structures and equipment 1992=100, 1986=105.43, Source D15603.

Appendix (Continued)

Table A8: Canada, Expenditures and Stocks of R&D Investment

Year	GERD (millions $)	GDP defl. 1992=100	Real GERD (mil. 1992 $)	Accumulated Stock GERD (mil. 1992 $)	Depreciated Accumulated Stock GERD (mil. 1992 $)	population thousands	Per Capita Depreciated Accumulated Stock GERD (1992 $)	Index 1971=1.00
Series		d15612				d1		
1963	458	19.38	2,364	2,364	2,364	18,931	124.9	0.159
1964	555	19.90	2,789	5,153	4,680	19,277	242.8	0.308
1965	662	20.65	3,206	8,359	6,950	19,634	354.0	0.449
1966	750	21.68	3,460	11,819	9,020	19,998	451.1	0.573
1967	853	22.63	3,770	15,589	10,986	20,364	539.5	0.685
1968	905	23.45	3,859	19,448	12,648	20,692	611.3	0.776
1969	976	24.53	3,980	23,428	14,098	20,994	671.5	0.853
1970	1,059	25.73	4,117	27,545	15,395	21,288	723.2	0.918
1971	1,285	26.58	4,835	32,380	17,152	21,780	787.5	1.000
1972	1,372	28.18	4,870	37,249	18,591	22,253	835.4	1.061
1973	1,470	30.83	4,769	42,018	19,641	22,521	872.1	1.107
1974	1,689	35.35	4,778	46,796	20,491	22,839	897.2	1.139
1975	1,901	39.00	4,874	51,671	21,267	23,169	917.9	1.166
1976	2,071	42.58	4,864	56,535	21,878	23,482	931.7	1.183
1977	2,322	45.48	5,106	61,641	22,609	23,764	951.4	1.208
1978	2,609	48.48	5,382	67,023	23,469	24,008	977.5	1.241
1979	3,044	53.10	5,733	72,756	24,508	24,245	1,010.8	1.284
1980	3,575	58.93	6,067	78,823	25,673	24,548	1,045.8	1.328
1981	4,415	65.38	6,753	85,576	27,292	24,864	1,097.6	1.394
1982	5,198	71.00	7,321	92,897	29,155	25,167	1,158.4	1.471
1983	5,517	74.78	7,378	100,275	30,702	25,425	1,207.5	1.533
1984	6,206	77.30	8,028	108,304	32,590	25,671	1,269.5	1.612
1985	6,904	79.23	8,714	117,018	34,786	25,912	1,342.5	1.705
1986	7,460	81.45	9,159	126,177	36,988	26,171	1,413.3	1.795
1987	7,865	85.25	9,226	135,403	38,816	26,503	1,464.6	1.860
1988	8,373	89.15	9,392	144,795	40,445	26,856	1,506.0	1.912
1989	8,944	93.28	9,589	154,384	41,945	27,318	1,535.4	1.950
1990	9,756	96.13	10,149	164,533	43,705	27,733	1,575.9	2.001
1991	10,207	98.70	10,341	174,875	45,306	28,086	1,613.1	2.048
1992	10,698	99.98	10,701	185,575	46,945	28,481	1,648.3	2.093
1993	11,490	101.23	11,351	196,926	48,907	28,858	1,694.7	2.152
1994	12,121	102.40	11,837	208,763	50,963	29,220	1,744.1	2.215
1995	12,660	105.10	12,046	220,809	52,816	29,574	1,785.9	2.268
1996	13,102	106.58	12,294	233,103	54,546	29,918	1,823.2	2.315
1997	13,383	107.13	12,493	245,596	56,130	30,241	1,856.1	2.357

Source: Statistics Canada *Industrial Research and Development - 1997 Intentions*. GDP deflator is
from *Canadian Economic Observer, 1995/1996*, except for 1996 which is a four quarter average from
Canadian Economic Observer, August 1997. The depreciation is 20% of a declining balance.
Note: GERD is general domestic expenditure on research and development.

Appendix (Continued)

Table A9: Canada, Value of Timber Stocks

Year	Value of Timber Stocks Stock Value I mil. dollars *d15612	GDP Deflator 1992=100	population thousands *d1	Real Per Capita Value of Timber Stocks Stock Value I 1992$	Real Per Capita Value of Timber Stocks Stock Value I Index 1971=1.00
1961	11,940.4	18.7	18,238	3,506	1.238
1962	12,887.2	19.0	18,583	3,655	1.291
1963	13,707.7	19.4	18,931	3,737	1.320
1964	14,661.9	19.9	19,277	3,822	1.350
1965	15,187.9	20.7	19,634	3,746	1.323
1966	16,194.8	21.7	19,998	3,736	1.320
1967	16,310.8	22.6	20,364	3,540	1.251
1968	16,879.8	23.5	20,692	3,479	1.229
1969	17,619.7	24.5	20,994	3,422	1.209
1970	17,080.2	25.7	21,288	3,119	1.102
1971	16,383.6	26.6	21,780	2,831	1.000
1972	18,038.2	28.2	22,253	2,877	1.016
1973	22,909.2	30.8	22,521	3,300	1.166
1974	29,673.0	35.4	22,839	3,675	1.298
1975	33,468.2	39.0	23,169	3,704	1.308
1976	38,685.8	42.6	23,482	3,870	1.367
1977	43,541.7	45.5	23,764	4,029	1.423
1978	48,457.7	48.5	24,008	4,164	1.471
1979	57,630.9	53.1	24,245	4,476	1.581
1980	68,787.9	58.9	24,548	4,755	1.680
1981	73,853.3	65.4	24,864	4,543	1.605
1982	68,972.3	71.0	25,167	3,860	1.363
1983	63,206.4	74.8	25,425	3,325	1.174
1984	55,848.9	77.3	25,671	2,814	0.994
1985	51,324.3	79.2	25,912	2,500	0.883
1986	59,569.8	81.5	26,171	2,795	0.987
1987	88,135.5	85.3	26,503	3,901	1.378
1988	119,604.6	89.2	26,856	4,996	1.765
1989	140,435.5	93.3	27,318	5,511	1.947
1990	146,842.7	96.1	27,733	5,508	1.946
1991	130,282.7	98.7	28,086	4,700	1.660
1992	106,164.6	100.0	28,481	3,728	1.317
1993	86,675.8	101.2	28,858	2,967	1.048
1994	92,957.4	102.4	29,220	3,107	1.097
1995	114,257.9	105.1	29,574	3,676	1.298
1996	114,257.9	106.6	29,918	3,583	1.266
1997	114,257.9	107.1	30,241	3,527	1.246

Source: Statistics Canada *Econections* CD-ROM Cat. No. 16-200-XKE.
Note: Value of timber stocks in 1996, 1997 is assumed to be equal value in 1995.

Appendix (Continued)

Table A10: Canada, Value of Energy Natural Resources

Year	Real Value of Recoverable Bitumous Coal Res. Present Value (mil 1992$)	Real Value of Established Crude Bitumen Res. Present Value (mil 1992$)	Real Value of Established Natural Gas Reserves Present Value (mil 1992$)	Real Value of Established Crude Oil Reserves Present Value (mil 1992$)	Real Value of Subbituminous Coal & Lignite Reserves Present Value (mil 1992$)	Total Real Energy Reserves (mil 1992$)	Per Capita Total Real Energy Reserves (1992 $)	Index 1971=1.00
1961			1,591	22,002		23,593	1,294	0.330
1962			3,069	23,028		26,097	1,404	0.359
1963			5,115	25,765		30,880	1,631	0.416
1964			6,357	27,138		33,495	1,738	0.444
1965			7,361	33,491		40,851	2,081	0.531
1966			6,777	33,876		40,654	2,033	0.519
1967		62	6,561	34,052		40,675	1,997	0.510
1968		535	6,477	37,074		44,086	2,131	0.544
1969		0	7,371	38,559		45,930	2,188	0.559
1970		0	6,694	42,199		48,893	2,297	0.586
1971	30,523	0	6,264	45,827	2,707	85,321	3,917	1.000
1972	28,790	608	5,382	45,151	2,554	82,484	3,707	0.946
1973	26,315	836	17,137	54,475	2,334	101,097	4,489	1.146
1974	22,946	1,915	35,861	79,993	2,035	142,750	6,250	1.596
1975	20,799	1,193	72,456	84,581	1,845	180,874	7,807	1.993
1976	19,052	1,834	93,048	83,288	1,690	198,912	8,471	2.163
1977	18,642	0	94,121	90,602	1,809	205,174	8,634	2.204
1978	20,497	0	102,190	98,913	1,900	223,500	9,309	2.377
1979	19,917	0	118,873	94,336	2,479	235,605	9,718	2.481
1980	13,856	22,673	170,797	93,203	3,002	303,532	12,365	3.157
1981	13,634	13,263	173,541	94,962	4,047	299,447	12,043	3.075
1982	15,742	19,727	178,527	112,977	5,065	332,038	13,193	3.368
1983	18,465	19,293	187,339	135,902	5,367	366,367	14,410	3.679
1984	26,552	18,000	173,659	138,673	6,917	363,800	14,172	3.618
1985	23,539	17,898	161,821	131,401	6,274	340,932	13,157	3.359
1986	20,817	8,381	106,264	50,437	4,821	190,721	7,288	1.860
1987	18,741	18,392	69,396	63,160	5,270	174,959	6,602	1.685
1988	20,484	3,241	54,551	30,852	5,689	114,816	4,275	1.091
1989	14,388	9,673	48,234	39,290	3,733	115,318	4,221	1.078
1990	17,708	19,823	56,308	48,458	4,268	146,564	5,285	1.349
1991	16,502	10,279	42,479	26,293	4,578	100,130	3,565	0.910
1992	12,405	10,236	45,163	25,330	4,538	97,672	3,429	0.876
1993	16,205	8,766	57,021	22,525	4,938	109,455	3,793	0.968
1994	11,921	11,760	49,498	23,897	5,866	102,942	3,523	0.899
1995	13,650	15,863	27,761	23,788	4,905	85,967	2,907	0.742
1996	13,461	15,645	27,377	23,460	4,838	84,781	2,834	0.723
1997	13,392	15,565	27,238	23,340	4,814	84,349	2,789	0.712

Source: Statistics Canada *Econections* CD-ROM Cat. No. 16-200-XKE.
Note: Data in bold represents the earliest available data point for that series. This was assumed to
be the value for all previous periods. Value of all energy natural resources in 1996, 1997 is assumed
to be equal value in 1995.

Appendix (Continued)

Table A11: Canada, Value of Mineral Natural Resources (Proven and Probable)

	Value of Nickel, Copper, & Molybdenum Reserves Present Value (mil $)	Value of Gold Reserves Present Value (mil $)	Value of Iron Reserves Present Value (mil $)	Value of Zinc-Lead-Silver Reserves Present Value (mil $)	Value of Potash Reserves Present Value (mil $)	Value of Uranium Reserves Present Value (mil $)	GDP defl. 1992=100	Population thous.	Total Value of Minerals (mil $)	Total Real Value of Minerals Per Capita (1992 $)	Index 1971=1.00
1971	16,365	0	13,448	10,166	5,525	3,239	26.6	21,780	48,743	8,421	1.000
1972	16,365	0	13,448	10,166	5,525	3,239	28.2	22,253	48,743	7,774	0.923
1973	16,365	0	13,448	10,166	5,525	3,239	30.8	22,521	48,743	7,021	0.834
1974	16,365	0	13,448	10,166	5,525	3,239	35.4	22,839	48,743	6,037	0.717
1975	16,365	0	13,448	10,166	5,525	3,239	39.0	23,169	48,743	5,394	0.641
1976	16,365	0	13,448	10,166	5,525	3,239	42.6	23,482	48,743	4,876	0.579
1977	12,030	0	15,105	10,166	6,330	5,283	45.5	23,764	48,914	4,526	0.537
1978	16,392	0	13,538	10,166	7,634	8,715	48.5	24,008	56,444	4,850	0.576
1979	50,878	0	25,550	10,166	12,733	10,561	53.1	24,245	109,887	8,535	1.014
1980	62,575	2,265	27,475	12,399	19,287	10,992	58.9	24,548	134,994	9,332	1.108
1981	32,684	914	20,187	3,479	17,902	9,197	65.4	24,864	84,363	5,190	0.616
1982	19,430	0	14,910	3,376	8,101	8,785	71.0	25,167	54,602	3,056	0.363
1983	22,495	2,199	12,786	3,550	7,192	6,548	74.8	25,425	54,769	2,881	0.342
1984	22,342	1,040	11,910	4,740	14,550	8,357	77.3	25,671	62,939	3,172	0.377
1985	20,109	1,161	15,319	2,729	5,880	8,337	79.2	25,912	53,534	2,608	0.310
1986	16,145	4,118	13,155	5,142	4,455	7,950	81.5	26,171	50,965	2,391	0.284
1987	24,904	7,062	15,020	4,383	7,867	7,863	85.3	26,503	67,099	2,970	0.353
1988	54,897	5,766	11,715	5,227	16,194	7,649	89.2	26,856	101,447	4,237	0.503
1989	55,683	3,033	13,071	9,892	18,068	6,362	93.3	27,318	106,109	4,164	0.494
1990	39,459	3,178	9,963	7,855	15,402	5,482	96.1	27,733	81,339	3,051	0.362
1991	26,186	2,309	10,377	3,353	15,617	7,365	98.7	28,086	65,205	2,352	0.279
1992	25,470	1,675	8,231	4,929	17,020	6,785	100.0	28,481	64,109	2,251	0.267
1993	17,907	4,897	7,068	1,162	15,639	6,428	101.2	28,858	53,100	1,818	0.216
1994	25,731	5,856	10,179	2,203	21,769	6,018	102.4	29,220	71,757	2,398	0.285
1995	40,193	5,372	11,464	2,746	25,814	6,515	105.1	29,574	92,104	2,963	0.352
1996	40,193	5,372	11,464	2,746	25,814	6,515	106.6	29,918	92,104	2,889	0.343
1997	40,193	5,372	11,464	2,746	25,814	6,515	107.1	30,241	92,104	2,843	0.338

Source: Statistics Canada *Econections* CD-ROM Cat. No. 16-200-XKE.
Note: Data in bold represents the earliest available data point for that series. This was assumed to be the value for all previous periods. Value of all minerals in 1996, 1997 is assumed to be equal value in 1995.

Appendix (Continued)

Table A12: Canada, Total Value of Natural Resources

Year	Real Per Capita Value of Timber Stocks Stock Value I (1992 $)	Per Capita Total Real Energy Reserves (1992 $)	Total Real Value of Minerals Per Capita (1992 $)	Total Real Per Capita Value of Nat. Res. (1992 $)	Index 1971=1.00
1971	2,831	3,917	8,421	15,170	1.000
1972	2,877	3,707	7,774	14,358	1.221
1973	3,300	4,489	7,021	14,810	1.259
1974	3,675	6,250	6,037	15,963	1.357
1975	3,704	7,807	5,394	16,905	1.438
1976	3,870	8,471	4,876	17,216	1.464
1977	4,029	8,634	4,526	17,189	1.462
1978	4,164	9,309	4,850	18,323	1.558
1979	4,476	9,718	8,535	22,729	1.933
1980	4,755	12,365	9,332	26,453	2.250
1981	4,543	12,043	5,190	21,777	1.852
1982	3,860	13,193	3,056	20,109	1.710
1983	3,325	14,410	2,881	20,615	1.753
1984	2,814	14,172	3,172	20,158	1.714
1985	2,500	13,157	2,608	18,265	1.553
1986	2,795	7,288	2,391	12,473	1.061
1987	3,901	6,602	2,970	13,472	1.146
1988	4,996	4,275	4,237	13,508	1.149
1989	5,511	4,221	4,164	13,897	1.182
1990	5,508	5,285	3,051	13,844	1.177
1991	4,700	3,565	2,352	10,617	0.903
1992	3,728	3,429	2,251	9,409	0.800
1993	2,967	3,793	1,818	8,578	0.729
1994	3,107	3,523	2,398	9,028	0.768
1995	3,676	2,907	2,963	9,546	0.812
1996	3,583	2,834	2,889	9,306	0.791
1997	3,527	2,789	2,843	9,159	0.779

Sources: Tables A9, A10, A11.

Appendix (Continued)

Table A13: Canada, Estimates of the Costs of Human Capital by Educational Attainment Level

Year	0 - 8 years, thousands	Cost in millions, thousands	Some secondary education	Cost in millions	Graduated from high school, thousands	Cost in millions	Some post-secondary, thousands	Cost in millions	Post-secondary certificate/diploma, thousands	Cost in millions	University degree, thousands	Cost in millions	Work age, thousands	Cost in millions	Population, thousands	Human Capital per capita in 1992$
1971	4360.6	227.4	6894.0	449.4			1703.2	160.1	1571.8	158.6	914.6	164.2	15251.395	1159.7	22,026	52,654
1972	4338.5	226.2	7140.8	465.5			1670.6	157.1	1595.4	161.0	967.3	173.7	15570.265	1183.5	22,285	53,106
1973	4322.8	225.4	7407.1	482.8			1640.9	154.3	1621.6	163.6	1024.6	184.0	15918.868	1210.2	22,560	53,642
1974	4320.8	225.3	7707.7	502.4			1616.9	152.0	1653.6	166.9	1088.8	195.5	16326.939	1242.1	22,875	54,301
1975	4316.4	225.1	8016.0	522.5			1592.4	149.7	1685.2	170.1	1156.3	207.6	16736.035	1275.0	23,209	54,936
1976	4334.3	226.0	8236.4	536.9			1578.0	148.4	1745.9	176.2	1229.0	220.7	17123.6	1308.1	23,518	55,623
1977	4218.0	220.0	8646.6	563.6			1594.2	149.9	1731.8	174.8	1302.4	233.9	17492.9	1342.1	23,796	56,400
1978	4274.4	222.9	8908.3	580.7			1521.7	143.1	1779.8	179.6	1354.9	243.3	17839.1	1369.5	24,036	56,979
1979	4274.6	222.9	9397.3	612.5			1335.0	125.5	1723.8	174.0	1452.1	260.7	18182.7	1395.7	24,277	57,490
1980	4188.0	218.4	9645.8	628.7			1411.6	132.7	1776.8	179.3	1527.4	274.3	18549.6	1433.4	24,593	58,286
1981	4167.3	217.3	9683.3	631.2			1509.6	141.9	1904.9	192.2	1618.3	290.6	18883.3	1473.3	24,900	59,167
1982	4056.8	211.5	9796.2	638.5			1600.9	150.5	2004.6	202.3	1718.3	308.5	19176.8	1511.5	25,202	59,974
1983	3988.8	208.0	9751.9	635.7			1712.2	161.0	2126.9	214.6	1853.5	332.8	19433.2	1552.1	25,456	60,972
1984	3913.8	204.1	9833.5	641.0			1781.9	167.5	2220.7	224.1	1930.6	346.7	19680.5	1583.4	25,702	61,605
1985	3773.9	196.8	9975.5	650.2			1847.3	173.7	2300.2	232.1	2032.6	365.0	19929.4	1617.8	25,942	62,363
1986	3694.5	192.7	10007.8	652.3			1904.9	179.1	2445.4	246.8	2129.5	382.4	20182.1	1653.3	26,204	63,092
1987	3584.0	186.9	10110.1	659.0			1896.2	178.3	2556.5	258.0	2285.6	410.4	20432.4	1692.6	26,550	63,751
1988	3569.2	186.1	10000.9	651.9			1982.0	186.4	2690.2	271.5	2447.2	439.4	20689.6	1735.3	26,895	64,521
1989	3490.9	182.0	10136.9	660.7			1999.2	188.0	2852.1	287.8	2488.6	446.9	20967.7	1765.5	27,379	64,482
1990	3125.1	163.0	4908.3	319.9	4395.1	343.8	1897.6	178.4	4643.1	468.6	2308.2	414.5	21277.3	1888.1	27,791	67,941
1991	3062.4	159.7	4943.7	322.2	4523.4	353.8	1918.5	180.4	4741.9	478.5	2422.9	435.1	21612.8	1929.7	28,120	68,625
1992	3001.8	156.5	4835.9	315.2	4676.1	365.8	1953.7	183.7	4904.0	494.9	2614.7	469.5	21986.1	1985.6	28,542	69,568
1993	2879.4	150.1	4721.9	307.8	4791.3	374.8	1997.5	187.8	5151.6	519.9	2829.7	508.1	22371.3	2048.5	28,947	70,768
1994	2958.1	154.3	4678.2	304.9	4513.0	353.0	1975.1	185.7	5585.9	563.7	3006.5	539.9	22716.7	2101.5	29,256	71,831
1995	2914.4	152.0	4644.7	302.8	4519.4	353.5	2042.8	192.1	5843.2	589.7	3062.9	550.0	23027.3	2140.0	29,615	72,260
1996	2872.6	149.8	4578.3	298.4	4620.2	361.4	2071.2	194.8	6040.6	609.6	3168.9	569.0	23351.8	2183.0	29,964	72,853
1997	2800.8	146.1	4484.7	292.3	4430.2	346.5	2158.5	203.0	6480.3	654.0	3332.0	598.3	23686.5	2240.1	30,287	73,964

Source: Labour Force Historical Review CDROM 71F0004XCB.

Note: Data on working age population from 1971 to 1975 were calculated on the basis of the data for 1976 and the growth rate from the historical labour force estimates from 1971 to 1975. Number of persons in each educational group from 1971 to 1975 were calculated on the the base of constant growth rate for this group from 1976 to 1981 and the share of this group from the total working age population for the same period.

Appendix (Continued)

Table A14: Canada's Net Foreign Debt in Millions of Dollars

	Population	Net Int'l Investment Position (mil $)	GDP deflator 1992=100	Real Net Int'l Investment Position (mil 1992 $)	Per Capita Real Net Int'l Investment Position (1992 $)	Index 1971=100
Matrix	1	4180				
Series D	d1	d65219	d15612			
1961	18,238,000	-17,006	18.68	-91,063	-4,993	0.906
1962	18,583,000	-18,170	18.98	-95,758	-5,153	0.935
1963	18,931,000	-18,989	19.38	-98,008	-5,177	0.939
1964	19,277,200	-19,680	19.90	-98,894	-5,127	0.930
1965	19,633,500	-21,888	20.65	-105,995	-5,396	0.979
1966	19,997,500	-23,712	21.68	-109,398	-5,466	0.992
1967	20,363,700	-25,636	22.63	-113,308	-5,560	1.009
1968	20,692,000	-27,432	23.45	-116,981	-5,651	1.025
1969	20,994,200	-29,375	24.53	-119,776	-5,703	1.035
1970	21,287,500	-30,054	25.73	-116,828	-5,486	0.995
1971	21,779,600	-32,264	26.58	-121,407	-5,512	1.000
1972	22,253,000	-34,909	28.18	-123,901	-5,560	1.009
1973	22,521,300	-37,666	30.83	-122,193	-5,416	0.983
1974	22,839,300	-42,188	35.35	-119,344	-5,217	0.947
1975	23,168,800	-50,433	39.00	-129,315	-5,572	1.011
1976	23,481,900	-61,307	42.58	-143,998	-6,123	1.111
1977	23,764,100	-68,656	45.48	-150,975	-6,345	1.151
1978	24,008,400	-88,104	48.48	-181,751	-7,562	1.372
1979	24,245,300	-103,154	53.10	-194,264	-8,002	1.452
1980	24,548,200	-110,277	58.93	-187,148	-7,610	1.381
1981	24,864,400	-135,738	65.38	-207,630	-8,339	1.513
1982	25,167,300	-136,601	71.00	-192,396	-7,634	1.385
1983	25,425,200	-144,317	74.78	-193,002	-7,582	1.376
1984	25,670,900	-154,405	77.30	-199,748	-7,772	1.410
1985	25,912,100	-177,833	79.23	-224,466	-8,653	1.570
1986	26,171,000	-196,816	81.45	-241,640	-9,222	1.673
1987	26,502,500	-212,572	85.25	-249,351	-9,392	1.704
1988	26,855,800	-215,905	89.15	-242,182	-9,005	1.634
1989	27,318,300	-232,061	93.28	-248,792	-9,087	1.649
1990	27,733,000	-252,506	96.13	-262,685	-9,452	1.715
1991	28,085,700	-267,408	98.70	-270,930	-9,635	1.748
1992	28,481,300	-298,114	99.98	-298,189	-10,447	1.895
1993	28,858,300	-323,739	101.23	-319,821	-11,049	2.004
1994	29,219,500	-336,339	102.40	-328,456	-11,227	2.037
1995	29,573,600	-336,858	105.10	-320,512	-10,823	1.963
1996	29,917,500	-331,120	106.58	-310,692	-10,369	1.881
1997	30,241,100	-339,403	107.13	-316,829	-10,573	1.918

Sources: Net debt is Net International Investment Position (D65219).

Appendix (Continued)

Table A15: Penetration of Selected Household Equipment

(% of households)

Years	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Bath facilities	**90.90**	91.20	91.51	91.81	92.12	92.42	92.73	93.04	93.35	93.66	93.97	94.29	**94.60**	96.70	**98.80**
Flush toilets	**94.30**	94.47	94.63	94.80	94.96	95.13	95.29	95.46	95.63	95.80	95.96	96.13	**96.30**	97.65	**99.00**
Refrigerators	**97.40**	97.50	97.61	97.71	97.82	97.92	98.03	98.13	98.24	98.35	98.45	98.56	98.66	98.77	98.87
Telephones	**92.30**	92.77	93.25	93.72	**94.20**	94.85	**95.50**	95.95	**96.40**	96.40	**96.40**	96.70	97.00	97.30	97.60
Colour TVs	**3.90**	6.14	9.67	15.24	**24.00**	33.60	**43.20**	51.40	**59.60**	66.00	**72.40**	58.35	**73.50**	79.20	**84.90**
Microwave ovens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**10.20**
Video recorders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Automatic wash. mach.	**30.40**	32.84	35.48	38.32	**41.40**	44.40	**47.40**	51.25	**55.10**	57.25	**59.40**	57.25	**55.10**	61.00	**66.90**
Clothes dryers	**34.20**	35.96	37.81	39.75	**41.80**	44.45	**47.10**	50.50	**53.90**	56.85	**59.80**	59.40	**59.00**	62.80	**66.60**
One or more automobiles	**74.70**	75.20	75.69	76.20	**76.70**	76.80	**76.90**	77.65	**78.40**	78.55	**78.70**	78.05	**77.40**	78.80	**80.20**
Freezers	**28.40**	29.77	31.21	32.72	**34.30**	36.70	**39.10**	41.05	**43.00**	45.20	**47.40**	50.90	**54.40**	54.45	**54.50**
Dishwashers	-	-	-	-	-	-	-	-	-	-	-	-	**14.70**	23.90	**33.10**
Home computers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Air conditioners	-	-	-	-	-	-	-	-	-	-	-	-	**2.90**	9.45	**16.00**
Average Penetration Rate	39.04	39.70	40.49	41.45	42.66	44.02	45.38	46.75	48.12	49.15	50.18	49.26	49.60	52.18	55.50
Index 1971=1.00	0.94	0.96	0.98	1.00	1.03	1.06	1.09	1.13	1.16	1.19	1.21	1.19	1.20	1.26	1.34

Appendix (Continued)

Table A15 (Continued)

(% of households)

Years	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Bath facilities	**98.80**	98.90	**99.00**	**99.00**	**99.10**	**99.40**	**99.40**	**99.40**	**99.40**	**99.50**	**99.50**	**99.70**	**99.80**	99.80
Flush toilets	**99.00**	99.10	**99.20**	**99.20**	**99.40**	**99.40**	**99.40**	**99.50**	**99.50**	**99.50**	**99.70**	**99.70**	**99.80**	99.80
Refrigerators	**98.98**	99.09	99.19	**99.30**	**99.10**	**99.60**	**99.40**	**99.50**	**99.70**	**99.40**	**99.80**	**99.40**	**99.70**	99.60
Telephones	**97.90**	98.20	**98.20**	**98.10**	**98.50**	**98.40**	98.47	**98.53**	**98.10**	**98.70**	**99.00**	**99.00**	**98.50**	98.70
Colour TVs	**87.30**	89.30	**91.30**	**93.30**	**94.40**	**95.20**	**96.20**	**96.90**	**97.20**	**97.50**	**97.70**	**98.20**	**98.50**	98.50
Microwave ovens	**12.50**	17.75	**23.00**	**33.60**	**43.20**	**53.80**	**63.40**	**68.20**	**73.50**	**76.00**	**79.10**	**81.50**	**83.40**	85.30
Video recorders	**6.40**	11.29	19.90	**35.10**	**45.00**	**52.00**	**58.80**	**66.30**	**68.50**	**73.80**	**77.30**	**79.20**	**82.10**	83.50
Automatic wash. mach.	**67.00**	68.40	**69.80**	70.40	71.00	**72.50**	**74.10**	**75.10**	**75.20**	**75.80**	**76.90**	**77.10**	**77.60**	78.00
Clothes dryers	**66.10**	67.50	**68.50**	68.60	69.50	**71.00**	**72.80**	**73.40**	**73.40**	**74.00**	**75.10**	**75.40**	**76.00**	76.50
One or more automobiles	**79.20**	78.15	**77.10**	**77.30**	**78.30**	**78.30**	**78.20**	**77.80**	**77.60**	**76.50**	**77.50**	**75.20**	**74.50**	73.90
Freezers	**54.90**	55.95	**57.00**	**57.70**	**57.30**	**56.90**	**58.30**	**57.60**	**58.20**	**57.90**	**58.70**	**58.80**	**57.10**	57.10
Dishwashers	**33.90**	35.50	**37.10**	**37.90**	**39.40**	**41.30**	**42.50**	**42.00**	**43.70**	**44.20**	**45.20**	**46.40**	**47.10**	47.70
Home computers	-	-	-	**10.30**	11.45	**12.60**	14.45	**16.30**	**18.60**	**20.00**	**23.30**	**25.00**	**28.80**	31.60
Air conditioners	**17.00**	17.40	**17.80**	**18.10**	**19.60**	**20.80**	**24.60**	**24.40**	**26.70**	**26.70**	**25.70**	**26.80**	**27.60**	29.30
Average Penetration Rate	56.15	57.44	58.95	61.90	64.06	65.96	68.09	71.07	72.09	72.82	73.89	74.39	75.04	75.66
Index 1971=1.00	1.35	1.39	1.42	1.49	1.55	1.59	1.64	1.71	1.74	1.76	1.78	1.79	1.81	1.83

Source: 1986 to 1996 from Statistics Canada *Household Facilities by Income and Other Characteristics,* Cat. No. 13-218*.* Data for 1968, 1972, 1974, 1976, 1978, 1980, 1982, 1983, and 1995 is from occasional Statistics Canada publications of the same title, Cat. No. 13-540, 13-560, 13-565, and 13-567. The data in bold are actual observations taken from the publications. The remaining data are interpolations based on an assumption of constant growth between given data points. Where there was no value for an item before an actual observation, a 0.0 penetration rate was assumed.

Appendix (Continued)

Table A16: Environmental Indicators

Year	Ozone Layer Over Canadian Centres in Dobson units.					Greenhouse Gas Emissions	
	Toronto	Edmonton	Resolute	Average	Index 1971=1.00	Carbon Dioxide Equivalents kilotons	Index 1971=1.00
1971	354	345	398	366	0.999	613,088	1.000
1972	360	346	408	371	1.015	613,088	1.000
1973	332	339	387	353	0.964	613,088	1.000
1974	352	355	382	363	0.992	613,088	1.000
1975	351	352	366	356	0.974	613,088	1.000
1976	347	338	371	352	0.962	613,088	1.000
1977	355	354	371	360	0.984	613,088	1.000
1978	337	333	380	350	0.956	613,088	1.000
1979	348	343	377	356	0.973	613,088	1.000
1980	351	349	375	358	0.979	613,088	1.000
1981	348	341	371	353	0.965	**613,088**	1.000
1982	344	359	370	358	0.977	587,299	1.044
1983	333	334	360	342	0.935	560,076	1.095
1984	339	340	357	345	0.944	583,282	1.051
1985	340	335	371	349	0.953	599,651	1.022
1986	336	334	424	365	0.996	590,233	1.039
1987	345	339	360	348	0.951	607,206	1.010
1988	342	330	359	344	0.939	649,919	0.943
1989	339	334	367	347	0.947	683,962	0.896
1990	330	332	354	339	0.925	653,845	0.938
1991	338	337	364	346	0.946	644,852	0.951
1992	333	328	342	334	0.913	664,019	0.923
1993	319	311	328	319	0.872		
1994	333	326	364	341	0.932		
1995							
1996							

Source: Ozone data is from Statistics Canada *Environmental Perspectives* Cat. No. 11-528-XPE, no. 3. Greenhouse gas data is from Statistics Canada *Econections* CD-ROM Cat. No. 16-200-XKE.
Note: Data in bold represents the earliest available data point for that series. This was assumed to be the value for all previous periods.

Appendix (Continued)

Table A17: Gini Coefficients for Canada, All Units

Year	Income before Transfers	Index 1971=1.00	Total Money Income	Index 1971=1.00	Income After Tax	Index 1971=1.00
1971	0.447	1.000	0.400	1.000	0.373	1.000
1972	0.446	0.998	0.395	0.988	0.368	0.987
1973	0.445	0.996	0.392	0.980	0.368	0.987
1974	0.441	0.987	0.389	0.973	0.363	0.973
1975	0.451	1.009	0.392	0.980	0.364	0.976
1976	0.462	1.034	0.402	1.005	0.374	1.003
1977	0.445	0.996	0.388	0.970	0.362	0.971
1978	0.445	0.996	0.394	0.985	0.367	0.984
1979	0.436	0.975	0.381	0.953	0.355	0.952
1980	0.442	0.989	0.383	0.958	0.358	0.960
1981	0.437	0.978	0.377	0.943	0.351	0.941
1982	0.453	1.013	0.381	0.953	0.353	0.946
1983	0.471	1.054	0.393	0.983	0.363	0.973
1984	0.469	1.049	0.389	0.973	0.359	0.962
1985	0.466	1.043	0.388	0.970	0.358	0.960
1986	0.467	1.045	0.389	0.973	0.359	0.962
1987	0.468	1.047	0.390	0.975	0.357	0.957
1988	0.469	1.049	0.390	0.975	0.355	0.952
1989	0.461	1.031	0.386	0.965	0.352	0.944
1990	0.470	1.051	0.389	0.973	0.352	0.944
1991	0.486	1.087	0.395	0.988	0.357	0.957
1992	0.491	1.098	0.394	0.985	0.356	0.954
1993	0.497	1.112	0.396	0.990	0.358	0.960
1994	0.495	1.107	0.394	0.985	0.354	0.949
1995	0.493	1.103	0.397	0.993	0.357	0.957
1996	0.498	1.114	0.403	1.008	0.362	0.971
1997	0.498	1.114	0.403	1.008	0.362	0.971

Source: Statistics Canada *Income After Tax, Distributions by Size in Canada 1994* and *1993*.
Note: Data for 1997 assumed to be equal data for 1996.

Appendix (Continued)

Table A18: Poverty Rate and Poverty Gap Ratios, + Poverty Intensity, Canada, 1971-1997

Years	Poverty Rate	Index 1971=1.00	Income to need Ratio	Poverty Gap Ratio	Index of poverty gap	Poverty Intensity	Index of Poverty Intensity
	A	A'	B	C=1-B	C'	D=A*C	E=A'*C'
1971	14.5	1.000	0.65	0.35	1.000	0.051	1.000
1972	14.5	1.000	0.65	0.35	1.000	0.051	1.000
1973	14.5	1.000	0.65	0.35	1.000	0.051	1.000
1974	15.5	1.069	0.65	0.36	1.014	0.055	1.084
1975	16.5	1.138	0.64	0.36	1.029	0.059	1.170
1976	16.8	1.155	0.64	0.37	1.043	0.061	1.205
1977	17.0	1.172	0.63	0.37	1.057	0.063	1.239
1978	16.8	1.159	0.64	0.36	1.029	0.060	1.192
1979	16.6	1.145	0.65	0.35	1.000	0.058	1.145
1980	16.1	1.107	0.66	0.34	0.971	0.055	1.075
1981	15.5	1.069	0.67	0.33	0.943	0.051	1.008
1982	15.7	1.083	0.68	0.32	0.914	0.050	0.990
1983	15.8	1.090	0.67	0.33	0.943	0.052	1.027
1984	15.9	1.097	0.66	0.34	0.971	0.054	1.065
1985	15.1	1.041	0.67	0.33	0.943	0.050	0.982
1986	14.9	1.028	0.68	0.32	0.914	0.048	0.940
1987	14.5	1.000	0.68	0.32	0.914	0.046	0.914
1988	14.5	1.000	0.69	0.31	0.886	0.045	0.886
1989	14.2	0.979	0.69	0.31	0.886	0.044	0.867
1990	14.9	1.028	0.68	0.32	0.914	0.048	0.940
1991	14.8	1.021	0.68	0.32	0.914	0.047	0.933
1992	14.8	1.021	0.68	0.32	0.914	0.047	0.933
1993	15.0	1.034	0.69	0.31	0.886	0.047	0.916
1994	14.7	1.014	0.69	0.31	0.886	0.046	0.898
1995	15.1	1.041	0.68	0.32	0.914	0.048	0.952
1996	15.1	1.041	0.68	0.32	0.914	0.048	0.952
1997	15.1	1.041	0.68	0.32	0.914	0.048	0.952

Source: Statistics Canada *Income After Tax, Distributions by Size in Canada.*
Note: Poverty is measured using Statistics Canada's LIM, 1996$ base. 1974, 1976, 1978, 1980, 1983 are interpolations based on average of previous and subsequent years. Data for 1971, 1972 were assumed to be equal 1973 data. Data for 1996, 1997 were assumed to be equal to 1995 data.

Appendix (Continued)

Table A19: Male-Female Earnings Ratios
(Women's Earnings as % of Men's)

Year	Full-year full-time workers	Index 1971=1.00	All earners	Index 1971=1.00
1971	59.7	1.000	46.9	1.000
1972	59.8	1.002	46.1	0.983
1973	59.3	0.993	46.3	0.987
1974	59.6	0.998	47.4	1.011
1975	60.2	1.008	48.1	1.026
1976	59.1	0.990	46.7	0.996
1977	62.1	1.040	50.8	1.083
1978	63.0	1.055	50.8	1.083
1979	63.5	1.064	51.6	1.100
1980	64.4	1.079	51.7	1.102
1981	63.7	1.067	53.6	1.143
1982	64.0	1.072	55.1	1.175
1983	64.8	1.085	55.2	1.177
1984	65.6	1.099	57.5	1.226
1985	65.1	1.090	56.3	1.200
1986	65.8	1.102	57.5	1.226
1987	66.1	1.107	57.8	1.232
1988	65.4	1.095	57.5	1.226
1989	66.0	1.106	59.1	1.261
1990	67.7	1.134	59.8	1.275
1991	69.6	1.166	61.5	1.311
1992	71.9	1.204	63.9	1.362
1993	72.2	1.209	64.3	1.371
1994	69.8	1.169	62.3	1.328
1995	73.1	1.224	65.1	1.388

Source: Statistics Canada *Earnings of Men and Women* Cat. No. 13-217-XPB.

Appendix (Continued)

Table A20: Weights Used for Economic Security Index

Year	% of Women and children at Risk of Widowhood	Normalized Weight of women at risk of single parent poverty	Pop 45-64, thousands	% 45-64 of total population	Normalized weight of 45-64 population at risk of elderly poverty	% of population affected of risk for health	Normalized weight of population at risk for health	All population (thousands), *d1	Pop 15-64, thousands	Pop 15-64 as % of total population	Normalized weight of WAP at risk of unemployment	Total %
	A	B=A/L	C	D=C/H*100	E=D/L	F	G=F/L	H	I	J=I/H*100	K=J/L	L=A+D+F+J
1971	57.73	0.2413	4,023.3	18.47	0.0772	100.00	0.4180	21779.6	13,731.6	63.05	0.2635	239.25
1972	57.50	0.2405	4,101.3	18.43	0.0771	100.00	0.4183	22253.0	14,043.3	63.11	0.2640	239.04
1973	57.28	0.2390	4,170.9	18.52	0.0773	100.00	0.4173	22521.3	14,372.8	63.82	0.2663	239.61
1974	57.05	0.2375	4,245.4	18.59	0.0774	100.00	0.4162	22839.3	14,760.0	64.63	0.2690	240.26
1975	56.83	0.2358	4,322.8	18.66	0.0774	100.00	0.4150	23168.8	15,164.6	65.45	0.2717	240.94
1976	56.60	0.2356	4,397.5	18.73	0.0779	100.00	0.4162	23481.9	15,246.8	66.25	0.2757	240.26
1977	56.38	0.2343	4,450.5	18.73	0.0778	100.00	0.4157	23764.1	15,556.5	66.67	0.2771	240.57
1978	56.15	0.2331	4,501.8	18.75	0.0778	100.00	0.4151	24008.4	15,843.5	67.14	0.2787	240.89
1979	55.93	0.2319	4,535.4	18.71	0.0776	100.00	0.4147	24245.3	16,120.2	67.72	0.2809	241.12
1980	55.70	0.2309	4,569.8	18.62	0.0772	100.00	0.4146	24548.2	16,419.3	67.99	0.2819	241.20
1981	55.48	0.2301	4,604.2	18.52	0.0768	100.00	0.4147	24864.4	16,689.4	68.06	0.2823	241.11
1982	55.25	0.2291	4,709.3	18.71	0.0776	100.00	0.4146	25167.3	16,923.9	68.05	0.2821	241.21
1983	55.03	0.2282	4,765.2	18.74	0.0777	100.00	0.4147	25425.2	17,127.4	68.10	0.2824	241.13
1984	54.80	0.2267	4,823.7	18.79	0.0777	100.00	0.4137	25670.9	17,313.4	68.11	0.2818	241.70
1985	54.58	0.2260	4,859.0	18.75	0.0777	100.00	0.4142	25912.1	17,484.1	68.13	0.2822	241.46
1986	54.35	0.2254	4,906.8	18.75	0.0777	100.00	0.4147	26171.0	17,654.1	68.06	0.2822	241.16
1987	54.13	0.2250	4,928.7	18.60	0.0773	100.00	0.4156	26502.5	17,812.6	67.87	0.2821	240.59
1988	53.90	0.2244	5,008.3	18.65	0.0776	100.00	0.4162	26855.8	17,987.5	67.69	0.2818	240.24
1989	53.68	0.2239	5,092.0	18.64	0.0778	100.00	0.4172	27318.3	18,179.3	67.36	0.2811	239.68
1990	53.45	0.2233	5,187.0	18.70	0.0781	100.00	0.4177	27733.0	18,402.1	67.24	0.2809	239.39
1991	53.23	0.2223	5,296.5	18.86	0.0787	100.00	0.4176	28085.7	18,646.4	67.40	0.2814	239.48
1992	53.00	0.2216	5,619.0	19.73	0.0825	100.00	0.4181	28481.3	18,929.4	66.46	0.2779	239.19
1993	52.78	0.2204	5,791.0	20.07	0.0838	100.00	0.4176	28858.3	19,224.6	66.62	0.2782	239.46
1994	52.55	0.2192	6,003.9	20.55	0.0857	100.00	0.4170	29219.5	19,486.5	66.69	0.2781	239.79
1995	52.33	0.2181	6,188.2	20.92	0.0872	100.00	0.4168	29573.6	19,711.7	66.65	0.2778	239.90
1996	52.10	0.2170	6,379.7	21.32	0.0888	100.00	0.4165	29917.5	19,954.1	66.70	0.2778	240.12
1997	51.88	0.2158	6,569.8	21.72	0.0904	100.00	0.4160	30241.1	20,202.1	66.80	0.2779	240.40

Sources: Annual Demographic Statistics, Statistics Canada Cat. 91-213, Appendix Table A-24.

Appendix (Continued)

Table A21: Forecasts of Consumer Price Index Inflation, 1975-1995

Year	Current Year Forecasts				Next Year Forecasts			
	Average Forecast	Actual Inflation	Magnitude of Error (act.-exp.)	Per Cent Error	Average Forecast	Actual Inflation	Magnitude of Error (act.-exp.)	Per Cent Error
1975	9.99	10.74	0.75	6.98	7.65	7.49	-0.16	-2.14
1976	8.16	7.49	-0.67	-8.95	7.24	8.02	0.78	9.73
1977	7.44	8.02	0.58	7.23	6.62	8.92	2.30	25.78
1978	8.62	8.92	0.30	3.36	7.24	9.15	1.91	20.87
1979	9.06	9.15	0.09	0.98	8.40	10.17	1.77	17.40
1980	9.99	10.17	0.18	1.77	10.58	12.45	1.87	15.02
1981	12.47	12.45	-0.02	-0.16	11.40	10.80	-0.60	-5.56
1982	10.90	10.80	-0.10	-0.93	8.43	5.82	-2.61	-44.85
1983	5.77	5.82	0.05	0.86	5.53	4.34	-1.19	-27.42
1984	4.97	4.34	-0.63	-14.52	5.64	3.95	-1.69	-42.78
1985	4.09	3.95	-0.14	-3.54	4.53	4.17	-0.36	-8.63
1986	3.93	4.17	0.24	5.76	4.18	4.36	0.18	4.13
1987	4.29	4.36	0.07	1.61	4.73	4.02	-0.71	-17.66
1988	4.16	4.02	-0.14	-3.48	4.62	5.00	0.38	7.60
1989	4.91	5.00	0.09	1.80	4.72	4.76	0.04	0.84
1990	4.74	4.76	0.02	0.42	5.92	5.62	-0.30	-5.34
1991	5.98	5.62	-0.36	-6.41	3.70	1.51	-2.19	-145.03
1992	2.02	1.51	-0.51	-33.77	2.74	1.84	-0.90	-48.91
1993	2.08	1.84	-0.24	-13.04	2.27	0.23	-2.04	-886.96
1994	0.75	0.19	-0.56	-294.74	1.91	2.12	0.21	9.91
1995	1.99	2.12	0.13	6.13	2.21	1.49	-0.72	-48.32

Source: David R. Johnson, "Expected Inflation in Canada 1988-1995: An Evaluation of Bank of Canada Credibility and the Effect of Inflation Targets," *Canadian Public Policy* vol.23, no. 3, September 1997.

Appendix (Continued)

Table A22: Police-Reported Crime in Canada, 1962-1995
(Rates per 100,000 Population)

Year	Violent Crime	Index 1971=1.00	Property Crime	Index 1971=1.00
1971	491	1.000	3,638	1.000
1972	496	0.990	3,623	1.004
1973	522	0.941	3,693	0.985
1974	551	0.891	4,139	0.879
1975	583	0.842	4,485	0.811
1976	582	0.844	4,520	0.805
1977	570	0.861	4,453	0.817
1978	578	0.849	4,565	0.797
1979	608	0.808	4,888	0.744
1980	634	0.774	5,427	0.670
1981	652	0.753	5,741	0.634
1982	669	0.734	5,821	0.625
1983	677	0.725	5,589	0.651
1984	698	0.703	5,481	0.664
1985	732	0.671	5,430	0.670
1986	782	0.628	5,528	0.658
1987	826	0.594	5,531	0.658
1988	865	0.568	5,419	0.671
1989	908	0.541	5,271	0.690
1990	970	0.506	5,593	0.650
1991	1,056	0.465	6,141	0.592
1992	1,077	0.456	5,868	0.620
1993	1,072	0.458	5,524	0.659
1994	1,038	0.473	5,212	0.698
1995	995	0.493	5,237	0.695

Source: Statistics Canada *Canadian Crime Statistics, 1995* Cat. No. 85-205XPE.
Note: Crime here excludes traffic offenses. Due to changes in counting procedures for Metro Toronto as of 1992, caution should be used when calculating year-to-year changes between 1991 and 1992 for Canada, Ontario, and Toronto. 1994 are revised crime data.

Appendix (Continued)

Table A23: Probability of Loss of Life or Injury in Auto Accident

Year	Victims Killed	Victims Injured	Population (thousands) d44946	Probability of Auto Death per 100,000 pop.	Injury	Index 1971=1.01 Death	Injury
1971	5,573	192,599	22,026	25.3	874.4	1.000	1.000
1972	6,221	215,705	22,285	27.9	967.9	0.906	0.903
1973	6,706	223,777	22,560	29.7	991.9	0.851	0.882
1974	6,290	229,641	22,875	27.5	1,003.9	0.920	0.871
1975	6,061	220,941	23,209	26.1	952.0	0.969	0.919
1976	5,307	199,735	23,518	22.6	849.3	1.121	1.030
1977	5,253	214,630	23,796	22.1	902.0	1.146	0.969
1978	5,429	239,640	24,036	22.6	997.0	1.120	0.877
1979	5,863	256,225	24,277	24.2	1,055.4	1.048	0.828
1980	5,461	262,977	24,593	22.2	1,069.3	1.139	0.818
1981	5,383	261,176	24,900	21.6	1,048.9	1.170	0.834
1982	4,169	225,717	25,202	16.5	895.6	1.530	0.976
1983	4,216	224,297	25,456	16.6	881.1	1.528	0.992
1984	4,120	237,455	25,702	16.0	923.9	1.578	0.946
1985	4,364	259,189	25,942	16.8	999.1	1.504	0.875
1986	4,068	264,481	26,204	15.5	1,009.3	1.630	0.866
1987	4,286	280,575	26,550	16.1	1,056.8	1.567	0.827
1988	4,154	278,618	26,895	15.4	1,035.9	1.638	0.844
1989	4,246	284,937	27,379	15.5	1,040.7	1.632	0.840
1990	3,965	262,604	27,791	14.3	944.9	1.773	0.925
1991	3,691	249,198	28,120	13.1	886.2	1.928	0.987
1992	3,500	249,821	28,542	12.3	875.3	2.063	0.999
1993	3,614	247,582	28,947	12.5	855.3	2.027	1.022
1994	3,260	244,975	29,256	11.1	837.3	2.271	1.044
1995	3,347	241,800	29,615	11.3	816.5	2.239	1.071
1996	3,082	230,885	29,964	10.3	770.5	2.460	1.135

Source: Traffic Injury Research Foundation.
Note: Index is base year 1971 divided by current year.

Appendix (Continued)

Table A24: Benefits, Jobless, Employment - Working Age Population for Canada

Year	Beneficiaries, All benefits, *D732896	Beneficiaries, Regular benefits, *D736531	Unemploy- ment 15+	Unemploy- ment 65+	Unemploy- ment 15-64	Not in labour force 15+	Not in labour force 65+	Not in labour force 15-64	Jobless, 15-64, thousands	% of the unemployed people receiving regular benefits	% of the jobless people receiving regular benefits
	AA	A	B	C	D=B-C	E	F	G=E-F	H=D+G	I=A/D	J=A/H
1971	1430714	394370.7			535.0			6233.0	6768.0	73.71	5.83
1972	1904460	524957.0			553.0			6289.0	6842.0	94.93	7.67
1973	2006620	553117.0			515.0			6250.0	6765.0	107.40	8.18
1974	2067580	569920.4			514.0			6285.0	6799.0	110.88	8.38
1975	2453930	676416.3			690.0			6498.0	7188.0	98.03	9.41
1976		626530.8	753.9	3.9	750.0	6593.5	1698.4	4895.1	5645.1	83.54	11.10
1977		668341.7	882.1	3.7	878.4	6632.7	1754.8	4877.9	5756.3	76.09	11.61
1978		710172.5	944.5	3.1	941.4	6574.1	1810.5	4763.6	5705.0	75.44	12.45
1979		614838.3	869.7	3.4	866.3	6552.4	1873.9	4678.5	5544.8	70.97	11.09
1980		603634.2	900.4	2.9	897.5	6567.1	1940.2	4626.9	5524.4	67.26	10.93
1981		619983.3	933.9	3.2	930.7	6551.4	2003.4	4548.0	5478.7	66.61	11.32
1982		1031425.0	1362.8	4.8	1358.0	6778.9	2061.9	4717.0	6075.0	75.95	16.98
1983		1119049.2	1504.2	3.8	1500.4	6823.4	2123.1	4700.3	6200.7	74.58	18.05
1984		1066334.2	1450.2	3.6	1446.6	6827.9	2179.4	4648.5	6095.1	73.71	17.49
1985		1020703.3	1380.8	3.7	1377.1	6806.7	2255.9	4550.8	5927.9	74.12	17.22
1986		972473.3	1283.1	4.2	1278.9	6804.4	2347	4457.4	5736.3	76.04	16.95
1987		909629.2	1208.2	5.1	1203.1	6801.7	2433.5	4368.2	5571.3	75.61	16.33
1988		884798.3	1081.6	4	1077.6	6789.1	2510.3	4278.8	5356.4	82.11	16.52
1989		889537.5	1065.3	3.6	1061.7	6816.3	2592.1	4224.2	5285.9	83.78	16.83
1990		964290.0	1163.9	3.1	1160.8	6948.3	2672.7	4275.6	5436.4	83.07	17.74
1991		1156039.2	1491.7	8	1483.7	7204.9	2762.8	4442.1	5925.8	77.92	19.51
1992		1147640.8	1640.2	10.2	1630.0	7504	2851.6	4652.4	6282.4	70.41	18.27
1993		1072370.0	1648.8	10.3	1638.5	7707.8	2943	4764.8	6403.3	65.45	16.75
1994		895075.8	1540.7	10.8	1529.9	7884.4	3012.1	4872.3	6402.2	58.51	13.98
1995		735888.3	1422.1	8.5	1413.6	8099.7	3107.6	4992.1	6405.7	52.06	11.49
1996		706699.2	1469.2	8.2	1461.0	8206.5	3179.7	5026.8	6487.8	48.37	10.89
1997		594238.9	1413.5	6.9	1406.6	8332.5	3261.9	5070.6	6477.2	42.25	9.17

Appendix (Continued)

Table A24 (Continued)

Year	Pop 15+, thousands	Pop 65+, thousands	Pop 15-64, thousands	Full Time Employed 15+, thousands	Full Time Employed 65+, thousands	Full Time Employed 15-64, thousands	Full Time Employed/ Pop 15-64, %	Average weekly regular payment benefits, $, 5704 / *D730479	Average weekly earnings, $, 4288/ *L657711	Average weekly benefits/ average weekly earnings (%)
	K	L	M=K-L	N	O	P=N-O	Q=P/M	R	S	T=R/S
1971	15476.0	1744.4	13731.6	*8558.8*	*120.1*	8438.7	61.45	52.60	168.33	31.25
1972	15831.0	1787.7	14043.3	*8558.8*	*120.1*	8438.7	60.09	62.11	137.19	45.27
1973	16207.0	1834.2	14372.8	*8558.8*	*120.1*	8438.7	58.71	68.24	146.30	46.64
1974	16643.0	1883.0	14760.0	*8558.8*	*120.1*	8438.7	57.17	74.62	162.29	45.98
1975	17099.0	1934.4	15164.6	*8558.8*	*120.1*	8438.7	55.65	84.92	186.60	45.51
1976	17123.5	1876.7	15246.8	8558.8	120.1	8438.7	55.35	93.16	209.21	44.53
1977	17493.0	1936.5	15556.5	8677.3	120.9	8556.4	55.00	101.37	229.44	44.18
1978	17839.0	1995.5	15843.5	8947.7	123.8	8823.9	55.69	109.43	242.09	45.20
1979	18182.7	2062.5	16120.2	9274.8	123.0	9151.8	56.77	107.50	261.00	41.19
1980	18549.6	2130.3	16419.3	9491.5	121.0	9370.5	57.07	119.90	287.88	41.65
1981	18883.3	2193.9	16689.4	9699.9	119.6	9580.3	57.40	128.90	321.13	40.14
1982	19176.8	2252.9	16923.9	9276.3	118.6	9157.7	54.11	143.69	362.02	39.69
1983	19433.3	2305.9	17127.4	9242.2	112.2	9130.0	53.31	153.85	382.78	40.19
1984	19680.5	2367.1	17313.4	9490.7	111.0	9379.7	54.18	160.04	398.66	40.14
1985	19929.5	2445.4	17484.1	9745.3	110.5	9634.8	55.11	169.07	412.75	40.96
1986	20182.1	2528.0	17654.1	10045.1	105.9	9939.2	56.30	178.74	425.16	42.04
1987	20432.4	2619.8	17812.6	10354.3	111.2	10243.1	57.50	187.17	441.23	42.42
1988	20689.6	2702.1	17987.5	10666.9	111.7	10555.2	58.68	199.02	460.67	43.20
1989	20967.6	2788.3	18179.3	10917.4	107.7	10809.7	59.46	212.47	484.23	43.88
1990	21277.4	2875.3	18402.1	10929.0	109.5	10819.5	58.79	230.00	506.24	45.43
1991	21612.7	2966.3	18646.4	10573.6	108.9	10464.7	56.12	244.48	529.48	46.17
1992	21986.2	3056.8	18929.4	10467.2	111.8	10355.4	54.71	252.81	547.98	46.14
1993	22371.3	3146.7	19224.6	10534.4	109.7	10424.7	54.23	256.02	557.94	45.89
1994	22716.8	3230.3	19486.5	10798.4	123.0	10675.4	54.78	251.80	568.27	44.31
1995	23027.3	3315.6	19711.7	10996.8	116.3	10880.5	55.20	252.96	573.75	44.09
1996	23351.8	3397.7	19954.1	11087.2	118.5	10968.7	54.97	255.32	586.06	43.57
1997	23686.5	3484.4	20202.1	11291.3	123.9	11167.4	55.28	249.72	598.26	41.74

Source: Series # B,C,E,F,K,L,N,O are from Labour Force Historical Review CDROM 71F0004XCB.
Note: Data for series #N,O for 1971-1975 are assumed to be equal data for 1976. Data for series #A for 1972-1974 were calculated assuming the same growth as for series # AA, data for 1971 based on the data for 1972 and growth rate for claimants in 1971-72 period from Historical Statistic of Canada, E168. Jobless people is defined as unemployed people and people not in labour force. Data for series #D,G for1971-1974 are from Canadian Labour Force Estimates, 1946-1984.

Appendix (Continued)

Table A25: Canada, Greenhouse Gas Emissions Cost

Year	Canada GDP, millions of 1990 G-K Dollars)	World GDP, millions of 1990 G-K Dollars)	Canada's share in the world GDP, %	World CO2 Emission (millions of metric tones)	World Emission CO2 Cost, mill. of 1990$ ($24.4 per metric ton)	Canada's share of World CO2 emission social cost (millions of 1990$)	Population, thousands, *D1	Emission cost per capita, 1992$
	A	B	C=A/B*100	D	E=D*24.4	F=C*E/100	G	H=F/G/0.96125
1961	156,283	8,137,175	1.9206	12,982	316,756	6,083.6	18,238	347.02
1962	167,399	8,512,768	1.9664	13,250	323,300	6,357.5	18,583	355.91
1963	176,033	8,884,930	1.9813	13,518	329,844	6,535.0	18,931	359.12
1964	187,778	9,557,792	1.9647	13,786	336,387	6,608.9	19,277	356.65
1965	200,184	10,071,305	1.9877	14,055	342,931	6,816.3	19,634	361.17
1966	213,814	10,649,074	2.0078	14,323	349,475	7,016.8	19,998	365.03
1967	220,497	11,016,274	2.0016	14,591	356,018	7,125.9	20,364	364.04
1968	231,844	11,580,161	2.0021	14,859	362,562	7,258.8	20,692	364.94
1969	244,250	12,227,815	1.9975	15,127	369,105	7,372.9	20,994	365.34
1970	250,734	12,869,817	1.9482	15,395	375,649	7,318.5	21,288	357.65
1971	265,192	13,389,468	1.9806	15,664	382,193	7,569.7	21,780	361.57
1972	280,277	13,988,567	2.0036	15,932	388,736	7,788.8	22,253	364.12
1973	301,880	14,921,483	2.0231	**16,200**	395,280	7,997.0	22,521	369.40
1974	315,080	15,226,809	2.0692	16,468	401,824	8,314.7	22,839	378.73
1975	323,252	15,428,144	2.0952	16,736	408,367	8,556.2	23,169	384.18
1976	343,102	16,110,275	2.1297	17,005	414,911	8,836.4	23,482	391.48
1977	355,375	16,783,237	2.1174	17,273	421,455	8,924.0	23,764	390.66
1978	371,652	17,531,398	2.1199	17,541	427,998	9,073.2	24,008	393.15
1979	386,142	18,118,245	2.1312	17,809	434,542	9,261.1	24,245	397.37
1980	391,866	18,500,325	2.1182	18,077	441,085	9,342.9	24,548	395.94
1981	406,323	18,871,756	2.1531	18,345	447,629	9,637.8	24,864	403.24
1982	393,255	19,074,172	2.0617	18,614	454,173	9,363.7	25,167	387.06
1983	405,827	19,660,980	2.0641	18,882	460,716	9,509.8	25,425	389.11
1984	431,697	20,619,078	2.0937	19,150	467,260	9,782.9	25,671	396.45
1985	452,109	21,429,086	2.1098	19,418	473,804	9,996.3	25,912	401.33
1986	466,864	22,263,660	2.0970	19,686	480,347	10,072.8	26,171	400.40
1987	486,218	23,138,044	2.1014	19,955	486,891	10,231.4	26,503	401.62
1988	510,368	24,275,251	2.1024	20,223	493,435	10,374.1	26,856	401.86
1989	522,476	25,047,613	2.0859	20,491	499,978	10,429.2	27,318	397.16
1990	521,517	25,555,255	2.0407	20,759	506,522	10,336.8	27,733	387.75
1991	512,518	25,711,179	1.9934	21,027	513,065	10,227.3	28,086	378.82
1992	516,356	26,078,852	1.9800	21,295	519,609	10,288.2	28,481	375.79
1993	527,703	26,078,852	2.0235	21,564	526,153	10,646.6	28,858	383.80
1994	549,340	26,078,852	2.1065	21,832	532,696	11,221.0	29,220	399.51
1995			2.1065	**22,100**	539,240	11,358.9	29,574	399.57
1996			2.1065	22,368	545,784	11,496.7	29,918	399.77
1997			2.1065	22,636	552,327	11,634.5	30,241	400.24

Sources: Data on Greenhouse Gas emission in Canada for 1973 and 1995 are from International Energy Agency Data for the years between 1973 and 1995 were interpolated assuming a constant linear growth trend over the period. This trend was extrapolated backwards and forwards outside. Data on GDP for Canada and the World are from Monitoring the World Economy, Angus Maddison, 1995, P.181, 211. Data for 1995-1997 GDP share for Canada assumed to be equal to data for 1994. Recalculation into 1992$ were made with GDP IPI 1990=96.125 1992=100, Source: *D15612.

Appendix (Continued)

Table A26: Canada, Underground Consumption

Year	All workers	Total Self Employed Workers	% of Self Employed Workers	Index of Self Employed Workers 1971=1.00	% of Underground Consumption
1961			9.172	0.820	1.950
1962			9.355	0.837	1.989
1963			9.542	0.854	2.029
1964			9.733	0.871	2.070
1965			9.927	0.888	2.111
1966			10.13	0.906	2.153
1967			10.33	0.924	2.196
1968			10.53	0.942	2.240
1969			10.75	0.961	2.285
1970			10.96	0.980	2.331
1971			11.18	1.000	2.595
1972			11.40	1.020	2.647
1973			11.63	1.040	2.700
1974			11.86	1.061	2.754
1975			12.10	1.082	2.809
1976	9776.2	1206.6	12.34	1.104	2.865
1977	9978.2	1280.0	12.83	1.148	2.978
1978	10320.4	1360.2	13.18	1.179	3.060
1979	10760.6	1423.0	13.22	1.183	3.070
1980	11082.2	1462.3	13.20	1.180	3.063
1981	11398.1	1521.5	13.35	1.194	3.099
1982	11035.1	1537.1	13.93	1.246	3.234
1983	11105.6	1594.2	14.35	1.284	3.333
1984	11402.4	1628.8	14.28	1.278	3.316
1985	11741.9	1677.0	14.28	1.278	3.316
1986	12094.5	1681.6	13.90	1.244	3.228
1987	12422.4	1746.1	14.06	1.257	3.263
1988	12818.9	1820.9	14.20	1.271	3.298
1989	13086.0	1809.1	13.82	1.237	3.209
1990	13165.1	1889.3	14.35	1.284	3.332
1991	12916.1	1919.9	14.86	1.330	3.451
1992	12842.0	1936.1	15.08	1.349	3.500
1993	13014.7	2056.4	15.80	1.413	3.668
1994	13291.6	2111.4	15.89	1.421	3.688
1995	13505.5	2135.6	15.81	1.415	3.671
1996	13676.2	2266.6	16.57	1.483	3.848
1997	13940.6	2487.9	17.85	1.596	4.143

Source: Labour Force Historical Review CDROM 71F0004XCB.
Note: Share of self-employed workers for 1971-75 were
extrapolated assuming a constant growth trend for next 5 years.

Bibliography

Alonzo, William and Paul Starr, eds. (1987) *The Politics of Numbers* (New York: Russell Sage).

Atkinson, Anthony, Lee Rainwater and Timothy M. Smeeding (1995) *Income Distribution in OECD Countries: Evidence from the Luxembourg Income Study* (Paris:OECD).

Atkinson, Giles, Richard Dubourg, Kirk Hamilton, Mohan Munasinghe, David Pearce, and Carlos Young (1997) *Measuring Sustainable Development: Macroeconomics and the Environment* (Cheltham, UK: Edward Elgar).

Baily, Martin Neil, Gary Burtless, and Robert E. Litan (1993) *Growth with Equity: Economic Policymaking for the Next Century* (Washington, DC: Brookings Institution).

Baumol, William and Wallace Oates (1995) " Long-Run Trends in Environmental Quality," in Julian L. Simon (ed.) *The State of Humanity* (Cambridge, Mass.: Basil Blackwell) pp. 444-475.

Bettman, Otto L. (1974) *The Good Old Days-They Were Terrible!* (New York: Random House).

Bibby, Reginald (1995) *The Bibby Report: Social Trend Canadian Style* (Toronto: Stoddard).

Blanchflower, David G. and Andrew J. Oswald (1997) "The Rising Well-Being of the Young," NBER Working Paper No. 6102, July.

Blendon, Robert J., Jihn M. Benson, Mollyann Bridie, Richard Morin, Drew E. Altman, Daniel Gitterman, Mario Brossard, and Matt James (1997) "Bridging the Gap Between the Public's and Economists' Views of the Economy," *Journal of Economic Perspectives*, Volume 11, Number 3, Summer, pp. 105-118.

Boskin, M.J. (chairman), E.R. Dulberger, Z. Griliches, R.J. Gordon, and D. Jorgenson (1996) *Toward A More Accurate Measure of the Cost of Living,* Final Report to the Senate Finance Committee from the Advisory Commission to Study the Consumer Price Index.

Brink, Satya and Allen Zeesman (1997) *Measuring Social Well-Being: An Index of Social Health for Canada*, Research Paper R-97-9E, Applied Research Branch, Strategic Policy Group, Human Resources Development Canada, June.

Brown, Clair (1994) *American Living Standards, 1918-1988* (Cambridge, Mass.: Blackwell).

Burkhauser, R.V., M. Smeeding, and J. Merz (1996). "Relative Inequality and Poverty in Germany and the United States Using Alternative Equivalence Scales," *The Review of Income and Wealth*, 42, 381-400.

Canadian Council on Social Development (1996) *Measuring Well-Being: Proceedings from a Symposium on Social Indicators, Final Report* (Ottawa).

Cobb, Clifford and John B. Cobb, Jr. (1994) *The Green National Product: A Proposed Index of Sustainable Economic Welfare* (Lanham, Maryland: University Press of America).

Cobb, Clifford, Ted Halstead and Jonathan Rowe (1995) "If GDP is Up, Why is America Down?" *The Atlantic Monthly*, October.

Cobb, Clifford, Ted Halstead and Jonathan Rowe (1995) *The Genuine Progress Indicator: Summary of Data and Methodology* (San Francisco:Redefining Progress).

Crabbe, Philippe (1997) "Sustainable Development: Concepts, Measures, Market and Policy Failures at the Open Economy, Industry, and Firm Levels," Occasional Paper Number 16, Industry Canada, October.

Currie, Janet (1995) *Welfare and the Well-Being of Children.* (Harwood Academic Publishers).

Daedalus (1994) Special Issue on Health and Wealth, Vol. 124, Number 4, fall.

Dale, Ann and John B. Robinson, eds. (1996) *Achieving Sustainable Development* (Vancouver: UBC Press).

Daly, Mary C. and Greg Duncan (1998) "Income Inequality and Mortality Risk in the United States: Is There a Link?" *FRBSF Economic Letter*, Number 98-29, October 2.

Dawson, J. C. ed., (1996) *Flow-of-Funds Analysis* (Armonk/London: M.E. Sharpe).

Eckstein, Z. and I. Zilcha (1994) "The Effects of Compulsory Schooling on Growth, Income Distribution and Welfare", *Journal of Public Economics*, Vol. 54, May, 1994, pp. 339-359.

Eisner, Robert (1989) *The Total Income System of Accounts* (Chicago: University of Chicago Press).

Evans, Robert G., Morris L. Marer and Theodore R. Marmor (1994) *Why Are Some People Healthy and Others Not? The Determinants of Health of Populations* (Hawthorne, NY: Aldine de Gruyter).

Fankhauser, S. (1995) "Evaluating the Social Costs of Greenhouse Gas Emissions," *Energy Journal*, Vol 15, pp. 157-84.

Fortin, Nicole (1995) "Allocation Inflexibilities, Female Labor Supply and Housing Assets Accumulation: Are Women Working to Pay the Mortgage," *Journal of Labor Economics* Volume 13, No. 3, pp. 524-557.

Galor, O. and J. Zeira (1993) "Income Distribution and Macroeconomics", *Review of Economic Studies*, January, 1993, Vol. 60, pp. 35-52.

Globe and Mail (1998) "Find it Harder to Make Ends Meet? You're Not Alone," August 4.

Gwartney, James and Robert Lawson (1997) *Economic Freedom of the World: 1997* (Vancouver: The Fraser Institute).

Hamilton, Kirk, (1994) "Green Adjustments to GDP," *Resources Policy*, Volume 20, No. 3, pp. 156-168.

Hardi, Peter and Stephan Barg (1997) "Measuring Sustainable Development: Review of Current Practice," Occasional Paper Number 17, Industry Canada, November.

Hayward, Steve and Laura Jones (1998) *Environmental Indicators for Canada and the United States*, Critical Issues Bulletin, Fraser Institute.

Henderson, D.W. (1974) *Social Indicators: A Rationale and Research Framework*, Economic Council of Canada.

Human Resources Development Canada (1995) "The Social Outlook: The Need for a Human Investment Strategy," May 26, Ottawa.

Human Resources Development Canada (1996) "Measuring Social Well Being: An Index of Social Health for Canada," paper presented at the Centre for the Study of Living Standards session "Beyond GDP" at the annual meeting of the Canadian Economics Association, Memorial University, St. John's, Newfoundland, June 2.

Human Resources Development Canada (1998) *An Analysis of Employment Insurance Benefit Coverage*, Working Paper W-98-35E, Applied Research Branch, Strategic Policy Group. Ottawa, October.

Jacques, A., F. Neitzert, and P. Boileau (1997) *Trends in Canada's Greenhouse Gas Emissions, 1960-1995*, Environment Canada, April.

Jencks, Christopher (1987) "The Politics of Income Measurement," in Alonzo, William and Paul Starr, eds. *The Politics of Numbers* (New York: Russell Sage).

Jenkins, S. (1991) "The Measurement of Income Inequality", pp. 3-38 in L. Osberg (Editor), *Economic Inequality and Poverty: International Perspectives* (M.E. Sharp Inc., Armonk, New York).

Jorgenson, Dale and Barbara Fraumeni (1992) "Output of the Education Sector," in Z. Griliches (ed.) *Output Measurement in the Service Sector*, Studies in Income and Wealth, Volume 56, National Bureau of Economic Research (Chicago: University of Chicago Press).

Lane, Robert E. (1993) "Does Money Buy Happiness?" *The Public Interest*, pp. 56-65.

Lavis, John and Gregory L. Stoddart (1994) "Can We Have Too Much Health Care?" *Daedalus*, Volume 123, Number 4, fall, pp.43-60.

Levy, Frank (1996) "Is Economic Anxiety Justified?" Paper commissioned by the Competitiveness Policy Council, September, www.cais.net/cpc/running.

Litan, Robert, Robert Z. Lawrence, and Charles Schultze (eds.) *American Living Standards: Threats and Challenges* (Washington, DC: Brookings Institute).

Little, Bruce (1998) "Opportunity to Under-Report Income Fuels Drive to Self-Employment: Study," *The Globe and Mail*, October 7.

Kendrick, J.W. (1976) *The Formation and Stocks of Total Capital* (New York: Columbia University Press).

Kendrick, J.W., ed. (1996) *The New System of National Accounts* (Boston/ Dordrecht/ London: Kluwer Academic Publishers).

Keuning, Steven (forthcoming) "A Powerful Link Between Economic Theory and Practice: National Accounting," *The Review of Income and Wealth*.

Kilfoil, M. (1998) "Two Essays Examining the Impact of Standardizing for Differences in Hours Worked on Household Earnings Distributions." Ph.D. Thesis, Department of Economics, Dalhousie University.

Knack, S. and P. Keefer (1997) "Does Social Capital have an Economic Payoff? A Cross-Country Investigation," *Quarterly Journal of Economics*, Vol. CXII, November, Issue 4 pp. 1251-1288.

McFate, Katherine, Roger Lawson and William Julius Wilson, eds. (1995) *Poverty, Inequality, and the Future of Social Policy: Western States in the New World Order* (New York: Russell Sage).

Messinger, Hans and Abe Tarasofsky (1997) "Measuring Sustainable Economic Welfare: Looking Beyond GDP," paper presented at the annual meeting of the Canadian Economics Association, St. John's, Newfoundland, June 2-4.

Mishel, Lawrence and Jared Bernstein (1996) "Trouble in Paradise: Eroding Wages and Growing Income Inequality," paper commissioned by the Competitiveness Policy Council, September, www.cais.net/cpc/running

Mishel, Lawrence, Jared Bernstein, and John Schmitt (1997) *The State of Working America, 1996-97*, Economic Policy Institute (Armonk, NY: ME Sharpe).

Moss, Milton (1973) *The Measurement of Economic and Social Performance*, NBER.

National Forum on Family Security (1993) *Family Security in Insecure Times,* Volume I. National Forum on Family Security (1996) *Family Security in Insecure Times*, Volumes II and III.

Nordhaus, William (1996) "Do Real Output and Real Wage Measures Capture Reality/ The History of Light Suggests Not," in Bresnehan, Timothy and R.J. Gordon (1996) eds. *The Economics of New Goods,* NBER (Chicago: University of Chicago Press).

OECD (1996) *Measuring What People Know: Human Capital Accouting for the Knowledge Economy* (Paris).

OECD (1998) *Human Capital Investment: An International Comparison*, Centre for International Research and Innovation.

O'Reilly, Brian (1998) *The Benefits of Low Inflation: Taking Stock*, Technical Report No. 83, April, Bank of Canada

Osberg, Lars (1985) "The Measurement of Economic Welfare," in David Laidler (coordinator) *Approaches to Economic Well-Being*, volume 26 of the research program of the Royal Commission of the Economic Union and Development Prospects for Canada (MacDonald Commission) (Toronto: University of Toronto Press).

Osberg, Lars (1985a) *The Idea of Economic Well-Being*. Paper presented at the 19th General Conference of the International Association for Research in Income and Wealth, Noordwijkerhout, Netherlands, August 25-31, mimeograph, Dalhousie University, June.

Osberg, Lars, ed. (1991) *Income Distribution in International Perspective* (Armonk:NY, ME Sharpe).

Osberg, Lars (1992) "Sustainable Social Development," in Robert C. Allen and Gideon Rosenbluth (eds.) *False Promises: The Failure of Conservative Economics* (Vancouver: New Star Books).

Osberg, Lars (1997) "Economic Growth, Income Distribution and Economic Welfare in Canada, 1975-1994," *North American Journal of Economics & Finance*, 8(2), pp. 153-199.

Osberg, L. (1998) "Economic Insecurity" mimeograph, Department of Economics, Dalhousie University.

Ostry, Sylvia and Mahmood Zaidi (1979) *Labour Economics in Canada*, Third Edition (Toronto: MacMillan).

Picot, Garnett (1996) "Earnings Inequality, Working Time and Wages Among Men and Women," Business and Labour Market Analysis Division, Statistics Canada.

Phipps, S. and T.I. Garner (1994). "Are Equivalence Scales the Same for the United States and Canada?" *The Review of Income and Wealth*, 40, 1-18.

Putnam, Robert D. (1993) *Making Democracy Work: Civic Traditions in Modern Italy* (Princeton , NJ: Princeton University Press).

Ragan, Christopher (1998) "On the Believable Benefits of Low Inflation," Working Paper 98-15, Bank of Canada.

Robinson, John B. (1996) *Life in 2030: Exploring a Sustainable Future for Canada* (Vancouver: UBC Press).

Ross, David, Richard Shillington, and Clarence Lochhead (1994) *The Canadian Fact Book on Poverty* (Ottawa: Canadian Council on Social Development).

Richardson, Sue and Peter Traves (1993) *Living Decently: Material Well-Being in Australia* (Melbourne: Oxford University Press).

Sarlo, Christopher (1998) *Canadian Living Standards 1998 Report*, Critical Issues Bulletin, (Vancouver: Fraser Institute).

Sharif, N. & S. Phipps (1994) "The Challenge of Child Poverty: Which Policies Might Help?" *Canadian Business Economics*, Vol. 2, No. 3, Spring 1994, pp. 17-30.

Sharpe, Andrew and Myles Zyblock (1997) "Macroeconomic Performance and Income Distribution in Canada," *North American Journal of Economics & Finance*, Volume 8, Number 2, pp.167-199.

Slottje, Daniel J., Gerald W. Scully, Joseph G. Hirschberg, and Kathy J. Hayes (1991) *Measuring the Quality of Life Across Countries: A Multidimensional Analysis* (Boulder, Col.: Westview Press).

Smith, Phillip (1994) "The Canadian National Accounts Environmental Component: A Status Report," in *National Income and Expenditure Accounts, Annual Estimates, 1982-1993*, Cat. 13-201.

Statistics Canada (1994) *The Size of the Underground Economy in Canada*, Cat. No. 13-603.

Statistics Canada (1996) *Environmental Perspectives*, Cat. No. 11-528.

Statistics Canada (1996) *Households' Unpaid Work: Measurement and Valuation*, Cat.. No. 13-603.

Statistics Canada (1997) *Econnections: Linking the Environment and the Economy, Indicators and Detailed Statistics, 1997*, cat 16-200, December.

United Nations (1993) in collaboration with, Eurostat, International Monetary Fund, Organisation for Economic Co-operation and Development, and World Bank, *System of National Accounts 1993*, United Nations, New York. (Series F, No. 2, Rev. 4), 1993.

United Nations Development Program (1997) *Human Development Report: 1997* (New York: Oxford University Press).

Usher, Dan (1980) *The Measurement of Economic Growth* (Oxford: Basil Blackwell).

Vanier Institute of the Family (1994) *Profiling Canada's Families*.

Waring, Marilyn (1988) *Counting for Nothing: What Men Value and What Women Are Worth* (Wellington, New Zealand: Allen and Unwin).

Wilkinson, R.G. (1996) *Unhealthy Societies: The Afflictions of Inequality* (London: Routledge).

Wolfson, Michael (1994a) "Toward a System of Health Statistics," *Daedalus*, Volume 123, Number 4, fall, pp.181-193.

Wolfson, Michael (1994b) "Implications of Evolutionary Economics for Measurement in the SNA: Towards a System of Social and Economic Statistics," paper prepared for the 23rd General

Conference of the International Association for Research in Income and Wealth, St. Andrews, New Brunswick, August 21-27.

Wolfson, Michael (1995) "On Frameworks for Social Policy- the Measurement Perspective," comments for the Roundtable on the CHST, December 4.

Wolfson, Michael (1996) "Health-Adjusted Life Expectancy," *Health Reports*, Statistics Canada. Summer, Vol. 8, No. 1, pp. 41-45.

Woolley, Frances (1998) "Work and Household Transactions," in *How Families Cope and Why Policymakers Need to Know*, Canadian Policy Research Network Study No. F02 (Ottawa).

World Bank (1997) *Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development*, EDS Studies and Monographs Series No. 17. (Washington, DC).