

**Measuring Economic Security in Insecure Times:
New Perspectives, New Events and the Index of Economic Well-being**

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Measuring Economic Security in Insecure Times:
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Since 1998, the Centre for the Study of Living Standards has published the Index of Economic Well-Being¹, which attempts to estimate the level and trend of aggregate economic well-being in Canada and other OECD nations. One of the four components of the IEWB, and a key driver of its trends during the 1990s, is the sub-index of Economic Security. A major issue of the 1998-2008 period was the policy drive in OECD nations to greater “labour market flexibility”, a policy direction which produced revisions to labour market regulation and social policy aimed at reducing social protection in order to encourage growth. The construction of the IEWB was motivated in part by the perception that both costs in reduced economic security and benefits in aggregate growth should be considered in any evaluation of trends in aggregate well-being. However, during this period, policy changes were usually gradual. It was consequently not a major constraint that in measuring the impact of changes in economic security on economic well-being, data on macro-economic aggregates and micro-data on individual households are available only with a lag, often of several years. At least until recently, the extrapolation of past trends provided a plausible guide to current realities, and to likely future outcomes.

Recently, this assumption has become more questionable. Between January 2008 and May 2009, but especially since September 2008, the global economy has sunk into recession, unemployment has spiked upwards around the world, North American stock market values have tumbled by roughly 50%, (with an unprecedented amount of day to day volatility) and housing prices have declined in many countries. With news reports of major corporate bankruptcies filling the daily headlines, and continual downward revisions of economic growth projections from major agencies such as the IMF and OECD, uncertainty about the future has surged. It is not clear, as of May 2009, whether Canada and other OECD nations are entering a long period of continued financial instability and slow or negative growth or whether ‘business as usual’ will re-emerge in short order. But it is clear that confidence in financial markets has been badly shaken, that several trillion dollars of perceived wealth in home equity and stock market value has vaporized and that anxiety about the economic future has dramatically increased.

The sudden onset of the global recession, and the particular combination of financial crisis and real economy decline that has characterized this recession, pose significant problems for the measurement of economic security, and its implications for aggregate well-being. How should one measure recent trends in the economic security that individuals need to plan their personal visions of the future good life? When business cycle changes are so rapid, how reliable

¹ See Osberg and Sharpe, 1998, 2000, 2002.

can estimates based on historical data be? What amendments to IEWB methodology should be made? How should one add the trend in economic security to the (adverse) trends in average income, aggregate wealth and inequality to estimate what is happening to over-all economic well-being?

Although OECD data is available enabling comparisons of many countries, this paper is restricted to Canada, Australia, Germany, Norway, Sweden, the UK and the USA and to analysis of trends since 1980. We focus on these seven nations because simultaneous discussion of too many places rapidly becomes unmanageable, because these particular countries may be especially interesting as epitomizing the ‘Scandinavian’, ‘Anglo’ and ‘Continental European’ welfare state regimes and because an earlier paper (Osberg and Sharpe, 2005) has presented already discussed, for these countries, the implications of the IEWB for the Human Development Index. The paper starts in Section 1 with a brief outline of the Index of Economic Well-Being, in which a measure of economic security is embedded. Section 2 then discusses our methodology for the measurement of Economic Security, the amendments that have been made over the years and the rationale for these changes. Section 2 also presents updated estimates, which combine actual data to 2007 and the latest OECD forecasts of unemployment through 2010. Section 3 then considers the adequacy of our framework for discussion and measurement of economic (in)security during times as tumultuous as the present. Section 4 discusses possible improvements for the future.

1. The Index of Economic Well-being: Motivation and Framework²

The IEWB is an intermediate type of index. While broader in conception than GDP per capita, it still aims only at the ‘economic’ dimension of life – its philosophy is that there is more to “well-being” than economic well-being, but there is more to economic well-being than GDP per capita, and it is useful to have better measures of the economic well-being of society because better measurement may help guide better decisions. The IEWB avoids consideration of broader ‘quality of life’ issues (such as crime rates) on the grounds that too much aggregation of dissimilar dimensions of social and political well-being can obscure understanding of their inter-relationships. But it takes a broad view of “economic well-being” as being “access to the resources needed for material consumption” because the narrower focus of GDP accounting omits consideration of many issues (for example, leisure time, longevity of life, asset stock levels) which are important to the command over resources of individuals. Our Index of Economic Well-Being is based on four dimensions of economic well-being – average current consumption flows, aggregate accumulation for future consumption, income distribution, and economic security.

Exhibit 1 illustrates our identification of four components of well being, which recognize trends in both average outcomes and in the diversity of outcomes, both now and in the future.

² This section is largely based on Osberg and Sharpe (2005).

Exhibit 1 - Dimensions of Economic Well Being		
Concept	Present	Future
“Typical Citizen” or “Representative Agent”	[A] Average Flow of Current Income	[B] Aggregate Accumulation of Productive Stocks
Heterogeneity of Experiences of all Citizens	[C] Distribution of Potential Consumption – Income Inequality and Poverty	[D] Insecurity of Future Incomes

When an average income flow concept, like GDP per capita (or the Genuine Progress Index or GPI), is used as a summative index of society’s well-being, the analyst implicitly is stopping in quadrant [A] – assuming (a) that the experience of a representative agent can summarize the well-being of society and (b) that the measured income flow optimally weights consumption and savings, so that one need not explicitly distinguish between present consumption flows and the accumulation of asset stocks which will enable future consumption flows. However, if society is composed of diverse individuals living in an uncertain world who typically “live in the present, anticipating the future,” each individual’s estimate of societal economic well-being will depend on the proportion of national income saved for the future – i.e. both quadrants [A] and [B] matter. As well, real societies are not equal. There is therefore a long tradition in economics that “social welfare” depends on both average incomes and the degree of inequality and poverty in the distribution of incomes – quadrant [C]. And the focus of this paper is on quadrant [D] – the fact that if the future is uncertain, and complete insurance is unobtainable (either privately or through the welfare state), individuals will also care about the degree to which the economic future is secure.

These four components therefore have a logical rationale and a manageable dimensionality – the IEWB is calculated as the weighted sum of [A] + [B] + [C] + [D]. However, although these four dimensions of well-being are all valuable to some degree, tastes differ. Different individuals may assign differing degrees of relative importance to each dimension of well-being – indeed, each citizen in a democratic society has the right to come to a personal conclusion about the relative weight of each dimension. And because citizens are occasionally

called upon, in a democracy, to exercise choices (e.g. in voting) on issues that affect the collectivity (and some individuals, such as civil servants, make such decisions on a daily basis), they all have reason sometimes to ask questions of the form: “Would public policy X make ‘society’ better off?”

A measure of social well-being is useful if some people, at least some of the time, want an index to help them answer such questions. We can assume that individuals know more about their own preferences and their own life situation than anyone else is likely to know, so individuals need no real help in calculating the implications for their own personal utility of public policy on any given issue. But individuals who want to maximize some combination of their own well-being and society’s well-being can be seen as maximizing: $U_i = \alpha_1$ (own utility) + α_2 (Social Index expressing own estimate of society’s well-being). If $\alpha_2 = 0$ for all persons, always, then there is no point in constructing the IEWB or any other social index. We are presuming that for some people, at least some of the time, $\alpha_2 \neq 0$ – which we think to be highly plausible.

In the real world, citizens are frequently called upon to choose between policies (e.g. on education, or on health) which affect dimensions of life that cannot be measured in directly comparable units. Hence, individuals often have to come to a summative decision – i.e. have a way of “adding it all up” – across domains that are conceptually dissimilar. We argue that the role of people who construct social indices should be one of helping citizens – e.g. as voters in elections and as bureaucrats in policy making – to come to reasonable summative decisions about the level of society’s well-being. From this perspective, the purpose of index construction should be to help individuals think systematically about public policy, without necessarily presuming that all individuals have the same values. Although it may not be possible to define an *objective* index of societal well-being, individuals still have the problem (indeed, the moral responsibility) of coming to a *subjective* evaluation of social states, and they need organized, objective data if they are to do it in a reasonable way.

Each dimension of economic well-being is itself an aggregation of many underlying trends, on which the existing data is of variable quality – the subject of this paper is the “Economic Security” domain.

2. The Evolution of the Economic Security Domain of the IEWB

The definition of ‘economic insecurity’ that underlies our work has been: “the anxiety produced by a lack of economic safety – i.e. by an inability to obtain protection against subjectively significant potential economic losses” (Osberg, 1998:17). An alternative definition is “an individual’s perception of the risk of economic misfortune” (Dominitz and Manski, 1997; Scheve-Slaughter, 2004, Anderson and Gascon; 2007). Since both definitions are essentially subjective, and forward-looking, the ‘economic security’ domain is the most complex domain of the Index of Economic Well-being and the methodologies used in its construction have evolved since the Index was first released in 1998.

Uninsurable uncertainty about what the future holds will decrease the economic welfare of risk averse individuals, but many types of hazards can be subject to uninsurable uncertainty. To construct a useful index, we must specify both the types of misfortune that might produce insecurity and the measures of anxiety or insecurity about such losses. But what is the criterion for selecting the specific hazards that span the ‘most important’ life domains that cause economic insecurity, and for neglecting others?

Over fifty years ago, the United Nations’ Universal Declaration of Human Rights stated:

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]³

Because the articulation, and adoption, of human rights covenants such as the UN’s Universal Declaration are the result of a political process which (at least in democracies) can claim general societal support, these documents have huge advantages in specifying the important aspects of well-being to consider in index construction. No matter how wise they may be, individual researchers cannot claim such general social legitimacy. In this and other papers we have therefore adopted a “named risks” approach, and addressed the change over time in four key objective economic risks – those associated with unemployment, illness, “widowhood” (interpreted here as single female parenthood) and old age.⁴Our core hypothesis

³Today, the gender specificity of the language of 1948 will strike many people as odd – but Article 2 makes it clear that all rights are to be guaranteed to male and female persons equally.

⁴ The required data have not been available to measure the economic misfortunes associated with disability, but were that possible, we would include it as well.

is that changes in the subjective level of anxiety about a lack of economic safety are proportionate to changes in objective risk⁵.

We adopt this empirical strategy partly because reliable survey data on subjective anxieties or economic security is only occasionally available. Nevertheless, even if we use objective data to predict subjective attitudes, measuring the objective risks of “*the event of unemployment, sickness, disability, widowhood, old age or other loss of livelihood in circumstances beyond his control.*” is an exercise in empirical compromise. Comparisons over time and locality are only possible if similar data has been gathered at different times and places, which inevitably restricts our measurement choices to pre-existing data bases. Since there is less data available that is comparable internationally than there is available within Canada, we have had to accept some compromises in international comparisons which we can avoid in inter-provincial, or over time, comparisons within Canada.

2.1 “Security in the event of Unemployment”

Our measure of the risk imposed by unemployment is conceptually driven by three variables: the unemployment rate, the proportion of the unemployed receiving unemployment benefits, and the average proportion of earnings that are replaced by such benefits. However, an important limitation of our international comparisons is the fact that although the OECD does publish internationally comparable measures of the average replacement rate, we do not have a reliably comparable measure of the proportion of the unemployed who receive unemployment benefits. In this paper, we must therefore model “Security in the event of Unemployment” using just the unemployment rate and the average percentage of lost earnings replaced by unemployment benefits (i.e. the “Gross Replacement Rate”⁶). (Our comparisons of different provinces within Canada are not constrained in this way.)

For Canadian readers, this limitation of the current paper is especially important. In the first version of the IEWB (Osberg and Sharpe, 1998), the large downward trend in the ‘security from unemployment’ component was an important driver of the overall economic security domain and hence the overall Index. Within the risk to unemployment component it was the fall in the EI coverage rate (the ratio of EI beneficiaries to unemployed) that was in turn driving the risk of unemployment component – and the decline in UI/EI coverage is a crucial aspect of the inadequacy of Canada’s current EI system to meet the needs of Canadians for economic security in the current recession (see Osberg, 2009). When we use Canadian data to compare jurisdictions

⁵ In three waves of ISSP data 1989, 1997 and 2005, Green (2009:1) reports that “subjective employment insecurity tracks the unemployment rate” while Dominitz and Manski (1997) report “Expectations and realizations of health insurance coverage and of job loss tend to match up closely”.

⁶ The average of the gross unemployment benefit replacement rates for two earnings levels, three family situations Source: OECD, Tax-Benefit Models. See Martin (1996) for a fuller discussion.

http://www.oecd.org/document/3/0,3343,en_2649_34637_39617987_1_1_1_1,00.html

within Canada, or trends over time, we are able to account for this trend – which is why our within-Canada and cross-national comparisons do not have quite the same trends.

Originally, the conceptual framework underlying the unemployment security component was the expected value of financial loss. The economic risk created by unemployment was seen as a compound probability of financial loss for the “typical” labour force participant – i.e. (probability of not having a job) * (fraction of wage not replaced by UI/EI)⁷. This probabilistic approach ignored any non-economic costs to non-employment, and implicitly assumed it was irrelevant which component of the compound probability of financial loss changed – all that mattered was the “bottom line” of financial loss due to unemployment⁸.

Since the publication of our initial estimates of the Index of Economic Well-being, the economics literature has seen a spectacular growth in the number of papers using self-reported measures of happiness, life satisfaction or well-being. A consistent finding in this literature is the large negative impact on happiness of higher unemployment rates – not just for those actually unemployed, but also for the employed who become more anxious about the risk of unemployment⁹. In some specifications of the correlates of individual happiness, one can compare directly the relative magnitude of the influence on happiness of changes in the risk of unemployment and changes in unemployment compensation benefits – and the hypothesis that these are equal in impact is conclusively rejected. Cross-country regressions with life satisfaction data on 271 thousand people indicate that the unemployment rate is considerably more important than the unemployment compensation system as a source of self-reported happiness for the working population¹⁰. Consequently, in the aggregation of the overall employment security index it is now given a weight of four-fifths, compared to a weight of one-fifth for the financial protection variable – which represents a significant change from the earlier methodology where the unemployment rate and unemployment benefit system were weighted equally.

The aggregation procedure for the variables that make up the risk of unemployment component of the economic security domain recognizes two distinct issues – the risk of

⁷ In analyses using just Canadian data, we were able to use: (probability of not having a job) * (probability of not getting UI/EI benefits) * (fraction of wage not replaced by UI/EI). As a practical matter, this methodology meant that much of the change during the 1990s in the overall risk to unemployment variable came from the large fall in the UI/EI coverage rate over this period.

⁸ The view that the only costs associated with unemployment are monetary has been strongly criticized – e.g. by Osberg (1988).

⁹ See Bruno S. Frey and Alois Stutzer, *Happiness and Economics: How The Economy and Institutions Affect Well-Being* (Princeton: Princeton University Press, 2002; Robert J. Di Tella and Raphael MacCulloch, “Income, Happiness and Inequality as Measures of Welfare,” June 18, 2003

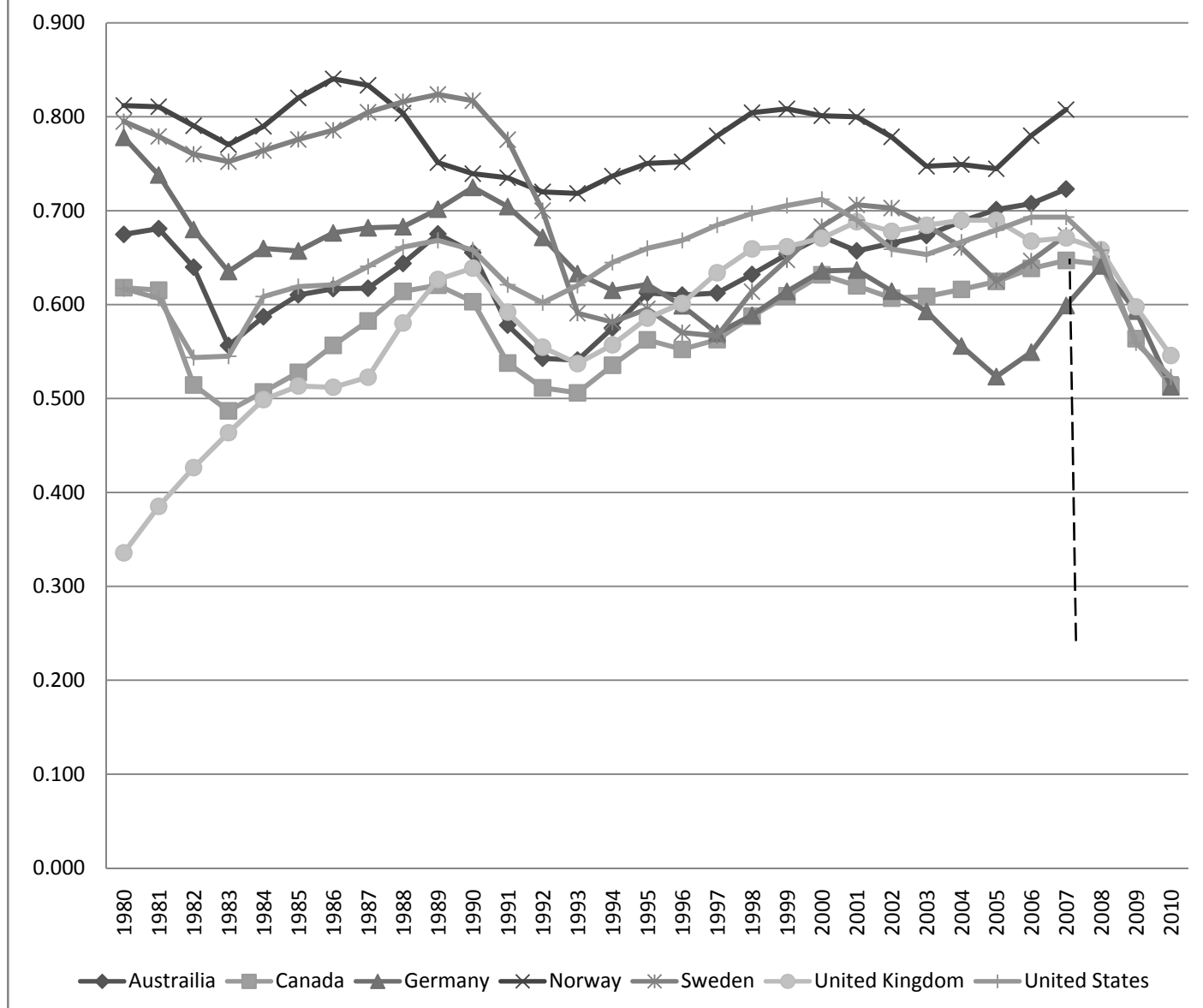
¹⁰ See Di Tella, MacCulloch and Oswald (2003:819), where in six different specifications of ordered probit regressions (n=271,224) predicting life satisfaction, the size of the negative coefficient on the unemployment rate was, on average, 2.13 times larger than the size of the positive coefficient on unemployment benefits. Since the range of unemployment benefits observed (0.003 to 0.631) was about three times greater than the range of unemployment rates (0.006 to 0.211), one should rescale regression coefficients to a common range to interpret relative size effects – hence their results could be read as implying unemployment changes are about six times more important than UI benefit changes in maintaining well-being.

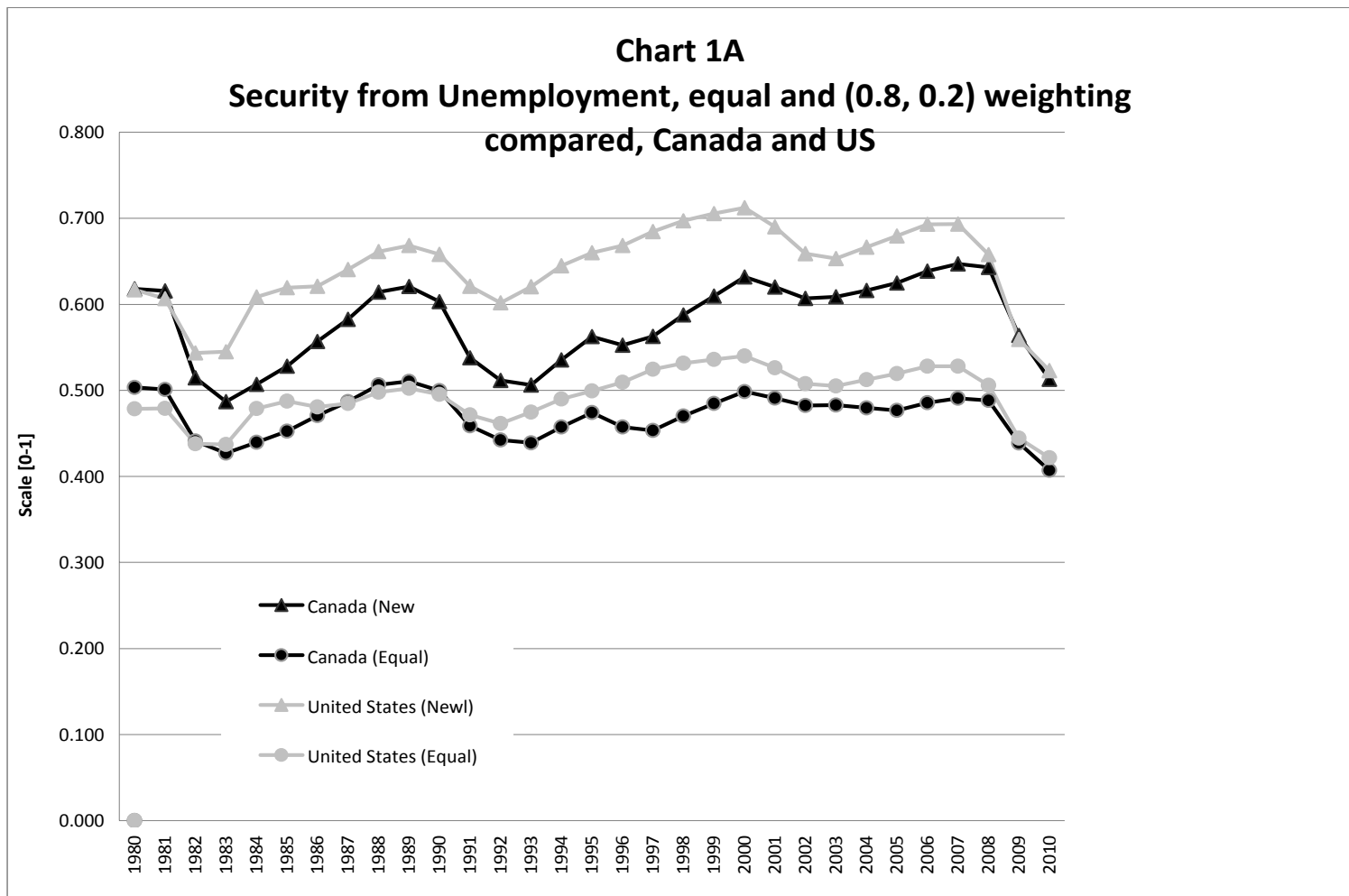
unemployment and the risk of financial loss from unemployment. Both the unemployment rate and the financial protection index are scaled, using the linear scaling procedure¹¹. The scaled values of the two indexes are weighted to produce the overall index of security from the risk imposed by unemployment. The relative ease of getting a job provides employment security by enabling attractive options (in a low unemployment labour market) in the event of unemployment. A higher probability of getting unemployment benefits, or higher benefits, provides security by compensating individuals for their earnings loss. We make the unemployment rate and the financial protection rate additive in weighted impacts, not multiplicative, which dampens the evolution of the risk to unemployment component over time.

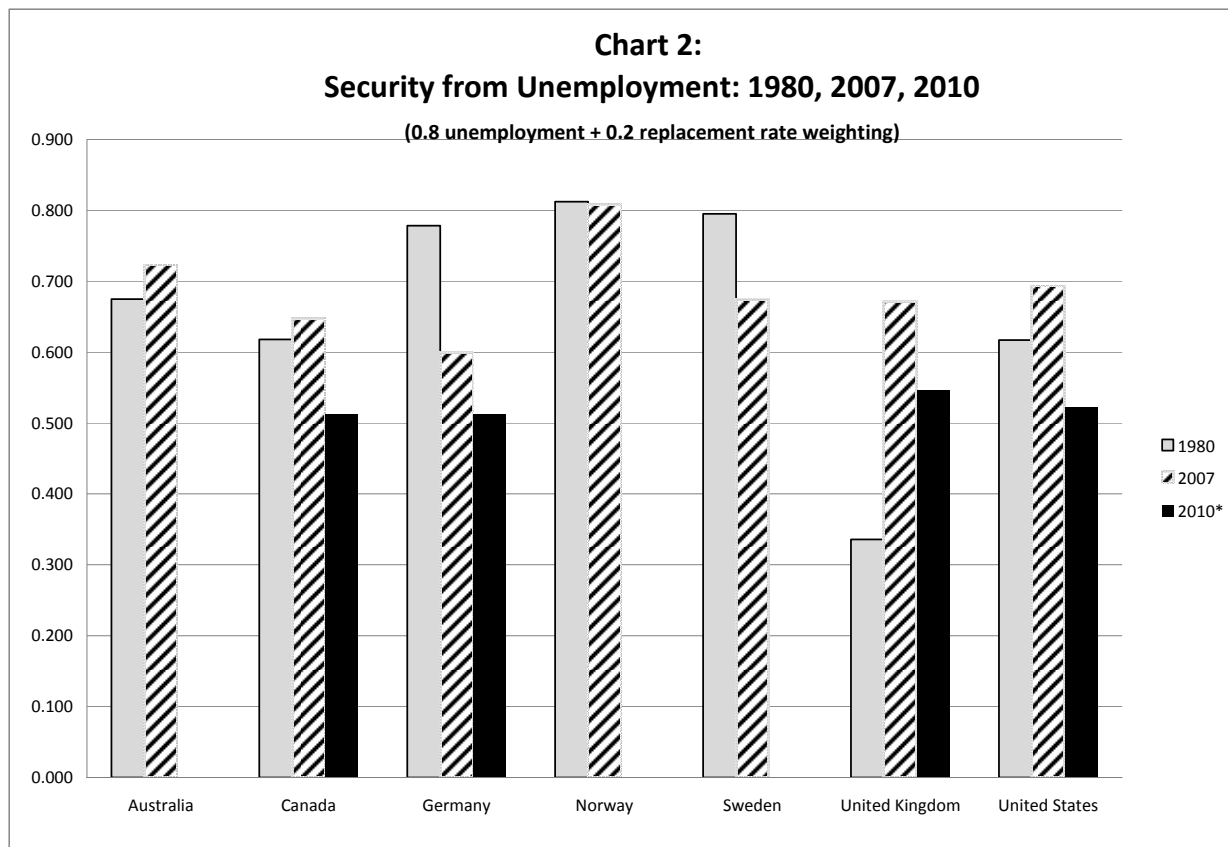
Chart 1 presents estimates of our Security from Unemployment sub-index for Canada, Australia, Germany, Norway, Sweden, the UK and the USA, combining actual data to 2007 and the latest OECD forecasts through 2010, using our updated methodology. Chart 1A is a sensitivity analysis which shows – for the illustrative cases of the USA, and Canada – what the trend would have been if the unemployment and financial protection variables were weighted as in our original methodology. As one might expect, the more heavily the unemployment rate is weighted, the better the US tends to look during periods (as in the 1990s) when the US unemployment rate was low compared to other nations. Chart 2 summarizes the beginning and end dates.

¹¹ See Sharpe, Andrew and Julia Salzman (2003) "Methodological Choices Encountered in the Construction of Composite Indicators," paper presented to the annual meeting of the Canadian Economics Association, Carleton University, Ottawa, Ontario May.

Chart I
Security from Unemployment
 (0.8 unemployment + 0.2 replacement rate weighting)







2.2 “Security in the event of .. sickness”

In keeping with our economic focus – interpreting ‘economic’ as control over material goods and services – we make no attempt to quantify the utility loss from pain or suffering or capacity limitation imposed by illness. The focus of the IEWB is the financial risk imposed by illness, which has three dimensions: (a) expenditures on care necessitated by illness; (b) the loss of income caused by illness and (c) the possibility of events such as personal bankruptcy that might be precipitated by illness.

In international comparisons, a key issue is the coverage of public health care. In Canada, for example, health care deemed medically necessary provided by hospitals and doctors’ offices is free of charge to all citizens, because it is provided through publicly financed medicare programs. In this sense, the financial risk imposed by illness is much less than in countries without such universal coverage – i.e. the United States. Other countries have different mixes of public and private services, with varying combinations of co-pay for services rendered. Even in Canada there are significant private expenditures on health care, which have been rising rapidly – for example, dental care, many drugs taken outside hospitals, unlisted medical services such as acupuncture, and delisted medical services (physiotherapy and vision care are examples of

medical services that have been recently delisted in Ontario – but in general the coverage of drugs and non-standard services varies by province).

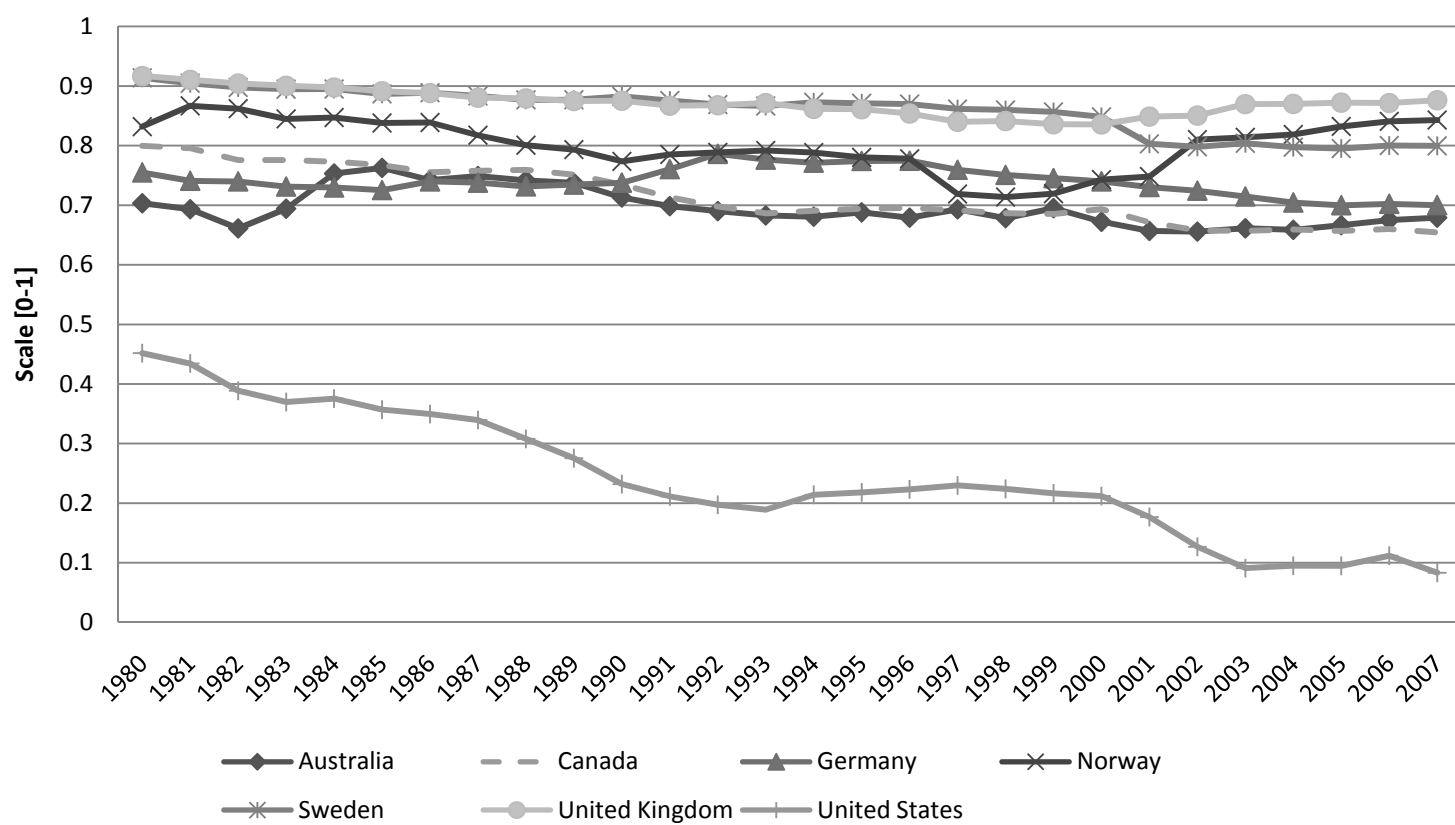
In principle, we would like to distinguish between the expenditures produced by the hazard of illness and the medical spending resulting from consumer preferences – but as a practical matter, statistics collected from the providers of medical services typically report the aggregate total of both types of spending. Plastic surgeons will, for example, both repair the disfiguring damage caused by fires and accidents and indulge the preferences of those individuals sufficiently affluent to purchase a slightly altered shape of nose. If our objective is to assess individuals’ “Security in the event of .. sickness”, we would like to assess the protection individuals have against the costs of the former event, while disregarding expenditures resulting from the latter choice. Conceptually, one has ‘security’ if one can obtain protection from the adverse implications of an event that is *ex ante* uncertain – but the voluntary choice of medically discretionary services is not an ‘insecurity’ issue.¹²

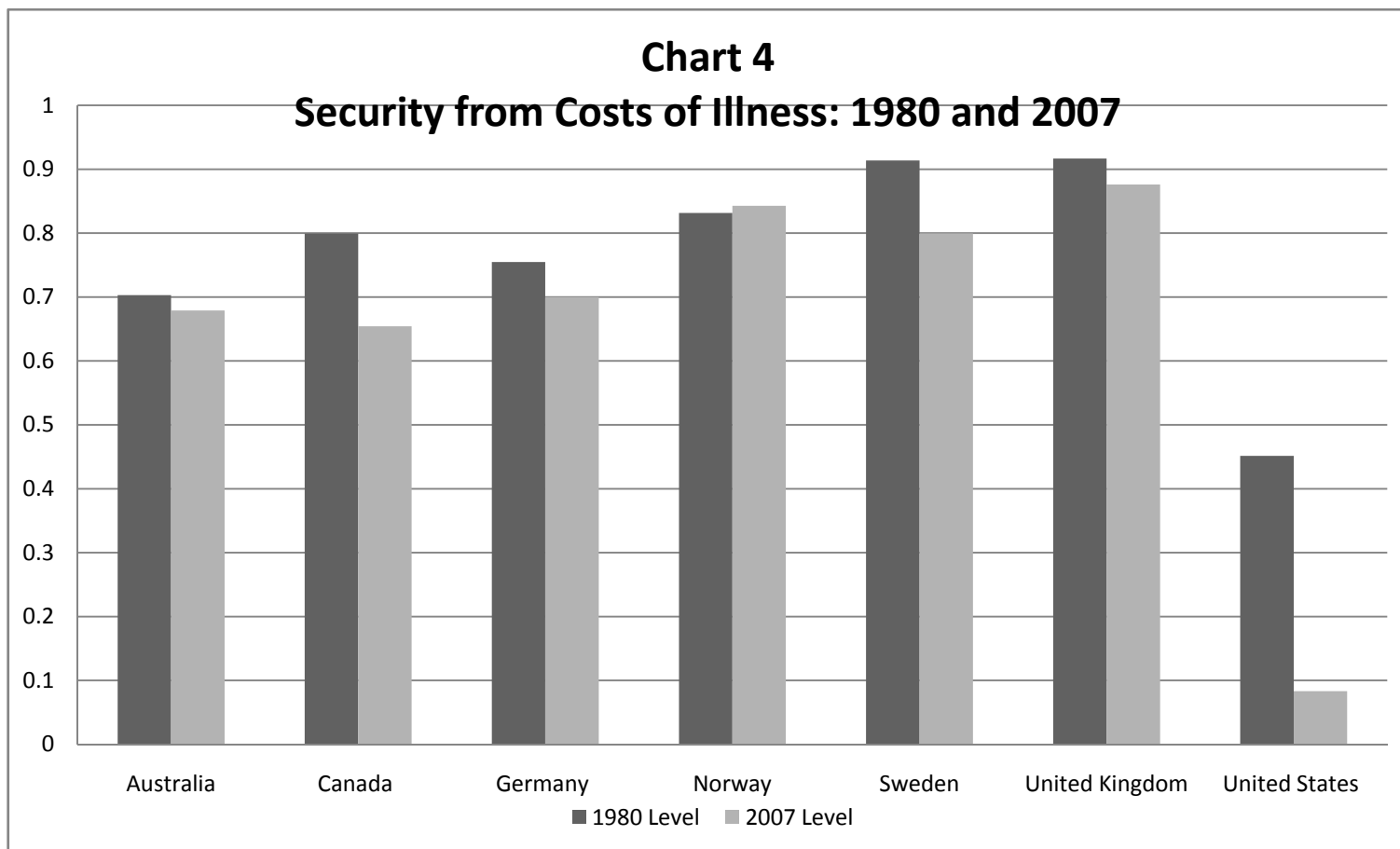
In the Canadian context, a plastic surgeon should in principle be reimbursed by the public health care system for providing ‘medically necessary’ procedures, but not for indulging discretionary consumer choices – but there is continual controversy over the conceptual dividing line between the two categories and over the extent to which inadequate or delayed supply of medically necessary public health care services is driving the purchase of private substitutes. As well, an institutional feature of the Canadian system is the fact that medically necessary drugs are provided free by the state in a hospital context, but not after discharge from hospital (although the cost may then be wholly or partially covered by private insurance or by provincial drug assistance plans – e.g. for the elderly or low-income populations). Both the speed of patient discharge and the reliance of the health care system on drug therapies have been rising over time. If one adds together the wholly covered costs of hospital care and the partially covered costs of drug treatment, the result is a partially covered system of paying for medically necessary health care costs.

In the IEWB, we have used the percentage of disposable household income spent by households on health care services that is not reimbursed by public or private health insurance as our indicator of the financial risk raised by illness. In 2007, this ranged from a low of 1.17% in the UK to a high of 9.7% in the USA, with Canada the next highest at 3.56%. Per capita private expenditure on health care in Canada rose from \$353 (US\$ -2000 prices) in 1980 to \$964 in 2007. Although this development can be considered deterioration over time in the economic security of Canadians, Charts 3 and 4 illustrate how Canada and these other five affluent OECD countries are clustered in a fairly narrow band. Charts 3 and 4 also illustrate the much lower level of, and larger deterioration in, security in the event of illness in the US, relative to other countries

¹² We disregard here any change in probability of adverse events that might be induced by choice – e.g. we would consider fixing a broken leg to be a medically necessary procedure, however it happened and whether or not the choice to go skiing changes its probability.

Chart 3
Security from Costs of Illness





2.3 “Security in the event of ...widowhood”

When the UN Universal Declaration of Human Rights was drafted in 1948, the percentage of single parent families was relatively high in many countries, partly as a result of the casualties of World War II. At that point in time, the “male bread-winner model” of a single earner household with a non-employed spouse was a plausible portrayal of social reality and “widowhood” was the primary way in which women and children lost access to male earnings. Since then, the two-earner family has become the social norm in all the countries discussed in this paper, while 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”.

In all countries discussed in this paper, the prevalence of poverty among single parent families is much higher than in the general population, and family break-up is a hugely important determinant of entry into poverty. Although we recognize that divorce and separation have large emotional costs for many people and that the termination of abusive or dysfunctional relationships can have social benefits, we do not attempt to model these issues. We also do not attempt to model the transactions costs – e.g. in legal bills – associated with the risk of family breakup. Our focus is a limited financial one – i.e. we model the risk of becoming poor because of family breakup.

We model trends in this aspect of economic insecurity in an ‘expected value’ sense – i.e. we multiply (the probability of divorce) * (the poverty rate among single female parent families)¹³ * (the average poverty gap ratio among single female parent families).¹⁴ The product of these last two variables is proportional to the intensity of poverty. Poverty is defined as it was for all households under the equality domain – in relative terms as the proportion of households below one half median equivalent income.

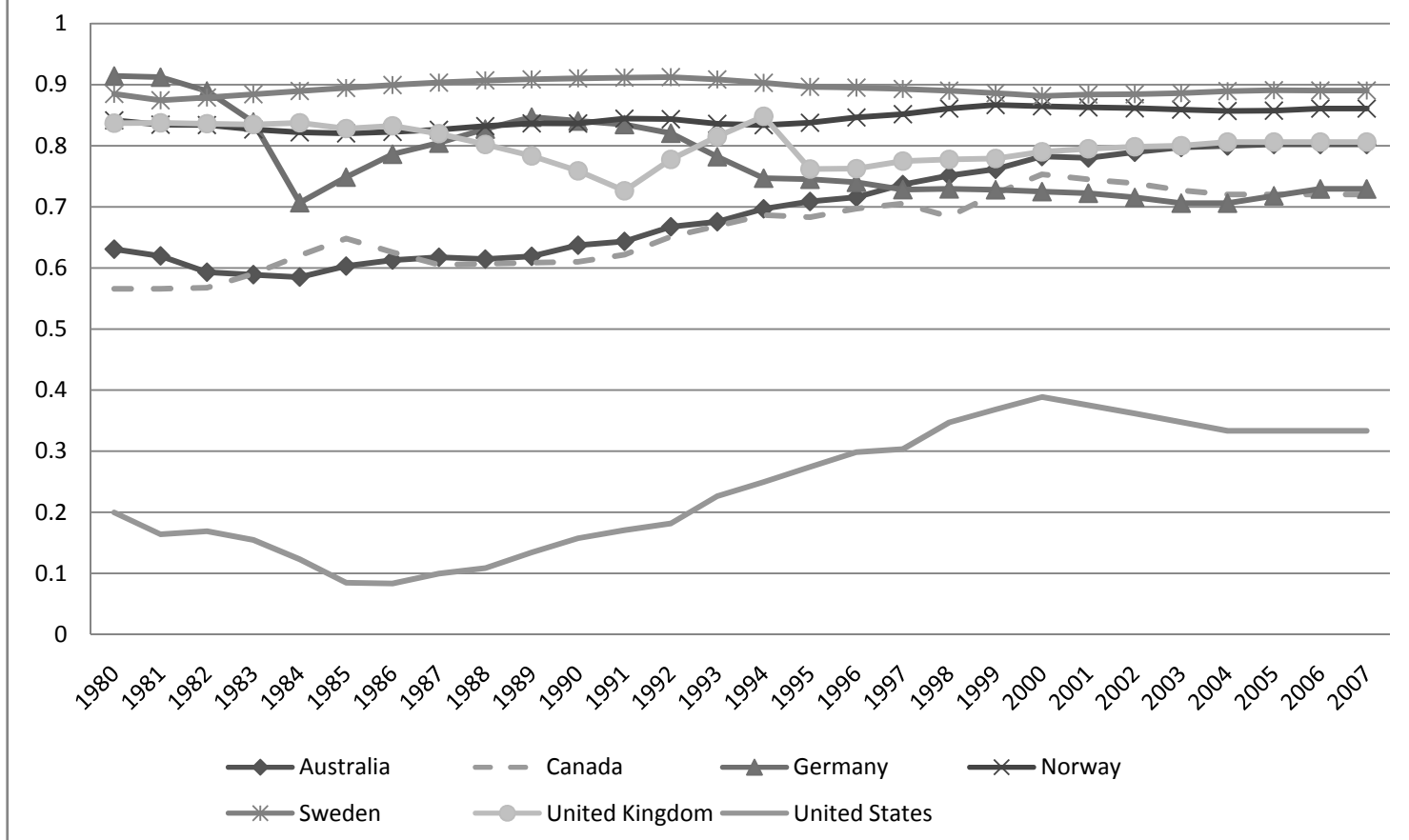
The divorce rate per thousand was 2.2 in Canada in 2007, the same as Sweden and not so different from Germany or Norway (2.3), but less than Australia (2.6), the UK (2.8) and the US (4.2). The USA was also an outlier in the poverty gap for single parent families at 42.7%, compared to a range for other nations from 18.8% in the UK to 32.3% in Germany. However, Canada (43.4%) and the US (43.7%) were quite similar in the rate of poverty for single female headed households with children – well above Germany (34.9%), the UK (30.5%) or Australia (31.6%) and very different from Norway and Sweden, where the poverty rate was 13.3% and 9.7% respectively.

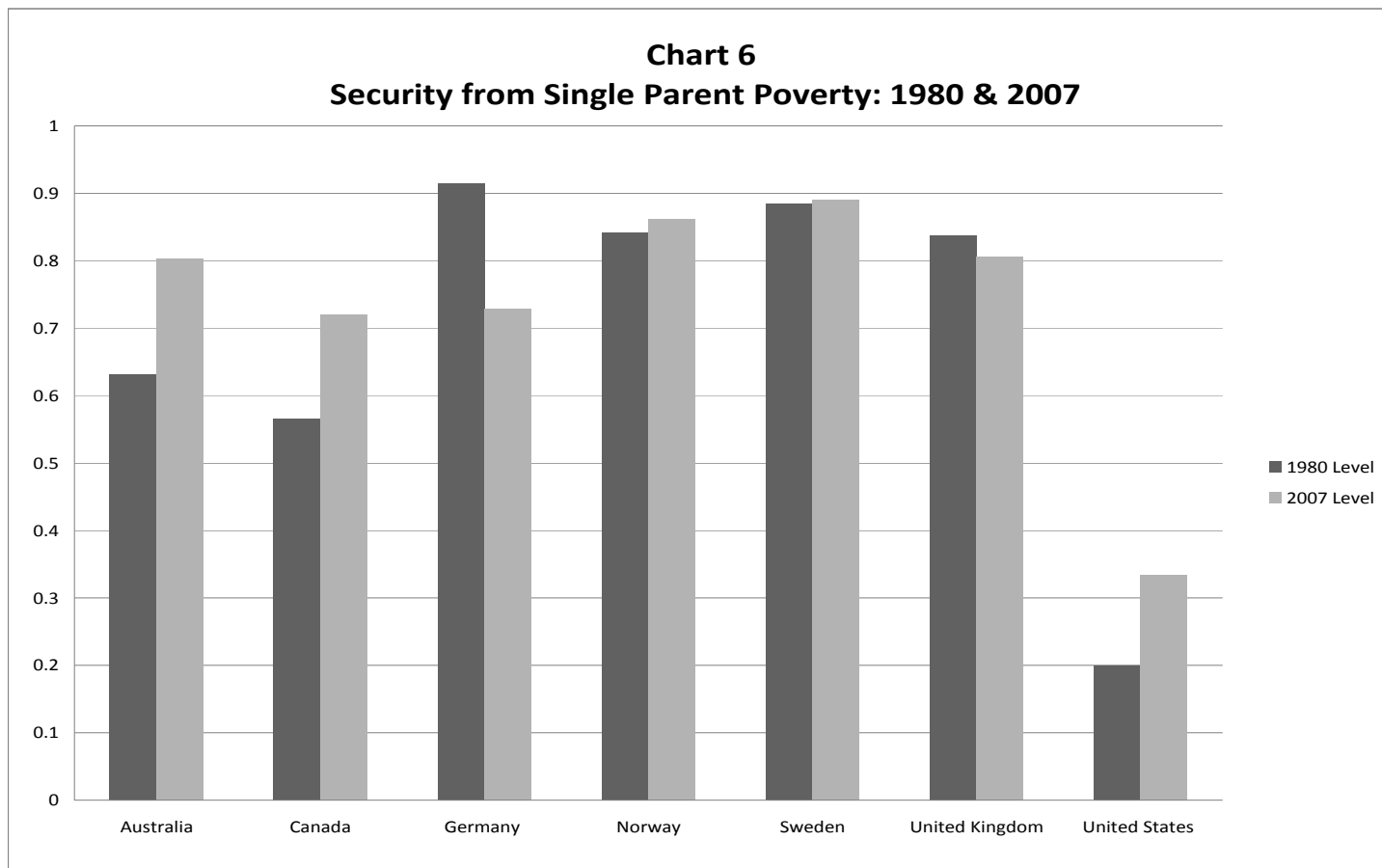
¹³ Since RATE= INCIDENCE x AVERAGE DURATION, the poverty rate among single parents is equal to the conditional probability that a single parent will enter poverty multiplied by the average duration of a poverty spell, we are accounting jointly for the duration of poverty spells and for their likelihood, but with the restrictive maintained hypothesis that both have equal influence. Inadequacy of data preclude examination of household dissolution among co-habiting couples.

¹⁴ This procedure effectively ignores single male parents. In Canada, males comprise only about 17 per cent of the single parent population.

With the US as an outlier on all dimensions, but other countries sometimes higher and sometimes lower on particular dimensions, it is perhaps not surprising that Charts 5 and 6 show the product of these influences to be clustered in a fairly narrow band – except for the US.

Chart 6
Security from Single Parent Poverty



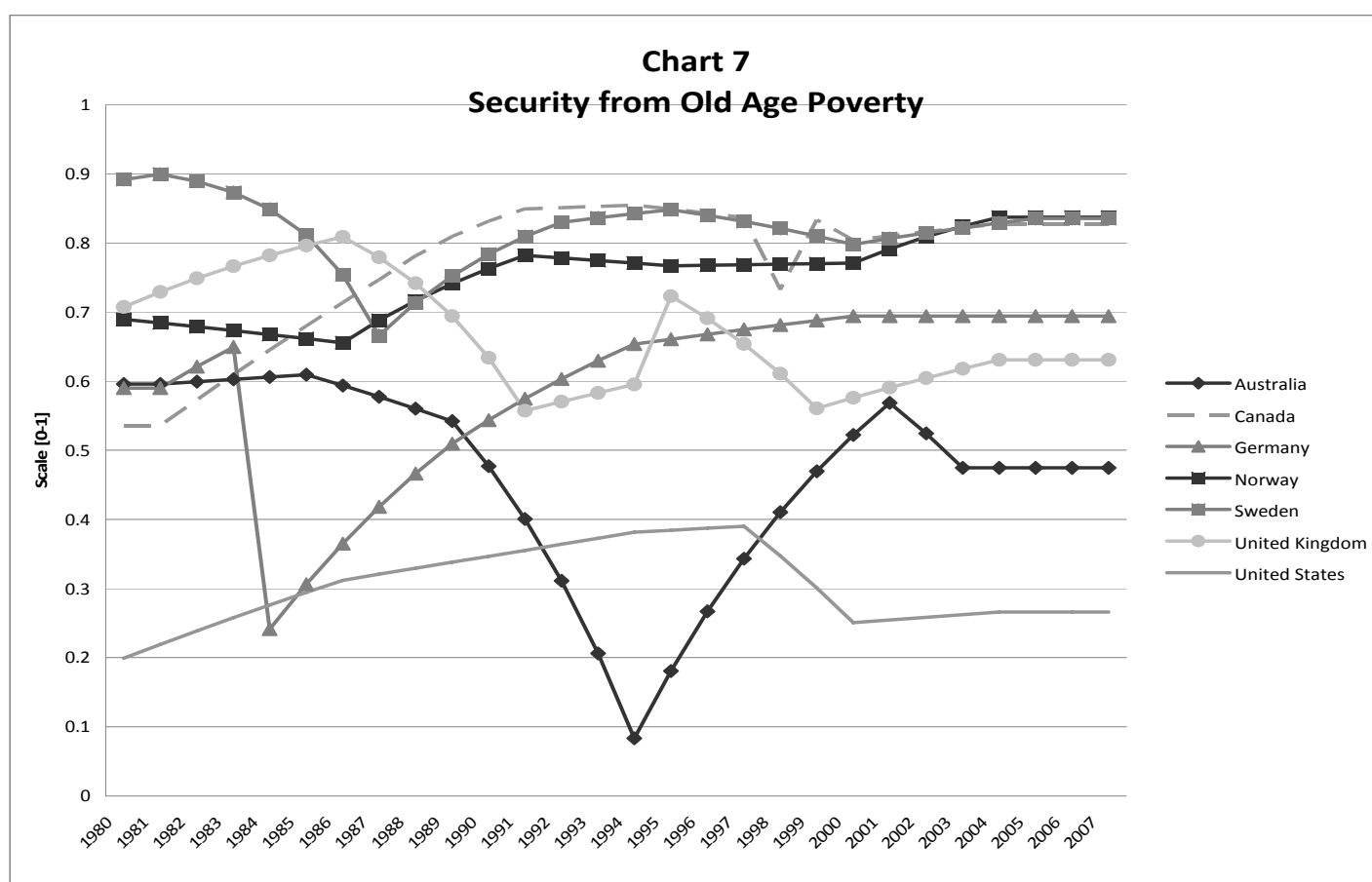


2.4 “Security in the event ofold age”

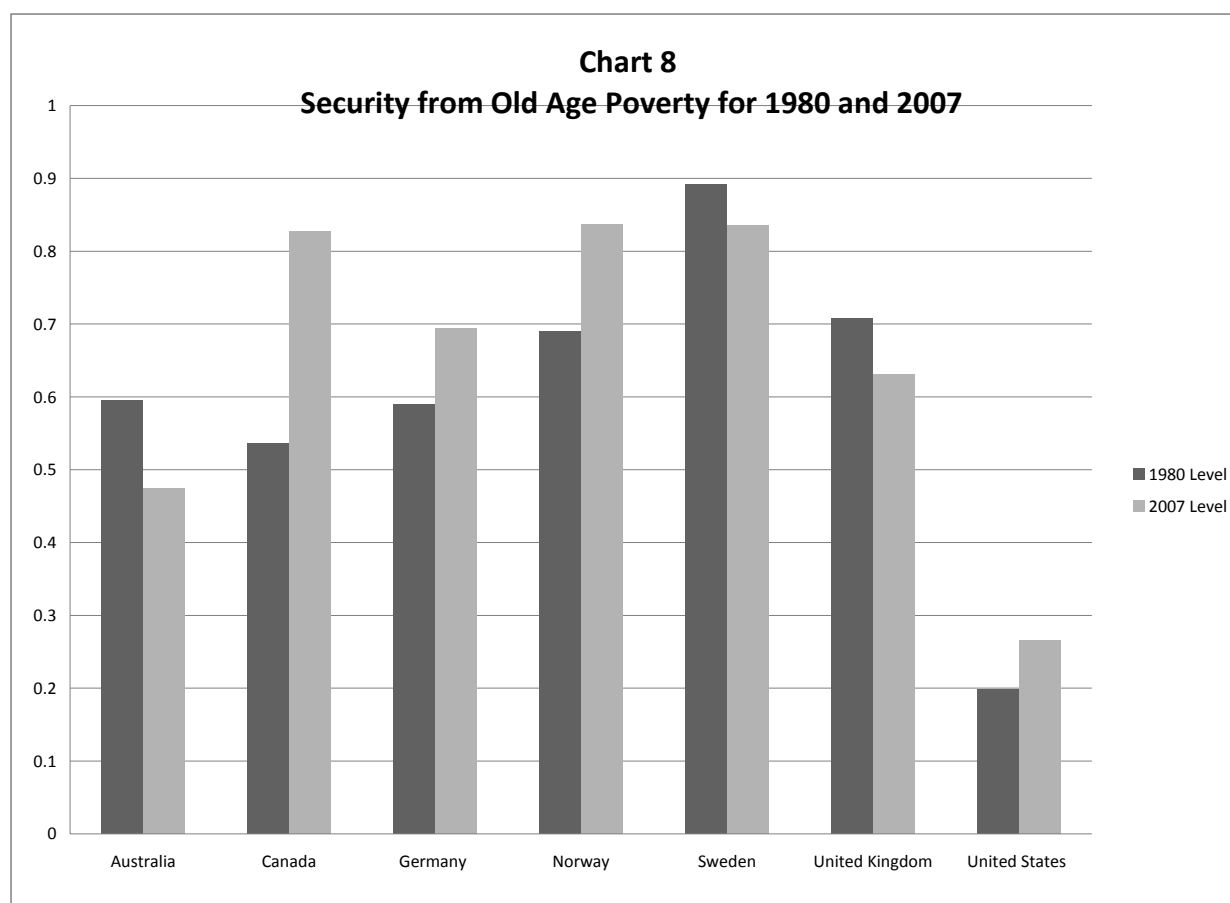
The IEWB perspective on security in the event of old age has been that feelings of insecurity about old age are often driven by fears of a worst case outcome, and the likelihood of that worst case outcome. For that reason, the fourth component of the economic security domain is the risk of poverty in old age, which is proxied by the poverty intensity (= poverty rate * average poverty gap ratio) experienced by households headed by a person 65 and over.

Chart 7 indicates fluctuations over time in poverty intensity among senior citizens – e.g. in Germany or Norway – which sometimes seem to follow a “saw-tooth” type of pattern. A possible explanation is that a characteristic feature of the income distribution of the elderly in all the countries discussed in this article is a “spike” in the incomes of the elderly at the minimum income base defined by the structure of the country’s old age security system (which is often quite close to the ‘one half median income’ poverty line. Since the elderly are, in the main, not employed, and many depend entirely on public pensions, their incomes from pension entitlements can often be much the same, because they are determined by the same formula, and

driven by much the same data. The large numbers of elderly people without significant income from capital or private pensions necessarily have to depend entirely on the minimum income base defined by pension legislation. When the resulting spike in the income distribution is close to the poverty line, and the formula is imperfectly adjusted for annual inflation, but revised every few years, one will tend to observe ‘saw-tooth’ fluctuations over time in poverty among the elderly. As well, since our data for this variable are drawn from the Luxembourg Income Study, which has periodic observations from each country, we have been forced to interpolate between data points and accept data (e.g. from Germany in 1983 and 1984) which are drawn from different original surveys – and both these compromises may introduce error.



As both Chart 7 and Chart 8 show, security in old age improved significantly in Canada over the 1980 to 2007 period. For most other countries, despite some significant fluctuations over time, the basic picture in 1980 and 2007 was fairly similar – as Chart 8 indicates.



The poverty gap of seniors has also fallen significantly over the past quarter century, from 26.9 per cent in 1981 to 17.2 per cent in 2005, a 36.2 per cent decline. Unlike the rather haphazard path of elderly poverty rate, the poverty gap has been on a more or less steady downward trajectory. The overall component of the risk of poverty in old age, the poverty intensity, is the product of the poverty rate and gap. It stood at 0.095 in 1981 and 0.030 in 2005 (Table 9), representing a fall of 68.7 per cent. Again, this was larger than the falls of the poverty rate (50.8 per cent) and the poverty gap (36.2 per cent) taken separately because of the multiplicative effect. The poverty intensity index is then scaled.

2.5 Security in the event of disability, or other loss of livelihood in circumstances beyond his control”

“Disability” is a term that covers a number of specific hazards, for which some insurance coverage is available – e.g. in Canada, some workers are covered under the private “long-term disability” insurance policies held by their employers, while short-term illness benefits are available under Employment Insurance and longer-term benefits can sometimes be obtained under the CPP/QPP plans. In Canada, provincial social assistance programs also typically

recognize the needs of clients with disabilities. In principle, an Index of Economic Security should try to measure the adequacy, in total, of this coverage against an important source of risk to well-being – but the non-availability of comparable international data has thus far prevented us from doing so. Data non-availability is even more of a constraint for “Security in the event of ...other loss of livelihood in circumstances beyond his control” – indeed, it is far from clear to us conceptually what data might enable an analyst to distinguish between choice and “circumstances beyond his control” in the determination of low income.

When we entirely omit consideration of these dimensions of (in)security we are implicitly setting the weight of these issues to zero. This is not satisfactory, but we do not yet have a better alternative.

2.6 Aggregation of the Components of Economic Security into Overall Economic Security Domain Index

The scaled values of the four components of the economic security domain are aggregated to obtain an overall scaled index for the domain. To do so, we must choose weights for each risk. One possible choice would be equal weighting, which would carry with it the implicit assumption that all the named risks are of equal importance. We think it more plausible that some risks are of greater salience, and affect more people more profoundly, than others. Hence, the IEWB has instead, up to now, chosen to construct weights for this aggregation procedure from the relative sizes of the populations deemed to be subject to each risk.

In terms of the risk of unemployment, it is assumed that the entire population of working age (i.e. 15 to 64 years) is subject to this risk. [In Canada, this is equivalent to about 70 per cent of the total population.] In terms of the financial risk associated with illness, it is assumed that 100 per cent of the population is at risk. In terms of the risk of single parent poverty, it is assumed that all married women and their children who are under 18 are at risk [about 35% of the population in Canada]. On the presumption that individuals only really start to worry about poverty in old age as their retirement years start to near, it is assumed that the population 45-64 are most at risk [26 % of the Canadian population]. The component specific weights are generated by adding up all the proportions of the population subject to the four risks (231 in the Canadian case) and then standardizing to unity by dividing each proportion of the population affected by the risk by that total.

Because the demographic structure of each country differs, and shifts over time, the proportion of the population affected by the different risks, and hence the weights, vary by country and over time. The contribution of each component is the product of its scaled value and weight.

Chart 9 presents the summary Index of Economic Security for all seven countries, while Chart 10 is a comparison of the 1980 start and the 2007 end-point. The immediately obvious lesson is the much lower level, and downward trend, of economic security in the United States – well before the advent of the current recession. The US is not particularly an outlier in security from the costs of unemployment, but in all the other three dimensions of economic security it falls well short of the comparator nations. Largely because our new weighting for unemployment benefits in the costs of unemployment de-emphasizes the replacement rate of UI/EI benefits and ignores entirely the decline in UI/EI coverage in Canada, the IEWB Index of Economic Security shows essentially no change for Canadians. Norwegians and Australians also had very small changes. In the UK there has been an improvement and in Germany and Sweden deterioration in economic security – but in both level of economic security and in trends over time, the US stands out clearly.

Chart 9

Index of Economic Security 1980-2007

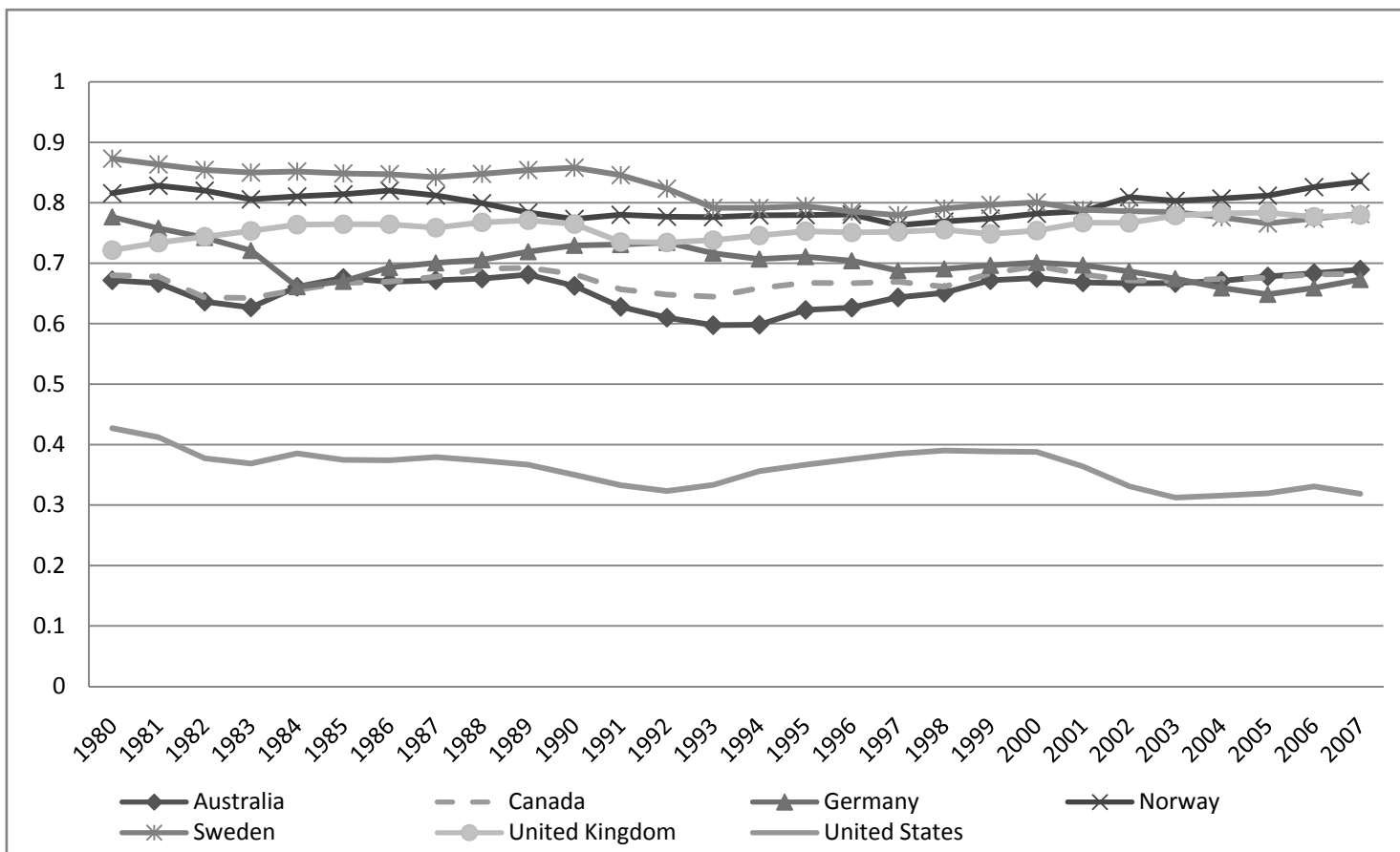
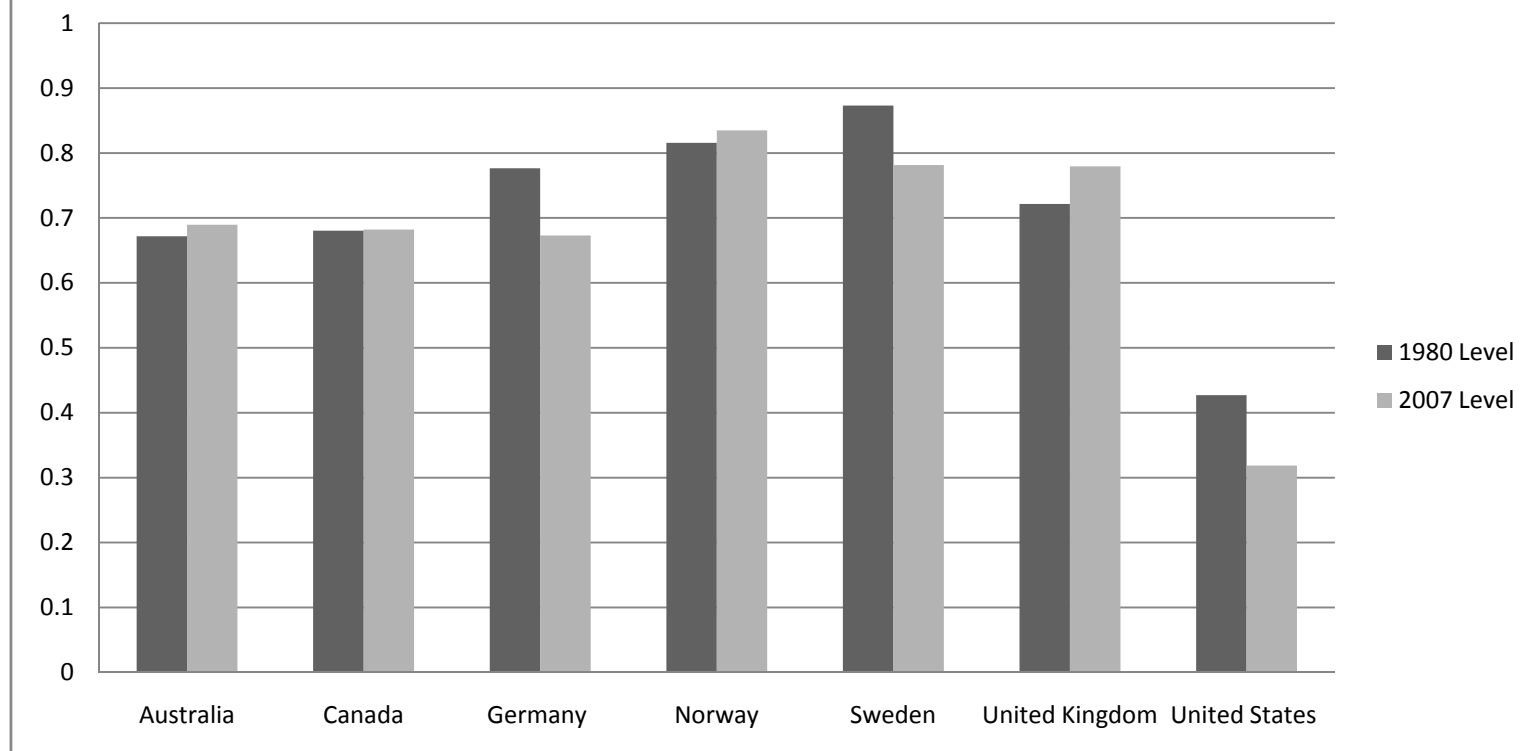


Chart 10
Index of Economic Security for 1980 and 2007



3. Perennial Problems, Needed Revisions and Possible Extensions

a. “Security in the event of .. Unemployment”

As recently as October 2008, which is only six months ago, job creation in Canada was still positive – the rapidity of the onset of the current global recession has been unprecedented. If we continued to use only observed data, publication of an index based on such data would risk irrelevance to current social realities, since annual data on a cross-section of countries is still only available up to 2007. It is plausible to think that the insecurities felt in 2009 are quite different from those of 2007 – but the key issue is how much they might have changed.

In most cases, the structures of national social welfare systems have not changed much since 2007, even if the circumstances they must cope with have experienced a shock. The design of health care systems, for example, still produces much the same risk of uncovered health care costs in 2009 as in 2007. In the US, the maximum duration of state UI benefits has been

extended by 13 weeks (and by 5 weeks in Canada) but other nations have not yet had to significantly change their unemployment benefits systems.

The big change which a recession produces is in expectations of the unemployment rate – e.g. the OECD Economic Outlook of March 2009 predicted that Canadian unemployment would rise from 6.1% in 2008 to 8.8% in 2009 and 10.5% in 2010. Charts 1 and 2 above have therefore incorporated the most recent OECD forecasts for the unemployment rate 2008-2010 to illustrate the impact of the current recession on security from unemployment, assuming that the replacement rate on earnings remains at their 2005 levels.

In doing this calculation, we have accepted the fact that country-level unemployment rate projections are not available from the OECD for all nations. On the grounds of maintaining data comparability, we have also chosen not to look for supplemental forecasts from other sources for omitted countries (in this group of seven – Norway, Sweden and Australia). A striking feature of the data on Security from Unemployment 2008-2010 in the four remaining countries (Canada, Germany, the UK and US), as shown in Chart 1, is their similarity. All four countries show a virtually identical level and identical steep decline in security from unemployment.

As has already been mentioned, our methodology has changed from an equal, multiplicative weighting of the components of security from unemployment – probability of unemployment and expected replacement rate when qualified – to a 4/5th weight on probability of unemployment with the remainder weighted to the financial offset package. Chart 1A shows how much difference that makes over time, using the specific examples of Canada and the US. As can be seen, each nation's fluctuations over time remain similar and the rank ordering of these three countries remains unchanged in almost all years. As one might expect, assigning greater weight to the unemployment rate has a greater magnitude of impact on our index of security for countries with relatively low unemployment (e.g. the US in the late 1990s).

b. “Security in the event of .. Sickness”

Three issues have been questioned as problematic in our index of “security in the event of sickness”: (1) our inability to make any allowance for the risk of uninsured earnings losses produced by sickness; (2) the difficulty of distinguishing between optional choices and medical necessities as components of uninsured medical expenditures and (3) the possibility that our index understates the qualitative differences between health care coverage systems – in particular, the differences in risk of medically induced personal bankruptcy between the US and other countries.

As Charts 3 and 4 illustrate, the US is an outlier in health cost insecurity, even with our current methodology. But in using the aggregate national percentage of disposable income spent on un-reimbursed health costs as our indicator of exposure to health care cost risk we have been criticized as implicitly doing two things – (1) assuming all health care costs to result from an

exposure to risk – i.e. not be a discretionary choice and (2) averaging over all households, i.e. those with trivially small, as well as those with disastrously large, expenditures. However, if the income elasticity of demand for discretionary health expenditures is similar across countries and if the insurance coverage of discretionary, medically unnecessary expenses is comparable, a simple model can be used to illustrate the irrelevance of discretionary expenditure to our rankings – see Appendix 1. We have no grounds for assuming that nationalities differ in underlying preference for medically unnecessary discretionary health care spending.

Appendix 1 also address the issue of whether differences in average uncovered expenditures are a reasonable proxy for the relative level of anxiety felt about possible financial disaster for health reasons. In the US, for example, the possibility of disastrously large health care bills (which may exceed coverage limits even for individuals with some health insurance) is a worst case outcome that has no real parallel in Canada or other countries with an effective public health care system. In general, the ability of individuals to cope with a given uninsured health care bill will depend on their income level, so part of the incidence of health care cost induced bankruptcies is due to the frequency of low incomes. Because the IEWB includes a separate income distribution segment, our discussion of health care risks focuses on the probability of bankruptcy *for a person at a given income level*. Nevertheless, if the distribution of the costs of health care events is non-linear, this implies that the distribution of risk of bankruptcy will also be non-linear in the percentage of health care costs covered by insurance.

Appendix 1 provides an illustrative calculation of the relationship between the IEWB index of health care cost insecurity (i.e. the average uncovered percentage of health care costs) and the probability of personal bankruptcy, under the maintained hypothesis that the distribution of medically necessary health care costs is Paretian. In that specific case, the exact relationship is easily derived, but in general it will depend on the specific functional form, and the empirical parameters, of the probability distribution of medically necessary health care costs. Given that (a) we already can show that there is a one-to-one monotonic relationship between the average uncovered health care cost burden and the probability of health care cost bankruptcy, and (b) the US is already a clear outlier in this dimension, we are left with the judgement call as to whether the benefits to deriving more exact estimates of this non-linear relationship exceed the costs in (a) research resources and (b) decreased index transparency.

An alternative use of research resources would be to derive some estimate of the coverage of individuals against the hazard of loss of earnings in the event of illness. We have long known this to be a deficiency of the IEWB.

c. “Security in the event of old age”; Middle Class Security, Pension Adequacy and The Financial Melt-Down

When we initially built the IEWB in 1998, we interpreted “*security in the event of old age*” as being protection against the hazard of poverty in old age. We weighted this hazard by the percentage of the population who were aged 45 to 64 because we thought of insecurity as a forward-looking phenomenon. We had already counted the current experience of poverty among senior citizens under the distribution component of the IEWB and in looking for an indicator of anxiety about the future, we assumed myopia among younger workers (we assumed that the retirement years only loom into subjective consciousness in a major way mid-way through the forties).

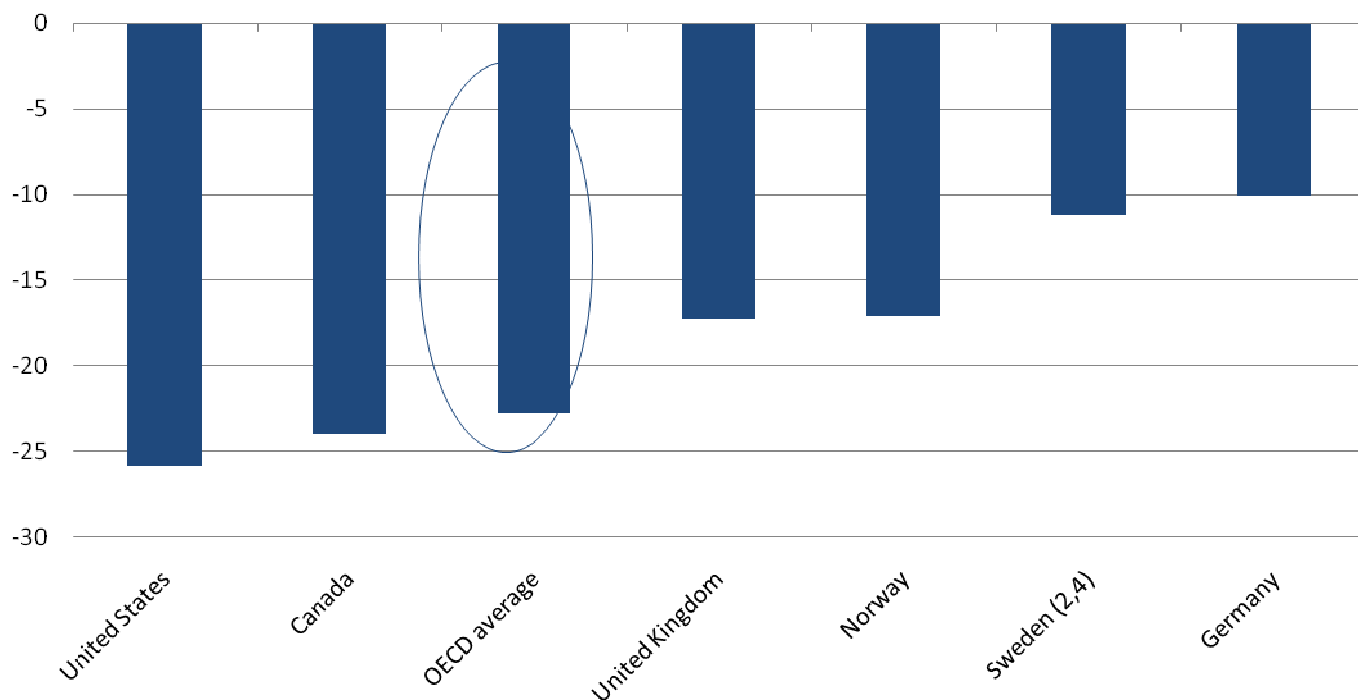
As a practical matter, in the Canadian context, by focussing on the poverty rate and depth among seniors, the design of Canada’s old age security system means that our measure primarily picked up those who had minimal public pension entitlements under CPP/QPP. Because we assumed that the issue that produces economic anxiety about old age is the probability and depth of poverty among senior citizens, we were ignoring the worries of the more affluent, at least to the extent they stayed non-poor. We did not think of “*security in the event of old age*” as being about the anxiety that someone might feel about possibly being unable to fully maintain a middle-class or more affluent lifestyle. And the implicit assumption throughout was that private retirement savings – either in directly held wealth or private pension plan entitlements – were a source of greater security, not a producer of anxieties.

Is this still the most reasonable way to think of economic security in the event of old age in May, 2009? Chart 11 below is taken from the OECD¹⁵ and documents the dramatic decline in value in pension fund assets during 2008 (-23.9% real return in Canada, -25.8% in the US). Even more dramatic graphics could be provided by the year to year change in housing prices or stock market indices in different countries.

From the perspective of “Security in the event of old age”, the exposure of individuals to these trends in asset prices depends on the extent to which they have such assets, whether they are contractually protected, and the current credibility of such contract protections. In comparing Defined Benefit (DB) to Defined Contribution type plans (in the US, often called 401(k) plans, in Canada termed RRSPs), it is clear that DC plans are entirely exposed to asset market price fluctuations. The percentage of retirement savings in a Defined Contribution or Defined Benefit form differs dramatically across countries – Broadbent et al (2006:14) report, for example, that in 2004/05, some 77.1% of pension plan members in Canada were in Defined Benefit type plans, but in the US the corresponding percentage was 28%.

¹⁵ OECD Private Pensions Outlook 2008 - OECD © 2009 - ISBN 9789264044388

Chart 11 Real pension fund returns in selected OECD countries, January-October 2008
In percent



The percentage of the labour force covered by private pension plans, of either DB or DC form, has been declining over time in Canada (see Morissette and Ostrovsky, 2006), and for the uncovered, variation in pension plan assets are irrelevant to their current sense of security. But even for workers with long established DB pension plans, the current recession has raised new questions about how much of the pensions previously anticipated from Defined Benefit plans will, in the end, be paid. This uncertainty, even for particular pension plans, is necessarily magnified if we are to estimate the risk exposure of all near-retirement individuals.

As Wolff (1991) has discussed, a comprehensive accounting of personal wealth should include both the private assets of individuals and the present value of their expected benefits from public pensions. The security of individuals as they near their retirement depends on their access to both types of “augmented wealth”. Hence, the level of security in old age of people at different points in the income distribution depends on the details of the structure of their nation’s old age security system – which poses an important conceptual problem, as a comparison of Canada and the US may illustrate.

As Charts 7 and 8 illustrated, if the issue in “Security in the event of old age” is seen as security from poverty in old age, the US does relatively poorly compared to Canada, largely because the earnings-related portion of the Canadian old age security system is supplemented by a universal pension and a negative income tax, via the OAS/GIS system. However, if the issue in “Security in the event of old age” is better perceived as enabling “dignity in one’s old age” and if this is interpreted as receiving a pension or other income that enables some approximation of an individual’s previous style of life to be maintained, then the Canada/US comparison is far from clear. In Canada, the earnings-related component of old age security under CPP/QPP has a fairly low ceiling on pensionable earnings (\$46,300 in 2009) implying a modest \$908.75 per month as maximum pension entitlement. In the US in 2009, Social Security contributions are payable on earnings up to \$106,800, and the maximum monthly pension payable is \$3,253 (if taken at age 70, but dropping to \$2,410 if taken at age 66).¹⁶ Both countries index public pensions for inflation. The conundrum is that middle class Americans are substantially more protected by public pensions from the risk of a decline in their living standard following retirement than middle class Canadians, even if there is a greater risk of poverty in old age in the US, compared to Canada.

Although the OECD has been willing to publish (see Chart 12¹⁷) estimates of adequacy for various ‘typical’ pension plan configurations, it is unclear how to summarize the total risk exposure of these configurations, particularly given the substantial proportion of the population who never gain entitlement to private pensions. But it is clear that the details of public pension plan coverage and the solvency and coverage of private pension plans offer lots of complexity in any estimation of the exposure of the middle class to ‘life style’ uncertainty in old age.

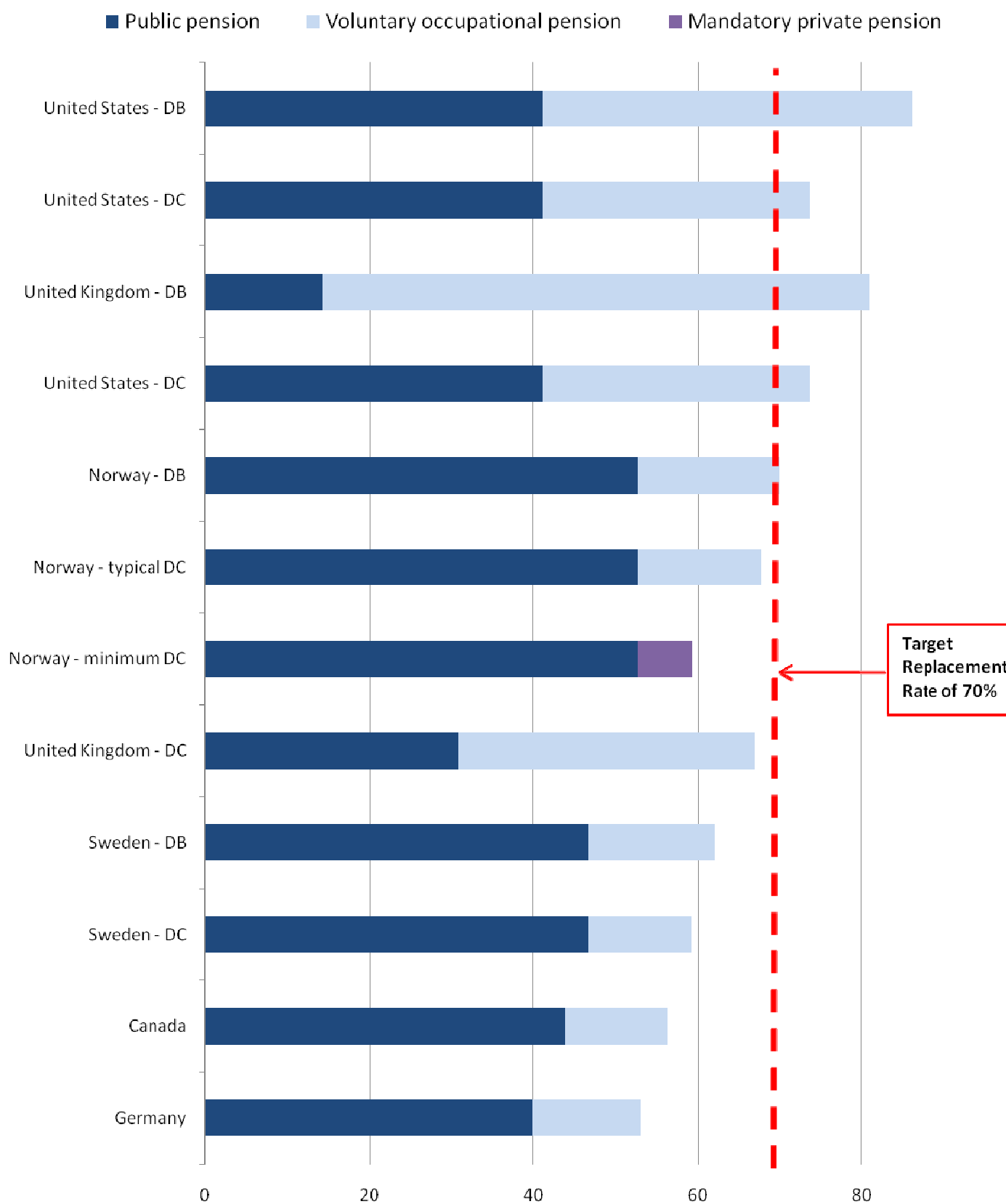
The ‘bottom line’ of this discussion is that insecurity in the sense of anxiety about poverty in old age is not necessarily the same as insecurity about a general maintenance of ‘middle class’ consumption lifestyle. However, the details of pension adequacy for life-style maintenance are complex, problematic to summarize and difficult to observe in longitudinal data sets in a given country, much less in internationally comparable longitudinal data. Such indicators of income maintenance as do exist imply that countries do not necessarily rank similarly on indicators of both middle class adequacy and old age poverty prevention – compare, for example, the position of the US in Chart 12 and in Chart 8.

By contrast, the focus of the IEWB on whether or not elderly people are income poor in old age relies on a relatively straightforward measurement, which can be directly observed in comparable cross-sectional household surveys, such as LIS data.

¹⁶ For CPP benefits see <http://www.hrsdc.gc.ca/eng/isp/pub/factsheets/retire.shtml>; for US Social Security see <http://www.socialsecurity.gov/cgi-bin/benefit6.cgi>.

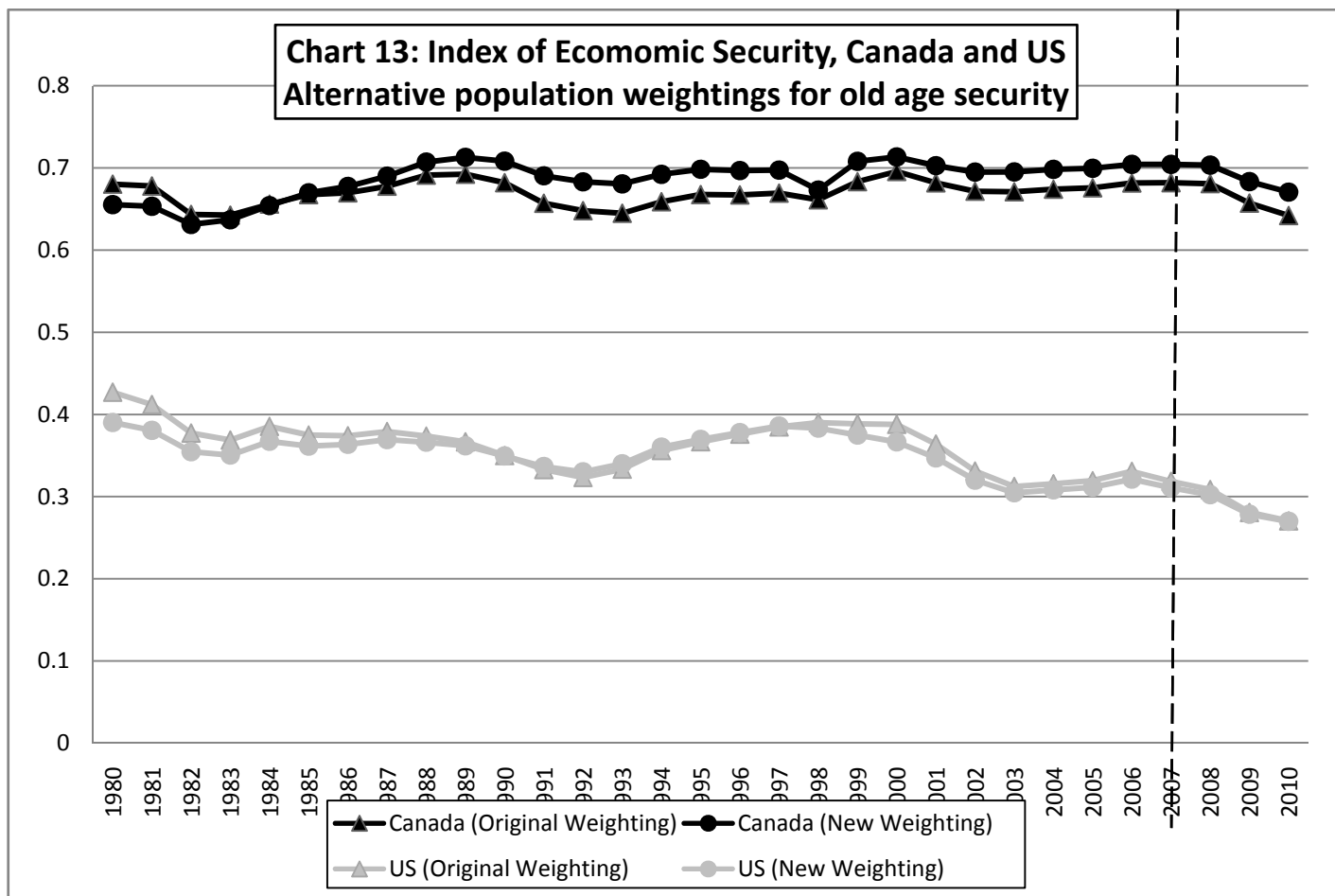
¹⁷ See OECD Private Pensions Outlook 2008 - OECD © 2009 - ISBN 9789264044388 – available at http://www.oecd.org/document/60/0,3343,en_2649_34853_41770428_1_1_1_1,00.html#summary
See also http://stats.oecd.org/WBOS/Index.aspx?DatasetCode=PNNI_NEW

Chart 12.
Potential replacement ratio at normal retirement age:
public pension, mandatory private pensions and typical occupational plans
 As a percentage of final earnings



Feelings of financial insecurity are also driven partly by continuing fears of specific discrete events (like the loss of a house due to foreclosure), partly by the loss of potential future consumption due to the vaporization of aggregate wealth over the period since 2007, and also by the extreme degree of day-to-day within-period volatility in asset prices, which has driven a new level of distrust of financial markets. But we do not have a good way to measure such free-floating subjective anxieties.

Heslop (2009:9) has also commented: “The decision to focus only on those aged 45-64 seems question-begging, first because anticipation is not the only source of anxiety, and second, because those 65 and over in the modern world may expect to live many more years if not decades, so they have plenty to worry about.” Chart 13 shows the sensitivity of our aggregate index of security to this choice of population weight, for Canada and the US. If we assume that the appropriate population weight for old age security is the fraction of the population aged 45-64 we get the trend labelled “original”. If we take the polar opposite point of view that everyone hopes to get old, and therefore presume that 100% of the population has reason to worry about poverty in old age, we get the “new” estimates. As can be seen, it makes very little difference.



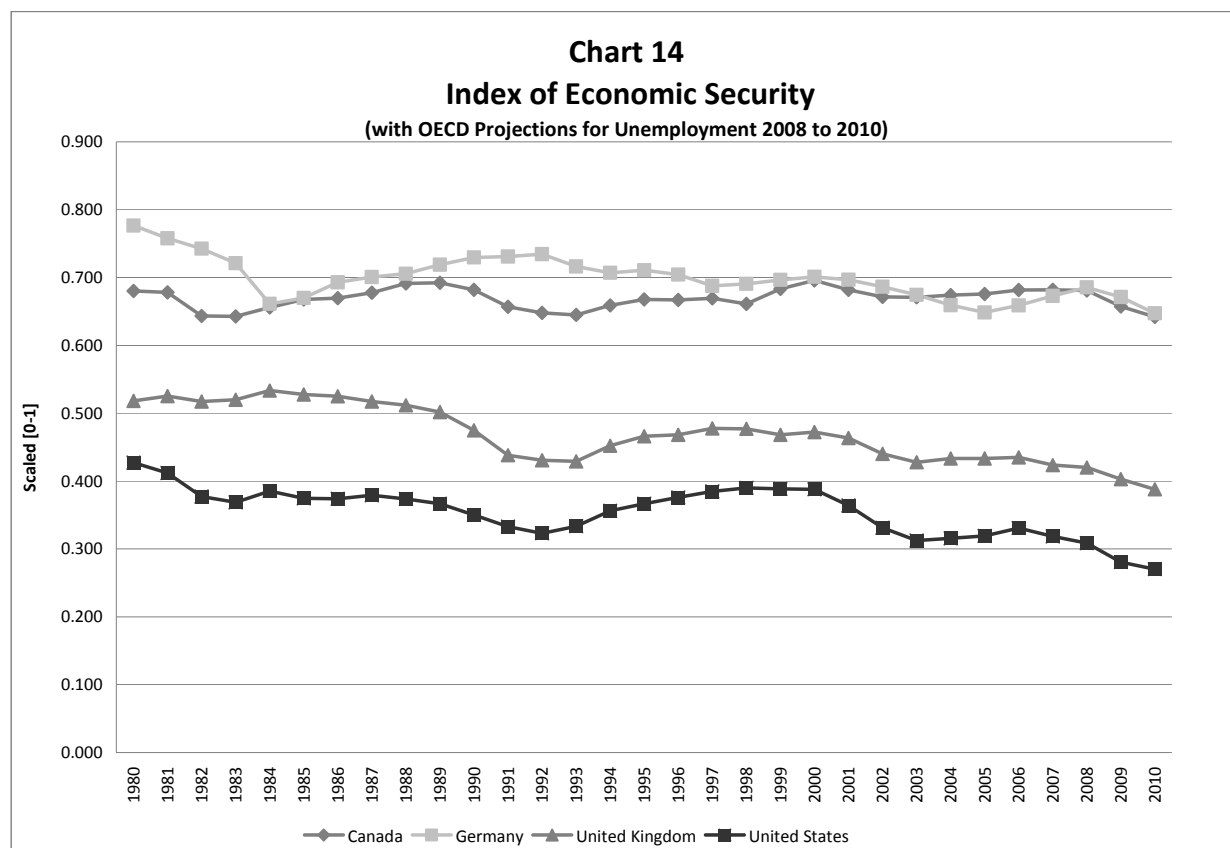
d: “Security in the event of .. Widowhood”

As noted above, we have interpreted this as “the risk of single (female) parent poverty” and we have ignored the poverty probability of male single parents. Is it fair to argue that we have thereby maintained an anti-male gender bias implicit in the (exclusionary) reference to “widowhood” in the UN Universal Declaration of Human Rights?

If the IEWB is to be ‘gender-neutral’ as an over-all index, then presumably any poverty of single male parents, and the poverty of children in male single parent households, should be included in the IEWB – and it is. The Income Distribution component of the IEWB counts the poverty rate and poverty gap of all household types. Here, however, we are concerned with insecurity in the sense of “the anxiety produced by a lack of economic safety”, so the question is whether men and women have the same subjective, forward-looking anxiety about the prospect of poverty in the event of family break-up. We think that males and females feel this anxiety quite differently, for both objective and cultural reasons. Although some men may fear the

prospect of poverty due to desertion by their wives, we think it is really only realism to recognize that far more women have such anxieties.

4. Implications and Conclusion.



How much has the recession affected economic security?

Chart 14 summarizes our Index of Economic Security for Canada¹⁸, Germany, the UK and US, including the OECD forecasts for 2008, 2009 and 2010 data. (As already noted, OECD forecasts for 2008-2010 for Sweden, Norway and Australia are not available to us.) Although it is clear that our measure of economic security is now trending down for all four countries, the rate of decline is not nearly as precipitous as the recent decline in output in these countries. This

¹⁸Since the data we have available for international comparisons do not allow us to consider the impact of declining UI/EI coverage on the unemployment security of Canadians, the relative position of Canada, compared to Germany, since 1995 in Chart 14 is undoubtedly overstated. However, the ordering of countries is not likely to change – most of the weight in the unemployment security component is assigned to the unemployment rate, and it is just one of the four components of Economic Security.

makes sense, because the structure of the health care, social welfare, unemployment benefit and public pension systems in these countries is largely unchanged. Although ‘security in the event of unemployment’ has deteriorated sharply and the trend for 2008 to 2010 is firmly down, the recession has as yet brought no real change to the other three components of our economic security index. Although newspaper headlines may tell us daily of the impacts of the recession on particular firms and on labour markets, Chart 14 may also serve as a reminder that the mechanisms of the modern welfare state that mitigate other aspects of economic insecurity remain in place.

We hope that this paper has demonstrated that in one respect, the Economic Security component of the IEWB can be easily extended, using forecasts of the unemployment rate, to model the change in economic security induced by a recessionary downturn in the labour market. But this particular recession has been driven by the “most dangerous shock in mature financial markets since the 1930s¹⁹” and, in combining financial market crises and a downturn in real economic activity, has created previously unimagined anxieties about the ability of capital markets to guarantee future retirement security for many members of the middle and upper middle class. Our index of ‘economic security’ has emphasized security against the risk of poverty – for single parents and for the elderly – and the IEWB should be interpreted in that light. However, the peculiar nature of the current recession has also raised the question as to whether a broader and more complex measure of ‘economic security’ in old age among the non-poor also deserves some consideration. In the IEWB, the “income distribution” component is already a weighted combination of income poverty and income inequality – perhaps our consideration of security in old age needs a similar broadening.

¹⁹ IMF – World Economic Outlook October 2008

Appendix 1

Assume that health care expenditures H_{ijt} for the i^{th} person in period t in country j (who has income equal to Y_{ijt}) can be classified either as “medically necessary” M_{ijt} or “Discretionary” D_{ijt} .

Our basic identity is:

$$H_{ijt} = M_{ijt} + D_{ijt}.$$

For most of this note, we suppress the notation for country j , period t , and refer to individual i as receiving medically necessary services M_i and making discretionary expenditures D_i , and having income of Y_i .

Discretionary expenditures are, in general, determined by the relative price of medical services and by personal income, but if all individuals face the same prices in a given country at a given time and if we assume demand to be iso-elastic, all the variation in demand for discretionary health care expenditure is determined by relative income. If discretionary expenditures are linearly related to personal income, we have:

$$[1] \quad D_i = \beta Y_i$$

We assume that medically necessary expenditures arise because accidents and illnesses happen randomly to people and that they give rise to a probability distribution of medically necessary expenditures whose frequency distribution is described by:

$$[2] \quad M_i = g(m)$$

We define \bar{M} and \bar{D} as mean medically necessary and discretionary expenditure for a population of size n .

$$[3A] \quad \bar{M} = \sum_{i=1}^n M_i g(m)$$

$$[3B] \quad \bar{D} = \beta \bar{Y}$$

Insurance Coverage

Assume that individual i is reimbursed for a proportion of health care costs, or (equivalently) that some proportion of identical individuals are covered under health insurance, and that the insurance coverage of medically necessary and discretionary expenditure is given by

$$[4] \quad a_i = a(M_i)$$

$$[5] \quad d_i = d(D_i)$$

The out of pocket, non-reimbursed portion of health care costs H_i^* for individual i is then given by:

$$[6] \quad H_i^* = (1 - a)M_i + (1 - d)\beta y_i$$

In total, unreimbursed health care costs are:

$$[7] \quad \sum_{i=1}^n H_i^* = [(1 - a)\bar{M} + (1 - d)\beta\bar{Y}]n$$

In the “health care cost security” sub-component of the IEWB we use average unreimbursed health care costs as a percentage of average personal disposable income. We can call this IEWB and compute it as in:

$$[8] \quad IEWB = \frac{\sum_{i=1}^n [(1-a)M_i + (1-d)D_i]}{\sum_{i=1}^n y_i}$$

$$= \frac{(1-a)\bar{M}}{\bar{Y}} + (1-d)\beta$$

If we are comparing two countries at a point in time, we will be interested typically in the difference between health security scores, as [9].

$$[9] \quad IEWB_j - IEWB_{j'}$$

$$= \left[\frac{(1-a_j)\bar{M}_j}{\bar{Y}_j} - \frac{(1-a_{j'})\bar{M}_{j'}}{\bar{Y}_{j'}} \right] + [(1-d_j)\beta_j - (1-d_{j'})\beta_{j'}]$$

The first term in square brackets is what we want to measure, while the second squared bracket term is the error introduced by the fact that measured health care spending includes both medically necessary and discretionary components. It disappears if $\beta_j = \beta_{j'}$ and $d_j = d_{j'}$ [i.e., the income effect and the insurance coverage of discretionary health spending are the same across nations]. If we just assume that $\beta_j = \beta_{j'}$ (which can be called the “equal hypochondriatic income elasticity” assumption and can be defended as the standard economic assumption when we have no evidence to suggest unequal preferences) then the error reduces to:

$$[\beta_j d_j - \beta_{j'} d_{j'}] = \beta_j [d_j - d_{j'}]$$

Since β_j is likely to be a number of the order of 0.05, and $[d_j - d_{j'}]$ is unlikely to be large, their product (i.e., the error) will be small.

The question remains as to whether average per capita uncovered costs are an adequate proxy for “insecurity” if people are in fact worried about the probability of “medical disasters” that they cannot pay for. Let us call this Prob (B) – i.e., probability of medical bankruptcy.

Define $f(y)$ frequency density of income y

$F(y) = \int_0^y f(y)dy$ = cumulative distribution function of income y

We assumed a probability distribution of medically necessary expenditures $g(M)$ with corresponding cumulative distribution function $G(M)$.

Suppose that a financially disastrous medical event is defined as having uncovered expenditures greater than some multiple c of an individual’s income – i.e. $(1-\alpha)M_i \geq cy_i$. The critical incident is defined by $M_i \geq \frac{cy_i}{(1-\alpha)}$. Note that if coverage of costs is complete, $\alpha=1$ and the critical health incident is impossible, i.e., happens only if $M_i \geq \frac{cy}{0} = \infty$.

So, for any individual, at income level Y_i the probability of a financially disastrous event is:

$$[10] \quad \text{PROB} (B|y_i) = 1 - G\left(\frac{cy_i}{1-\alpha}\right)$$

If we are willing to assume that $g(M)$ is similar across nations (perhaps because we assume similar efficiency of treatment and probability of illness), and if we are also willing to assume c is the same (equal access to credit) then across countries the insecurity faced by a person at income level y_i depends only on $(1-\alpha)$ – which is what we measured in equation [9].

Note that this is NOT the same as saying equation [10] will measure cross-country differences in risk of medical bankruptcies. The average probability of bankruptcy depends on both $f(y)$ – the distribution of income – and $g(M)$ $(1-\alpha)$ the risk of uncovered health care costs.

$$[11] \quad \begin{aligned} \bar{B} &= \int_0^{\infty} f(y) (\text{PROB} (B)|y)dy \\ &= \int_0^{\infty} f(y) \left[1 - G\left(\frac{cy}{1-\alpha}\right)\right] dy \end{aligned}$$

The practical meaning of this, when we compare the US with other countries, is that our sub-index for ‘security in the event of sickness’ captures the difference in economic security from the risk of uncovered health care costs *for people at a given income level*. What we do not measure – and arguably should not measure in the security component of the IEWB, since the IEWB has a separate Income Distribution component – is the greater number of people who, in a more

unequal society, will experience medical bankruptcy because their incomes are lower than they would have been in a more equal society.

For two individuals (1 and 2) with the same income y and same access to capital c , the expense of the critical “bankruptcy inducing medical event” is determined only by their respective insurance coverage rates a_1 and a_2 .

$$M_1^* = \frac{cy}{(1 - a_1)}$$

$$M_2^* = \frac{cy}{(1 - a_2)}$$

If the frequency distribution of medical costs is governed by a similar Paretian process for both individuals (with the minimum x and shape parameter k) then

$$PROB (M > m) = \left(\frac{m}{x}\right)^{-k}$$

the probability of bankruptcy for each individual is then given by:

$$PROB (B_1) = Prob(M > M_1^*) = \left[\frac{\frac{cy}{1 - a_1}}{x}\right]^{-k}$$

$$PROB = (B_2) = PROB(M > M_2^*) = \left[\frac{\frac{cy}{1 - a_2}}{x}\right]^{-k}$$

Relative odds of bankruptcy are then:

$$\frac{Prob(B_1)}{Prob (B_2)} = \left[\frac{1 - a_2}{1 - a_1}\right]^{-k}$$

References

- Broadbent, John, Michael Palumbo and Elizabeth Woodman (2006) *The Shift from Defined Benefit to Defined Contribution Pension Plans - Implications for Asset Allocation and Risk Management* December 2006 Prepared for a Working Group on Institutional Investors, Global Savings and Asset Allocation established by the Committee on the Global Financial System
- Messinger, Hans (1997) "Measuring Sustainable Economic Welfare: Looking Beyond GDP," paper presented at CSLS Workshop on Economic Well-being in Canada, September 25, Ottawa, Ontario.
- Di Tella, Rafael, Robert MacCulloch and Andrew Oswald (2003) "The Macroeconomics of Happiness" *The Review of Economics and Statistics* November 2003, 85(4) Pp.809-827
- Helen Boss Heslop (2009) ECONOMIC SECURITY AS AN ELEMENT OF ECONOMIC WELLBEING Draft CSLS Ottawa 2009
- John P. Martin (1996) *Measures of Replacement Rates for the Purpose of International Comparisons: A Note*, OECD Economic Studies, No. 26
- Osberg, Lars (1985) "The Measurement of Economic Well-being," in David Laidler (ed.) *Approaches to Economic Well-being*, Volume 36, MacDonald Commission (Toronto: University of Toronto Press).
- Osberg, Lars (1988) "The 'Disappearance' of Involuntary Unemployment" *Journal of Economic Issues*, Sept. 1988. Vol. 22, No. 3, pp. 707-728.
- Osberg, Lars and Andrew Sharpe (1998) "An Index of Economic Well-being for Canada," Research Report, Applied Research Branch, Human Resources Development Canada, December.
- Osberg, Lars and Andrew Sharpe (2000) "International Comparisons of Trends in Economic Well-being Lars" Luxembourg Income Study Working Paper No. 242., February 2000.
- Osberg, Lars and Andrew Sharpe (2002) "An Index of Economic Well-being for Selected OECD Countries," *Review of Income and Wealth*, 48 (3), September, pp. 291-316.
- Osberg, Lars and Andrew Sharpe (2005) "How Should We Measure the "Economic" Aspects of Well-being," *Review of Income and Wealth*, 51 (2) June, pp. 311-336.
- Osberg, Lars and Andrew Sharpe (2006) "New Estimates of the Index of Economic Well-being for Selected OECD Countries," paper to be presented at the 7th Conference of the International Society for Quality of Life Studies, Rhodes University, Grahamstown, South Africa, July 18-21.

Osberg, Lars (2009) *Canada's declining social safety net: EI reform and the 2009 Budget*
Conference: The 2009 Federal Budget: Challenge, Response and Retrospect John Deutsch
Institute May 7-8, 2009 - Queen's University

Wolff, Edward (1991) "The Distribution of Wealth: Methodological Issues, Time Trends and
Cross-Sectional Comparisons" Pages 92 to 133 in L. Osberg (ed) *Economic Inequality and
Poverty: International Perspectives* M.E. Sharpe Armonk, New Jersey 1991

Sharpe, Andrew and Julia Salzman (2003) "Methodological Choices Encountered in the
Construction of Composite Indicators," paper presented to the annual meeting of the Canadian
Economics Association, Carleton University, Ottawa, Ontario May.