ASSESSING ALTERNATIVE FINANCING METHODS

FOR THE CANADIAN HEALTH CARE SYSTEM

IN VIEW OF POPULATION AGING

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ABSTRACT[1]

The cost of the Canadian health care system is approximately 10% of Gross Domestic Product (GDP). Survey-evidence suggests that Canadians do not wish to have additional funds spent on health care but believe that the system should be able to deliver better quality care. Due to declining fertility rates and increased life expectancy, the Canadian population is aging. Over the next 25 years, the dependency ratio will increase dramatically, primarily due to the "baby boom generation" [2], reaching age 65. This will place twofold cost pressures on governments responsible for maintaining the health care system:

- As a consequence of increased life expectancy, on average, Canadians will have a longer period of health care consumption. Although age-specific cost may not increase, with an aging population aggregate annual health care expenditures are expected to increase.

- The dependency ratio is a proxy for the size of the labour force and hence for the GDP. The increasing dependency rate may result in a slowdown in GDP growth, given constant technology.

In Section I, this paper attempts to quantify these factors. A single measure combining cost and quality is developed to demonstrate the magnitude of the challenge and is used in assessing alternative financing models.

In Section II, this paper examines a number of different approaches to health care financing including user fees and alternative compensation methods for physicians. The paper highlights documented information from Canada and international experience on the implementation issues involved. The paper evaluates the desirability of implementing these approaches in Canada.

INTRODUCTION

According to survey information published in October 2003, "rather than paying more to maintain or improve (health) care, Canadians are more supportive of innovative solutions and incentives for appropriate use - that work within or expand upon - the current system" (Pollara 2003). The statement seems straightforward. But what do Canadians mean by it and how should cost and quality of care be measured over time? In Section I of this paper these questions are examined and a measure of dollars of health care expenditure per year of disability-adjusted life expectancy (DALE) is proposed. Using this measure and projections of the Canadian population in 2031, cost of health care, and Gross Domestic Product (GDP), it is shown that, by maintaining health care costs per year of DALE at today's level in real terms, after adjustment for population aging, health care costs as a percentage of GDP are affordable. These projections are dependent on growth of GDP, which is itself dependent on productivity growth. Section I concludes with a brief review of divergent views of various economists concerning productivity growth projections.

In Section II of the paper, some aspects of the challenge to maintain measured health care costs at today's level are examined, such as measures of efficiency of the current system, and alternative financing methods such as user fees and alternative compensation methods for physicians. This paper recommends that user fees not be implemented for universally-mandated medically necessary services, primarily because of the inequitable burden placed on the less healthy, especially the less-healthy poor, but also for reasons of economic inefficiency. The paper recognizes the cost-management incentives inherent in a capitation system for physician payment, acknowledges the need for gradual change in implementing such a system, but expresses skepticism concerning the likelihood of capitation achieving its potential in the manner in which it is being implemented in Ontario.

SECTION I - HEALTH CARE COST PROJECTIONS

Cost Of Health Care - 2005

In 2005, total expenditures on health care in Canada were 9.6% of GDP (The Economist 2005) or approximately $115 billion. The survey results previously quoted may indicate that Canadians do not want to pay any more dollars in absolute terms for health care services of equivalent quality. Given that the future for Canada will include some inflation, an increasing, as well as an aging, population which will exert upward cost pressures, I shall interpret the survey results to indicate that Canadians do not wish to pay a greater share of GDP for health care services of equivalent quality. There is no universally accepted single measure of quality. Any single measure will emphasize certain aspects of care and exclude other aspects. One measure is life expectancy. The quality and comprehensiveness of the health care system may contribute to increasing life expectancy in a variety of aspects including: better prenatal and infant care reducing infant mortality rates; population-wide immunization programs reducing the risk of death due to tuberculosis, smallpox, etc.; adequate access to care by physicians and in hospitals, thereby prolonging life. Such a measure does not include any measure of responsiveness, as would say a measure which incorporated length of waiting time for service, nor does it include any measure of equality of access to care which may vary for those in rural areas or for native peoples, nor does it include a measure of effectiveness of treatment except to the extent that ineffective treatment affects mortality.

A measure of quality used by the World Health Organization which is more encompassing than life expectancy is disability-adjusted life expectancy. DALE corresponds to the number of years of life expectancy free of disability plus a fraction of the years of life expectancy during disability calculated using weights assigned to various states between death and perfect health (WHO 2000), as such DALE is less than life expectancy. The difference between DALE and life expectancy is approximately seven years. Both absolutely and relatively this reduction in life expectancy due to disability is less in richer low-mortality sub regions of the world, further widening the health status gap between richer and poorer nations (Ibid). For the purposes of this paper, DALE is used to measure quality by making a deduction of seven years from life expectancy (except as noted later when examining the impact of health status improvement). Since purchasing power parity is commonly measured in reference to U.S. dollars, quality-adjusted health expenditure (QAHE) is calculated as aggregate health care expenditure expressed in U.S. dollars using a measure of purchasing power parity divided by

aggregate DALE for the population. QAHE is a complex measure including health care expenditure converted to U.S. dollars divided by a measure of quality being DALE. As such, a high QAHE produces an undesirable ranking.

Table 1 shows the rankings of the top ten countries based on QAHE, the GDP per capita expressed on a purchasing power parity basis, these countries' health expenditure as a percent of local GDP and where these countries would rank internationally on this measure, and the countries' DALE in years and their rank based on DALE. The countries are ranked in descending order of QAHE. This ordering does not change the position of the USA and Switzerland, first and second respectively, from their position when the traditional ranking of health expenditure as a percent of GDP in local currency is used. However, the expenditure gap between the USA, Switzerland and Norway when measured by QAHE in USD, the difference between 76.6 and 67.2 and 64.4 respectively, does not seem as great as it does when measured as a percentage of local GDP, the difference between 14.6% and 11.2% and 9.6% respectively. Canada ranks tied fifth-sixth in health care expenditures as a percentage of local GDP but drops to eighth in QAHE in USD, indicating that if DALE is the measure of quality, Canada is getting relatively good value for its expenditures. It is interesting to observe how Japan and the Scandinavian countries rise in the rankings when QAHE rather than health care expenditure as a percentage of GDP is used as the measure. Japan is especially interesting. It has a relatively low rank in terms of health care expenditure as a percentage of local GDP, tied fifteenth-sixteenth, and a world leading DALE; yet due to its relatively strong currency, it ranks ninth in QAHE in USD. Norway, Denmark and Sweden are ranked 3, 4 and 6 respectively based on QAHE, up from 5/6, 11 and 9 respectively when cost as a percent of local GDP is used. The change in position can be explained by the large relative purchasing power of their currency and in Denmark's case, by its relatively low DALE.

TABLE 1
International Ranking
By QAHE Expressed In U.S. Dollars

Rank Based On QAHE	Country	QAHE in USD ($)	GDP Per Capita in Purchasing Power (USA = 100)	Health Expend-iture as Percent of Local GDP (%)	Rank as % Local GDP	DALE	Rank by DALE
1	USA	76.6	100.0	14.6	1	70.9	17
2	Switzerland	67.2	85.4	11.2	2	74.1	2
3	Norway	64.4	100.4	9.6	5/6	73.2	8
4	Denmark	48.9	82.3	8.8	11	70.8	18
5	Germany	43.9	73.1	10.9	3	72.3	12
6	Sweden	42.2	70.8	9.2	9	73.8	4
7	France	38.8	73.2	9.7	4	73.1	9
8	Canada	35.4	79.6	9.6	5/6	73.7	5
9	Japan	35.1	75.4	7.9	15/16	75.7	1
10	Australia	34.1	76.2	9.5	7	74.0	3

Source: The Economist Pocket World in Figures 2006 Edition, calculations by author

Projected Canadian Health Care Costs - 2031

Due to comparatively high rates of fertility in Canada after World War II followed by a significant decline in the 1970's and subsequently, in combination with mortality rate

improvements, Canada has a large demographic cohort born between 1946 and 1965, commonly referred to as the baby-boomers. As this cohort grows older, it is anticipated that its demands for retirement income and health care will place a significant burden on the Canadian financial system for two reasons:

1. the large size of this cohort will increase public expenditures on retirement income and health care absolutely; and

2. the costs of retirement payments and health care expenditures for this cohort will be borne by taxes and contributions made primarily by employed persons, and the ratio of dependants to employed persons is expected to increase dramatically.

This paper examines the effect of health care expenditures[3] in light of population aging. Using the assumptions and methods described in Appendix A, the effect on health care costs of changing demographics is summarized in Table 2. To estimate health care expenditures by age-sex range, the "basic health factors" from The Health of Canadians – The Federal Role Volume Six: Recommendations for Reform in respect of a basket of 57 common primary care services were used (with adjustment as described in below for the various scenarios).

1. these factors are applied to the 2005 and 2031 population projections to determine the expected change in health care costs due solely to demographic changes
2. to illustrate the impact of improving health status, the factors are modified by repeating the factors for ages 15 – 19 for ages 20 – 24 and shifting all other higher age factors to the next higher age range
3. to illustrate the impact of improving health status when the adjustment to life expectancy for DALE is assumed to be 5 years, the factors in 2. are modified by repeating the factors for ages 45 – 49 for ages 50 -54 and shifting all other higher age factors to the next higher age range

It is assumed that health care costs by age-sex range remain the same as in 2005. Three different population growth scenarios are shown: low growth, medium growth, and high growth (columns 3, 4, 5 in Table 2).

From Table 2 it can be seen that the senior dependency ratio, the ratio of those aged 65 and over to those (considered working age) aged 15 – 64, increases by a much greater percentage, 93% - 126%, than does the health expenditure factor, 9.8% - 12.7%. (Compare lines 5 and 7 in the table). Nonetheless, health expenditures can be expected to increase due to shifting age-sex population distribution. Brown and Suresh (2004)**,** among others, have suggested that one aspect of increased life expectancy is general

health status improvement which will have the effect of postponing health care costs. The last two lines of Table 2 (compared to lines (6) and (7)) illustrate the relative moderation in health cost increases, when health care costs are lagged in order to model the improvement in health status which may accompany increased life expectancy. Although there remains an increase in the health expenditure factor, the increase is small. The final component in comparing the affordability of projected health care expenditures in 2031 to health care costs in 2005 is to project GDP for 2031 and convert projected expenditures to a percentage of GDP. For this exercise GDP per employed person for 2005 is multiplied by the projected number of employed persons in 2031 and by a growth in GDP factor to account for productivity growth over the 26 year period. Two annual productivity growth factors are used: 1.36% which represents the average annual growth in GDP per hour from 1981 - 2003 and 1% to illustrate a slower rate of annual

TABLE 2

Demographic And Health Care Expenditure Ratios 2005 And 2031

Aspect	2005	2031 Low Growth	2031 Medium Growth	2031 High Growth
(1) Percentage of Population 0-14	17.6	13.1	14.2	15.9
(2) Percentage of Population 15-64	69.3	62.5	60.1	61.6
(3) Percentage of Population 65 and over	13.1	24.4	25.7	22.5
(4) Senior Dependency Ratio {(3)/(2)}	18.9	39.0	42.8	36.5
(5) Percentage Increase Over 2005 in Senior Dependency Ratio	0	106	126	93
(6) Health Care Expenditure Factor for Population	1.039	1.171	1.154	1.141
(7) Percentage Increase Over 2005 in Health Care Expenditure Factor for Population in 2031	0	12.7	11.1	9.8
(8) Health Care Expenditure Factor With Health Status Improvement for Population in 2031	1.039	1.078	1.064	1.053
(9) Percentage Increase Over 2005 in Health Care Expenditure with Health Status Improvement for Population in 2031	0	3.8	2.4	1.3

productivity growth. It is further assumed that the basic cost of health care per DALE remains at the 2005 level, to reflect the message in the survey quotation that Canadians do not want to pay more for comparable quality. However, the basic cost is adjusted for changes in the health expenditure factor due to changing age-sex distribution. The results of these calculations are summarized in Table 3. Also shown in the last line of Table 3 is the projected impact if health status were improved and as a consequence, the adjustment to life expectancy to obtain DALE reduced from 7 years to 5 years. It is interesting to note that with a 1% annual productivity growth rate and no change to the health expenditure factors by age-sex, the projected costs are approximately at the 2005 level of 9.6% of GDP. However, on this projection there has been an increase in average DALE of over 3 years from 73.7 in 2005 to 77.0 in 2031. At annual productivity growth rates greater than 1%, such as 1.36%, the health care costs in 2031, as a percentage of GDP, are lower than 2005 levels, on all of the population growth projections, and are accompanied by a quality improvement as measured by an increased DALE.

TABLE 3
Projected Health Care Expenditure In 2031
As A Percentage of GDP

| | Population Projection | | | | | |
| | Low | | Medium | | High | |
Assumption / Annual Productivity Rate	**1.36%**	**1%**	**1.36%**	**1%**	**1.36%**	**1%**
No change to health expenditure factors	8.81	9.66	8.75	9.60	8.71	9.56
Lag on health expenditure factors DALE adjustment 7 years	8.11	8.90	8.07	8.85	8.04	8.82
Lag in health expenditure factors DALE adjustment 5 years	7.89	8.65	7.85	8.62	7.84	8.59

Hence, if Canada is able to keep its basic rate of health expenditures per DALE at 2005 levels, before adjustment for changing demographic factors, provided the average annual rate of GDP growth is at least 1%, Canada's level of health care expenditures as a percentage of GDP is projected to be at today's level or below in 2031.

Other Writers' Analyses

The outcome of the foregoing analysis is somewhat surprising in view of the large projected increases in the senior dependency ratios. In this subsection, certain other writers' analyses are reviewed.

Evans et al. (2001) would not be surprised. They warn against "apocalyptic demography", i.e., predicting skyrocketing health care costs based on increasing demographic dependency ratios. By analyzing the B.C. linked health data set they find that:

> "Only 9.6% of total national health expenditures, in 1998, was attributable to an excluded category-…- in which per capita expenditure might be expected to rise considerably as the population ages. Curiously, though, it has not done so over the last quarter century" (Ibid).

> "Age-specific use rates over our period of analysis moved downward for hospitals but increased for physicians' services and apparently, for pharmaceuticals. Closer examination, however, reveals that the later trend is in large measure price inflation masquerading as increasing utilization" (Ibid).

> "The evidence from British Columbia is quite clear. Changes in the age structure of the overall population have not in the past been major contributors to trends in the per capita utilization of health care services, and they will not be in the future" (Ibid).

It is worth observing that "the future" to which they refer is to the end of their projection period in the mid 2020's before the oldest of the baby-boom cohort has reached age 80. Nonetheless, it is clear that they would not be surprised by the findings of this paper.

Denton and Spencer (1999) "survey the literature, issues, and evidence relating to cost increases and evidence related to cost increases associated with the aging of the Canadian population" and observe "it is important to recognize that population change affects not only the demand side of the economy, but also the *supply* side" (Ibid). In fact, in the projections in Part A of this paper, it is the rate of growth of GDP, "the supply side", which outpaces projected growth in health care expenditures, to indicate that health care

expenditures as a percentage of GDP, may decline from today's level. Denton and Spencer conclude:

> "Our projections indicate that when a comprehensive view is taken of population aging on government expenditures, the *demographically induced* rate of growth of total expenditure is likely to be about the same as the overall rate of growth of the population. Furthermore, when projected expenditures are compared to the projected productive capacity of the economy, it seems likely that the total expenditures for all budgeting categories combined will be a *smaller* percentage of GDP in 2031 than in 1991, even though there will be large increases in expenditures on health care and social security" (Ibid).

So their conclusions are consistent with projections in this paper, even though they used projections to 2031 from 1991 whereas this paper's projections to 2031 are on based on more recent 2005 data.

On the other side of the issue, Robson (2001) warns that "demographic changes will exert steady pressure on heath care budgets" which has the danger that:

> "government will react to the prospect of prolonged aging-related pressure on health care budgets by sticking with a pay-as-you-go approach that will place on the next generation a disproportionate share of the burden of caring for the elderly boomers. Such an approach is neither sensible nor defensible" (Ibid).

and concludes "the baby boomers present a sizeable challenge to the sustain-ability of Canada's health care system" (Ibid).

How can such divergent views be reconciled? Without access to each writer's model and its inherent assumptions, any reconciliation by this author is impossible. Two critical assumptions in any modeling exercise are:

      1. the assumed rate of productivity growth; and

      2. the assumed rate of growth in health care costs by age-sex range.

A comprehensive review of the factors affecting productivity growth and the appropriateness of each individual author's assumption of productivity growth is beyond the scope of this paper. However, before concluding Section I, several comments are

listed in the next subsection which identify certain aspects to be considered in developing an appropriate productivity assumption. The assumed rate of growth in health care costs by age-sex range is also beyond the scope of this paper. In Section II, certain aspects of health care demand are discussed, which are to be considered in developing a health care cost growth assumption.

Considerations Regarding The Productivity Growth Assumption

With respect to an annual productivity growth rate, Robson uses 1.6% and he notes "increases in real output per person of working age have averaged 1.6 percent annually since 1980" (Ibid). Denton and Spencer (2003), in a follow-up paper, consider it a reasonable assumption that "the annual rate of increase in labour productivity remains the same as in the decade 1991-2001, 1.61 percent". Sharpe (2005) summarizes the average annual rates of growth assumed by various sources showing the rates range from 1.2% for real GDP per hour assumed by Centre for Spatial Economics (2005), 1.6% for real GDP per worker assumed by both Infometrica (2006) and Conference Board of Canada, and 1.7 % for real GDP per worker assumed by Finance Canada (2006) and University of Toronto (2006).

Denton and Spencer (2003) observe that:
> "GDP is thus equal to the product of the population, the proportion of the population regarded as the source from which the labour force is drawn, the overall labour force participation rate, the employment rate (or 1 minus the unemployment rate), and aggregate productivity, represented by output per person employed. (Output per person employed reflects a number of factors: the capital/labour ratio, returns to scale, the state of technical progress, the proportions of high and low productivity industries in aggregate output, average hours worked and the educational and skill composition of the work force.)"

Sharpe (2005) summarizes these components in a slightly different manner:
> "Labour productivity growth which is always measured in real terms, can be decomposed into two components, changes in capital intensity or the capital-labour ratio (also called capital deepening) and changes in multifactor productivity, which captures the effect of a number of factors including technical change, measurement error, economies of scale, and capacity utilization".

How some of these factors may change with an aging population is matter of conjecture. However, it is likely that there will be slower labour force growth. In this paper's projections, the labour force only grows, in total, from 2005 to 2031, by 1.5%, 8.4 % and 15.3% corresponding to low, middle and high growth scenarios. With slowing in the growth in the labour force, real wage rates may rise, making investments in capital more economical. Sharpe (Ibid) notes that greater capital intensity could contribute to more rapid labour productivity growth. Moreover, higher wage rates may lead to greater investment in human capital, for example, through increased education and training. The 2001 Canadian Census confirms the trend to higher education and marks the first time that the majority of the working age population had post-secondary Education (Statistics Canada 2003). The World Health Report 1999 (WHO 1999) states that "life expectancy at birth alone is one of the strongest explanatory variables of growth in GDP", and continues "the relationship between health improvement variables and economic growth is sufficiently significant in the long term to justify sustained national commitment to investing in health." (Ibid). By this account, improving life expectancy and health status, which may be present in an aging population, could contribute to strong GDP growth.

Robson and Guillemette (2003) observe:

> "the life-time effects of better nutrition and preventative medicine in youth and improved medical technology later in life seem likely to lead to continued improvements in the health status of the older population, and a concomitant potential for increases in its participation in the workforce… At least as striking as the improvements in Canadians' health status are their improvements in educational attainment…Labour force participation increases with educational attainment".

On the other hand, Robson and Guillemette (Ibid) raise a number of concerns regarding productivity growth for an aging population, including the following:

> "There are many reasons to think that demographic changes and the slower growth in labour inputs they imply will affect saving and productivity growth….One is the possibility that an older population will save less. The other is adverse implications of an aging workforce for productivity".

> "Both studies find that labour-force members in their sixties are markedly less productive than other workers implying that an increasing population of actual

and potential workers in their sixties would depress aggregate productivity" (Ibid).

There is no clear consensus of what the future rates of productivity growth and GDP growth will be, nor will all the factors affecting these growth rates operate in the same direction. The cost projections in this Part A are encouraging but they are heavily dependent on many assumptions, a very important one being the rate of growth of GDP. Two further assumptions implicit in this model are that there will be no change in service intensity and that productivity increases can be affected equally easily regardless of industry. These assumptions are questionable, for reasons identified in another paper analyzing health cost projections (Andrews 2006):

1. "the figures assume no change in service intensity. However, there is reason to suspect that there will be increasing demands for service intensity as the baby boomers age. The baby-boom generation has come to expect quick and high-quality delivery for other goods and services and may demand the same for health care services".

2. "raising productivity significantly in service-intensive industries and economies can be difficult since part of productivity gains are normally shared with workers, in the form of increased wages and/or improved benefits. In such situations, with an aging population of workers and former workers defined benefit plans provide a further drag on productivity gains. The cost of defined benefit plans continues to increase over time as a percentage of wages, as the group ages" (Ibid).

In summary, there is no consensus on what the impact of an aging population will be on productivity growth rates. Productivity growth is a key component of GDP growth. The results of Section I are encouraging because they show that, given the specified assumptions regarding health expenditure, increases in life expectancy and GDP growth, health care expenditures in 2031 will be at or below the 2005 levels, as a percentage of GDP. Nevertheless, the results are dependent on the assumed rates of GDP growth. In the absence of definitive studies demonstrating the impact of an aging population on productivity growth rates, the results of this Section I should be viewed with a prudent degree of caution.

SECTION II - DEMAND MANAGEMENT THROUGH FINANCING ALTERNATIVES

Health System Performance

A significant assumption underlying the calculations in Section I is that the cost per DALE can be maintained at the 2005 level. There are many factors which may place pressure on costs such as technology innovation and implementation, redefinition of medically necessary services, demands for quicker access to service or for greater service intensity, higher wages in part due to slower labour force growth, need to replace infrastructure, etc. In this part, an evaluation of the cost performance of the Canadian health care system is presented to help understand the potential for cost maintenance or improvement. Next the paper examines alternative financing methods to limit excess demand, defined as being demand for care beyond what is deemed medically necessary, on the assumption that there may be excess demand. Excess demand may arise from actions of both patients and providers. Before concluding, this part identifies numerous areas for further research.

The World Health Organization (WHO) has undertaken a performance ranking of the health care systems in 191 countries (WHO 2000). Based on a survey of 1006 respondents from 125 countries, of which half were from among its own staff, the WHO established a system of weights as follows: 50% for the category "health" as measured by DALE, 25% for the category "responsiveness", 25% for the category "fair financial contributions". The first two categories comprise two equally-weighted sub-assessments. The category "health" had separate 25% sub-assessments for overall or average rating of health and for distribution or equality of health. The category "responsiveness" had separate 12.5% sub-assessments for overall or average rating of responsiveness and for distribution or equality of responsiveness. Table 4 shows the performance ranking for the countries listed in Table 1, both in respect of total health and overall health system performance. Evans et al (2000) used the same data but focused on performance in terms of achieving the goal of improving health measured in terms of DALE. [33] Their definition of efficiency is as follows:

> "Our efficiency is more than technical efficiency narrowly defined…we use health expenditure as the indicator of inputs to the health sector, and health as the output. Efficiency then reflects not only whether health programs and interventions are produced at the lowest possible cost (i.e. technical efficiency), but also whether the health system chooses to provide the most cost-effective set

of programs or interventions for the given level of expenditure (sometimes called allocative efficiency in the health economics literature)" (Ibid).[4]

TABLE 4

Health System Performance

Group by Producing Health Uncertainty Interval	Country	WHO Performance Rank		Comparative Efficiency In Producing Health Uncertainty Interval
		Overall health system Performance	On Level Of Health	
A	France	1	4	2-7
	Japan	10	9	7-11
B	Norway	11	18	16-23
	Sweden	23	21	18-26
	Switzerland	20	26	21-31
C	Canada	30	35	33- 40
	Australia	32	39	35-43
	Germany	25	41	39-47
D	Denmark	34	65	61-72
	USA	37	72	67-78

They use statistical methods to produce uncertainty intervals for the WHO Performance Rank on level of health, as shown in the last column of Table 4. Based on overlaps in these uncertainty intervals, this author has regrouped the ten countries into groupings A, B, C, D. Given Canada's placement in group C, with a ranking of 35 on level of health and 30 on overall health system performance, it is safe to conclude that the Canadian health care system is not achieving its level of DALE as cost-effectively as possible.

From these data and analyses, it is not possible to estimate how much more efficient Canada could become. In an analysis of the equity and funding of the Australian health services, Peacock and Segal (1999) identify the following factors, which mitigate against system efficiency in Australia:

- fragmentation of services with multiple government level involvement;
- urban and rural populations and vast sparsely inhabited regions;
- aboriginal people and the gross disparity in the health status of this group compared to the rest of the population; and

- the role of the private sector and specifically a two-tiered health system underpinned by a large private health insurance market which supports differential access to services.

Canada is very close to (just slightly ahead of) Australia in the efficiency rankings. The Canadian health care system is characterized by the first three features listed above. The first two may be considered structural characteristics which arise in respect of the British North America Act and our geography. Because they are structural, they are unlikely to change. Concerted action could be taken to address the health status of native peoples, as such this component is not truly structural; however, given the length of time that this disparity has persisted and the complexity of the change management issues faced in trying to change it, this characteristic might be considered "quasi-structural". As such, the native peoples' disparity in health status is unlikely to change significantly in the short term. Canada does not have a two-tier system for medically necessary services as Australia does. This may be part of the explanation regarding why Canada is slightly higher in the efficiency rankings than Australia. In this regard, it is worth noting the following results from a 2005 Canadian health care survey (Pollara 2005) based on telephone interviews with nationally representative samples of 1,207 members of the Canadian public, 203 doctors, 201 nurses, 202 pharmacists, and 201 managers and trustees, which suggest that Canadians may be becoming more open to the idea of a parallel insurance system for medically necessary care:

- "45% of the public, 49% of nurses, 48% of managers, 72% of pharmacists and 73% of physicians support the idea that Canadians should be **allowed to pay out of pocket to purchase faster access** to health services that are currently funded under the public system.

- When asked whether they would personally be **willing to pay out of pocket to purchase faster access** to health services that are currently funded under the public system, support came from 49% of the public, 60 % of nurses, 63% of managers, 74% of physicians, and 76% of pharmacists.

- 57% of Canadians believe **allowing the purchase of private insurance for health care services already covered** under the public health system would have either no impact or a positive impact on the Canadian health system".

Given the analysis of Peacock and Segal, there is a need to inform Canadians about the impact of private parallel care on efficiency of the health system. Based on their analysis

of the dynamics of a parallel private system in Australia, Hurley et al (2001) warn that the potential for cost savings is limited, waiting times are unlikely to be reduced in the publicly financed system, and the existence of the private parallel system will affect the operation of the public system. We turn now to considerations of excess demand.

Excess demand is a slippery topic to address precisely. To begin, a definition of medically necessary services is required. Different countries, cultures and economies will likely arrive at different conclusions regarding what services, if any, are to be available on an (at least partially) publicly-funded basis, if a physician or other qualified provider deems them necessary to treat a patient. Hence, two aspects of a medically necessary service are a determination by society that the service should be (at least partially) publicly funded and the determination by an accredited provider that it is necessary. However, it does not follow that all services that are (at least partially) publicly funded and are recommended by an accredited provider are necessary. To be necessary, it must satisfy a need of the patient; i.e., there must be an effective treatment for the condition from which the patient is suffering. If there is no effective treatment, then a service recommended by an accredited provider should not be considered medically necessary. But there are other complications, what if the individual's condition has not been diagnosed or the individual has declined to accept the diagnosis. Surely that does not mean that no medically necessary service is required. Moreover, if there is more than one method to treat a condition and one treatment is more expensive than the other, could both treatments be medically necessary, or is only the least expensive treatment medically necessary, or are there other considerations[5]? Before examining arguments regarding cost sharing, some comments regarding supplier-induced demand are presented.

Supplier-induced Demand (SID)

Although patients typically identify a demand, i.e., recognizing that they have a condition which may require treatment, whether treatment is required and performed and the type and extent of treatment is typically determined by the provider[6]. Two separate aspects of the reliance placed by patients on the health care provider make it likely that the treatment plan prescribed by the provider will be adopted by the patient.
1. Information asymmetry, or imperfect information, meaning that patients seldom are in a position to critically evaluate the provider's diagnosis, or the likely effectiveness of the treatment plan or alternative options; and

2.   An agency relationship, meaning the patient trusts the physician to act in the patient's best interest in making the diagnosis and prescribing treatment, for a variety of reasons including licensing and the medical profession's code of ethics. Consequently, there is a relatively small likelihood that the patient will not pursue the treatment plan as prescribed.

In theory, SID occurs if a provider recommends a course of treatment that is not medically necessary and which would not have been accepted by the patient if the patient had all the relevant information (and the necessary time and ability to understand and assess such information); for example, if the provider recommends services that are not strictly medically necessary or that are more expensive than other treatments with the same degree of effectiveness or if the provider increases service intensity, such as by seeing the patient longer, requesting more frequent follow-up visits, or requesting a wider array of tests <u>and</u> if a fully informed patient would not have chosen such services. In practice, for a variety of reasons, it is difficult to obtain the relevant data to establish categorically the existence of SID; one practical reason being the inability to determine what the fully informed patient would have chosen. Nonetheless, there is a significant body of literature which purports to document the existence of SID, such as the following:

- A Japanese study of treatment of heart attack patients found that "increases in the relative number of hospitals and physicians are significantly related to physician-initiated expenditures and the effect is higher for high-tech treatments…physicians respond to more competition by generating greater demand for their services by increasing outputs, under Japan's fixed reimbursement system." (Noguchi et al 2005)

- A panel data study on French physicians providing ambulatory care who faced an increase in the physicians per capita found strong support for the existence of SID and noted that "physicians counter balance the fall in number of consultations by an increase in the volume of care delivered in each encounter." (Delattre and Dormont 2002)

- A study of primary care physicians in Quebec found that physicians are sensitive to financial considerations. "In order to defend their income, they are prepared to adjust both quantitatively and qualitatively their choice of consultation type." (Nassiri and Rochaix 2006)

While there is strong evidence to support a belief that SID does occur, there remains room for doubt. Where studies show physicians increase the quantity of service there is still room to argue that perhaps a medical purpose was served or that alternative treatment plans were specified due to lack of information regarding the effectiveness of specific treatments or ambiguity regarding the diagnosis. Moreover, the observed differences in demand are in respect of hypothesized supply and demand curves, and there remains the possibility these hypothesized curves were, in practice, misspecified. This is especially true with respect to health care services where the patient is unlikely to have sufficient information or the ability to assess available information concerning treatment plans and outcomes. In fact, even the physicians may be uncertain about alternative treatment plans and outcomes (Mooney 1994). Also, the studies of SID do not all reach the same conclusion.

- A Norwegian study to examine whether SID exists for primary care physician services found that "neither of these two groups of physicians [contract and salaried physicians] increased their output as a response to an increase in physician density" (Grytten and Sorensen 2001) and "we did not find SID for primary physician services in Norway" (Ibid). A possible explanation for this finding is that when physicians are remunerated by salary or are under contract income would not decrease even if utilization declined, so there would be no incentive for SID.

- A study by Dranove and Wehner (1994) casts doubt on the reliability of the statistical methods used by some studies which find evidence of SID. Using childbirths, an area of care where inducement should not exist, they "find 'evidence' of inducement of childbirths, calling into question the validity of the TSLS [two stage least squares regression analysis] approach".

Although the existence of the SID cannot be established categorically, there is evidence to suggest that it is likely to exist in certain situations, for the following reasons:
- Physicians are human beings and are likely to trade-off work and leisure activities at various incomes levels. Brown and Lapan (1979) found evidence that "the physicians' labour supply curve is backward-bending". As such, it is likely that physicians place value on income and leisure and make trade-offs between the two and furthermore, physicians may have income objectives to support their style of living.

- When their income objectives are threatened, a not unreasonable human behavioural response, is to attempt to protect that income:

  - In Colorado between 1976 and 1978, the reimbursement schedule was increased more for rural physicians than for urban physicians, so that urban physicians would perceive that their income, relative to rural colleagues, had decreased. Rice (1983) found that "declining reimbursement rates result in the provision of more highly intensive services; increasing reimbursement rates result in provision of less highly intensive services. These findings are highly supportive of the demand inducement hypothesis".

  - Due to information asymmetry and the agency relationship, physicians are in a position to induce demand.

  - There are various studies, some of which have been described, which find evidence of demand inducement.

Cost Sharing

If cost reduction for public health care provision is the objective, a possible policy response is the introduction of some type of user cost-sharing, e.g., user fees, for services such as physician and hospital services that are provided currently under the provincial health care plans without direct charge to the patient. In the absence of any change in utilization, such a policy action would not reduce aggregate cost but it would create cost-shifting to patients, and perhaps their private insurance providers, reducing the cost borne by the public health plans. However, an argument may be made that there is likely "excess demand" i.e., demand for care that is not medically necessary, so that utilization would likely reduce as a result of introducing user cost-sharing; thus, aggregate cost of health care would be reduced. This section explains this argument and then examines it critically. It concludes that the introduction of user cost-sharing is unlikely to reduce cost in aggregate, will result in cost shifting, will change the mix of services and patients being served which will adversely affect the poor, and in the long term is likely to result in an overall decline in health status when measured across the entire population.

An argument for a reduction in costs due to introduction of user cost-sharing might be made as follows:

- In a perfectly competitive market where users paid the fair price for health care services, and services were available to satisfy any level of demand, the level of

services consumed would depend on the users' demand schedule. An equilibrium would be reached at the quantity Q with price P where the marginal benefit of the last unit of service consumed equals the marginal cost of that last unit of service.

- By introducing insurance, in this case the provincial health plans, the out-of-pocket price of services to the user is reduced to zero. At this price a much larger level of services would be consumed, say quantity Q*, which "results in a societal 'welfare loss' under the conventional model because people purchase services with marginal benefit far below the cost of these services" (Rice 1998). Moreover, when services are virtually free to the user[7], a problem of moral hazard arises, i.e., there is no constraint on the user to consume services in a responsible manner and as a consequence, waste results, e.g. through use of excessive services such as multiple physician visits for minor illnesses or inappropriate use of services such as visits to emergency rooms rather than visiting a physician's office for non-emergency treatment advice.

- Introducing a user coinsurance-charge provided it is not fully covered by private insurance raises the effective cost of services to the user above zero. It is argued that this will not only reduce the quantity of services demanded but also will act to curb some waste of services that would otherwise have been consumed due to moral hazard.

- Hence it is argued that introducing user coinsurance-charges for certain services previously fully paid for by the provincial plan will reduce wastage resulting from moral hazard. By reducing utilization, costs will be reduced.

This argument is based on standard microeconomic analysis in a perfectly competitive market. Such analysis may not apply. Consider the following:

- With the exception of a few people such as hypochondriacs, individuals do not demand health care, other than preventative care, unless they are ill. People seek health and as long as they are healthy, they do not demand health care; demand for health care is derived demand. As such, it is questionable whether the availability of health care, without fee to the user, will result in people consuming unnecessary health care services. Since excessive health care services cannot be resold by the recipient and may not be of any benefit to the consumer, the extent of moral hazard postulated is likely overstated.

- Two separate aspects of the reliance placed by patients in the health care provider, namely information asymmetry and agency (explained in the previous subsection), reduce the likelihood that user coinsurance-charges will reduce utilization. Information asymmetry, or imperfect information, means that patients seldom are in a position to critically evaluate the provider's diagnosis, or the likely effectiveness of the treatment plan or alternative options. Moreover, because of the principal-agent relationship the patient believes the provider is acting in the patient's best interest in making the diagnosis and prescribing treatment. Consequently, there is a relatively small likelihood that the patient will not pursue the treatment plan as prescribed, even though the patient must pay a user coinsurance charge.

  The random Health Insurance Experiment (HIE) (Manning et al 1987) estimated price elasticities for all care of .17 - .22 depending on coinsurance rate. Where demand is quite inelastic, the introduction of coinsurance will have little effect on utilization. Furthermore, an inelastic demand schedule has a steeper slope which means that the associated welfare loss due to the provision of zero-price services is less. Rice (1998) observes that where there is evidence that cost sharing did reduce utilization, "patients are as likely to forego effective medical services…as they are to forego less effective care".

The foregoing discussion suggests that the introduction of user coinsurance-charges is unlikely to have a significant impact on utilization and, therefore, on cost in aggregate. The following paragraphs present arguments why the introduction of user coinsurance-charges would be a poor policy decision in the long-term.

- The HIE (Manning et al 1987) did find evidence "that demand elasticities for medical care are nonzero and indeed that the response to cost sharing is nontrivial". One area where the demand for care was quite elastic when coinsurance increased was well care episodes, defined as "medically deferrable [care] without great loss and can occur when the patient is not considered sick" (Ibid) where price elasticity increased from .14 when coinsurance was in the range 0% - 25% to .43 when coinsurance was in the range 25% - 95% (Ibid). Advocates for coinsurance charges might cite this is an illustration of how utilization can be changed to reduce cost. However, the well care episodes are not unnecessary services, merely deferrable ones. Hence, in the longer term the service needs to be performed. One cannot assess from these data whether if care is deferred for too long there may be other (more) costly services required.

The HIE found that there was an income effect, with those of low income being affected most. "For poor adults…who began the experiment with high blood pressure…there was a clinically significant reduction in blood pressure in the free fee-for-service plan compared to plans with cost sharing…… the magnitude of this reduction would lower mortality about 10 percent each year among this group" (Ibid). In other words, health status among poor adults was negatively affected by (the change in care received due to having to pay) a coinsurance charge.

- Similar results were found in the Indonesian Resource Mobilization Study (WHO 1999) which examined the effect of changes in prices of publicly provided health services on labour force participation:

> "the great majority of those where prices had been raised showed at least some ill effects…But the effects were much greater among the poor, among men over 40, and among women in households with low economic and educational status. Men in the bottom quartile of per capita income in the test areas reported losing almost a full day more of activity compared to the control group. Moreover, the follow-up study showed significant declines in labour force participation among the more vulnerable groups…labour force participation for women with no education fell 14%. Women over 40 were also likely to have high dropout rates from the labour market in the areas where health costs had gone up. Wage rates for men were also affected. The comparative slippage in the test areas was particularly great for older workers, whose health is presumably a greater factor in their work performance".

In terms of the cost measure proposed in this paper, reductions in life expectancy are a cost attribute to be considered in assessing any proposed changes to the health care system. Moreover, from the discussion on factors affecting GDP and productivity growth, work force participation is important. The results of these studies would have a doubly negative impact on QAHE, affecting both GDP growth and DALE.

The primary focus of this section is on cost-sharing (and its disadvantages). The previous subsection contained a lengthy discussion of SID, which will now be incorporated in this

discussion. If cost-sharing were introduced and if it were to result in an initial drop in utilization, would such a drop be permanent?

With a fee-for-service (FFS) reimbursement system of physicians' services, a permanent drop in utilization would result in a decrease in physicians' incomes. Evidence seems to support the view that some physicians would attempt to prevent a decrease in their income and one way to do this would be by inducing demand. If (some) physicians respond this way, total costs for services will not be reduced to the extent anticipated, since costs of services are directly related to physicians' income. However, some of the (induced) services delivered will be less than medically necessary and of questionable benefit. Moreover, those receiving services will be those willing and able to pay the coinsurance fees. The poor who are unhealthy may be discouraged from seeking medically necessary care which they consider unaffordable. Furthermore, if as a result of an initial (slight) decline in utilization associated with the introduction of a coinsurance, (some) physicians are available to supply services, it is likely that there will quickly be a demand for the physicians' services, albeit to deliver services that may not be strictly medically necessary. On this scenario, introduction of coinsurance does not reduce the overall cost of care provided but does result in a less beneficial and economically inefficient mix of services being delivered and in a reduction in services to the less-healthy poor. Accordingly, cost-sharing for medically necessary services does not appear to be an appropriate policy option to control costs.

Alternative Physician Reimbursement Models

If one accepts that there is SID, one may reasonably ask how it may be controlled or eliminated. Given the earlier claim that SID is not an unreasonable human behavior, one direction of promise is to find a physician-reimbursement method which does not encourage or reward such behaviour. Table 5 shows a comparison of attributes of four alternative methods of physician compensation: salary, capitation, FFS, and case-based. The first line in the table shows that under salary and FFS, physicians have low incentives to keep costs down; but, under capitation and case-based compensation methods, the incentives to keep costs down are high. Lines 2 and 3 in Table 5 show that under FFS there are appropriate incentives to deliver high quality services; whereas, under the other compensation methods, the incentives to deliver quality services are limited. Line 5 shows that patients can exercise the greatest choice of caregiver under FFS, which is frequently identified as a desirable attribute of FFS.

TABLE 5

Comparison of Attributes of Alternative Methods of PhysicianCompensation

Attribute Assessed	Methods of Physician Compensation			
	Salary	Capitation	Fee-for-service	Case-based
Physicians have appropriate incentives to keep costs down	Low	High	Low	High
Physicians have appropriate incentives to provide optimal quality of care	Limited	Limited	High	Limited
Physicians have appropriate incentives to provide high quality of care	Limited	Limited	High	Limited
Patients are not denied access	High	Limited	Limited	Limited
Patients can exercise choice	Low	Limited	High	Limited
The payment system is easy to administer	High	High	Limited	Limited
The payment system requires a sophisticated information and cost accounting system	Low	Low	High	High

Source: summarizing material in (Chawla et al 1997)

With salary compensation, physician compensation is determined in advance without reference to services provided or patients treated. There is no connection between compensation and cost-effective treatment. As previously discussed, FFS compensation directly links delivery of services to physicians' income, which rewards the delivery of services whether they are cost-effective or not. Capitation compensation arrangements tie physician compensation to a roster of enrolled patients. The capitation payment is determined in advance (and may be adjusted to reflect demographics and geographical factors) and does not depend on treatments delivered (although it may be reduced if enrolled members seek treatment from other physicians). Effectively the physician's income is determined in advance, regardless of whether any services are rendered, so there is no compensation incentive to render services, especially ones that are not medically necessary (except perhaps the incentive to offer services that will prevent the

requirement of more complicated and time-consuming treatment in the future). Case-based compensation plans categorize treatments by case-type, so that reimbursement is in respect to the case, based on pre-determined formulae, regardless of the number of services actually rendered to provide treatment. As such there is no incentive to recommend treatments that are not medically necessary. However, evidence of "case creep" has been observed, i.e., the tendency of physicians or of hospitals to categorize cases at a more serious, complex case level which is subject to higher reimbursement (Carlsson et al 2002).

Let us examine some of the advantages and disadvantages of the capitation system. Of the four methods of physician compensation, it appears best-suited to eliminate SID and it is being introduced, in certain circumstances, by Ontario and a number of provinces. Some of the advantages are:

- The cost of care can be readily determined in advance. One knows the number of units (i.e., enrolled patients), and their relevant characteristics, on which compensation is to be based, and once the capitation rate is set, the costs are established.

- Since physicians are not incented to provide services that are not medically necessary, they may be more inclined to provide a better mix of services, which is more beneficial to society and more economically efficient, e.g. more preventative and fewer curative services.

- Since physicians' incomes are based on their roster of patients, they will wish to maintain the number enrolled. However, if patient care is neglected in a current year, it can have adverse implications subsequently, for the physician's income, such as by having the patient cease enrollment or by having the patient become more seriously ill later requiring more intensive treatment. Hence, there is an incentive for the physician to provide preventative medicine, nutritional counseling, health education, etc. Such services in turn may reduce the overall burden on the health care system.

Some of the disadvantages include:
- It places all the risk for patient care on the physician. Although average cost per capita for the whole population may show a relatively small annual variation, when costs are examined for smaller rosters of patients, the variations will be more significant. Newhouse et al (1997) state that it appears that only about 20 –

25 percent of the variance in actual annual spending can be explained prospectively through knowledge of an individual's health and health spending in the prior few years, the remaining variance is, by definition, random.

- Faced with the risks described above, physicians may try to enroll only those patients whom the physician anticipates is likely to have lower service requirements than the capitation payment. This results in "cream skimming" and the potential exclusion of certain patients, such as the chronically ill.

- Since the physician is not compensated for services delivered, the physician may under-serve the patients such as by delaying appointments, shortening length of visits, prescribing drugs in lieu of more physician-intensive treatment. This may be detrimental to the health status of patients and may increase the health costs to the system (but not necessarily the physician) at a later date.

- Not all services can be covered by capitation, e.g., emergency treatment and certain surgeries, so the model does not stand on its own. Moreover, it can become complicated to administer and potentially unfair if the patient seeks services from other physicians and a system of charge backs, or negation, is imposed.

Ontario and a number of other provinces are moving toward reform of delivery of primary care services incorporating a capitation compensation component. Some positive aspects of this reform are the formation of provider care groups or networks able to provide some form of care on a 24/7 basis, accompanied by a standard [guarantee] of access to care. Aggregations of providers, instead of sole practitioners, are also better able to bear the risk of adverse fluctuations in medical care costs relative to the annual capitation payments. Moreover, these care groups will be staffed by physicians, nurses and other professionals which should provide for a better matching of the skills of the professionals delivering care to the skills required, which should increase economic efficiency.

At this stage, implementation is primarily voluntary. Providers are forming groups and creating patient rosters. The province is providing financial support to subsidize the costs associated with group formation. Hurley et al (1999) endorse a gradual approach, "Take a middle path based on clear articulation of the system ultimately envisioned and an unequivocal decision to implement reform, but one allowing gradual implementation

starting with those most eager to adopt the new approach and with the services that are best understood". This advice to implement gradually is warranted. When changing compensation methods substantially for physicians throughout the province it is likely that some physicians' incomes will be reduced (because it is highly unlikely that for each physician, the payment for services actually rendered on a FFS basis in the prior year will exactly correspond to the aggregate capitation income in respect of the physician's enrolled patients in the year of switch-over). As previously mentioned, experience in Colorado which Rice has described provides a warning of the behavioural response that may accompany any (perceived) reduction in income.

However, voluntary implementation is unlikely to be successful in achieving the desired cost savings. With voluntary enrollment, there is an incentive to enroll the individuals in better health and exclude or dis-enroll those in poor health or with chronic conditions. Moreover, the capitation system will be most effective in controlling costs if the physician groups are able to act as gatekeepers. This is best accomplished if all patients are enrolled with a physician group and if the patient must attend his or her physician group first when seeking care, except in permissible exceptional circumstances, as is the case in the UK National Health Service (Hausman and Le Grand 1999). With a voluntary system where not all patients are enrolled, such control is not possible.

Furthermore, not all services can be suitably compensated on a capitation basis. Hutchison et al (1999) recommend "that for enrolled populations, capitation funding be blended with other funding streams". While it is easy to agree that blended funding may be more appropriate, it adds significant complexity and accompanying administrative cost. Is such complexity and expense warranted?

In a previous subsection, it was argued that SID exists and that FFS provides an incentive for SID. However, what has not been established is the cost to the system of SID. Grignon et al (2002) concluded "Canada does not appear to have a serious problem of controlling health care costs". That being the case, is it worth disrupting the current system? Many physicians enjoy and are accustomed to the FFS model of private practice. Changing their compensation method may have an adverse impact on their incentive to work. For example, Gaynor and Gertler (1995) state "that changing the method of physician payment from fee-for-service to capitation will dramatically reduce physician effort". Moreover, requiring physicians to work in groups with other professionals will create new dynamics and in some cases will provide incentives to free ride. Discussing the organization of General Practitioners (GPs) into Primary Care Groups (PCG) in the

UK, Hausman and Le Grand (1999) observe: "PCGs…are unlikely to bring about appreciable savings in administrative costs…It seems likely that there will be significant conflicts of interests among the GPs within each PCG, which will be costly to overcome."

In conclusion, the changes, to create primary care groups which will provide 24/7 care by employing a broader mix of professionals, are laudable because they should improve the responsiveness of the system and achieve greater economic efficiency. However, these outcomes are achievable without implementing a system of capitation. As noted above, capitation places the financial burden of random annual variance in costs on the physicians, and this variance is significant. Faced with such financial risks it is reasonable to expect a behavioural response from physicians and the market place, such as cream skimming, dis-enrollment of less healthy patients, higher fees for practice insurance. Capitation[8] might be used at a province-wide level to determine the prospective funds available for services, where the annual variance in cost can be borne by all physicians or shared with the (taxpayers in the) province; however I suggest that services be delivered on a FFS or salary basis, with volume modifiers. As Mooney (1994) notes, there are alternative fee structures that could be used. Permitting physicians and their medical associations to develop fee structures within an overall budget determined on a province-wide capitation basis is more likely to avoid undesirable behavioural responses.

As capitation is being introduced with primary care reform, in Ontario and many other provinces, gradually and without complete (mandatory) participation, it is unlikely to achieve fully its cost reduction objectives, due to cream-skimming, dis-enrollment of the chronically ill, etc.; however, it may carry a heavy cost associated with addressing behavioural reactions such as reduced work incentives or "workarounds" through cream-skimming, dis-enrollment, etc. In this author's view, the anticipated cost savings will not compensate for the costs associated with the behavioural responses to the disruption of the system. Capitation, using this approach to implementation, would be better avoided.

Areas For Further Research

There are many topics relevant to the subjects discussed in this paper which could not be addressed in full, if at all. A number of areas for further consideration include:

- Alternative methods to quantify quality other than using DALE or life expectancy. It would be desirable to find a quantitative measure which incorporated responsiveness and also incorporated a measure of equity.

- How an aging population will affect productivity growth, labour force participation rates and GDP growth.

- How to model growth in health care costs for an aging population to incorporate the possibility of health status improvement.

- An analysis of how to separate needed services from wanted services and how to curb excessive consumption while maintaining open access on the basis of need.

- The impact of parallel private insurance systems for mandated covered care and whether such systems are workable and if so in what circumstances.

- The extent of SID, if it exists.

- How access to services based on time (i.e., ability or willingness to wait) may encompass some of the same disadvantages as access to services based on willingness-to-pay, and how this might be addressed.

CONCLUSION

This paper has shown that if costs per DALE can be maintained at 2005 levels, then on the basis of various assumptions regarding GDP growth, regardless of the population distribution in 2031, health care costs as a percentage of GDP will be at or below the level of 2005.

The paper shows that Canada's health care system is not as efficient as it could be, either absolutely or relative to other countries. However, there are certain structural characteristics that may limit Canada's ability to become more efficient, namely, the sharing of responsibility for health care among governments, Canada's vast sparsely inhabited areas, and the need for special treatment of Canada's native people.

The paper describes the adverse consequences of implementing cost-sharing for medically necessary services in any attempt to control costs and reduce excess demand. It recommends against the implementation of cost-sharing.

It is likely that SID exists. Its elimination would make the system more economically efficient. However, the implementation of a capitation system of physician reimbursement as a response to SID may face too many implementation issues for it to achieve its objectives without creating adverse consequences, such as behavioural responses by physicians to work less.

In summary, the Canadian system is not perfect from an efficiency perspective. Changing demographics will impose cost pressures on the system; hence, it will be important to maintain cost control. However, with appropriate cost control in combination with reasonable growth in GDP, the cost of health care as a consequence of changing demographics is affordable. The prospect of demographic change should not be used as an excuse to shock the system with dramatic cost control measures.

APPENDIX A - MODEL ASSUMPTIONS AND METHODS

Population Data – from Statistics Canada Catalogue No. 91-520-XIE – July 1, 2005 population projection as the starting point and 3 population projections for 2031 representing low growth (Scenario 1), medium growth (Scenario 2), and high growth (Scenario 6). Population growth is dependent on assumptions regarding fertility, mortality and net migration. A summary of key assumptions made by Statistics Canada follows:

Component	Low Growth	Medium Growth	High Growth
Fertility	1.3 children/woman	1.5 children/woman	1.7 children/woman
Male life expectancy	81.1 years	81.9 years	82.6 years
Female life expectancy	85.3 years	86.0 years	86.6 years
Immigration rate	5.5 per 1,000	7.0 per 1,000	8.5 per 1,000
Emigration rate	1.5 per 1,000	1.5 per 1,000	1.5 per 1,000

Employment Rates – from Statistics Canada Catalogue No. 71-001-XIE – these rates are applied to the population data for age ranges 15 – 64 to estimate the size of the employed labour force. It is assumed that the same employment rates by age-sex will apply in 2031.

GDP – 2005 figures from The Economist Pocket World in Figures 2006 Edition
- GDP per employed person for 2005 is calculated
- GDP in 2031 is calculated by applying a constant annual rate of GDP growth to the GDP per employed person for 2005 and multiplying by the projected number of employed persons in 2031. Two constant annual rates of GDP growth are used:
  1. 1.36% which is the historical average annual rate of productivity growth in the total Canadian economy, as measured by GDP per hour, for the period 1981 – 2003, as quoted by Andrew Sharpe in Future Productivity Growth in Canada and Implications for the Canada Pension Plan, p. 16
  2. 1% to illustrate a lower growth assumption (selected by the author)

DALE – projected life expectancy from Statistics Canada Catalogue No. 91-520-XIE reduced by 7 years, a relationship identified by the World Health organization (or 5 years in the scenario of health improvements resulting in increased DALE)

Health Costs – (a) the "basic health factors" by age-sex range are from The Health of Canadians – The Federal Role Volume Six: Recommendations for Reform, p. 83, and represent the age-sex factors applied for payment for rostered patients in respect of a basket of 57 common primary care services

4. these factors are applied to the 2005 and 2031 population projections to determine the expected change in health care costs due solely to demographic changes
5. to illustrate the impact of improving health status, the factors are modified by repeating the factors for ages 15 – 19 for ages 20 – 24 and shifting all other higher age factors to the next higher age range
6. to illustrate the impact of improving health status when the adjustment to life expectancy for DALE is assumed to be 5 years, the factors in 2. are modified by repeating the factors for ages 45 – 49 for ages 50 -54 and shifting all other higher age factors to the next higher age range

(b) the 2005 health care costs of 9.6% of GDP are from The Economist Pocket World of Figures 2006 Edition. This figure is converted to an average cost per DALE in 2005. The health care costs in 2031 are projected as the average cost per DALE in 2005 multiplied by the ratio of average "basic health factor" for 2031 to 2005 multiplied by the projected aggregate DALE for the population in 2031. This figure is divided by projected 2031 GDP to provide projected health costs in 2031 as a percentage of GDP.

(c) it is assumed that there is no change in relative purchasing power for health care services between 2005 and 2031. The health care expenditures in 2005 converted to purchasing power in U.S. dollars are from The Economist Pocket World of Figures 2006 Edition.

Quality-adjusted Health Expenditure (QAHE) – calculated as aggregate health care expenditure in U.S. dollars (based on the purchasing power parity measure in (c) above) divided by aggregate DALE for the population.

END NOTES

1. A version of this paper was prepared for a reading course in health economics under the supervision of Dr. Lori Curtis. The author wishes to thank Dr. Curtis for her guidance and also to thank Professor Robert L. Brown for his suggestions on reading the paper.

2. The baby-boom generation in Canada is considered to be those born between 1946 and 1965, although some writers end it at 1964.

3. For a discussion of the projected impact of the baby-boomers on retirement costs, see, for example. Andrews, Doug, The Impact Of The Equity Risk Premium and Population Aging On The Canadian Retirement Savings System

4. This author has seen this measure referred to as cost-effectiveness efficiency.

5. For a fuller discussion of need, see Culyer, A.J., Need, Values and Health Status Measurement and Williams, Alan, 'Need' – an Economic Exegesis in Culyer (1978)

6. Since the initial "demand" usually comes from the patient, Mooney (1994) suggests that Supplier-Induced Need (SIN) is a more accurate term than SID. Although I agree with this subtle distinction, SID is widely used in the literature and will be used here.

7. When opportunity costs associated with time for waiting, travel and recovery are considered, the price of service may not be perceived as zero even though there is no out-of-pocket charge at point of service.

8. Ideally, the capitation rate used would be set on a needs basis. Given that automobile licenses and emission tests can be mandated at regular intervals, why might not annual physical examinations and certain diagnostic tests be mandated in order to assess the health status and health needs of the population? See Hurley et al (2004) for a discussion of some of the challenges in developing needs-based formulae.

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