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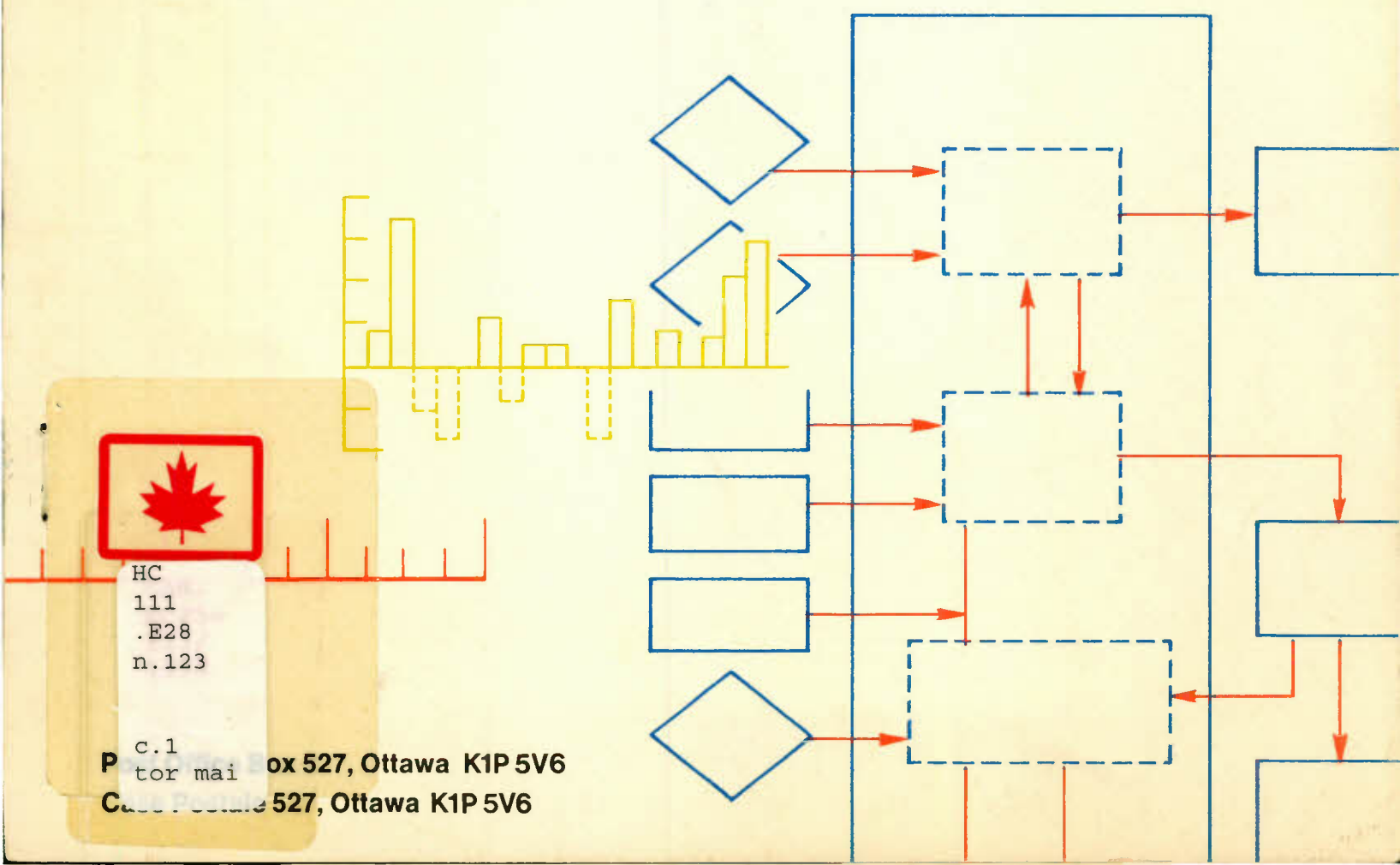

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DISCUSSION PAPER NO. 123

Health Expenditures in Canada and the Impact of Demographic Changes on Future Government Health Insurance Program Expenditures

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and
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RÉSUMÉ

Le secteur des soins de santé au Canada s'est caractérisé depuis le début du siècle, et surtout depuis l'instauration des régimes publics d'assurance-médicale et d'assurance-hospitalisation, par une intervention croissante du gouvernement et par une augmentation considérable des dépenses. Cette situation n'a pas manqué de susciter de l'inquiétude tant dans les milieux gouvernementaux qu'ailleurs. Dans le but de présenter des renseignements pertinents à la prise de décisions dans ce domaine, le présent document donne une vue d'ensemble sur les tendances qui ont marqué, dans le passé, les dépenses de santé au Canada, pour ensuite discuter de l'incidence éventuelle de l'évolution démographique sur ces mêmes dépenses, dans le cadre des régimes d'assurance-médicale et d'assurance-hospitalisation.

Ce document se divise en deux parties. Il examine d'abord l'évolution des dépenses de santé et présente un court historique des moments les plus importants où l'Etat s'est engagé dans le secteur de la santé. A l'époque coloniale, l'intervention publique se limitait généralement aux cas d'épidémies. Après la Confédération, l'intervention du gouvernement a augmenté de façon graduelle, d'abord au niveau municipal, ensuite aux niveaux provincial et fédéral. En 1972, tous les Canadiens bénéficiaient de deux régimes publics d'assurance-santé: l'assurance-médicale et l'assurance-hospitalisation. L'effet immédiat de ces régimes a été d'accroître fortement la part des dépenses publiques, et aussi le pourcentage du PNB, consacrée à la santé. Toutefois, une analyse des tendances récentes révèle que le taux de croissance des dépenses de santé, publiques et privées, a considérablement ralenti depuis 1970. A titre d'exemple, les dépenses globales au chapitre de la santé, exprimées en pourcentage du PNB, sont passées de 5.6% en 1960 à 7.1% en 1970, et se sont depuis lors stabilisées à ce niveau. Une comparaison, à ce titre, entre la croissance de nos dépenses avec celles des Etats-Unis et d'autres pays développés révèle que les nôtres n'ont pas augmenté de façon démesurée ces dernières années. Néanmoins, l'inquiétude souvent exprimée à l'égard des sommes dépensées n'est pas sans fondement. Trois catégories de facteurs qui contribuent à expliquer ces préoccupations font ici l'objet d'un examen: (1) les facteurs qui ont trait à la nature même du secteur des soins de santé; (2) ceux qui se rapportent aux préoccupations politiques des gouvernements; et (3) ceux qui s'expliquent par l'évolution dans la composition démographique du pays.

Le second chapitre présente, jusqu'en 2031 et pour l'ensemble du Canada, des projections sur les dépenses de santé relevant de l'Etat (en vertu des régimes d'assurance-médicale et d'assurance-hospitalisation) en partant de l'hypothèse que les changements qui affecteront de manière la plus sensible les dépenses de santé seront les modifications dans la taille et la

structure d'âge de la population. Suite à l'analyse des trois composantes de base de l'évolution démographique (soit l'espérance de vie, la fécondité et l'immigration), les auteurs présentent deux scénarios, l'un de forte et l'autre de faible croissance démographique. Ces scénarios indiquent que le vieillissement relatif de la population représentera un phénomène important à l'avenir, dont l'incidence sera d'ailleurs plus prononcée selon que le taux de fécondité sera plus ou moins faible. Les auteurs présentent ensuite un modèle de projection de dépenses de santé touchant les régimes d'assurance-médicale et d'assurance-hospitalisation; selon ce modèle, une forte croissance démographique conduira à un plus fort volume de dépenses de santé de caractère public qu'une faible croissance démographique, toutefois cette dernière entraînera des coûts plus élevés par habitant. Il en ressort également que les pressions démographiques sur ces dépenses publiques seront plus importantes dans le proche avenir qu'à plus long terme. Une analyse de sensibilité des résultats démontre que l'évolution des profils d'utilisation pourrait contribuer grandement à réduire les dépenses des gouvernements dans ce domaine. Enfin, la comparaison entre la croissance projetée des coûts par habitant et celle du PNB indique qu'à l'avenir, le gouvernement pourrait disposer d'une marge de manoeuvre dans la répartition des fonds entre la santé et d'autres domaines d'intérêt public.

Dans leurs conclusions, les auteurs font quelques recommandations en vue d'augmenter l'efficacité dans le secteur de la santé.

ABSTRACT

The health care sector in Canada, since the beginning of this century and especially with the establishment of the public medical care and hospital insurance programs, has been characterized by growing interventions of governments and by a notable increase in expenditures. This situation has caused some concern in government circles and elsewhere. In order to provide some information relevant to decision-making in this area, this paper presents an overview of past trends in health expenditures in Canada and of the possible impact of future demographic developments on expenditures under the medical and hospital insurance programs.

The paper is divided in two chapters. The first one looks at the evolution of health expenditures, and presents a brief historical review of the major steps through which governments became deeply involved in the field of health. Government intervention in the colonial era was limited largely to efforts during the outbreaks of epidemics. After Confederation, government intervention increased gradually, first mainly at the local level, and then at the provincial and federal levels. By 1972, all Canadians were covered by both the medical care and hospital insurance programs. The initial impact of these programs was to augment substantially the share of government expenditures devoted to health, as well as to increase health expenditures as a percentage of GNP. However, an analysis of recent trends shows that the rate of growth of public and private health expenditures has slowed considerably since 1970. For example, total health expenditures as a percentage of GNP rose in Canada from 5.6 per cent in 1960 to 7.1 per cent in 1970, but stabilized thereafter around this level. Comparisons of the growth of health care expenditures are made with the United States and with other developed countries, and the conclusion emerges that our health care expenditures have not grown inordinately in recent years. Nonetheless, reasonable concern is frequently expressed about the amount of money spent on health. Three categories of factors that help explain this concern are discussed: (1) factors to do with the nature of the health services sector; (2) factors related to the political preoccupations of governments; and (3) factors related to changes in the demographic composition of the population.

In the second chapter, government-insured health expenditures (under the medical care and hospital insurance programs) are projected to 2031 for Canada for the case in which the only changes significantly affecting these expenditures are the changes in the size and age structure of the population. After analyzing the three basic components of demographic change (life expectancy, fertility, and immigration), a high growth demographic scenario and a low growth demographic scenario are selected. These scenarios indicate

that the relative aging of the population will represent an important phenomenon in the future, and the impact will be more pronounced the lower the fertility rate. A model of projections of health expenditures related to the medical care and hospital insurance programs is then presented; the results of employing this model suggest that high demographic growth will lead to higher government-insured health expenditures than low demographic growth, but that low demographic growth will lead to higher per capita costs. It is also shown that demographic pressures on government-insured health expenditures will tend to be stronger in the near future than in the more distant future. Sensitivity analysis of the basic results shows that changes in consumption patterns could have a substantial impact in reducing government-insured health expenditures. Finally, a comparison of the projected growth of per capita costs relative to the projected growth of GNP suggests that there could be some future margin of flexibility in the allocation of government funds between health and other concerns.

In the conclusions, some suggestions for improving efficiency in the health sector are put forward.

ACKNOWLEDGEMENTS

We are grateful to David Henderson for the valuable comments he has made throughout the course of this study, to Bryan Boulier, David Bloom and Lilian Buchanan for contributing ideas relevant to certain parts of the paper, to Dr. K.S. Gnanasekaran and Miss J. Perrault of Statistics Canada for providing the demographic projections, to Gilles Longtin for undertaking computer calculations and the preparation of tables, and to Jocelyne Parisien and Rita Sunstrum for typing with care several versions of the text. The authors, however, remain responsible for any errors or omissions that might remain in the paper.

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Introduction

With the establishment of public hospital and medical care insurance programs, the relative importance of governments in the health services sector has increased significantly. For instance, in 1948, one year after the first public hospital insurance plan was introduced in Saskatchewan, governments in Canada were responsible for 47 per cent of hospital expenditures. In 1961, after all the provinces had joined the hospital insurance program, the share of the public sector in these expenditures had increased to 88 per cent. The medical care insurance program was established in all ten provinces over the period 1961 to 1972. Partly as a result of this, the share of the public sector in total health expenditures rose from 43 per cent to 73 per cent between 1960 and 1972.

Because of the increasing involvement of governments in the health sector, the share of health in their respective budgets has obviously risen substantially. While in 1955 expenditures related to health accounted for 18.9 per cent of the total budgets of provincial governments, they accounted for 25.2 per cent of their budgets in 1975. The increase was also rapid in the case of the federal government, from 1.2 to 7.4 per cent during the same period, while the share of health remained approximately the same (between 4 and 5 per cent) in the case of local governments.

This rapid growth in the amount of resources devoted to health has been the subject of some preoccupation by the governments recently, especially at the provincial level, and

it is the purpose of this study to shed some light on this matter through a look at past expenditures on health in Canada, and at possible future trends in expenditures under the medical care and hospital insurance programs.

In this first chapter, we will first present a brief historical review of the major steps by which governments became involved in the provision of health services. We will then look more closely at some quantitative measures of the importance of the health services sector in Canada by analyzing past and present trends and by comparing the Canadian situation with the situation in other developed countries, with special emphasis on United States. Probably the major finding of this exercise is that, despite the rapid growth mentioned earlier, there has been a clear tendency for health expenditures, as a percentage of the Canadian gross national product, to level off since 1970. Furthermore, when compared to the United States and other countries, the relative health effort in Canada does not seem to be excessively large. This seems to indicate that the concern frequently expressed about the growth of health expenditures is at least partly exaggerated. However, there are still a number of factors that justify or at least explain this concern and these will be discussed at the end of Chapter 1.

Among the factors that will influence the consumption of health services in Canada in the years to come, the change in the demographic composition of the population is probably among the most important. Thus, in the second chapter, we will make certain projections of the future consumption of

health services in Canada under the medical care and hospital insurance programs. These will cover the next 50 years or so, and will use two alternative demographic scenarios, one of "low" population growth and one of "high" population growth. Then, we will evaluate the margin of flexibility that will remain to the governments in the control of the growth of the health services sector, after taking into account the constraints related to the demographic changes. Finally, in the conclusion of this study, some of the ways by which the growth of the health services sector could be restrained in the future will be suggested.

Chapter 1: Governments and the Growth of Health Expenditures: Past Evolution

1.1 Historical Review[1]

1.1.1 Events Leading up to the Establishment of the Hospital Insurance Program

State intervention in health establishments in the colonial era in Canada was limited to outbreaks of epidemics. The appearance of a serious cholera epidemic in 1832, after the arrival of a large contingent of Irish immigrants, was the occasion of the first general public hygiene measures. Local hygiene offices were set up in order to bring the epidemic under control. But these offices were not permanent and, once the epidemic was over, their activities ceased. A similar scenario was repeated in 1847, 1849, 1854 and 1865.

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1 This historical review was drawn up with the help of the following works:

C.H. Berry, *Voluntary Medical Insurance and Prepayment*, Royal Commission on Health Services, Ottawa, 1965.

E.S.L. Gowan, *Voluntary Health Organizations in Canada*, Commission on Health Services, Ottawa, 1966.

J.E.F. Hastings and W. Mosley, *Organized Community Health Services*, Royal Commission on Health Service, Ottawa, 1966.

Health and Welfare, Canada, *Review of Health Services in Canada*, December 1976.

Report of the Committee on the Healing Arts, Volume 1, Toronto, 1970.

J-Y. Rivard, G. Blain, J-C. Martin, and Y. Taylor, *L'évolution des services de santé et des modes de distribution des soins au Québec*, Commission d'enquête sur la santé et le bien-être social, Gouvernement du Québec, 1970.

Royal Commission on Health Services, Volume 1, Ottawa, 1964.

Royal Commission on Health Services, Volume 2, Ottawa, 1964.

The passage of the Public Health Act in 1875 in Britain exerted a very clear influence on Canada. Beginning with Ontario in 1884, each province passed an act on public health inspired basically by the British act. These required each municipality to set up a local health office and appoint a physician-hygienist and a hygiene inspector. As the West was opened and new provinces joined Confederation, hospitals were established, some of which were built and operated by municipalities or groups of municipalities. Moreover, at this time, except in Quebec, asylums for the mentally ill fell under provincial authority. To these were added sanatoriums built either by the provincial governments or by philanthropists.

In 1916, Saskatchewan passed the Union Hospital Act allowing municipalities to set up hospital districts for the construction and maintenance of hospitals. A legislative measure the following year gave the municipalities the right to levy taxes in order to finance a hospital care plan for most if not all of their inhabitants. Manitoba and Alberta also established municipal hospitalization programs in the 1920s.

Following the report of the Rowell-Sirois Commission presented in 1940, the federal government created an advisory board on health insurance in 1942 which presented its report as well as a proposed bill on health insurance to the special house committee on social security the following year. A form of health insurance based largely on the work of the advisory board

was added to the federal proposals presented at the Federal-Provincial Conference on reconstruction held in 1945. These proposals included the granting of subsidies to the provinces in order to assist them in administering a full program of health insurance to be introduced gradually on a national basis. Following a subsequent Federal-Provincial Conference on this subject in 1946, the federal government's proposals were rejected. The Conference was dissolved because of basic differences of opinion between Ottawa and the provinces on financial relations and on the principle of provincial autonomy.

But this was not the first evidence of federal interest in this economic sector since, as early as 1925, a motion in the House of Commons had authorized the Standing Committee on Industrial and International Relations to prepare a report on insurance against sickness.

In another area, the Federal Parliament had also passed an act in 1935 on investment and social insurance that authorized an administrative commission to gather information on any proposal designed to provide, on a collective or cooperative basis through insurance or otherwise: 1) medical, dental and surgical care including medications, pharmeceutical products, accessories or hospitalization, or 2) compensation for the loss of wages caused by ill health, accident or sickness. This act, after being submitted to the Supreme Court of Canada, was judged unconstitutional, and this decision was later upheld in appeal by the Privy Council in London.

During this time, Saskatchewan had decided to act alone and passed the Saskatchewan Hospitalization Act which took effect in 1947 and represented the first compulsory program in Canada sponsored by a province that guaranteed hospital care for the entire population of the province.

In 1948, the federal government again took the initiative with a program of *national health subsidies*. These subsidies covered the establishment of surveys on health, a share of the costs of building hospitals and certain public hygiene services.

In 1949, British Columbia and Alberta implemented their own hospitalization insurance programs. While the British Columbia program differed little from Saskatchewan's, Alberta's plan, begun on July 1, 1950, was based on the already existing municipal hospitalization plans administered by municipal boards, and thus did not apply to the entire province.

When Newfoundland entered Confederation in 1949, it already had some 15 years' experience in this field. Its subsidized hospital services program (Cottage Hospital Service) provided the services of salaried doctors to approximately one-third of the population.

In 1955, with the wide-spread interest in the issue of health insurance, the provinces called for a discussion of the subject at the Federal-Provincial Conference. At this time, the Prime Minister declared that the federal government was ready

to provide financial assistance for health insurance plans. Consequently, in January 1956, the federal government presented concrete proposals to the provinces on health insurance, providing for the establishment of a program of health insurance applied in stages and giving priority to hospitalization insurance and diagnostic services.

The first federal act containing all these proposals was the Hospitalization Insurance and Diagnostic Services Act of 1957 which split cost of hospital services for the insured between Ottawa and the provinces.

Four provinces -- Newfoundland, Saskatchewan, Alberta and British Columbia -- already had their own hospitalization insurance program. They signed corollary agreements on July 1, 1958, along with Manitoba, while Prince Edward Island, Nova Scotia, New Brunswick and Ontario followed in 1959, the Northwest Territories and the Yukon in 1960 and Quebec in 1961.

For the evolution of events described above, we can follow the relatively more recent changes in the share of the public sector in hospital expenditures. Between 1948 and 1958, the share of public funds increased from 47 per cent to 59 per cent of total hospital expenditures. In 1959, due largely to the entrance of Ontario in the hospital insurance scheme, it increased to 78 per cent, and in 1961, when Quebec joined the program, it was 88 per cent.[2]

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2 See Table A-1 in Appendix A.

1.1.2 Events Leading up to the Establishment of the Medical Insurance Program

The first government intervention in the field of medical insurance occurred in 1914. During this year, the rural municipality of Sarnia, Saskatchewan instituted a form of medical insurance by paying a premium to physicians to encourage them to practice in the region. The experiment was so successful that two years later the province passed an act on rural municipalities allowing them to levy a property tax to provide a residence premium for general practitioners, who were also responsible for public hygiene services in the region. A hundred or so of these programs were in operation by 1946. Similar programs on a smaller scale were also adopted in Manitoba in 1921 and Alberta in 1926.

Over this same period, three provinces saw fit to provide medical care for the poor. In 1931, British Columbia passed legislative measures aimed at insuring welfare recipients for most forms of medical care. In 1932, Ontario persuaded its municipalities to participate voluntarily in a program of medical insurance for the poor and in 1935 made the system compulsory for all municipalities. Finally, the 1945 Saskatchewan Health Services Act provided a complete range of health services to welfare recipients. The benefits included hospital, dental, medical and pharmaceutical services.

But the most important government program of medical insurance during this period was the Saskatchewan program known as the Swift Current Health Region Program. Created in 1946, it

provided the 54,000 inhabitants of the region with an entire range of medical services at home, at the physician's office and at the hospital. In addition, a complete program of dental care was offered to all children under 16 years of age. This plan was financed by compulsory personal income tax, property taxes and provincial subsidies.

In 1947, a program of medical insurance was established in Alberta for welfare recipients. During the following decade, similar plans appeared in the six other provinces which had previously been without such plans, so that by 1958 all provinces had a complete program of state medical insurance for welfare recipients.

Thus, over that period, complete coverage of medical care needs was limited mainly to welfare recipients. It was only in 1962 in Saskatchewan that the first Provincial Medical Insurance Program appeared. The following year, Alberta regulated contracts sold by private medical insurance companies and set limits on premiums. A program of partial subsidies from public funds was also set up to help those who could not pay the full premium. By the end of 1966, over 70 per cent of the Alberta population belonged to this insurance system.

In 1965, the medical insurance program of the British Columbia government offered individual insurance to residents of the province when the single private insurer failed to provide this type of insurance on a non-profit basis. A program of partial subsidies was also created, but welfare recipients were insured separately on the basis of a lower premium scale.

Ontario's health insurance program (1966) evolved in practically the same way except that it covered most of welfare recipients, who received the same benefits. In 1967, Alberta adopted a similar plan administered by a provincial body.

Then during the summer of 1965, a federal proposal based on the recommendations of the Hall Commission was presented at a Federal-Provincial Conference. The Prime Minister proposed the universal application of a full program of medical services which would be administered by the public sector and whose benefits would be transferable between provinces.

Once the provinces had given their assent, the federal government was prepared to reimburse provinces which applied a medical insurance program for half of the average cost per capita of the services covered provided they adhere to certain basic principles. The federal act on health care, which incorporated these principles, was passed in 1966 and took effect on July 1, 1968. Saskatchewan and British Columbia agreed to implement the program as soon as it took effect. Newfoundland, Nova Scotia, Manitoba, Alberta and Ontario joined in 1969, Quebec and Prince Edward Island in 1970; New Brunswick and the Northwest Territories following in 1971 and the Yukon in 1972.

1.2 The Situation Over the Last Few Years

1.2.1 Recent Trends

In 1970, realizing the growing importance of the health services sector in the economy, the Economic Council devoted one chapter of its annual review to health.[3] In that chapter, it was anticipated that expenditures on *personal* health care could reach about 6.5 per cent of the gross national product in 1975, from a level of about 6.2 per cent in 1970. The latest data (see Table 1.1) show that, in fact, they were still at 6.2 per cent, i.e., lower than expected.

Table 1.1 below shows that, since 1970, health care expenditures have not increased at an excessive rate, contrary to much current belief. Between 1960 and 1970, *total* health care costs, as a percentage of GNP, rose from 5.6 per cent to 7.1 per cent, reflecting, in part, the extension of health care services to those who could not previously afford them. But from 1970 to 1976, health care costs as a proportion of GNP levelled off; this proportion was 7.1 per cent of GNP in 1975 (the same as in 1970), and about 6.8 per cent for 1976 (the latter is a preliminary figure). This means that health care costs over this seven year period did not increase at a greater pace than the economy's capacity to pay these costs. With respect to particular elements within the total, it can be seen that the costs of institutional care, as a percentage of GNP, were 3.6 per cent in 1970, 3.5 per cent in 1973 and 3.8 per cent

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3 Economic Council of Canada, Seventh Annual Review: *Patterns of Growth*, Ottawa, Queen's Printer, September 1970, Chapter 4.

Table 1.1

HEALTH CARE EXPENDITURES BY CATEGORY AS A PERCENTAGE OF THE GROSS NATIONAL PRODUCT, CANADA, 1960-75[1]

	Years							
	1960	1965	1970	1971	1972	1973	1974	1975
Total Health Expenditures (private and public)	5.62	6.07	7.10	7.36	7.19	6.84	6.73	7.12
Personal Health Care	4.62	5.11	6.15	6.37	6.28	5.97	5.84	6.22
Institutional Care	2.47	2.90	3.61	3.69	3.64	3.50	3.55	3.84
Hospitals[2]	2.18	2.59	3.25	3.28	3.22	3.09	3.12	3.34
Nursing Homes	0.29	0.31	0.37	0.41	0.42	0.42	0.44	0.49
Professional Services[3]	1.34	1.39	1.63	1.76	1.76	1.64	1.54	1.61
Physicians' Services	0.93	0.98	1.20	1.31	1.31	1.19	1.12	1.15
Dentists' Services	0.29	0.29	0.31	0.33	0.33	0.34	0.33	0.36
Other[4]	0.13	0.11	0.11	0.11	0.11	0.12	0.10	0.10
Drugs and Appliances[5]	0.81	0.82	0.91	0.92	0.88	0.83	0.75	0.77
Other Health Expenditures	1.00	0.96	0.94	0.99	0.92	0.88	0.88	0.89
Prepayment and Administration	0.15	0.16	0.11	0.13	0.13	0.12	0.12	0.12
Government Public Health	0.22	0.19	0.23	0.24	0.24	0.22	0.22	0.23
Other Health Services[6]	0.09	0.10	0.10	0.10	0.10	0.10	0.09	0.10
Research	0.03	0.06	0.08	0.08	0.08	0.08	0.07	0.07
Medical-Facility Construction	0.51	0.46	0.41	0.44	0.37	0.36	0.38	0.37

1. Current dollar basis.
2. Includes general and allied special hospitals, mental hospitals, tuberculosis sanatoria, and federal hospitals.
3. Expenditures relating to professionals employed in various institutions are included in institutional services.
4. Includes chiropractors, naturopaths, osteopaths, podiatrists, physiotherapists, and private duty and Victorian Order nurses.
5. Includes prescribed and non-prescribed drugs, eye glasses from optometrists and from opticians, hearing aids and parts, and other prostheses.
6. Voluntary organizations.

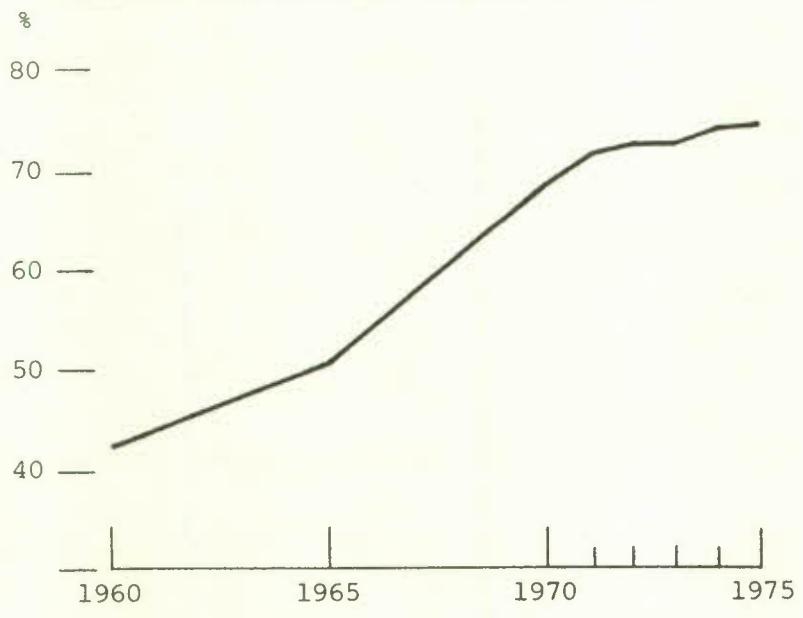
Source: Health and Welfare Canada, Health Economics and Statistics Division, preliminary unpublished figures.

in 1975, that the costs of professional services remained in the vicinity of 1.6 per cent, over this period and that the costs of drugs and appliances decreased from more than 0.9 to less than 0.8 per cent between 1970 and 1975.

While the share of governments in total health expenditures rose from 43 per cent in 1960 to 75 per cent in 1975 (see Chart 1.1), and while the proportion of health expenditures in government budgets also increased, we notice (see Chart 1.2) that this latter proportion which was 13.5 per cent in 1972 has been decreasing slowly but continuously to 12.4 per cent in 1975. It would not appear that the considerable involvement of governments in the health area has led, once established, to an excessive growth in the budgetary allocations to this area.

Chart 1.1

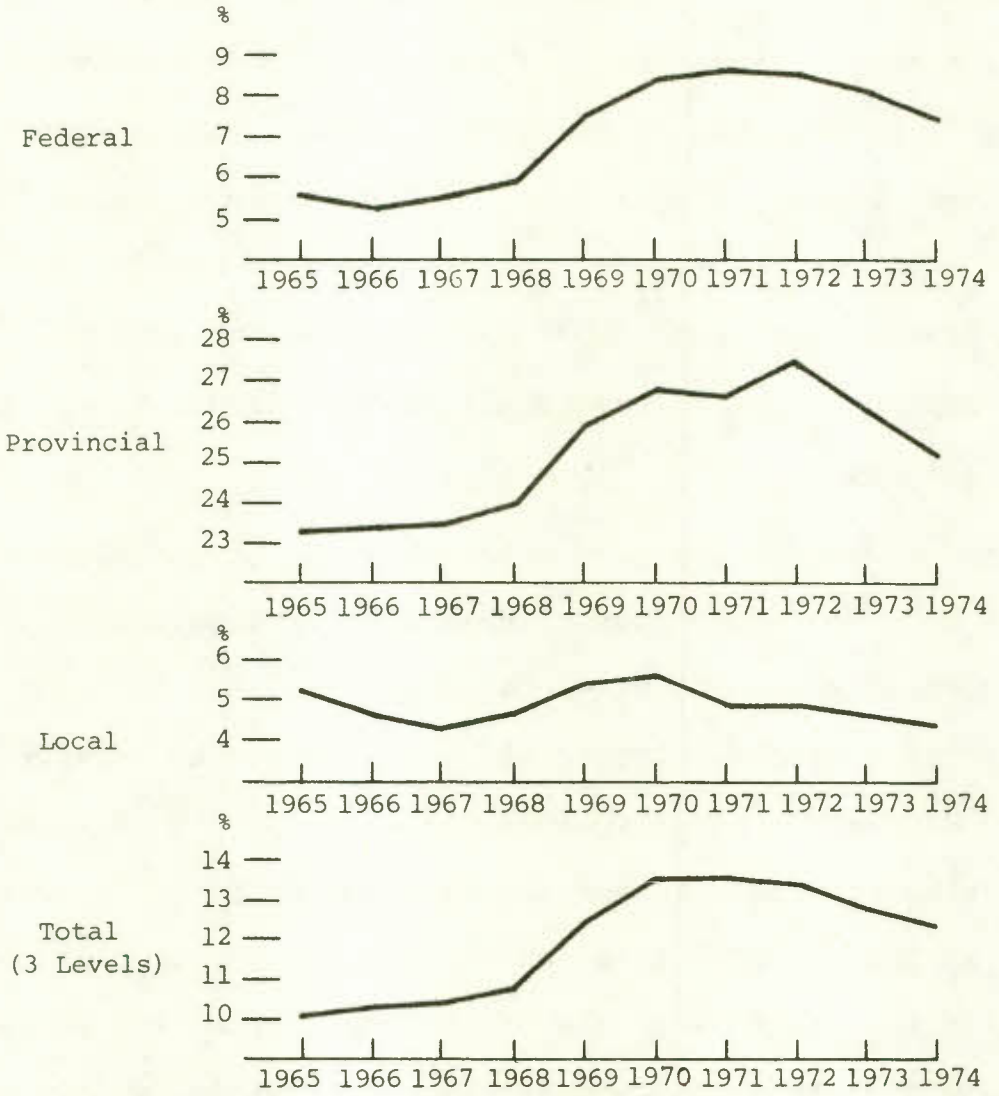
SHARE OF THE PUBLIC SECTOR IN TOTAL HEALTH EXPENDITURES, CANADA, 1960-1975



Source: Health and Welfare Canada, Health Economics and Statistics Division, Preliminary unpublished figures; see Table A-2 in Appendix A.

Chart 1.2

GOVERNMENTS' HEALTH EXPENDITURES,
AS A PERCENTAGE OF THEIR BUDGETS,
BY LEVEL OF GOVERNMENT,
CANADA, 1965-1974



Source: Public Finance Division, Statistics Canada, and estimates by the authors; see Table A-3 in Appendix A.

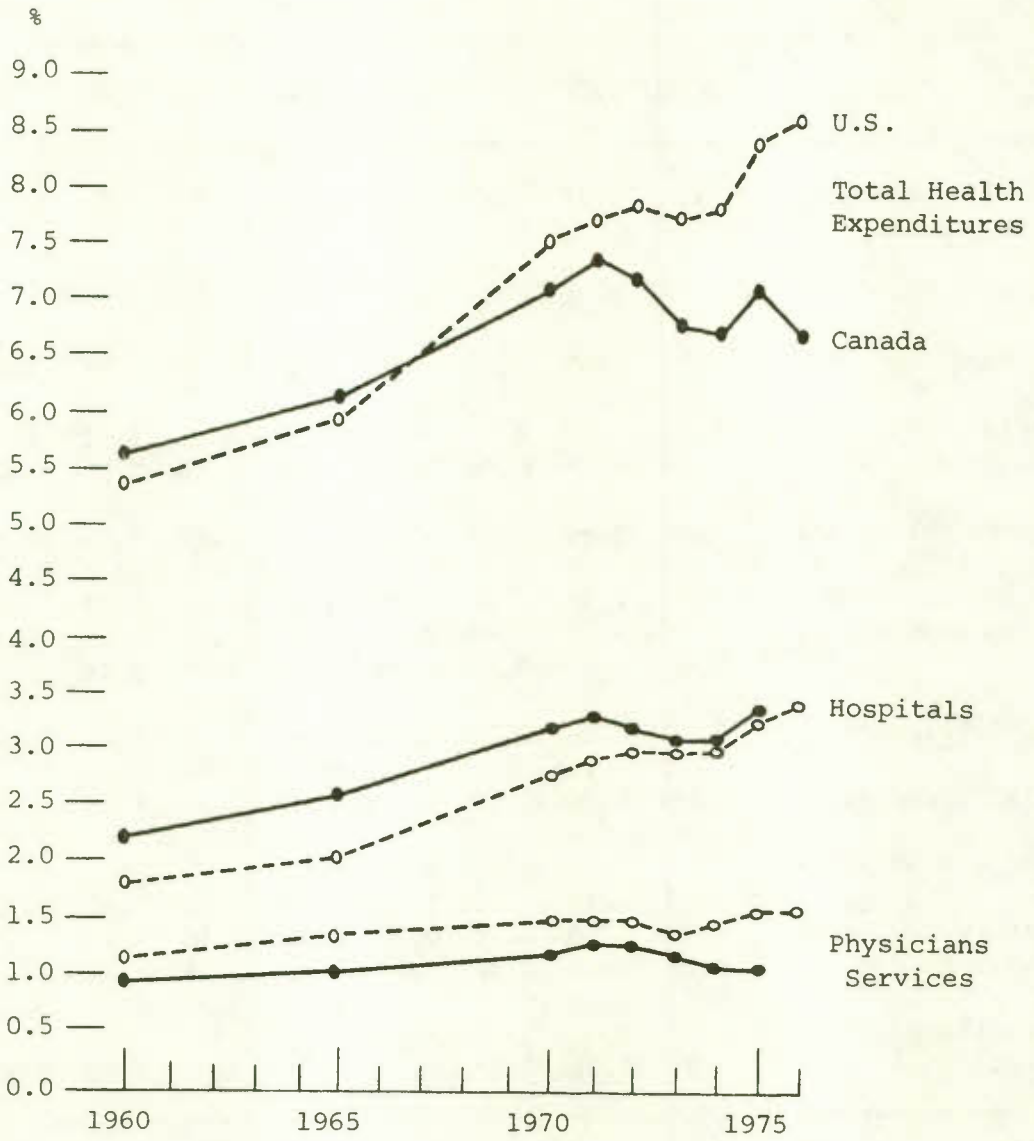
That the situation of health care costs in Canada is not as bad as is often thought is particularly obvious when we compare it with the situation in the United States. While Canada spent more of its GNP on health than the United States during most of the 60s, we can see that the trend has been reversed in

the 70s (see Chart 1.3 and Table 1.2). The share of health in the U.S. GNP has been constantly going up, reaching 8.6 per cent in 1976, while it levelled off in Canada, as noted above, to 6.8 per cent in 1976. With respect to the major components of that total, hospital expenditures relative to GNP have always been higher in Canada than in the United States, but the gap has been shrinking recently (Chart 1.3). In contrast, costs of physicians' services relative to GNP are lower in Canada than in the United States, but, while they are still going up in the United States, they have decreased slightly in Canada (Chart 1.3 and Tables 1.1 and 1.2).

An exhaustive analysis of the reasons of the above differences is beyond the scope of this study. However, it is interesting to note the opposite philosophies of the two countries regarding government intervention in the health services sector. In Canada, as we know, there is considerable coverage of many services through the medical care and hospital insurance programs. In the United States, government intervention tends to be limited to certain segments of the population (the poor, the aged) and most individuals are still responsible for the payment of the majority of the services provided (either directly or through private insurance schemes). One can find several reasons which suggest why costs are growing faster in the United States than in Canada. For example, as can be seen from Tables 1.1 and 1.2, administrative costs are proportionately higher in the United States and have grown more rapidly than in Canada; this reflects, to some extent the more fragmented nature of the

Chart 1.3

SOME CATEGORIES OF HEALTH CARE EXPENDITURES,
AS A PERCENTAGE OF THE GROSS NATIONAL PRODUCT,
CANADA AND UNITED STATES, 1960-1976



Sources: Health and Welfare Canada, Health Economics and Statistics Division, preliminary unpublished figures; R.M. Gibson and M.S. Mueller, "National Health Expenditures, Fiscal Year 1976", *Social Security Bulletin*, April 1977, Table 1 and 5; estimates by the authors.

Table 1.2

HEALTH CARE EXPENDITURES BY CATEGORY AS A PERCENTAGE OF THE GROSS NATIONAL PRODUCT, UNITED STATES, 1960-1976

	Years								
	1960	1965	1970	1971	1972	1973	1974	1975	1976
Total Health Expenditures (private and public)	5.34	5.91	7.47	7.71	7.81	7.65	7.81	8.42	8.64
Personal Health Care	4.48	4.91	6.29	6.46	6.50	6.39	6.46	7.05	7.23
Institutional Care	1.91	2.18	3.25	3.41	3.50	3.50	3.56	3.95	4.10
Hospitals	1.81	1.99	2.81	2.90	2.96	2.96	3.01	3.32	3.44
Nursing Homes	0.10	0.19	0.44	0.52	0.54	0.54	0.55	0.63	0.66
Professional Services	1.69	1.84	2.10	2.13	2.09	2.01	2.09	2.27	2.31
Physicians' Services	1.13	1.28	1.46	1.50	1.46	1.41	1.45	1.58	1.63
Dentists' Services	0.39	0.41	0.49	0.48	0.48	0.46	0.50	0.54	0.53
Other	0.17	0.15	0.15	0.15	0.16	0.15	0.14	0.15	0.15
Drugs and Appliances	0.88	0.89	0.94	0.92	0.91	0.88	0.81	0.83	0.82
Other Health Expenditures	0.86	1.00	1.17	1.25	1.31	1.26	1.35	1.37	1.42
Prepayment and Administration	0.17	0.19	0.22	0.25	0.32	0.31	0.40	0.41	0.46
Government Public Health	0.08	0.10	0.16	0.17	0.16	0.15	0.19	0.20	0.20
Other Health Services	0.27	0.22	0.26	0.27	0.29	0.28	0.24	0.24	0.24
Research	0.13	0.21	0.19	0.19	0.19	0.19	0.19	0.20	0.21
Medical-Facility Construction	0.21	0.28	0.34	0.36	0.36	0.33	0.33	0.32	0.31

Sources: For the years 1960 to 1973, *National Health Expenditures in Canada, 1960-73*, Health and Welfare Canada, Ottawa, April 1975; for the years 1974 to 1976, R.M. Gibson and M.S. Mueller, "National Health Expenditures, Fiscal Year 1976", *Social Security Bulletin*, April 1977; and estimates by the authors.

public and private schemes in the United States. In addition, there are relatively more aged in the United States than in Canada (this part of the population using comparatively more health services), and their proportion grew more rapidly in the United States than in Canada over the period 1970-75.[4]

From another point of view, comparisons with other O.E.C.D. countries show as well that the relative additional effort of Canada in the health sector during the period 1962-1974 has not been one of the most substantial, despite the fact that Canada, like several of these countries, adopted a policy of universal health care during that period. While the share of health in the "trend"[5] GDP increased by 1.6 percentage points in Canada between 1962 and 1973, it rose by 2.6 points in Sweden and 2.9 points in the Netherlands over approximately the same period (see Table 1.3).

Finally, we observe, with the reservation that international comparisons are always difficult to make (partly because of different demographic structures), that health expenditures

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4 Over the period 1970-1975, the proportion of the population aged 65 years or more rose from 8.0 to 8.5 per cent in Canada and from 9.8 to 10.5 per cent in the United States: Statistics Canada, "Population 1921-1971", Catalogue No. 91-512, and U.S. Department of Commerce, "U.S. Current Population Reports: Special Studies", Series P-23, No. 59 (May 1976).

5 Ratios to GDP published by O.E.C.D. are calculated with reference to a cyclically adjusted or "trend" GDP. This is done in order to avoid the influence of business fluctuations on the level of output, which could distort the measured shares of health expenditures in that output. The data for "trend" GDP are given in Annex I of "The Measurement of Domestic Cyclical Fluctuations", O.E.C.D., *Economic Outlook - Occasional Studies*, July 1973 (updated for the period 1970-1975).

as a proportion of the Canadian "trend" GDP are more or less at the average of the other selected O.E.C.D. countries (see Table 1.4).

Table 1.3

CHANGES IN PERCENTAGE POINTS OF THE SHARE OF TOTAL HEALTH EXPENDITURES IN "TREND" GROSS DOMESTIC PRODUCT: SELECTED O.E.C.D. COUNTRIES, 1962-1974 (OR NEAREST AVAILABLE RANGE OF DATES)

		Percentage Points
Netherlands	(1963-1972)	2.9
Sweden	(1963-1974)	2.6
United States	(1960-1974)	2.4
Norway	(1962-1973)	2.3
France	(1962-1974)	2.2
Germany	(1960-1974)	2.2
Australia	(1962-63/1975-76)	1.7
Canada	(1962-1973)	1.6
United Kingdom	(1962-1975)	1.3

Source: O.E.C.D., "Public Expenditures on Health", *Studies in Resource Allocation*, July 1977, page 28.

Table 1.4

TOTAL HEALTH EXPENDITURES AS A PERCENTAGE OF "TREND" GROSS DOMESTIC PRODUCT AT CURRENT PRICES: SELECTED O.E.C.D. COUNTRIES, 1974 (OR NEAREST AVAILABLE DATE)

		Percentage Points
United States	(1974)	7.4
Netherlands	(1972)	7.3
Sweden	(1974)	7.3
France	(1974)	6.9
Canada	(1973)	6.8
Germany	(1974)	6.7
Australia	(fiscal year 1975/76)	6.5
Norway	(1973)	5.6
United Kingdom	(1975)	5.2

Source: O.E.C.D., "Public Expenditures on Health", *Studies in Resource Allocation*, July 1977, page 10.

1.2.2 Causes of Governments' Concern

In spite of the fact that since 1970 health care costs have not risen more rapidly than the growth of the economy or than the growth of government budgets, concern is frequently voiced with respect to the actual amounts of money spent on health.[6]

For example, the federal government, in collaboration with the provinces, noticeably modified recently the form of its participation in the funding of hospital and medical insurance programs. This was the result of the new philosophy previously expressed in the 1974 working document on health.[7] With these reforms, shared costs programs were replaced by transfers of income tax points and by per capita grants based on the evolution of GNP growth.

As another example, we can mention provincial governments' policies also aimed at reducing the growth of health expenditures. These include the recent closing of hospitals and the decrease in the number of beds in Ontario, the effort of the Quebec government to reduce the growth rate of social security expenses, and the desire of Alberta to adjust the growth of health expenditures to the rate of growth of inflation.

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6 See, for example, R.G. Evans, "Does Canada Have Too Many Doctors?", *Canadian Public Policy*, Vol. II: 2, pp. 147-60 (1976), and J.G. Boutin, and J. Bisson, *Les consommateurs et les coûts de la santé au Québec de 1971 à 1975*, Service de la Recherche et de la Statistique, Assurance-maladie, Québec, January 1977.

7 See M. Lalonde, Minister of National Health and Welfare, *A New Perspective on the Health of Canadians; A Working Document*, Ottawa, April 1974.

Several factors can explain the recent interest of governments in restraining the growth of health expenditures. For purposes of discussion, it is convenient to classify them in three broad categories: first of all, there are the factors related to the health services sector itself, which generally does not possess the usual market mechanisms that permit the efficient allocation of resources; secondly, there are factors related to the political preoccupations of governments; and finally, there are the factors related to the change of the demographic composition of the population and of its consumption habits. We will now examine separately each of these factors.[8]

(a) Factors Related to the Health Services Sector

There are a number of particular features in the health services sector that make it different from most other sectors of economic activity. These features, which affect both consumers and producers, are such that efficient allocation of resources could be difficult in that sector:

(i) Payment of Fees by a Third Party

Since the establishment of hospital and medical care insurance programs, consumers do not have to pay directly the

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8 Some of these factors are also discussed in "The Complex Puzzle of Rising Health Care Costs: Can the Private Sector Fit it Together? Compendium of Labor-Management Innovations in Reducing Health Care Costs", a summary of hearings held in New York, Chicago, San Francisco, Philadelphia, Houston and Miami, U.S. Council on Wage and Price Stability, December 1976; and also, *The Rapid Rise of Hospital Costs*, Staff Report to the Executive Office of the President, U.S. Council on Wage and Price Stability, January 1977.

cost of the services they receive. Instead, the physician or the institution sends the bill to the appropriate agency which is responsible for paying it.

Obviously, this affects the behaviour of the consumers and the producers. From basic economic theory, we know that consumers and producers make their decisions on the basis of prices. But when consumers do not have to pay directly the price of what they buy, they could be incited to consume an unnecessarily large amount. That this could be the case for health services under certain conditions has been suggested by several studies.[9]

(ii) Consumers' Lack of Information on Costs

Not only do consumers not have to pay directly for the services they buy, but, in many instances, they do not know the costs of those services. For example, the hospital insurance program is financed directly through the general funds of governments, which means that little information on costs is available to consumers. In the case of medical care insurance, only four provinces[10] collect premiums on a separate basis. In

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9 See, for example, Paul B. Ginsburg and Larry M. Manheim, "Insurance Copayment and Health Services Utilization: A Critical Review", *Journal of Economics and Business*, Vol. 25 (Winter, 1973); Joseph P. Newhouse and Charles E. Phelps, *On Having Your Cake and Eating It Too: Economic Problems in Estimating the Demand for Health Services* (Rand Corporation, 1974); Charles E. Phelps, "Effects of Insurance on Demand for Medical Care", in Ronald Andersen, *et al.*, *Equity in Health Services* (Cambridge, Mass., Ballinger Publishing Company, 1975).

10 Health insurance premiums are collected only in Quebec, Ontario, Alberta and British Columbia. In Alberta and British Columbia, premiums cover only part of costs of health insurance.

those provinces, consumers often become aware of these costs only once a year, that is, when they produce their income tax reports. In the other provinces, the medical care insurance program is financed through government revenues, and consumers generally have no knowledge of the costs.

(iii) Physicians' Influence

The sector of health services is characterized by the fact that the physician determines the nature and the quantity of the services to be provided, because the patient is unable to judge for himself the kinds of services his state of health requires.

There exists the possibility that some physicians, because they are remunerated according to the number of services they provide, might be incited to increase their income by increasing unnecessarily the number of services rendered (while still not breaching professional standards). This could be relatively easy to do since, as we know, fees are not paid directly by patients. Such behaviour would undoubtedly lead to inefficient utilization of medical apparatus.[11]

(iv) Medical Innovations and Technological Changes

Medical innovations have been characterized by an emphasis on complex therapeutic and diagnostic techniques, which

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11 See M.S. Feldstein, "The Rising Price of Physicians' Services", *Review of Economics and Statistics*, Vol. 52 (May 1970); V.R. Fuchs, and M.J. Kramer, *Determinants of Expenditures for Physicians' Services in the United States, 1948-68*, U.S. Department of Health, Education and Welfare, N.B.E.R. Occasional Paper 117 (1972).

often require hospitalization and expensive equipment. As a consequence, the number of services and the total cost of health services has increased. At the same time, substantial medical technological progress and a large diffusion of existing technology has taken place. Depreciation of old equipment, installation of new equipment and the training of personnel to use it are other factors which have led to increased costs. Also, for reasons related partly to professional and institutional prestige, there is sometimes an excess supply of certain equipment in some regions.

(v) Health Perceived as a Right

Health is perceived and has been recognized as a right for everybody, to which no exceptions are permitted. Although there is no legislation on this matter, it is usually assumed that physicians are under the obligation to provide their patients with all the appropriate treatments available under the current state of the art. In certain cases, this may lead to very high costs.[12]

(b) Factors Related to Preoccupations of Governments

Besides the above factors related to the health services sector, there are also factors related to the government sector itself that help explain the recent concern about the growth of health expenditures. These can be divided into two categories:

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12 See E. Ajaleu, "L'Etat et les droits du malade", *Prospective et santé*, No. 2, 1977.

(i) The Roles of Governments

The continuous growth of current health expenditures, and more generally, the continuous growth of education, health and social security expenditures, has been such that it has become increasingly difficult for governments to allocate public funds in new fields of interest. More and more, government officials feel confined in the role of managers of already established programs, whose recurrent charges are particularly high.

The new fields of interest that have attracted recent attention are the problems related to energy, public transportation, housing, pollution control, recreation, and so on. In principle, it should be possible, with the increase of productivity, to devote new resources to those new projects. However, since health expenditures are already growing at about the same pace as the GNP, it is difficult to take advantage of any gains in productivity.

Furthermore, there has been, during the last twenty-five years or so, a decline in the growth of productivity.[13] This means that, if health expenditures remain as hard to compress as they have been in the past, and if the decline in the growth of productivity continues, we will have to allocate a larger share of our national resources just to maintain quality and quantity of care at their present levels.

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13 Between 1950 and 1960, productivity per worker increased at the average annual rate of 2.8 per cent. This rate was 2.4 per cent between 1960 and 1970 and only 1.1 per cent between 1970 and 1975 (Source: CANSIM data bank).

(ii) Political Motivations of Governments

Governments' actions are often motivated by considerations of prestige, and political leaders aim at maximizing the possibility of their re-election. Leaders, even when they agree with the objectives of the social policies adopted in the past, may feel that their predecessors have left them with very expansive programs whose political benefits have already been internalized.

They are pushed by their interests and by outside pressures towards new fields of intervention, but they find that their flexibility is greatly limited. Within that context, it is natural for governments to try to re-evaluate budgets, limit deficits and eliminate unnecessary expenses, in order to release resources enabling them to tackle new problems whose political benefits are more tangible.

(c) Change in Demographic Composition on Consumption Habits of Population

Consumption of health services is determined, to a large extent, by physiological conditions of individuals. The latter, of course, depends on a number of factors particular to each individual, but, at the level of a large population, age and sex composition of that population are the major factors that determine physiological needs. This aspect is important because the Canadian population is expected to become older in the future years. For example, the proportion of the population aged 65 years and more, which was one out of twelve in 1976, could be as high as one out of ten in 1986 and one out of eight

in 2001. Since these demographic changes represent a relatively new phenomenon whose impact on the demand for health services may be significant, the next chapter of this study will be devoted to that question.

To a lesser extent, consumption of health services is also determined by socio-economic characteristics of individuals, like their education, income or occupation. These characteristics will change over the future years, changing the demand for health services.[14]

Because expenditures related to demographic and socio-economic characteristics are hard to compress, and because the role of the price system is greatly limited in the health services sector, it is reasonable that governments want to undertake measures in order to control the consequences of these expected changes.

1.3 Conclusion: Why Health Expenditures Did Not Increase Faster

We have seen above that health expenditures as a proportion of GNP remained at roughly the same level between 1970 and 1975. Given all the factors that should create upward pressures on health expenditures, one can ask why, since the establishment of the medical care and hospital insurance programs, health care costs did not increase faster than they did.

Among other things, three factors seem to have a particular importance in explaining the recent evolution.

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14 This topic will be studied in future work.

(a) Evolution of Physicians' Fee Schedule

Since the establishment of provincial health insurance programs, physicians' fees have increased only slightly. According to an estimate of the Health Economics and Statistics Division of Health and Welfare Canada, between the fiscal years 1971-72 and 1976-77, the average annual rate of change of physicians' payment schedules was 3.9 per cent,[15] while, during the same period, the consumer price index increased at an average annual rate of 8.3 per cent.[16] This means that, in real terms, the price of physicians' services decreased. Since the number of services per physician did not increase at the same rate as the price decrease, the real income of physicians went down.

Table 1.5 shows the number of general practitioners and specialists practising medicine in Canada for the years 1968 through 1975. The number per 100,000 Canadians rose from

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15 Payment schedules reflect the amounts payable by provincial plans for physicians' services. Generally they are based upon the fee schedule of the provincial medical association, modified by percentage discounts (if any) and plan payment rules. In the case of Quebec, the payment schedules are based upon agreements reached between the provincial government on the one hand, and the Federations of specialists and general practitioners respectively on the other hand. Also, note that 1976-77 figures are preliminary. They take into account the payment schedule revisions which came into effect in the three Prairie provinces on January 1, 1977, as well as the agreements which were implemented in Quebec on November 1, 1976 (for general practitioners) and January 1, 1977 (specialists), respectively. Regarding the increases implemented in Quebec, it was estimated that the cost impact over one year would amount to 15.0 per cent. The lump-sum payments received by the majority of Quebec physicians are not taken into account.

16 Based upon the Consumer Price Index (all items) for the calendar years 1971 to 1976.

110 in 1968 to 136 in 1975. Although their average earnings have increased notably over this period and are high relative to the average for most other professions,[17] they have increased less rapidly than GNP per capita, or than average earnings per employed member of the labour force, as can be seen from the last column of the table.

These facts suggest that physicians did not exploit to their advantage, as they could, the possibility that they have to influence consumption of services.

Table 1.5

EVOLUTION IN THE NUMBER OF PHYSICIANS AND IN THEIR EARNINGS RELATIVE TO AVERAGE EARNINGS PER EMPLOYED MEMBER OF THE LABOUR FORCE, CANADA, 1968-75

Year	Number of general practitioners and specialists[1]	Number per 100,000 population	Average net professional earnings per physician (dollars)	Average earnings per employed member of the labour force (dollars)	Ratio of average earnings per physician to average earnings per employed member of the labour force
1968	18,244	82	28,615	5,064	5.65
1969	19,260	92	30,861	5,497	5.61
1970	19,906	93	34,360	5,897	5.83
1971	21,411	99	39,203	6,357	6.17
1972	22,642	104	39,977	6,885	5.81
1973	23,363	106	41,221	7,587	5.43
1974	24,680	110	42,289	8,719	4.85
1975	25,884	114	45,360	9,997	4.54

1. These figures represent estimates of the number of taxable self-employed physicians, excluding, for example, interns, residents, and physicians for whom the largest part of their earnings comes in the form of salary.

Source: Health and Welfare Canada, *Earnings of Physicians in Canada, 1962-1972*, unpublished material from Health Economics and Statistics, Information Systems Branch, Health and Welfare Canada, and estimates by the authors.

17 For a comparison of earnings by occupations, see Meltz, N.M. and Stager, D., *The Structure of Earnings by Occupation in Canada 1931-74*, Anti-Inflation Board, Discussion Paper, 1977.

(b) Queues and Indirect Costs

In spite of the fact that costs of health services are paid by a third party and that consumers generally ignore those costs, consumption of health services is not completely "free". It involves a journey to the place where services are provided and in some cases a loss of working income. Furthermore, after they reach the physician's office or the hospital, patients have to queue up before being looked after. All these time costs and other indirect costs seem to have been important enough to discourage consumers from abusing the services provided "freely" and to prevent unlimited growth in the consumption of health services.

(c) Vigilance of Governments

Finally, the constant preoccupation of provincial and federal governments about the growth of health expenditures is another important factor. By pointing out continuously the magnitude of health expenditures, governments have contributed to maintaining the growth of these expenditures to reasonable proportions.

Chapter 2: Projections of Future Trends in Government Health Insurance Program Expenditures in Canada

2.1 Introduction

In the first chapter, we have seen that, during the establishment of hospital and medical care insurance programs, health expenditures in Canada increased substantially, but that their growth has slowed considerably since 1970. This recent evolution suggests that, in our search for a model explaining the future trends in health expenditures, we should look at new factors of change rather than old ones. Given the fact that new programs of a magnitude comparable to those that already exist are very unlikely to be introduced, this approach seems reasonable.

This chapter presents a model of projections of health expenditures in Canada under the medical care and hospital insurance programs,[18] based on the evolution of the demographic structure of the population. The choice of emphasis on the demographic aspect can be justified for the following reasons:

(i) Market mechanisms, mainly because of government intervention, have been considerably reduced in the health services sector. Hence, usual demand and supply models can be excluded.

(ii) Consumption of health services is highly related to physiological needs which depend, for a large

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18 As proxied by the costs associated with physicians' services and general public and allied special hospitals.

part, on the demographic structure of the population. In particular, old people are important consumers of health services.

(iii) Demographic projections are already available and the impact of demographic change on consumption of health services under the medical care and hospital insurance programs can be gauged.

(iv) Finally, the Canadian population is aging quite rapidly, which means that estimates of the impact of demographic changes on consumption of health services under the medical care and hospital insurance programs are particularly relevant at this time.

Besides demographic factors, we are also aware that other factors might influence health expenditures in the future. These include changes in relative prices, changes in technology and changes in consumption patterns of health services. Although less attention will be paid to those factors, they will be considered at various steps in the remainder of this study. But our approach is rather to *isolate* the impact of demographic changes in order to provide some guidelines for policies aiming at influencing the future growth of health expenditures under the medical care and hospital insurance programs.[19]

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19 In contrast with this approach, a forthcoming study made in Statistics Canada by Z. Zsigmond and L.A. Lefebvre isolates the impact of alternative changes in consumption patterns of health services.

2.2 Summary of Expected Demographic Changes

2.2.1 Components of Demographic Changes

In order to evaluate the impact of demographic changes on consumption of government-insured health services, we will first examine, with respect to the way they affect aging, three major components of demographic changes:[20]

2.2.1.1 Life Expectancy at Birth

Between 1931 and 1971, life expectancy at birth increased by 9.3 years for males and by 14.3 years for females (Table 2.1). According to Statistics Canada, it should increase by about one year for males between 1971 and 1986 (reaching 70.2 years in 1986) and by two years for females (reaching 78.4 years in 1986). Furthermore, if it is assumed that decreases in the mortality rates after that year would affect mainly those over 65 years, life expectancy at birth can be projected to reach 72.7 years for males and 78.9 years for females by 2001.[21]

The effect of future increases in life expectancy at birth on the age structure of the population may differ from those experienced previously. In the past, increases in life expectancy at birth were caused to a considerable extent by

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20 The material used for the demographic projections comes from Statistics Canada: *Population Projection for Canada and the Provinces, 1972-2001*, Catalogue 91-514, June 1974, *Technical Report on Population Projection for Canada and the Provinces, 1972-2001*, Catalogue 91-516, July 1975, and special unpublished information.

21 Life tables used for these latter estimates can be found in Statistics Canada, Catalogue 91-516, Tables 4.28 and 4.29.

decreases in infant mortality, and this tended to result in a younger population. However, future improvements are expected to affect less infant mortality than mortality at other ages. While, according to our assumptions, the decline in mortality after 1986 will tend to lead to an older population, the most important effect will be to increase the *absolute* size of the population, and, particularly, the *number* of older people.

Table 2.1

LIFE EXPECTANCY AT BIRTH, ACTUAL AND *PROJECTED*, CANADA, 1931-2001

	1931	1941	1951	1956	1961	1966	1971	1976	1986	2001
Males	60.0	63.0	66.3	67.6	68.4	68.7	69.3	*69.7*	*70.2*	*72.8*
Females	62.1	66.3	70.8	72.9	74.2	75.2	76.4	*76.9*	*78.4*	*79.1*
Difference	2.1	3.3	4.5	5.3	5.8	6.5	7.1	*7.2*	*8.2*	*6.3*

Sources: Statistics Canada, Catalogue Nos. 84-206, 91-514 and 91-516.

2.2.1.2 Total Fertility Rate[22]

Fertility in developed countries has been characterized by a steady decline since the beginning of the 60s. As far as future is concerned, three hypotheses have been considered by Statistics Canada, two of which (the low and the medium) will be retained in this study. In the first one (see Table 2.2), it is assumed that total fertility rate will continue its decline up to 1981, stabilizing at that level after that. In the second one, it is assumed that the decline will stop and that total

22 Total fertility rate is the average number of children each woman would have if there was no mortality in the child-bearing ages.

fertility rate will go up again, reaching 2.2 births per woman in 1981, and remain at this level thereafter.[23]

With fertility at a much lower level (for either assumption) than it was in the past, the population will become gradually older. Note that the effect of future changes in fertility on aging is opposite to the effect of changes in life expectancy at birth. While the latter will have very little influence on the *relative* age structure but will affect the *absolute* number of old people, the former will affect mainly the *relative* age structure but will not have a large impact on the *absolute* number of old people for some time.

Both *relative* and *absolute* demographic changes will clearly affect health expenditures, and hence both these components of demographic change are of concern to us here.

Table 2.2

TOTAL FERTILITY RATE, ACTUAL AND *PROJECTED*, CANADA, 1961-2031[1] (BIRTHS PER WOMAN)

1961	1966	1971	1976		1981	→	2031
				Low	*1.8*	→	*1.8*
3.857	2.826	2.19	1.85				
				Medium	*2.2*	→	*2.2*

1 See definition in footnote 21.

Source: Statistics Canada, Catalogue No. 91-514.

23 There was also an assumption of high fertility in the original projections of Statistics Canada. This assumption, however, is no longer considered as representing a likely outcome.

2.2.1.3 International Migration

To some extent, international migrations will have an impact on the age structure of the Canadian population. Immigrants, on the average, are younger than the rest of the population and the effect of that will be to reduce aging of population. However, given the projected numbers involved, their influence will not be sufficient to compensate for the effect of reduced fertility on the age structure of the population. Among the scenarios considered by Statistics Canada regarding international migration, two will be used in this study. In these scenarios, it is assumed that net annual migration will be respectively 60,000 persons and 100,000 persons for all the years of the projections.

2.2.2 Demographic Scenarios Selected for the Projections

Different combinations of assumptions about the components of demographic growth can be chosen in order to produce a variety of demographic scenarios. In order to reflect a reasonable range of possible population growth, two *basic demographic scenarios* will be used in the remainder of this study to derive projections of health expenditures under the medical care and hospital insurance programs.

Each demographic projection is made up to the year 2031. The length of that period may appear long, but it is reasonable since many of the people alive today will still be alive at that time. However, we realize that projections for such a long period have a good deal of uncertainty associated

with them, and our analysis will concentrate as well on a number of intermediate years for which the uncertainty becomes less as we approach the present.

Although only two basic demographic scenarios will be used, we will also refer, throughout the analysis, to other scenarios for the purpose of comparisons with the basic scenarios.

Both basic scenarios assume that life expectancy at birth will increase slightly up to the year 2001, as indicated above, and then remain at the 2001 level till the year 2031. The life expectancy figures used are given in Table 2.1 above. With respect to the other components, the two scenarios are defined as follows:

2.2.2.1 Low Growth Scenario

Total fertility rate is assumed to stabilize at 1.8 births per woman from 1981 to 2031, according to the low assumption of Table 2.2 above. For all the years between 1972 and 2031, net immigration is 60,000 persons per year.

2.2.2.2 High Growth Scenario

Total fertility rate is assumed to stabilize at 2.2 births per woman from 1981 to 2031, according to the medium assumption of Table 2.2. For all years between 1972 and 2031, net immigration is 100,000 persons per year.

2.2.3 The Importance of Aging

Using these scenarios, we can now measure the magnitude of the aging phenomenon. In both scenarios, the number of persons aged 65 years and more will grow at a much faster rate

than the total population (Table 2.3). The growth of the aged will be quite substantial from now to 1991, will then slow down for about twenty years, and then go up again after 2011 as a result of the aging of those who were part of the baby boom that followed the Second World War.

Table 2.3

PERCENTAGE GROWTH RATE OF CANADIAN POPULATION, BY AGE GROUP, 10 YEAR PERIODS, CANADA, 1971-2031

Demographic Scenarios	1971-1981	1981-1991	1991-2001	2001-2011	2011-2021	2021-2031
Low growth						
0-19	-9.6	-2.2	-0.3	-5.1	-1.2	-2.8
20-64	24.3	14.4	8.4	7.0	-1.9	-4.9
65 and more	29.2	28.2	17.4	17.1	32.8	23.3
Total	11.3	10.4	6.9	5.0	2.9	0.5
High growth						
0-19	-6.6	10.9	9.7	2.3	8.5	4.8
20-64	26.5	16.4	11.1	13.3	3.8	3.3
65 and more	29.8	28.9	18.2	18.7	35.1	24.6
Total	13.8	15.8	11.4	10.5	8.8	6.8

Source: Statistics Canada, Catalogue No. 91-514, special projections and estimates by the authors. Data used to generate these growth rates are presented in Tables B-1 to B-4 in Appendix B.

Looking at the same phenomenon from another angle, the proportion of the total population aged 65 years and more will increase continuously (Table 2.4). While in 1976, this proportion was 8.6 per cent, it will be about 10 per cent in 1986, between 11 and 12 per cent in 2001, and between 17 and

21 per cent in 2031. In terms of absolute numbers, there were about 2.0 million persons 65 years of age and more in 1976. There will be about 2.5 million in 1986, 3.4 million in 2001, and between 6.5 and 6.9 million in 2031.

Table 2.4

PERCENTAGE OF POPULATION AGED 65 YEARS AND MORE, CANADA, 1976-2031

Demographic Scenarios	1976	1981	1986	1991	1996	2001	2011	2021	2031
Low growth	8.6	9.4	10.0	10.9	11.5	12.0	13.3	17.2	21.1
High growth	8.6	9.2	9.6	10.3	10.7	10.9	11.7	14.6	17.0

Source: Statistics Canada, special projections, and estimates by the authors.

2.3 A Model of Projections of Health Expenditures

2.3.1 Demographic Changes and Consumption of Health Services

Demographic changes will have an impact on costs of government-insured health services to the extent that, as noted before, the amount of services required to keep a person in good health varies with age. It has been shown that the relationship between cost of health services on one hand, and age and sex on the other hand, can be represented by an asymmetric U-shaped curve.[24] As an example, this relationship is illustrated (see Chart 2.1) with data on costs of physicians' services under the medical care program in Quebec.

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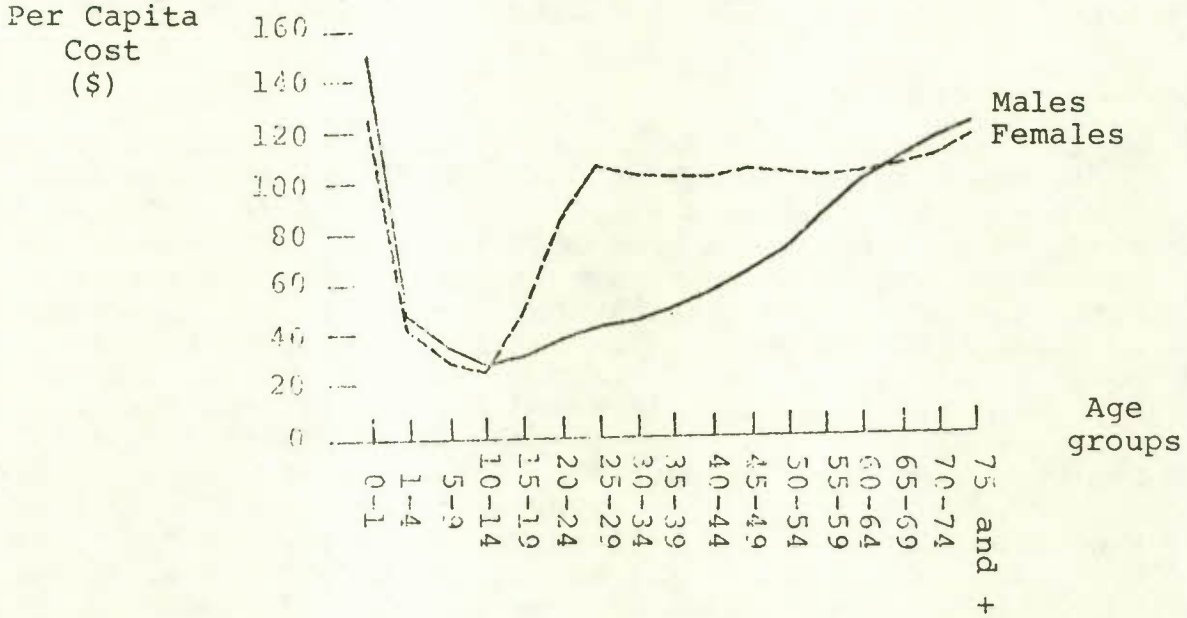
24 See E.T. Denton and B.G. Spencer, "Health Costs When the Population Changes", Canadian Journal of Economics, Vol. VIII, No. 1, February 1975, pp. 34-48.

During the first year after birth, costs are very high but decrease rapidly with age up to about age 15. After that age, they start growing again, and do so at a particularly increasing rate for females during the child-bearing years. Costs remain higher for females than for males for a number of years beyond the child-bearing years, but for old people, costs tend to be higher for males than for females.

This graph shows clearly that, if the distribution of costs by age and sex remains the same, expected future aging of the Canadian population will have important consequences on health expenditures. The purpose of the model of projection that follows is to evaluate the impact of this relationship with respect to the medical care and hospital insurance programs.

Chart 2.1

PER CAPITA COST OF MEDICAL CARE PROGRAM,
BY AGE AND SEX,
QUEBEC, 1975



Source: Régie de l'assurance-maladie du Québec, *Statistiques annuelles, 1975*, and estimates by the authors.

2.3.2 Assumptions

In order to derive the model evaluating this impact, the following assumptions have to be made about the economic environment in which health expenditures will evolve.[25]

2.3.2.1 Demand Side

It is assumed that the demand for government-insured health services by consumers is a function of physiological conditions only, and that the latter, at the aggregate level, are determined by the age and sex structure of the population. Further, it is assumed that the average level of consumption for an individual in a particular age-sex group will remain the same as at present over the period studied. We also exclude the possibility that demand will be influenced significantly by variables like income or relative prices.

In the present Canadian institutional context, these assumptions seem to be justified since services are provided

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25 While these are significant assumptions, it is only necessary to assume that there will be no large departures from them for the projections to have relevance. We have preferred to state these assumptions precisely in order to make our model rigorous. Note that some authors used models similar to ours without mentioning explicitly these assumptions, although it is clear that they have to be satisfied in order for the model to be correct. For example, see E.T. Denton and B.G. Spencer, *Op. Cit.*, J.A. Clark and N.E. Collishaw, *Canada's Older Population*, Staff Paper, Long Range Planning Branch, Health and Welfare Canada, 1975, M.K. Rombout, *Hospitals and Elderly: Present and Future Trends*, Long Range Health Planning Branch, Health and Welfare Canada, 1975, and M.K. Rombout, *Health Care Institutions and Canada's Elderly*, A Supplement to: *Hospitals and the Elderly: Present and Future Trends*, Long Range Health Planning Branch, Health and Welfare Canada, 1975.

"free" to consumers through the medical care and hospital insurance programs. Even if indirect costs may have the effect of limiting consumption, it is not expected that the changes in those costs will be large enough to affect levels of consumption.

2.3.2.2 Supply Side

Because of their involvement in the health services sector, governments are, to some extent, responsible for ensuring that there is no shortage in the supply of services. Thus, it may be assumed that consumption of health services will be determined only by demand considerations and that supply will follow demand, whatever its level.

However, governments may not react so passively to increases in demand. In order to account for that possibility, this assumption will be relaxed at a later stage of this study by analyzing the impact of some possible changes in consumption patterns that could be initiated by governments.

2.3.2.3 Prices

Even if the apparent price paid by consumers is zero, prices of production factors in the health services sector are obviously positive and may be subject to change. We assume that *relative* prices relating health services to the rest of the economy will remain constant. Also, we ignore changes in the current price levels by projecting health expenditures in constant dollars.

At a later stage of this study, we will evaluate the effect of relaxing the assumption of constant relative prices.

2.3.2.4 Technology

It is assumed that technological progress will not modify consumption patterns. Quality of services may improve through time, but we assume that the quantity of health services required by a given physiological condition will remain constant. Any radical transformation in the technology is excluded from the model, but a smooth pattern of change is allowed for. For example, in the demographic projections that we are using, life expectancy at birth is assumed to increase slightly up to year 2001; this implies, among other things, some improvements in the efficiency of health services.

2.3.3 Categories of Health Expenditures Considered

In accordance with the above assumptions, we will concentrate our efforts on two types of health services: physician's services, and public general and allied special hospitals. The expenditures for these services are very largely covered by the medical care and hospital insurance programs, represent a very large portion of these programs and, hence, are a good proxy for them.[26] These services lend themselves particularly well to the

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26 For example, physicians' services represented 84 per cent of the costs of the medical care program in Quebec in 1975, and virtually all such services were paid for by the program. Although the program does not pay for all charges for physicians' services in the rest of Canada, it pays for the vast bulk of them (94 per cent including Quebec). On the hospital side, public general and allied hospitals accounted for 84 per cent of all hospital expenditures in Canada in 1974, and nearly all expenditures (91 per cent) in these hospitals were paid for by the hospital insurance program. In the text and tables that follow, we use the terms "medical care and hospital insurance program expenditures", "government-insured health expenditures", and the like as the two services examined correspond roughly to what is covered by the medical care and hospital insurance programs.

assumptions and methodology of projection employed in the document.

Furthermore, current expenditures related to physicians' and public general and allied special (PGAS) hospital services represent a very large part of the total output of the health services sector, since these two types of expenditures have accounted in the recent past for more than half of total health expenditures (Table 2.5).

Table 2.5

SELECTED CATEGORIES OF HEALTH EXPENDITURES, CANADA, 1970-1974

	1970	1971	1972	1973	1974
	(Millions of dollars)				
Physicians' services	1,032	1,240	1,375	1,471	1,647
Public general and allied special hospitals[1]	2,248	2,514	2,784	3,132	3,871
Total health expenditures	6,081	6,948	7,567	8,457	9,926
Percentage of the above two categories in total health expenditures	53.9	54.0	54.9	54.4	55.6
Percentage of the above two categories in the GNP	3.8	4.0	3.9	3.7	3.7

1 Does not include capital expenditures.

Sources: *National Health Expenditures in Canada*, Health and Welfare Canada, Statistics Canada, *Hospital Statistics*, Vol. II, Catalogue No. 83-228.

2.3.4 Methodology

With the stage set in this way, we can now present the methodology used for projecting government-insured health expenditures. The general method consists in estimating age and sex specific per capita ratios relating costs of health services to a given population and in applying those ratios to projected populations. More precisely, let i be the age and j be the sex, the total cost of health services at year t can be expressed by the following identity:

$$(\text{total cost})_t = \sum_i \sum_j \left(\frac{\text{cost}}{\text{person}}\right)_{ijt} \times (\text{persons})_{ijt} . \qquad (1)$$

This equation needs to be estimated for both physicians' services and hospitals.

In the case of physicians' services, it is convenient to rewrite equation (1) in the following way:

$$(\text{total cost})_t = \sum_i \sum_j \left(\frac{\text{services}}{\text{person}}\right)_{ijt} \times \left(\frac{\text{cost}}{\text{service}}\right)_{ijt} \times (\text{persons})_{ijt} . \qquad (2)$$

It is easy to see that the first, the second and the fourth assumptions of sub-section 2.3.2 imply that the ratio $\left(\frac{\text{services}}{\text{person}}\right)_{ijt}$ is constant through time for each combination of i and j. Similarly, by the third assumption, the ratio $\left(\frac{\text{cost}}{\text{service}}\right)_{ijt}$ is also constant. Therefore, provided our assumptions are correct, the subscript t can be deleted from the ratio $\left(\frac{\text{cost}}{\text{person}}\right)_{ijt}$ in equation (1).

Projections of costs of physicians' services can then be calculated using demographic projections and data on per capita cost by age and sex for a given base year. These latter data can be obtained from the annual statistical reports of provincial health insurance agencies. Unfortunately, because of differences in the presentation of the data among the provinces, it has not been possible to use simultaneously all the information that was available. However, since the relative distribution of costs by age and sex was about the same in all the provinces, we picked the distribution observed in Quebec in 1975 as a basis for our calculations.[27] In order to get estimates for Canada as a whole, the Quebec cost distribution was adjusted to the Canadian total cost of physicians' services for the year 1974.[28] All projected dollar figures used from now on have to be interpreted as being in terms of 1974 dollars.

Turning now to the case of hospitals, we can rewrite equation (1) the following way:

$$(\text{total cost})_t = \sum_i \sum_j \left(\frac{\text{separations}}{\text{person}}\right)_{ijt} \times \left(\frac{\text{days}}{\text{separation}}\right)_{ijt} \times \left(\frac{\text{cost}}{\text{day}}\right)_{ijt} \times (\text{persons})_{ijt} . \qquad (3)$$

---

27 Table B-5 in appendix shows that consumption patterns by age and sex of health services are very similar across provinces, although the levels are different. Tables B-6, B-7 and B-8 for Quebec also show that they remained relatively constant over time, at least for the period considered. We chose Quebec as a basis because it was the only province for which data for a recent year were available with an appropriate level of dissaggregation.

28 1974 was chosen because it was the most recent year for which data on total costs were available.

Note that, for hospitals, we have decomposed consumption between separations and patient-days per separation.[29] This distinction is convenient for interpretation and will be used later. In this case as well, the assumptions made in sub-section 2.3.2 can be used to deduce that the subscripts t can be deleted in all three ratios of equation (3).

We can proceed for hospitals the same way as we did for physicians' services by estimating per capita costs by age and sex for a base year. These data are available for Canada from Statistics Canada publications.[30] In this case, also, costs are adjusted to 1974 dollars.

A final adjustment has to be made before these data can be used for projecting government-insured health expenditures. For both physicians' and public general and allied special (PGAS) hospital services, per capita costs for women in the child-bearing years have been adjusted to account for pregnancy costs. These costs, by their nature, are more related to the number of births than to the total number of women in the

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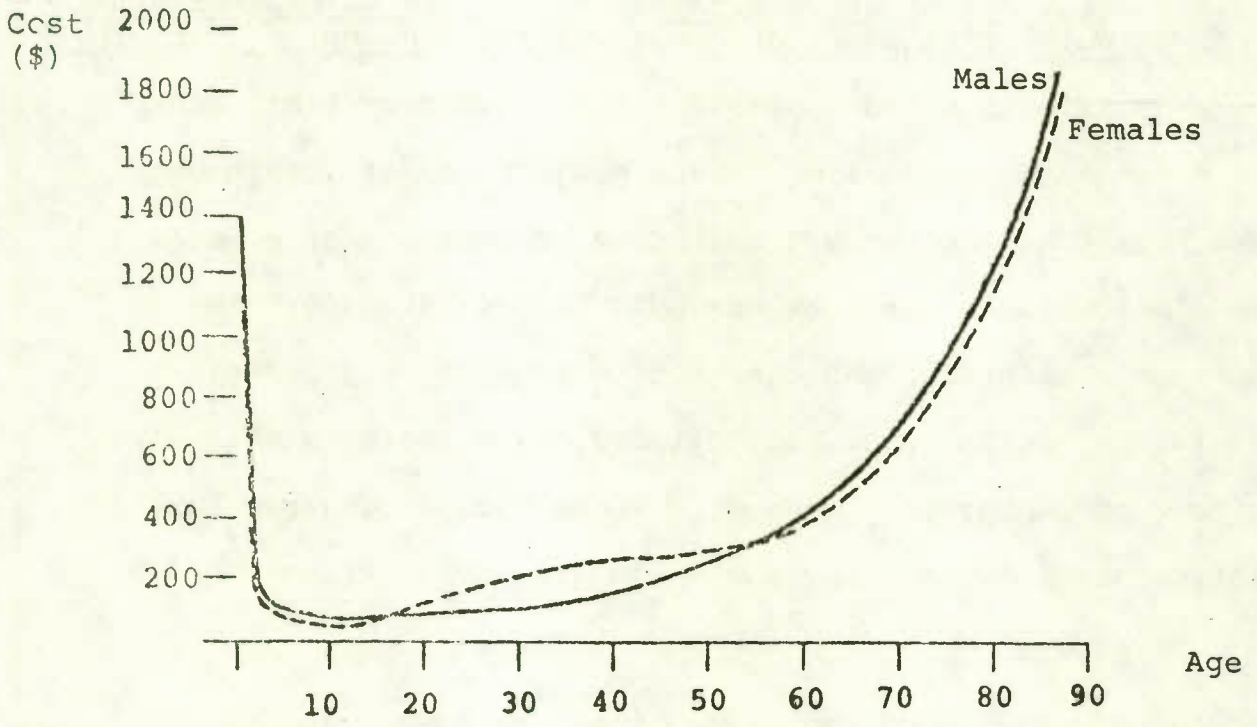
29 Separation is the discharge or death of an inpatient. The frequency counts show individual cases separated, not the number of particular individuals separated -- i.e. a particular individual may be separated more than once (See Statistics Canada, Catalogue 82-206).

30 Data on consumption of hospitals services are presented in Tables B-9, B-10 and B-11 in appendix. They come from Statistics Canada, *Hospital Morbidity*, Catalogue 82-206, annual. Data on total costs come from *Hospital Statistics, Vol. II, Expenditures, Revenues, Balance Sheets*, Catalogue 83-228, annual.

child-bearing age groups (i.e. they are more related to the fertility rates). Thus, pregnancy costs were shifted from these women and attributed to children one year of age and younger.[31]

Chart 2.2

ADJUSTED ANNUAL PER CAPITA COST OF GOVERNMENT-INSURED HEALTH SERVICES, BY AGE AND SEX, CANADA, 1974[1]



1 Expenditures under government-insured health services (the medical care and hospital insurance programs) are proxied, as noted in the text, by the costs associated with physicians' services and the use of public general and allied special hospitals.

Source: See text and Table B-12 in Appendix B.

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31 In the case of physicians' services, we had to use data for Saskatchewan for the year 1973 in order to separate pregnancy costs from other costs. These were the only available data. Also in order to relate, to some extent, hospital costs to age and sex of patients, we used data from Statistics Canada's Survey of Consumer Finances, 1975.

Chart 2.2 presents the adjusted per capita costs of government-insured health services by age and sex that were used for the projections.[32] We observe the same pattern that we noted before, i.e. costs are very high during the first year after birth, then decrease to a low level, and finally increase with age. The adjustment for pregnancy had the effect to make the patterns more similar for men and women.

2.4 Results

2.4.1 Projections of Government-Insured Health Expenditures With Constant Prices and Constant Consumption Patterns

Straightforward application of the above relationship on the demographic projections gives projections of government-insured health expenditures (proxied by projections of expenditures on physicians' services and PGAS hospitals) under the assumptions that prices and consumption patterns will remain constant. By making these assumptions, our purpose is to isolate the effect of demographic changes. These include changes in the population size *and* changes in the age structure of that population.

The results of the projections are summarized in Tables 2.6 and 2.7 for low and high demographic scenarios respectively. Since high demographic growth will produce a higher population than low demographic growth, total health expenditures for physicians' and PGAS hospitals' services will also tend to be higher in the former scenario than in the latter. However, low demographic growth involves an older age structure and

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32 Calculations for the projections were done employing five-year age groups up to the group 80 years or more. Due to the high costs for infants, age group 0-4 was broken down between 0-1 and 1-4.

Table 2.6

PROJECTIONS OF GOVERNMENT-INSURED HEALTH EXPENDITURES,
LOW DEMOGRAPHIC GROWTH, 1974 PRICES,
CANADA, 1976-2031

	1976	1981	1986	1991	1996	2001	2011	2021	2031
Population (000)	22,752.2	24,014.1	25,324.4	26,510.8	27,498.5	28,345.6	29,762.9	30,617.5	30,757.6
Total cost ($ millions)[1]									
Physicians' services	1,713.9	1,959.2	1,997.6	2,111.9	2,213.3	2,316.9	2,512.3	2,643.2	2,702.1
Hospital services[2]	3,954.3	4,346.2	4,756.7	5,147.7	5,540.2	5,947.6	6,763.3	7,577.7	8,449.8
Total	5,668.2	6,205.4	6,754.3	7,259.6	7,753.5	8,264.5	9,275.6	10,220.9	11,151.9
Per capita cost ($)									
Physicians' services	75.33	77.42	78.88	79.66	80.49	81.74	84.41	86.33	87.85
Hospital services	173.80	180.99	187.83	194.17	201.47	209.82	227.24	247.50	274.72
Total	249.13	258.41	266.71	273.83	281.96	291.56	311.65	333.83	362.57
Distribution of total cost (%)									
Physicians' services	30.2	30.0	29.6	29.1	28.5	28.0	27.1	25.9	24.2
Hospital services	69.8	70.0	70.4	70.9	71.5	72.0	72.9	74.1	75.8
Percentage imputable to persons aged 65 and more (%)									
Population	8.6	9.4	10.0	10.9	11.5	12.0	13.3	17.2	21.1
Physicians' services	14.5	15.3	16.0	17.3	18.2	18.6	20.0	25.2	30.6
Hospital services	36.6	38.0	39.6	42.0	43.8	44.6	45.8	51.6	59.6

1 These costs, as noted in the text, can be considered as a proxy for the expenditures under the medical care and hospital insurance programs.

2 For public general and allied special hospitals.

Source: Statistics Canada and estimates by the authors.

Table 2.7

PROJECTIONS OF GOVERNMENT-INSURED HEALTH EXPENDITURES,
HIGH DEMOGRAPHIC GROWTH, 1974 PRICES,
CANADA, 1976-2031

	1976	1981	1986	1991	1996	2001	2011	2021	2031
Population (000)	22,917.9	24,55.0	26,529.3	28,402.0	30,063.2	31,633.7	34,954.1	38,024.9	40,618.3
Total cost ($ millions)[1]									
Physicians' services	1,725.8	1,913.0	2,099.4	2,246.3	2,380.6	2,534.3	2,873.1	3,157.1	3,408.7
Hospital services[2]	3,974.7	4,456.8	4,960.9	5,403.3	5,852.5	6,352.8	7,433.3	8,548.4	9,830.8
Total	5,700.5	6,369.8	7,060.3	7,649.6	8,233.1	8,887.1	10,306.4	11,705.5	13,239.5
Per capita cost ($)									
Physicians' services	75.31	77.97	79.14	79.09	79.19	80.11	82.20	83.03	83.92
Hospital services	173.43	181.65	187.00	190.24	194.67	200.82	212.66	224.81	242.02
Total	248.74	259.62	266.14	269.33	273.86	280.93	294.86	307.84	325.94
Distribution of total cost (%)									
Physicians' services	30.3	30.0	29.7	29.4	28.9	28.5	27.9	27.0	25.7
Hospital services	69.7	70.0	70.3	70.6	71.1	71.5	72.1	73.0	74.3
Percentage imputable to persons aged 65 and more (%)									
Population	8.6	9.2	9.6	10.3	10.7	10.9	11.7	14.6	17.0
Physicians' services	14.4	14.9	15.4	16.4	17.1	17.3	18.1	22.1	25.7
Hospital services	36.5	37.2	38.3	40.4	41.9	42.4	42.8	47.8	52.2

1 These costs, as noted in the text, can be considered as a proxy for the expenditures under the medical care and hospital insurance programs.

2 For public general and allied special hospitals.

Source: Statistics Canada and estimates by the authors.

consequently higher average per capita costs for these services.[33] For instance, the per capita cost, which was $249 in 1976 (in 1974 dollars), would increase under this scenario to $292 in 2001 and to $363 in 2031, while, under the high growth scenario, it would be $281 in 2001 and $326 in 2031.

This latter result is of course due to the fact that old people will represent a higher proportion of the population in the low growth scenario. As can be seen in the bottom lines of Table 2.6, these people could account for a very large proportion of government-insured health expenditures in the future. While in 1976, people 65 years old and older represented 9 per cent of the population, and accounted for about 14.5 per cent of expenditures on physicians' services and for 37 per cent of expenditures on (PGAS) hospitals, in 2001, under the low growth assumption, they will account for 12 per cent of the total population, 19 per cent of physicians' services' expenditures and

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33 We could also have carried the analysis on a per worker basis instead of on a per capita (or per consumer) basis. The objectives of such an analysis, however, would not have been the same. The major purpose of this study is to isolate the impact of demographic changes on expenditures for government-insured health programs, not to estimate the burden that will have to be borne by the workers. To the extent that the relative share of government revenues that comes from workers does not change, it is obvious that, if the proportion of workers in the population decreases, the average burden of the medical care and hospital insurance programs per worker will be higher. In the opposite case, it will be lower. Over the period studied, both cases can happen, partly because the proportion of the population aged 15-64 will fluctuate, and also because the labour force participation rate and the unemployment rate are likely to change. These considerations could easily be the object of a study, but they will not be discussed further here.

for 45 per cent of PGAS hospitals' expenditures. Thus, we can see that aging of population will have a much larger impact on PGAS hospitals' expenditures than on physicians' services expenditures. By 2031, people 65 years old and older could account for as much as 60 per cent of PGAS hospitals' expenditures. The impact is still significant under the high growth scenario, where the percentages are only slightly lower than under the low growth scenario. From those figures, we can see the importance of considering more efficient and less costly ways to care for the aged.

We can complete this picture by analyzing the average annual rates of change of total population, government-insured health expenditures, and per capita government-insured health expenditures. This analysis is useful because it allows us to look more closely at the nature of the changes projected as the following derivation shows.

Let C be the cost of government-insured health services, c be the per capita cost, and P be the total population. Total cost can be expressed as:

$$C = cP \tag{4}$$

Taking natural logarithms, we have:

$$\log C = \log c + \log P \ , \tag{5}$$

and differentiating with respect to time,

$$\frac{d \log C}{dt} = \frac{d \log c}{dt} + \frac{d \log P}{dt} \ . \tag{6}$$

In other words, the percentage increase in government-insured health expenditures is equal to the sum of the percentage increase in expenditure per capita and the percentage increase in total population.[34] With the help of this last equation, we can break down the increase in these health expenditures into two components: one reflecting the increase in population size and the other reflecting the changes in the age composition of that population.

The results of this operation are presented in Table 2.8. In the low growth assumption, government-insured health expenditures will increase between 1976 and 2001 at an average annual rate of 1.51 per cent, of which 0.88 per cent will be due to increase in population size and 0.63 per cent will be due to changes in the age structure. When the growth rates are taken over the whole period 1976 to 2031, we notice that changes in the age structure become more important, explaining 0.68 out of 1.23 per cent average annual increase.

We observe a different pattern in the case of the high growth scenario. Between 1976 and 2001, government-insured health expenditures grow at a rate of 1.78 per cent annually, but 1.29 per cent of it is due to the increase in population size and only 0.49 per cent is due to changes in the age structure. The same behaviour is observed when growth rates are taken from 1976 to 2031.

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34 Note that growth rates have to be defined in continuous time for this operation to be correct. In practice, when the growth rates are small (in the order of 1 or 2 per cent), it does not matter whether we compute them in continuous time or in discrete time, since $\log (1 + r) \simeq r$ for small values of r.

Table 2.8

AVERAGE ANNUAL GROWTH RATE OF GOVERNMENT-INSURED HEALTH EXPENDITURES, BROKEN DOWN BY COMPONENT, BASIC DEMOGRAPHIC SCENARIOS, CANADA, 1976-2031

	1976-1981	1981-1986	1986-1991	1991-1996	1996-2001	2001-2011	2011-2021	2021-2031	1976-2001	1976-2031
					(percentages)					
Low Growth										
Population	1.08	1.06	0.91	0.73	0.60	0.48	0.28	0.04	0.88	0.55
Physicians' services										
Per capita expenditures	0.54	0.37	0.19	0.20	0.30	0.32	0.22	0.17	0.33	0.28
Total expenditures	1.63	1.44	1.11	0.94	0.91	0.81	0.50	0.21	1.21	0.83
Hospital services[1]										
Per capita expenditures	0.81	0.74	0.66	0.74	0.81	0.80	0.85	1.04	0.75	0.83
Total expenditures	1.90	1.82	1.59	1.48	1.42	1.29	1.14	1.09	1.63	1.38
Total[2]										
Per capita expenditures	0.73	0.63	0.52	0.58	0.67	0.66	0.68	0.82	0.63	0.68
Total expenditures	1.82	1.70	1.45	1.32	1.28	1.16	0.97	0.87	1.51	1.23
High Growth										
Population	1.37	1.57	1.37	1.14	1.02	1.00	0.84	0.66	1.29	1.04
Physicians' services										
Per capita expenditures	0.69	0.29	-0.01	0.02	0.23	0.26	0.10	0.10	0.25	0.20
Total expenditures	2.08	1.87	1.36	1.16	1.25	1.26	0.94	0.76	1.54	1.24
Hospital services										
Per capita expenditures	0.93	0.58	0.34	0.46	0.62	0.57	0.55	0.74	0.59	0.61
Total expenditures	2.31	2.16	1.72	1.61	1.65	1.58	1.40	1.40	1.88	1.65
Total										
Per capita expenditures	0.85	0.49	0.23	0.33	0.51	0.48	0.43	0.57	0.49	0.49
Total expenditures	2.24	2.07	1.61	1.47	1.53	1.49	1.28	1.23	1.78	1.53

1 For public general and allied special hospitals.

2 These growth rates can be considered as proxies for the growth rates of expenditures under the medical care and hospital insurance programs.

Source: Statistics Canada and estimates by the authors.

Thus, whatever demographic scenario is employed, health expenditures will grow; however, the reasons for the growth may differ notably. Table 2.8 also shows that the highest growth rates in government-insured health expenditures will occur in the near future, i.e. between now and 1986, a little below 2 per cent per year in the low growth scenario and a little above 2 per cent in the high growth scenario. This is because both components of growth are sizable during that period. Over a longer period, we notice that the population size component decreases monotonically with time while the age structure component remains high in low growth scenario, and first drops off and then increases in the high growth scenario.

Finally, it is interesting to note that, since we have assumed constant relative prices, the results of Table 2.8 can be interpreted as growth rates in relation to certain physical units of health services. If it is assumed that workload of physicians and that use rates of hospitals beds will remain the same, then the figures in Table 2.8 indicate by what percentage the number of physicians and the number of beds will have to be increased in order to satisfy the new demand resulting from demographic changes. For example, we can see that the number of physicians would have to increase between 1.6 and 2.1 per cent annually, depending on the demographic scenario, from now to 1981, in order to satisfy demand and that the number of hospital beds would have to increase between 1.9 and 2.3 per cent annually during the same period. In practice, however,

whether real demand increases at these rates or faster it may well be possible to use existing resources more efficiently. This aspect will be considered in Section 2.4.3.

2.4.2 Impact of Alternative Demographic Scenarios

The projections of government-insured health expenditures that result from the two basic demographic scenarios can be modified in several ways. We will first consider modifications in the assumptions of the demographic scenarios, while leaving unchanged the assumptions about the environment of the health services sector.

Both basic scenarios made the same assumptions about life expectancy at birth. It was assumed that it would increase up to year 2001, reaching 72.7 years for men and 78.9 years for women, and remain at that level up to year 2031. In the original projections of Statistics Canada, however, it was assumed that life expectancy at birth would increase only up to 1986, and would remain the same after that, at 70.2 years for men and 78.4 years for women. Changing life expectancy changes the population size component of health expenditures in the same direction. However, its effect on the age structure component is unclear *a priori*.

In Table 2.9 (see also Tables B-13 and B-14 in Appendix B) the impacts of these two assumptions are compared. We can see that higher life expectancy increases both components of change in government-insured health expenditures after 1986. In the case of the age structure component, this is because we

Table 2.9

AVERAGE ANNUAL GROWTH RATE OF GOVERNMENT-INSURED HEALTH EXPENDITURES, BROKEN DOWN BY COMPONENT, IMPACT OF CHANGE IN LIFE EXPECTANCY AT BIRTH, CANADA, 1976-2031

	1976-1981	1981-1986	1986-1991	1991-1996	1996-2001	2001-2011	2011-2021	2021-2031	1976-2001	1976-2031
Low growth - Lower Life Expectancy										
Population	1.08	1.06	0.90	0.69	0.54	0.42	0.22	0.01	0.86	0.51
Per capita health expenditures	0.73	0.63	0.50	0.53	0.58	0.58	0.63	0.77	0.60	0.63
Total rate[1]	1.82	1.70	1.42	1.22	1.13	1.00	0.85	0.78	1.45	1.14
Low growth - Higher Life Expectancy										
Population	1.08	1.06	0.91	0.73	0.60	0.48	0.28	0.04	0.88	0.55
Per capita health expenditures	0.73	0.63	0.52	0.58	0.67	0.66	0.68	0.82	0.63	0.68
Total rate	1.82	1.70	1.45	1.32	1.28	1.16	0.97	0.87	1.51	1.23
High growth - Lower Life Expectancy										
Population	1.37	1.57	1.35	1.10	0.96	0.94	0.80	0.63	1.27	1.01
Per capita health expenditures	0.85	0.49	0.22	0.28	0.43	0.40	0.37	0.52	0.46	0.44
Total rate	2.24	2.07	1.58	1.38	1.39	1.35	1.17	1.16	1.72	1.45
High growth - Higher Life Expectancy										
Population	1.37	1.57	1.37	1.14	1.02	1.00	0.84	0.66	1.29	1.04
Per capita health expenditures	0.85	0.49	0.23	0.33	0.51	0.48	0.43	0.57	0.49	0.49
Total rate	2.24	2.07	1.61	1.47	1.53	1.49	1.28	1.23	1.78	1.53

1 These growth rates can be considered as proxies for the growth rates of expenditures under the medical care and hospital insurance programs.

Source: Statistics Canada and estimates by the authors.

assumed that, from 1986 to 2001, mortality would go down mainly at higher ages. In fact, we notice that increased life expectancy has a slightly higher effect on the age structure component than on the population size component; but, overall, the shift is relatively small, accounting for a difference of only about one-tenth of a percentage point in the growth rate for government-insured health expenditures by 2031. Thus, differences in life expectancy of that order of magnitude have a relatively small impact and do not significantly change the pattern of the two basic scenarios. A more important change in life expectancy would have a larger impact, but, since our model of projection assumes no radical change in medical technology, we have decided not to include such a scenario.[35]

The other component of demographic growth that can be analyzed is migration. We remember that the two basic scenarios were constructed by combining the low fertility and low immigration assumptions on one hand and the high fertility and high immigration assumptions on the other hand. Two intermediate scenarios are presented in Table 2.10 (see also Tables B-15 and B-16 in appendix) combining low fertility with net immigration of 100,000 people per year and high fertility with net immigration of 60,000 per year, while life expectancy at birth is the

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35 Note that we would need really revolutionary changes to increase life expectancy by a large number of years. For example, an important improvement like elimination of cancer would increase life exepctancy at birth by simply 3 years. See K.S. Gnanasekaran, "Mortality Trends and Projections for Canada and the Provinces, 1950-1986", in *Technical Report on Population Projections for Canada and the Provinces*, Statistics Canada, Catalogue 91-516, July 1975. For more details, see Boulet, J.A.; *The Impact of Alternative Features of Mortality Patterns on Expenditures under the Medical Care and Hospital Insurance Programs*, paper presented to the Canadian Population Society Annual Meetings of the Learned Societies Conferences held at the University of Western Ontario, London, May 29-30, 1978.

Table 2.10

AVERAGE ANNUAL GROWTH RATE OF GOVERNMENT-INSURED HEALTH EXPENDITURES, BROKEN DOWN BY COMPONENT, IMPACT OF DIFFERENT IMMIGRATION ASSUMPTIONS, CANADA, 1976-2031

	1976-1981	1981-1986	1986-1991	1991-1996	1996-2001	2001-2011	2011-2021	2021-2031	1976-2001	1976-2031
					(percentages)					
Low Fertility - Low Immigration										
Population	1.08	1.06	0.91	0.73	0.60	0.48	0.28	0.04	0.88	0.55
Per capita health expenditures[1]	0.73	0.63	0.52	0.58	0.67	0.66	0.68	0.82	0.62	0.68
Total rate	1.82	1.70	1.45	1.32	1.28	1.16	0.97	0.87	1.51	1.23
Low Fertility - High Immigration										
Population	1.26	1.23	1.08	0.89	0.77	0.64	0.44	0.20	1.04	0.71
Per capita health expenditures	0.69	0.59	0.49	0.55	0.64	0.64	0.67	0.80	0.59	0.65
Total rate	1.96	1.83	1.58	1.45	1.41	1.29	1.11	1.01	1.63	1.36
High Fertility - Low Immigration										
Population	1.19	1.40	1.21	0.98	0.86	0.86	0.70	0.52	1.13	0.89
Per capita health expenditures	0.90	0.53	0.26	0.35	0.53	0.49	0.44	0.59	0.52	0.51
Total rate	2.10	1.94	1.48	1.34	1.40	1.36	1.14	1.12	1.64	1.40
High Fertility - High Immigration										
Population	1.37	1.57	1.37	1.14	1.02	1.00	0.84	0.66	1.29	1.04
Per capita health expenditures	0.85	0.49	0.23	0.33	0.51	0.48	0.43	0.57	0.49	0.49
Total rate	2.24	2.07	1.61	1.47	1.53	1.49	1.28	1.23	1.78	1.53

1 These growth rates can be considered as proxies for the growth rates of expenditures under the medical care and hospital insurance programs.

Source: Statistics Canada and estimates by the authors.

same as in the two basic scenarios. Higher immigration obviously increases total population. Also, because immigrants are concentrated in younger age groups, we expect higher immigration to have some attenuating effect on the age structure of the population and, in particular, the aging aspect.

The two intermediate scenarios, of course, give growth rates of government-insured health expenditures somewhere in between the growth rates of the two basic scenarios. In fact, the impact of immigration is quite large since low fertility with high immigration produces about the same growth rate as high fertility with low immigration. However, we notice that immigration affects mainly the population size component of the growth of government-insured health expenditures, while the age structure component is still dominated by the fertility assumptions.

In summary, the above exercise shows clearly that the major factor that affects the age structure of the population is fertility. Reasonable changes in life expectancy would affect only slightly both components of increase of government-insured health expenditures, while changes in immigration would have a relatively small impact on the age structure component, but would significantly affect the population component.

2.4.3 Impact of Changes in Consumption Patterns

So far, we have assumed that age and sex specific consumption patterns of government-insured health services would remain the same during the projection period. We will

now assume that some action is taken by governments in order to realize some savings in the hospital sector. We have chosen hospitals' rather than physicians' services because the hospital sector is considered, in particular, to be less efficient than it could be.[36]

In this scenario, we will assume that, from now to 1986, length of stay in hospitals will be reduced by 10 per cent for people aged less than 65 years and by 20 per cent for people aged 65 years or more. It is further assumed that half of this reduction will occur by 1981, the other half by 1986, and that length of stay will remain at its 1986 level for the rest of the projection period. This pattern of change is somewhat arbitrary, but it is presented here mainly as an example in order to evaluate the magnitude of the impact on government-insured health expenditures. It should be remarked that we are not concerned for the moment about how this reduction will be done. Certain suggestions will, however, be made in the concluding section.

Table 2.11 (see also Tables B-17 and B-18 in Appendix B) summarizes the result of this reduction in length of stay using the two basic demographic scenarios. We can see clearly in comparing these figures with the figures in Table 2.8 that the impact is quite large since we observe negative growth rates in per capita cost of government-insured hospital services and of all government-insured health services for the period

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36 For example, the recent policies introduced in Ontario aiming at closing hospitals and at decreasing the number of beds should be noted.

Table 2.11

AVERAGE ANNUAL GROWTH RATE OF GOVERNMENT-INSURED HEALTH EXPENDITURES, BROKEN DOWN BY COMPONENT, IMPACT OF A REDUCTION OF LENGTH OF STAY IN HOSPITALS, HIGH DEMOGRAPHIC AND LOW DEMOGRAPHIC GROWTH SCENARIOS, CANADA, 1976-2031

	1976-1981	1981-1986	1986-1991	1991-1996	1996-2001	2001-2011	2011-2021	2021-2031	1976-2001	1976-2031
					(percentages)					
Low Growth										
Population	1.08	1.06	0.91	0.73	0.60	0.48	0.28	0.04	0.88	0.55
Hospital services										
Per capita expenditures	-0.62	-0.84	0.61	0.70	0.79	0.78	0.78	0.95	0.13	0.52
Total expenditures	0.46	0.22	1.53	1.43	1.41	1.27	1.07	1.00	1.01	1.06
Total rate (physicians and hospitals)[1]										
Per capita expenditures	-0.26	-0.45	0.47	0.54	0.64	0.64	0.62	0.73	0.19	0.45
Total expenditures	0.82	0.61	1.40	1.27	1.25	1.13	0.90	0.77	1.07	1.00
High Growth										
Population	1.37	1.57	1.37	1.14	1.02	1.00	0.84	0.66	1.29	1.04
Hospital services										
Per capita expenditures	-0.50	-0.98	0.29	0.42	0.61	0.56	0.49	0.66	-0.03	0.30
Total expenditures	0.87	0.59	1.67	1.57	1.64	1.57	1.34	1.33	1.26	1.34
Total rate (physicians and hospitals)										
Per capita expenditures	-0.13	-0.57	0.19	0.29	0.49	0.47	0.37	0.49	0.06	0.27
Total expenditures	1.24	1.00	1.57	1.44	1.52	1.47	1.22	1.16	1.35	1.31

1 These growth rates can be considered as proxies for the growth rates of expenditures under the medical care and hospital insurance programs.

Source: Statistics Canada and estimates by the authors.

1976 to 1986. Thus, if it is possible to reduce length of stay in hospitals in the manner that we have just described, this will help significantly to compensate for the effect of the growth and changing age structure of the population on government-insured health expenditures.

Other similar changes in consumption patterns of health services would produce similar results. In fact, a smaller reduction in length of stay would have been enough to significantly offset the effect of the changing age structure of the population. It should be noted, however, that a reduction of the same magnitude in consumption patterns of physicians' services would have had a smaller impact. Nevertheless, the example that we have just presented demonstrates clearly the benefits of realizing certain economies in the health services sector.

2.4.4 Impact of Changes in Relative Prices

In order to have an idea of the real costs of government-insured health services and of the share of those services in the GNP, we have to evaluate the effects of relaxing the assumption of constant relative prices. However, since the margin of error may be large in any attempt to predict future prices, we will proceed with that analysis in a somewhat different way from what we have done so far in analyzing changes in the assumptions underlying the model. Instead of defining alternative price scenarios, we will provide a method for estimating the relationship between changes in prices and changes

in the share of government-insured health care as a percentage of GNP.

In order to carry this analysis, it is convenient to derive further results from equation (4), defined above. This equation expresses the cost of health services (in this case, government-insured health services) as the product of per capita cost and population:

$$C = cP$$

Per capita cost (c) can be broken down further into two parts: the number of services per capita (s) and the cost per service (q): We then have

$$C = sqP \ , \tag{7}$$

and the growth rate of that expression can be written as

$$\frac{d \log C}{dt} = \frac{d \log s}{dt} + \frac{d \log q}{dt} + \frac{d \log P}{dt} \ . \tag{8}$$

Note that, in all the projections done so far, it was assumed that relative prices are constant, i.e. $\frac{d \log q}{dt} = 0$, and that the growth in per capita cost was due entirely to increases in the number of services per capita (caused, for example, by increases in the proportion of aged). Thus, equation (8) indicates how changes in relative prices will affect real government-insured health expenditures.

It is interesting to relate this last equation to the rate of change of the share of government-insured health care as a percentage of GNP. Let h be the share of these health

expenditures as a percentage of GNP and Y be the GNP, we have,

$$h = \frac{C}{Y} \quad , \tag{9}$$

whose growth rate can be expressed as:

$$\frac{d \log h}{dt} = \frac{d \log C}{dt} - \frac{d \log Y}{dt} \quad . \tag{10}$$

Defining now GNP per capita as

$$y = \frac{Y}{P} \quad , \tag{11}$$

we have

$$\frac{d \log y}{dt} = \frac{d \log Y}{dt} - \frac{d \log P}{dt} \quad ,$$

or $$\frac{d \log Y}{dt} = \frac{d \log y}{dt} + \frac{d \log P}{dt} \quad . \tag{12}$$

Substituting in (10) the expression in (8) for $\frac{d \log C}{dt}$ and the expression in (12) for $\frac{d \log Y}{dt}$, the term $\frac{d \log P}{dt}$ disappears and we get

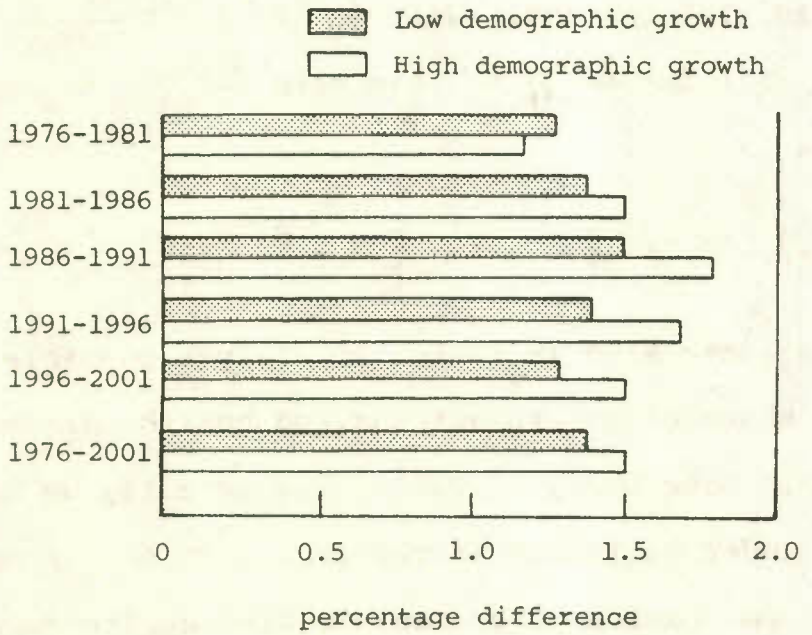
$$\frac{d \log h}{dt} = \frac{d \log s}{dt} + \frac{d \log q}{dt} - \frac{d \log y}{dt} \quad . \tag{13}$$

This expression is useful to analyze possible future trends in the share of government-insured health care as a percentage of GNP. Note that, in Tables 2.8 to 2.11, we have estimated $\frac{d \log s}{dt}$ under different assumptions. This is simply the growth rate in per capita government-insured health expenditures at constant relative prices. For example, in Table 2.8, between 1976 and 2001, this rate was 0.63 per cent for low demographic growth and 0.49 for high demographic growth. On the other hand,

the term $\frac{d \log y}{dt}$ approximates the growth of productivity per capita in the economy. If we assume that the latter will grow at about 2 per cent per year, we can see from equation (13) that, in order to prevent the share of government-insured health cost as a percentage of GNP from increasing between 1976 and 2001, the relative price of health services would have to increase by less than 1.37 (2.00 - 0.63) per cent per year in the low demographic growth scenario and 1.51 (2.00 - 0.49) per cent per year in the high demographic growth scenario (see Chart 2.3).

Chart 2.3

DIFFERENCE BETWEEN ANNUAL INCREASE OF GNP AND ANNUAL INCREASE OF GOVERNMENT-INSURED HEALTH EXPENDITURES AT CONSTANT RELATIVE PRICES, UNDER THE ASSUMPTION THAT PER CAPITA GNP WILL INCREASE AT 2 PER CENT PER YEAR, CANADA, 1976-2001



Source: Estimates by the authors

In practice, it is difficult to measure accurately relative price changes in the health services sector because of changes in quality. With that reservation in mind, it is clear, however, that prices of health services have increased in the past much faster than other prices.[37] If relative health prices continue to rise at the same rates in the future, the share of government-insured health expenditures as a percentage of GNP will increase. However, the relative price rise that has been experienced in the past can be partly attributed to the substantial intervention of governments in that sector during that period. Further, we have seen in the first chapter that the effects of that intervention considerably softened over the recent years. If there are no further interventions, as might be expected given the present economic and social climate, then prices of health services should increase at a much slower rate than they did before and the share of government-insured health care as a percentage of GNP could remain stable, or could even decrease.

2.5 Conclusion: Evaluation of Margin of Flexibility Resulting from the Projections

We have presented a number of projections of government-insured health expenditures based on different assumptions about the factors that will affect their growth. To conclude this chapter, it might be useful, for the purpose of policy interest, to distinguish between the factors that are controllable and those that are not.

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37 See J.L. Migué and G. Bélanger, *The Price of Health*, Macmilland Company of Canada, Toronto, 1974, Chapter 5.

Our view is that all demographic variables should clearly be considered as not appropriate for attempts at control. Even if we know that low demographic growth, because of aging, will involve a higher relative burden of health services than high demographic growth, it would not be sensible to establish policies to increase birth rate just to decrease that burden. The argument is similar with respect to immigration policies.

The best policies to influence the growth in government-insured health expenditures are probably those oriented towards changing consumption patterns of health services. We have seen in one of the scenarios that a reduction in consumption could significantly change some of the trends. Thus such efforts have considerable potential.

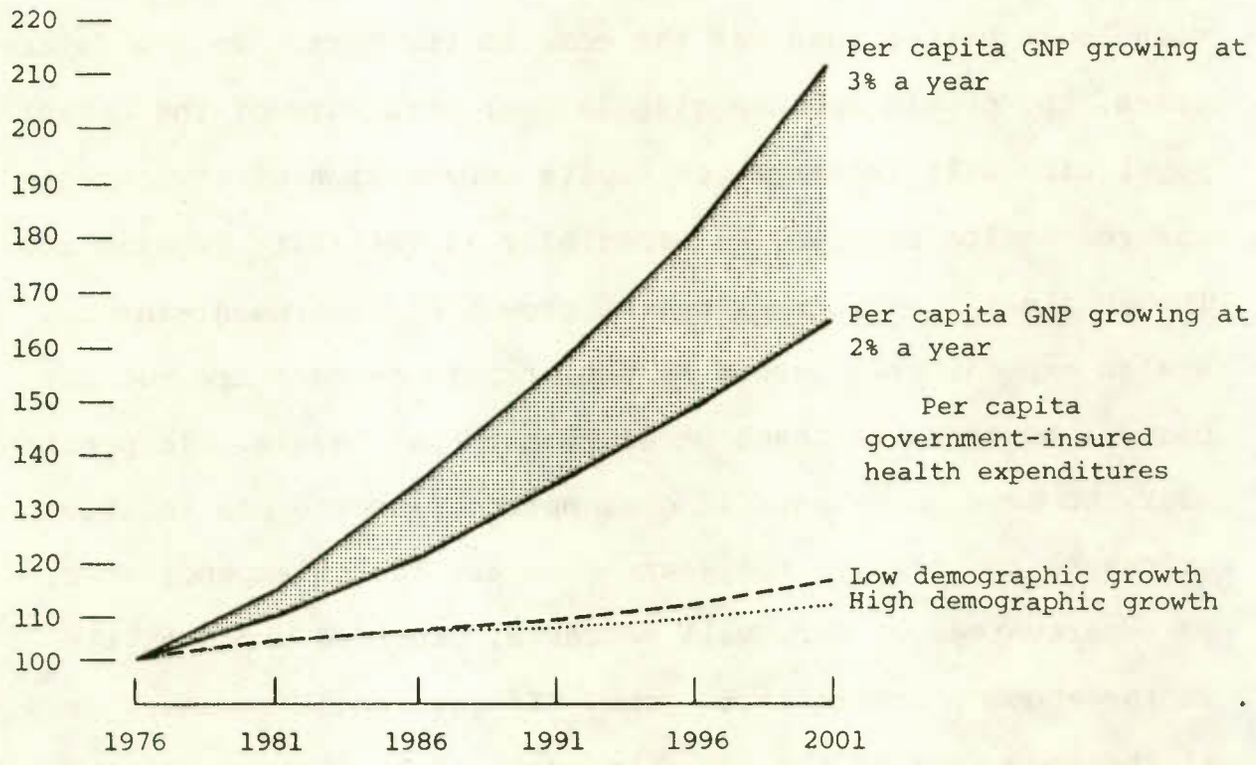
Finally, we have seen that changes in relative prices could have an important impact on the future share of health in the GNP. Even if relative prices in the economy are determined by market forces, in the health services sector, because of the major role of governments, it could be possible to some extent to control their growth. Keeping relative prices of health services at their present level could even decrease the share of health costs as a percentage of GNP.

In Chart 2.4, we compare the evolutions of per capita GNP and government-insured health expenditures for the period 1976-2001 under the assumptions that GNP per capita will grow at 2 per cent and 3 per cent per annum and that the relative price of government-insured health services will remain constant.

We can see clearly that the growth of health expenditures caused by aging of the population will be much lower than the growth of GNP per capita that we can expect from possible increases in productivity. This means that, if consumption patterns and prices remain constant, the burden of the government-insured health services sector relative to economy's productive capacity will decrease substantially and that governments could enjoy a margin of flexibility in the process of allocating resources between health and other sectors.

Chart 2.4

EVOLUTION OF PER CAPITA GNP AND GOVERNMENT-INSURED HEALTH EXPENDITURES AT CONSTANT RELATIVE PRICES, CANADA, 1976-2001 (1976 = 100)



Source: Statistics Canada and estimates by the authors

Summary and Conclusions

Through a series of programs whose purpose was to make health services accessible at a low cost to the entire population, the most important of those programs being the medical care and hospital insurance programs, government intervention in the health services sector in the 50s and 60s was responsible to some extent for the relative increase that took place over that period in amount of resources devoted to health. During the 60s, the share of health expenditures as a percentage of GNP rose at a notable rate, but, since the beginning of the seventies, it has remained at a stable level. Thus, despite the fact that concern is frequently expressed about the large amount of resources devoted to health care, the present situation looks better than was the case in the past. In the future years, the growth and changing (aging) structure of the Canadian population will increase per capita consumption of government-insured health services,[38] especially if fertility remains low. Though significant, the rates of growth of government-insured health expenditures caused by demographic changes are not expected, however, to reach unreasonably high levels. In particular, we have seen that, if consumption patterns and relative prices do not change, the share of these health expenditures, as a percentage of GNP, will decrease, provided productivity in the economy continues to grow. If government revenues grow at the same rate as the GNP, the share of health costs in their budgets should decrease as well.

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38 As proxied by the costs associated with physicians' services and public general and allied special hospitals. See footnote 26 and relevant text.

Thus, it is not impossible (with the caveats concerning consumption patterns and relative prices clearly in mind) that governments could enjoy some margin of flexibility in the process of allocating resources between health and other sectors in the future. The choices that will have to be made as to whether to allocate any "flexible" resources to health or to some other sectors will depend of course on the preference patterns of consumers, but because government intervention replaced to a large extent market mechanisms in the health services sector, such decisions should evolve collectively.

It is not easy to define what would be, for the society, an acceptable level of quality and of quantity of health care. In individual cases, people very often are willing to pay very large amounts in order to save a life or to prevent other consequences of ill health. It is clear that this attitude, if generalized, could lead to investing all our resources in health. In practice, choices made at the level of the collectivity have to take account of a broader set of alternatives.

Without anticipating the preferences that might be expressed, through the voting process, by consumers-citizens about the quality and quantity of health services they might wish in the future, some minimum standards can be defined by considering the present environment. To begin with, consumers will probably attempt to ensure that the services which they receive are at least comparable to those they would receive in

a neighbouring area. In addition, producers will wish to be able to work with the same kind of equipment that is available elsewhere. Also, these producers would prefer that the income they earn from their profession be comparable to the income that they could earn in a neighbouring area. Without this there will tend to be a shortage of medical manpower in the regions where the mobility is high, and/or a decrease in the quality of professional services available.

These are the constraints within which decisions on health policy will have to be made. It might be worthwhile pointing out here that the state of health of an individual or a population is not only affected by the amount of health services consumed. Thus, policies aiming at influencing health should concentrate on other factors as well. In fact, it seems that increases in national health expenditures in developed countries may not have a relatively large impact on the level of health.[39] Some American studies have suggested that heredity, education, life-style, and environment are more important in explaining the state of health than consumption of health services.[40]

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39 See for example, Newhouse, J.P., "Medical-Care Expenditures: A Cross-National Survey", *Journal of Human Resources*, Vol. XII, No. 1, Winter 1977, pp. 113-125.

40 U.S. Council of Economic Advisers, *Annual Report 1976*, Chapter 3; L. Benham and A. Benham, "The Impact of Incremental Medical Services on Health Status, 1963-1970" in Ronald Anderson, et. al., *Equity in Health Services* (1975); V.K. Fuchs, *Who Shall Live* (New York: Basic Books, Incorporated, 1974).

This, however, should not be considered as a reason for reducing the consumption of health care services in as far as these are based on the need for treatment. Nonetheless, there is probably room for a more judicious use of the existing facilities, and this would require changes in producers' and consumers' attitudes. It is known, for example, that some people make unnecessary use of health services, while others make inadequate use of these services until their problems become unavoidably evident. It is clear that making more services available to those who already use too many of those services would have no impact on their health. On the other hand, if people who make inadequate use of the services used them earlier, this could have a significant impact on their health as well as on the total cost they ultimately incur.

This example suggests that, regardless of the optimal quantity and quality of health services the population wishes, it should be possible to make more efficient use of the existing resources. There are a number of ways of making more efficient use of health resources that can be suggested; some of these are noted below.

Measures Aimed at Influencing Consumers

1. In order to make consumers more aware of the financial implications of the consumption of government-insured health services, the appropriate government agencies could mail them annually a statement of the costs they have incurred.

2. Similarly, through public media, governments could make consumers sensitive to the fact that health care is not, in effect, a "free" good.

3. Many Canadians use out-patient departments of hospitals for cases that could be treated in the physician's office. People should be made aware that this habit leads to higher costs. At the same time, policies to encourage easier access to physicians on weekends might help reduce some of the burden on out-patient departments of hospitals.

4. Because of aging of population, the composition of the demand for health services will change. If the methods of taking care of the aged do not change, the additional costs could be high because of the inappropriateness of the existing hospital facilities for that kind of care. Alternative methods of taking care of the aged may be more efficient and less costly.[41]

5. Canadians should be made more and more conscious of the possibilities that they have to improve their health themselves by decreasing their consumption of tobacco, of alcohol and of drugs, by changing their eating habits, by doing appropriate physical exercise, and so on.[42]

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41 For example, many hospitals have been designed for short-term care rather than for long-term care. On the other hand, it is possible in many cases to take care of the aged at home rather than in hospitals, as it is done in some European countries. It is interesting to note that the proportion of the population aged 65 and more in Europe is much higher than in Canada (12 per cent on average, reaching 15 per cent in some countries, compared to 8.6 per cent in Canada in 1976).

42 See M. Lalonde, op. cit. (footnote 7).

Measures Aimed at Influencing Producers

1. Without neglecting the quality of care, governments should continue attempts to improve the surveillance of the budgets of hospitals or of departments of hospitals. If done properly this could encourage managers to allocate resources more efficiently by avoiding, for example, the presence of an excess (or inadequate) number of beds and of excess (or insufficient) personnel.

2. Some medical acts currently done by professionals could be done by nurses or certain less qualified personnel.

3. Within the limits of the budgetary constraints, the geographical distribution of equipment could be improved by avoiding surpluses in some regions and shortages in others.

4. Committees could be formed to evaluate, on a sampling basis, the appropriateness of length of stay in hospitals, and of surgical procedures.[43] They should also study the quality and necessity of technological innovations, and their rate of obsolescence.

5. Advertising could be introduced for certain pharmaceutical products, and for eyeglasses and the like. According to some American studies,[44] prices are lower in the regions where such advertising is allowed.

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43 See, E.G. McCarthy and C.W. Widener, "Effects of Screening by Consultants on Recommended Elective Surgical Procedures", The New England Journal of Medicine, Vol. 291, No. 25, December 1974.

44 J.F. Cady, *Restricted Advertising and Competition: The Case of Retail Drugs*, American Enterprise Institute for Public Policy Research, 1976; L. Benham and Y. Brogeau, *Advertising Competition and the Price of Eyeglasses*, American Enterprise Institute for Public Policy Research, 1975, Reprint No. 36.

APPENDIX A

Supplementary Tables to Chapter 1

Table A-1

SOURCES OF FUNDS FOR HOSPITALS' EXPENDITURES, CANADA, 1948-1961[1]

	1948	1950	1953	1954	1955	1956	1957	1958	1959	1960	1961
	$ millions										
Private[2]	117.2	145.6	184.3	194.8	200.6	237.8	265.5	265.6	161.5	180.1	112.3
Public[3]	103.8	151.4	219.8	251.9	279.4	291.9	321.9	374.4	572.6	646.1	811.7
Total	221.0	297.0	404.1	446.7	480.0	529.7	587.4	640.0	734.1	826.2	924.0
Public as a percentage of total	47.0	51.0	54.4	56.4	58.2	55.1	54.8	58.5	78.0	78.2	87.8

1 Includes public and private active treatment, mental, tuberculosis and chronic hospitals. Excludes National Defence Hospitals.

2 Includes patient and other revenue, voluntary insurance and one-third of deficits of active treatment hospitals.

3 Includes public insurance, workmen's compensation, government grants, government payments for individuals, federal hospitals, and two-thirds of deficits of active treatment hospitals.

Source: *Royal Commission on Health Services*, Volume I, Ottawa, Queen's Printer, 1964, page 475, and estimates by the authors.

Table A-2

SOURCES OF FUNDS FOR TOTAL HEALTH EXPENDITURES,
IN PERCENTAGES, CANADA, 1960-1975

	1960	1965	1970	1971	1972	1973	1974	1975
				percentages				
Private	57	49	31	28	27	27	26	25
Public	43	51	69	72	73	73	74	75
Federal	16	20	29	31	31	31	32	32
Provincial	24	29	39	40	41	41	41	42
Local	3	2	1	1	2	1	1	1
Total	100	100	100	100	100	100	100	100

Source: Health and Welfare Canada, Health Economics and Statistics Division, preliminary unpublished figures.

Table A-3

GOVERNMENTS' HEALTH EXPENDITURES, TOTAL AND BY LEVEL OF GOVERNMENT, IN MILLIONS OF DOLLARS AND AS A PERCENTAGE OF BUDGET, CANADA, 1965-1966/1974-1975

	Federal		Provincial		Local		Total of Three Levels	
	$ millions	%	$ millions	%	$ millions	%	$ millions	%
1965-1966	486	5.6	1,529	23.2	235	5.2	1,677	10.1
1966-1967	516	5.3	1,839	23.3	259	4.8	1,995	10.3
1967-1968	622	5.5	2,192	23.5	261	4.3	2,325	10.5
1968-1969	751	6.0	2,558	24.0	319	4.7	2,713	10.9
1969-1970	1,037	7.5	3,243	26.0	399	5.3	3,474	12.4
1970-1971	1,308	8.3	3,979	26.8	455	5.5	4,262	13.5
1971-1972	1,603	8.8	4,622	26.7	466	4.9	4,886	13.5
1972-1973	1,789	8.6	5,200	27.3	503	4.9	5,478	13.4
1973-1974	1,951	8.0	5,792	26.3	538	4.8	6,069	12.9
1974-1975	2,296	7.4	7,054	25.2	590	4.4	7,357	12.4

Sources: Public Finance Division, Statistics Canada, and estimates by the authors.

APPENDIX B

Supplementary Tables to Chapter 2

Table B-1

DEMOGRAPHIC PROJECTIONS, BY AGE, MALE POPULATION,
CANADA, 1976-2031,
LOW DEMOGRAPHIC GROWTH SCENARIO

	1976	1981	1986	1991	1996	2001	2011	2021	2031
0	177,019	195,650	201,768	191,094	179,267	176,500	179,780	171,490	167,648
1 - 4	695,748	751,642	806,573	791,579	740,542	710,835	722,571	697,966	675,291
5 - 9	937,274	880,272	954,817	1,015,906	990,409	927,784	901,066	900,407	859,221
10 - 14	1,157,844	942,914	886,113	960,636	1,021,796	996,538	901,809	916,765	884,000
15 - 19	1,186,784	1,163,259	949,261	892,898	967,516	1,028,822	941,574	914,989	914,325
20 - 24	1,096,628	1,208,928	1,185,608	973,755	918,665	993,707	1,030,304	936,355	951,194
25 - 29	973,280	1,127,576	1,239,298	1,216,849	1,007,454	953,476	1,089,656	1,003,368	977,090
30 - 34	819,449	989,179	1,142,367	1,253,731	1,231,927	1,024,424	1,045,630	1,081,759	988,980
35 - 39	664,897	821,947	990,171	1,142,226	1,253,049	1,231,900	973,429	1,107,636	1,022,583
40 - 44	641,075	660,416	815,374	981,709	1,132,589	1,242,956	1,019,396	1,040,280	1,075,618
45 - 49	628,570	628,710	647,942	800,218	964,167	1,113,342	1,202,240	951,536	1,081,793
50 - 54	592,526	606,876	607,119	626,543	775,378	936,099	1,187,807	974,575	994,735
55 - 59	490,241	559,383	573,084	574,685	595,949	740,735	1,035,679	1,117,587	885,256
60 - 64	431,807	447,605	510,880	525,191	530,725	554,767	837,284	1,061,156	870,711
65 - 69	332,349	374,399	388,510	445,852	462,972	472,753	620,567	865,950	932,925
70 - 74	240,390	269,042	302,899	316,189	367,536	386,492	418,665	630,882	797,917
75 - 79	149,698	175,230	196,138	222,089	235,550	277,992	303,204	398,863	555,261
80 and more	141,724	152,134	172,889	197,400	229,534	258,532	334,320	372,080	518,672
Total	11,357,303	11,955,162	12,570,811	13,128,549	13,605,026	14,027,653	14,744,980	15,143,645	15,153,220

Source: Statistics Canada, Special Projections.

Table B-2

DEMOGRAPHIC PROJECTIONS, BY AGE, FEMALE POPULATION,
CANADA, 1976-2031,
LOW DEMOGRAPHIC GROWTH SCENARIO

	1976	1981	1986	1991	1996	2001	2011	2021	2031
0	167,974	185,553	191,330	181,208	169,995	167,371	170,482	162,622	158,980
1 - 4	660,425	713,863	765,726	751,304	702,733	674,406	685,463	662,131	640,628
5 - 9	893,256	835,041	906,086	963,707	939,169	879,470	853,817	853,191	814,130
10 - 14	1,107,069	898,928	840,844	911,838	969,443	945,002	854,515	868,632	837,551
15 - 19	1,136,143	1,114,106	906,404	848,498	919,479	977,106	893,249	867,666	867,042
20 - 24	1,064,994	1,161,014	1,139,113	932,088	874,531	945,587	978,932	888,739	902,811
25 - 29	979,311	1,094,099	1,189,973	1,168,354	962,142	904,983	1,033,635	950,072	924,580
30 - 34	799,516	994,739	1,109,332	1,205,102	1,183,771	978,324	992,371	1,025,559	935,751
35 - 39	649,158	805,065	999,543	1,113,772	1,209,264	1,188,164	927,035	1,054,839	971,810
40 - 44	617,570	648,919	803,941	997,260	1,110,817	1,205,805	981,766	995,716	1,028,494
45 - 49	616,127	612,958	644,298	798,022	989,728	1,102,649	1,176,238	919,390	1,045,134
50 - 54	615,676	607,361	604,678	636,000	787,847	977,289	1,181,928	963,249	976,983
55 - 59	520,878	601,750	594,298	592,312	623,526	772,434	1,066,958	1,137,484	890,527
60 - 64	464,007	502,970	581,723	575,426	574,052	604,740	927,451	1,119,854	913,770
65 - 69	370,277	436,237	474,214	549,367	544,269	543,946	709,470	976,864	1,040,345
70 - 74	290,917	334,963	396,550	432,651	501,829	498,100	525,761	803,652	968,667
75 - 79	210,306	245,988	287,150	342,419	373,816	433,610	430,802	562,280	771,937
80 and more	231,260	265,372	318,341	382,939	457,083	518,919	628,092	661,898	915,281
Total	11,394,864	12,058,927	12,753,545	13,382,267	13,893,494	14,317,905	15,017,966	15,473,839	15,604,421

Source: Statistics Canada, Special Projections.

Table B-3

DEMOGRAPHIC PROJECTIONS, BY AGE, MALE POPULATION,
CANADA, 1976-2031,
HIGH DEMOGRAPHIC GROWTH SCENARIO

	1976	1981	1986	1991	1996	2001	2011	2021	2031
0	179,034	229,885	253,632	242,474	230,656	239,509	274,241	278,518	297,854
1 - 4	702,562	804,792	1,012,887	1,002,345	947,867	936,078	1,080,613	1,115,920	1,173,172
5 - 9	944,376	898,102	1,050,952	1,282,440	1,260,927	1,194,900	1,283,948	1,405,285	1,434,350
10 - 14	1,163,087	956,808	910,713	1,063,397	1,294,662	1,273,435	1,204,768	1,383,345	1,422,783
15 - 19	1,191,832	1,174,649	969,268	923,575	1,076,129	1,307,016	1,220,479	1,309,169	1,429,954
20 - 24	1,108,526	1,227,667	1,210,640	1,007,346	962,879	1,115,472	1,324,845	1,256,770	1,433,904
25 - 29	988,406	1,158,260	1,276,772	1,260,580	1,059,706	1,016,312	1,397,326	1,311,739	1,399,467
30 - 34	830,316	1,018,477	1,187,102	1,305,220	1,289,645	1,090,626	1,198,993	1,405,737	1,338,518
35 - 39	671,649	841,540	1,028,024	1,195,382	1,312,917	1,297,969	1,058,372	1,433,852	1,349,486
40 - 44	645,208	672,533	840,157	1,024,515	1,190,531	1,307,572	1,098,502	1,204,930	1,407,441
45 - 49	631,007	635,961	663,005	827,692	1,009,334	1,173,404	1,274,937	1,042,552	1,406,937
50 - 54	594,138	611,306	616,192	643,168	804,049	981,986	1,254,588	1,055,169	1,157,109
55 - 59	491,421	562,413	578,773	584,776	613,254	769,608	1,094,932	1,188,554	973,230
60 - 64	432,695	449,811	514,773	531,530	541,169	571,990	880,790	1,123,229	945,104
65 - 69	333,103	376,104	391,356	450,180	469,494	482,991	646,661	917,306	994,023
70 - 74	240,895	270,301	304,927	319,153	371,755	392,595	433,090	665,063	845,923
75 - 79	149,920	175,895	197,352	223,872	238,056	281,485	310,592	416,453	588,933
80 and more	141,801	152,416	173,544	198,575	231,333	261,126	339,441	383,229	544,449
Total	11,439,977	12,216,920	13,180,070	14,086,219	14,904,364	15,694,075	17,377,118	18,896,820	20,142,637

Source: Statistics Canada, Special Projections.

Table B-4

DEMOGRAPHIC PROJECTIONS, BY AGE, FEMALE POPULATION,
CANADA, 1976-2031,
HIGH DEMOGRAPHIC GROWTH SCENARIO

	1976	1981	1986	1991	1996	2001	2011	2021	2031
0	169,886	218,013	240,498	229,917	218,713	227,106	260,032	264,087	282,418
1 - 4	666,883	764,308	961,520	951,271	899,394	888,016	1,024,987	1,058,469	1,112,759
5 - 9	899,942	851,904	997,312	1,216,683	1,195,839	1,132,839	1,216,891	1,331,968	1,359,535
10 - 14	1,111,980	911,970	864,049	1,009,299	1,228,445	1,207,711	1,141,782	1,311,095	1,348,510
15 - 19	1,141,418	1,125,367	925,782	878,022	1,023,148	1,242,075	1,158,650	1,242,477	1,357,242
20 - 24	1,078,938	1,182,331	1,166,402	967,477	920,051	1,065,121	1,263,203	1,197,492	1,366,258
25 - 29	994,000	1,126,903	1,230,132	1,214,476	1,016,357	969,322	1,332,614	1,249,480	1,333,016
30 - 34	808,715	1,021,533	1,154,187	1,257,296	1,241,920	1,044,555	1,142,437	1,339,649	1,274,227
35 - 39	654,848	821,665	1,033,659	1,165,869	1,268,675	1,253,513	1,010,502	1,371,391	1,288,785
40 - 44	621,149	659,276	825,132	1,035,851	1,167,269	1,269,526	1,059,390	1,156,329	1,351,297
45 - 49	618,515	619,587	657,631	822,080	1,031,019	1,161,642	1,248,291	1,009,270	1,364,326
50 - 54	617,663	612,209	613,695	651,613	814,025	1,020,462	1,249,657	1,044,544	1,139,376
55 - 59	522,748	606,024	601,361	603,441	641,099	800,340	1,128,519	1,211,602	981,802
60 - 64	465,702	506,899	587,967	584,361	586,912	623,821	972,535	1,188,020	994,714
65 - 69	371,569	439,478	479,553	556,892	554,337	557,730	738,552	1,036,524	1,111,403
70 - 74	291,792	337,258	400,615	438,634	509,811	508,417	544,860	845,173	1,029,975
75 - 79	210,754	247,328	289,717	346,529	379,581	441,101	443,260	586,830	820,516
80 and more	231,439	266,061	320,004	386,099	462,221	526,348	640,780	683,718	959,540
Total	11,477,940	12,318,113	13,349,216	14,315,810	15,158,817	15,939,645	17,576,942	19,128,119	20,475,708

Source: Statistics Canada, Special Projections.

Table B-5

STANDARDIZED[1] PER CAPITA COST OF THE MEDICAL CARE PROGRAM,
BY AGE GROUP AND BY SEX,
SOME CANADIAN PROVINCES

Age Group	Sex	Newfound-land 1973-74	Nova Scotia 1970-71	Quebec 1974-75	Ontario 1974-75	Manitoba 1973-74	Saskat-chewan 1974-75	Alberta 1973-74
0-4	Males	97	97	90	82	89	101	98
	Females	79	78	75	69	76	86	85
	Total	88	88	82	76	83	93	92
5-14	Males	50	52	49	47	48	51	52
	Females	46	48	42	42	45	47	51
	Total	48	50	45	45	46	49	52
15-24	Males	57	54	53	57	60	57	59
	Females	120	111	100	112	118	114	122
	Total	88	82	76	84	89	85	90
25-44	Males	77	63	72	78	72	70	70
	Females	188	151	161	148	147	143	148
	Total	131	106	116	112	109	107	110
45-64	Males	117	115	119	117	112	102	115
	Females	149	144	154	142	140	132	148
	Total	135	130	137	130	126	116	131
65 and more	Males	172	199	184	174	174	176	177
	Females	180	185	169	169	163	178	172
	Total	176	191	175	171	168	177	174
Total	Males	82	83	80	83	83	84	82
	Females	119	117	119	123	117	116	119
	Total	100	100	100	100	100	100	100
Per capita cost estimated by Health and Welfare Canada (dollars)		37.98	39.50	66.82	67.26	53.26	55.67	55.97

1 Standardized such that per capita cost for total population is equal to 100 in each province.

Sources: Estimates by the authors from provincial statistical reports on health insurance programs. In the case of Ontario, we used unpublished tables provided by the Ministry of Health. The last row comes from Health and Welfare Canada, *Annual Report, Medical Care, 1974-1975.*

Table B-6

PER CAPITA COST OF THE MEDICAL CARE PROGRAM,
BY AGE GROUP AND BY SEX,
QUEBEC, 1971-1975 (IN DOLLARS)

	Males						Females					
Age Group	1971	1972	1973	1974	1975	Increase 1971-1975 %	1971	1972	1973	1974	1975	Increase 1971-1975 %
0-1	89.2	66.5	98.1	95.8	150.6	68.8	72.3	55.8	81.1	79.7	124.0	71.5
1-4	36.0	35.5	44.5	41.0	48.3	34.2	29.5	29.2	36.1	34.4	40.2	36.3
5-9	26.2	25.7	30.1	32.6	35.5	35.9	21.8	21.6	25.1	27.2	28.9	32.6
10-14	20.0	21.3	23.4	26.0	28.1	40.5	17.7	19.3	20.7	22.6	24.5	38.4
15-24	25.5	28.3	29.4	31.8	34.9	36.9	49.0	53.4	55.1	59.3	66.6	35.9
25-34	30.4	35.6	35.8	38.9	43.4	42.8	78.6	87.1	90.8	98.1	104.9	33.5
35-44	37.5	40.3	43.1	47.5	52.9	41.1	73.1	76.5	86.9	93.0	101.2	38.4
45-54	49.0	54.2	56.6	62.5	69.5	41.8	72.9	79.1	84.6	93.7	102.8	41.0
55-64	67.0	72.5	78.3	82.1	92.3	37.8	72.9	79.5	83.5	88.4	100.7	38.1
65 and more	90.4	95.0	101.3	109.5	114.2	26.3	86.1	90.5	92.7	100.6	109.7	27.4
Total	38.2	40.8	44.3	47.7	53.5	40.1	56.3	60.0	65.6	71.0	79.1	40.5

Sources: *Statistiques annuelles*, Régie de l'assurance-maladie du Québec; M. Rodrigue, *Quelques habitudes de consommation de services médicaux, Québec, 1971-72*, Health and Welfare Canada, Ottawa, December 1973, and calculations by the authors.

Table B-7

NUMBER OF MEDICAL SERVICES PER CAPITA,
BY AGE GROUP AND BY SEX,
QUEBEC, 1971-1975

Age Group	Males						Females					
	1971	1972	1973	1974	1975	Increase 1971-1975 %	1971	1972	1973	1974	1975	Increase 1971-1975 %
0-1	11.2	7.9	11.1	10.7	16.9	51.6	9.4	6.8	9.4	9.0	14.1	50.1
1-4	4.7	4.6	5.5	4.9	5.5	16.1	4.0	3.9	4.6	4.2	4.6	14.7
5-9	3.0	3.2	3.7	4.0	4.3	41.1	2.6	2.7	3.1	3.3	3.4	31.3
10-14	2.4	2.7	3.0	3.5	3.7	51.2	2.2	2.5	2.7	2.9	3.1	42.2
15-24	2.9	3.4	3.4	3.7	4.1	40.3	5.4	6.0	5.9	6.3	6.9	28.6
25-34	3.4	4.0	4.0	4.3	4.8	42.2	8.1	8.9	9.0	9.5	10.1	24.7
35-44	4.1	4.4	4.6	5.1	5.7	38.7	7.9	8.6	9.8	10.3	11.3	44.2
45-54	5.5	6.0	6.0	6.2	7.2	31.5	8.6	9.6	10.4	11.3	12.4	44.4
55-64	7.7	8.1	9.0	8.5	9.4	22.3	8.9	9.7	10.1	10.5	11.9	33.3
65 and more	11.3	11.5	11.5	12.1	12.4	9.6	11.7	12.0	11.8	12.4	13.2	12.2
Total	4.5	4.8	5.0	5.3	5.9	33.0	6.5	7.0	7.5	8.0	8.8	34.8

Sources: *Statistiques annuelles*, Régie de l'assurance-maladie du Québec; M. Rodrigue, *Quelques habitudes de consommation de services médicaux, Québec, 1971-72*, Health and Welfare Canada, Ottawa, December 1973, and calculations by the authors.

Table B-8

COST PER MEDICAL SERVICE,
BY AGE GROUP AND BY SEX,
QUEBEC, 1971-1975 (IN CURRENT DOLLARS)

	Males						Females					
Age Group	1971	1972	1973	1974	1975	Increase 1971-1975 %	1971	1972	1973	1974	1975	Increase 1971-1975 %
0-1	8.0	8.4	8.8	8.9	8.9	11.4	7.7	8.3	8.6	8.8	8.8	14.2
1-4	7.7	7.3	8.1	8.4	8.8	15.0	7.4	7.5	8.0	8.2	8.7	18.5
5-9	8.6	8.0	8.2	8.2	8.3	-4.2	8.3	7.9	8.2	8.3	8.4	0.5
10-14	8.3	7.8	7.7	7.5	7.6	-7.5	8.1	7.6	7.7	7.7	7.8	-3.1
15-24	8.8	8.4	8.6	8.5	8.6	-2.6	9.1	9.0	9.3	9.4	9.6	5.6
25-34	9.0	8.9	9.1	9.0	9.0	-0.2	9.7	9.8	10.1	10.3	10.4	6.9
35-44	9.1	9.2	9.3	9.4	9.3	1.8	9.3	8.9	8.9	9.0	8.9	-4.0
45-54	8.9	9.1	9.5	9.6	9.6	7.6	8.5	8.3	8.2	8.3	8.3	-2.5
55-64	8.7	9.0	8.7	9.7	9.8	12.5	8.2	8.2	8.3	8.5	8.5	3.7
65 and more	8.0	8.3	8.8	9.0	9.2	15.2	7.3	7.5	7.9	8.1	8.3	13.4
Total	8.6	8.6	8.8	8.9	9.0	5.1	8.6	8.6	8.8	8.9	9.0	4.3

Sources: *Statistiques annuelles*, Régie de l'assurance-maladie du Québec; M. Rodrigue, *Quelques habitudes de consommation de services médicaux, Québec 1971-72*, Health and Welfare Canada, Ottawa, December 1973, and calculations by the authors.

Table B-9

NUMBER OF PATIENT-DAY PER CAPITA IN
GENERAL AND ALLIED SPECIAL HOSPITALS,
BY AGE GROUP AND BY SEX,
CANADA, 1971-1973

	Males			Females		
Age Group	1971	1972	1973	1971	1972	1973
0-1	3.690	3.419	3.229	2.853	2.504	2.543
1-4	1.213	1.274	1.129	0.952	1.015	0.913
5-9	0.566	0.525	0.506	0.468	0.422	0.413
10-14	0.414	0.401	0.404	0.396	0.352	0.358
15-19	0.585	0.574	0.567	0.981	0.925	0.887
20-24	0.694	0.680	0.708	1.840	1.693	1.670
25-29	0.659	0.678	0.646	2.119	2.032	1.911
30-34	0.770	0.786	0.777	1.989	1.841	1.732
35-39	0.985	0.973	0.917	1.908	1.784	1.709
40-44	1.284	1.253	1.229	1.917	1.856	1.796
45-49	1.657	1.655	1.643	2.061	1.992	1.982
50-59	2.258	2.255	2.152	2.311	2.351	2.192
55-59	2.948	3.069	2.909	2.665	2.716	2.595
60-64	3.970	3.910	3.928	3.438	3.411	3.255
65-69	5.264	5.212	5.204	4.461	4.624	4.440
70-74	7.351	7.442	7.249	6.444	6.590	6.198
75-79	9.956	10.667	10.613	9.068	9.577	9.223
80-84	13.403	14.567	14.510	13.104	13.558	13.709
85 and more	17.495	19.763	20.237	18.164	18.796	18.702
Total	1.686	1.703	1.673	2.153	2.152	2.099

Sources: Statistics Canada, Catalogue No. 82-206 and unpublished tables from Hospital Morbidity Section, Statistics Canada.

Table B-10

NUMBER OF SEPARATIONS PER CAPITA IN
GENERAL AND ALLIED SPECIAL HOSPITALS,
BY AGE GROUP AND BY SEX,
CANADA, 1971-1973

	Males			Females		
Age Group	1971	1972	1973	1971	1972	1973
0-1	0.3843	0.3734	0.3774	0.2882	0.2634	0.2815
1-4	0.1830	0.1949	0.1873	0.1415	0.1493	0.1415
5-9	0.1007	0.0941	0.0957	0.0871	0.0796	0.0800
10-14	0.0642	0.0620	0.0627	0.0616	0.0587	0.0579
15-19	0.0754	0.0752	0.0766	0.1557	0.1541	0.1539
20-24	0.0845	0.0852	0.0892	0.2996	0.2820	0.2847
25-29	0.0804	0.0824	0.0833	0.3216	0.3196	0.3099
30-34	0.0880	0.0886	0.0891	0.2580	0.2610	0.2547
35-39	0.1014	0.1011	0.1020	0.2226	0.2179	0.2155
40-44	0.1196	0.1225	0.1213	0.1931	0.1956	0.1948
45-49	0.1420	0.1447	0.1490	0.1805	0.1806	0.1850
50-54	0.1737	0.1771	0.1744	0.1822	0.1884	0.1843
55-59	0.2011	0.2074	0.2138	0.1821	0.1867	0.1880
60-64	0.2457	0.2496	0.2542	0.1998	0.2044	0.2078
65-69	0.2810	0.2936	0.2996	0.2303	0.2358	0.2340
70-74	0.3492	0.3639	0.3592	0.2715	0.2772	0.2778
75-79	0.4169	0.4361	0.4460	0.3229	0.3308	0.3324
80-84	0.4919	0.5236	0.5275	0.3782	0.3827	0.3946
85 and more	0.5575	0.6239	0.6342	0.4153	0.4164	0.4192
Total	0.1367	0.1386	0.1399	0.1950	0.1947	0.1950

Sources: Statistics Canada, Catalogue No. 82-206 and unpublished tables from Hospital Morbidity Section, Statistics Canada.

Table B-11

PATIENT-DAYS PER SEPARATION IN
GENERAL AND ALLIED SPECIAL HOSPITALS,
BY AGE GROUP AND BY SEX,
CANADA, 1971-1973

	Males			Females		
Age Group	1971	1972	1973	1971	1972	1973
0-1	9.6	9.2	8.6	9.9	9.5	9.0
1-4	6.6	6.5	6.0	6.7	6.8	6.5
5-9	5.6	5.6	5.3	5.4	5.3	5.2
10-14	6.5	6.5	6.4	6.4	6.0	6.2
15-19	7.8	7.6	7.4	6.3	6.0	5.8
20-24	8.2	8.0	7.9	6.1	6.0	5.9
25-29	8.2	8.2	7.8	6.6	6.4	6.2
30-34	8.8	8.9	8.7	7.7	7.1	6.8
35-39	9.7	9.6	9.0	8.6	8.2	7.9
40-44	10.7	10.2	10.1	9.9	9.5	9.2
45-49	10.5	11.4	11.0	11.4	11.0	10.7
50-54	13.0	12.7	12.3	12.7	12.5	11.9
55-59	14.7	14.8	13.6	14.6	14.5	13.8
60-64	16.2	15.7	15.4	17.2	16.7	15.7
65-69	18.7	17.8	17.4	19.4	19.6	19.0
70-74	21.1	20.5	20.2	23.7	23.8	22.3
75-79	23.9	24.5	23.8	28.1	28.8	27.7
80-84	27.2	27.8	27.5	34.7	35.4	34.7
85 and more	31.4	31.7	31.9	43.7	44.6	44.6
Total	12.3	12.3	12.0	11.0	11.0	10.8

Sources: Statistics Canada, Cataloque 82-206 and unpublished tables from Hospital Morbidity Section, Statistics Canada.

Table B-12

ADJUSTED PER CAPITA COST OF SERVICES UNDER THE MEDICAL CARE AND HOSPITAL INSURANCE PROGRAMS, BY AGE AND SEX, CANADA, 1974 (DOLLARS)

Age Group	Males			Females		
	Physicians' Services	Hospitals	Total	Physicians' Services	Hospitals	Total
0-1	387.6	966.5	1,354.1	357.6	897.0	1,254.6
1-4	54.4	103.5	157.9	45.2	82.5	127.7
5-9	40.2	47.0	87.2	32.5	38.4	70.9
10-14	31.6	34.8	66.4	27.6	31.3	58.9
15-19	36.1	51.3	87.4	47.7	52.8	100.5
20-24	42.9	64.2	107.1	73.3	69.8	143.1
25-29	47.6	60.5	108.1	89.0	88.0	177.0
30-34	50.2	74.1	124.3	98.5	117.2	215.7
35-39	56.0	85.2	141.2	104.9	139.0	243.9
40-44	63.2	112.4	175.6	110.3	159.7	270.0
45-49	72.8	151.7	224.5	116.6	187.3	303.9
50-54	84.0	198.5	282.5	115.0	202.7	317.7
55-59	98.0	269.2	367.2	113.0	244.6	357.6
60-64	110.6	359.8	470.4	114.1	302.3	416.4
65-69	121.2	466.5	587.7	117.8	410.4	528.2
70-74	130.8	655.6	786.4	121.3	573.0	694.3
75-79	136.4	962.9	1,099.3	131.3	780.9	912.2
80 and more	136.4	1,362.3	1,498.7	131.3	1,366.9	1,498.2

Sources: Calculations by the authors using, Régie de l'assurance-maladie du Québec, *Statistiques annuelles 1975*, Statistics Canada, Catalogue Nos. 82-206 and 83-228, unpublished tables from the Hospital Morbidity Section, Statistics Canada, unpublished data from Statistics Canada's Survey of Consumer Finances, 1975, for the age-sex pattern of hospital consumption and unpublished data from the Saskatchewan Medical Care Insurance Commission, for the costs related to pregnancy.

Table B-13

PROJECTIONS OF EXPENDITURES UNDER THE MEDICAL CARE AND HOSPITAL INSURANCE PROGRAMS, LIFE EXPECTANCY INCREASING UP TO 1986 ONLY, LOW DEMOGRAPHIC GROWTH, 1974 PRICES, CANADA, 1976-2031

	1976	1981	1986	1991	1996	2001	2011	2021	2031
Population (000)	22,752.2	24,014.1	25,322.9	26,490.5	27,422.2	28,177.0	29,383.6	30,058.3	30,066.5
Total cost ($ millions)									
Physicians' services	1,713.9	1,859.2	1,997.4	2,109.7	2,204.9	2,298.2	2,469.8	2,579.5	2,621.8
Hospital services	3,954.3	4,346.2	4.756.2	5,137.4	5,498.5	5,852.1	6,540.5	7,236.0	7,986.9
Total	5,668.2	6,205.4	6,753.6	7,247.1	7,703.4	8,150.3	9,010.3	9,815.5	10,608.7
Per capita cost ($)									
Physicians' services	75.33	77.42	78.88	79.64	80.41	81.56	84.05	85.82	87.20
Hospital services	173.80	180.99	187.82	193.93	200.51	207.69	222.59	240.73	265.64
Total	249.13	258.41	266.70	273.57	280.92	289.25	306.64	326.55	352.84
Distribution of total cost (%)									
Physicians' services	30.2	30.0	29.6	29.1	28.6	28.2	27.4	26.3	24.7
Hospital services	69.8	70.0	70.4	70.9	71.4	71.8	72.6	73.7	75.3
Percentage imputable to persons aged 65 and more (%)									
Population	8.6	9.4	10.0	10.9	11.4	11.7	12.8	16.4	20.1
Physicians' services	14.5	15.3	16.0	17.2	18.0	18.2	19.3	24.1	29.2
Hospital services	36.6	38.0	39.6	41.9	43.5	43.9	44.5	50.0	57.8

Sources: Statistics Canada special tabulations and calculations by the authors.

Table B-14

PROJECTIONS OF EXPENDITURES UNDER THE MEDICAL CARE AND HOSPITAL INSURANCE PROGRAMS, LIFE EXPECTANCY INCREASING UP TO 1986 ONLY, HIGH DEMOGRAPHIC GROWTH, 1974 PRICES, CANADA, 1976-2031

	1976	1981	1986	1991	1996	2001	2011	2021	2031
Population (000)	22,917.9	24,535.0	26,527.8	28,381.3	29,985.0	31,459.4	34,552.7	37,419.8	39,849.3
Total cost ($ millions)									
Physicians' services	1,725.8	1,913.0	2,099.3	2,244.1	2,372.1	2,515.1	2,828.7	3,089.1	3,321.1
Hospital services	3,974.7	4,456.8	4,960.3	5,392.9	5,810.3	6,255.6	7,203.8	8,190.8	9,338.4
Total	5,700.5	6,369.8	7,059.6	7,637.0	8,182.4	8,770.7	10,032.5	11,279.9	12,659.5
Per capita cost ($)									
Physicians' services	75.31	77.97	79.14	79.07	79.11	79.95	81.86	82.55	83.34
Hospital services	173.43	181.65	186.99	190.02	193.77	198.85	208.49	218.89	234.34
Total	248.74	259.62	266.13	269.09	272.88	278.80	290.35	301.44	317.68
Distribution of total cost (%)									
Physicians' services	30.3	30.0	29.7	29.4	29.0	28.7	28.2	27.4	26.2
Hospital services	69.7	70.0	70.3	70.6	71.0	71.3	71.8	72.6	73.8
Percentage imputable to persons aged 65 and more (%)									
Population	8.6	9.2	9.6	10.3	10.6	10.7	11.2	13.8	16.1
Physicians' services	14.4	14.9	15.4	16.4	16.9	16.9	17.4	21.1	24.4
Hospital services	36.5	37.2	38.3	40.3	41.7	41.8	41.6	46.2	52.3

Sources: Statistics Canada special tabulations and calculations by the authors.

Table B-15

PROJECTIONS OF EXPENDITURES UNDER THE MEDICAL CARE AND HOSPITAL INSURANCE PROGRAMS,
LOW FERTILITY AND HIGH IMMIGRATION,
1974 PRICES, CANADA, 1976-2031

	1976	1981	1986	1991	1996	2001	2011	2021	2031
Population (000)	22,917.9	24,405.4	25,955.7	27,393.1	28,641.8	29,760.5	31,744.3	33,169.9	33,860.1
Total Cost ($ millions)									
Physicians' services	1,725.8	1,887.6	2,043.1	2,176.9	2,298.9	2,425.0	2,668.7	2,850.2	2,958.6
Hospital services	3,974.7	4,395.7	4,838.7	5,266.8	5,702.2	6,158.9	7,094.5	8,060.3	9,106.0
Total	5,700.5	6,283.3	6,881.8	7,443.7	8,001.1	8,583.9	9,763.2	10,910.5	12,064.6
Per capita cost ($)									
Physicians' services	75.31	77.35	78.73	79.47	80.26	81.48	84.07	85.93	87.38
Hospital services	173.43	180.11	186.42	192.27	199.09	206.95	223.49	243.00	268.93
Total	248.74	257.46	265.15	271.74	279.35	288.43	307.56	328.93	356.31
Distribution of total cost (%)									
Physicians' services	30.3	30.0	29.7	29.2	28.7	28.2	27.3	26.1	24.5
Hospital services	69.7	70.0	70.3	70.8	71.3	71.8	72.7	73.9	75.5
Percentage imputable to persons aged 65 and more (%)									
Population	8.6	9.3	9.9	10.7	11.2	11.6	12.9	16.7	20.4
Physicians' services	14.4	15.1	15.8	16.9	17.7	18.1	19.5	24.5	29.6
Hospital services	36.5	37.8	39.2	41.5	43.1	43.7	44.9	50.7	58.5

Sources: Statistics Canada special tabulations and calculations by the authors.

Table B-16

PROJECTIONS OF EXPENDITURES UNDER THE MEDICAL CARE AND HOSPITAL INSURANCE PROGRAMS,
HIGH FERTILITY AND LOW IMMIGRATION,
1974 PRICES, CANADA, 1976-2031

	1976	1981	1986	1991	1996	2001	2011	2021	2031
Population (000)	22,752.9	24,145.4	25,894.1	27,505.2	28,888.2	30,163.8	32,870.0	35,248.6	37,146.7
Total cost ($ millions)									
Physicians' services	1,713.8	1,884.3	2,052.3	2,179.2	2,291.6	2,421.5	2,707.9	2,935.8	3,129.0
Hospital services	3,953.9	4,406.2	4,875.6	5,278.4	5,681.6	6,128.4	7,079.6	8,035.3	9,141.6
Total	5,667.7	6,290.5	6,927.9	7,457.6	7,973.2	8,549.9	9,787.5	10,971.1	12,270.6
Per capita cost ($)									
Physicians' services	75.32	78.04	79.26	79.23	79.33	80.28	82.43	83.29	84.23
Hospital services	173.79	182.49	188.29	191.91	196.68	203.17	215.38	227.96	246.10
Total	249.11	260.53	267.55	271.14	276.01	283.45	297.81	311.25	330.33
Distribution of total cost (%)									
Physicians' services	30.2	30.0	29.6	29.2	28.7	28.3	27.7	26.8	25.5
Hospital services	69.8	70.0	70.4	70.8	71.3	71.7	72.3	73.2	74.5
Percentage imputable to persons aged 65 and more (%)									
Population	8.6	9.3	9.8	10.5	11.0	11.2	12.0	14.9	17.5
Physicians' services	14.5	15.1	15.6	16.8	17.5	17.7	18.5	22.7	26.4
Hospital services	36.6	37.5	38.7	41.0	42.7	43.2	43.6	48.6	55.2

Sources: Statistics Canada special tabulations and calculations by the authors.

Table B-17

PROJECTIONS OF EXPENDITURES UNDER THE MEDICAL CARE AND HOSPITAL INSURANCE PROGRAMS
ASSUMING A REDUCTION IN LENGTH OF STAY IN HOSPITALS FROM NOW TO 1986,
LOW DEMOGRAPHIC GROWTH, 1974 PRICES, CANADA, 1976-2031

	1976	1981	1986	1991	1996	2001	2011	2021	2031
Population (000)	22,752.2	24,014.1	25,324.4	26,510.8	27,498.5	28,345.6	29,762.9	30,617.5	30,757.6
Total cost ($ millions)									
Physicians' services	1,713.9	1,859.2	1,997.6	2,111.9	2,213.3	2,316.9	2,512.3	2,643.2	2,702.1
Hospital services	3,954.3	4,046.3	4,092.5	4,416.7	4,743.8	5,087.8	5,777.1	6,428.5	7,101.3
Total	5,668.2	5,905.5	6,090.1	6,528.6	6,957.1	7,404.7	8,289.4	9,071.7	9,803.4
Per capita cost ($)									
Physicians' services	75.33	77.42	78.88	79.66	80.49	81.74	84.41	86.33	87.85
Hospital services	173.80	168.50	161.60	166.60	172.51	179.49	194.10	209.96	230.88
Total	249.13	245.92	240.48	246.26	253.00	261.23	278.51	296.29	318.73
Distribution of total cost (%)									
Physicians' services	30.2	31.5	32.8	32.3	31.8	31.3	30.3	29.1	27.6
Hospital services	69.8	68.5	67.2	67.7	68.2	68.7	69.7	70.9	72.4
Percentage imputable to persons aged 65 and more (%)									
Population	8.6	9.4	10.0	10.9	11.5	12.0	13.3	17.2	21.1
Physicians' services	14.5	15.3	16.0	17.3	18.2	18.6	20.0	25.2	30.6
Hospital services	36.6	36.8	36.9	39.2	40.9	41.7	42.9	48.7	56.7

Sources: Statistics Canada special tabulations and calculations by the authors.

Table B-18

PROJECTIONS OF EXPENDITURES UNDER THE MEDICAL CARE AND HOSPITAL INSURANCE PROGRAMS
ASSUMING A REDUCTION IN LENGTH OF STAY IN HOSPITALS FROM NOW TO 1986,
HIGH DEMOGRAPHIC GROWTH, 1974 PRICES, CANADA, 1976-2031

	1976	1981	1986	1991	1996	2001	2011	2021	2031
Population (000)	22,917.9	24,535.0	26,529.3	28,402.0	30,063.2	31,633.7	34,954.1	38,024.9	40,618.3
Total cost ($ millions)									
Physicians' services	1,725.8	1,913.0	2,099.4	2,246.3	2,380.6	2,534.3	2,873.1	3,157.1	3,408.7
Hospital services	3,974.7	4,151.0	4,274.9	4,644.6	5,021.8	5,448.1	6,371.5	7,284.6	8,315.2
Total	5,700.5	6,064.0	6,374.3	6,890.9	7,402.4	7,982.4	9,244.6	10,441.7	11,723.9
Per capita cost ($)									
Physicians' services	75.31	77.97	79.14	79.09	79.19	80.11	82.20	83.03	83.92
Hospital services	173.43	169.19	161.14	163.53	167.04	172.23	182.28	191.57	204.71
Total	248.74	247.16	240.28	242.62	246.23	252.34	264.48	274.60	288.63
Distribution of total cost (%)									
Physicians' services	30.3	31.5	32.9	32.6	32.2	31.7	31.1	30.2	29.1
Hospital services	69.7	68.5	67.1	67.4	67.8	68.3	68.9	69.8	70.9
Percentage imputable to persons aged 65 and more (%)									
Population	8.6	9.2	9.6	10.3	10.7	10.9	11.7	14.6	17.0
Physicians' services	14.4	14.9	15.4	16.4	17.1	17.3	18.1	22.1	25.7
Hospital services	36.5	36.0	35.5	37.6	39.1	39.6	40.0	44.9	51.2

Sources: Statistics Canada special tabulations and calculations by the authors.