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# Public Homecare Expenditures in Canada

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Un examen des dépenses des gouvernements provinciaux au Canada concernant les soins à domicile révèle qu'il existe de grandes différences dans la dépense publique réelle par personne. Les déterminants-clés de la dépense provinciale réelle par personne pour les soins à domicile sont le revenu provincial réel par personne — les variables représentant la proportion de la population âgée de 65 ans et plus — les transferts réels, par personne, du gouvernement fédéral et la proportion du Revenu Domestique Brut provincial qui est destinée aux dépenses de santé. Les dépenses publiques pour les soins à domicile sont élastiques au revenu, elles prennent en compte la croissance de la population âgée et leur augmentation est prévue d'ici 2004. Il apparaît que l'accroissement des transferts du fédéral au provincial ne serait pas le moyen le plus efficace d'augmenter les dépenses publiques pour les soins à domicile, étant donné les différences constatées dans les programmes de soins à domicile proposés par les provinces.

An examination of Canadian provincial government homecare expenditures finds wide differences in real per capita public homecare expenditures. The key determinants of real per capita provincial public homecare expenditures are real provincial per capita income, variables representing the proportion of the provincial population aged 65 and older, real per capita federal health transfers and the proportion of provincial GDP devoted to health expenditures. Public homecare expenditures are income elastic and sensitive to the growth of the elderly population and are projected to increase substantially by 2005. The evidence suggests that increasing federal transfers to the provinces would not be the most effective means to boost public homecare expenditures given different provincial homecare program responses.

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## INTRODUCTION

This paper examines the dimensions of public homecare expenditures in Canada and the factors determining the growth in provincial government homecare spending. In an era of rising demand for health care, government has come to view homecare as a potential cost-saving strategy relative to more expensive acute care. However, such strategies do require an understanding of the determinants of homecare spending. Like health-care

spending in general, the determinants of homecare spending are a complex mix of economic, demographic and policy variables that need to be fully appreciated if responsible health-care policy is to be formulated.

There is now an international literature examining the determinants of health expenditures across countries that can be applied to Canada's provinces.<sup>1</sup> This paper uses a pooled time-series cross-section approach to estimate and examine the

determinants of provincial government homecare spending on data available for the period 1975–1996. While individual regressions of real per capita public homecare expenditures by province are a legitimate way of studying the determinants of spending, this approach does not highlight the obvious regional differences that can emerge across Canada. As well, such an approach limits the sample size of the study whereas pooling the time series expands sample size and therefore degrees of freedom.

The results of the paper show that the key determinants are real per capita gross domestic product (GDP), variables representing the proportion of the population aged 65 and older, real per capita federal health transfers and the proportion of GDP devoted to health care. Public homecare expenditures are shown to be sensitive to the growth in the population of the elderly. Also, a high positive income elasticity was found, suggesting that public homecare expenditures are a normal good and rising incomes will foster increased demand over time. Income growth and an aging population will lead to future growth in per capita public homecare expenditures that will accentuate already existing differences in the quantity and quality of public homecare.

Health-care spending and its determinants are major issues.<sup>2</sup> Like other industrialized countries, Canada has witnessed an increase in per capita health-care expenditures and the share of GDP accounted for by health spending. In 2000, Canada spent nearly \$95 billion on health care, representing about 9.5 percent of GDP which is down from the peak of 10.2 percent attained in 1992.<sup>3</sup> Canadian real per capita health expenditures in 2000 rose to \$2,784 (in 1992 dollars) and continued their fiscal pressure on provincial governments which deliver health care in Canada. Increased homecare spending as a substitute for more expensive acute care has been a response to this fiscal pressure. However, there is also evidence of demand for such care from consumers.<sup>4</sup> Public health care and support services for individuals at home have grown substantially, and by 1997–98 were estimated to to-

tal more than \$2 billion. While expenditure growth rates have been high, they did decline somewhat during the 1990s. Nevertheless, as a percent of total public health expenditures, public homecare expenditures have grown from about 0.7 percent in 1975–76 to almost 4 percent by the end of the 1990s (Canada. Health Canada 1997). Public homecare expenditures thus account for a small but growing proportion of total health-care spending and are viewed by many as a wave of the future both at home and internationally.<sup>5</sup>

## ISSUES AND CONTEXT

The definition of what constitutes homecare is not standardized either internationally or across Canada's provinces, but there is a fair degree of consensus as to its main components.<sup>6</sup> Homecare covers services that range from home-cleaning and support services to skilled medical and nursing services, such as feeding tubes, dressing changes, catheter insertion and breathing devices, delivered in a home environment (*Consumer Reports* 1995). The Canadian Home Care Association uses a Health Canada definition which defines homecare as "an array of services enabling Canadians, incapacitated in whole or in part, to live at home, often with the effect of preventing, delaying, or substituting for long-term care or acute care alternatives."<sup>7</sup> The National Health and Population Survey conducted by Statistics Canada defines homecare as "health care or homemaker services received at home, with the cost being entirely or partially covered by government" (Wilkins and Park 1998, p. 32). For the purposes of this paper, public homecare expenditures are as defined by Health Canada and include nursing care and support services received at home because of an illness or health condition.<sup>8</sup>

In Canada, homecare is associated primarily with the elderly and chronic health conditions. A Statistics Canada study found that over half-a-million Canadians received homecare in 1994–95 and that a substantial proportion of people who indicated

need were not receiving homecare. Approximately 136,000 people reported needing assistance with personal care such as washing, dressing, and eating but received no homecare (Wilkins and Park 1998, pp. 35-36). Only 1 percent of the household population under age 65 received homecare compared with 8 percent in the age 65–79 category and 22 percent of those aged 80 and older. As well, the number of people aged 65 and older who received homecare (352,200) greatly outnumbered those residing in institutions (185,600). Nearly 240,000 homecare users had arthritis or rheumatism, making up nearly half of homecare users. As well, the probability of receiving homecare was greater among those in the lower income groups.

In Canada, homecare is a provincial responsibility so that “access and service provisions differ across the country, as does language used to describe their various components. Specifically, there is no Canadian home and community care legislation equivalent to the *Canada Health Act* (CHA)” (Neysmith 1995, p. 160). The result is a wide range of services offered and paid for under the various provincial homecare plans. In some provinces, a physician’s referral may be required to access the homecare system while in others the referral must come from a social service agency. Recent attempts to establish a national homecare program were abandoned as the federal government concluded that “there is just too much provincial resistance to its direct involvement in home care” (Greenspon 1998). The 1999 and 2000 federal budgets have increased provincial funding for health care by increasing the amounts for the Canada Health and Social Transfer (CHST) but no specific initiatives have been targeted at homecare.

Table 1 provides information on public homecare programs across Canada’s provinces including date of formal establishment and examples of monthly services. Canada’s provinces established homecare programs beginning in the 1970s, and the 1990s have seen major reforms as regionally based homecare delivery programs adhering to provincial standards

have been implemented.<sup>9</sup> The first provincially funded homecare programs were established in 1972 in Ontario and Quebec and by the late 1980s, all provinces had them.

In Ontario, homecare has recently undergone major institutional reforms. Prior to 1994, the providers of long-term care and community and facility services operated quite independently. In 1994, mandatory provincial placement coordination services came into effect and beginning in 1997, regionally based Community Care Access Centres (CCAC) were introduced to provide simplified access to homecare services with each CCAC able to purchase services via contract from providers. In British Columbia, the Ministry of Health is withdrawing entirely from the direct provision of homecare services, and authority for homecare services is being delegated to regional and local decision-making bodies. Saskatchewan is probably the most advanced in the regionalization process; in 1994, the existing 45 homecare district boards were brought together under the authority of District Health Boards.

New Brunswick is a leader when it comes to the implementation of a centrally coordinated homecare system with regional/decentralized delivery units.<sup>10</sup> The aim of most of these types of reforms is to provide for central coordination of programs delivered regionally and with a single point of entry to a range of diverse homecare services.<sup>11</sup> In 1981, New Brunswick established the New Brunswick Extra-Mural Hospital (NBEMH) as an independent, free-standing hospital with 14 regional units. Research estimated a cost function for the NBEMH that suggested that the coordination costs of this type of dispersed delivery did not differ across units, thereby supporting the view “that it is possible to operate a decentralized hospital-at-home system ... and have the individual units obey the same objective function” (Ferguson and Barry 1992, p. 1118). In 1996, New Brunswick homecare underwent a major restructuring as the management of the existing services was devolved into eight regional hospital corporations.

TABLE 1  
Information on Provincial Homecare Programs

<i>Province</i>	<i>Year Homecare Program Established</i>	<i>Example of Value/Amount of Monthly Services</i>	<i>Date of Onset of More Regionally Based Delivery</i>
Nfld.	1975	2,268 per month (10 hrs a day) for seniors	1992
PEI	1986	28 hrs per week (4 hrs per day)	1996
NS	1988	Acute: \$4,000 per month Chronic: \$2,200 per month	1996
NB	1981	\$2,040 per month	1996
Que.	1972	35–44 hrs per week	1991
Ont.	1972	4 nursing visits per day of 1 hr each to max of 80 hrs 1st month and 60 hrs each month after	1997
Man.	1974	Upper cost limit based on institutional care formula	1992
Sask.	1978	\$2,500–3,000 per month	1992
Alta.	1978	\$3,000 per month	1995
BC	1978	40–98 hrs per month depending on care level	1997

Source: Canadian Home Care Association (1998*d*); and Health Canada (1999).

A number of factors have influenced the development and growth of homecare services over the last two decades. First, increased life expectancy and the aging of the baby-boomers have been factors in the growth in the population of seniors. A greater number of elderly people receiving costlier forms of care and treatments resulting from new technologies and drugs has helped contribute to rising health-care costs and pressures to find cheaper alternatives.<sup>12</sup> For example, in Canada those aged

65 and older accounted for 62 percent of hospital days in 1996–97 while representing only 12 percent of the population (Statistics Canada 1999).

Second, technological change has also made possible more home delivery of services, and home treatment does appear to be a consumer preference and is also often cheaper. For example, in the United States, a patient on a ventilator a few years ago would have required hospitalization at a monthly

cost of US\$21,500. Today, that service can be provided at home for about one-third the cost of an acute care hospital (Gemignani 1996, p. 57). A Canadian example for gall bladder removal and treatment for post-operative infection suggests that for over eight weeks of treatment, hospital care would cost \$21,197 while a combination of hospital and homecare cost \$5,893.<sup>13</sup> A recent study by the Saskatchewan Health Services Utilization and Research Commission found that on average it costs \$830 more overall to provide a patient with non-acute care in hospital than to discharge them home with alternate follow-up care (HSURC 1998; also Hollander 1999). Infusion therapy now allows for in-home chemotherapy and curbside vans are available to do lab tests. Examples of future technological changes which will continue to boost homecare services are smart toilets that monitor body chemistry, online computer links between doctors and patients, telecommunication devices that will monitor blood pressure, and portable diagnostic equipment. In many ways, the growth in homecare marks a return to the health system of the last century where the home environment was the primary treatment site.

Third, some of the growth in homecare is because of cost pressures on the hospital system resulting in earlier patient discharge than a decade ago. Statistics Canada recently reported that the average patient in 1996–97 spent 10.7 days in hospital, which is a day shorter than a decade earlier (Statistics Canada 1999). However, the cost effectiveness of homecare relative to acute hospital care is not conclusively decided. While a climate of fiscal restraint has fuelled the argument that home- and community-based care is a cheaper alternative to hospital care, some studies have suggested that homecare costs have been underestimated. Moreover, a “home care program is feasible because much of the daily care is actually provided by someone in the client’s immediate family” (Neysmith 1995, p. 169).<sup>14</sup> If this assessment is accurate, then the recent decline in the proportion of GDP accounted for by health expenditures may represent merely a redistribution of costs away from the formal health sector and onto families.

Finally, improvements in computerized data management information systems make it easier to manage the coordination of the dispersed delivery of homecare services. This is an important issue given that the current patchwork of systems across and within provinces has meant that the availability of information on homecare services as well as their access are important concerns. In Canada, such coordination improvements will occur at the provincial level, although it has been suggested that the policy and planning potential of a national information system with uniformity of language for homecare would provide crucial standardized data (Neysmith 1995). Ultimately, an integrated homecare system would have a single point of entry for services, coordinated assessment and placement, coordinated management of care, a consistent classification system for services, and a single administration. Homecare in Canada could at best aim to provide these elements at the provincial level.

There are a number of issues facing public homecare in Canada, including the absence of a coherent national strategy, the lack of human resources, inadequate funding, and the care-giver burden (Anderson and Parent 1999). There is also a growing trend to privatization in the Canadian homecare industry fuelled by the expectation that increased competition will drive down the cost of homecare. Regional devolution of service delivery is an attempt to create a more market-like institutional structure.<sup>15</sup> In Ontario, the entire homecare field is being opened to commercial providers with 43 regionally based CCACs established to formalize delivery and award contracts worth approximately \$1 billion. Manitoba is in the process of privatizing services for home intravenous care, those needing assistance when discharged from the hospital, and for replacing government staff on leave or vacation. The government expects to save about \$10 million.<sup>16</sup> One of the concerns with the growing privatization of homecare is with potential fraud. There have been a number of such cases in the US homecare industry but “proponents of more private-sector involvement in health care say fraud is more

unlikely here than in the U.S. because of the far greater checks and balances in Canada's medical system" (Lindgren and Den Tandt 1998, p. A6).

## DATA AND OVERVIEW

The data used in this study come from Statistics Canada (CANSIM),<sup>17</sup> Health Canada, and the Canadian Institute for Health Information (see Appendix for variable definitions and details). Figures 1 to 3 and Tables 2 to 4 provide an overview of public homecare expenditures in Canada. Figure 1 shows per capita public homecare expenditures in Canada from 1975–1996 in both nominal and real dollars and illustrates the growth in public homecare spending. In 1975, public homecare spending accounted for \$62.3 million or 0.5 percent of total health-care expenditures whereas by 1996, the total had risen to \$2 billion or 2.7 percent of total health-care

expenditures. In per capita terms, public homecare spending over this period rose from \$2.68 (\$8.25 in 1992 dollars) to \$66.75 (\$64.14 in 1992 dollars). The implied annual growth rate in real per capita public homecare expenditures over this period was approximately 10 percent, although the implied annual rate was higher before 1985 at 10.7 percent and lower for the period 1985–1996 at 9 percent. This slowdown in growth is puzzling given the attention that homecare has received over the last decade regarding its growth and increasing importance.

Figure 2 shows real per capita public homecare expenditures by province. There are dramatic variations in the level of real per capita public homecare expenditures by province and these differences are reinforced in Figure 3 which shows the dispersion across provincial programs. Real per capita homecare expenditures have risen since 1975 but the growth rate decelerated dramatically for some

FIGURE 1  
Per Capita Canadian Public Homecare Expenditures, 1975–1996

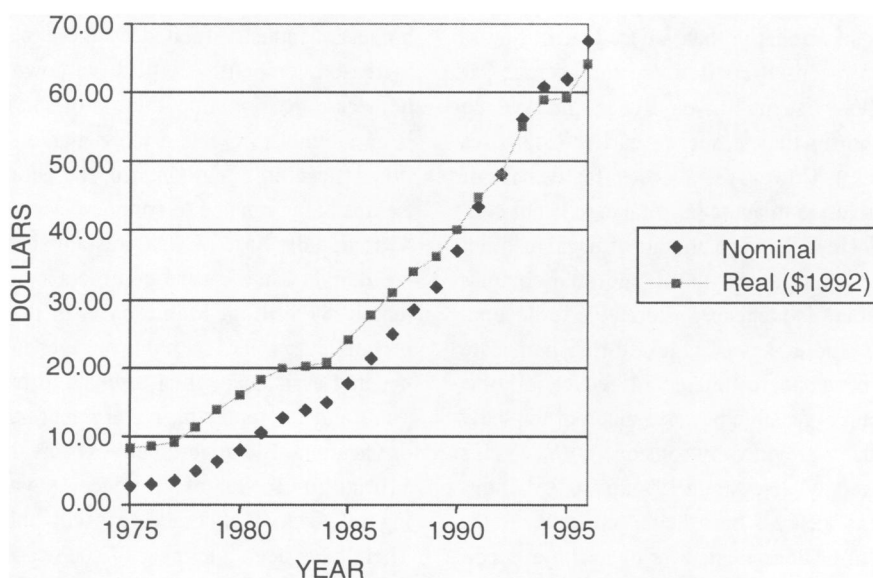


FIGURE 2  
Real Per Capita Public Homecare Expenditures, 1975–1996

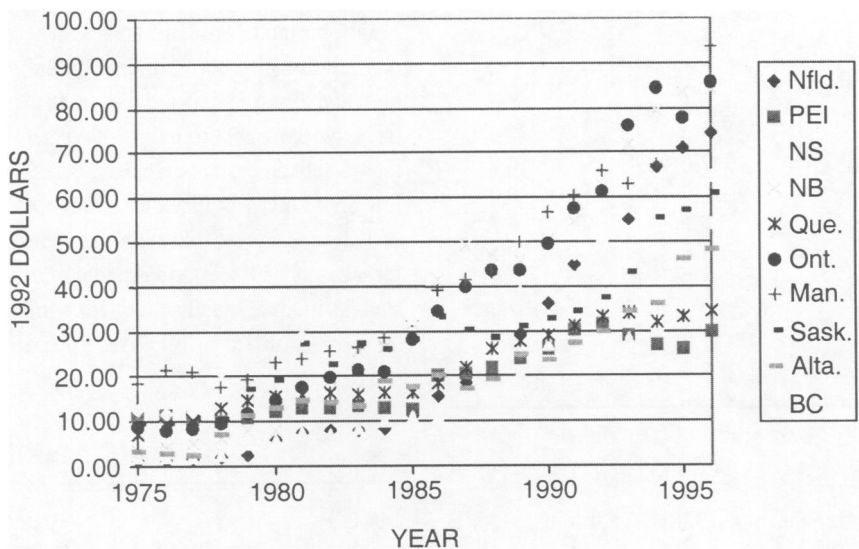


FIGURE 3  
Trends in Dispersion for Per Capita Public Homecare Expenditures

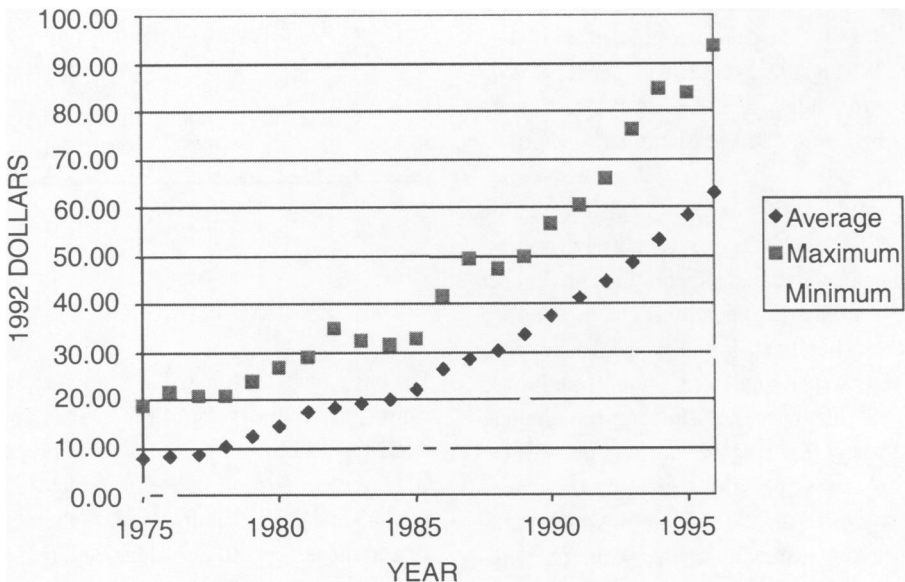




TABLE 2  
Implied Annual Growth Rates in Real Per Capita Public  
Homecare Expenditures (percent)

	1975–1985	1985–1996
Nfld.	20.8	17.0
PEI	1.0	7.9
NS	17.0	16.2
NB	22.9	9.0
Que.	8.1	6.7
Ont.	11.7	10.1
Man.	5.5	9.7
Sask.	10.9	7.0
Alta.	17.2	9.1
BC	9.5	4.5

provinces after the mid-1980s (see Table 2). As a result, the growth in expenditure has also been accompanied by increasing dispersion as the gap between the high and low spenders increases. In 1975, real (1992) per capita public homecare expenditures across the ten provinces averaged \$7.83, ranging from a low of \$1.43 in Newfoundland to a high of \$18.66 in Manitoba. By 1985, the provincial average was \$22.21 and expenditures ranged from a low of \$10.83 in Nova Scotia to a high of \$32.91 in Manitoba. By 1996, the average had reached \$63.05 and ranged from a low of \$29.87 in Prince Edward Island to a high of \$93.52 in Manitoba.

Figure 3 provides some additional information on the trend in the dispersion of spending over time. Whereas mean and median expenditures on real per capita public homecare expenditures have increased steadily, there has been a widening gap between those provinces spending large amounts and those spending near the lower end. The long-run implication is that vastly differing amounts are being spent on homecare across provinces creating the potential for vastly differing care. Table 3, which ranks the provinces by expenditure level over time, reveals some clustering into high and low public homecare spenders, but with changes over time. For

example, by the mid-1990s, Alberta ranked as one of the lower public homecare spenders along with Prince Edward Island, Quebec, and British Columbia. The high spenders were Newfoundland, Ontario, Manitoba, and New Brunswick. There is no obvious relationship here either regionally, as both the high and low spenders are dispersed across the country, or with respect to income levels as high and low income provinces are dispersed across both high and low spending provinces (see Table 4).<sup>18</sup> These observations suggest that regional or institutional differences as well as standard economic determinants such as income may account for some of the evolution of public homecare spending in each province.<sup>19</sup>

TABLE 3  
Real Per Capita Homecare Spending by Provincial Rank

		1975	1985	1995	2005 (Simulation)
Lowest	1.	Nfld.	NS	PEI	PEI
	2.	NS	Nfld.	Que.	Que.
	3.	Alta.	PEI	Alta.	Alta.
	4.	NB	QUE	BC	BC
	5.	Que.	Alta.	Sask.	Sask.
	6.	Sask.	Sask.	NS	NS
	7.	Ont.	Ont.	Nfld.	Nfld.
	8.	PEI	NB	Ont.	Ont.
	9.	BC	Man.	NB	Man.
Highest	10.	Man.	BC	Man.	NB

MODEL, ESTIMATION AND RESULTS

The basic model estimated in this paper has real per capita provincial public homecare expenditures modelled as a function of real per capita provincial GDP, the proportion of the provincial population aged 65 and older (subdivided into those aged 65 to 79 and those aged 80 and older) and real per capita federal government health transfers. These variables are found to be significant determinants of real per

TABLE 4

Comparing Selected Provincial Variables: Averages 1975–1996 (dollar amounts in 1992 dollars)

	<i>Real Per Capita Homecare Expenditures</i> \$	<i>Health Exp to GDP Ratio</i> (%)	<i>Real Per Capita GDP</i> (\$)	<i>Proportion Aged 65+</i> (%)	<i>Real Per Capita Federal Health Transfers</i> (\$)
Nfld.	24.7	12.4	14648	8.5	534.5
PEI	19.0	12.8	15378	12.4	567.4
NS	17.4	10.6	17370	11.5	535.8
NB	37.5	10.8	16908	10.8	531.2
Que.	21.5	9.1	21518	9.7	541.0
Ont.	37.5	7.9	27393	10.5	546.5
Man.	41.6	9.8	21152	12.2	533.3
Sask.	29.7	8.8	23350	12.7	555.5
Alta.	20.3	6.9	31813	8.2	538.1
BC	34.6	8.6	24984	11.5	528.6

capita public homecare expenditures in Canada (see Di Matteo and Di Matteo 1998). In addition, dummy variables for the onset of the Canada Health and Social Transfer and political parties are included. There is also a health-care sector size variable defined as the ratio of total health expenditures (net of public homecare spending) to GDP. The model is specified in log-log form so that the coefficient estimates are elasticities and therefore enable us to interpret the responsiveness of real per capita provincial public homecare expenditures to the variables. As well, provincial dummies and provincial-interactive variables are specified to allow for differences across the provinces in real per capita provincial public homecare expenditures. The data set consists of ten provincial annual time series over the period 1975–1996 resulting in 220 observations.

The inclusion of a per capita income variable is standard in studies of health-care expenditure determinants with higher income associated with greater health-care spending.<sup>20</sup> In the case of homecare spending, which is a very small portion of total health expenditures, the issue is whether publicly funded homecare expenditures are a nor-

mal or inferior good. There is less ambiguity regarding the effect of the proportion of population 65 and older, which is expected to have a positive effect on real per capita health-care expenditures. Health-care consumption is unevenly distributed over the life cycle with increasing use by the elderly. In general, costs are relatively high for infants, decline sharply during the first few years of life and then rise, at first gradually, but then more sharply as the population ages.

Canadian studies have shown that the per capita costs of health care for a 60-year old are nearly double that for a 40-year old while those for a 70-year old are nearly triple those of a 40-year old (Denton and Spencer 1983, p. 38).<sup>21</sup> In a physician fee-for-service study done for British Columbia, the average annual per capita cost increase for people aged 75 and older was 5.5 percent with fastest growth in the use of specialist care (Barer *et al.* 1989, p. 39). Studies for the United States also show similar patterns and trends in health-care expenditures associated with the aging of the population (Waldo *et al.* 1989; Schrimper and Clark 1985). Given that the proportion of population aged 65 and older was 7.6

percent in 1961 and is expected to reach 18 percent by 2025, it can be assumed that the growing number of elderly will be a factor in rising health-care expenditures (Marzouk 1991, p. 490). The evidence suggests that the relationship between total health expenditures and the elderly also repeats itself for homecare spending. The greatest users of homecare services in Canada are the elderly. As well, in the United States, it has been estimated that approximately 2 percent of those aged less than 65 need homecare services whereas 9 percent of those aged 65–69 and 45 percent of those aged 85 and older do (Freeman 1995, pp. 9–10). The increase in costs with age also provides some justification for examining the effect of different age categories for those age 65 and older.

The federal health transfer revenue variable is important to a study of the determinants of real per capita health-care expenditures because transfers are an important source of revenue to Canada's provincial governments, although they vary in importance across the country. There is, however, no *a priori* expectation as to what the effect of federal health transfers on public homecare spending might be. Homecare is not considered an insured medical expenditure like physician and hospital services under the *Canada Health Act* and therefore an increase in transfers need not result in an increase in public homecare spending. At the same time, recent decreases in federal cash transfer payments may have provided fiscal incentives for provinces to attempt to substitute public homecare for what was perceived as more expensive hospital care generating increases in public homecare spending. Real per capita federal health transfers in 1986 dollars (including both cash transfers as well as tax points<sup>22</sup>) exhibit a downward trend since 1989 which accelerated into 1995 and 1996 as federal spending restraint took effect.

By 1996–97, the end of the period dealt with in this paper, estimated total federal cash transfers to the provinces and territories totaled \$25 billion (total transfers including tax points were \$38.5 billion).

Approximately 32 percent of federal cash transfers were general purpose transfers (e.g., equalization<sup>23</sup>) and the remainder were specific purpose transfers mainly under the rubric of the CHST (Canadian Tax Foundation 1996, p. 8–2). These transfers were down substantially from the 1995–96 fiscal year which saw total cash transfers at a value of \$28.9 billion.<sup>24</sup> In 1995–96, 35 percent of federal cash transfers to the provinces and territories were general purpose and the remainder were specific purpose. Of the specific purpose transfers, \$6.9 billion were for insured health services, \$2.2 billion were for postsecondary education for a total of \$9.1 billion under what was termed Established Program Financing (EPF). Another \$7.2 billion was transferred under the Canada Assistance Plan which financed provincial welfare. The 1990s saw a shift in federal transfer funding not only in dollar amounts but also in the institutional arrangements governing those transfers, which have evolved considerably since the mid-1970s.

Prior to 1977, the federal government was providing cash transfers that essentially funded 50 percent of all provincial health-care expenditures.<sup>25</sup> The rapid increases in provincial health-care expenditures of the 1970s alarmed the federal government and this open-ended grant system was replaced in 1977 with the EPF system which linked the cash grant for health and postsecondary education to provincial income and population growth. This severed the direct link between provincial health expenditures and the federal cash contribution. In 1986, as part of its deficit control strategy, Ottawa further restricted the growth of EPF transfers (see Carter 1988, 1994; Perry 1989, pp. 446–53, 651–52). Finally, effective in 1996 (the 1996–97 fiscal year), insured health services, postsecondary education, and the Canada Assistance Plan were collapsed into the new CHST.

This rearrangement has made it difficult to obtain data on federal health transfers as they are now incorporated into a much more general transfer payment. *National Health Expenditures in Canada 1975–1996* provides a consistently defined health

transfer variable for the period 1975–95 which includes both the cash and tax point transfers. For the purposes of this paper, the 1996 federal health transfer variables were estimated by taking the ratio of federal health transfers (cash and tax points) to the total of cash and tax point transfers in 1995 and then applying it to total transfers for 1996.

The onset of EPF and the CHST were fiscal transfer events which represented efforts to control federal expenditures. Along with a federal health transfer variable to capture changes in values, it is also necessary to capture these regime changes. Dummy variables were specified in an effort to capture these changes in the Canadian federal transfer system. In an effort to see if the onset of EPF affected the ratio of public to total health expenditures, an EPF dummy variable was specified which took on a value of one for the period 1977–95 and zero otherwise. In an effort to capture the impact of the onset of the CHST, a dummy variable CHST was specified which takes on a value of one in 1996 and zero otherwise.

In addition, political party variables were included to account for their potential impact on the real per capita level of provincial public homecare expenditures. The evidence suggests that political parties have had little effect on the level of provincial government spending in Canada (Abizadeh and Gray 1992). However, it could be that some political parties are more philosophically predisposed to implementation of increased homecare expenditure programs. The Canadian political spectrum ranges from right-of-centre parties such as the Progressive Conservatives and Social Credit to the more centrist Liberals to the left-of-centre New Democratic Party and Parti Québécois.<sup>26</sup>

A pooled time-series, cross-section regression was estimated for real per capita provincial public homecare expenditures using SHAZAM 7.0 with final results presented in Table 5. The pooled time-series, cross-section approach was used because of the increase in observations and hence degrees of

freedom permitted over separate regressions by province.<sup>27</sup> Coefficient estimate significances are at the 5 percent level unless otherwise stated. The pooling technique used is that of Kmenta (1986) for data that are cross-sectionally heteroskedastic and time-wise autoregressive. As well, the model is estimated under the assumption of cross-sectional dependence as well as independence.<sup>28</sup> Box-Cox testing for functional form yielded the log-log specification as the best, therefore the coefficient estimates are interpreted as elasticities.

In arriving at the final model, empirical work began with an unconstrained model that assumed different coefficient estimates across provincial cross-sections for the constant, real per capita income, the population proportion aged 65 and older variables, real per capita federal health transfers and the share of GDP accounted for by total health expenditures.<sup>29</sup> When this model was tested against a fully constrained model (the same coefficient for all cross-sections for each variable), the fully constrained model failed the F-test, suggesting that one or more variables needed to be unconstrained. Unconstraining the constant was the next logical step and the results from the F-test suggested the need for a separate constant for each province. In subsequent steps, federal transfers, real per capita income, the population age variables, and the share of GDP accounted for by total health expenditures were unconstrained and test results indicated that only the per capita federal health transfer variable needed to be unconstrained. The EPF variable was dropped from the final specification as it was statistically insignificant at the 5 percent level.

The results in Table 5 show that real per capita provincial public homecare expenditures are positively and significantly related to real per capita provincial income, the population proportion aged 65 and older variables and the share of GDP accounted for by total health-care expenditures. Moreover, these results are significant for both the FULL and NON-FULL options (see note 28). Since the FULL model explains 96 percent of the variation in real

TABLE 5  
Final Regression Results

Variable	FULL OPTION		NON-FULL OPTION	
	Coefficient	t-statistic	Coefficient	t-statistic
Real per capita GDP	1.34	6.49*	1.59	4.61*
Proportion aged 65-79	3.74	7.47*	3.68	5.08*
Proportion aged ≥ 80	1.72	6.14*	1.41	3.32*
Health expenditure to GDP ratio	0.57	3.31*	0.76	2.72*
Constants				
Nfld.	8.14	1.61	-2.39	-0.35
PEI	12.54	4.14*	7.98	1.84
NS	4.48	0.86	-5.95	-0.93
NB	-1.81	-0.59	-4.64	-1.11
Que.	16.82	3.91*	9.71	1.30
Ont.	12.62	3.73*	8.33	1.82
Man.	17.12	6.75*	14.69	3.39*
Sask.	-1.60	-0.47	-2.81	-0.57
Alta.	-3.01	-0.58	-6.73	-0.98
BC	13.06	3.42*	9.76	1.68
Political Party Variables				
LIB	0.12	3.96*	0.13	2.76*
SC	0.23	2.97*	0.21	1.57
PQ	0.08	1.63	0.11	1.18
NDP	0.08	3.73*	0.09	2.49*
Transfer Variables				
Canada Health and Social Transfer dummy	0.06	2.06*	0.05	1.14
Interaction of real per capita federal health transfers (RFEDHTRC) and province				
RFEDHTRC-NFLD	-0.02	-0.03	1.11	1.22
RFEDHTRC-PEI	-1.03	-2.41*	-0.83	-1.40
RFEDHTRC-NS	0.25	0.31	1.39	1.49
RFEDHTRC-NB	1.43	3.16*	1.36	2.41*
RFEDHTRC-QUE	-1.55	-2.33*	-0.94	-0.89
RFEDHTRC-ONT	-0.89	-2.35*	-0.75	-1.60
RFEDHTRC-MAN	-1.67	-5.79*	-1.81	-4.28*
RFEDHTRC-SASK	1.20	2.45*	0.87	1.37
RFEDHTRC-ALTA	1.70	2.22*	1.75	1.79
RFEDHTRC-BC	-1.03	-2.00*	-1.04	-1.40
Buse R-squared	0.96		0.88	
Log of Likelihood Function	186.52		133.08	

Notes: Dependent Variable: Real (1992 dollars) per capita provincial public home care expenditures.

Functional Form: Log-Log

Estimation Range: 1975-1996

\*Denotes significant at 5 percent level.

per capita provincial public homecare spending as opposed to 88 percent for the NON-FULL, subsequent discussion focuses on the FULL results.

Real per capita provincial public homecare expenditures are income elastic as a 1-percent increase in real per capita provincial income generates a 1.34-percent increase in real per capita provincial public homecare expenditures. Real per capita provincial public homecare expenditures are even more sensitive to the proportion of population aged 65 and older. A 1-percent increase in the proportion of population aged 65 to 79 will generate a 3.74-percent increase in real per capita provincial public homecare spending while that aged 80 and older, a 1.72-percent increase. The implication is that the aging of the Canadian population will add substantially to public homecare expenditures in the next century. Indeed, what is intriguing is that the growth rate of real per capita provincial public homecare expenditures declines with the proportion of population aged 80 and older. It may be that those individuals who manage to survive into their 80s and 90s are either robust enough that they require homecare at a diminished rate of growth or that they are more likely to be institutionalized. While the fear of escalating health-care costs as the population ages is often over-emphasized, such a fear is not entirely unwarranted in the case of homecare spending. However, since homecare costs only constitute a very small proportion of total health-care costs and the growth rates in homecare spending appear to decline after age 80, the impact on overall health-care expenditures will be small.

These results for income and age may also provide an explanation for the slowdown in the growth rate of real per capita provincial public homecare spending since the mid-1980s. Although the population has been aging, generating increased homecare spending pressure, the 1990s in Canada have been a period of flat growth in real per capita provincial income and this may have reduced the growth in real per capita provincial public homecare spending below what it could otherwise have been.

As well, the share of provincial GDP accounted for by total health expenditures is positive and significant suggesting that there may indeed be cost pressures driving the increase in real per capita provincial public homecare expenditures, although the relationship is quite inelastic. A 1-percent increase in the share of provincial GDP accounted for by total health expenditures is associated with about six-tenths of a 1-percent increase in real per capita provincial public homecare expenditures.

The political party variables suggest that having certain political parties in office at the provincial level is associated with higher levels of real per capita provincial public homecare spending. Relative to the Progressive Conservatives (the omitted reference group) the Liberals, Social Credit, and New Democratic Parties all appear to have spent relatively more on real per capita public homecare expenditures while the Parti Québécois does not appear to be significantly different. It is difficult to interpret these results in any way that reflects ideology or approaches to public policy as provincial politics are influenced by many variables and provinces develop their own political cultures over time. Nevertheless, given that the results show parties across the Canadian political spectrum spending more than the omitted group, it suggests that some political parties may have been quicker to move into homecare spending than others once elected to office. As such, provinces with Liberal, Social Credit or New Democratic governments have been more likely to increase real per capita public homecare expenditures.

Finally, we come to the federal health transfer variables. First, the onset of the CHST in 1996 appears to have led to a statistically significant increase in real per capita provincial public homecare expenditures. The reduction in federal transfers associated with the onset of the new CHST transfer regime seems to have boosted real per capita provincial public homecare expenditures by approximately 6 percent. Federal health transfers appear to have had a negative and significant impact on per capita public homecare spending in five provinces (Prince Edward

Island, Quebec, Ontario, Manitoba, and British Columbia) a positive and significant effect in three others (New Brunswick, Saskatchewan, and Alberta) and no significant effect on the remaining provinces (Newfoundland and Nova Scotia). Federal health transfers are made under the auspices of the *Canada Health Act* which was designed to establish more precise conditions under which provincial health programs would qualify for federal assistance and deals with hospital and physician services (see Perry 1989, pp. 647-77). Homecare is not covered under the *Canada Health Act* and therefore, theoretically, there should exist no direct funding link between federal health transfers and homecare spending.

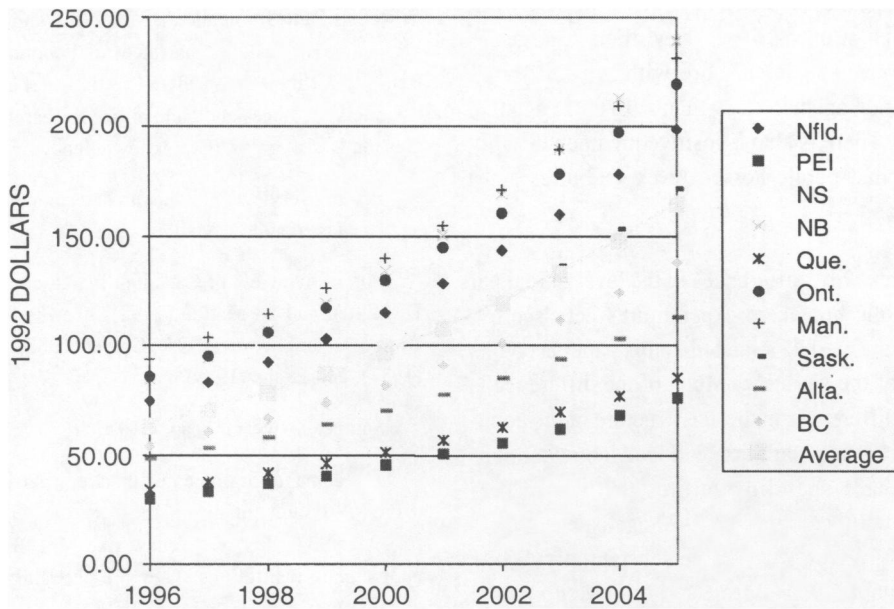
A negative coefficient on federal health transfers can be interpreted within the framework of cost pressures as fuelling a shift to homecare away from hospital care. As federal health transfers, which go primarily to hospital and physician services, are reduced, provinces face increasing fiscal pressure in their health-care sectors and therefore substitute homecare expenditures for other more traditional methods of care. This explanation, however, does not explain why New Brunswick, Saskatchewan, and Alberta would decrease public homecare spending in response to a decrease in federal transfers. New Brunswick is one of the biggest per capita spenders on public homecare and therefore may have integrated its homecare program so well into its provincial system that increases in federal transfers free up resources which are then channelled into homecare. Alberta, however, is one of the lower public homecare spenders and why it behaves in a similar way has no readily obvious explanation. A difference between Alberta and New Brunswick on the transfer side is that Alberta receives relatively low cash transfers and much higher tax point transfers given its robust economy. It may be that, compared to New Brunswick, Alberta is treating its federal health transfers more like own-income rather than an external contribution.

The regressions in Table 5 were used to simulate real per capita provincial public homecare expendi-

tures for the period 1996 to 2005. It was assumed that the key variables — real per capita income, real per capita federal health transfers, population proportions aged 65-79 and 80 plus — would grow at the provincial annual average rate for the period 1975-96 for each province. The annual growth rates used were 1.1 percent for real per capita GDP, 0.6 percent for real per capita federal health transfers, 1.6 percent for population proportion aged 65-79 and 2.8 percent for population proportion aged 80 plus.<sup>30</sup> The health-to-GDP ratio for each province was kept fixed at the 1996 level while the CHST and political party variables were omitted. Implied annual growth rates for the period were calculated and the growth rate applied to actual real per capita provincial public homecare spending from 1996 and compounded to 2005. The results are illustrated in Figure 4 while Table 3 ranks the provinces in 2005 from lowest to highest. The results are quite sensitive to the population age variables and suggest that by 2005, real per capita provincial public homecare expenditures will have increased substantially from their 1996 values. About 90 percent of the growth in real per capita provincial public homecare spending in this simulation can be attributed to the aging of the population. On average, real per capita provincial public homecare spending will rise 152 percent between 1996 and 2005 ranging from a low of 134 percent in Alberta to a high of 184 percent in New Brunswick. Average spending will rise from \$63.05 in 1996 to \$164.73 in 2005 for an implied annual average growth rate of 9.6 percent which is slightly above the implied growth rate for the 1975 to 1996 period (9.5 percent).

These simulations should be cautiously interpreted as more of an exercise rather than a forecast. The results do suggest that provincial divergence in public homecare spending will continue to grow. Whereas in 1996, per capita provincial public homecare spending in 1992 dollars ranged from \$30 to \$94, by 2005, these simulations suggest a range of \$76 to \$239. Quebec and Prince Edward Island will be clustered at the bottom of public homecare spending while New Brunswick and Manitoba will

FIGURE 4  
Provincial Public Homecare Expenditures: Simulation 1996–2005



be near the top. Nevertheless, political policy shifts and exogenous economic or demographic shocks can influence the results dramatically and are not taken into account by these simulations.<sup>31</sup>

Moreover, increases in the rates of growth for federal transfers and for income would increase per capita provincial public homecare spending, but reduce the relative impact of an aging population on public homecare expenditures. For example, using the same population proportion growth rates but with real per capita income growth of 2 percent and real per capita federal transfers growth of 1 percent, by 2005 average real per capita provincial public homecare spending would be \$177 rather than \$165. The simulation also assumed that the total health-care-to-GDP ratio remains constant and any increases in it would also generate additional upward pressure on public homecare spending according to the estimated model. However, all things given, contin-

ued divergence is going to occur with its implications of vastly different quantities and quality of public homecare spending. The demand for some type of federal public homecare program or standards will not diminish.

## CONCLUSION

Public homecare spending has become a major health policy issue in Canada over the last decade because of rising health costs and increased expenditures on health care. A pooled time-series, cross-section model was used to estimate and examine the determinants of real per capita provincial public homecare expenditures over the period 1975–96. The results show that the key determinants are real per capita provincial GDP, variables for the proportion of the provincial population aged 65 and older, real per capita federal health transfers and the



proportion of provincial GDP devoted to health care. As well, some differences exist in expenditures based on political parties in power. These expenditures are shown to be quite sensitive to the growth in the population of the elderly, though large increases were associated more with the proportion of population aged 65 to 79 than with those aged 80 and older. There is also a positive income elasticity implying that public homecare expenditures are a normal good.

There are wide differences in the level of real per capita public homecare expenditures across provinces and the model estimated in this paper accounts for most of the variation. Much of the difference is rooted in differences in the age structure of the population. An aging population will lead to greater public homecare spending, although the greatest increases will occur in the 65–79 age categories after which growth rates decline substantially. While an aging population is projected to drive up public homecare costs substantially, homecare costs still make up only a small proportion of total health-care spending and the overall impact will be quite manageable.

Federal health transfers also appear to have had an effect on expenditure levels, but since provinces react differently, simply increasing health transfers would not be an effective general policy to boost provincial public homecare expenditures. Any increase in federal transfers to boost public homecare spending would be more effective if accompanied by a national level plan to direct the use of those funds. The federal government may eventually need to re-visit its decision not to pursue a national homecare program. As well, the high income elasticity of homecare spending suggests that the economic slowdown that has gripped Canada for much of the 1990s is also responsible for the slowdown in the growth rate of public homecare spending since the mid-1980s.

## NOTES

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<sup>1</sup>For an overview of the health determinants literature, see Di Matteo and Di Matteo (1998).

<sup>2</sup>For an overview of Canadian health-care issues, see Di Matteo and Di Matteo (1998); Brown (1987, 1991); Blomqvist and Brown (1994); Culyer (1988); Evans *et al.* (1987); and Evans (1989).

<sup>3</sup>Source: <[www.cihi.ca](http://www.cihi.ca)>.

<sup>4</sup>The demand for home health care is partly consumer driven. In a recent newspaper article, André Picard (1999a, p. A8) writes: "Today, like Mrs. Bitney, many people shun institutions. They are choosing to live and die at home."

<sup>5</sup>In the United States, for example, the year 1995 saw nearly 18,000 home health providers serve nearly seven million patients at a cost of \$27 billion. In 1989, only one-fifth of this amount was being spent on half as many patients. (See Gemignani 1996, p. 57).

<sup>6</sup>As Picard writes: "At present, the home care system in Canada is not a system at all. The country's health ministers cannot even agree on a common definition of the term" (1999c, p. A6).

<sup>7</sup>See <[www.travel-net.com/~chca](http://www.travel-net.com/~chca)>.

<sup>8</sup>See the "Definition and Methodology Section," Health Canada (1997).

<sup>9</sup>An overview of Canadian public homecare programs and spending is also available in Health Canada (1999). See also Anderson and Parent (1999).

<sup>10</sup>As reported in a Canadian Home Care Association document, "While management of service delivery has been decentralized, overall direction, including development, standards setting, funding, and monitoring of the provincial EMP is the responsibility of the Hospital Services Division of the Department of Health and

Community Services.” See Canadian Home Care Association for the Health Transition Fund, Health Canada (1998, p. 2).

<sup>11</sup>An exception is Alberta where centralized coordination is lagging. In 1995, Alberta went from a system with 27 health units providing homecare services to 17 regional authorities, but “In Alberta, there are essentially 17 different home care programs due to the 17 RHAs. There needs to be consistency for core services, with standards, equal access and portability.” See Canadian Home Care Association (1998, p. 13).

<sup>12</sup>While an aging population is responsible for much of the recent increase in homecare, it is not the main driver in total health expenditures. According to a recent report, population growth, inflation, aging, and rising costs for current programs are projected to increase total health expenditures by approximately 5 percent per year. In addition, other accelerators such as technology and increased incidence of chronic and new diseases could drive this figure upward. Of the 5 percent figure, just under 1 percent is attributable to population aging (Provincial and Territorial Ministers of Health 2000; and also Northcott 1994).

<sup>13</sup>See Picard (1999b, p. A9). It should be noted that the hospital bed freed up would need to be taken out of service for the full savings.

<sup>14</sup>A spokesperson for the Victorian Order of Nurses remarked: “Yes, the move to the community is under way but the funds aren’t shifting from institutions to the community. What we are finding is that a load, a very big load, is being placed on families” (Sullivan 1997, p. C3).

<sup>15</sup>Again, as reported in a Canadian Home Care Association document, “Regionalization has been the predominant feature of reform in Manitoba where the government is moving from its role as funder to that of monitoring standards and delivery of services. Regional Health Authorities (RHAs) will be fully responsible for creating programs.” See Canadian Home Care Association (1998, p. 3).

<sup>16</sup>These savings are expected to be primarily through the lower salaries and management efficiencies of private companies. See *Winnipeg Free Press* (1996).

<sup>17</sup>CANSIM (Canadian Socio-Economic Information Management) is Statistics Canada’s main computerized

database. Public Home Care Expenditures are from Health Canada (1997).

<sup>18</sup>This also suggests that there is no obvious *a priori* regional grouping of contiguous provinces for regression analysis.

<sup>19</sup>For example, in the 1980s, both Quebec and Newfoundland had an above average share of their health expenditures in more capital-intensive hospital and institutional care. In 1985, while an average of 59.2 percent of health expenditures across Canada’s provinces were for institutional and related expenses, the comparable figures were 65.8 percent in Newfoundland and 62.7 percent in Quebec (Brown 1991, p. 19). Other regional factors can include population size, population density and extent of urbanization.

<sup>20</sup>There is an extensive literature on the income elasticity of health-care expenditures rooted in the empirical determinants of health expenditures. The debate centres on whether health-care expenditures are a necessity or a luxury good. Classic studies include Kleiman (1974); and Newhouse (1977). For more recent studies see Gerdtham *et al.* (1992); Murthy and Ukpolo (1994); Hansen and King (1996); Di Matteo and Di Matteo (1998).

<sup>21</sup>For additional discussion of the impact of aging on Canada’s health-care costs, see Denton, Neno Li and Spencer (1987).

<sup>22</sup>The federal government makes cash transfers to the provinces as well as transfers based on points of the income tax which have been vacated by the federal government. While the latter constitute a transfer in technical terms, they are essentially now a form of own-source revenue for the provinces.

<sup>23</sup>Equalization is provided to provinces with below-average fiscal capacity and current recipients include all the provinces except British Columbia, Alberta, and Ontario.

<sup>24</sup>This represents a one-year reduction of 13.5 percent in total transfers. For 1997–98, total transfers were set to decline to \$35 billion of which \$19.8 billion was to be a cash transfer. The floor for the CHST cash transfer was eventually set at \$12.5 billion and for 1997–98, the CHST was estimated to be \$12.6 billion. In 1994–95, the value of the cash transfer for Established Program Financing and the Canada Assistance Plan was over \$16 billion.

<sup>25</sup>Under the provisions of medicare, the federal contribution was to be a per capita payment for provincial residents enrolled in the plan equal to one-half of the average national per capita cost. Use of national per capita cost figures benefited provinces that spent below the national average. For a discussion of the trials and tribulations involved in adopting Canadian medicare, see Perry (1989, pp. 623-77).

<sup>26</sup>For an historical perspective on Canadian political parties at both the federal and provincial level, see Van Loon and Whittington (1981, pp. 326-69).

<sup>27</sup>There are alternate approaches to time series based on the issue of stationarity. A stationary time series is one whose mean and variance do not change with time. If variables in a regression are non-stationary, then the implication is that the regression may be spurious. If the error term is stationary, then the two variables are co-integrated with the error term representing short-term deviations from that relationship. Tests for stationarity are available, but their power is limited by both the quality and the time span of the data (see Gregory and Haug 1998, pp. 273-79); Davidson and Mackinnon 1993, pp. 715-22; Muscatelli and Hurn 1992, pp. 1-43).

Recent studies on the determinants of health expenditures have criticized the time-series literature on the basis of the issue of stationarity and applied a co-integration approach. (See Hansen and King 1996; Murthy and Ukpolo 1994). However, results do not differ from the main body of literature as they found that the income elasticity of health-care spending is not significantly different from one.

Tests applied to the variables by province in this study found that approximately half were non-stationary in levels. However, in light of the small number of observations per province along with the inconclusive and uncertain nature of testing for stationarity, we opted for a pooled time-series, cross-section approach with its advantage of higher degrees of freedom. As well, recent research suggests that stationarity is not as serious a problem in panel data when panel level tests are employed and therefore "researchers studying national health expenditures need not be as concerned as previously thought about the presence of unit roots in the data" (see McKoskey and Seldon, p. 375). Individual error-corrected provincial regressions were nevertheless estimated and

their results paralleled those of the pooled time-series, cross-section.

<sup>28</sup>Assuming cross-sectional dependence is done using the FULL option in SHAZAM. Provincial economies in Canada do exhibit a tendency to move together during the course of the business cycle. Results are presented for both the FULL option and its absence.

<sup>29</sup>It was decided *a priori* that EPF, the CHST, and the political party variables would be constrained. EPF and CHST represent transfer regime changes and unconstraining the real per capita federal health transfer variable was thought sufficient. The political variables remained constrained because of potential collinearity problems. For example, the Parti Québécois only exists in Quebec while some of the Atlantic provinces have only ever elected Progressive Conservatives or Liberals.

<sup>30</sup>The proportion of population over aged 65 using these growth rates will average 16 percent by 2011 for the ten provinces. The average for the ten provinces using Statistics Canada Projections is 16 percent. See Anderson and Parent (1999, p. 129, Appendix 4).

<sup>31</sup>Ibbitson (2001) points out that much recent Ontario homecare spending is now for early discharge of acute-care patients of all ages. These types of policy changes substantially weaken the result that an aging population will be the primary factor boosting public homecare expenditures.

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## APPENDIX

### VARIABLES DEFINITIONS AND SOURCES

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Real Per Capita Provincial Public Home Care Expenditures	Per capita <sup>a</sup> public homecare expenditures in 1992 dollars. <sup>b</sup> Source: Health Canada. Public Home Care Expenditures in Canada, 1975-76 to 1997-98.
Real Per Capita GDP	Per capita provincial gross domestic product in 1992 dollars. Source for provincial GDP: CANSIM. <sup>c</sup>
Proportion Aged 65-79	Proportion of the provincial population between ages 65 and 79. Source: CANSIM.
Proportion Aged $\geq 80$	Proportion of the provincial population aged 80 and over. Source: CANSIM
Health Expenditure to GDP Ratio	Total expenditures on health (public and private) divided by provincial gross domestic product. Health expenditures are net of public homecare spending. Source for total health expenditures: Canadian Institute for Health Information ( <a href="http://www.cihi.ca">www.cihi.ca</a> ).
Cross-Section Dummies	
Nfld.	1 if Newfoundland, 0 otherwise.
PEI	1 if Prince Edward Island, 0 otherwise.
NS	1 if Nova Scotia, 0 otherwise.
NB	1 if New Brunswick, 0 otherwise.
Que.	1 if Quebec, 0 otherwise.
Ont.	1 if Ontario, 0 otherwise.
Man.	1 if Manitoba, 0 otherwise.
Sask.	1 if Saskatchewan, 0 otherwise.
Alta.	1 if Alberta, 0 otherwise.
BC	1 if British Columbia, 0 otherwise.
Transfer Variables	
Real Per Capita Federal Health Transfers	Real per capita value in 1992 dollars of federal health transfers including both cash and tax point transfers. Source for federal health transfers: Canadian Institute for Health Information ( <a href="http://www.cihi.ca">www.cihi.ca</a> ).
EPF	1 if Established Program Financing regime in effect, 0 otherwise.
CHST	1 if Canada Health and Social Transfer regime in effect, 0 otherwise.
Political Party Variables	
L B	1 if Liberal Party in power, 0 otherwise.
PC	1 if Progressive Conservative Party in power, 0 otherwise (reference group).
NDP	1 if New Democratic Party in power, 0 otherwise.
PQ	1 if Parti Québécois in power, 0 otherwise.
SC	1 if Social Credit Party in power, 0 otherwise.

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Notes: <sup>a</sup>Per capita figures constructed using provincial population. Source: CANSIM.

<sup>b</sup>All real figures in 1992 dollars using provincial Total Health Care Implicit Price Index. Source: CANSIM/CIHI.

<sup>c</sup>Canadian Socio-Economic Information Management System.

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