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HEALTH CARE EXPENDITURES IN CANADA AND UNITED STATES: DETERMINANTS AND IMPACT OF FEDERAL FUNDING REFORMS, 1990 - 2000

RAPPORT DE RECHERCHE

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AOÛT 2003

ABSTRACT

The public finance share of health expenditures differs a lot between Canada and United States. Public spending is far more important in the former than in the latter. Federal and provinces in Canada, and states in United States, finance the health system in both countries. This paper first estimated public health care determinants. Gross domestic product and federal transfers to provinces were found significantly and positively related to public Canadian provinces health expenditures, while federal transfers to states and unemployment rate were found significantly and positively related to public American states health expenditures. Estimates were also conducted for total province and State health expenditures. Canadian results did not significantly changed, while American ones varied. Total health expenditures in United States were rather related to the relative price of health care and the proportion of population over 65 years old. Second, this paper estimated the impacts on spending of federal funding reforms that took place during the 90s. Canadian reform impact differs depending which federal transfers variable is used: the reform for estimates using the total federal transfers to provinces variable was significant, while it was not when using the health federal transfers to provinces variable. American reform had a significant and positive effect on health expenditures.

CONTENTS

1	INTRODUCTION	5
2	HEALTH PROGRAMS AND REFORMS 1990-2000	6
2.1	CANADA	6
2.1.1	Overview of the Canadian Health Care system	6
2.1.2	Description of the Canadian health care programs and their reforms during the 90s	7
2.2	UNITED STATES	14
2.2.1	Overview of the American Health Care system	14
2.2.2	Description of the American health public programmes and their reforms during the 90s	15
3	DETERMINANTS OF HEALTH EXPENDITURE LITERATURE	24
4	OVERVIEW OF THE DATA	29
4.1	Public health expenditures	29
	Canada	29
	United States	31
4.2	Total Health Care Expenditures	32
	Canada	32
	United States	33
4.3	Gross Domestic Product (GDP)	34
	Canada	34
4.4	Personal Income (PI)	36
	Canada	37
	United States	38
4.5	Proportion of population over 65 years old	39
	Canada	39
	United States	41
4.6	Federal transfers to provinces and States	42
	Canada	42
	United States	44
4.7	Unemployment Rate	45
	Canada	46

United States	47
4.8 Relative Price of Health Care	48
Canada	48
United States	50
5 MODEL AND ESTIMATES	51
5.1 Canada	51
5.2 United States	55
5.3 Canada vs. United States	60
6 CONCLUSION	63
7 REFERENCES	65

1 INTRODUCTION

The Canadian and American health care systems distinguish themselves on numerous points. In 2000, Americans spent 13% of their gross domestic product in health care, while Canadians spent 9.2%. Furthermore, the public finance share of total health spending was 70.8% in Canada, while it was only 44.3% in United States (MSSS, 1, 2003). Thus, public financed programs necessarily accomplish very different role in each country.

In Canada, the federal and provincial governments finance public health expenditures and provide care to all Canadians without distinctions. In the United States, the federal and State governments only furnish public insurance to specific groups of people.

The purpose of this paper is to estimate the public and total health care expenditures determinants for Canadian provinces and American states during the 1990-2000 period. It will also try to asses if the weight of the public sector in the health system influences expenditure determinants. Second, the study will estimate the impacts of the federal funding reforms that affected both health systems during the decade.

The first section presents Canadian and American health care systems as well as reforms that affected them. This is followed by a literature review of health care expenditures determinants. Then, an overview of data used for the analysis is done. Finally, the model and the estimates, using pooled cross-section time-series regression analysis, are presented.

2 HEALTH PROGRAMS AND REFORMS 1990-2000

This first chapter provides a brief description of the Canadian and American health care system. Firstly, an overview of both systems will be presented. This will be followed by a review of health funding programs that exist between federal governments and provinces in Canada and states in United States. Finally, a description of the main reforms that affected both health systems during the 1990-2000 decade will be done.

2.1 CANADA

2.1.1 Overview of the Canadian Health Care system

Both public and private sectors have their role in the Canadian health system. However, it's the former, through the Federal and provincials governments, which is responsible for providing most of health care in Canada. The private sector rather complements public insurance. In 2000, about 71% of health care expenditures were made by the public sector. (See table 1)

**Table 1 - Public health care expenditures,
Percentage of total health expenditures, by
province and Canada**

	1975	1980	1985	1990	1995	2000
Nfld.	77,6	66,2	74,9	79,9	77,1	78,5
P.E.I.	73	61,5	70,8	72,7	68,3	70,1
N.S.	78,8	77,5	76,9	73,8	68,5	70,5
N.B.	77,4	73,8	73,3	74,1	73,2	71,3
Que.	78,8	81,5	79	75,6	73,5	72,6
Ont.	75,3	72,1	72,3	72,8	67,9	67,3
Man.	77,7	76,1	75,9	78,5	75	74,9
Sask.	74,5	79,5	78,2	79,6	74,7	76,2
Alta.	76,4	77,1	79,6	75,3	70,4	71,3
B.C.	71,9	72	73,6	73,1	74,5	73,7

Canada 76,2 75,5 75,5 74,5 71,3 70,8

(MSSS, 2, 2003)

The federal government has a role in the Canadian health system. It sets national principles that must be followed by the provincial and territorial jurisdictions. Health Canada defines federal government responsibilities as followed:

- *Setting and administering national principles or standards for the health care system through the Canada Health Act*
- *Assisting in the financing of provincial health care services through fiscal transfers*
- *Delivering direct health services to specific groups including veterans, native Canadians, persons living on reserves, military personnel, inmates of federal penitentiaries and the Royal Canadian Mounted Police*
- *Fulfilling other health-related functions such as health protection, disease prevention, and health promotion*

HC, 1, 2003

Provinces and territories administrate and conceive their specific health care system. Each province funds its health expenditures with taxes levied and transfers received by the federal government. Health Canada defines provincial and territorial responsibilities as followed:

- *Managing and delivering insured health services*
- *Planning, financing, and evaluating the provision of hospital care, physician and allied health care services*
- *Managing some aspects of prescription care and public health*

HC, 1, 2003

Other health services, such as prescription drugs benefits, optometric services, dental services, chiropractic services and medical equipment, can be covered by provinces and territories outside the national health insurance system.

The private sector complements the public health system by providing services not covered by the governments. For example, cosmetic surgery is usually done in private clinics. However, *“under most provincial laws, private insurers are restricted from offering coverage which duplicates that of the government programs, but they can compete in the supplementary benefits market.”* (HC, 2, 2003)

2.1.2 Description of the Canadian health care programs and their reforms during the 90s

During the war period, the federal government elaborated many programs meant to create a system of social insurance, including a health insurance program. Due to federal-provincial tensions, these reforms were rejected. In 1957, a new federal plan was set up:

the *Hospital Insurance and Diagnostic Services Act* (CFHCC, 2002, p.2) (see table 2). The federal government established three conditions that had to be respected by the provinces to be eligible for its cost-sharing (50/50):

Provincial plans had to:

- *Provide coverage to all residents of the province on uniform terms and conditions,*
- *Include specified diagnostic services*
- *Limit co-insurance or deterrent charges so as to ensure that an excessive financial burden was not placed on patients*

CFHCC, 2002, p.3

The *Medical Care Act* was adopted in 1966. This new program, also known as Medicare, established a formal cost-sharing (50/50) mechanism between federal and provincial governments. Once again, some conditions had to be met by the provinces:

- *Administration and operation on a non-profit basis by a public authority*
- *Coverage of all services rendered by a medical practitioners that are medically required*
- *Universal coverage of all provincial residents on equal terms and conditions*
- *Portability of benefits*

CFHCC, 2002, p.3

In the early 70's, neither federal governments, preoccupied by the growth of its social expenditures, nor provincial's governments, worried about federal control in the cost-sharing program, were pleased with the situation. After negotiations between the two levels of government, the *Federal-Provincial Fiscal Arrangements and Established Programs Financing Act* was adopted in 1977.

a. Federal-Provincial Fiscal Arrangements and Established Programs Financing (EPF) Act (1977–1995)

In 1977, the Federal government profoundly modified the mode of financing: transfers for hospital, medical services and post-secondary education were combined in the EPF. Transfers are intended "*to be an equal per capita payment to each province*" (CFHCC, 2002, p.4).

Funding

Transfer funds come in two forms:

Roughly half was initially paid as an equal per capita cash transfer. The other half was made available to provinces as a tax-point transfer. It included 13.5 percentage points of personal income tax (PIT) room and one percentage point of corporate income tax (CIT) room. The tax points were equalized to the national average on the basis of the then prevailing federal equalization formula. (...) The federal government gained greater predictability in its financial commitment. (...) The provinces gained a reduction in federal administrative controls.

CFHCC, 2002, p.4

Tax-point transfer

The principle behind a tax-point transfer is that the federal government reduces its tax rates while provinces, at the same time, raise their own rates by an equivalent amount. The result, then, is to increase provincial's revenues and decrease federal revenues, leaving a nil impact on the taxpayer. The EFP further established that the *"the value of the tax points was to grow as economies expanded, and the cash transfer was escalated by the growth rate of per capita GNP"* (DPC, A, 2003). Thus, tax-point transfer provides important revenues to provincial government because of their increasing value over time.

Equalization program

Another federal transfer is associated to the EPF: the *Equalization Program*. This program's role, created in 1957, is to *"ensure that less prosperous provinces have sufficient revenue to provide reasonably comparable levels of public services at reasonably comparable levels of taxation"* (DPC, C, 2003). However, payments received under this program are unconditional, that is provinces can spend cash received wherever wanted. The province equalization entitlements are calculated in three steps.

- *Step 1: Measure each province's per capita fiscal capacity and compare it with that of the provinces that makes up the program's standard*
(CDF, 2002, p.17)

The fiscal capacity of each province, which corresponds to the capacity to collect revenue, is calculated for 33 sources of revenue. Obviously, the tax structure (tax base

and tax rate) differs between provinces, so a representative standard (composed of Quebec, Ontario, Manitoba, Saskatchewan and British Columbia since 1982) is used in comparison to measure if a province “has a surplus (fiscal capacity greater than the standard) or a deficiency (fiscal capacity lower than the standard)” (CDF, 2002, p.19)

- *Step 2: Compensate disparities in fiscal capacity among the provinces*

The compensation is calculated on a per capita basis, for each province, with this formula:

$$\text{Equalization entitlements for a source of revenue in a province} = \left(\begin{array}{c} \text{Fiscal capacity} \\ \text{of the standard} \\ \text{(per capita tax} \\ \text{base of the} \\ \text{provinces that} \\ \text{make up the} \\ \text{standard)} \end{array} - \begin{array}{c} \text{Fiscal capacity of} \\ \text{the province (per} \\ \text{capita tax base of} \\ \text{the province)} \end{array} \right) \times \begin{array}{c} \text{Average tax} \\ \text{rate of the 10} \\ \text{provinces} \end{array} \times \begin{array}{c} \text{Population} \\ \text{of the} \\ \text{province} \end{array}$$

(CDF, 2002, p.19)

- *Step 3: Add up the equalization entitlements of each tax base for each province*

(CDF, 2002, p.20)

Once the entitlements are determined for all sources of revenue, the sum renders the *equalization entitlements for a province*. If the result is nil or negative, the province does not receive any transfer from the federal government. In other words, there is a cap and a floor on the transfers. The former is to protect the government of Canada against “*an open-ended growth in entitlements*” (DFC, D, 2003), and the latter is to protect provinces from a sudden decline in transfers.

Conditions

Conditions for federal funding under Medicare were established in 1966. To discourage provincial practices like extra-billing by doctors and facility fees collected by hospitals, the House of Commons passed the *Canada Health Act* (CHA) in 1984. To receive their full-cash contribution from Ottawa, provincial governments must respect the criteria and conditions of the CHA, related to preceding acts:

1. **Public administration:** *the administration of the health care insurance plan of a province or territory must be carried out on a non-profit basis by a public authority*
2. **Comprehensiveness:** *all medically necessary services provided by hospitals and doctors must be insured*

3. Universality: all insured persons in the province or territory must be entitled to public health insurance coverage on uniform terms and conditions

4. Portability: coverage for insured services must be maintained when an insured person moves or travels within Canada or travels outside the country

5. Accessibility: reasonable access by insured persons to medically necessary hospital and physician services must be unimpeded by financial or other barriers

HC, 3, 2003

Because of its budgetary difficulties, the federal government imposed repeatedly, between 1982 and 1995, compressions on the amount of its transfers:

- *1982: GNP per capita escalator would be applied to the total EPF entitlement, rather than EPF cash*
- *1986: EPF growth reduced from GNP to GNP-2 per cent*
- *1989: EPF growth reduced to GNP-3 per cent beginning in 1990-1991*
- *1990: EPF per capita transfer frozen for 1990-91 and 1991-92 for all provinces*
- *1991: Budget extended the EPF freeze introduced in 1990-91, for three more years to 1994-95*
- *1994: Budget announced that total EPF transfers in 1996-97 to be no higher than in 1993-94*

DPC, A, 2003

In 1995, the tightening of the transfers culminated with the creation of the *Canada Health and Social Transfer* (CHST), replacing both the EPF and CAP programs.

b. Canada Health and Social Transfer

The 1995 federal government budget established that, starting in 1996, contributions to health care, post-secondary education, social assistance and social services would be united under a single program: the Canada Health and Social Transfer. Federal funding would now on be as a block, replacing EPF and CAP, without distinction between health, education and social programs. The Budget also set at GNP -3 per cent the EPF growth for 1995-96. (DPC, A, 2003)

Funding

The CHST funding, divided in two parts, is similar to the EPF one of 1977: a part comes from a cash transfer, the other from a tax transfer, under which the federal government

reduced its personal (13.5%) and corporate (1%) income tax rates, allowing provinces to raise their tax rates by the same amount. *"The CHST is allocated first of all by determining the total entitlements under the program for Canada as a whole. (...) These total entitlements are then allocated among the provinces according to their share of the population of Canada"* (CDF, 2002, p.9). The province of Quebec represents a special case in Canada. In the 60's, the federal government offered to the Canadian provinces *"contracting-out arrangements for certain programs"* (DPF, G, 2003). Only Quebec chose this arrangement that is distinct of the CHST transfers, known as Alternative Payments for Standing Programs. It actually receives the value of extra tax points while other provinces receive amounts in cash. *"The Quebec Abatement consists of a reduction of 16.5 percentage points of Basic Federal Tax (BFT) for all tax filers"* (DPF, G, 2003).

The 1996 Budget introduced a cash floor of \$11 billion in the amounts transferred under the CHST to the provinces. It also fixed funding, for 1996-1997 and 1997-1998, to \$26.9 and \$25.1 billion respectively. Finally, a five-year funding arrangement for the 1998-99 to 2002-2003 period was introduced: GDP-2% for the first year, GDP-1.5% for the second, and GDP-1% for the last three.

In 1998, the cash floor rose to \$12.5 billion. In 1999, the Budget increased CHST funding by \$11.5 billion for the following five years. It also changed the allocation formula to obtain an equal per capita CHST by 2001-02 across Canada (DPC, 2003, A). Finally, the federal budget created non-recurring trust accounts and special funds to be allocated among the provinces on an equal per capita basis. In the 1999-2000 budget, the government deposited \$3.5 billion, which had to be withdrawn before March 31, 2002. This action was repeated in the 2000-2001 budget, \$2.5 billion were allocated to the trust accounts (to be withdrawn before March 31, 2004). In 2000, the government of Canada *"deposited \$1 billion in a new trust fund account to fund medical equipment"* (CDF, 2002, p.12).

Conditions

Provincial governments need to follow two conditions to be eligible for federal CHST funds:

- *The criteria and conditions of the Canada Health Act passed in 1984 (described earlier)*
- *No minimum residency requirement for social assistance benefits*

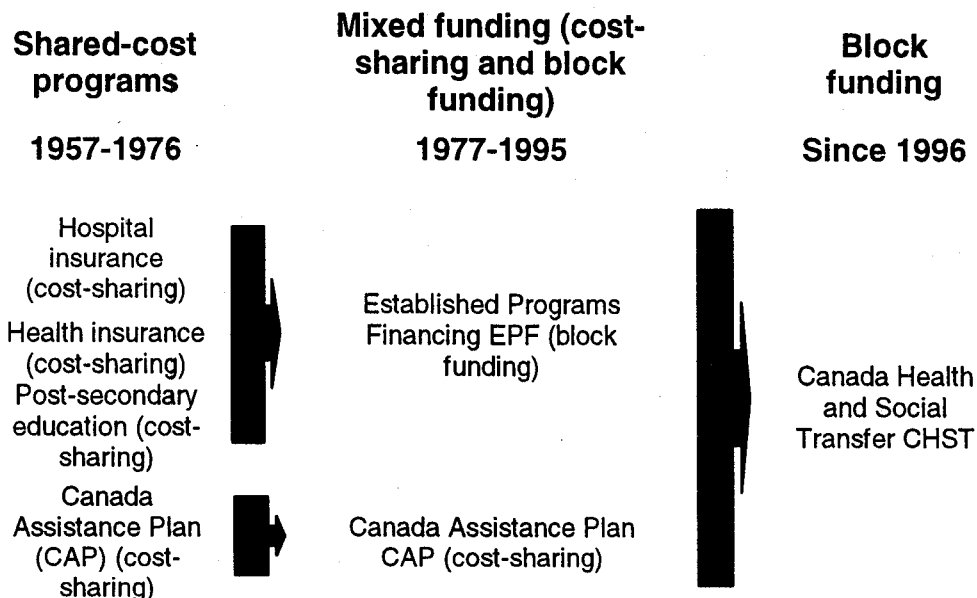
DPC, B, 2003

If a province fails one of these conditions, the federal government

“can reduce its transfer by an amount it considers appropriate (...) [it] may even reduce others transfers programs by the financial penalties it decides to impose on a province that fails to comply with a national standard”.

CDF, 2002, p.12

Table 2: Canadian federal funding of social programs since 1957



(CDF, 2002, p.12)

2.2 UNITED STATES

2.2.1 Overview of the American Health Care system

Similarly to the Canadian health system, public and private sectors in United States each have their responsibilities in providing health care services. The main difference is that the latter occupies a far larger place in the United States.

The private sector owns and operates the majority of health care facilities, which gives it the dominant role in providing insurance. The public sector plays a financing role, being a purchaser of insurance for uncovered people. A majority of hospitals and health institutions are owned by the private sector, but are not necessarily run for-profit. About three-quarters of the American population are covered by private health insurance, which is, for a vast majority, bought by their employers (OECD, 2003, p.8). (See Table 3)

Table 3. Personal health-care spending by source of funds in United States (Per cent)

	1960	1970	1980	1990	1995	2000
PRIVATE FUNDS	78.6	64.8	59.7	61.0	55.4	56.7
Out-of-pocket payments	55.2	39.7	27.1	22.5	16.9	17.2
Private insurance	21.4	22.3	38.3	33.4	33.4	34.6
Other	2.0	2.8	4.3	5.0	5.1	5.0
PUBLIC FUNDS	21.4	35.2	40.3	39.0	44.6	43.3
Federal Funds	8.7	22.9	29.3	28.6	34.1	32.8
Medicare	0.0	11.5	16.9	17.6	20.6	19.2
Medicaid (including SCHIP)	0.0	4.3	6.4	6.6	9.5	9.8
Other¹	8.7	7.1	6.0	4.4	4.0	3.8
State and Local Funds	12.6	12.3	11.1	10.5	10.5	10.5
Medicaid	0.0	3.7	5.1	4.8	6.2	6.9
Other²	12.6	8.6	5.9	5.6	4.3	3.6

Source: Centers for Medicare and Medicaid Services (CMS) from OECD, 2003, p.8

¹ Includes federal government employees, active members of the military and their families and military veterans

² Includes state government employees

Three levels of government act in the American health system. The federal government, through Medicare and Medicaid programs, is a “*purchaser of health insurance and a third-party payer for health care*” (OECD, 2003, p. 7). It principally covers elderly and disabled persons, employees of the federal government and members of the armed forces.

State governments, for their part, regulate health care providers and insurance companies. In addition, public programs are managed and financed by them, in association with the federal government, “*to provide health insurance or direct health care to poor children and families*” (OECD, 2003, p.7). State employees, just like federal workers, are also covered.

Finally, local governments mostly finance, together with the state governments, the safety net providers, like the county hospitals, who look after indigent and uninsured people.

2.2.2 Description of the American health public programmes and their reforms during the 90s

There are two main health public programs in the United States: Medicare and Medicaid. Federal government funds the first one and its goal is to provide a health insurance for elderly and disabled persons. A brief description of this program is presented, although it is not the main point of this paper, being only financed by the federal level. The second one is a cost-shared venture between federal and state governments. Its role is to deliver medical assistance to eligible poor people.

a. Medicare

The “Health Insurance for the Aged and Disabled” program, commonly known as Medicare was first implemented in 1966, to cover people age 65 or over and qualified disabled people. This health insurance program was established to “*complement the retirement, survivors, and disability insurance benefits [...] of the Social Security Act*” (CMS, 2, 2002). Department of Health and Human Services (DHHS) administrates this

program, the second largest source of health insurance after the employer-based coverage.

Coverage

In 2000, Medicare covered 34 millions elderly (97 percent of older Americans) and about 5 million disabled people (HCFA, 2, 2002). The program is composed of three parts. The first one, Hospital Insurance (HI) known as part A, “*covers inpatient hospital services, short-term care in skilled nursing facilities, post-institutional home health care, and hospice care*” (HCFA, 2, 2002). People over 65 years old and eligible for Social Security are automatically entitled to this part, while the individuals not automatically entitled in this Part can enrolled by paying a monthly premium. Disabled people, under age 65, are also eligible if they have been receiving *Social Security Disability Insurance* benefits for at least two years.

The second one, Supplementary Medical Insurance (SMI) known as part B, permits people enrolled in HI, to pay a monthly premium to receive “*physicians’ services, laboratory work and other medical supplies and services* [not covered by part A] ” (OECD, 2003, p.10). Almost everyone covered under Part A choose to pay to get the complementing services of Part B.

The last one, Medicare + Choice, known as Part C, was established in 1997 as part of the Balanced Budget Act (BBA), which reformed mechanism of the American health system. It introduces the private sector in the process of Medicare:

“[...] *private health plans are paid a monthly capitation payment for each enrollee that is based on the amount Medicare spends per beneficiary in the geographic area served by the plan.*”

OECD, 2003, p.10

Beneficiaries of this last part of Medicare can receive their Part A and B benefits from private health plans like health maintenance organizations (HMO)³, preferred provider

³ **Health Maintenance Organization (HMO)** HMOs provide or arrange for a comprehensive package of health care services for a fixed monthly premium with nominal copayments permitted (Medicare a profile)

organizations and private fee-for-service plans. (HCFA, 2, 2002, p.54). About 14% of Medicare beneficiaries were enrolled in Part C in 2001 (OECD, 2003, p.11).

Funding

Medicare represented about one fifth of total health spending in the United States in 2001, the largest share being spent for inpatient hospital health services (48%) and physician services (27%) (OECD, 2003, p.10). In 1999, \$5,410 was spent in average per beneficiary (HCFA, 2, 2002, p.54). The program is funded by two trust funds. The first one, named the Medicare Hospital Insurance Trust Fund, is associated to the HI program (Part A). It mainly receives its income from a mandatory payroll tax levied on workers and employers (1.45 percent each, 2.9 percent of self-employed), from income taxes levied on Social Security benefits and from interest income on invested assets. The second trust fund is associated to the SMI program (Part B) and is financed by monthly premium payments (\$45.50) from the beneficiaries that cover about 25% of costs and by general revenue of the U.S. Treasury. Premium and general revenue are reviewed each year. Finally, Medicare + Choice (Part C) is financed by both trust funds "*in proportion to the relative weights of HI and SMI benefits to the total benefits paid by the Medicare program*" (CMS, 2002).

b. Medicaid and State Children's Health Insurance Program (SCHIP)

Medicaid was established in 1965 by Title XIX of the Social Security Act. Federal and state governments jointly finance the program. It essentially provides three types of health protection:

- *Health insurance for low-income families with children and people with disabilities*
- *Long-term care for older Americans and individuals with disabilities*
- *Supplement coverage for low-income Medicare beneficiaries for services not covered by Medicare (e.g., outpatient prescription drugs) and Medicare premiums, deductibles and cost sharing*

HCFA, 1, 2000, p.6

Medicaid is the third largest source of health insurance in United States (HCFA, 1, 2000, p.6).

Coverage

Being a co-financed program, states have to follow certain parameters established by the federal government. The state programs to receive federal funds must cover these categories of persons:

- (1) Individuals meeting the requirements of the *Aid to Families with Dependent Children* (AFDC) program that were in effect in their States as of July 16, 1996⁴
- (2) Children under age 6 whose family income is at or below 133 percent of the *Federal poverty level* (FPL)
- (3) Pregnant women whose family income is below 133 percent of the FPL
- (4) *Supplement Security Income* (SSI) recipients in most States
- (5) Recipients of adoption or foster care assistance under Title IV of the Social Security Act
- (6) Special protected groups (individuals who lose their cash assistance due to earnings from work or from increased Social Security benefits, but who may keep Medicaid for a period of time)
- (7) All children born after September 30, 1983 who are under age 19, in families with income at or below the FPL
- (8) Certain Medicare beneficiaries (low-income Medicare beneficiaries)

CMS, 1, 2002

State governments may also choose to provide Medicaid coverage for “*categorically related groups [...] (who) share characteristics of the mandatory groups*” (CMS, 1, 2002), such as higher-income pregnant women and children defined in terms of family income and resources, “*medically needy persons*”⁵ established by the states, recipients of State supplementary income payments, persons receiving long-term care and disabled people who do not qualify themselves under usual requirements. In 1998, the distribution of the population covered by Medicaid by basis of eligibility was as followed:

- 18.9 million children (51%)
- 7.9 million adults (21%)
- 6.6 million blind or disabled individuals (18%)

⁴ Welfare reform law enacted on July 16, 1996: “Congress established this eligibility group to insure individuals did not lose Medicaid coverage due to TANF” (HCFA, 1, 2000, p.6)

⁵ “*The medically needy (MN option allows States to extend Medicaid eligibility to additional persons. These persons would be eligible for Medicaid under one of the mandatory or optional groups, except that their income and/or resources are above the eligibility level set by their State*” (CMS, 1, 2002)

- 3.9 million elderly (11%)⁶

HCFA, 1, 2000, p.66

Furthermore, states, to be qualified for federal funding, must offer basic services to groups of people: (1) inpatient and outpatient hospital services, (2) prenatal care, (3) vaccines for children, (3) physician services, (4) nursing facility services for persons aged 21 or older, (5) family planning services and supplies, (6) rural health clinics services, (7) home health care for persons eligible for skilled-nursing services, (8) laboratory and x-ray services, (9) paediatric and family nurse practitioner services, (10) nurse-midwife services, (11) *Federally qualified health-centre* (FQHC) services, and ambulatory services, and, finally, (12) *Early and periodic screening, diagnostic, and treatment* (EPSDT) services for children under age 21 (CMS, 1, 2002). As for the covered groups, state governments can decide to expand the quantity of health services provided in return of additional federal funding.

Once the parameters of coverage and basic services of the federal government are performed, each state:

1. *Establishes its own eligibility standards*
2. *Determines the type, amount, duration, and scope of services*
3. *Sets the rate of payment for services*
4. *Administers his own program*

CMS, 1, 2002

Considerable differences among state programs are thus observed: "*there are essentially 56 different Medicaid programs – one for each State, territory and the District of Columbia*" (HCFA, 1, 2000, p.6).

During the 1988–1998 period, children uninsured increased from 13.1 percent to 15.4 percent, mainly due to the decrease of employer-sponsored insurance coverage for children under 18 years old (Medicaid a profile, p.72). A new co-financed program, named *State Children's Health Insurance Program* (SCHIP), was initiated by the Balanced Budget Act in 1997. Its objective was to widen the medical coverage of

⁶ "For those who are dually enrolled in Medicare in Medicaid, Medicare serves as the primary payer, while Medicaid covers cost-sharing, deductibles and payment for care not covered in the Medicare benefits package, such as prescription drugs and long-term care." (OECD, 2003, p.12)

uninsured, low-income children whose family's income is too high for Medicaid and too low to afford private health plans. SCHIP has to be provided:

(...) through either or both of two methods: (1) a program to obtain health insurance coverage that meets requirements [...] relating to the amount, duration, and scope of benefits; or (2) expanding eligibility for children under the State's Medicaid program

CMS, 3, 2002

Therefore, states had to choose between three options: expand Medicaid coverage for children (56%), provide funds to children through separate child health programs (30%) or a combination of both possibilities (36%) (HCFA, 1, p.74). In fiscal year 1999, two million children were covered by SCHIP (HCFA, 1, 2000, p.72).

Funding

Medicaid operates as a vendor payment program. States may pay health care providers directly on a fee-for-service basis, or States may pay for Medicaid services through various prepayment arrangements." "(...) each State for the most part has broad discretion in determining the payment methodology and payment rate for services. Generally, payment rates must be sufficient to enlist enough providers so that covered services are available at least to the extent that comparable care and services are available to the general population within that geographic area

CMS, 1, 2003

The federal government pays a share of the expenditures incurred by state governments, determined by the number of people participating in the program and services provided. The *Federal Financial Participation* (FFP) payments are made accordingly to medical or related administrative services and are intended to "fairly distribute the burden of financing program benefits among the states" (FAHCA, 2002). The funding comes from general revenue, not from trust funds as for some parts of Medicare. The formula-derived rate for Federal Medicaid reimbursement is known as the *Federal Medicaid Assistance Percentage* (FMAP). It is determined with per capita income by State based on a 3-year average compared to the national average⁷:

⁷ "The Federal percentage of each State (...) shall be promulgated by the Secretary between October 1 and November 30 of each year, on the basis of the average per capita income of each State and of the United

$$\text{State Share} = \frac{(\text{State average per capita income})^2}{(\text{National average per capita income})^2} \times 45 \%$$

Federal share is therefore obtained by subtracting the State share to 100 percent. The FMAP cannot be lower than 50 percent or higher than 83 percent. Federal participation is recalculated annually. Thus, a lower income State will have a higher FFP, and in the same way, a higher income state, a lower FFP. (FAHCA, 2002).

In 1998, for example, the federal government paid 50 percent of Massachusetts, New Hampshire and New York Medicaid expenditures, while it paid respectively 77 percent and 74 percent for Mississippi and West Virginia. The former had a high personal income level, the latter, low level. The federal government paid in average 57 percent of expenditures to jurisdictions.

As it has been introduced earlier, the BBA of 1997 created the *State Children's Health Insurance Program*. To achieve the program funding, the BBA also created the *Enhanced FMAP*. This new percentage is:

"equal to the FMAP for the State increased by a number of percentage points equal to 30 percent of the number of percentage points by which such FMAP for the State is less than 100 percent"

$$\text{E-FMAP} = \text{FMAP} + 30\%(1-\text{FMAP})$$

DHHC, 2002

In no case, the enhanced FMAP can exceed 85 percent. Centers for Medicare and Medicaid Services must approve SCHIP State Plan before allowing the cash transfers. State allotments are determined in accordance with the statutory formula that is determined by the number of children potentially eligible to SCHIP and the State cost factor.

Medicaid Reforms 1990-2000

States for the three most recent calendar years for which satisfactory data are available from the Department of Commerce" (CSSL, 2003)

Reforms affected Medicaid program during the 1990-2000 decade, particularly the *Balanced Budget Act* of 1997. This government reform created the *State Children's Health Insurance Program*, which is considered as the most significant change in Medicaid since the legislation was enacted in 1966. However, others reforms occurred during the 90s.

The beginning of the decade saw a growth in spending, in nominal dollars, of over 27 percent per year between 1990 and 1992 (Klemm, 2000, p.110). This was mainly due to the severe recession that brought higher levels of unemployed and uninsured. The states, already having budgetary difficulties, had to find alternative financing mechanisms. They principally used the *Disproportionate Share Hospital (DSH) payments*⁸, a specific part of Medicaid, "*which were designed to help hospitals with a high proportion of low-income (...) and, more important, not subject to the Federal limits that applied to all other types of Medicaid reimbursement*" (Klemm, 2000, p.109). In doing this, state governments shifted their costs to the federal government. The latter reacted in enacting the *Medicaid Voluntary Contribution and Provider-Specific Tax Amendments of 1991* that capped DSH payment at 12 percent of Medicaid spending (Klemm, 2000, p.110).

The years 1993-1996, characterized by better economics conditions, saw many reforms being conducted by states, following the beginning of the decade that was a test for the governments. Medicaid spending growth was 8 percent on average during these years (Klemm, 2000, p.110). In 1995, the American Congress examined the possibility of creating the *Medigrant* program "*which would have ended the Federal Medicaid entitlement (FMAP) and capped Federal matching funds*" (Klemm, 2000, p.110). This proposition was not adopted, but it incited state governments to accelerate spending in 1995, which would have been under Medigrant, the base year to calculate the blocks grants.

The end of the decade saw the most important reforms since the start-up year of Medicaid program. In 1996, the Congress passed the *Personal Responsibility and Work*

⁸ "*DSH accounted for 9 percent of total Medicaid spending in Fiscal Year 1998*" (HCFA, 1, p.27)

Opportunity Reconciliation Act, known as the welfare reform, that transformed the *Aid to Families with Dependent Children* (AFDC) program by the *Temporary Assistance for Needy Families* (TANF). This reform did not change the eligibility for the Medicaid program because “*families meeting the requirements for assistance under the old AFDC rules continued to be eligible*” (Klemm, 2000, p.110). Congress did not want to modify Medicaid coverage by the welfare reform.

In 1997, the Congress enacted the most important reform. The BBA, among others, “*placed further restrictions on DSH payments*” (Klemm, 2000, p.110), by specifying state-specific allotments for the period 1998-2002. The establishment of the *State Children’s Health Insurance* (SCHI) program was the major innovation. SCHI “*authorized nearly \$40 billion in Federal funding over 10 years (1998-2007) to provide health coverage to low-income children who did not qualify for Medicaid*”(Klemm, 2000, p.110). Between 1997 and 1999, spending growth was 5.6 percent on average (Klemm, 2000, p.110).

3 DETERMINANTS OF HEALTH EXPENDITURE LITERATURE

A large number of papers studying the determinants of health care expenditures have been written since the 1970s. This section will describe some of them. Two categories of studies emerged through the years, the first one focusing on the demand side, the other one on the supply side. A majority of papers use a demand approach, in which health care expenditures are linked in equations to factors such as income, price, demographic structure and public spending share, instead of a supply approach which usually includes factors like progress in the technology of medicine, mode of payment of physicians and increase of medical workforce (See table 4, p.27-28).

Newhouse (1977), using demand theory and a cross-section of 13 countries with data for 1971, found that gross domestic product per capita (GDP) explains about 92 percent of the health expenditures of the countries studied and that others factors only have marginal effects. He also found an income elasticity in the 1.15 to 1.31 range, and then stated that medical care is a luxury good in economic terms.

Hitris and Posnett (1992) confirmed Newhouse's analysis in their paper. Using a pooled sample of cross-section and time-series observations of twenty OECD countries for the 1960-1987 period, they found a "*strong positive relationship between per capita health spending and GDP*" (Hitris and Posnett, 1992, p.180). They also identified some non-income variables notably proportion of population over 65 years old, public finance share of health spending and mortality rate. Like Newhouse (1977), they found that "*the importance of some non-income variables is also confirmed, although the direct effect of such factors appears to be small*" (Hitris and Posnett, 1992, p.180).

Gerdtham *et al.* (1994), carried on this line of studies, using pooled cross-section time-series databases of twenty countries for the 1970-1991 period; to estimate the determinants of health expenditures. They divided their exogenous variables into two groups. The first one included "*non-institutional or background factors*" such as age structure of the population, GDP per capita, the unemployment rate and tobacco and

alcohol consumption, while the second one included variables focusing on “*institutional arrangements affecting the demand, funding, and delivery of health services in different countries*”, like the nature of the health-care system, insurance coverage, ways of remunerating physicians, existence of ambulatory gatekeepers, number of physicians per 1000 individuals, share of in-patient care and finally, the level of high-cost procedures. Gerdtam *et al.* (1994), as in the majority of previous papers, concluded that GDP per capita was the main variable affecting health expenditures. They reported income elasticities ranging from 0.7 to 0.8. Tobacco consumption was identified as a significant variable, contrary to the other non-institutional factors that were mainly insignificant. Finally, few institutional factors, for example primary care gatekeepers, ways of remunerating physicians and level of in-patient care, appeared to be robust in their regression.

L’Horty *et al.* (1997), after a discussion about supply variables affecting health expenditures, estimated a regression, based on time-series OECD data from 1965 to 1995 for France. They used five types of determinants: wealth (GDP per capita), demography (population over 65 years old), institutional factors (rate of coverage by Social Security and share of medical invoices financed by public administrations), relative price of health (health spending price index on private consumption price index) and medical technical progress (e.g. spending on therapeutic devices). L’Horty *et al.* (1997) obtained similar results to other studies. The expansion in health expenditures seemed very sensitive to the increase in GDP per capita. They also discovered that technical progress was responsible for about a quarter of the increase in health expenditures. Finally, they state that demographic factors only have marginal effects.

Di Matteo and Di Matteo (1998) studied the determinants of Canadian provincial governments health expenditures. Using pooled time-series cross-section data from 1965 to 1991 for the ten provinces, they estimated a regression with two common variables, real provincial per capita income and proportion of the provincial population over age 65. In addition, they included a federal cash transfers variable because “*transfers are an important source of revenue to Canada’s provincial governments. (...) About 20% of*

provincial government revenue is obtained from federal transfers but this ranges from over 40% in the Atlantic provinces, to a low of 12% in Alberta.” (Di Matteo and Di Matteo, 1998, p.221). They also specified dummy variables for each province and for years of transfer program reforms. All their variables were significant. Real income per capita remained an important constituent of health expenditures. As expected, the level of federal transfers as well as transfer reforms were significant variables. However, compared to previous papers, the proportion of population aged 65 and over was significant in their study. They wrote that an *“increase (of 1%) in the proportion of the population over age 65 will add on average about 1.3 (percent) per year to real per capita provincial government health expenditures.”* (Di Matteo and Di Matteo, 1998, p.227). Finally, they stated that *“the aging of Canada’s population coupled with a decline in federal transfer payments suggests that the public funding of health care at the provincial level will be a source of policy concern well into the next century”* (Di Matteo and Di Matteo, 1998, p.227).

Holahan and Garret (2001) specifically studied the effects of a rise of unemployment in the United States on Medicaid, based on the fact that an economic slowdown, first, increased enrolment and consistently raised costs and, second, reduced revenues of state governments. Using state-level data, they estimated *“enrolment elasticities – the percent change in Medicaid enrolment that would result from a one percent (...) change in the unemployment rate, holding other things equal”* (Holahan and Garret, p.2, 2001). For example, they found that an increase from 4.5% to 5.5% of the unemployment rate would raise the enrolment by about 500 000 people. Next, they estimated the cost implications of a raise in the enrolment.

Table 4 - Literature review

Study	Design	# Countries	Year(s)	Sample (N)	Endogenous variable	Exogenous variable	Results
Newhouse (1977) Medical care expenditure: A cross-national survey	Cross section	13	1971	13	Per capita medical expenditures	GDP per capita	Newhouse observed a strong positive relationship between per capita health spending and per capita GDP. He found that about 92 percent of health expenditures variations could be explained by GDP per capita variations and that the income elasticity of health care exceeds one. He concludes that factors other than income only have marginal effects and that medical care is a luxury good "possibly arising from the fact that, at the margin, the demand for health care may relate more to caring (or subjective component of health) than to curing (or physiological health)" (Gerdtham et al. (1994))
Hitris and Posnett (1992) The determinants and effects of health expenditure in developed countries	Pooled Time-Series and Cross-Section	20 (OECD countries)	1960 - 1987	560	Per capita health spending	GDP per capita, Proportion of population over 65 years old, Public finance share, Shift dummies for individual countries	Hitris and Posnett, using a large sample of time-series and cross-section observations, confirmed previous papers conclusions that identified GDP per capita as the main determinant of health spending. They also observed an income elasticity of health spending "at or around unity". Non-income variables are also identified, but their effects «appear to be small". Furthermore, they stated that OECD countries cannot be seen as a homogenous group, health care system being very distinct among them. They concluded that their "result may be misleading. To the extent that the relative price of health care is also an important determinant of the demand of health, the omission of this variable may lead to a downward bias in the estimated income elasticity, and at the same time to an understatement of the role of non-income variables".
Gerdtham et al. (1994) Factors affecting Health Spending: a Cross-Country Econometric Analysis	Pooled Time-Series and Cross-Section	20	1970-1991	484 (overall expenditure)	Per capita health-care expenditure	GDP per capita, Non-Institutional factors: Proportion of population 75 years old and over, Proportion of population 4 years old and under, Female labour force participation, Alcohol Intake, Tobacco consumption, Institutional factors: Shift dummies for nature of health-care system, insurance coverage, ways of remunerating physicians, ambulatory gatekeepers, number of physicians, share of in-patient care, level of high-cost procedures	Gerdtham et al. observed that GDP per capita is highly significant in all regressions, with income elasticities in the range 0.7-0.8. Only one non-income factor, tobacco consumption, was identified as significant. All other non-institutional factors were generally insignificant. Six institutional factors were identified as significant in their study: primary care gatekeepers lower overall expenditure; lower levels of overall, ambulatory, and pharmaceutical spending occur in systems where patient pays first and seeks reimbursement after; ways of remunerating physicians influence health expenditure; in-patient care is more expensive than ambulatory care; health services provided by the public sectors are associated with lower overall health expenditure; total supply of doctors may affect positively ambulatory spending.

Table 4 - Literature review (continued)

Study	Design	# Countries	Year(s)	Sample (N)	Endogenous variable	Exogenous variable	Results
L'Horty <i>et al.</i> (1997) Expliquer la croissance des dépenses de santé: le rôle du niveau de vie et du progrès technique	Time-Series	1 (France)	1960-1995	36	Per capita health-care expenditure	GDP per capita, Population over 65 years old, Rate of coverage by Social Security, Share of medical invoices financed by public administrations, Relative price of health, Medical Technical progress	L'Horty <i>et al.</i> explained in their paper that the population wealth level, measured by GDP per capita, is the main determinant of health spending in France. The income elasticities of health care ranged from 0.68 to 1.55, depending the ways model is estimated. Medical technical progress is identified a major determinant of health expenditures, being responsible for about a quarter of increase. Other factors only have marginal effects on spending.
Di Matteo and Di Matteo (1998) Evidence on the determinants of Canadian provincial government health expenditures: 1965-1991	Pooled Time-Series and Cross-Section	1 (10 provinces)	1965-1991	270	Réal per capita provincial government expenditures on health care	Real per capita GDP, Proportion of population aged over 65 years old, Real per capita federal transfers, Shift dummies for each provinces, Shift dummy for Established Program Financing (one for each province) to capture the onset of the new program	Di Matteo and Di Matteo studied the health expenditures determinants of Canadian provinces. They found that real provincial per capita income is positively and significantly related to health spending. They identified an income elasticity of 0.77 and then stated that "real per capita provincial government health expenditures are a necessity rather than a luxury good". The proportion of population over 65 years old is significant with an elasticity of 0.81. Federal transfers are also identified as an important determinant, with an elasticity of 0.48. Finally, shift dummies, for the onset of the Established Program Financing, are significant for only two provinces, Newfoundland and Quebec. They argue that "it is possible that other provinces were able to offset the EPF declines either via other grant income or through own source revenues in a manner not available to Newfoundland or Quebec".
Holahan and Garret (2001) Rising unemployment and Medicaid		1 (United States)	1998				Holahan and Garret identified in this study two channels through which Medicaid is affected by an economic slowdown: first, increased enrolment raised costs, second, reduced revenues lower resources for the public program. They estimated the effect of increased unemployment rates on Medicaid enrolment, of increased enrolment on Medicaid expenditures and of increased federal matching rates on state Medicaid expenditures. They found that an increase in the unemployment rate from 4.5% to 5.5% would raise enrolment by about 500,000 people raising costs by 2 billions. Finally, they stated that increased federal matching rate would provide a fiscal relief to American states.

4 OVERVIEW OF THE DATA

The data set that will be used to study the determinants of public health expenditures in Canada and United States consists of a pooled sample of time-series cross-section observations for all Canadian provinces and American States, covering the years 1990 to 2000. Using the health expenditure determinants literature described in the last section, five variables were chosen for the model: per capita gross domestic product (GDP), proportion of population over 65 years old, per capita federal transfers to provinces and states, unemployment rate and relative price of health care. To complement the analysis, three more variables will be used in the model. Total health care expenditures will be used instead of the public health care expenditures variable, per capita personal income instead of per capita GDP and Canadian health federal transfers will finally replace Canadian total federal transfers. A brief description of all variables follows hereafter (all variables are in current dollars).

4.1 Public health expenditures

Canada

The provincial government health care expenditures were obtained from the Canadian Institute for Health Information. As Figure 1a shows, there was relative stability in spending until 1996. That year and the four next, a significant increase for all provinces was observed. Newfoundland, with an increase of about 62%, was the province with the highest growth, whereas, Alberta and Saskatchewan, with growth of around 30%, were the ones with the lowest. Manitoba, followed by Newfoundland and British Columbia, were the provinces, in 2000, with the highest public spending per capita. Canada, over the 1990-2000 period, saw a public health expenditures growth rate of 36.54%.

Figure 1a - Public Sector Health Expenditure per capita, by province and Canada, 1990-2000

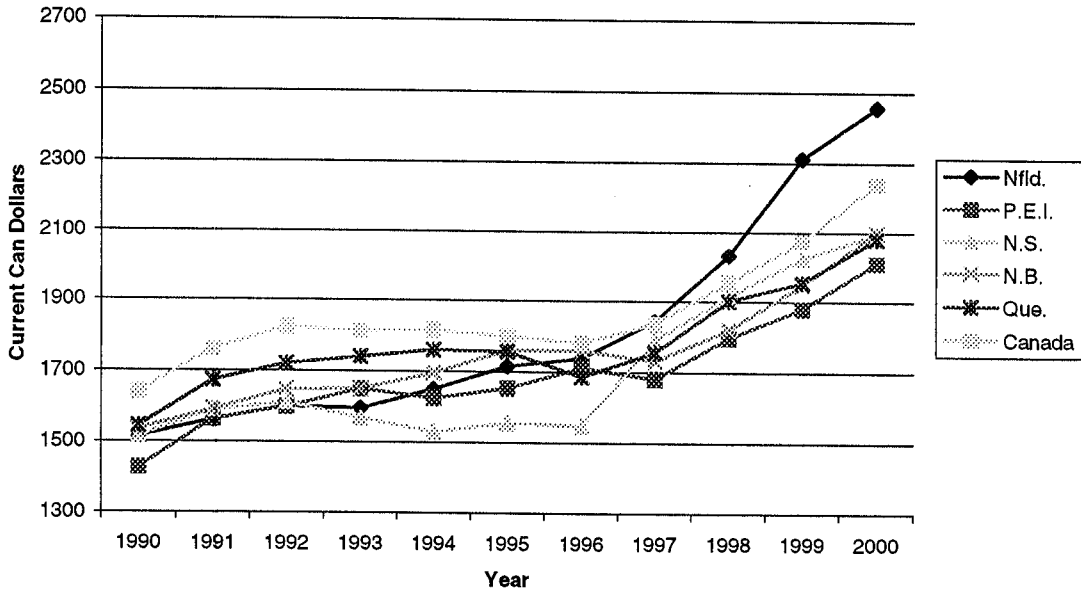
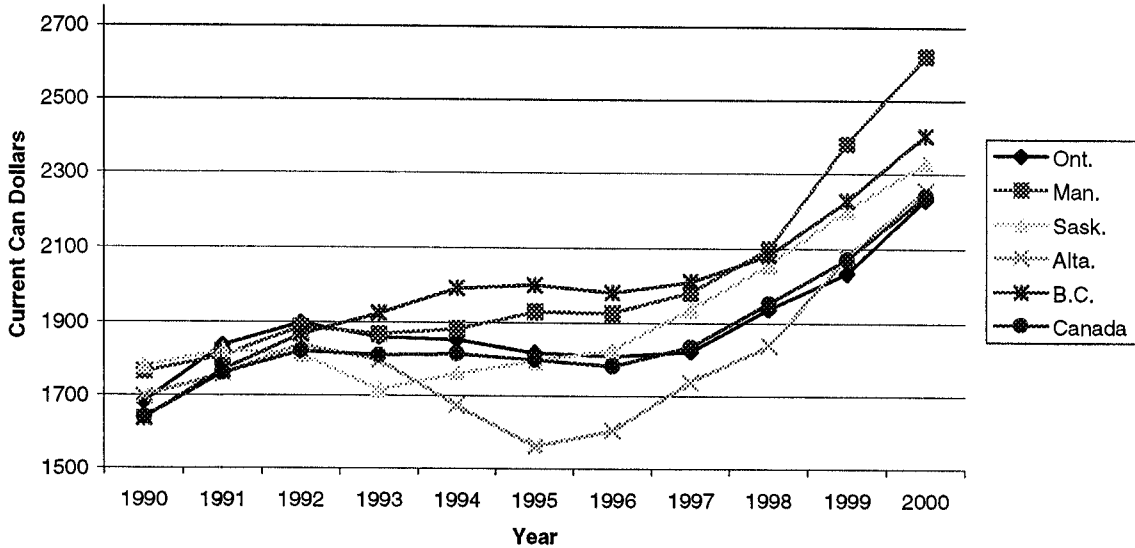


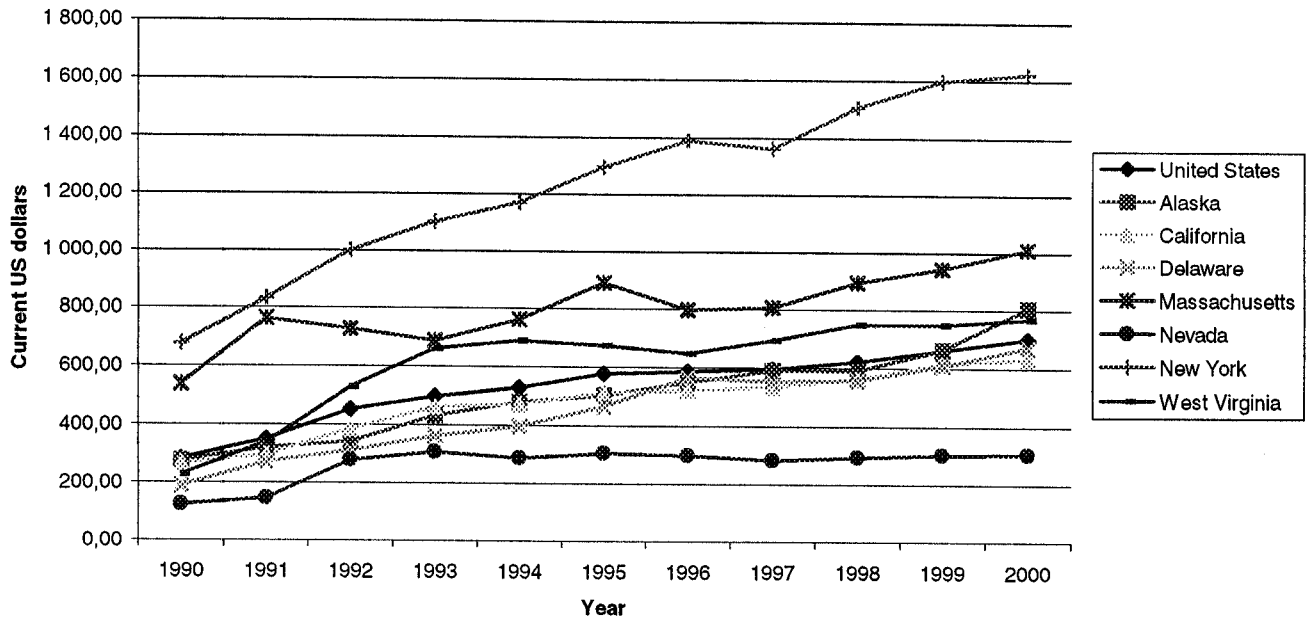
Figure 1a (continued) - Public Sector Health Expenditure per capita, by province and Canada, 1990-2000



United States

The American state Medicaid health expenditures data were obtained from two sources, the Kaiser Family Foundation, “an independent philanthropy focusing on the major health care issues facing the nation” and the Centers for Medicare & Medicaid Services, a branch of the United States Department of Health and Human Services and known, until 2001, as the Health Care Financing Administration (HCFA). As it can be observed in Figure 1b, there was an important increase in public health expenditures in the United States during the 90s. The growth for the entire country was 147.40%. The highest spending increase, with a growth over the 1990-2000 period of 256.74%, was in Delaware, while Massachusetts had the lowest increase with 87.82%. Per capita spending was the highest in the State of New York during the whole decade, increasing from \$676.95 to \$1623.23, up 139.79%. The lowest level was observed in Nevada, advancing from \$122.98 to \$306.25 throughout the decade.

Figure 1b - Medicaid and SCHIP Expenditures per capita, for Benefits and DSH payments, by State and United States, 1990-2000



4.2 Total Health Care Expenditures

Canada

The total health care expenditures data were obtained from Cansim II (Statistics Canada). It includes public and private sector health spending in Canada. As for public expenditures, a relative stability can be observed for the beginning of the decade (Fig.2a). After 1996, spending increased sharply for all provinces. In 1990, the Maritimes followed by Quebec were the provinces with the lowest spending, while Ontario and Prairies had the highest. The situation did not change drastically in 2000 with Prince-Edward-Island and Quebec spending the least in Canada, while Manitoba and Ontario were spending the most.

Figure 2a - Total Health Expenditure per capita, by province and Canada, 1990-2000

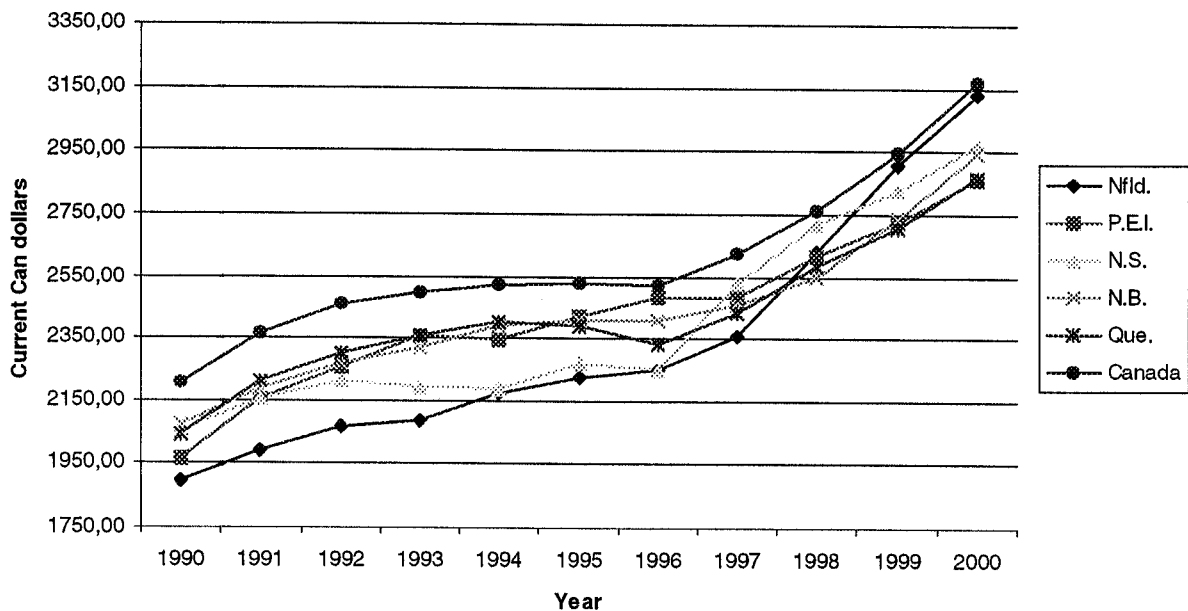
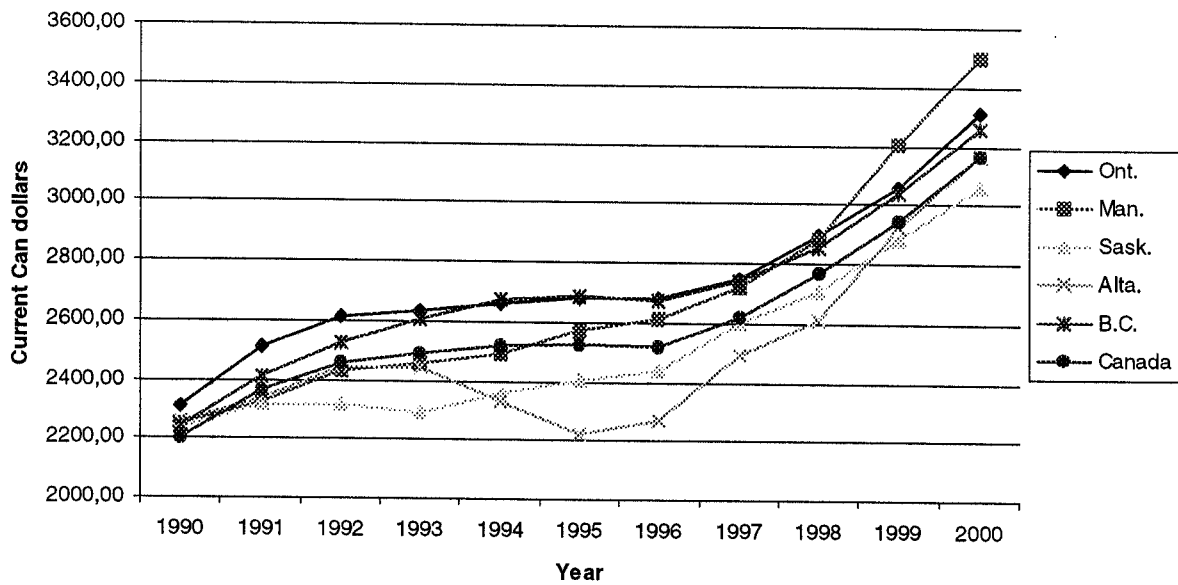


Figure 2a (continued) - Total Health Expenditure per capita, by province and Canada, 1990-2000



United States

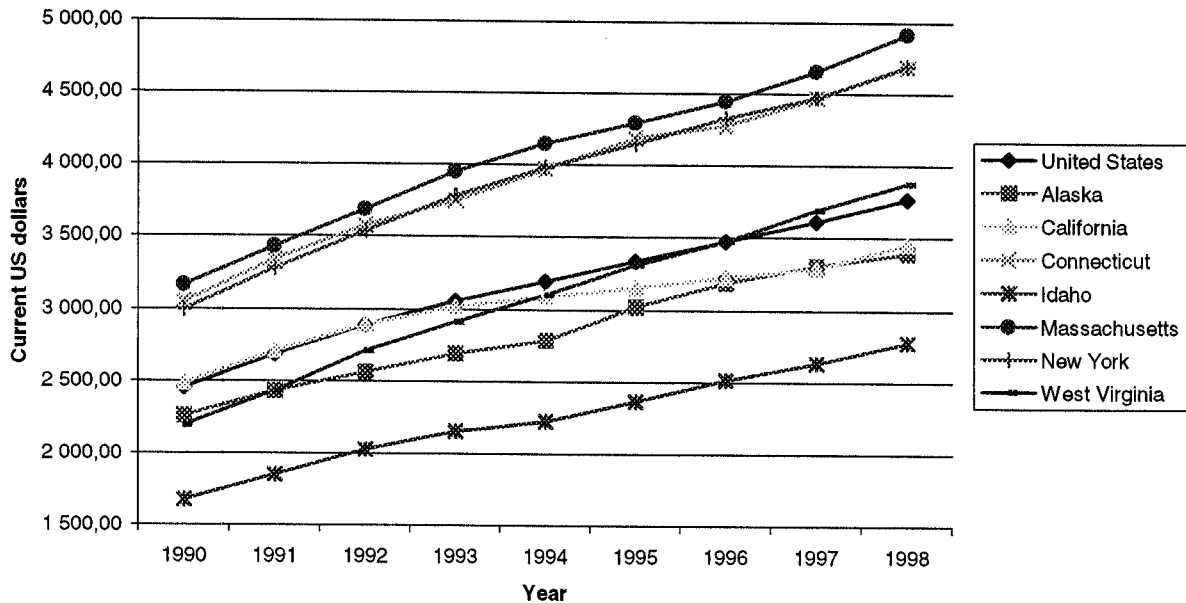
The data, named personal health care (PHC) expenditures, were obtained from the Centers for Medicare & Medicaid Services (Fig.2b).

Expenditures for PHC include spending for hospital care, physician services, dentist services, other health professional services, home health care, nursing home care, and health care products purchased in retail outlets (such as prescription drugs or over-the-counter medicines sold in pharmacies, and eyeglasses sold in optical goods stores).

Martin *et al.*, 2001, p.111

Estimates by type of services and by Medicare and Medicaid are also measured. These data are only available for the years 1990-1998, which limits the analysis. In 1990, Connecticut had the highest PHC expenditures with about \$3,000 spent per capita, while Idaho had the lowest with \$1,600. In 1998, Massachusetts spend the most, followed closely by many Northeast States, while Idaho still had the lowest expenditures. Maine had the highest growth rate (79%) during these nine years, while Arizona was the State that best controlled its spending with a rise of only 38%.

Figure 2b - Total Personal Health Care Expenditure, by State and United States, 1990-2000



4.3 Gross Domestic Product (GDP)

The health determinants literature shows that per capita gross domestic product is usually the most significant variable in explaining the expenditure increase. Based on previous studies, it is expected that provinces and states with higher GDP per capita will spend more on health care.

Canada

The Canadian provinces gross domestic product data, on an expenditure base, were obtained from Cansim II (Statistics Canada). Figure 3a gives an outlook of the evolution during the last decade. There was slow growth until the mid-nineties, after which the increase accelerated. Atlantic provinces, followed by Quebec and Manitoba, had the lowest levels of GDP per capita, while Alberta and Ontario were the ones with the highest. Alberta, with a growth rate of 65.04%, followed closely by Newfoundland with 63.91%, were the provinces with the highest increase, while British Columbia (30.07%) and Ontario (33.65%) were the ones with the lowest.

Figure 3a - Gross Domestic Product per capita, expenditure-based, by province and Canada, 1990-2000

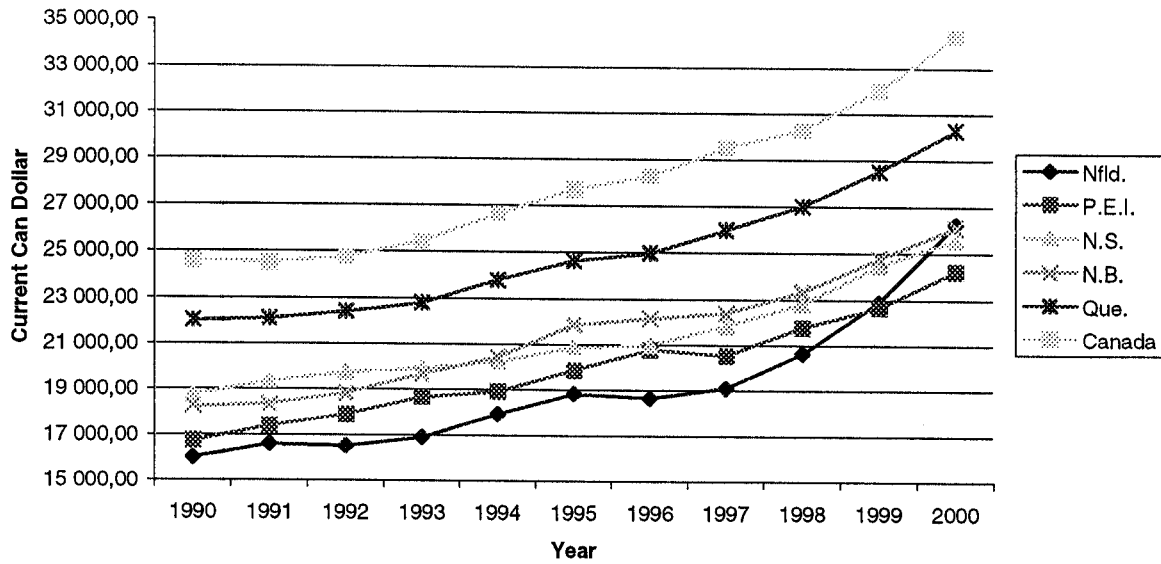
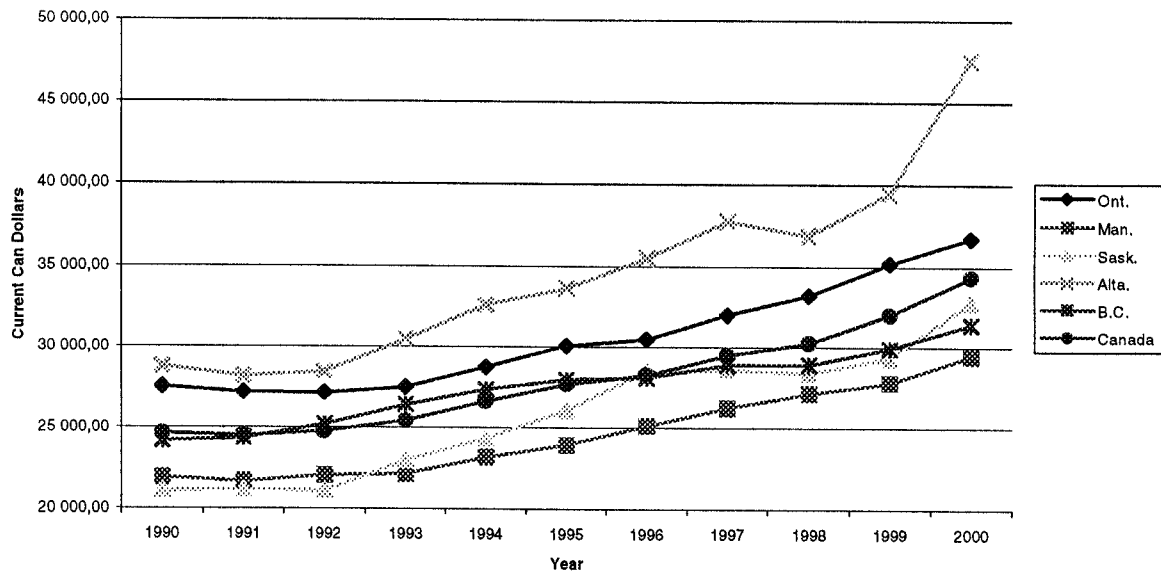


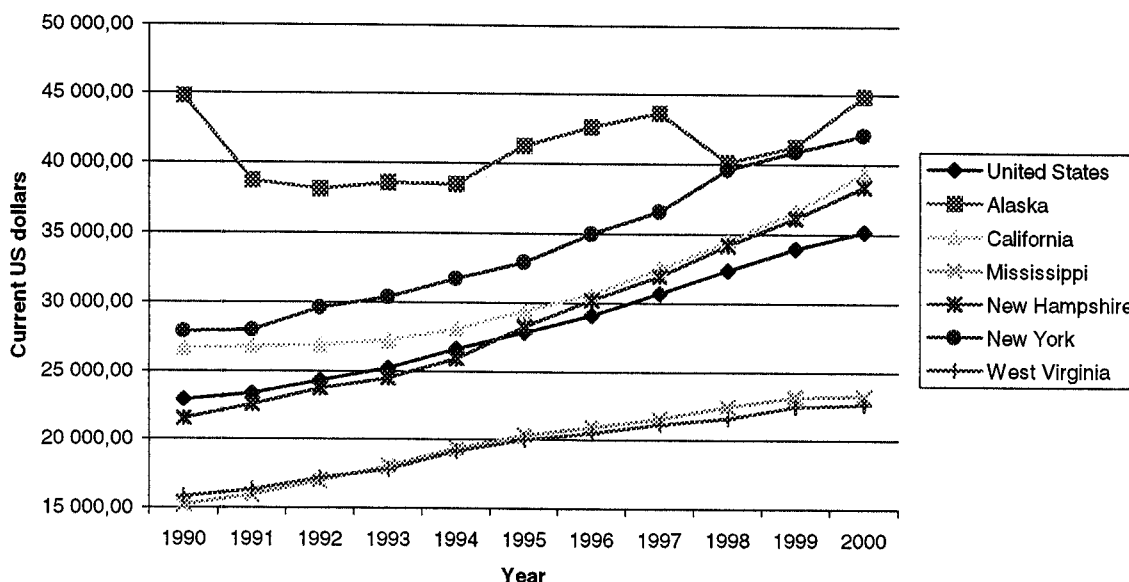
Figure 3a (continued) - Gross Domestic Product per capita, expenditure-based, by province and Canada, 1990-2000



United States

The American Gross State Product per capita data were obtained from the Bureau of Economic Analysis, Regional Accounts Data.

Figure 3b - Gross State Product per capita, by state and United States, 1990-2000



There was during the last decade, as shown in Figure 3b, constant growth of GSP per capita in the United States. New Hampshire, with an increase of 78.50%, followed closely by Oregon (75.56%), had the highest growth rate between 1990 and 2000, while Alaska had by far the lowest rate with 0.17%. On the other hand, Alaska had the highest GSP per capita level in 1990 and the second best in 2000. Connecticut was the wealthiest State in 2000 with a GSP per capita of about \$47.500. The poorest state in 1990 was Mississippi with a GSP level of about \$15.200. In 2000, West Virginia held that less than envious title.

4.4 Personal Income (PI)

Many papers reviewed in the last section, such as L'Horty *et al.* (1997) and Di Mateo and Di Mateo (1998), used the per capita gross domestic product variable as an alternative for per capita personal income. Furthermore, Medicaid federal funding, as described earlier, is determined by state personal income, not by the GDP. Both variables will consequently be used in our model and a comparison will be made.

Canada

The personal income data for Canadian provinces were obtained from Cansim II (Statistics Canada).

Figure 4a - Personal Income per capita, by province and Canada, 1990-2000

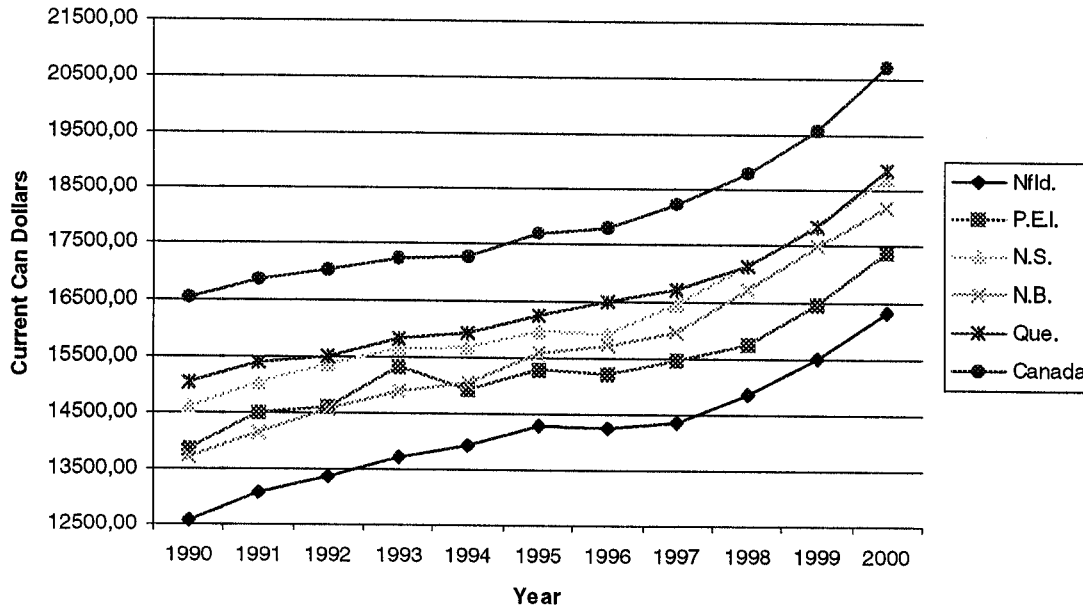
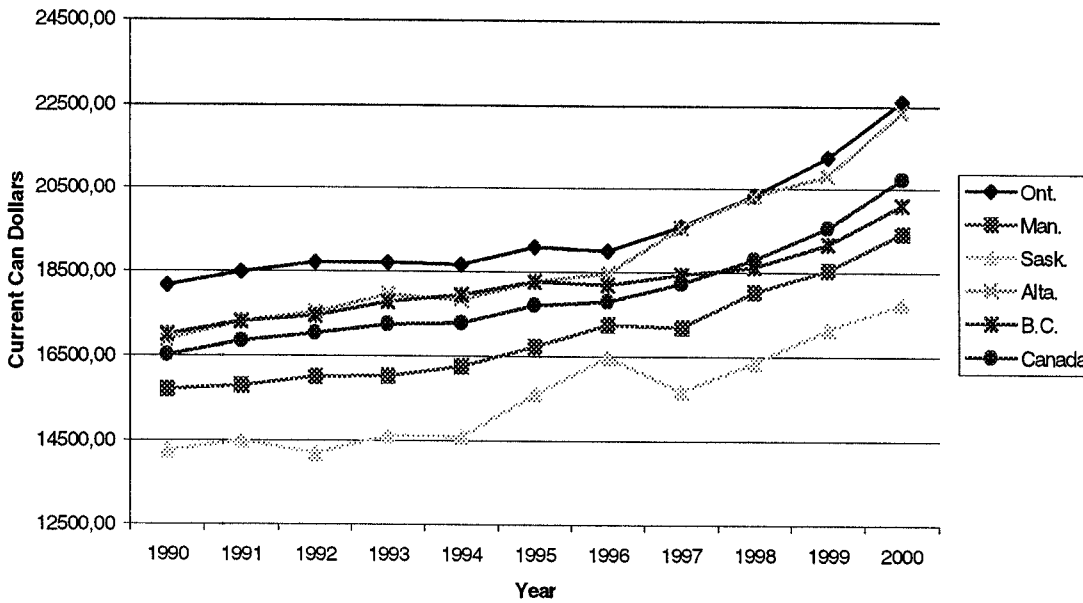


Figure 4a (continued) - Personal Income per capita, by province and Canada, 1990-2000

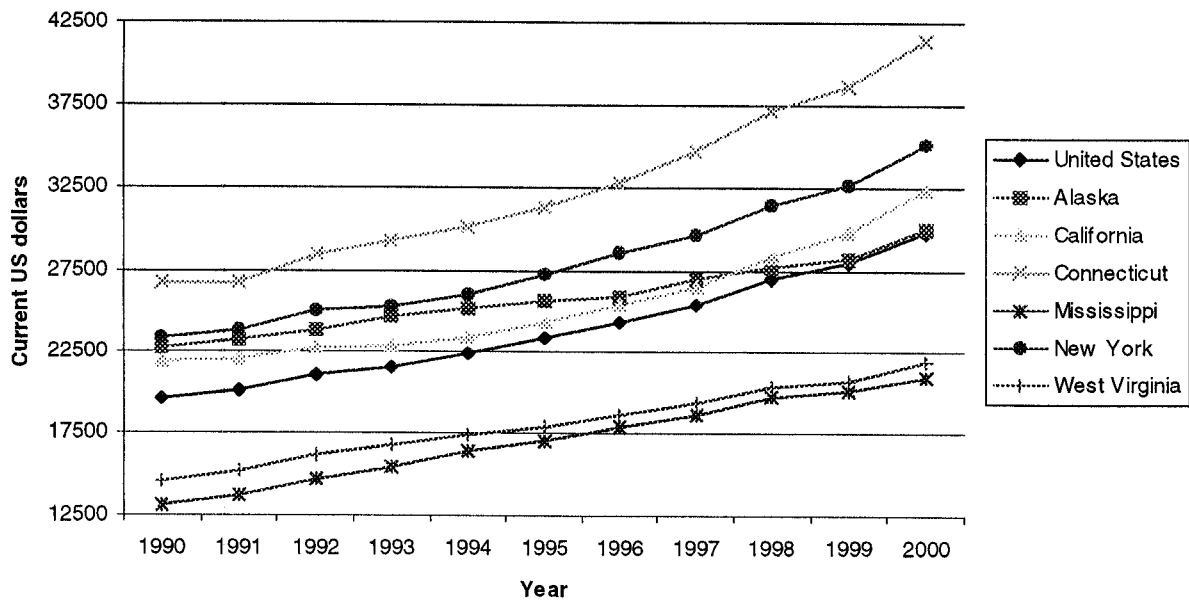


The data analysis is very similar to the GDP's one. After a relatively slow increase at the beginning of the decade, the growth rate accelerated after 1996 (Fig.4a). As for GDP, Maritime provinces, particularly Newfoundland had the lowest per capita personal income during all the 1990-2000 period, while Ontario had the highest. Between 1990 and 2000, New Brunswick increased its per capita personal income the most (33%) while British Columbia had the smallest rise (18%).

United States

The American personal income data were obtained from the Bureau of Labour Statistics. As it was for Canada, GDP data and PI data for the United States are very similar (Fig.4b). There was constant growth during the whole decade. Connecticut had the highest per capita PI during all the entire 1990-2000 period (\$27,000 to \$41,000), while Mississippi had the lowest (\$13,000 to \$21,000). Colorado was the State, which increased its PI the most (68%), while Hawaii had the lowest growth (27%).

Figure 4b - Personal income per capita, by state and United States, 1990-2000



4.5 Proportion of population over 65 years old

Studies, reviewed in the health determinants expenditures literature, suggested that the proportion of population older than 65 years old was often not significant or was marginal compared to GSP per capita. However, its inclusion can be justified by the fact that *“population aging might be expected to increase costs of health care in most societies because health expenditures by and for older age groups tend to be proportionally greater than their population share”* (Kinsella *et al.*, 2001, p.45).

In addition, the *Commission on the Future of Health Care in Canada* reported that *“health expenditures typically increase with age, although most analysts agree that aging alone will only drive up costs by about 1% a year (Conference Board of Canada, 2001)”* (CFHCC, 2002, p.20). The report also cited Rosenberg (2000) who pointed out that:

Much of the international evidence reviewed indicated that modest growth in economies should insure that most countries are able to manage the growth in their elderly populations and increased health care spending in the future. It is also worth remembering that there are countries which already have significantly larger elderly populations than Canada, spend significantly less and achieve similar health outcomes in comparison to Canada (Rosenberg, 2000, p.20)

(CFHCC, 2002, p.20)

The inclusion of the variable for the United States is also justified. In 1998, the elderly population represented about 11% of Medicaid beneficiaries, but accounted for 31 percent of total expenditures (HCFA, 1, 2000, p.12). Furthermore, the percentage increase of elderly beneficiaries was lower, 11% between 1973 and 1998, compared to the entire elderly population of the United States, which increased by 50% (HCFA, 1, 2000, p.62). Finally, the HCFA report stated that the increase of the elderly population's wealth contributed to the decrease in their Medicaid enrolment.

Canada

The population data for Canada were obtained from Cansim II (Statistics Canada). The proportion of population over 65 years old increased during the last decade for all

provinces, as it is plotted in Figure 5a. Newfoundland (9.4% to 11.7%) and Alberta (8.8% to 10.0%) were the two provinces with the lowest proportion of elderly the decade.

Figure 5a - Proportion of population over 65, by province and Canada, 1990-2000

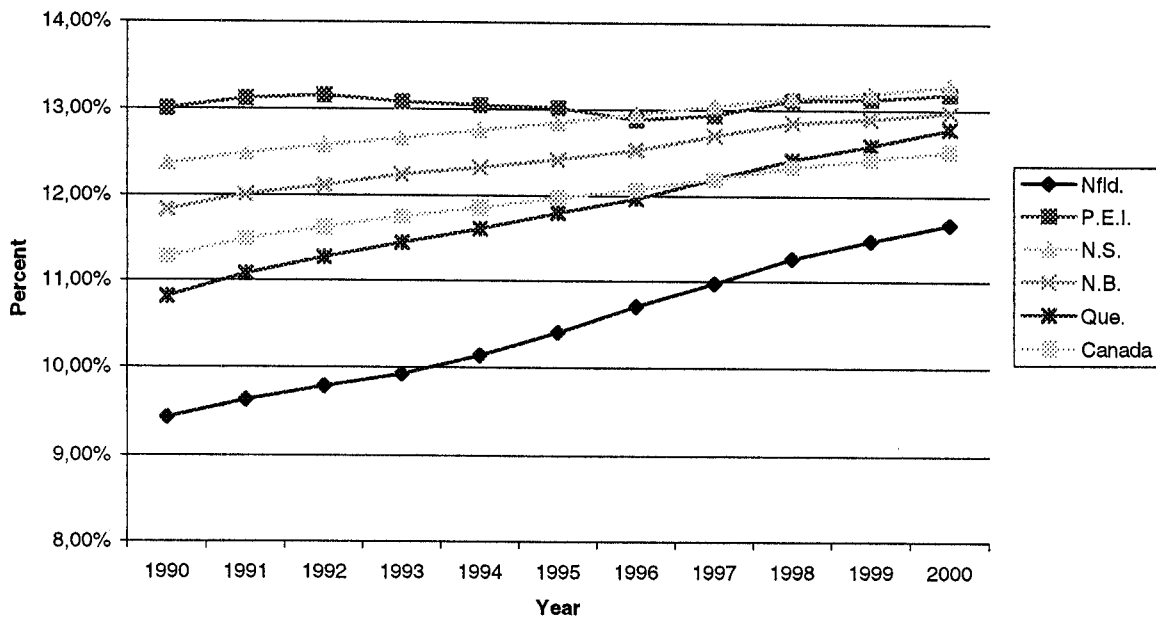
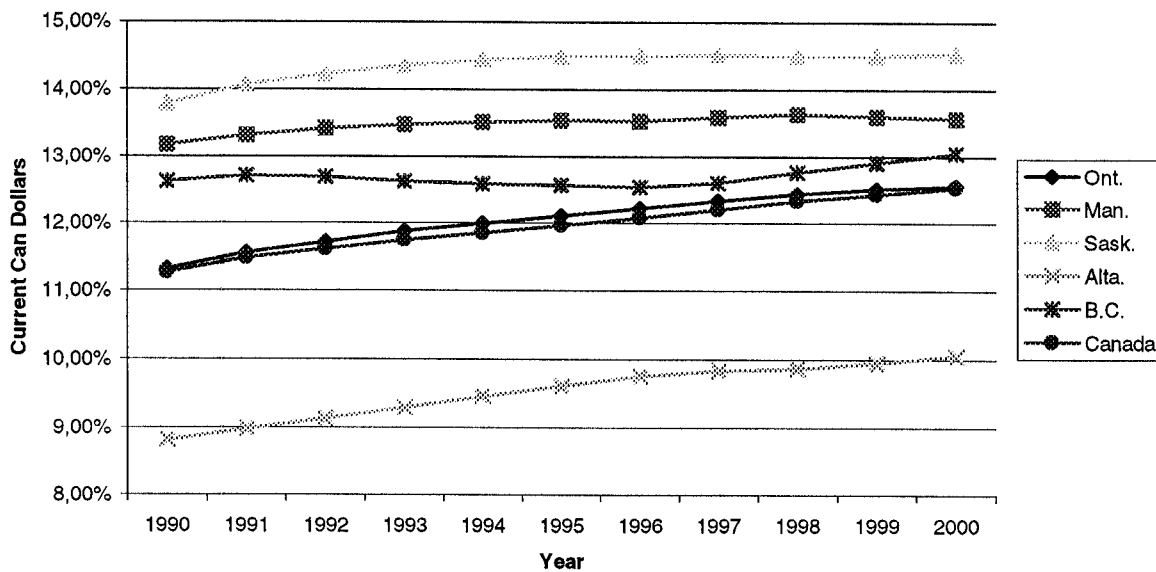


Figure 5a (continued) - Proportion of population over 65 years old, by province and Canada, 1990-2000



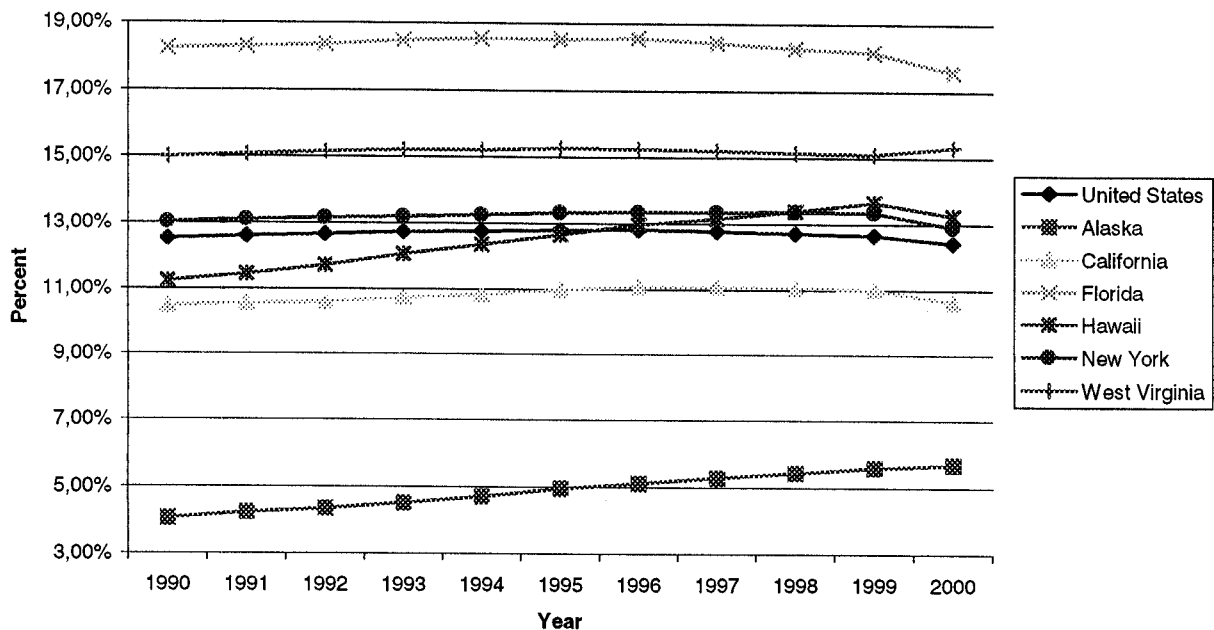
However, Newfoundland was the Canadian province for which the proportion increased

the most. Saskatchewan (13.8% to 14.5%) and Manitoba (13.2% to 13.6%) were the two oldest provinces during all the 1990-2000 period.

United States

The American population data were obtained from the National Center for Health Statistics for the years 1990 to 1999 and from the U.S. Census Bureau for 2000 (Fig.5b). Alaska was the state in which the proportion of population over 65 years old increased the most during the decade, with a rise of about 40%. On the other hand, it remained the state with the least elderly of the entire country. Florida was the state throughout the decade, with a proportion of about 18% of the population, with most old persons. However, many American states saw a decrease of its population over 65 years old, Idaho being the one with the highest decline (about 6%). For the country as a whole, the decrease was 0.71%.

Figure 5b - Proportion of population over 65 years old, by state and United States, 1990-2000



4.6 Federal transfers to provinces and States

One paper reviewed in section 3 included transfers between public administrations. Di Matteo and Di Matteo outlined it very clearly, in federal system like Canada, cash transfers from federal government to provinces are an important determinant of health spending. Their study examined Canadian province health expenditures over the 1965-1991 period. The 1990-2000 period will be studied here and as the description of the Canadian health system in section 3 outlined it, an important transfer reform occurred in 1996. This could possibly have a significant effect on province health care expenditures.

The American case is somewhat different. Medicaid & SCHIP federal spending levels are determined by the number of enrolled people and by the services provided. Certain optional services (e.g. family planning services) related to larger federal matches can be offered by state programs. A state with a personal income level below the average receives more cash, a state under receives less. Ergo, American federal transfers should be strongly correlated to the per capita personal income variable and the first one could offset the other.

Canada

The Canadian Federal transfers data were obtained from Cansim II (Statistics Canada). First, federal transfers as a whole were chosen for the study (Fig.6a). As Di Matteo and Di Matteo wrote in their study on Canadian provincial government health expenditures:

Thus, while only 24% of federal cash transfers are specifically designated for health care, general purpose transfers are also potentially available for use on health care meaning that up to two third of federal transfers to the provinces could be used to fund health care spending by the provinces

Di Matteo and Di Matteo, 1998, p.222

Expectedly, Atlantic provinces, lead by Newfoundland, were the ones with the highest transfers per capita from the federal government over the 1990-2000 period. Inversely, Ontario, followed by Alberta, were the two provinces with the lowest levels of transfers. Furthermore, Alberta has seen its level decline a lot during the decade, with a decrease of about 19%, while British Columbia enjoyed a 19% increase in its transfers.

Figure 6a - Federal transfers per capita, by province and Canada, 1990-2000

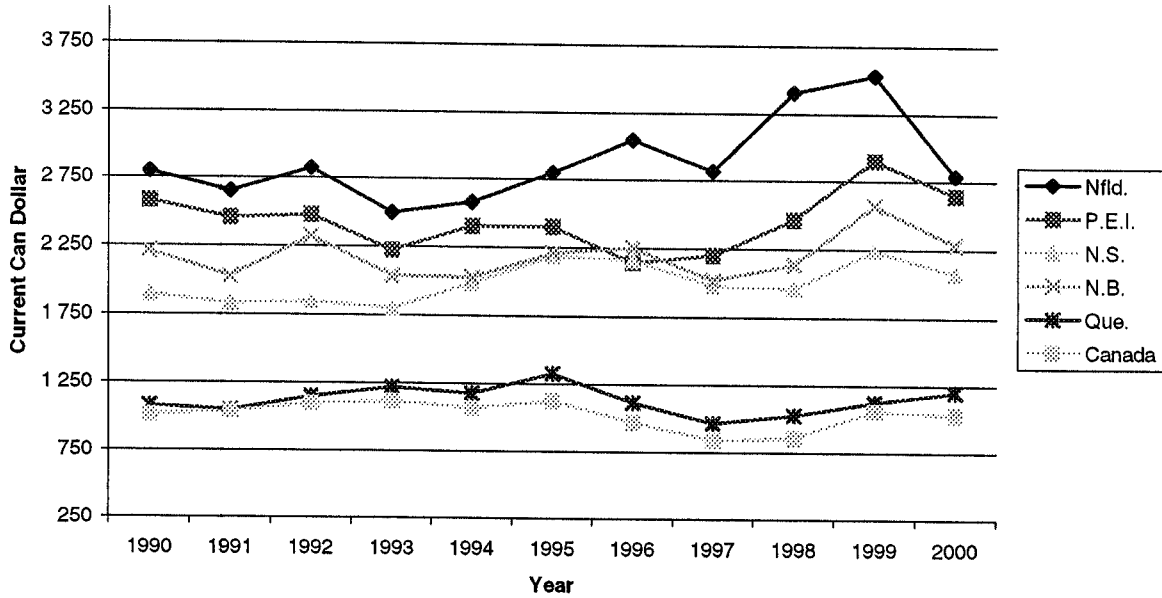
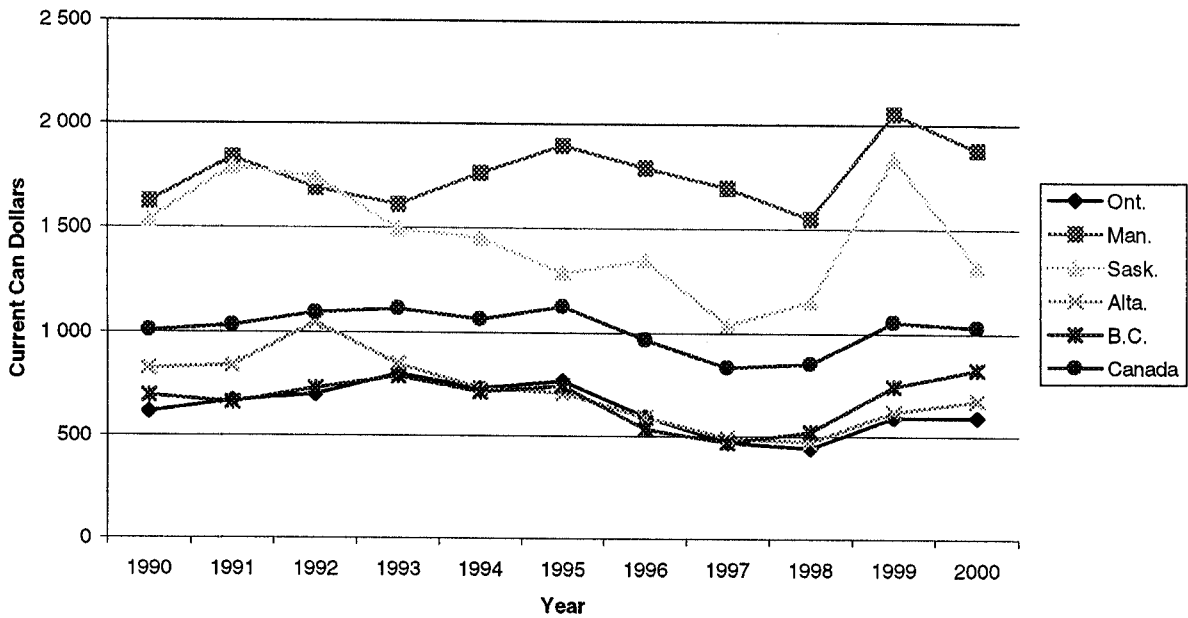


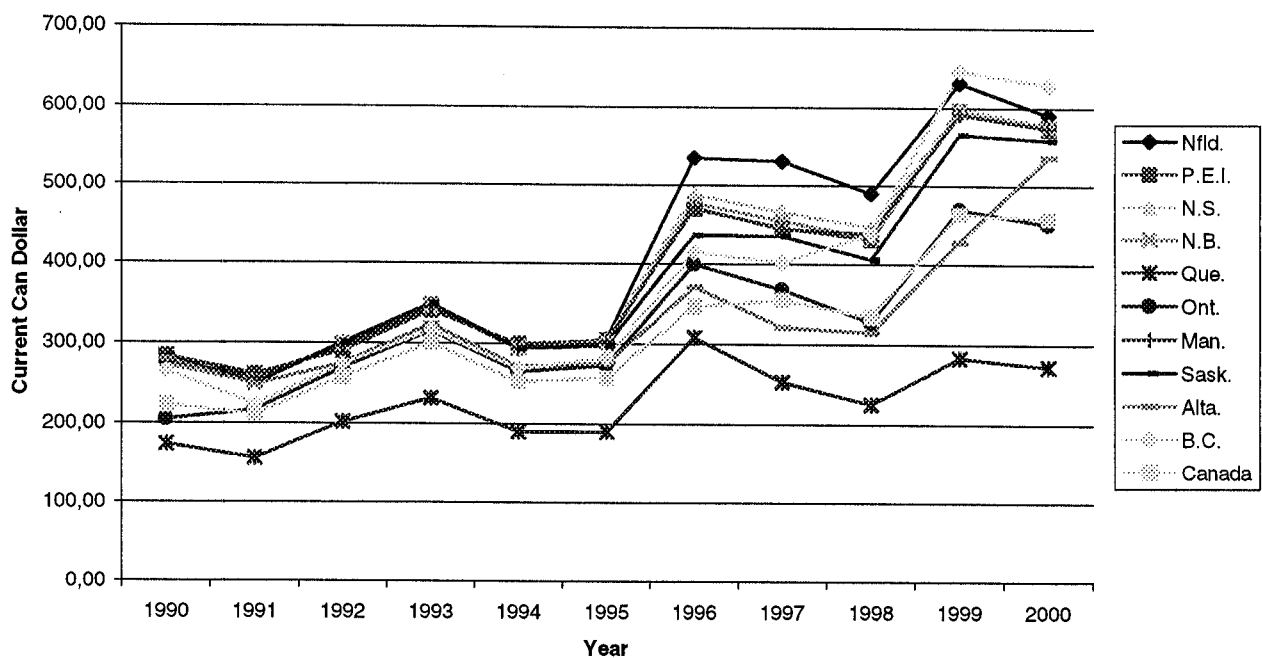
Figure 6a (continued) - Federal transfers per capita, by province and Canada, 1990-2000



Second, health specific federal transfers were chosen for the study, even if general purpose transfers can be spent on health care by Canadian provinces. For the 1990-1995

period, *Contributions under the Hospital Insurance Act* and *Health Resources Fund* data were used, while *Canadian Health and Social Transfer* data were used for the 1996-2000 period. As Figure 6b shows, health specific federal transfers to provinces were relatively stable until the enactment of the reform in 1996. This latter year, there was a sharp increase. However, it is explained by the fact that the *Canadian Health and Social Transfer* reform united federal funding for health care, post-secondary education, social assistance and social services, as described in section 2.

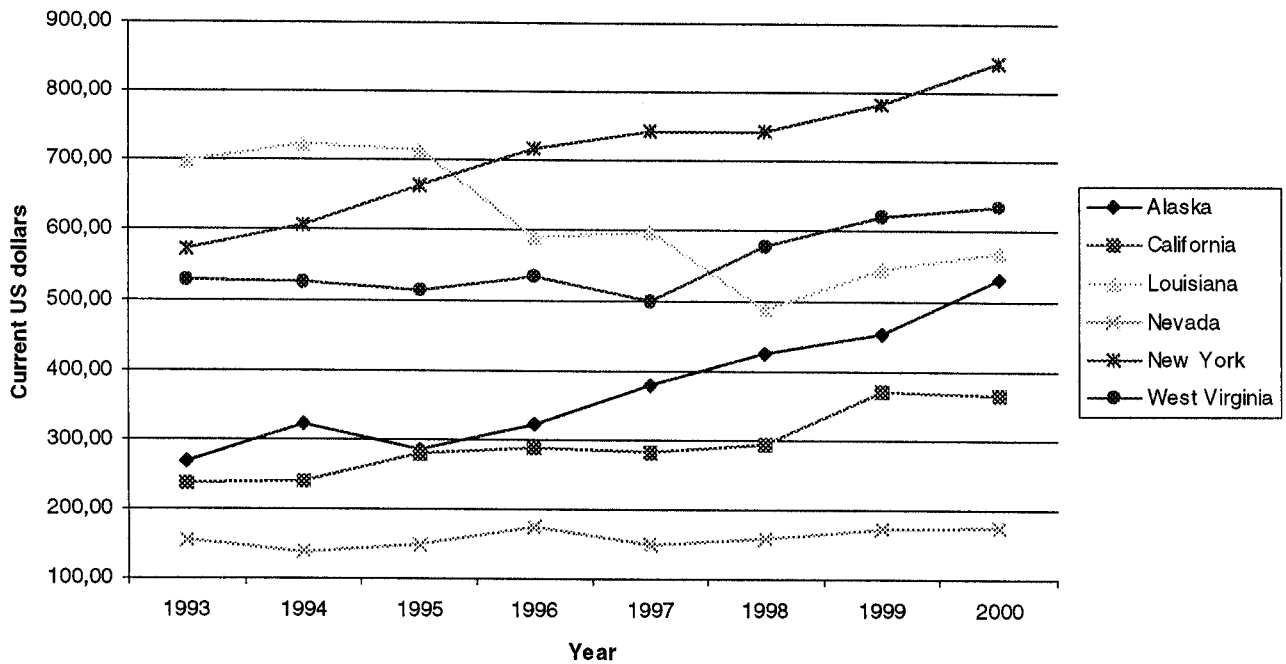
Figure 6b - Health Federal transfers per capita, by province and Canada, 1990-2000



United States

The federal transfers to states data, corresponding to the federal Medicaid financial participation, were obtained from the Centers for Medicare & Medicaid Services. The data was only available for the 1993-2000 period, which limits the analysis to this period of time (Fig.6c). In 1993, Louisiana was the State with the highest per capita federal transfers, being one of the States with the lowest per capita personal income. In 2000, New York had the highest per capita transfers. During all the period, Nevada had the lowest per capita cash transfers from federal government.

Figure 6c - Federal transfers per capita, by state and United States, 1993-2000



4.7 Unemployment Rate

American health care public programs were designed to help people who cannot afford private insurance. Medicaid, as described in section 2, was specifically created to help poor and disabled people. Economic fluctuations affect these kinds of persons. A period of growth usually helps people find a job, thus allowing them to buy a private insurance or to be covered by their employer's health care insurance. So, as Holahan and Garret (2001) stated, an increase of the unemployment rate generally rises the enrolment and the costs of Medicaid.

The same logic cannot be applied to Canada, its health system being public. However, a considering amount of literature exists stating that better economic conditions usually lower the unemployment rate and affect population health positively, and thus could decrease health care expenditures. The opposite could also be true. Jin, Chandrakant and Svoboda (1995) reported that:

Most aggregate-level studies reported a positive association between national unemployment rates and rates of overall mortality and mortality due to cardiovascular disease and suicide.

Jin, Chandrakant and Svoboda (1995)

Furthermore, in a paper published by the Canadian Public Health Association, estimations of the financial impact of unemployment on the Canadian health care system are accomplished:

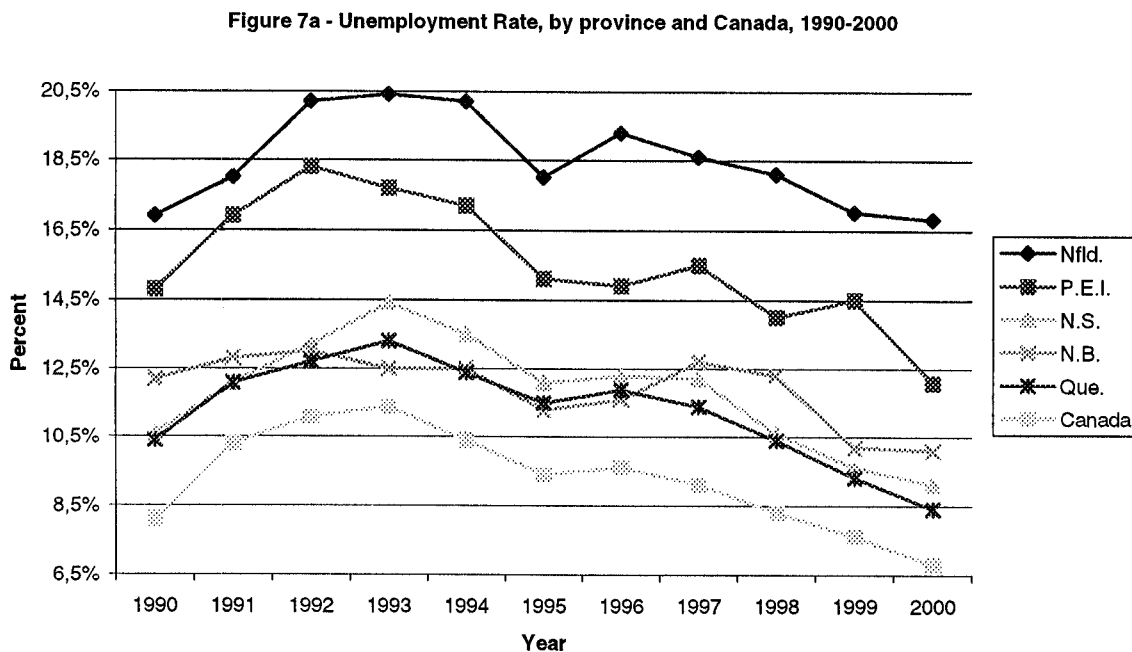
(...) the total excess annual cost of health care in Canada attributable to the unemployment level in 1993 was \$845 million, for 12.3% unemployed or \$1,085 million for 15% unemployed

Canadian Public Health Association (1996)

In summary, the unemployment rate does seem to influence the Canadian public finance health system.

Canada

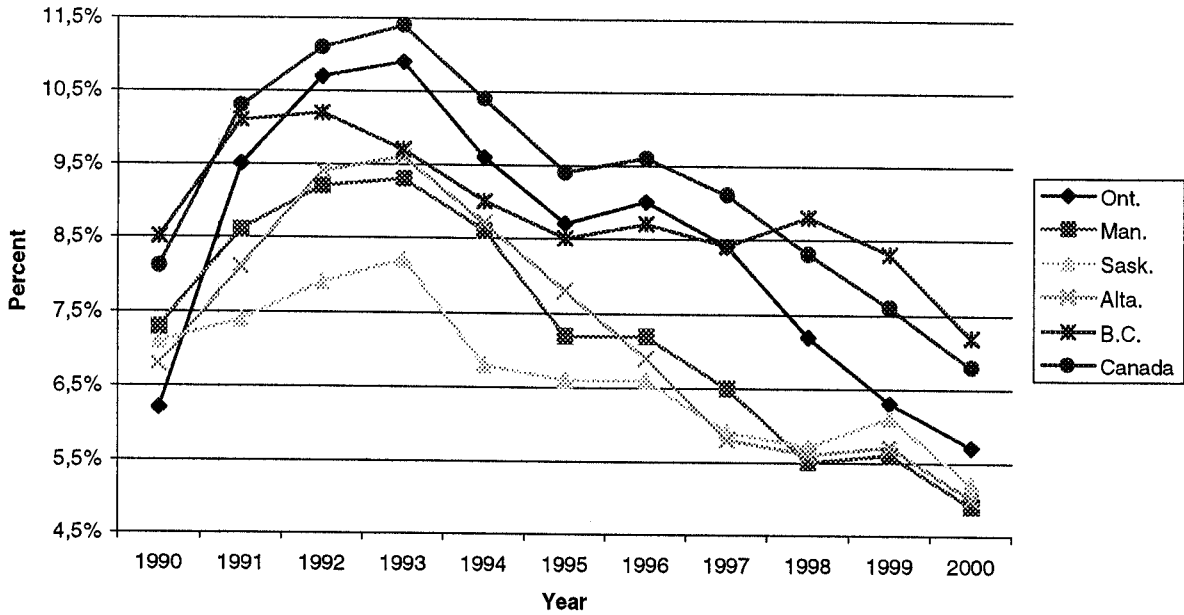
Unemployment rate data for Canadian provinces were obtained from Cansim II (Statistics Canada) (Fig.7a).



Atlantic provinces had the highest unemployment rate in Canada during the decade, although Prince-Edward-Island, Nova Scotia and New Brunswick reduced their nominal

rate by about 2%. Newfoundland was the only province with an unchanged rate between 1990 and 2000. The Prairies kept the lowest rates over most years and had the highest decreases. Over Canada, rates generally rose until 1993 and declined after.

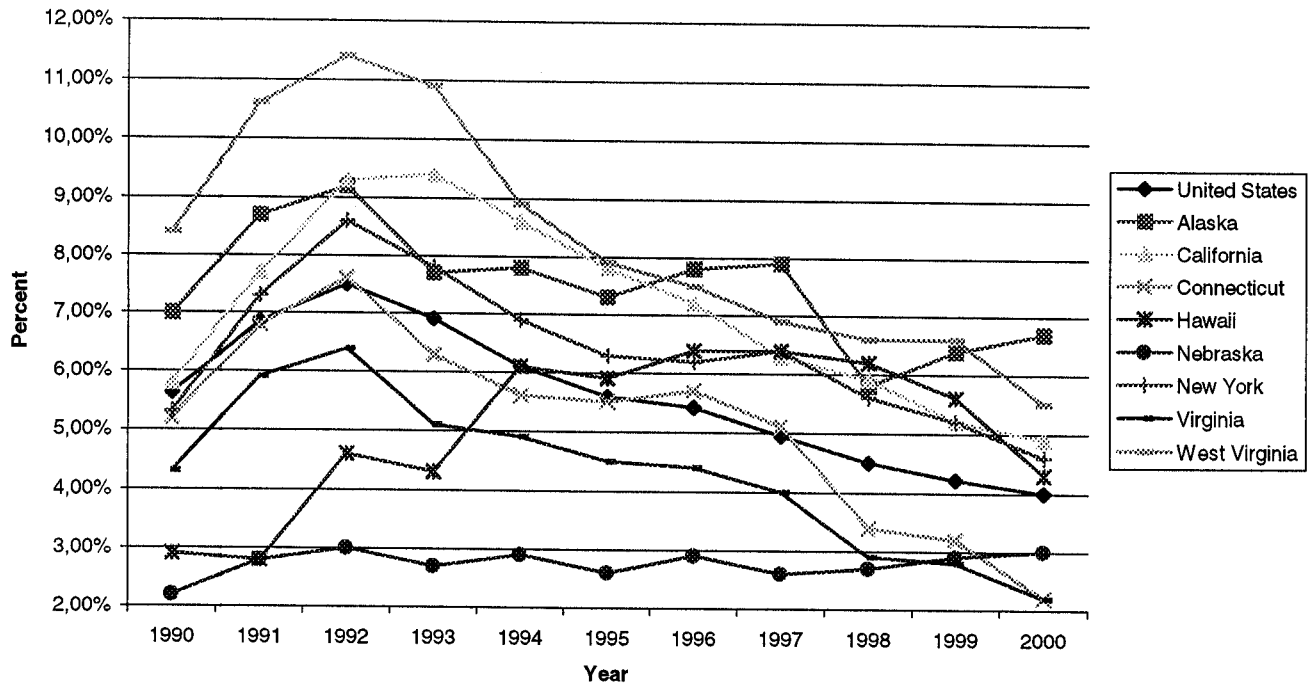
Figure 7a (continued) - Unemployment Rate, by province and Canada, 1990-2000



United States

The American data were obtained from the Bureau of Labour Statistics (Fig. 7b). There was generally a huge decrease of unemployment rate across the United States, particularly after 1992. Connecticut surpassed all the other States with a decrease of about 58%. It also had, with Virginia, the lowest rate (2.2% in 2000). Nebraska, with an increase of about 37% was one of the few States for which rates rose. However, its rate stayed below the American average over the period, not exceeding 3%. Finally, West Virginia, with the highest rate in 1990 and Alaska, highest in 2000, were two States in which rates stayed above the average.

Figure 7b - Unemployment Rate, by state and United States, 1990-2000



4.8 Relative Price of Health Care

Hitris and Posnett (1992) conclude their paper by stating that their results could be misleading, given that a relative price of health care variable was omitted. They wrote that “*the omission of this variable may lead to a downward bias in the estimated income elasticity, and (...) to an understatement of the role of non-income variables*” (Hitris and Posnett, 1992, p.180). L’Horty *et al.* (1997), for their part, included the relative price of health care to study the determinants of health expenditures in France. They built their index by dividing a health spending price index by the consumer price index. The same principle was applied to Canada and United States.

Canada

The relative price of health care variable for Canadian provinces used for the model is a ratio of an index based on *Health and Social service institutions expenditures* data for the 1990-2000 period, and the *Consumer Price Index* for the same years.

Figure 8a - Relative Price of Health Care, by province and Canada, 1990-2000

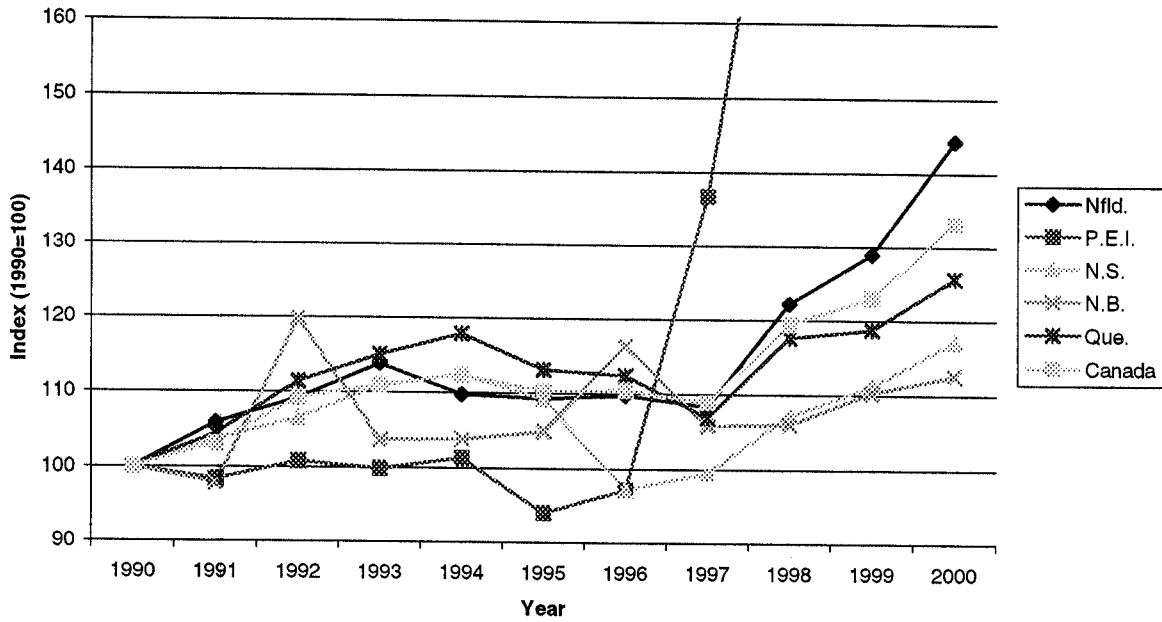
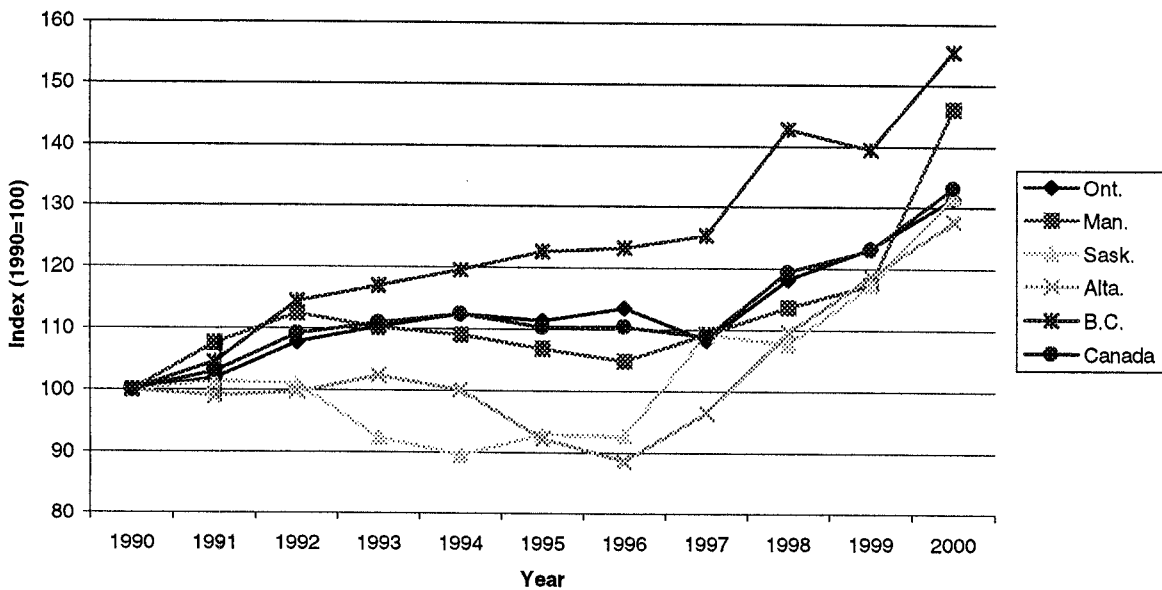


Figure 8a (continued) - Relative Price of Health Care, by province and Canada, 1990-2000



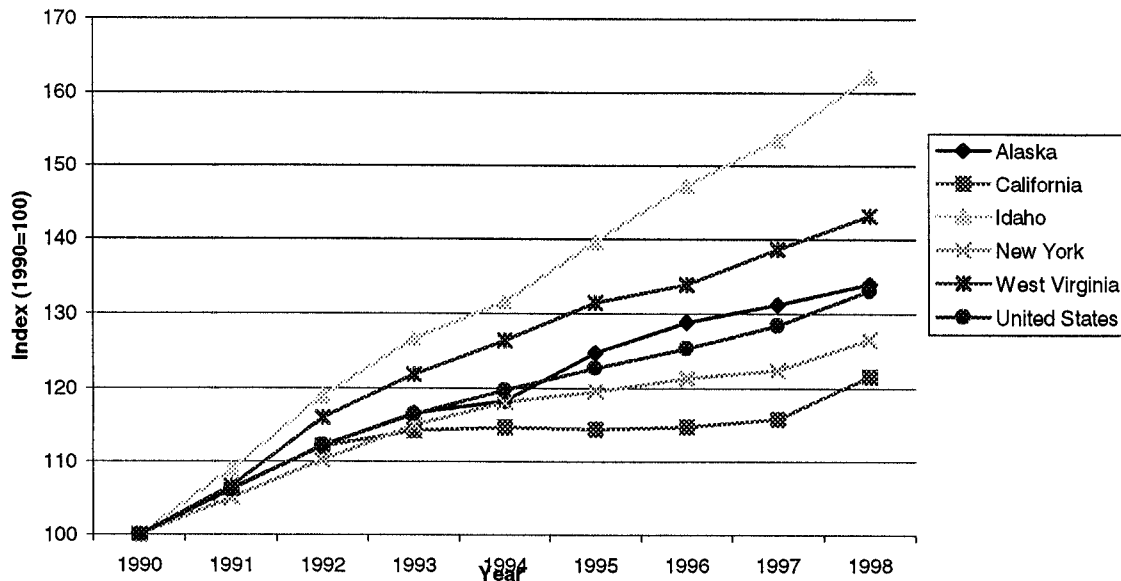
Both variables were obtained from Cansim II (Statistics Canada). 1990 is the base year (1990=100). During the decade, the relative price of Prince-Edward-Island's health care system increased the most, the index going from 100 in 1990 to about 252 in 2000 (see

Fig. 8a). New Brunswick and Nova Scotia were the two provinces where the relative price did not have a huge increase. In Canada, the relative price was 133 in 2000.

United States

The American state relative price was built similarly. The Total Personal Health expenditures data for each state, obtained from the CMS, and the consumer price index, obtained from the Bureau of Economic Analysis, were used for the ratio (see Fig. 8b). However, CMS's data being available only for the 1990-1998 period, the analysis will be limited. Base year is 1990 for the index. The relative price index demonstrates that California was the state where the relative health care price increased the least (1998=122), while Idaho was the state with the highest increase (1998=162). The United States index was 133 in 1998.

Figure 8b - Relative health care price, by state and United States, 1990-1998



5 MODEL AND ESTIMATES

Estimates in this paper are based on the literature reviewed in section 3. Health care determinants will be estimated for Canada and United States. Then, impacts on health expenditures of health federal funding reforms will be analyzed. Pooled time-series cross-section regressions were estimated, first, for per capita Canadian provincial and American state government health expenditures, and second, for per capita provincial and state total health expenditures. Using STATA 8.0, a GLS Random-Effect Model was used to evaluate cross-sectional time-series regressions. A log-log specification was used, so *“that coefficient estimates are elasticities and therefore enable us to interpret the responsiveness of provincial [or state] expenditures to the variables”* (Di Mateo and Di Mateo, 1998, p.219). The 5% level was used for the significance of coefficient estimates.

5.1 Canada

The data set for Canada covers the ten provinces for the 11 years 1990-2000: a total of 110 observations. First, a relationship was estimated between per capita provincial health care expenditures and per capita gross domestic product ($\ln gdp$), proportion of population over 65 years old ($\ln ov65yo$), per capita federal transfers to provinces ($\ln intrans$), unemployment rate ($\ln unemplorate$) and relative price of health care ($\ln medrp$). Second, estimations were conducted by replacing per capita provincial health care expenditures data by per capita provincial total expenditures data ($\ln totexp$). Third, per capita gross domestic data were replaced by per capita personal income data ($\ln pi$) in the estimates.⁹ Finally, total per capita federal transfers to provinces were replaced by health per capita federal transfers to provinces ($\ln healthtrans$). Dummies were specified for each province and for each year¹⁰ of the decade. A *Canadian Health and Social Transfer* dummy ($dCHST$) was also specified to observe the effect of the reform on health care expenditures.

⁹ Estimates were also conducted without the per capita federal transfers to provinces variable. However, results were similar or insignificant.

¹⁰ Dummies for Ontario and year 2000 were dropped

The results in Table 5 and 6 show that Canadian provincial public and total health care expenditures were positively and significantly related, first to per capita gross domestic product and per capita personal income, and second to per capita federal transfers and per capita health federal transfers.

Table 5 - Canada - Final Regression Results with TOTAL FEDERAL TRANSFERS - 1990 - 2000

	(1) Public expenditures - Gross Domestic Product			(2) Public expenditures - Personal Income			(3) Total expenditures - Gross Domestic Product			(4) Total expenditures - Personal Income		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
lmgdp / lnpi	0,49	0,14	3,65	0,57	0,26	2,20	0,39	0,11	3,63	0,42	0,20	2,04
lnov65yo	-0,19	0,20	-0,95	-0,02	0,20	-0,08	-0,14	0,16	-0,92	0,00	0,16	-0,02
lnintrans	0,18	0,04	4,93	0,14	0,04	3,89	0,14	0,03	4,82	0,11	0,03	3,76
lnunemplorate	0,03	0,06	0,55	0,01	0,06	0,21	-0,01	0,05	-0,26	-0,03	0,05	-0,60
lnrelpricehealth	-0,02	0,04	-0,47	0,02	0,04	0,46	-0,03	0,03	-0,91	0,00	0,03	0,01
dCHST	0,18	0,05	3,57	0,20	0,67	3,00	0,25	0,04	6,18	0,27	0,05	5,12
_cons	0,96	1,61	0,60	0,87	2,65	0,33	2,66	1,27	2,09	2,88	2,10	1,37
R-sq:												
within =	0,8969			0,8872			0,9432			0,9375		
between =	1,0000			1,0000			1,0000			1,0000		
overall =	0,9218			0,9145			0,9541			0,9495		

The CHST reform dummy had a positive and significant impact on health expenditures with estimates using total federal transfers, while it was not significant with health federal transfers. Furthermore, year dummies and province dummies, not shown in Tables 5 and 6, were collectively significant and had an impact on expenditures as well¹¹. Finally, regressions explain, in all four cases, more than 91% of the variation in provincial public and total health care expenditures.

¹¹ The collective significance of year dummies and province dummies were established by Wald tests. In all cases, the null hypothesis, constraining coefficients to zero, were rejected.

Table 6 - Canada - Final Regression Results with FEDERAL HEALTH TRANSFERS-1990 - 2000

	(1) Public expenditures - Gross Domestic Product			(2) Public expenditures - Personal Income			(3) Total expenditures - Gross Domestic Product			(4) Total expenditures - Personal Income		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
lngdp / Inpi	0,33	0,14	2,42	0,65	0,26	2,51	0,26	0,11	2,50	0,49	0,20	2,41
Inov65yo	0,10	0,21	0,47	0,18	0,21	0,88	0,09	0,17	0,56	0,16	0,16	1,01
Inrelpricehealth	0,01	0,07	0,13	-0,01	0,07	-0,10	-0,04	0,05	-0,73	-0,05	0,05	-1,03
Inunemplorate	0,01	0,04	0,14	0,04	0,04	0,89	-0,01	0,03	-0,30	0,01	0,03	0,44
Inhealthtrans	0,25	0,07	3,70	0,26	0,07	3,79	0,21	0,05	4,00	0,21	0,05	4,05
dCHST	0,03	0,08	0,37	-0,03	0,09	-0,31	0,12	0,06	1,84	0,08	0,07	1,06
cons	2,93	1,57	1,86	-0,15	2,70	-0,06	4,07	1,22	3,33	1,94	2,12	0,91
R-sq:												
within =	0.8858			0.8864			0.9291			0.9389		
between =	1.00			1.00			1.00			1.00		
overall =	0.9134			0.9138			0.9508			0.9506		

Per capita gross domestic product, estimates (1) and (3), and per capita personal income, estimates (2) and (4), had the highest elasticities of the significant variables, and were then the main determinants of public and total provincial health care expenditures in Canada. These results are similar to those reviewed in section 3, however the coefficients are smaller. Per capita personal income coefficients were greater than the per capita gross domestic ones for all estimates. A possible explanation for this result is that personal income is a better wealth indicator than gross domestic product. For example, in 2000, Newfoundland had the lowest per capita personal income, but not the lowest per capita gross domestic product. The latter is drove up by petroleum revenues that do not necessarily go to Newfoundland population. Therefore, more variations on health care expenditures are induced by personal income than by GDP, spending being linked to the population wealth.

There are no major differences between estimates conducted with public expenditures and total expenditures. This could be explained by the fact that in the Canadian health care system, public spending is far more important than the private funding. However, coefficients of personal income and gross domestic product for total expenditures are lower than for public expenditures. This suggests that spending not covered by public insurance could be less elastic to income and more related to non-observable variables. For example, persons requiring cosmetic surgery, a service not publicly covered, could be less influenced by cash than by personal non-observable variable.

Per capita total federal transfers (Table 5), with an elasticity in the 0.11 to 0.18 range, and per capita health federal transfers (Table 6), with an elasticity in the 0.21 to 0.26 range, were also important variables influencing variations in health care expenditures in Canada during the 1990-2000 period. In 1999, for example, the province of Quebec, which spent about 14 billions dollars in the health sector (more than a third of Quebec's government spending), received about 2 billions dollars through the *Canadian Social and Health Transfers* and, in total transfers from Ottawa, about 8 billions dollars (MSSS, 2003). Thus, the federal government paid directly for a seventh of public health expenditures. Furthermore, Di Matteo and Di Matteo's (1998) analysis suggesting that "*large portions of unconditional federal transfers to the provinces were being directed into health care expenditures*" can certainly be applied here, considering that the health sector is the one in which provincial governments spend the most.

Quite surprisingly, the proportion of the population over 65 years old was not a significant variable in any estimation. However, the context of the 1990-2000 decade could explain, at least in part, this result. As described in section 4, until 1996, there was a relative stability in public and total health expenditures in Canada. Between 1997 and 2000, provincial spending increased. In the mean time, the growth rate of the proportion of population over 65 years old was greater at the beginning of the decade than at the end. So, contrary to the conclusions of some papers reviewed in the literature, a larger proportion of elderly people in the Canadian population did not positively influence health expenditures during the decade.

The unemployment rate variable was also non-significant in every estimate. The statement saying that unemployment level increases health care costs should then be rejected. However as it was in the case of the proportion of population over 65 years old variable, the 1990-2000 context could have influenced the results. While unemployment rates were increasing at the beginning of the decade, provincial health spending was relatively stable, and as rates decreased at the end of 90s, spending raise. A longer period of data collections could change these results.

The relative price of health care did not influence public or total health care expenditures in Canada during the 1990-2000 decade.

Finally, the 1996 reform replacing EPF and CAP programs with the Canadian Health and Social transfers had a different impact depending on the federal transfers variable. The reform had a positive and significant impact on health care expenditures with estimates using total federal transfers. This result may seem surprising because total federal transfers to provinces were tightened by this reform, as shown in Figure 6 of section 4. However, it could be supposed that Canadian provinces used other sources of funds to finance health care spending when federal transfers dropped in 1996. This also could explain why health expenditures increased at the end of the decade in spite of transfer cuts. On the other hand, the CHST reform was not significant in estimates using health federal transfers. This result was expected considering that the reform was a continuation of budgetary contractions that begun during the 80s.

5.2 United States

The data set for United States covers the fifty states for the 1993-1998 period: a total of 300 observations. Estimates for the complete decade could not have been made given that total health expenditures data was available for the 1990-1998 period only and that the

federal transfers to State data was available for the 1993-2000 period¹². However, the methodology used for Canadian provinces was applied to American States. A relationship was estimated between per capita state public health care expenditures, i.e. Medicaid spending, and per capita GDP (Ingdp), proportion of population over 65 years old (Inov65yo), per capita federal transfers to states (Infedtrans)¹³, unemployment rate (Inunemplorate) and relative price of health care (Inrelpricehealth). Other estimations were conducted by replacing public expenditures by total expenditures and GDP by personal income (Inpi). Dummies were specified for each state and each year of the studied period¹⁴. A *Balanced Budget Act of 1997* dummy was also specified, to observe the effect of the reform on health expenditures.

Table 7 - United States - Final Regression Results - 1993 - 1998

	(1) Public expenditures - Gross Domestic Product			(2) Public expenditures - Personal Income			(3) Total expenditures - Gross Domestic Product			(4) Total expenditures - Personal Income		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
Ingdp / Inpi	0,01	0,01	0,72	0,10	0,25	0,39	0,00	0,00	0,88	0,09	0,08	1,24
Inov65yo	-0,14	0,23	-0,60	-0,08	0,28	-0,28	0,14	0,07	2,00	0,20	0,08	2,35
Inunemplorate	0,18	0,03	5,58	0,18	0,03	5,46	0,01	0,01	0,52	0,01	0,01	0,83
Infedtrans	0,54	0,04	14,10	0,53	0,04	14,16	0,02	0,01	1,56	0,01	0,01	1,34
Inrelpricehealth	0,08	0,16	0,52	0,08	0,16	0,51	0,66	0,05	14,25	0,66	0,05	14,19
dbba1997	0,16	0,03	5,00	0,15	0,06	2,44	0,12	0,01	12,79	0,11	0,02	5,99
cons	2,81	0,87	3,24	2,10	2,29	0,92	5,06	0,26	19,56	4,32	0,68	6,34
R-sq:												
within =	0,8153			0,8149			0,9748			0,9749		
between =	1,0000			1,0000			1,0000			1,0000		
overall =	0,9797			0,9797			0,9922			0,9923		

The results in Table 7 show that American health expenditure determinants vary depending on whether estimations are conducted with public spending or total spending as the dependent variable. State public health expenditures were positively and significantly related to federal transfers and unemployment rates for the 1993-1998

¹² Estimates were made for the 1993-2000 period with the available variables, but results did not differ significantly from 1993-1998 estimates.

¹³ Estimates were also conducted without the per capita federal transfers to states variable. However, results were similar or insignificant.

¹⁴ Dummies for California and year 1993 were dropped.

period, while state total health expenditures were positively and significantly related to the proportion of population over 65 years old and the relative price of health care. Neither per capita gross domestic product nor per capita personal income was significant in any estimation. The BBA 1997 dummy had a significant and positive effect on health spending in the United States. In addition, year dummies and State dummies, not shown in Table 7, were collectively significant and had an impact on public and total health care expenditures¹⁵. Finally, regressions explain more than 97% of the variation in State public and total health expenditures in all four cases studied.

Per capita federal transfers to state governments had the greatest elasticities for both public expenditures estimates. This is consistent with the fact that federal transfers are an important source of funds for states in the financing of the Medicaid program. In section 2, it has been stated that the *Federal Medicaid Assistance Percentage* (FMAP), through which federal government finance State health expenditures, covers between 50 and 83 percent of state spending. Furthermore, FMAP being determined by state average per capita income, it can be supposed that the presence of per capita federal transfers in the estimate, offsets the effect of per capita GDP and PI. Estimates without transfers were conducted, but the coefficient of GDP and PI remained non-significant. However, their level of significance increased. A longer period of estimation would maybe have changed results.

The unemployment rate variable was also significant, with an elasticity of 0.18, in both state public health care expenditures estimates, as it would have been expected. The Medicaid program was enacted in 1965 to cover eligible poor people. As Holahan and Garret (2001) concluded in their paper, an increase of the unemployment rate generally raises the enrolment and costs of Medicaid.

On the other hand, the proportion of population over 65 years was found to be not significant in explaining public expenditures. The Medicaid program, although 11% of its

¹⁵ The collective significance of year dummies and state dummies was established by Wald tests. In all cases, the null hypothesis, constraining coefficients to zero, were rejected.

beneficiaries are over 65 years old and that 31 percent of expenditures are related to them, is not only a program for elderly people. In reality, the government mainly provides insurance to the elderly through Medicare.

The relative price of health care did not seriously influence public expenditures during the 1993-1998 period. This could be explained by the nature of services covered by the Medicaid program. Drugs and other medical non-durable products are excluded from the public insurance, while spending on these products increased a lot during the period studied:

(...) in 1996 and 1997, spending on drugs and non-durables had the highest growth rate of any PHC category in 1998 (12.3 percent) (...). Several causes are cited as reasons. Changes in the Food and Drug Administration's approval process sped the introduction of new prescription medicines that tend to be higher priced than drugs already on the market. As drug companies increased spending for advertising, consumer demand rose for these new products. Additionally, private health insurance companies were covering more of the cost of prescription drug spending. Finally, managed care¹⁶ helped to increase access to physician services, which in turn led to increased prescription drug utilization. (Cowan et al., 1999)

Martin et al., 2001, p.125

Results obtained from estimates with state total health expenditures as the dependant variable were different. It seems very logical that determinants vary, given that the Medicaid program accounted for only 15.7 percent of personal health care spending in 1995, while private funds financed 55.4 percent.

The relative price of health care, with an elasticity of 0.66 for both estimates, was the most important variable explaining variation in American State total health care expenditures for the 1993-1998 period. Prescription drugs and other medical non-durable products are included in total health care expenditures data, and as just mentioned, these products had the highest growth rate of any PHC category from 1996 to 1998 and the sector's second-fastest-growing on average since 1980, behind physicians and other

¹⁶ Managed care plan: Term applied to a wide range of insurance plans, including HMO's, where choice of providers is limited and administrative measures control utilization of services (Medicare a Profile, p.56)

professionals. It was then expected that rising health care relative price induced a large positive variation on American state total health care expenditures.

The proportion of population over 65 years old was also positively and significantly related to state total health expenditures, with an elasticity of 0.14 for the GDP estimation and 0.20 for the personal income one. This result is consequent with the study published in 2001 by the U.S. Department of Commerce, cited in section 4, which stated that an increasing elderly population in occidental societies would drive up health care costs. Furthermore, by using total health expenditures data, Medicare spending is included. In 1995, the share of total personal health care spending of this federal government program for elderly and disabled people was 20.6 percent.

Neither per capita gross domestic product nor per capita personal income was significant in any of the two total expenditures estimations. This result is unexpected, considering that in all papers reviewed in section 3, these variables were always very important in explaining variations in health care expenditures. A possible explanation is the length of the period studied. Due to the limited availability of the state total health expenditures and of the federal transfers to states variables, the analysis was constrained to the 1993-1998 period. Estimates were also conducted with the available data for the 1993-2000 period. GDP and PI coefficients were still not significant, however, the significance level increased. A longer period of study would maybe bring estimate results closer to the literature's data .

Also, the unemployment rate variable was not significant in any estimate. This could be explained by the fact that the total health expenditure growth rate was relatively constant during the 1993-1998 period, while the unemployment rate dropped in 1993 and remained constant until 1998. As for GDP and PI, a longer period of estimation would maybe modify results.

Per capita federal transfers coefficients were non-significant for the 1993-1998 period. This was expected considering that federal transfers only fund the Medicaid program,

which only represented about 15 percent of American total health expenditures. Thus, a variation in federal transfers to states is expected to have only marginal effects on State total spending.

Finally, the Balanced Budget Act of 1997, reforming the Medicaid program and extending the coverage for children, had a significant and positive impact on both public and total state health care expenditures. This result was expected considering that the reform increased federal funding and obliged state governments to increase spending for children living in poor families. On the other hand, this consequence should be interpreted carefully, considering that this reform took place in 1998 and that the studied period ended this same year.

5.3 Canada vs. United States

The results obtained from Canadian and American estimates show that health expenditure determinants differ between the two countries. On the other hand, public expenditures in both countries seem to be influenced by similar determinants.

Estimates for each country were conducted with per capita public health expenditures as the dependant variable. Per capita GDP and federal transfers to provinces were significant for Canada, while per capita federal transfers to state and unemployment rates were significant for the United States. As expected, the federal transfers variable is a very important determinant of expenditures in both federal systems. The American government funds about 60% of Medicaid payments (OECD, p.8), through its *Federal Financial Participation*. In Canada, provinces have claimed, since the end of the decade, that the federal government pays 14 cents for each dollar spent in health care (HC, 2, 2003). But, as it was demonstrated in section 2, Canadian provinces do not receive a specific cash transfers for health care from Ottawa, therefore it is then difficult to know the exact federal participation.

Per capita GDP was a major determinant of health expenditures in Canada for the 1990-2000 period, while it was not for the United States. This difference could certainly be explained by the nature of both health systems. In Canada, public share of total expenditures is very high, suggesting that spending should be related to the wealth level of Canadians, as the literature review showed. In contrast, in the United States, Medicaid program share of total expenditures is low and it was established to cover a specific group, the poor people. Furthermore, the federal transfers variable maybe offset wealth variables in the estimations.

The unemployment rate was significant in United States, not in Canada. Once again, the nature of both public health systems seems to have influenced results. Medicaid expenditures should be more sensitive to the level of unemployment, because this program provides insurance to the poor non-insured. In Canada, employed and unemployed people receive health public insurance without distinction.

Finally, the impacts of the federal funding reforms were different for both countries. With the total federal transfers variable, the Canadian reform had a positive and significant impact on health expenditures. This result was unexpected, considering that federal transfers dropped after the 1996 reform, but other reasons stated previously could explain it. The reform was not significant in estimates using the health federal transfers variable. In the United States, the increase of expenditures was expected, considering that the reform expanded the Medicaid coverage to more children. However, the length of the studied period put the results in perspective.

Four other estimates were conducted with per capita total health expenditures as the dependant variable. There were no major changes in the Canadian results, public expenditures being predominant in the health system. On the other hand, American results changed, showing that health expenditures determinants are different according to the private or public nature of the health system.

Federal transfers were not significant to explain variations in total health expenditures in United States, representing less than 10 percent of spending during the decade. It is rather private funds, representing between 55 and 60 percent of spending during the decade, which influenced expenditures the most. As estimates showed, the relative price of health care, by driving up private sector costs, increased American spending. In Canada, this variable did not seem to have influenced neither total expenditures, nor public expenditures.

6 CONCLUSION

This paper studied the health care expenditure determinants of Canadian provinces, for the 1990-2000 period, and American states, for the 1993-1998 period, and tried to determine if both countries' federal health funding reforms had an impact on spending. Results were obtained from regressions using pooled time-series cross-section data sets.

Canadian results showed that provincial public and total health expenditures were positively and significantly related to per capita gross domestic product and per capita federal transfers. The onset of the *Canadian Health and Social Transfer* in 1996 had a positive and significant impact on provincial spending in estimates using the total federal transfers variable, but was not significant in estimates using the health federal transfers variable.

American results showed that state public health expenditures, that is Medicaid spending, were positively related to per capita federal transfers and unemployment rate level. State total health expenditures were rather related to the relative price of health care and the proportion of population over 65 years old. The onset of the *Balanced Budget of 1997* had a positive and significant impact on state spending.

These results illustrate that Canadian and American health care systems differ in many ways. While province and state public expenditures were determined in both countries by federal transfers, the relative price of health care and the proportion of elderly drove up total expenditure in the United States due to the private nature of the health system. However, the American data availability may be influence estimates, therefore, a longer period of data collection could improve results for both countries

Other reforms have been enacted since the beginning of the millennium and others will follow. In September 2000, Canadian provinces First Ministers "*agreed on a shared action plan for renewing health care and investing in early childhood development*" (HC, 4, 2003). The federal government decided to invest \$21.1 billion of additional cash over five years through the Canadian Health and Social Transfer. Furthermore, on February

2003, provinces agreed on a new plan with the federal to improve the quality of the Canadian health system. The government of Canada will invest \$34.8 billion over five years:

- *To relieve immediate pressures on the health care system;*
- *For a new Health Reform Fund for primary care, home care and catastrophic drug coverage; and*
- *For the purchase of diagnostic and medical equipment, and investment in information technology*

HC, 4, 2003

Finally, in January 2003, the Bush Administration proposed to fundamentally restructure Medicaid and SCHIP, due to State budget problems and rising costs.

“The proposal gives states a choice of remaining in the current Medicaid/SCHIP program or of opting into an alternative structure. The key elements of the alternative structure include:

- *Broad state flexibility over use of funds*
- *Capped federal funding, which replaces the open-ended entitlements to Medicaid matching funds*
- *The possibility of some upfront fiscal relief for states (but their capped funding levels will be reduced in later years to ensure the proposal is budget neutral)*
- *A State “maintenance-of-effort requirement”, which replaces the Medicaid matching rate system*
- *SCHIP funds folded into a state’s capped funding levels”*

Guyer, 2003, p.4

This reform could alter Medicaid coverage and affect the American safety net. The Kaiser Commission on Medicaid and the Uninsured doubt that the Administration’s proposal *“provides States with the tools they will need to address these underlying challenges”* (Guyer, 2003, p.16-17).

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