SHOULD THE CANADIAN GOVERNMENT CUT TAXES? A GENERATIONAL ACCOUNTING RESPONSE

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Abstract

In this paper we applied the generational accounting methodology to Canada in the year 2000. The results we obtained reveals that, even though since 1997, the federal government has implemented a tight fiscal policy aimed to revert consecutive deficits, there exits a moderate generational imbalance that tends to increase with the population aging process. Therefore, a reduction in the level of taxes, from the generational accounting perspective, makes the present fiscal policy unsustainable in the long run.

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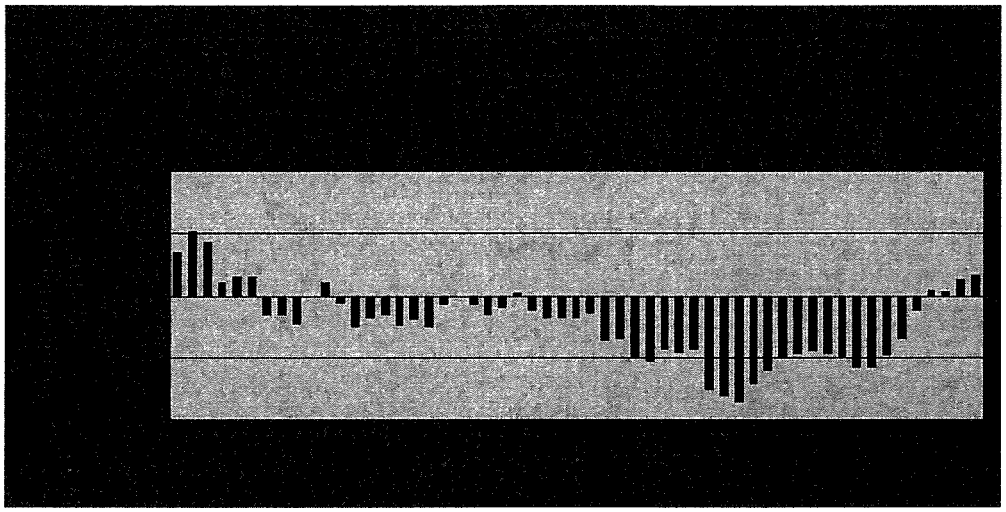
INTRODUCTION[1]

After the fiscal year of 1999, we have persistently heard and seen a public discussion regarding the appropriate level of taxes, as Canada's public finance enters in the surplus zone of public budget for three consecutive years since 1997.



Source: Public Sector Statistics, Fiscal Transactions, Table2, Statistic Canada, Catalogue 68-213 XPB, 2000-01.

Many policy makers surmise, in simple words, that taxes levels[2] are too high in Canada, affecting negatively labor, savings and investment incentives, and ultimately, economic growth. For the majority of them, the classical public finance rule of balancing the budget is enough to keep the soundness of the economy. Furthermore, for the classical public finance stream, surpluses should be avoided at all cost, for they are sources of artificial expenditures that in turn, are translated into permanent deficits, politically difficult to overcome in the future. Then, a sound public budget is the one that is in the neighborhood of deficit (Maurice Duverger, 1980).

In this work we try to analyze the afore-mentioned discussion from another perspective; the perspective offered by the generational accounting methodology.

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[1] All the credits of this work shall be shared with my supervisor Marcel Mérette. I am grateful to professor Apel for his pertinent observations. I am especially indebted to Allison Rebolledo, a graduate student at the Department of Economics, University of Ottawa. I assume, as usual, the responsibility of all errors, omissions or shortcomings present in this work.

[2] Take into consideration that policy makers make frequent reference to taxes level, but the convenience of taxes structure is hardly mentioned in any public discussions.

The motive for applying this novel fiscal accounting methodology is that, first of all, Canada presents a high ratio of public indebtedness with respect to its GDP; secondly, as a typical developed country, Canada will face a demographic shock known as the population aging and double population aging phenomena. Taking into account these two restrictions, we are obliged to consider what the intergenerational consequences of lowering taxes are. The dynamic approach of generational accounting comes to our aid, helping us to assess "who, ultimately, will pay the bill".

In chapter one, we introduce the generational accounting and the intertemporal public liability methodology. In chapter two, we make a cross comparison between generational accounting versus public deficit. We cover in this chapter the main criticisms over generational accounting. In chapter three, we introduce immigration within generational accounting methodology; we review the impact of immigration in the fiscal contribution of domestic population; we specially mentioned the American case. In chapter four, we discuss our findings for the Canadian case, which are summarized in the former section. Finally, in chapter five, we present our conclusions.

I. GENERATIONAL ACCOUNTING AND INTERTEMPORAL PUBLIC LIABILITIES

The intertemporal public liabilities (IPL) model is a straightforward derivation of generational accounts theoretical framework; generational accounts allow economists and policy makers to evaluate the impact on current and future generations of fiscal policies, meanwhile IPL aims to measure the fiscal sustainability gap that takes into account the sum of implicit and explicit debts.

We first present the generational accounts model thoroughly and then develop the IPL model as a specific application.

a. Generational Accounting Methodology

i) Why another way of measuring the deficit?

The measure of the budget deficit is one of the most controversial issues of the economic policy. The path of a fiscal policy departs, fundamentally, from what we understand about budget deficit and how we measure it. Unfortunately there is no consensus among economists of the "right" or "correct" measure[1]; budget deficits do not have a standard definition; instead, deficits are numerical figures resulting from receipts and payments categories that are applied, mostly, to the convenience of the policy maker or researcher (Auerbach, Gokhale and Kotlikoff, 1994).

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[1] More precisely, although the equation $\sum_{t=0}^{\infty}\frac{T_t}{\prod_{s=0}^{t}(1+r_s)}=\sum_{t=0}^{\infty}\frac{G_t}{\prod_{s=0}^{t}(1+r_s)}+D_0$ expresses a necessary intertemporal balance between government receipts and expenditures, the intrinsic classification of government receipts and expenditures is an arbitrary accounting convention. That is, the present value of the government receipts, T_t, might be labeled as government net taxes or government "assets"; by the same token, the current government obligations, D_0, for instance could be labeled as government "transfer payment" rather than "debt". These accounting conventions are not determined by the economic theory, whereas the household budget constraints in the various neoclassical models with optimizing are bound to marginal prices and endowments and independent of accounting conventions. Furthermore, the more moved away the fiscal accounting conventions from marginal prices and endowments, the more fiscal policy will cause intergenerational imbalances. (Auerbach et al., 1987)

Generational accounting methodology aims to fill this vacuum incorporating a dynamic perspective of the fiscal policy: the intergenerational distribution of the burden of government finance that does not depend on how government labels its revenue and expenditures. That is, generational accounting gives to the fiscal policy a conceptual basis that myriad of deficits definitions lack.

ii) Generational accounting framework[2]

Generational accounts indicate the intergenerational distribution of payments (net of taxes: taxes paid less transfers received) in present value, in order to maintain the government's intertemporal budget constraint. This intergenerational distribution means that those government deficits that are not charged to currents generations[3] must be paid by future generations.

Specifically the above definition means that the government's intertemporal budget constraint, at each point of time, imposes that "net tax payment of current and future generations be sufficient, in present value, to cover the present value of future government consumption, as well as pay off [service, totally or partially] the government net indebtedness". (Auerbach et al. 1994, 75)

The above statement can be expressed as follows[4]

$$(1) \qquad \sum_{k=t-D}^{t} Ht,k + (1+r)^{-(k-t)} \sum_{k=t+1}^{\infty} Ht,k = \sum_{s=t}^{\infty} Gs(1+r)^{-(s-t)} + \overset{g}{W}_{t}$$

Where

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[2] The major reference for this section is A. Auerbach, Gokhale, J. and Kotlikoff, L., "Generational Accounts: A Meaningful Way to Evaluate Fiscal Policy", *The Journal of Economics Perspectives*, Vol. 8, Issue 1, 73-94.

[3] The term "generation" has the same meaning that "cohorts" for us, that is, those people, male or female, born in year t or year t+1.

[4] The first two term of the above equation could be written more generally: Ht,k= $\sum \tau s,k * Ps,k * (1+r)^{-(s-k)}$, where the inferior limit of the summation is s=max(t,k), and the superior limit is k+D. In this expression $\tau s,k$ represents the net tax payment to be made by the generation K in the year s. The term Ps,k stands by alive population in year s pertaining to the generation K.
An important remark is that for generations born before the benchmark year t, the summation begins in year t. For those born in year t, of course, the summation also begins in year t. For those born in year k, where k>t, the summation begins in year k. On the other hand, the discounting factor is always referred to the benchmark year, t.

$\sum_{k=t-D}^{t} Ht,k$ = Summation of net tax payments of existing generations (in year t)

$(1+r)^{-(k-t)} \sum_{k=t+1}^{\infty} Ht,k$ = Net tax payments[5] of future generations in year t, (in present value)

$\sum_{s=t}^{\infty} Gs(1+r)^{-(s-t)}$ = Present value (in year t) of government consumption

$\overset{g}{W}_{t}$ = Government net financial assets (in year t)

The first summation of the left hand side of the identity, adds every generational accounts of current (living) generations. The index *k* in the first summation of the left hand side in the equation 1 goes from *t-D*, that is those with the maximum age *D* alive in year 0 (or base year), to *t*, (those born in year 0). Evidently, in the year *t* (our bench-mark year), *D* is equal to zero and Ht,t represents the net tax payments of the newborn cohort (generation born in year *t*); the last expression of this first summation is Ht,t-D, that represents the present value of the remaining tax payments of ancient cohort born in year *t-D* but still alive in year *t*.

The second summation adds every generational accounts of future generations in present value, where the index *k* represents the year in which every generation was born; this expression starts with the term Ht,t+1, the present value of the next tax payments of future generations, that is, those born in year *t+s*, for *s>t*. The rate *r* represents the real tax rate of return.

The term $\overset{g}{W}_{t}$ represents the government's financial net position in year t, that is

net financial assets.

[5] Net taxes of transfers. We do not deduct government spending from taxes, although, some methodologies do so.

In the right hand side of the equation (1) stands alone government consumption in year s, given by the expression G_s, which is discounted by the rate of the discount r.

Note that if in equation (1) we hold the present value of government consumption fixed, a decrease in the present value of net taxes to be paid by current generations should be compensated, necessarily, by higher net taxes imposed on future generations, which in fact, represents an intergenerational distribution of tax burden. This characteristic is called the zero sum nature of intergenerational fiscal adjustments.

So far, our generational accounting methodology embrace three characteristics we should be aware of:

1. The generational accounts methodology (GA) is not, whatsoever, a general equilibrium model.
2. The GA does not reflect the positive (or negative) externalities, benefits (or cost) received by any generation from government policy as a whole. That is, generational accounts only reflect the generation's net benefit or burden[6] from a particular policy change that affects only taxes and transfers.
3. Any decrease in cohorts' generational accounts will increase its budget constraint, allowing more consumption of one cohort at the expense of future cohorts (generations) consumption. This fact does not only represent an across cohorts distribution but the assumption that current cohorts do not counterbalance government intergenerational distribution by maintaining, increasing or decreasing the level of consumption or saving. In other words, the Ricardian Equivalence does not hold as a mechanism of tax burden equidistribution across generations.

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[6] "For the generational born in year k the year t remaining lifetime budget constraint is given by

$$\sum_{s=t}^{K+D}[C_{s,k}+I_{s,k}]*P_{s,k}(1+r)^{t-s} = {}^{p}W_{t,k} + \sum_{s=t}^{K+D} E_{s,k}P_{s,k}(1+r)^{t-s} - N_{t,k}$$. In this equation, the terms $C_{s,k}$, $I_{s,k}$ and $E_{s,k}$ stand, respectively, for the average values in year s of consumption, private net intergenerational transfers and labor earnings of generation born in year K. The term ${}^{p}W_{t,k}$ stands for year t net wealth of the generation born in year k". See Auerbach, Op. cit., p.74, footnote 5.

4. GA is a prospective analysis that allow us to compare generational accounts before and after a policy change, but it can only compare the life time fiscal burden of the newly born and future generations, because their entire lifetime are in the future. However, it cannot compare the generational accounts of one existing generation with that of another.

b. Estimation of General Accounting Components

i) Generational Accounts for the current generation

Generational accounts is a list of average values, $H_{t,k}$ divided by $P_{t,k}$, where recalling the footnote 3, $H_{t,k}$ is the net, in present value, payment due to the government for specific cohort born in year k, and t, as always, is our base year; $P_{t,k}$ is the current population in year t of the current living cohorts.

Following the Oreopoulus' methodology (Oreopoulus et at. 1996, Appendix A), the building of generational accounts requires the calculation of $H_{t,k}$ for the existing cohorts. That is,

$$\sum_{s=1}^{\infty} Ht,t+s = \overset{g}{W}_{t} + \sum_{s=1}^{\infty} Gs(1+r)^{t-s} - \sum_{s=0}^{D} Ht,t-s \quad [7]$$

In this particular raw case, we assume that tax payments of future generations are certain; however, this is a very strong assumption; should it be more idoneous to apply a rate of discount that expresses the level of uncertainty tax payments due to the fact that future income of tax payers are random. Then, we can express the above equation for future generations considering a discount rate ρ, where $\rho > r$, and r is the free-risk rate[8]:

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[7] This equation is a variation of the government's intertemporal budget constraint. Keeping government spending and net public financial assets as constant, the generational accounts of future generations will solely depend on the level of net taxation (in present value) on current generations.

[8] It is assumed that, for the multiperiod and multigenerational model, all future generations evaluate its future incomes flow as invariant. With this (strong) assumption, the burden on future generation as a residual gives us the correct measure of the aggregate generational accounts. "Note that this procedure will not give us a measure of the expected values of net tax payments by future generations, but rather the value of these payments based on such payments by existing generations." Auerbach Alan and Kotlikoff, L., "The Methodology of Generational Accounting" in Auerbach A. et al. editions, Generational Accounting Around the World.

$$H_{fut} = \sum_{t=0}^{\infty} (1+\rho)^{-t} G_t + B_{t=0} - \sum_{k=-D}^{0} H_{0,k}$$

For our particular case, the calculation of generational accounts of current alive cohorts begins with finding the aggregated values of taxes and transfers. We distribute these values following Chantal Hicks' distribution, which is base only on cohorts' age profile –sex[9] is not taken into consideration. Hicks' distribution is derived by the Social Policy Simulation Data Base Model (SPSD/M) version 5.2 and 9.0. This software, developed by Statistic Canada, comprises "information from the Survey of Consumer Finances (SCF), personal income tax, Unemployment Insurance claims, and the Family Expenditure Survey (FAMEX)" Chantal Hicks[10] (1998, p. 40). Of course, all taxes and transfers derived from the SPSD/M are allocated to individuals according to the age profile. Departing from the respective distribution we can, then, obtain the taxes paid and transfers received by every cohort. If we divide these amounts into the respective cohort population (alive in year t) we will get the average tax and transfer for the base year. The subtraction between taxes and transfers yields the generational accounts from every cohort.

It is important to remark two assumptions in the generational accounting methodology: 1) current fiscal policy will continue without adjustment for the current living generations (cohorts); 2) the tax burden of future generations is distributed equally among cohorts; successive cohorts face the same tax burden but adjusted by an adjustment factor, i.e., the growth rate of productivity.

The first assumption has two significant implications we should explain: a) projection of net taxes (of transfers) of living generations will be identical to those estimated in the base period adjusted by the productivity growth rate; b) shifts in the demographic tendency will affect the generational accounts of some cohorts at expense of others. In the case of an aging population, the fixed levels of health care expenditure (considered

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[9] This is an important methodological difference with respect to Oreopoulos' (1996, 1998) methodology and our work. Oreopoulos considered the distribution of taxes and transfers by age and sex. We only considered our distribution taking into consideration age profile, ignoring gender. This aspect could be considered as a shortage of our work, since the sex profile provides an important distinction of taxes due and transfers received. On the other hand, Oreopoulos (1996, 1998) did not take into consideration Education as an age transfer related, whereas we did. Education is an important age related transfer that should be considered in the generational accounting model.

[10] As we take the consolidated government revenues and expenditures accounts, the distinction of Federal, Provincial/Territorial and Local government balance is not a matter of consideration in our work. However, it is well known that fiscal policy has a different impact on level of governments that drives the discussion of Vertical Fiscal (im)balance. See The Conference Board of Canada, 2002.

transfers in our model) and pension plan (pay-as-you-go system) will signify higher generational accounts of young adult cohorts, that is, higher net average taxes due to the government.

It is evident from the equation (1) that the calculation of future generations' tax burden depends on generational accounts of current alive generations, government net financial assets (debt) in year t, and the projection of future government's expenditures.

The projection of government expenditure is calculated through an infinite geometric and convergent series. The population, on the other hand, is projected until the year 2200, with a (population) growth rate of 0.30 percent (United Nation, 2000) after 2050. It is assumed that the Canadian population should be in steady state after 2200.

ii) The Data Source

The building of generational accounts requires five data inputs: 1) population projection; 2) aggregated, as first step, and distributed (by age), as second step, taxes and transfers; 3) net financial assets of governments; 4) government expenditure at year t and its projection in the future, and 5) growth and discount rates.

1) Population Projection

The age and gender categories of Canadian population were retrieved from the Population Projection Section and CANSIM II, (Statistic Canada, December 2001) and World Population Prospects (United Nation, 2001). Below, we show the demographic assumptions (Medium Variant, Population Projection, United Nations, 2001) we worked with.

Population growth rate	0.30 per cent
Net migration per year	174 (thousands)
Net migration rate	4.3 (per 1,000 population)
Total fertility (per woman)	1.90 (per 1,000 population)
Infant mortality rate	4 (per 1,000 population)
Life expectancy, males	80.1 (in years)
Life expectancy, females	85.6 (in years)
Life expectancy, both sexes combined	82.8 (in years)

Source: World Population Prospects, United Nations, 2001

2) Projection of Taxes and Transfers

The first step, the aggregated amount of taxes and transfers are retrieved from the National Income and Expenditure Accounts, and the Consolidated Federal, Provincial/Territorial and Local Government Revenues and Expenditures (Statistic Canada, January 2001). The next table summarizes the government revenue and expenditures by category:

Receipts	**Expenditures and Transfers**
Personal Income Taxes	Health Care Expenditure (transfer)
Corporation Income Taxes	Education
Consumption Taxes	Elderly Benefits
Property Taxes	Unemployment Insurance (U.I.)
Contribution to S.I. Plan	Workers' Compensation
C/QPP Contributions	C/QPP
Net Investment Income	Government Purchases
Other Taxes	
Other Incomes	
(less) Seigniorage Revenue	Add Surplus

Source: Reproduced from Oreopoulus, Phillip and L. Kotlikoff, "Restoring Generational Account in Canada", Feb.1996, Choices, Vol.2, no.1, Table 16, p. 42. Some modifications were made in order to reflect the consolidated revenues and government expenditures.

All the data accounts, except Seigniorage revenue, are derived from the Public Sector Statistics (Statistic Canada, 2002). The seigniorage revenue was retrieved from the Bank of Canada's Annual Report (Bank of Canada, 2000).

We consider health spending as transfers instead of government purchases. The reason for this arrangement is to make the Canadian's generational accounts more compatible with American counterparts. The aggregated value of health expenditures were retrieved from Statistic Canada Public Sector Report (Statistic Canada, February, 2001.)

The second step, the distribution of taxes and transfers by age and gender categories, was made following the methodology Social Policy Simulation Database and Model (SPSD/M) of Statistic Canada, except for Health expenditures, Education, Corporate Income taxes, Seigniorage revenues and Other taxes. Corporate Income taxes are supposed to be transferred to consumers; thus, they were distributed into the population according to the cohort demographic weight. Other taxes, which comprise

Payroll taxes, Motor Vehicle, Liquor and Hunt licenses (licensees) among others, were allocated to the population of 16 years of age and older. Health and Education were obtained from surveys data.

Future revenues, transfers and expenditures were projected and discounted taking into consideration a productivity change rate (1% in our case) and a discount rate of 5%.

3) Net Financial Assets

We referred again to Statistic Canada (Statistic Canada, Public Sector Statistics, 2002) to retrieve this information. In the National Balance Sheet report we find the consolidated net financial assets of federal, provincial (territorial) and local governments. For the year 2000 the Net financial Assets of the nation is –202,478 millions.

4) Government Purchases

This item includes government purchases of goods and services. In the next table we classify the components of this expenditures.

General Government Services
Employee Pension Plan Benefits
Social Assistance
Other Social Services
Protection of Persons and Properties
Transportation and Communication
Resource Conservation and Industrial Development
Environment
Recreation and Culture
Labor, Employment and Immigration
Housing
Foreign Affairs and International Assistance
Regional Planning and Development
Research Establishments
Debt Charges
Other Expenditures
Total Gov. Purchases

Source: Reproduced from Oreopoulus, Phillip and L. Kotlikoff, "Restoring Generational Account in Canada", Feb.1996, Choices, Vol.2, no.1, Table 18, p. 45. Some modifications were made in order to reflect the consolidated revenues and government expenditures.

Take into account that we considered health care expenditures and education as transfers, so we deduct them from the total of government purchases. On the other hand, many miscellaneous transfers are considered expenditures, given that all of them are distributed equally among the population.

The present value of future government consumption is compound by federal, provincial and local purchases of goods and services. Beyond the last year available, we project future purchases taking into account the rate of productivity growth.

The most advance literatures[11] about generational accounting advise that federal, provincial and local purchases be divided by the number of beneficiaries that conform, for instance, three age groups: young, middle-aged and elderly; quasi-pure goods (i.e., defense and security) should be divided per capita.

That is,

$$(2) \qquad G_s = g_{y,s}\, pys + g_{m,s}\, p_{m,s} + g_{o,s}\, p_{o,s} + g_s\, p_s$$

where

G_s = total government consumption in year s
$g_{y,s}$ = expenditure on the age group 0-24 (young-aged group) in year s
$g_{m,s}$ = expenditure on the age group 25-64 (middle-aged group) in year s
$g_{o,s}$ = expenditure on the age group 65 and up (old-aged group) in year s
g_s = non-age-specific government expenditure in year s

$P_{y,s}$; $P_{m,s}$; $P_{o,s}$; P_s are the population of young, middle and old age and the total population in year s, respectively.

Unfortunately was impossible, for the purpose of this work, to find such disaggregated distribution of government expenditures. However, as mentioned above, we included education (and of course, health care) as government spending across age groups, treatment that yields a clearer picture of the generational balance in Canada.

[11] See, for instance, Gokhale J. and Raffelhuschen B. (2000)

5) Growth and Discount Rate

Another important step is the use of an **adequate discount rate**. As government revenues and expenditures do not have zero risk[12], the discount rate should be higher than the real rate of interest of government bonds; however, government revenues and expenditures are more stable than the real market return to capital[13]. All these suggest that the discount rate should be in between government bond interest rate and the private sector real return on capital. We chose a discount rate, (r), of 5 percent, similar to that Oreopoulos (1996, 1998) and Auerbach and Oreopoulos (1999) have chosen for the Canadian case. In the same way, we assumed that the productivity growth rate, (g), is 1 per cent, as Oreopoulos and Auerbach did.

A warning should be made regarding this issue. The level of discount rate chosen will affect the estimates of generational accounts. For instance, a higher discount rate will produce lower government expenditures and revenues (in present value). This fact, in turn, will carry out a gap of generational account of current (alive) and future cohorts (Oreopoulus et al., 1996).

The estimation of government net wealth takes only into account financial assets less liabilities in the base (benchmark) year[14].

iii) Calculating the Net Tax Payment of Future Generations

Once we have calculated the net taxes of current generations (in present values), the net government wealth and the government consumption, we can determine, **as a**

[12] There is positive likelihood that people face a higher or lower tax payment than expected; there is, as well, a positive likelihood that government expenditures be higher than planned. Haven (1994) argues that government expenditures, transfers and individual tax payments face different risks, and consequently their discount rate should be different. In the case of government's cash flow, there is not a concise method of measuring this risk. For individuals it is even harder to conceive an estimated future tax payments; on the other hand, the interest rate that individuals face is far off from being homogeneous. In the end, the *ad hoc* discount rate is a smart "guess".

[13] We are referring to the public finance of Canada, USA and Western Europe. This statement do not apply to less developed countries where government receipts and expenditures are unpredictable.

[14] The exclusion of tangible assets does not seem to be a serious omission for the calculation of net taxation of current and future generations. "If we value [tangible assets] at the present value of its imputed rent, these two adjustment [one in the right hand and the other in the left hand side of the equation 1] would cancel. For example, our exclusion of Yellowstone National Park from initial government assets is offset by our exclusion of the park's implicit rent from future government purchases." Auerbach et al., 1994, p. 78, footnote 7.

residual, the total collective net tax payment required of future generations (in present value, of course).

To further calculate the tax burdens of successive generations, we multiply the amount we found as residual by an adjustment factor, the rate of productivity growth of the economy. Algebraically

□□□

(3) $$(1+g)^{s-t} H_{fut} = TBSG_s \qquad \text{for } s>t$$

where

TBSG = Tax Burden of Successive Generations in year s
g = rate of productivity growth

To measure how much the actual tax burden of future generations is, we just compare the value we obtained applying the above methodology versus the lifetime net tax payments of current newborns. The generational accounts model reflects the tax payments of the respective generation's lifetime, assuming that "each successive generation's [net tax] payment is the same up to an adjustment for real productivity growth". Auerbach et al., 1991, p.61. Then, departing from the current fiscal policy, one can asses the intergenerational imbalance and the necessary kind of fiscal adjustment; that is, once we determine the magnitude of $H_{t,k}$, policy makers can come up with an across generational distribution of the tax burden, which in turn, will affect the time path of factorial prices and ultimately the welfare of current and future generations.

c. Intertemporal Public Liabilities, IPL's, a Way of Measuring Fiscal Sustainability[15]

An important consequence of the generational accounting methodology is the formulation of the intertemporal public liabilities model, IPL's. Indeed, one difference between generational accounting and IPL's is that taxes, in the former, are net of transfers; in the latter, instead, are net of transfers and government expenditures. Another difference consists in the findings; while in the generational accounting we aim to find the generational accounts of futures generations, in the IPL's we rather project net taxes through a geometric series in order to find the net financial position of government. Thence, the IPL's methodology allows us to evaluate, more clearly, the long-term fiscal sustainability of a government.

The total amount of IPL's is the sum of explicit (debt) and implicit (generational account) liabilities generated by fiscal policies. An important advantage of this approach over the traditional fiscal indicators, i.e., budget deficits, is that the incorporation of generational accounts allows us to incorporate the aging phenomena and the consequent variation of health care and social security expenditure over time. In other words, the IPL's is a response to the lack of traditional cash-flow deficit indicators of evaluating the long-term fiscal sustainability under the population aging circumstances.

With the application of IPL's we pursue two main objective: assess the size of tax adjustment to reach IPL's equal to zero, under the current population composition of ages, and see afterwards, how the population aging phenomenon affects the size of implicit liabilities.

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[15] The major reference of this section is based on the paper by J.Gokhale and Raffelhüsschen B., "Population Aging and Fiscal Policy in Europe and the United States", January 2000, Center for Economic Studies, Working Paper No. 237.

i) Measuring the government intertemporal budget constraint

The government intertemporal budget constraint expresses the balance between future net taxes and the service of net explicit debt.

Algebraically

$$(4) \quad \sum_{s=t}^{\infty} T_s^* (1+r)^{t-s} - B_t = 0$$

Where $T_s^* = \tau_s^* - G_s$ for s≥t,

and τ_s^* is the actual net (of transfers) tax payment that will depend on future fiscal adjustments in year s.

B_t is the public sector's net explicit debt in year t (explicit government liabilities).

In general, actual future net taxes will differ from current net taxes as we assumed that current set of fiscal policies was kept *ad infinitum.* We the denote the latter as

$$(5) \quad T_s = \tau_s - G_s$$

Equation (4) does not necessarily hold when we substitute T_s^* by T_s. For negative values, we consider the current fiscal policy as unsustainable[16]; for positive values, we consider there is an accumulation of resources. In both cases the fiscal policy should be adjusted.

Modifying the equation (4) we produce a country's intertemporal public liabilities carry out by current fiscal policy, that is

$$(6) \quad IPL_s = B_t - \sum_{s=t}^{\infty} T_s (1+r)^{t-s}$$

where the first term of the right hand side of equation (6) expresses the explicit government liabilities (net debt); the second term expresses the implicit government

[16] Fiscal policy is dubbed as "unsustainable" if the tax burden on future generations is so high that the population would refuse to pay, or the inflation tax could lead to reject public sectors bonds. Recall that the assumption of tax burden on future generations is only hypothetical, and signifies that current fiscal policy is applied with no adjustments to living generations.

liabilities generated by, for instance, the unfounded pay-as-you-go retirement programs and up adjustments of health care expenditures.

The result of equation (6) indicates the magnitude of adjustment to reach a sustainable path. If the result is positive, the government's total expenditure exceeds projected revenues under current fiscal policy, so net taxes should be up adjusted in the future. If the result is negative, net taxes should be down adjusted or government expenditures should be increased.

II. GENERATIONAL ACCOUNTING VERSUS PUBLIC BUDGET

The idea of a monetary indicator of fiscal policy effects on different members of current and future generations is not only enticing but a very important reference to public finance theory and policy. But should generational accounting suppress the public budget as indicator of fiscal policy performances?

Governments and international organisms regard public budget as the main indicator of fiscal responsibility. For instance, the International Monetary Fund and the World Bank monitor the ratio of budget deficit-GDP as an essential indicator of the fiscal policy of borrowers countries. Still, this key indicator of fiscal "responsibility" does not necessarily match "generational accounting's assessment of fiscal sustainability" (Kotlikoff and Leibritz, 1998). To emphasize our argument, let us retrieve the generational accounting of Canada, United States, Norway, Sweden and Japan (table 1) as percentage generational balance or imbalance (that is future generation versus new born generational accountings), as well as the government's deficit indicators.

Table 1

1995 Generational Accounting
(thousand of 1995 U.S. dollars)

Country	Future Generations	New Born	Generational Imbalance	Difference in %
Canada[1]	**114**	**113.8**	**0.2**	**0.2**
United States	130.4	86.3	44.1	51.1
Norway	173.5	106.3	67.2	63.2
Sweden	143.5	184.3	-40.8	-22.1
Japan	386.2	143.4	242.8	169.3

Source: Kotlikoff, L. and Leibritz W., (March 1998) "An International Comparison of Generational Accounts", National Bureau of Economic Research; Working Paper 6447. Table 2
1. Education is treated as a non-age related government spending.

If we look below in the table 2, the inconsistency between generational accounting and public deficit is not unexpected: public budget and generational accounting have a different theoretical background. Indeed, public budget is based only on accounting conventions whereas generational accounting has been developed within the economic theory framework. The static, and should we say, myopic nature of public budget does not account for fiscal sustainability of a set of economic policies;

the evaluation of fiscal sustainability is only possible with a dynamic methodology that, *a fortiori,* incorporates the demographic transition and welfare analyses; these characteristics make able generational accounting to answer "who pays the bill"[17].

Table 2
1995 Official deficits and debts
As a share of GDP
In percentage

Country	Deficit[1]	Primary[2] Deficit	Gross[3] Debt	Net Debt[4]
Canada	**4.1**	**-1.7**	**100.5**	**69.6**
United States	2.0	-0.4	63.4	48.2
Norway	-3.3	-3.9	42.8	-23.4
Sweden	7.7	5.2	80.3	32.9
Japan	3.7	3.1	80.6	10.3

1/ Budget Public Deficit
2/ Taxes minus non-interest expenditures
3/ Gross government liabilities
4/ Gross government liabilities minus government's financial assets

Source: Kotlikoff, L. and Leibritz W., (March 1998) "An International Comparison of Generational Accounts", National Bureau of Economic Research, Working Paper 6447. Table 5

The creators of generational accounting claim that this novel methodology should seriously be considered as a substitute of public budget. The authors of generational accounting argue that there exist three major reasons to forgo public budget as the main fiscal policy indicator: 1) the static nature of public deficit; 2) the lack of economic theory to support their conventions, and 3) the vulnerability of public budget's definitions to politically "convenient" uses and interpretations. Nonetheless, these three main reasons are not sufficient evidence to displace the public budget primacy. In any case, it is advisable to attack the generational accounts methodology for all the suspicious "weak flanks", and see how this new approach responds. These sorts of attacks are our major topics of the next section.

[17] The afore-consideration is important to our evaluation of Canada's fiscal policy. The fiscal policy that has been implemented since 1997 has accomplished a sound macroeconomic picture: the Canadian government has achieved a consecutive surplus public-budget. However, many policy makers consider that a surplus public-budget is, *per se*, as an over taxation that should be reversed until balance public-budget is reached. This consideration is, obviously, myopic since it does not consider either the intergenerational balance nor the welfare effects of taxes reduction in a country with a demographic transition and high level of debt ratio.

a. Criticism on Generational Accounting

i) Assumptions

Before considering in depth the criticism on generational accounting, we think it is convenient to make a brief commentary regarding attacking a theory on its assumptions basis. In order words, how important is it that a theory makes realistic assumptions?

This question belongs to a field (philosophy of science) that is not part of our study. However, in positive economics the veracity of assumptions is disregarded as important; nonetheless, what it is important is the capacity of explanation of a theory and the conclusions we can derive from if (Friedman, M., 1953). Does this mean that the veracity of assumptions does not matter? Our interpretation is that, even though theories with "weak" assumptions are preferable, disregarding a theory based only on its "unrealistic" assumptions simply means to deter the advance of any scientific discipline.

1. Rational and Perfect Foresighted Individuals

Generational accounting is an important tool that complements the life cycle neoclassical theory better than the annual budget data (Haverman, 1994).

Some critics of generational accounting, GA, imply that the linkage of GA with the economic theory depends on the assumptions of rationality and perfect foresighted people. However, it is not clear that GA assumes perfect foresight and rationality as *sine qua non* condition (Auerbach et al., 1994).

2. Permanence of Current Fiscal Policy

The unchanged fiscal policy for current (alive) generations is an important assumption of generational accounting methodology. This assumption allows the researcher to dissect the effect of an unchanged fiscal policy over future generations. For instance, a deficit situation will last forever under this assumption; moreover this assumption allows us to contrast the feasibility of the present fiscal policy, which is an important contribution of GA according to our opinion.

3. The Present Value Condition

A natural consequence of the everlasting (current) fiscal policy is that budget constraint does not necessarily hold for the current generations; instead, the burden of a balance budget is borne by future generations. Some economists point out that this assumption makes the generational accounts wrong tabulators, since the burden on future generations is over estimated.

4. The Zero Benefit-Cost of Public Expenditures

Rather than assumption, the non-adjudication of benefits from government purchases and spending on public goods is a methodological restriction of generational accounting.

The problem with this limitation is that generational accounting stresses the net tax burden of future generations without considering the benefits that present government purchases and spending generates in favor of future generations.

The same limitation applies to public investment portfolio and purchases of public assets (Haverman, 1994).

ii) Changes of Behavior Due to Fiscal Policy

A shortage of GA methodology is the non-consideration of changes of people's behavior after the application of taxes and transfers. These changes are reflected in the new general equilibrium locus, especially of consumption, saving and investment. Thus, it is possible that generational accounts do not reflect accurately intergenerational welfare we endeavor to measure. However, it is fair to note that all general equilibrium models, run with real data, suggest that the feedback effects of a fiscal shock occurs very gradually (dynamically speaking), so the impact on the discounted values comprising generational accounts are likely to be small (Auerbach and Kotlikoff, 1987; Auerbach, Gokhale and Kotlikoff, 1994).

iii) The Discount Rate

This is, perhaps, the most serious weakness of the generational accounting methodology. The selection of a discount rate is not only arbitrary but also inconsistent, in many cases, with the economic theory. This inconsistency has been a headache in the benefit-cost analysis and in the social evaluation of public policies in a competitive economy. A number of difficulties have been detected out from the economic theory. Among them: 1) there exist multiple market rates of return; thus, a natural question ensues: which one is the *ad hoc* rate of return that can be used to measure the social opportunity cost? . This problem worsens if we consider the great numbers of shadow rates that are not directly observable on the markets. 2) As the future is per se uncertain, how do we introduce uncertainty into the measure of future flows of government's revenues? ; That is, how does the discount factor can be adjusted to incorporate the risk element? . 3) The harmonization between the social rate of discount and market(s) rates are a consequence of capital market imperfections, "the divergence between social values and private costs in the product of government investment activity, the divergence between social and private values with regard to perspectives for the future, and the imperfections of the capital market that are a direct result of the corporate income tax." (Arrow, J. and Modercai K.; 1970.) Summing up, as Haverman (1994) cleverly points out, the selection of the discount rate should reflect the opportunity cost of deferring present consumption.[18]

The creators of generational accounting chose a discount rate of 6%, trying to reflect in this value the risk of future government revenues and expenditures; hence, the discount rate of interest should be in between the real rate of return on private capital, procedure that is per-se, arbitrary. The selection of the discount rate is a critical issue since its level affects the value of generational accounts in great proportion, misleading the conclusion of the adequacy (or non-adequacy) of a fiscal

[18] In Haverman words: "From a [neoclassical] macroeconomic growth perspective, what is desired is the discount rate that reflects the opportunity cost to citizen of deferring present consumption. If the withdrawal of resources from the private sector by government displaces only private investments (sic), the appropriate public discount rate would be the interest rate used by private individuals making investment decisions - the before-tax rate of return on uncertain private investments of, say, 10-15 percent. However, if government resource use displaces private consumption and (as generational accounts [sic.] suggest) society is under investing, the correct discount rate is the social rate of time preference indicated by low-tax rate on private savings of, say, 2-4 percent." (Haverman, 1994, p. 103).

policy. Another significant criticism made regarding the discount rate of interest employed by Auerbach, Gokhale and Kotlikoff is the use of the same discount rate for future liabilities and future expected revenues, which is clearly a dangerous oversimplification of assuming the same kind of risk for different streams of future revenues and liabilities.

iv) Advantages of using the Public Budget Indicator

In spite of many disadvantages that public budget deficit possesses (the lack of a theoretical background is, perhaps, the most significant) there are practical desirability properties that accompany this traditional macroeconomic indicator. Among them, the annual basis incorporates a practical planning of households, producers and government organisms. Indeed, household planning has a current-year income-expenditure basis that offers guide and control over the personal budgets. The same argument is valid for private producers and governments. And we think that neither individuals nor governments will be willing to substitute an annual public budget deficits indicator for a life cycle indicator (generational accounting). Also, the lack of rationality and perfect foresightedness are better captured by annual public budget deficit than by the generational accounting methodology. Finally, even though annual budget deficit has notorious linkage with Keynesian models which seem to be an out-fashion (since the appearance of rational expectation revolution) theory, its application as a budget control indicator is undeniable.

III- IMMIGRATION AND GENERATIONAL ACCOUNTING

This section aims to address the question of how the dynamic approach of generational accounting accounts for the fiscal contribution of immigration.

The great majority of economists have taken a cross-section (static) analysis path to answer the previous question. Nonetheless, a dynamic consideration is recognizable more comprehensive since it captures the tax, transfers and government expenditures dependency on age (of native and immigrants generations), and allows us to take into consideration successive immigrants generations in the analysis.

An important result of the dynamic approach has been drawn from the National Research Council (National Research Council, 1997, chapter 7). According to this prestigious publication, immigration flows to the United Sates represent a net fiscal benefit (in present value) only if the fiscal policy is responsible in terms of reducing the debt-GDP ratios.

The generational accounting contribution to the fiscal impact of immigration over time, presented by Auerbach and Oreopoulos (March, 1999), has as an advantage that it does not depend on arbitrary accounting conventions (as those utilized to measured national debt). However, as we have seen in the previous section, generational accounting makes use of **arbitrary** discount rates that should be managed with caution.

a. Incorporating Immigrant Cohorts

Originally, the generational accounting methodology ignored immigrant population, which means that increases in the total population due to immigration were treaty as a decrease in the mortality rate of native population that corresponds to same immigrants cohorts (age, sex). Consequently, generational accounts of cohorts affected by immigration either overestimate or underestimate the net fiscal burden.

The effort of incorporating immigration into the generational accounting methodology does not only modify the identity of government's intertemporal budget constraint, but it also affects the procedure to future cohort's generational accounts. More explicitly, we wrote the government's intertemporal budget constraint as

$$(1) \qquad \sum_{k=t-D}^{t} Ht,k + (1+r)^{-(k-t)} \sum_{k=t+1}^{\infty} Ht,k = \sum_{s=t}^{\infty} Gs(1+r)^{-(s-t)} + \overset{g}{W}_{t}$$

If now consider the effects of immigration, we should decompose the government's intertemporal budget constraint in such a way that it reflects native and immigrants cohorts separately

$$(9) \qquad \sum_{k=t-D}^{t} (H_{t,k} + F_{t,k}) \sum_{k=t+1}^{\infty} (H_{t,k} + F_{t,k})(1+t)^{-(k-t)} = \sum_{s=t}^{\infty} G_s(1+r)^{t-s} + \overset{g}{W}_{t}$$

where $F_{t,k}$ are, for instance, those immigrants' subjects born in year k.

In the footnote 4 we have a general definition of the next tax burden accounts of native people (in present value) born in year k

$$H_{t,k} = \sum_{s=k}^{k+D} \tau_{s,k} P_{s,k} (1+r)^{t-s}$$

By the same token

$$10) \quad F_{t,k} = \sum_{s=k}^{k+D} T_{s,k} Q_{s,k} (1+r)^{t-s}$$

represents the set of generational accounts of present and future immigrant cohorts born in year k, where particularly K=max(t,k), and $Q_{s,k}$ is the population of immigrant cohorts also born in year k. The dynamic behavior of $F_{t,k}$ represents the immigration flow.

i) Methodological Differences

Available the idoneous data, we can accomplish the breakdown of net tax burden upon living native and immigrants cohorts. Nonetheless, future generations burden is not a consequence of finding a residual anymore[19] for that procedure will not lead us to finding the necessary discrimination between native and immigrants tax burdens. This problem made Auerbach and Oreopoulos (March, 1999) figure out an alternative method to the residual assignation. This new method comprises, first, the calculation of

[19] Recall that generational accounts have standard procedure of finding future generation net tax burden (in present value) as a residual adjusted for the rate growth. See pages 6 and 7 for more explanation.

tax burden of living cohorts, and second, the calculation of future cohorts' net tax burden (for both immigrants and native) through combinations of taxes and transfers allocations until the intertemporal budget constraint is satisfied.[20]

b. Results[21]

Following we make a summary about the findings that Auerbach and Oreopoulos (Op. Cit.) show in the tables 3 and 4 for the American case. These findings are important for our work for two main reasons: first of all, the convenience of more immigration in Canada and U.S is an important issue of discussion in the present public policy. The economic, and in particular, the fiscal dimension of the immigration phenomenon it is not clear at all. In other words, is immigration beneficial or not from the fiscal point of view? Second of all, does the treatment of immigrants as native affect significantly the results of the standard generational accounting methodology, making them unreliable? Those are our main concerns that will be clarified in this section.

The table that follows below (table 3) shows a comparison between the traditional method and the new one. In the two first columns of the traditional (residual) method we can see the fiscal imbalance between the living and future generations. In the two columns that follow we have the new method of allocating the burden on future generations. In this method, all transfers and taxes are cut and increased, respectively, in a proportional manner (42%); all accounts are added together without discriminating between natives and immigrants. As the adjustment is made on future generations, the accounts of current generations are unchanged. At this point, we should remark two aspects: 1) the percentage increase (derived from this new methodology) is not equal for both genders for "the new methodology adjusts taxes and transfers, rather than overall burdens, proportionally." (Auerbach and Oreopoulos, op. cit. p.12). 2) This new methodology does not, in general, distribute net tax burden (adjusted by growth rate factor) evenly among all future cohorts. In fact, the general case is that the first future cohort (in the case of table 1) is the one whom carries the burden. **So this new methodology does not, in general, yield a proportional burden distribution among**

[20] "The allocation of the extra burden on future generations typically **will yield different percentage increases for men and women, and native and immigrants**, but will be based on a concrete change in actual policy variables." Auerbach A. and Oreopoulos P., "Generational Accounting and Immigration in the United Sates"; pp. 8-9.

[21] All data source that support these results can be found at http://emlab.berkeley.edu/users/burch/. The method that was used to make compatible two sets of tax transfers by nativity, age and sex are described at Auerbach and Oreopoulos, Op. Cit. pp.24-26.

all future generations, as it is the case of the standard methodology. The case the first future cohort assumes the heaviest burden is due to the fact that life expectancy of later cohorts is longer, making the net tax burden decline (increase of transfers in older ages). If that is the case, weightier burden should be borne by initials future generations.

i) Alternative Methodology

Table 3

Generational Accounts: Alternative Methodologies.
(in thousand of dollars; r=0.06, g=.012)
(1995)

Type of Method:

	Traditional Method		New Method of Allocating Burden on Future Generations		New Method of Allocating Burden Native Only	
Age	Males	Females	Males	Females	Males	Females
0	77.4	52.9	77.4	52.9	71.6	49.6
5	98.3	65.9	98.3	65.9	91.2	61.5
10	122.0	80.6	122.0	80.6	114.7	76.1
15	152.6	99.3	152.6	99.3	145.2	94.6
20	186.0	118.8	186.0	118.8	180.9	115.2
25	205.2	128.0	205.2	128.0	203.9	127.4
30	203.8	124.0	203.8	124.0	206.2	126.1
35	195.4	116.9	195.4	116.9	200.0	121.1
40	177.3	102.0	177.3	102.0	183.6	108.1
45	143.9	74.9	143.9	74.9	148.9	79.9
50	97.2	38.5	97.2	38.5	100.5	42.4
55	39.2	-5.4	39.2	-5.4	39.6	-3.7
60	-26.3	-52.9	-26.3	-52.9	-27.0	-52.3
65	-78.4	-89.1	-78.4	-89.1	-80.5	-90.3
70	-87.8	-94.7	-87.8	-94.7	-88.6	-95.0
75	-85.1	-92.0	-85.1	-92.0	-83.1	-90.8
80	-73.2	-80.5	-73.2	-80.5	-72.4	-79.9
85	-64.1	-66.0	-64.1	-66.0	-63.9	-65.9
90	-49.4	-49.8	-49.4	-49.8	-49.1	-49.7
Future G.A.	**119.5**	**81.7**	**132.9**	**95.3**	**121.3**	**87.6**
Generations % difference	54.3	54.4	71.7	80.1	69.4	76.6
Taxes and Transfers % change			42		42	

Source: Reproduce from Auerbach et al. "Generational Accounting and Immigration in the United Sates"; National Bureau of Economic Research; Working Paper No 740; March 1999. Table 1.

The last two columns of the table three present the extreme case of immigration absence. The reason for this procedure is that the extreme case (rather unrealistic) of eliminating immigration of first generation (and thus the successors of second and third generations) permits us isolate the fiscal impact of immigration overall the fiscal picture.

The analysis of the last two columns reveals that the generational accounts of current (living) cohorts are different from those calculated by the standard methodology. This difference is, in first instance, due to the fact that the elimination of immigration population of first generation (that should be part of living generations) leaves the net tax burden of native cohorts as the only net tax burden profile, which differs with respect to one of total population. In second instance, on average, immigrants of first generation belong to the rank of middle age and elderly cohorts, making the standard case to overestimate the transfers (which is equivalent to reducing net tax burden of current cohorts).

The 42 percent of transfers cut and taxes increase yield a generational account of future generations of 121.3 (thousand American dollars) for males cohort, which represents a 69 percent increase with respect to the newborns). This amount reflects two elements that are important for our Canadian case:

1. The standard procedure that treated immigrant as native did not present significantly biased results. Thus, our findings are, in some extent, reliable.
2. Immigration flow is almost fiscally neutral. In fact, the fiscal benefit (or burden) due to immigration is small with regard the overall fiscal imbalance, as we will appreciate in the table 2.

ii) Immigration, Government Purchases and Public Goods

In this point we analyze the case in which the fiscal imbalance is solved by a change in fiscal policy where taxes are raised and transfers cut in both living and future cohorts until the fiscal balance is reached. As we can see, in this point we consider two scenarios: no immigration after 2000, and no immigration after 2000 but considering national defense a pure public-good; (see table 4).

Table 4
The Impact of Immigration
(r=0.06,g=0.012)

	Initial Fiscal Balance Assumption:			
	No Change		Immediate Change	
Age	**Males**	**Females**	**Males**	**Females**
0	71.6	49.6	79.2	55.5
5	91.2	61.5	100.7	68.6
10	114.7	76.1	126.3	84.8
15	145.2	94.6	159.3	105.1
20	180.9	115.2	197.9	127.8
25	203.9	127.4	222.9	141.1
30	206.2	126.1	225.5	139.8
35	200.0	121.1	219.2	134.7
40	183.6	108.1	202.4	121.6
45	148.9	79.9	166.6	93.1
50	100.5	42.4	116.8	55.1
55	39.6	-3.7	54.5	8.6
60	-27.0	-52.3	-13.2	-40.0
65	-80.5	-90.3	-67.6	-78.3
70	-88.6	-95.0	-77.4	-84.5
75	-83.1	-90.8	-73.9	-82.0
80	-72.4	-79.9	-65.3	-72.9
85	-63.9	-65.9	-58.7	-60.6
90	-49.1	-49.7	-45.1	-45.6
Immigration Policy Assumption:	**Burden on Future Generations** (and percent changes in taxes and transfers)			
Baseline	121.3	87.6	79.0	55.2
% change (current/future)	42		6/6	
No immigration after 2000	125.6	91.0	74.9	52.1
% change (current/future)	46		6/3	
No immigration after 2000; defense a public good	131.9	95.8	132.9	95.3
% change (current/future)	51		6/8	

Source: Reproduce from "Generational Accounting and Immigration in the United Sates"; National Bureau of Economic Research; Working Paper No 740; March 1999. Table 2

The first two columns correspond to the last two columns of the table 3. Note that even though we have in the baseline row the generational account for the first native generation (future generation born in 1996), it does not preclude the inclusion of future immigration generations after 1996. The last two columns, "immediate change",

describe the generational accounts with fiscal policy adjustment. We can observe that with respect to the base year (native only, although it does not preclude the inclusion of future immigration generations after 1996), the immediate fiscal adjustment left both the living new born and the first future generation with almost the same generational accounts. Again, the smaller accounts of future generations are accounted for the longer expectancy of life (and the greater transfer payments expected) of future generations.

The elimination of immigration after the year 2000 implies the elimination of taxes and transfers that immigrants pay or receive, and a change in the amount of government purchases, depending on the nature of goods purchased (or produced), that is, nonpublic or public goods. In the first two rows (baseline and immigration after 2000) it is assumed a constant scale of government purchases.[22]

In the case of no fiscal policy adjustment, that is, the case in which the entire fiscal burden falls on future generations, immigration helps create fiscal balance. However, in the presence of fiscal policy adjustment, the elimination of immigration makes the burden of future generation decrease, but under this responsible fiscal scenario, current (living) generations pay the price of the fiscal balance restoration. This is so because in the fiscal adjustment case, current generations absorb more the burden as future generations posses a longer life expectancy. On the other hand, immigrant generations are located mostly in future cohorts, making its contribution null after their elimination. However, under the presence of pure public goods (as national defense), the elimination of immigration increases the burden on future generations, as the pure public-good should be produced without regard of the population size.

The preliminaries conclusions of this section are, then, that the fiscal benefit of immigration depend on: 1) the adjustment response to fiscal imbalance; 2) the assumption of government purchases in function of the demographic structure; 3) In United States case, the fiscal contribution of immigration (negative or positive, whatever might be) is relatively small in comparison to the overall size of the fiscal imbalance. 4) It is assumed in all the scenarios, that the population structure (profile) is not altered by immigration.

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[22] "...we assume that government purchase profile remain constant, meaning for example, that a reduction in the population size with no change in the population structure will induce a reduction of equal proportion in the level of government purchases." Auerbach and Oreopoulos, Op. Cit. p.16

IV- FINDINGS

Before commencing our analysis of results, it is advisable to emphasize the methodological differences of our work with respect to Oreopoulos (1996, 1998), as this latter work has been our point of reference for the Canadian case. This remark is important because it allows us to make comparisons with a certain degree of caution.

Oreopoulos (1996, 1998) broke down taxes and transfers by age and sex cohorts. He did not include education as an age-transfer, although, he considered it as part of general government spending. We, on the other hand, broke down taxes and transfers by age cohorts only, but include education as an age-transfer and deducting it from the general government spending.

Both of us considered a discount and productivity growth rates of 5 and 1 per cent, respectively. With respect to the Intertemporal Public Liabilities indicator, we considered an explicit public net debt supplied by the Department of Finance (2000) as input for our calculations. Finally, we do not perform sensitivity analysis of discount and productivity growth rates variations, since the literature in generational accounting is particularly aware of the high level of sensitivity of generational accounts results with respect to changes in discount and productivity growth rates assumptions. Instead, we concentrate our sensitivity analysis in the effect of Canadian demographic transition, as well as of debt and tax reductions, over the generational accounts of present and future generations.

a. The Base Year Case: including education or not?

For our base year (2000) most of three years budget plan of 1997 had been activated and produced favorable results in reverting budget fiscal deficit tendency.

The 1997 three years budget plan contemplated a significant reduction in program spending. For 1998-99, the reduction in program spending was considered to be $16.5 billions lower than in 1993-94 (a reduction of 13.8% in five years). See Appendix E. On the other hand, an increase in the level contribution of C/QPP was activated in 1997 until 2003, from 5.6 to 9.8 percent of earnings, in order to counterbalance the

demographic transition envisioned after 2010 (Actuarial Report, Superintendence of Banking and Financial Institutions, 2000).

Despite the fiscal adjustment implemented between 1997-99, a relative small generational accounting imbalance still remains for the year 2000, (see table 5). Including education as age related transfer, future generations will have to pay an extra tax burden of 19.52% with respect to new-borns. This burden is reduced to 9.29%, if education is treated as part of general government spending.

Table 5
Generational Accounts with base year 2000
(In thousand of CNS$)

Cohorts	Year of birth	Generational Accounts r=0.05, g=0.01 Education included as age-transfer	Generational Accounts r=0.05, g=0.01 No Education as age-transfer
c1=New Born	0-4	71,256	98,458
c2	5-9	74,697	101,718
c3	10-14	84,850	104,747
c4	15-19	95,934	107,894
c5	20-24	105,428	110,159
c6	25-29	106,135	107,840
c7	30-34	94,732	95,705
c8	35-39	78,744	79,330
c9	40-44	60,328	60,679
c10	45-49	38,822	39,022
c11	50-54	16,095	16,203
c12	55-59	-4,524	-4,458
c13	60-64	-25,335	-25,315
c14	65-69	-36,695	-36,695
c15	70-74	-36,518	-36,518
c16	75-79	-35,663	-35,663
c17	80-84	-26,716	-26,716
c18	85-89	-18,285	-18,285
c19	90 and over	-9,095	-9,095
Future Cohorts	2001 +	85,164	107,606
% difference		19.52	9.29

Both values are relatively small compared to the generational accounts of other industrialized countries. Just take, for instance, the cases of U.S., Japan, Germany and Italy in 1995, (see table 6).

Table 6
1995 Generational Accounts
(in thousand of US$)

	United States		Japan		Germany		Italy	
	A	B	A	B	A	B	A	B
New Borns	86.3	28.5	143.4	73	165	97.1	114.2	68.4
Future Generations	130.4	73.9	386.2	319.4	316.8	248.8	264.8	209.9
Generational Imbalance	51.10%	159.30%	169.32%	337.53%	92.00%	156.23%	131.87%	206.87%

A: Education expenditure treated as government consumption

B: Education treated as government transfers and distributed by age groups

Source: "An International Comparison of Accounts", Kotlikoff Laurence and Leibritz Willi, Working Paper 6447. Table 2

There is evidence that generational accounting in these countries have not changed substantially in 2000 (Gokhale and Raffelhüschen, 2000).

It is clear that when education is treated as government consumption, nonage-transfer, we find values close to generational balance. However, education is not disregardable government expenditure, neither by its amount nor for its impact on newborns and young age cohorts. This fact implies that calculation of generational accounts, treating education as an age related transfer, is considerably different from the case where education is treated as government spending consumption. With this respect, we do not concord with Oreopoulos (1998).

b. The Sensitivity Analysis of Lowering Taxes.

Table 7
Generational Accounts with base year 2000
(In thousand of CNS$)

Cohorts	Year of birth	Generational Accounts r=0.05, g=0.01 No Taxes Change	Generational Accounts r=0.05, g=0.01 All taxes change=-10%
c1=New Born	0-4	71,256	57,864
c2	5-9	74,697	60,936
c3	10-14	84,850	70,704
c4	15-19	95,934	81,389
c5	20-24	105,428	90,587
c6	25-29	106,135	91,402
c7	30-34	94,732	80,601
c8	35-39	78,744	65,542
c9	40-44	60,328	48,233
c10	45-49	38,822	28,065
c11	50-54	16,095	6,855
c12	55-59	-4,524	-12,419
c13	60-64	-25,335	-31,804
c14	65-69	-36,695	-41,911
c15	70-74	-36,518	-40,759
c16	75-79	-35,663	-38,998
c17	80-84	-26,716	-29,213
c18	85-89	-18,285	-19,980
c19	90 and over	-9,095	-10,010
Future Cohorts	2001 +	85,164	90,710
% difference		19.52	56.76

As expected, lowering all level of taxes in 10% generates a greater generational account imbalance, (see table 8 below). From 19.52 percentage difference with respect to newborns generational accounts in our base case, we jump to 52.76 percentage difference. Furthermore, the generational imbalance we obtained is in contradiction with the budget surplus tendency since 1998. The latter indicator seems to show an over-taxation levied on taxpayers and thus, some "room" to cut taxes off. Even in the case where personal income tax is reduced in 10%, the generational accounts of future generations increase in 32.34% with respect to newborns. Recall that personal income is

frequently point as a generator of double taxation, with significant consequences on consumption and investments.

Table 8
Generational Accounts with base year 2000
(In thousand of CNS$)

Cohorts	Year of birth	Generational Accounts r=0.05, g=0.01 No Taxes Change	Generational Accounts r=0.05, g=0.01 Less 10% Income tax
c1=New Born	0-4	71,256	65,992
c2	5-9	74,697	69,225
c3	10-14	84,850	79,160
c4	15-19	95,934	90,020
c5	20-24	105,428	99,312
c6	25-29	106,135	100,017
c7	30-34	94,732	88,860
c8	35-39	78,744	73,315
c9	40-44	60,328	55,449
c10	45-49	38,822	34,650
c11	50-54	16,095	12,764
c12	55-59	-4,524	-7,163
c13	60-64	-25,335	-27,249
c14	65-69	-36,695	-38,034
c15	70-74	-36,518	-37,521
c16	75-79	-35,663	-36,387
c17	80-84	-26,716	-27,226
c18	85-89	-18,285	-18,604
c19	90 and over	-9,095	-9,239
Future Cohorts	2001 +	85,164	87,332
% difference		19.52	32.34

c. Change of Population Structure: Source of Generational Account Imbalance in 2019[23].

The generational account imbalance shown below (table 9) is due to the demographic transition: high proportion of retired workers (baby boom phenomenon) and health care increases as a result of the aging population process.

As a matter of fact, for the Canadian Pension Plan (C/PP) case, contribution and expenditures are almost even (Appendix B), but after 2020 is clear that C/PP presents a negative cash-flow at the steady state contribution of 9.8%, which is the target rate contribution to be reached after in 2003.

Table 9

Generational Accounts with base year 2019
(In thousand of CNS$)

Cohorts	Year of birth	Generational Accounts r=0.05, g=0.01
c1=New Born	0-4	84,206
c2	5-9	90,038
c3	10-14	109,103
c4	15-19	129,970
c5	20-24	148,469
c6	25-29	151,479
c7	30-34	135,908
c8	35-39	113,212
c9	40-44	85,436
c10	45-49	52,576
c11	50-54	18,818
c12	55-59	-11,629
c13	60-64	-41,082
c14	65-69	-56,559
c15	70-74	-55,166
c16	75-79	-52,265
c17	80-84	-37,359
c18	85-89	-25,743
c19	90 and over	-10,411
Future Cohorts	2020 +	103.33
% difference		22.71

[23] For the fiscal prospects until 2019, we took as reference the projection of the Conference Board of Canada, March 2002.

The population aging process, on the other hand, plays significant role in the increase of health care expenditures, which is projected to a compound rate of 5.3% from 2003 until 2019 (The Conference Board of Canada, 2002), by far, the highest increase rate among programs spending.

The population-aging phenomenon represents a fiscal challenge, as in the year 2000 the proportion of older persons is 16.65% of the total population, whereas in 2019 it climbs to 24.81%. In 2050, this proportion jumps to 30.48%. These prospects mean that, for the next 50 years, there will be a sizeable pressure on elderly transfers and health care expenditures that should be carried by future generations taxpayers.

Regarding the generational accounts value for future generations, and more important, the difference value (in percentage) with respect to the newborn generation i.e. -those born in 2019- there is not a significant variation compared to the case of our base year (see p. 39). Even though the demographic shock is eventually actualized in 2019, the generational imbalance just varies in 3.19 percent in relation to 2000. The reason for this behavior resides in the aggressive scheme of debt payments that The Conference Board of Canada reflects in its projections, and more important, in the reduction of debt charges, as side effect, that makes the total government net spending compensate the pressure due to the population aging process. This argument should be more patent in the section "The Sensitive Analysis of Redeeming the Debt", p.36.

d. The Sensitive Analysis of Redeeming the Debt

One interesting issue is the sensitive analysis of paying the debt off, as a result of applying all eventual budget surpluses until the debt is completely redeemed. Let us assumed the redemption rate is fast enough to pay, fully, the net public debt in 2019. Then, we will have the following generational accounts scenario.

Table 10
Generational Accounts After Redeeming the Debt. 2019 Case

Cohorts	Year of birth	Generational Accounts r=0.05, g=0.01	Generational Accounts r=0.05, g=0.01 No Debt
c1=New Born	0-4	84,206	84,206
c2	5-9	90,038	90,038
c3	10-14	109,103	109,103
c4	15-19	129,970	129,970
c5	20-24	148,469	148,469
c6	25-29	151,479	151,479
c7	30-34	135,908	135,908
c8	35-39	113,212	113,212
c9	40-44	85,436	85,436
c10	45-49	52,576	52,576
c11	50-54	18,818	18,818
c12	55-59	-11,629	-11,629
c13	60-64	-41,082	-41,082
c14	65-69	-56,559	-56,559
c15	70-74	-55,166	-55,166
c16	75-79	-52,265	-52,265
c17	80-84	-37,359	-37,359
c18	85-89	-25,743	-25,743
c19	90 and over	-10,411	-10,411
Future Cohorts	2020 +	126,933	86,981
% difference		50.74	3.30

The table shown above (table 10) indicates that after the complete redemption of the net public debt, the generational balance is almost reached; in other words, the burden of the demographic transition on future generations taxpayers could be counterbalance if a great portion of present levels of surpluses is applied to reduce the net public debt.

The explanation for this generational account pattern of future and present generations resides, in the fact, in the great amount of budget revenues applied to debt service charges. In the year 2000, the debt service charges represented 24% of government purchases, which is a clear indication of the high level of the public net debt. Of course, given our assumption of redemption for 2019, the debt service charges must be zero thereafter.

e. Explicit and Implicit Debts: Consolidation of Intertemporal Public Liabilities

As it is evident from equation (6), the value of Intertemporal Public Liabilities (IPLs) represents both explicit (net public debt in year t) and implicit (taxes net of transfers flow discounted to year t) public sector liabilities. The size of IPLs also shows the size of policy adjustment necessary to make a fiscal policy sustainable in the long run. That is, if the IPLs indicator is positive, the government's total spending obligations (including debt charges) surpasses the projected receipts under the present fiscal policy, and net taxes increases should be implemented at any moment in the future. If negative, the IPLs indicates by how much taxes should be reduced or government expenditure increased to enhance the general welfare of the population.

For our base year, 2000, the IPLs is 35.88% (as percentage of GDP). This positive value indicates the high level of public net debt (73.62% of GDP) in 2000, whereas the net taxes (net of transfers), in present value, represents 35.88%. The Canadian IPLs is relatively small with respect another industrialized economies, specially the western Europeans whom present an average of 114.5% in their IPLs for 1995, with clear evidence that the fiscal balance has not been restored in 2000. In the case of European Union members, the Maastricht treaty has enforced a fiscal discipline mainly based on outstanding explicit liabilities and budget deficits not greater than 3% of GDP. There is evidence that these measures, that represent huge fiscal adjustment efforts, do not have the expected impact of reducing the fiscal imbalance carry until 2000 (Gokhale and Raffelhüschen, 2000).

V- CONCLUSIONS

Our basic results show that even though the success of reversing the high persistent budget deficit since 1998, there exists evidence of a moderate level of generational imbalance in 2000. Indeed, after the year 2000, future generations will have to pay 19.52% more (in net taxes) than new borns in 2000. This result contrasts with the budget surplus (1.9% of GDP) in our base year. Nonetheless, the generational account difference (in percentage) of future generation with respect to new borns is relatively low compared to international cases.

The treatment of education as government transfers and distributed by age groups makes a significant difference in the calculation of generational accounts, and by all means, it is advisable to include it. The inclusion of education does not only affect the generational accounts of future generations; it also affects the generational accounts of new borns and young generations.

Under the moderate generational imbalance evidence, it is not advisable to make any reduction in the tax level. Maintaining the level of government expenditure and transfers to date, any taxes cut will affect the generational balance between present and future generations; in this case, present generations will be benefit in terms of more disposable income but future generations will have to carry a heavier tax burden.
The most bland tax reduction, the reduction in 10% of personal income tax revenues, will signify an increment of 12.82% of tax burden for future generations. Again, this result contradicts the opinion of many policy makers whom propose a tax cut for the coming years.

A major concern in the fiscal dynamics literature is the demographic shock that should occur not far after 2010 i.e. -baby boom, population aging and double population aging[24]. Our generational accounts for future generations, based on The Conference Board of Canada's (2002) prospects, indicate that the demographic transition will generate a significant impact in the future generations tax burden. Our results show that,

[24] Double population aging process is referred to the number of people 80 years of age or older growing at fast pace. For 2000, only 2.9 percent of the population of Canada is 80 years or older. For 2050, it is projected that this group of age could represent 8.9 percent of the total population. This prospective will represent sizeable pressure on health care costs; United Nations (2001).

after the year 2019, future generations will have to pay 50.74% more in net taxes than new borns generations born in 2019. However, the aggressive scheme of debt payment that the federal government started implementing is an important step to reduce future generations tax burdens. The case where no net public debt is held (in the consolidated fiscal accounts of 2019) indicates that all government obligations would substantially decrease. In this scenario, the generational balance is almost reached.

Finally, caution should be exerted at time of interpreting generational accounting results. This novel dynamic fiscal accounting is extremely sensitive to variations in the discount and productivity growth rates. The results are very sensitive to the population projections as well. In this regard, the choices of *ad-hoc* parameters are up to the "right" judgment of the researcher but it might always be controversial choices.

Apendix A

Canada's Population and Population Projections
(In thousand of inhabitants)

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total	**30,750**	**31,002**	**31,257**	**31,507**	**31,751**	**31,992**	**32,229**	**32,462**	**32,691**	**32,918**
0-4 years	1,773	1,716	1,683	1,661	1,643	1,640	1,640	1,643	1,647	1,652
5-9 years	2,045	2,027	1,986	1,943	1,901	1,846	1,790	1,758	1,736	1,719
10-14 years	2,051	2,077	2,105	2,127	2,129	2,114	2,096	2,056	2,014	1,972
15-19 years	2,073	2,081	2,088	2,091	2,104	2,130	2,155	2,184	2,205	2,208
20-24 years	2,078	2,097	2,113	2,132	2,147	2,159	2,168	2,175	2,178	2,191
25-29 years	2,105	2,100	2,114	2,131	2,155	2,175	2,194	2,209	2,228	2,243
30-34 years	2,279	2,253	2,236	2,224	2,211	2,205	2,202	2,215	2,231	2,255
35-39 years	2,692	2,642	2,574	2,487	2,407	2,351	2,327	2,311	2,299	2,286
40-44 years	2,612	2,659	2,687	2,716	2,733	2,723	2,676	2,610	2,525	2,448
45-49 years	2,320	2,385	2,457	2,522	2,572	2,617	2,664	2,691	2,719	2,737
50-54 years	2,045	2,115	2,135	2,173	2,231	2,299	2,363	2,433	2,498	2,547
55-59 years	1,556	1,626	1,742	1,837	1,922	2,006	2,074	2,095	2,132	2,189
60-64 years	1,258	1,291	1,336	1,393	1,452	1,510	1,578	1,691	1,782	1,864
65-69 years	1,139	1,138	1,137	1,146	1,167	1,190	1,222	1,265	1,320	1,375
70-74 years	1,000	1,012	1,024	1,030	1,031	1,030	1,031	1,031	1,040	1,060
75-79 years	804	815	821	831	837	847	859	870	876	878
80-84 years	498	526	555	582	605	618	628	633	642	647
85-89 years	285	295	303	309	316	331	351	372	390	406
90 years and over	138	149	161	174	188	202	212	221	229	239

Sources: Cansim II, Statistic Canada, 2000.
World Population Prospects 2000, United Nations, 2001

Apendix A

Canada's Population and Population Projections
(In thousand of inhabitants)

YEAR	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total	**33,141**	**33,362**	**33,580**	**33,794**	**34,006**	**34,215**	**34,420**	**34,621**	**34,819**	**35,012**
0-4 years	1,659	1,666	1,675	1,683	1,692	1,701	1,709	1,716	1,723	1,729
5-9 years	1,716	1,716	1,718	1,722	1,728	1,734	1,742	1,750	1,758	1,767
10-14 years	1,918	1,864	1,832	1,810	1,793	1,790	1,790	1,792	1,796	1,802
15-19 years	2,193	2,175	2,135	2,093	2,053	1,999	1,946	1,914	1,893	1,876
20-24 years	2,216	2,241	2,270	2,291	2,293	2,279	2,261	2,222	2,181	2,141
25-29 years	2,255	2,264	2,271	2,274	2,286	2,311	2,336	2,364	2,385	2,387
30-34 years	2,274	2,293	2,308	2,326	2,341	2,352	2,360	2,367	2,370	2,382
35-39 years	2,281	2,278	2,291	2,307	2,331	2,349	2,367	2,381	2,399	2,413
40-44 years	2,394	2,370	2,355	2,344	2,332	2,326	2,324	2,337	2,353	2,376
45-49 years	2,728	2,682	2,618	2,536	2,461	2,408	2,385	2,371	2,360	2,349
50-54 years	2,591	2,637	2,665	2,693	2,710	2,702	2,658	2,596	2,516	2,443
55-59 years	2,256	2,318	2,388	2,451	2,499	2,543	2,589	2,616	2,644	2,662
60-64 years	1,945	2,011	2,032	2,069	2,125	2,190	2,252	2,319	2,381	2,428
65-69 years	1,431	1,496	1,603	1,690	1,768	1,845	1,907	1,929	1,964	2,019
70-74 years	1,082	1,113	1,152	1,203	1,255	1,306	1,366	1,465	1,546	1,617
75-79 years	878	880	881	891	910	930	957	993	1,038	1,083
80-84 years	656	666	676	682	684	685	688	691	700	716
85-89 years	415	423	427	433	438	445	453	460	465	467
90 years and over	254	269	284	297	309	320	331	340	348	356

Sources: Cansim II, Statistic Canada, 2000.
World Population Prospects 2000, United Nations, 2001

Apendix A

Canada's Population and Population Projections
(In thousand of inhabitants)

YEAR	2020	2021	2022	2023	2024	2025	2026	2050
Total	**35,200**	**35,382**	**35,558**	**35,727**	**35,890**	**36,044**	**36,190**	**40,408**
0-4 years	1,733	1,735	1,735	1,734	1,730	1,724	1,716	2,209
5-9 years	1,775	1,784	1,791	1,798	1,803	1,807	1,809	2,193
10-14 years	1,808	1,816	1,824	1,832	1,840	1,849	1,857	2,196
15-19 years	1,873	1,873	1,875	1,879	1,885	1,891	1,898	2,219
20-24 years	2,088	2,035	2,004	1,983	1,966	1,963	1,963	2,277
25-29 years	2,373	2,356	2,317	2,277	2,237	2,186	2,133	2,358
30-34 years	2,406	2,431	2,458	2,478	2,480	2,466	2,449	2,410
35-39 years	2,424	2,432	2,439	2,441	2,453	2,477	2,501	2,414
40-44 years	2,394	2,412	2,426	2,443	2,457	2,467	2,475	2,398
45-49 years	2,344	2,341	2,354	2,370	2,393	2,411	2,428	2,378
50-54 years	2,392	2,370	2,357	2,347	2,336	2,331	2,329	2,444
55-59 years	2,654	2,612	2,552	2,475	2,405	2,355	2,335	2,597
60-64 years	2,471	2,516	2,544	2,572	2,590	2,584	2,543	2,494
65-69 years	2,081	2,140	2,205	2,265	2,311	2,353	2,397	2,334
70-74 years	1,688	1,746	1,767	1,801	1,853	1,912	1,967	2,093
75-79 years	1,129	1,182	1,269	1,341	1,404	1,466	1,517	1,808
80-84 years	734	757	786	824	861	899	942	1,503
85-89 years	469	473	476	484	496	509	527	1,189
90 years and over	365	374	381	387	391	397	403	894

Sources: Cansim II, Statistic Canada, 2000.
World Population Prospects 2000, United Nations, 2001

APPENDIX B

Consolidated (1) Federal, Provincial, Territorial and Local Government Revenue and Expenditures, 2000/2001*

Receipts		Expenditures	
Personal Income Taxes	142,475.0	Health Care Expenditures	72,789.0
Capital Income Taxes	47,517.0	Education	61,306.0
Consumption Taxes	87,096.0	Elderly Benefits	24,256.0
Property Taxes	40,859.0	Employment Insurance Ben.	11,444.0
Contribution to IS plans	30,445.0	Workers Compensation Benef.	5,253.0
C/QPP Contributions	29,876.0	C/QPP	25,900.0
Investment Income	38,699.0	Govern. Purchases	260,116.0
Other taxes	15,123.0		
Other Incomes	43,540.0		
Sub-total revenues	475,630.0	Sub-total expenditures	461,064.0
less Seigniorage Revenue	1,992.4	add Surplus(2)	12,573.6
Total	473637.6	Total	473637.6
Federal Net Debt	561,733.0		
Provincial Net Debt	256166		
Consolidated Net Debt	817,899.0		

Government Purchases	
General Govern. Services	16,595.0
Employee Pension Plan Ben.	21,093.0
Social Assistance	41,480.0
Other Social Services	17,080.0
Protection of Persons and Properties	32,349.0
Transportation and Communication	16,965.0
Resource Conservation and Ind. Development	15,219.0
Environment	9,064.0
Recreation and Culture	10,322.0
Labour, Employment and Immigration	3,127.0
Housing	4,247.0
Foreign Affairs and Int. Assistance	4,452.0
Regional Planning and Development	1,662.0
Research Establishments	1,482.0
Debt Charges	62,433.0
Other Expenditures	2,546.0
Total Gov. Purchases	260,116.0

* In millions of CND$

(1) Include Canada Pension Plan and Quebec Pension Plan

(2) The inclusion of C/QPP and employment insurance benefits altered the surplus amount reflected in the sources

Sources: **Consolidated Federal, Provincial, Territorial and Local Government Revenues and Expenditures**
Statistic Canada, Public Sector Statistic, Catalogue 68-212, year 2000.
National Income and Expenditure Accounts,
Statistic Canada Catalogue, Annual Estimates, 2000, 13-001xpb
Statement of Revenue and Expense, Bank of Canada, Annual Report, 2001
Fiscal Reference Tables, Table 10; Major Transfers to Persons, Department of Finance, 2000

APPENDIX B

Projection of Revenue and Expenditures of Federal and Provincial Governments (2019)
(In millions of CND$)

Receipts		Expenditures	
Personal Income Taxes	276,219.0	Health Care Expenditures	166,487.0
Corporation Income Taxes	95,965.0	Education	113,608.0
Consumption Taxes	129,834.0	Elderly Benefits	52,915.0
Property Taxes	58,424.8	Employment Insurance Ben.	25,226.0
Contribution to SI plans	64,143.0	Workers Compensation Benef.	8,877.2
CPP Contributions*	58,420.0	CPP*	58,350.0
Investment Income	58,514.9	Govern. Purchases	329,118.6
Other taxes	21,624.6		
Other Incomes	64,621.6		
Sub-total revenues	827,766.9	Sub-total expenditures	754,581.9
		add Surplus	73,185.0
Total	827,766.9	Total	827766.9

Federal Net Debt	7,695.0
Provincial Net Debt	386,913.0
Consolidated Net Debt	394,608.0

*Exclude Quebec Pension Plan

Source: "Fiscal Prospects for the Federal and Provincial/Territorial Governments". The Conference Board of Canada, Draft, March 2002. Author's calculations

APPENDIX C

Distribution of Tax/Transfer*

Age	1995	2000	2019	2050	1995	2000
	Distribution Income Tax	Distribution Income Tax	Distribution Income Tax	Distribution Income Tax	Distribution Consumption Tax	Distribution Consumption Tax
c1=0-4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c2=5-9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c3=10-14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c4=15-19	0.0049	0.0047	0.0037	0.0041	0.0143	0.0139
c5=20-24	0.0352	0.0336	0.0295	0.0298	0.0549	0.0528
c6=25-29	0.0780	0.0694	0.0672	0.0630	0.0919	0.0823
c7=30-34	0.1295	0.1040	0.0928	0.0891	0.1301	0.1052
c8=35-39	0.1434	0.1391	0.1064	0.1010	0.1319	0.1288
c9=40-44	0.1512	0.1587	0.1232	0.1180	0.1266	0.1338
c10=45-49	0.1510	0.1577	0.1362	0.1310	0.1171	0.1232
c11=50-54	0.0950	0.1137	0.1159	0.1101	0.0830	0.1000
c12=55-59	0.0782	0.0871	0.1272	0.1179	0.0678	0.0762
c13=60-64	0.0572	0.0553	0.0910	0.0888	0.0573	0.0557
c14=65-69	0.0315	0.0299	0.0453	0.0497	0.0431	0.0412
c15=70-74	0.0222	0.0215	0.0297	0.0365	0.0352	0.0344
c16=75-79	0.0117	0.0132	0.0152	0.0241	0.0227	0.0259
c17=80-84	0.0058	0.0071	0.0087	0.0173	0.0118	0.0145
c18=85-89	0.0038	0.0036	0.0051	0.0123	0.0086	0.0084
c19=90+	0.0014	0.0014	0.0030	0.0072	0.0036	0.0035
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* In Units
Source: Chantal Hicks, "The Age Distribution of Tax/Tranfer System in Canada", Catalogue 68-513 XPB, 1998
Author's calculations

APPENDIX C

Distribution of Tax/Transfer*

Age	2019	2050	1995	2000	2019	2050
	Distribution Consumption Tax	Distribution Consumption Tax	Distribution Property Tax	Distribution Property Tax	Distribution Property Tax	Distribution Property Tax
c1=0-4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c2=5-9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c3=10-14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c4=15-19	0.0105	0.0113	0.0129	0.0125	0.0091	0.0093
c5=20-24	0.0454	0.0441	0.0334	0.0318	0.0264	0.0242
c6=25-29	0.0779	0.0702	0.0597	0.0529	0.0483	0.0413
c7=30-34	0.0918	0.0847	0.1063	0.0851	0.0716	0.0626
c8=35-39	0.0964	0.0879	0.1280	0.1236	0.0892	0.0771
c9=40-44	0.1016	0.0935	0.1274	0.1331	0.0975	0.0851
c10=45-49	0.1040	0.0961	0.1151	0.1197	0.0975	0.0854
c11=50-54	0.0997	0.0909	0.0842	0.1003	0.0965	0.0834
c12=55-59	0.1088	0.0967	0.0757	0.0840	0.1157	0.0976
c13=60-64	0.0897	0.0840	0.0681	0.0655	0.1017	0.0903
c14=65-69	0.0610	0.0643	0.0648	0.0613	0.0875	0.0874
c15=70-74	0.0464	0.0547	0.0506	0.0489	0.0636	0.0712
c16=75-79	0.0291	0.0442	0.0336	0.0377	0.0409	0.0590
c17=80-84	0.0175	0.0334	0.0183	0.0223	0.0258	0.0469
c18=85-89	0.0115	0.0267	0.0107	0.0104	0.0137	0.0301
c19=90+	0.0087	0.0172	0.0112	0.0109	0.0150	0.0491
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* In Units
Source: Chantal Hicks, "The Age Distribution of Tax/Tranfer System in Canada", Catalogue 68-513 XPB, 1998
Author's calculations

APPENDIX C

Distribution of Tax/Transfer*

Age	1995	2000	2019	2050	1995	2000
	Health Expenditures Distribution	Health Expenditures Distribution	Health Expenditures Distribution	Health Expenditures Distribution	Education Expenditures Distribution	Education Expenditures Distribution
c1=0-4	0.0279	0.0227	0.0279	0.0141	0.0401	0.0358
c2=5-9	0.0175	0.0164	0.0175	0.0088	0.2621	0.2629
c3=10-14	0.0175	0.0164	0.0175	0.0088	0.2797	0.2808
c4=15-19	0.0263	0.0251	0.0263	0.0134	0.2453	0.2505
c5=20-24	0.0332	0.0312	0.0332	0.0170	0.1041	0.1048
c6=25-29	0.0437	0.0382	0.0437	0.0213	0.0282	0.0264
c7=30-34	0.0516	0.0407	0.0516	0.0215	0.0179	0.0152
c8=35-39	0.0474	0.0451	0.0474	0.0202	0.0107	0.0109
c9=40-44	0.0419	0.0432	0.0419	0.0198	0.0062	0.0068
c10=45-49	0.0592	0.0608	0.0592	0.0310	0.0032	0.0036
c11=50-54	0.0476	0.0560	0.0476	0.0333	0.0012	0.0015
c12=55-59	0.0382	0.0419	0.0382	0.0349	0.0010	0.0012
c13=60-64	0.0369	0.0350	0.0369	0.0346	0.0004	0.0004
c14=65-69	0.1091	0.1018	0.1091	0.1040	0.0000	0.0000
c15=70-74	0.0938	0.0894	0.0938	0.0932	0.0000	0.0000
c16=75-79	0.1410	0.1565	0.1410	0.1753	0.0000	0.0000
c17=80-84	0.0808	0.0971	0.0808	0.1461	0.0000	0.0000
c18=85-89	0.0583	0.0556	0.0583	0.1158	0.0000	0.0000
c19=90+	0.0281	0.0269	0.0281	0.0871	0.0000	0.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0008

* In Units
Source: Chantal Hicks, "The Age Distribution of Tax/Tranfer System in Canada", Catalogue 68-513 XPB, 1998
Author's calculations

APPENDIX C

Distribution of Tax/Transfer*

Age	2019	2050	1995	2000	2019	2050
	Education Expenditures Distribution	Education Expenditures Distribution	UI Contribution Distribution	UI Contribution Distribution	UI Contribution Distribution	UI Contribution Distribution
c1=0-4	0.0374	0.0404	0.0000	0.0000	0.0000	0.0000
c2=5-9	0.2489	0.2613	0.0000	0.0000	0.0000	0.0000
c3=10-14	0.2703	0.2787	0.0000	0.0000	0.0000	0.0000
c4=15-19	0.2485	0.2486	0.0147	0.0145	0.0120	0.0140
c5=20-24	0.1182	0.1064	0.0688	0.0668	0.0630	0.0662
c6=25-29	0.0328	0.0274	0.1187	0.1074	0.1114	0.1088
c7=30-34	0.0174	0.0149	0.1642	0.1341	0.1282	0.1283
c8=35-39	0.0107	0.0091	0.1607	0.1586	0.1300	0.1286
c9=40-44	0.0068	0.0058	0.1550	0.1655	0.1376	0.1374
c10=45-49	0.0040	0.0034	0.1308	0.1390	0.1287	0.1288
c11=50-54	0.0020	0.0017	0.0897	0.1092	0.1193	0.1180
c12=55-59	0.0022	0.0018	0.0591	0.0670	0.1048	0.1011
c13=60-64	0.0008	0.0007	0.0301	0.0296	0.0522	0.0531
c14=65-69	0.0000	0.0000	0.0060	0.0058	0.0094	0.0107
c15=70-74	0.0000	0.0000	0.0015	0.0015	0.0022	0.0029
c16=75-79	0.0000	0.0000	0.0006	0.0007	0.0009	0.0015
c17=80-84	0.0000	0.0000	0.0001	0.0001	0.0001	0.0003
c18=85-89	0.0000	0.0000	0.0001	0.0001	0.0001	0.0003
c19=90+	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* In Units
Source: Chantal Hicks, "The Age Distribution of Tax/Tranfer System in Canada", Catalogue 68-513 XPB, 1998
Author's calculations

APPENDIX C

Distribution of Tax/Transfer*

Age	1995	2000	2019	2050	1995	2000
	UI Benefits Distribution	UI Benefits Distribution	UI Benefits Distribution	UI Benefits Distribution	C/QPP Contribution Distribution	C/QPP Contribution Distribution
c1=0-4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c2=5-9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c3=10-14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c4=15-19	0.0249	0.0250	0.0205	0.0239	0.0114	0.0112
c5=20-24	0.1166	0.1154	0.1074	0.1129	0.0621	0.0603
c6=25-29	0.1633	0.1504	0.1542	0.1505	0.1143	0.1033
c7=30-34	0.1705	0.1417	0.1339	0.1339	0.1620	0.1321
c8=35-39	0.1481	0.1487	0.1205	0.1191	0.1621	0.1597
c9=40-44	0.1136	0.1233	0.1014	0.1012	0.1540	0.1641
c10=45-49	0.0953	0.1031	0.0944	0.0944	0.1347	0.1429
c11=50-54	0.0670	0.0830	0.0896	0.0886	0.0909	0.1105
c12=55-59	0.0576	0.0664	0.1028	0.0991	0.0615	0.0696
c13=60-64	0.0431	0.0430	0.0751	0.0763	0.0350	0.0344
c14=65-69	0.0000	0.0000	0.0000	0.0000	0.0075	0.0072
c15=70-74	0.0000	0.0000	0.0000	0.0000	0.0027	0.0026
c16=75-79	0.0000	0.0000	0.0000	0.0000	0.0012	0.0013
c17=80-84	0.0000	0.0000	0.0000	0.0000	0.0003	0.0004
c18=85-89	0.0000	0.0000	0.0000	0.0000	0.0003	0.0003
c19=90+	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* In Units
Source: Chantal Hicks, "The Age Distribution of Tax/Tranfer System in Canada", Catalogue 68-513 XPB, 1998
Author's calculations

APPENDIX C

Distribution of Tax/Transfer*

Age	2019	2050	1995	2000	2019	2050
	C/QPP Contribution Distribution	C/QPP Contribution Distribution	C/QPP Benefits Distribution	C/QPP Benefits Distribution	C/QPP Benefits Distribution	C/QPP Benefits Distribution
c1=0-4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c2=5-9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c3=10-14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
c4=15-19	0.0092	0.0108	0.0049	0.0047	0.0026	0.0023
c5=20-24	0.0564	0.0592	0.0073	0.0069	0.0044	0.0035
c6=25-29	0.1064	0.1038	0.0085	0.0075	0.0053	0.0039
c7=30-34	0.1254	0.1253	0.0084	0.0067	0.0043	0.0033
c8=35-39	0.1299	0.1283	0.0119	0.0114	0.0063	0.0048
c9=40-44	0.1354	0.1350	0.0108	0.0112	0.0063	0.0048
c10=45-49	0.1313	0.1313	0.0207	0.0214	0.0134	0.0102
c11=50-54	0.1198	0.1183	0.0337	0.0400	0.0296	0.0222
c12=55-59	0.1081	0.1041	0.0420	0.0464	0.0492	0.0361
c13=60-64	0.0602	0.0610	0.1375	0.1316	0.1574	0.1215
c14=65-69	0.0116	0.0133	0.2801	0.2637	0.2897	0.2516
c15=70-74	0.0039	0.0050	0.2164	0.2080	0.2085	0.2027
c16=75-79	0.0016	0.0027	0.1231	0.1377	0.1150	0.1442
c17=80-84	0.0005	0.0010	0.0455	0.0551	0.0492	0.0775
c18=85-89	0.0004	0.0010	0.0313	0.0301	0.0306	0.0586
c19=90+	0.0000	0.0000	0.0180	0.0174	0.0279	0.0527
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* In Units
Source: Chantal Hicks, "The Age Distribution of Tax/Tranfer System in Canada", Catalogue 68-513 XPB, 1998
Author's calculations

APPENDIX D

Federal Government Fiscal Prospects
(CND$ millions)

	2000/01	2001/02 to 2005/06	2006/07 to 2019/20	2001/02 to 2019/20
Budgetary revenues	**178,590**	**195,967**	**341,694**	
		1.9	4.1	3.5
Budgetary expenditures	**161,442**	**191,553**	**256,239**	
		3.5	2.1	2.5
Program spending	**119,348**	**149,621**	**244,991**	
		4.6	3.6	3.9
Elderly benefits	**24,256**	**28,946**	**52,915**	
		3.6	4.4	4.2
Employment insurance benefits	**11,444**	**15,643**	**25,226**	
		6.5	3.5	4.2
Transfers to provinces/territories	**24,724**	**32,618**	**50,191**	
		5.7	3.1	3.8
Other program spending	**58,924**	**72,414**	**116,659**	
		4.2	3.5	3.7
Public Debt Charge	**42,094**	**41,932**	**11,248**	
		0.0	-9.0	-6.7
Budgetary balance	**17,148**	**4,414**	**85,455**	
Interest bearing debt	**589,232**	**571,313**	**52,728**	

Source: The Conference Board of Canada.

Note:The first line indicates the level at the end of the period

The second line indicates the percentage change as average annaul compound rates.

APPENDIX E

Fiscal Outlook with Budget Measures

	1994-95	1995-96	1996-97	1997-98	1998-99
	(billions of dollars)				
Budgetary revenues	123.3	130.3	135.5	137.8	144
Program spending	118.7	112	109	105.8	103.5
Operating balance	**4.6**	**18.3**	**26.5**	**32**	**40.5**
Public debt charges	42	46.6	45.5	46	46.5
Underlying deficit	-37.4	-28.3	-19	-14	-6
Contingency revenue				3	3
Deficit	**-37.4**	**-28.3**	**-19**	**-17**	**-9**
Non-budgetary transactions	11.6	11.4	13	11	10
Financial requirements/source	**-25.8**	**-16.9**	**-6**	**-6**	**1**

Source: Department of Finance, Budget Plan 1997.

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