RRSP Savings and the Aging of the Baby Boom Generation

Maxime Fougère*

PRÉCIS
Depuis l’entrée en vigueur du Régime enregistré d’épargne retraite (REÉR) en 1957, le régime est devenu la plus importante source d'épargne pour la retraite au Canada. On peut penser que les changements apportés au cours des années pour accroître l'accessibilité au programme expliquent la hausse soutenue de la demande pour les REÉR. D’un autre côté, le passage des baby boomers à travers la structure d’âge a pu aussi contribuer à accroître la demande de REÉR. Cet article examine dans quelle mesure la popularité du programme de REÉR depuis les années 70 peut s’expliquer par les changements démographiques. Le principal résultat de l’étude est que le choc du baby boom paraît être largement responsable de la croissance rapide de l’épargne sous forme de REÉR, laissant peu de place aux effets provenant du taux de rendement de l’épargne sous forme de REÉR et de l’enrichissement du programme à travers le temps pour expliquer la popularité du régime. De plus, selon l’analyse, lorsque les baby boomers vont prendre leur retraite au cours des prochaines années, les cotisations au REÉR vont diminuer de façon importante, pouvant même peut-être redescendre vers les niveaux atteints durant les années 70 en proportion du revenu. Finalement, les pertes de revenu des gouvernements provenant de la déduction des cotisations aux REÉR vont aussi diminuer et permettre d’amoidrir quelque peu les pressions sur les finances publiques.

ABSTRACT
Since the introduction of the registered retirement savings plan (RRSP) in 1957, RRSPs have become the most important form of retirement savings in Canada. It can be argued that the modifications made to enhance the accessibility of the program over the years have led to the increased and sustained demand for RRSPs. Alternatively, the passage of baby boomers through the age structure may also have contributed to increase the demand for RRSPs. This article explores the extent to which the popularity of the RRSP program since the 1970s can be explained by demographic changes. The article’s key finding is that the shock of the baby boom appears to be largely responsible

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for the rapid growth in RRSP savings, leaving little room for rate-of-return effects and the enrichment of the program through time to explain the popularity of the program. The analysis also suggests that when baby boomers retire over the next several years, RRSP contributions will fall dramatically, perhaps even gradually returning to levels approaching those reached during the 1970s as a proportion of income. Moreover, the government revenue loss associated with the deduction of RRSP contributions will decline, somewhat easing the pressures on public finances.

KEYWORDS: DEMOGRAPHY ■ RRSP ■ REGRESSION ANALYSIS ■ TAX EXPENDITURES

INTRODUCTION

The Canadian tax system encourages retirement saving through retirement pension plans (RPPs) and registered retirement savings plans (RRSPs) by providing a tax exemption on contributions to the plans and on the accrued interest. (Income earned from these plans is taxable upon withdrawal.) Since their introduction in 1957, RRSP savings have grown sharply. Amounting to $81 million or 0.5 percent of total wages and salaries in 1965, annual contributions to RRSPs reached $27.8 billion or 6.4 percent of total wages and salaries in 1999, becoming the most important form of retirement savings.

However, an important drawback is that the program costs governments a substantial amount of money. For example, the federal Department of Finance estimates that the revenue loss in federal personal income taxes (PITs) associated with the deduction of RRSP contributions amounted to $6.3 billion in 1997. The federal government also lost another $3.4 billion in revenue from the tax exemption of income in the form of interest on RRSP savings and regained only about $2.5 billion from the taxation of withdrawals. If we include the impact of the program on the PIT revenues of provincial governments, the total net revenue loss, or net tax expenditure, for both levels of government exceeded $10 billion in 1997.

It can be argued, however, that the net revenue loss to governments will eventually decrease as the RRSP system becomes mature and the baby boom generation goes through retirement. It is well known that the population is aging and that over the next several decades the proportion of the population older than 65 will virtually double in Canada. The aging of the population can be expected to significantly affect savings in the future. A prediction from the life cycle theory of savings is that an aging population will put downward pressure on retirement savings. In an empirical study, Fougère and Mérette have shown that demographic change is an important determinant of personal savings in Canada. They also found that the aging of the baby boom generation could eventually contribute to a significant reduction in personal savings over the next several decades. However, they did not address how the composition of savings, including RRSPs, would be affected by changes in the age structure. RRSP savings are becoming an increasingly large proportion of total private savings. Therefore, it is important to understand to what extent the aging of the baby boom generation affects the demand for RRSPs to assess the potential impact of future demographic change.
In this article, we examine the impact of demographic change on RRSP savings. We estimate an econometric equation of RRSP contributions and incorporate the population age structure among its potential determinants. We also isolate the direct effect of demographic change on RRSP savings and construct a model to isolate the historical contribution of the baby boom to the demand for RRSPs. Finally, on the basis of the results, we attempt to evaluate the extent to which the aging of the baby boom generation may affect RRSP contributions in the future and assess the fiscal implications.

This article is organized into five main sections, as follows:

1. a discussion of theoretical issues;
2. presentation of stylized facts pertaining to RRSP contributions and assets, and demographic change;
3. presentation of a model of RRSP contributions;
4. empirical analysis; and
5. concluding remarks.

THEORETICAL ISSUES

The life cycle theory of savings pioneered by Modigliani and Brumberg asserts that households smooth their consumption over time so as to maximize utility over their lifetime. According to the theory, the accumulation of savings for retirement is a household’s most important reason for saving. Over the life cycle, a household accumulates wealth during the pre-retirement period by consuming less than its disposable income. During retirement, the household decumulates wealth to finance its consumption. These observations imply that the savings rate follows a life cycle pattern.

Over the past few decades, the life cycle model has been tested and challenged by alternative explanations of savings. Research based on cross-section tabulations of wealth holdings and savings rates by age tends to find that older people do not dissave to the extent suggested by the life cycle model. In particular, studies for the United States by Kotlikoff and Bernheim claim that the primary intention of households in accumulating savings is not to fund their retirement but rather to make intergenerational transfers. These finding contradict the life cycle model. By contrast, studies by Hurd for the United States and Ando and Meredith for Japan have found that the wealth of a given cohort tends to decline after reaching its peak in the 60-65 age range; these studies thus support the life cycle model.

The life cycle model is also generally well supported by cross-country aggregate studies and by some macro evidence for Canada. Beach, Boadway, and Bruce provide formal tests of the life cycle consumption theory for Canada, using data by age cohort, and have found evidence that lends some support to the life cycle model.

According to Miles, research that suggests that the elderly do not dissave, based on household survey data, can be reconciled with the predictions of the life cycle model. Studies based on household surveys generally consider the depletion of pension funds in their measurement of income. However, this erroneously boosts the measured savings rate. When adjustments are made to savings rates by excluding
pension income, the pattern of savings per age cohort is more consistent with the life cycle model, as Fougère and Mérette,11 Miles,12 and Bosworth, Burtless, and Sabelhaus13 have shown. Weil14 proposes another explanation for the macro studies that show behaviour that is apparently consistent with the life cycle model. His model suggests that older people have a bequest motive and that the receipt of a bequest by members of the younger generation increases the recipients’ consumption. This implies that even if older people do not themselves dissave, they lower the savings of the young through their bequests.

In addition, Bakshi and Chen15 argue that, when allocating savings between housing and financial assets, households will generally put relatively more savings into housing at a young age, when they are raising a family. When they have acquired sufficient housing, probably around middle age, households will allocate more savings to financial assets for retirement purposes. This assumption is supported by Mankiw and Weil,16 who found that in the United States there is a jump in housing demand by people between the ages of 20 and 30, whereas the demand tends to drop after age 40.

Finally, even if total savings do not follow the pattern of the life cycle model, the design of the RPP and RRSP programs is such that savers are required to withdraw from these plans in retirement, implying that the life cycle model is particularly applicable to RPP and RRSP savings.

On the basis of these assumptions, it can be argued that the trend in RRSP savings over the past 30 years is explained to a certain extent by demographic factors. The strong growth in the population of young adults, beginning in the early 1970s, and the passage of baby boomers through the age structure coincide with the increased and sustained demand for RRSPs during the past 30 years. This suggests the importance of the effect of the baby boom generation itself to the strong rise in RRSP savings since the 1970s. It also suggests that the aging of the population is likely to reverse that trend by 2010. Given that RRSPs generate important revenue losses for both federal and provincial governments, it is expected that the aging of the population will provide some relief to governments through a reduction in the tax expenditures associated with RRSPs.17

THE RRSP SYSTEM: SOME STYLIZED FACTS
The first private pension plans in Canada date back to at least the time of Confederation. These plans, now called RPPs, were employer sponsored and covered employees of the federal public service, railways, and some commercial banks. As RPPs gained in popularity during the 1950s, the RRSP program was introduced in 1957 to allow non-participants in employer-sponsored RPPs, such as self-employed and other paid workers, to receive tax advantages on savings for future retirement. RPP participants were also allowed to contribute to RRSPs, but at a lower maximum level.

RRSP Contribution Limits
Since the introduction of the RRSP program in 1957, several modifications have been made to enhance its accessibility. Among other changes, the maximum annual
RRSP contribution permitted for both RPP participants and non-participants was revised several times. When the program was introduced in 1957, the contribution ceiling was 10 percent of earned income, or $2,500, for RPP non-participants, and $1,500 for RPP participants (see table 1). The contribution ceiling was increased to 20 percent of earned income, in 1972. In 1991, an important amendment was made to standardize the tax treatment of all private retirement programs, with new comprehensive ceilings placed on annual savings. In 1999, contributions to RRSPs were permitted up to a comprehensive limit of 18 percent of earned income for the preceding taxation year, to a maximum of $13,500. In addition to raising the contribution ceilings on several occasions, changes in legislation periodically introduced other contribution possibilities. For example, since 1974, tax filers have been permitted to contribute to their spouses’ RRSPs and deduct the contributions from their own personal income tax.

The remainder of this section discusses RRSP contributions and assets in greater detail. In addition, it contains some discussion of the demographic changes that have occurred since the 1960s and a projection of changes in the age structure of the population.

### Contributions and Assets

Figure 1 shows annual contribution rates to the RRSP program over the period 1965 to 1999. Annual contributions remained modest in the 1960s. By 1970, they reached about 0.5 percent of total wages and salaries, equivalent to 0.4 percent of personal disposable income; they rose at a faster pace during the 1970s and 1980s. Two brief decreases in the RRSP contribution rate took place: the first in 1981 and the second in 1990, each coinciding with a recession. The decrease in the RRSP contribution rate in 1990 also coincided with the removal of most opportunities to roll over income from pension sources into tax filers’ personal RRSPs. After 1990, RRSP contributions as a share of wages and personal disposable income grew at a much faster pace, but the growth slowed in 1997 and the rate has remained virtually unchanged since. By 1999, RRSP contributions represented 6.4 percent of wages and salaries and 4.9 percent of personal disposable income.

Table 2 presents the distribution of average RRSP contributions across age groups in 1997. If plotted as shown in the table, the age distribution of RRSP

<table>
<thead>
<tr>
<th>Year of policy change</th>
<th>Individuals with RPPs</th>
<th></th>
<th>Individuals without RPPs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of earned income</td>
<td>Maximum contribution, $</td>
<td>% of earned income</td>
<td>Maximum contribution, $</td>
</tr>
<tr>
<td>1957</td>
<td>10</td>
<td>1,500</td>
<td>10</td>
<td>2,500</td>
</tr>
<tr>
<td>1972</td>
<td>20</td>
<td>2,500</td>
<td>20</td>
<td>4,000</td>
</tr>
<tr>
<td>1976</td>
<td>20</td>
<td>2,500</td>
<td>20</td>
<td>5,000</td>
</tr>
<tr>
<td>1986</td>
<td>20</td>
<td>3,500</td>
<td>20</td>
<td>7,500</td>
</tr>
<tr>
<td>1991</td>
<td>18</td>
<td>11,500 – PA(^a)</td>
<td>18</td>
<td>11,500</td>
</tr>
<tr>
<td>1999</td>
<td>18</td>
<td>13,500 – PA(^a)</td>
<td>18</td>
<td>13,500</td>
</tr>
</tbody>
</table>

\(^a\) PA is the pension adjustment and reflects the amount saved in RPPs.
**TABLE 2  RRSP Contributions by Age Group, 1997**

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of tax filers, thousands</th>
<th>Total contributions, $ thousands</th>
<th>Contribution per tax filer, $</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 25</td>
<td>2,323</td>
<td>536,600</td>
<td>231</td>
</tr>
<tr>
<td>25-34</td>
<td>3,559</td>
<td>4,733,700</td>
<td>1,330</td>
</tr>
<tr>
<td>35-44</td>
<td>4,117</td>
<td>7,815,300</td>
<td>1,898</td>
</tr>
<tr>
<td>45-54</td>
<td>3,103</td>
<td>6,876,900</td>
<td>2,216</td>
</tr>
<tr>
<td>55-64</td>
<td>1,591</td>
<td>3,410,800</td>
<td>2,144</td>
</tr>
<tr>
<td>65+</td>
<td>562</td>
<td>682,400</td>
<td>1,214</td>
</tr>
</tbody>
</table>


**TABLE 3  RRSP Contribution by Income Class, 1997**

<table>
<thead>
<tr>
<th>Income class, $</th>
<th>Number of contributors, thousands</th>
<th>Total contributions, $ millions</th>
<th>Contribution share, %</th>
<th>Average contribution, $</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10,000</td>
<td>190</td>
<td>209.2</td>
<td>0.87</td>
<td>1,101.1</td>
</tr>
<tr>
<td>10,000-20,000</td>
<td>738</td>
<td>1,297.6</td>
<td>5.39</td>
<td>1,758.3</td>
</tr>
<tr>
<td>20,000-30,000</td>
<td>1,112</td>
<td>2,630.7</td>
<td>10.94</td>
<td>2,365.7</td>
</tr>
<tr>
<td>30,000-40,000</td>
<td>1,225</td>
<td>3,876.3</td>
<td>16.11</td>
<td>3,164.3</td>
</tr>
<tr>
<td>40,000-60,000</td>
<td>1,629</td>
<td>6,931.3</td>
<td>28.81</td>
<td>4,254.9</td>
</tr>
<tr>
<td>60,000-80,000</td>
<td>695</td>
<td>4,104.5</td>
<td>17.06</td>
<td>5,905.7</td>
</tr>
<tr>
<td>80,000+</td>
<td>523</td>
<td>5,006.1</td>
<td>20.81</td>
<td>9,571.9</td>
</tr>
<tr>
<td>Total</td>
<td>6,112</td>
<td>24,055.7</td>
<td>100.00</td>
<td>3,935.8</td>
</tr>
</tbody>
</table>


Contributions in 1997 would have an inverted U shape. The contribution per tax filer averaged $231 for individuals less than 25 years old, increasing with age until about age 45-54 when it reached $2,216, and declined thereafter. Overall, this appears consistent with the life cycle pattern. Assuming that each age cohort has a similarly inverted U shape of contributions as it ages, we may expect the aging of the baby boom generation to affect the demand for RRSP savings.

Table 3 presents the distribution of RRSP contributions by income class in 1997. As shown in the table, the average contribution increases with level of income. For example, lower-income contributors with annual incomes of $10,000 or less contributed $1,100 on average, compared with $4,255 for contributors with incomes between $40,000 and $60,000, and $9,571 for individuals with annual incomes above $80,000. Moreover, the vast majority of contributors are middle- to high-income individuals. About 17 percent of all contributions were made by individuals with income below $30,000, compared with 45 percent for individuals with incomes between $30,000 and $60,000, and 38 percent for individuals with incomes above $60,000.

Figure 2 illustrates the growth of private pension assets, comparing total RRSP assets with total RPP assets accumulated over the period 1984 to 1998. Given that
the RPP program is more mature than the RRSP and is a compulsory program\textsuperscript{18} with penalties for early withdrawals, its accumulated assets have grown at a much faster pace than RRSP assets. Despite this, total RRSP assets reached $241 billion in 1998, or 27 percent of GDP; this represents 37 percent of the amount of total RPP assets in 1998, compared with only 22 percent in 1984. The sum of total accumulated RPP and RRSP assets represented 98 percent of GDP in 1998, compared with 45 percent in 1984.

**Demographic Change and Aging**

Figure 3 illustrates the bulge in the age structure in Canada since 1960 and includes demographic projections through 2050.\textsuperscript{19} The population represented includes age groups 25-34, 35-54, 55-64, and 65 and above, which are presented as a share of
the total population. The fraction of the population aged 25-34 increased sharply beginning in 1968, as the baby boom generation gradually reached adult age and entered the workforce during the 1970s. (This period also corresponds with the first increase in the RRSP contribution rate.) Amounting to nearly 14 percent of the total population in 1960, this fraction of the population reached 18.6 percent in 1989. Its share of the population has been declining ever since and, according to projections, is expected to stabilize around the year 2005.

During the mid-1980s, the baby boomers joined the 35-54 age group. As shown in figure 1, this period coincides with a rapid increase in RRSP contributions. Accounting for nearly 23 percent of the population in 1960, this age group is expected to peak as a proportion of the population in 2002, reaching 31 percent, and to gradually decline thereafter as the baby boomers move into older age groups. While it continues to age, the share of the population represented by the 55-64 age group will increase over the next decade. This should contribute to an increase in the demand for RRSPs, an effect that will be countered, however, by the declining share of younger age groups.

Finally, the age group 65 and above has gradually increased since the 1970s. Its growth rate as a share of the total population is expected to rise at a much faster pace beginning in 2010, as the baby boomers retire. This should lead to significant downward pressure on the demand for RRSPs over the next several decades.

The change in the population structure can also be illustrated by the total dependency ratio, defined as the ratio of the dependent population to the working-age population.
population. Figure 4 presents the population aged 0-19 and 65 and above as a share of the population aged 20-64. The total dependency ratio reached a record level in 1968, when the baby boomers were young dependants. As the baby boomers began entering the labour force, the total dependency ratio fell at a rapid pace until 1988, and at a slower pace during the 1990s. According to demographic projections, it will continue to fall slowly until about 2010. As the baby boomers reach retirement age, the total dependency ratio is projected to rise rapidly again. The projected total dependency ratio is not unprecedented compared with the ratio in the 1960s, but the composition of the dependent population will be radically different.

A SIMPLE MACRO MODEL OF RRSP CONTRIBUTIONS

In this section, we derive a simple macro model of RRSP contribution rates based on the life cycle model. The life cycle hypothesis rests on the proposition that consumption by the representative household reflects the desire to achieve the preferred allocation of its life resources to consumption over the life cycle. We thus begin with a simple aggregate consumption function, where consumption depends on current income, expected income trends in the future, and net worth:

\[ C_t = \alpha_1 Y_t + \alpha_2 Y_t^e + \alpha_3 W_{t-1}, \]  

where all the coefficients are positive. We can also rewrite equation 1 for the savings rate:

\[ S_t/Y_t = 1 - (C_t/Y_t) = 1 - (\alpha_2 Y_t^e/Y_t - \alpha_3 W_{t-1}/Y_t) \]  

where \( C \) is consumption, \( S \) personal savings, \( Y \) current income, \( Y^e \) expected income, and \( W \) beginning-of-period net worth. If we assume that in the long run \( Y = Y^e \), then equation 2 becomes

\[ S_t/Y_t = 1 - (\alpha_2 - \alpha_3 W_{t-1}/Y_t). \]  

According to this model, households reduce their savings if net worth improves. This simple model of personal savings can be extended to a model of RRSP savings. In the case of RRSP savings, however, in addition to wealth, several other factors are important to consider: the composition of the wealth, the return to savings, demographic factors, membership in other pension plans, cyclical factors, and institutional changes.

Financial Versus Housing Wealth

In the standard model of savings, an increase in wealth increases lifetime income, which increases consumption and reduces aggregate savings. However, an agent’s behaviour with regard to retirement savings also depends on the composition of
the wealth. In particular, we must distinguish between financial and housing wealth. Retired people do not generally decumulate housing wealth to finance their consumption. They will most likely keep the same level of housing during retirement, until they become ill and lose autonomy; then they decumulate financial wealth to finance consumption. In addition, as indicated by Bakshi and Chen, the greater the housing wealth, the greater the probability of having acquired sufficient housing. This in turn should stimulate the demand for retirement savings, implying that housing wealth net of mortgage debt should be positively correlated to the demand for RRSP savings, while financial wealth should be negatively correlated to the demand for RRSP savings.

**The Net Return to RRSP Savings**

The impact of the return to savings has an indeterminate effect on RRSP savings, because it reflects the influence of a substitution and income effect. On the one hand, an increase in the rate of return to savings raises the level of welfare forgone if one consumes, increasing the incentive to save. On the other hand, the increase in the net return to non-human wealth increases lifetime income, which in turn increases consumption. The recent evidence from Fougère and Mérette, Lamy, and Beach, Boadway, and Bruce for Canada indicates that the substitution effect dominates the income effect, implying that a rise in real interest rates reduces real consumption and increases personal savings.

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**FIGURE 4 Total Dependency Ratio, 1961-2050**

Note: The total dependency ratio is defined as the ratio of the population aged 65+ plus the population aged less than 20 to the population aged 20-64.
A rise in real interest rates increases the return to savings and can be expected to stimulate the demand for both RRSPs and other forms of savings. Also, as mentioned in the introduction to this article, RRSPS provide a tax break on contributions and accumulated interest, but both principal and accumulated earnings are taxable upon withdrawal. Therefore, for a contributor, the benefit depends on the marginal tax rate at the time of the contribution and during the period before withdrawal, when the interest accumulates tax-free, while the cost depends on the marginal tax rate at the time of withdrawal. To capture the net return to RRSP savings, we incorporate the average marginal tax rate as a proxy. An increase in the marginal tax rate is expected to increase the incentive to save through RRSPs.

The issue of the substitution effect and the related question of whether tax-deferred savings represent new savings have been subject to debate in recent years. According to Poterba, Venti, and Wise, tax-deferred savings generate a substitution effect that stimulates private savings. However, Engen, Gale, and Scholz challenge this view, arguing that tax-deferred savings simply replace other forms of existing savings. In a theoretical paper, Ragan examines the substitution effect of RRSPs in the context of a progressive income tax system with taxable capital income. According to Ragan’s argument, when an RRSP is introduced, the rate of return on marginal savings within the RRSP is driven to equality with the rate of return to non-RRSP savings. Since RRSP contributions redistribute taxable income across periods, they increase future marginal income tax rates, thus reducing the after-tax return to savings.

In a more recent paper, Ragan recommends the abolition of RRSPs, claiming that they do not increase the overall amount of savings in the economy. The only people who can increase their savings level through RRSPs are Canadians who do all their saving with RRSPs and have not reached their contribution limit. The substitution effect might induce them to greater savings than otherwise, since such people do not face full taxation of their savings at the margin. However, there may simply not be sufficient Canadians in the position to thus increase aggregate savings.

Finally, Veal uses the 1988 federal personal income tax reform, which led to significant changes in marginal personal income tax rates for some individuals, as a natural experiment to test whether these tax changes affected RRSP contributions. He finds no convincing evidence that the tax rate changes affected the demand for RRSPs. Conversely, Milligan finds that taxes play a small but positive role in the decision to contribute to an RRSP.

Therefore, on the basis of the evidence, we can only conclude that the net return to RRSP savings has an indeterminate effect on RRSP savings.

**Demographic Factors**

As indicated earlier, an increase in the relative size of the working-age population is expected to lead to increased RRSP participation. The greater the proportion of middle-aged and older workers, the greater will be the savings in the form of RRSPs. By contrast, an increase in the proportion of retired people should lead to downward pressure on retirement savings.
RPP and CPP/QPP Savings

Membership in an RPP provides assurance of a pension income and reduces the need to contribute to an RRSP. However, many savers treat both types of savings as complementary, for many RPP members choose to supplement these savings by also contributing to RRSPs. In fact, middle- and higher-income earners with an employer pension plan are those most likely to contribute to an RRSP. In 1997, for example, the number of tax filers with incomes of at least $40,000 who saved through both RPPs and RRSPs was more than three times the number of tax filers of similar income level without an RPP who contributed to an RRSP. Also, as shown in table 3, the vast majority of RRSP contributors are middle- to high-income individuals. Moreover, it can be argued that since RRSPs are a more flexible savings vehicle than defined benefit RPPs, increased RRSP contributions may over time represent a substitution away from RPPs—that is, a form of asset switching rather than actual new savings. However, since about 90 percent of RPP members are in compulsory membership plans, the asset-switching effect is likely to be small.

Moreover, as part of the three-tier Canadian pension program, the Canada and Quebec Pension Plans (CPP/QPP) are mandatory public pension programs, financed through contributions shared between employees and employers. Until 1997, the CPP/QPP programs were virtually pay-as-you-go programs with the exception of a small fund of two years’ worth of benefits. The CPP/QPP programs were reformed in 1998 to increase the reserve fund over a six-year period to provide about five years of benefits. The maximum annual pension, which was $520 in 1970, is currently $8,664, representing a 354 percent increase in constant dollars. Since these programs also provide an assured pension income, an increase in expected future benefits should reduce the need to save through RRSPs and be negatively correlated to contributions.

Cyclical Factors

In periods of economic downturn, the probability of being unemployed increases and the demand for RRSPs is likely to decline, since unemployed workers have lower incomes and less contribution room. In addition, for employed workers, a period of economic slowdown or recession increases uncertainty with regard to future employment. Therefore, households are more likely to substitute precautionary savings for retirement savings and tend to save less through RRSPs, keeping their new savings in bank accounts, for example. In fact, as shown in figure 1, the two episodes of decline in the RRSP contribution rate coincide with the 1981-1982 and 1990-1991 recessions.

There are various ways to measure the state of the economy. Our preferred approach is to use a measure of the job offer rate, which provides an indication of changes in the demand for labour.

Institutional Changes

Finally, several modifications have been made to the RRSP program since its introduction in 1957 that may have attracted new contributors to the program.
Among the major modifications are the following: the change in contribution limits as a percent of earned income; the 1974 amendment that allowed tax filers to contribute to their spouses’ RRSPs; and the 1991 amendment that standardized the tax treatment of private pension plans. This last measure was followed by rapid growth in RRSPs.

**EMPIRICAL ANALYSIS**

In this section, we estimate the RRSP contribution rate model using ordinary least squares (OLS) with annual data for the period 1967 to 1997.  

We define the dependent variable as the ratio of annual RRSP contribution, $S_{RRSP}$, to personal disposable income, $Y$. It is regressed against the ratio of net financial wealth, $W_f$, to personal disposable income; the ratio of net housing wealth, $W_h$, to personal disposable income; the ratio of total RPP contributions, $S_{RPP}$, to personal disposable income; the ratio of total CPP/QPP contributions, $S_{CPP}$, to personal disposable income; a real long-term interest rate, $\rho$; a proxy for the job offer rate, $J_{or}$; the average marginal personal income tax rate, $\tau$, a set of demographic variables; and some dummy variables that capture the possible effect of institutional changes on the demand for RRSPs.

There is a possibility that some of the right-hand variables are not exogenous to the model. If that were the case, then the use of OLS would be inappropriate to estimate the equation for the RRSP contribution rate. The regressors would be correlated with the error term and would lead to least square bias. For example, there is a possibility that both the financial and housing wealth variables are endogenous to the model. In this context, these variables and the dependent variable could be affected by a common shock, such as a change in the return to equity and in inflation. Under this circumstance, the use of instrumental variables would be more appropriate. However, since it is difficult to find good instruments, the problem may not easily be resolved with this alternative method of estimation. To test for the possibility of endogenous right-hand variables, both a variable on the return to equity (the earnings-price ratio) and a variable on the annual inflation rate were included in the model in preliminary testing. Their inclusion had no significant impact on the results, and the variables were not significantly different from zero. Also, Bovenberg and Evans and Montgomery, who estimated savings rate equations, had a similar potential problem, but they used OLS as the estimation method. Finally, it must be noted that the wealth variables used in the RRSP contribution equations are lagged, which greatly reduces the risk of their being endogenous to the model.

**Data**

Net financial wealth is defined as total financial assets of persons and unincorporated businesses minus total financial liabilities (it includes RRSP and RPP wealth). Net housing wealth is total housing wealth minus net mortgage payments. Both series are available from the National Balance Sheet. Total RPP and CPP/QPP contributions include both employee and employer contributions. Data on RPPs are found
in *Quarterly Estimates of Trusteed Pension Funds*,\(^37\) while CPP/QPP contributions are available from the *National Income and Expenditure Accounts*.\(^38\) The series for RRSP annual contributions are from *Tax Statistics on Individuals*.\(^39\)

To capture the effect of the net return to RRSPs, we include both a real interest rate and a measure of the marginal tax rate. The real interest rate variable is after tax and defined as \(r(1 - \tau) - \pi_e\), where \(r\) is the nominal long-term interest rate. We use the yield on 10-year-and-over government of Canada bonds.\(^40\) The variable \(\pi_e\) is expected inflation and is approximated by the annual global inflation rate taken from the Consumer Price Index,\(^41\) lagged one year. The calculation for measuring the average marginal personal income tax rate in Canada is based on the method of Davies and Zhang,\(^42\) and the measure used is weighted by total income.

To account for the benefits associated with the net tax break for RRSP contributors, we incorporate the average marginal personal income tax rate as a separate variable. An increase in the marginal tax rate is expected to strengthen the incentive to save through RRSPs. However, although the measure accounts for the marginal tax rate in the year of contribution, it does not capture well the expected marginal tax rate in the year of withdrawal. The latter rate is more difficult to measure, because it depends on the expected income stream during the remaining life of the individual. Therefore, the estimated impact of \(\tau\) on \(S_{RRSP}\) must be interpreted with some caution.

The model also incorporates a measure of the job offer rate, which we define as the ratio of the Help Wanted index to total employment. This indicator is used to capture changes in the demand for labour.

The effects of demographic change are measured with two alternative sets of variables. The first set is the share of the population aged 25-34, \(P_{25-34}\); 35-54, \(P_{35-54}\); 55-64, \(P_{55-64}\); and 65 and above, \(P_{65+}\). The second is the total age/dependency ratio, \(Agedep\).

When we use econometric methods with time series, we have to be careful about the possibility of spurious regressions if economic time series exhibit non-stationary tendencies. To test for the presence of a unit root, we have applied the augmented Dickey-Fuller (ADF) and Philip-Perron tests to the series. Overall, according to the stationarity tests, we cannot reject the possibility that the series are stationary in logarithm form (a more detailed discussion is presented in appendix A). However, we reject stationarity in level form for some of the variables, such as \(S_{RRSP}/Y\). This implies that the appropriate mathematical form to use for the empirical equation is the logarithm form.

The other two standard problems we face when estimating time-series econometric models arise from the possibility of heteroscedasticity and autocorrelation\(^43\) of the error term, which reduce the power of the \(t\) statistics. Appendix B reports specification tests for the possible presence of heteroscedasticity and autocorrelation in the regressions.

**Regression Results and Simulations**

The results are presented in table 4. Columns 4-1 to 4-5 show the estimation results with the detailed population share variables. Column 4-1 includes all the
variables with the exception of the institutional dummy variables. Column 4-2 excludes the CPP/QPP contribution rate and real interest rate variables, and column 4-3 excludes the two wealth variables. Columns 4-4 and 4-5 include two dummy variables to capture the possible effect of regime changes on the demand for RRSPs.

According to the results in column 4-1, the corrected $R^2$ has a value of 0.99, which indicates a very good fit of the regression, and the Durbin-Watson statistic ($DW$) does not denote the presence of autocorrelation. All the coefficients have the expected effect on RRSP contributions, except for the real long-term interest rate, which has the wrong sign. Its effect is also not significantly different from zero. The results indicate that an increase in the share of the working-age population stimulates the demand for RRSPs, and that this effect increases with age. Also, not surprisingly, an increase in the fraction of the population 65 and above reduces the demand for RRSPs.

An improvement in economic conditions, reflected by a healthier labour market, also stimulates the demand for RRSPs. An increase in the average marginal personal income tax rate is found to stimulate the demand for RRSPs as well; this supports the views of Poterba, Venti, and Wise and of Beach, Boadway, and Bruce. However, the effect is small, because a 10 percentage point increase in the marginal tax rate would increase the RRSP contribution rate by only 4 percent. In addition, an increase in RPP contributions is followed by an increase in RRSP contributions, possibly resulting from the complementary aspect of both programs rather than from asset-switching effects. By contrast, the CPP/QPP programs reduce incentives to save through RRSPs, because an increase in contributions is associated with a fall in the demand for RRSPs. However, according to the $t$ statistic, the effect is not significantly different from zero. Finally, as expected, an increase in net financial assets reduces incentives to save through RRSPs, and an increase in net housing wealth increases the demand for RRSPs, providing some support for the assumption made by Bakshi and Chen, although the effects are not significantly different from zero.

Excluding the CPP/QPP contribution rate and real interest rate variables from the regression, as in column 4-2, alters the other results only marginally. In particular, the effect of the demographic variables remains virtually the same. In addition, excluding the two wealth variables does not have a large effect on the results (column 4-3).

In column 4-4, we have added $Q_{91t}$, a time trend beginning in 1991 and equal to zero before 1991. It is included to capture the significant changes made to contribution ceilings in 1991, which may have had a positive effect on the growth of RRSP contributions. As shown in the results, the variable is not significantly different from zero, as indicated by the $t$ statistic. In column 4-5, we have added $C_{lim}$, the RRSP contribution limit as a percentage of earned income. The variable is highly significant, suggesting that the change in contribution ceilings that occurred in 1972 contributed to the increase in the demand for RRSPs. However, the marginal tax rate variable becomes insignificant when $C_{lim}$ is introduced into the model.
This raises the possibility that the marginal tax rate rather than the incentive effect of the tax break captures the effect of $C_{lim}$. Also, the dummy variable $Q_{74on}$ (not shown in the table), equal to one from 1974 to 1997 and zero otherwise, was added to capture the fact that since 1974 tax filers are able to contribute to their spouses’ RRSPs and to claim the contributions on their own tax returns. However, the effect

### TABLE 4 Empirical Estimates of the RRSP Contribution Rate Equation, 1966-1997

<table>
<thead>
<tr>
<th>Variables</th>
<th>4-1</th>
<th>4-2</th>
<th>4-3</th>
<th>4-4</th>
<th>4-5</th>
<th>4-6</th>
<th>4-7</th>
<th>4-8</th>
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<td>Constant</td>
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<td>$\log(W_{ft−1}/Y_t)$</td>
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<td>−1.04</td>
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<td>−0.33</td>
<td>1.83</td>
<td>−0.25</td>
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<td>$Q_{74on}$</td>
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<td>$\tau_t$</td>
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<td>0.045</td>
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<td>0.070</td>
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<td>$\log(S_{\text{RPP},t}/Y_t)$</td>
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<td>$\text{Agedep}, t$</td>
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<td>—</td>
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<td>−2.47</td>
<td>−1.81</td>
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<td>$P_{2534}, t$</td>
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<td>47.2</td>
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<td>$P_{65+}, t$</td>
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<td>−83.5</td>
<td>−84.1</td>
<td>−80.2</td>
<td>−62.7</td>
<td>—</td>
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<tr>
<td></td>
<td>(−2.3)</td>
<td>(−2.4)</td>
<td>(−2.4)</td>
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<tr>
<td>$Q_{94t}t$</td>
<td>—</td>
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<td>0.11</td>
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<td>(4.3)</td>
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<tr>
<td>$C_{lim}, t$</td>
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<td>—</td>
<td>—</td>
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<td>—</td>
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<td>$R^2$</td>
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<td>0.99</td>
<td>0.99</td>
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<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
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<tr>
<td>$DW$</td>
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<td>1.95</td>
<td>2.0</td>
<td>2.0</td>
<td>2.33</td>
<td>2.3</td>
<td>1.80</td>
<td>1.40</td>
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</tbody>
</table>

*a t statistics are in parentheses.*
of the dummy variable is not significantly different from zero, and the coefficient has the wrong sign.

By contrast to the previous results, inclusion of the variable $Q_{91t}$ along with the total age/dependency ratio (column 4-7) suggests that the amendments made to standardize the tax treatment of all private retirement programs in 1991 had a significant positive impact on the growth rate of RRSP contributions. However, this result must be interpreted with care, since another possibility is that the time trend is simply picking up some of the effects of the more detailed age composition variables. Also, despite the inclusion of $C_{lim}$, the effect of the marginal tax rate variable remains significant, suggesting that changes in both the contribution limit and the marginal tax rate can influence the demand for RRSPs. Finally, excluding the two wealth variables from the model does not significantly alter the results, with the exception that according to some statistical tests, the predictive power of the model deteriorates slightly (see appendix B for details).

We have used two models to isolate the contribution of demographic changes to the demand for RRSPs over the past 30 years. For convenience, model 1 refers to the regression result of column 4-2 in table 4, while model 2 corresponds to the result of column 4-7. In the exercise, we have maintained the population shares and the total age/dependency ratio constant to their 1966 levels and simulated over the 1966-1997 period. However, this exercise must be interpreted with some care and considered a partial analysis, since it ignores the strong possibility that demographic changes also affect the other variables in the model. The simulation exercises are reproduced in figures 5 and 6, along with the in-sample forecast of RRSP contributions of models 1 and 2.

Both models are good predictors of the evolution of RRSP contributions since 1966. In addition, the simulations with the demographic variables held constant provide some striking results. According to the simulations, we can attribute most of the rise in the RRSP contribution rate since the late 1970s to the aging of the baby boom generation. In fact, both models suggest that with constant demographics, RRSP savings would have remained around 1 percent of personal disposable income rather than approaching 5 percent in 1997.

**Interpretation of Results**

This exercise indicates that factors such as rate-of-return effects and the enrichment of the program through time had a small effect on RRSP participation. This is consistent with the finding by Milligan that increases in the marginal tax rate could explain only 5.1 percent of the increase in RRSP participation between 1982 and 1996. Instead, our model suggests that the popularity of the program can be explained to a large extent by demographic changes. The model also controls for the possibility of asset-switching effects from RPPs to RRSPs; despite any asset switching, demographic factors remain dominant in the determination of RRSP contributions.

As indicated in figures 5 and 6, in the absence of the shock of the baby boom, RRSP contributions would have likely remained around 1 percent of personal
FIGURE 5  RRSP Contribution Rate, 1966-1997, Model 1

FIGURE 6  RRSP Contribution Rate, 1966-1997, Model 2
disposable income, on average, over the past 30 years. The results also suggest that the aging of the baby boom generation will continue to drive RRSP contributions upward over the next several years, as this cohort moves into the 55–64 age group. However, as baby boomers gradually retire, annual contributions will significantly drop as a proportion of income until the population growth rate reaches a new steady state. On the basis of the simulation exercises, RRSP contributions could decrease by a few percentage points as a share of personal disposable income.

A decrease of such magnitude in RRSP contributions would have important positive implications for PIT revenue by reducing governments’ tax expenditure associated with the deduction of RRSP contributions. The average marginal PIT rate of RRSP contributors was around 39 percent in 1997. Each additional 1 percentage point decline in the RRSP contribution rate would represent 0.39 percent of personal disposable income, equivalent to $5 billion in 1997, corresponding to a $2 billion gain in tax revenue. In addition, a substantial decline in RRSP contributions would also reduce the rate of accumulation of RRSP assets, which in turn would lower the tax expenditure associated with the non-taxation of accrued interest. Finally, we must consider the fact that as baby boomers retire and begin to withdraw their RRSPs, the revenue gains associated with the taxation of withdrawals should rise sharply and bring governments additional tax revenue.

RPPs and Demographics

It can be argued that if these findings are true for RRSPs, RPPs should have grown at approximately the same pace over the past 30 years. However, as shown in figure 7, RPP contributions have fluctuated between 2 and 3 percent of personal disposable income since the early 1970s.

Despite this apparently distinct path, it can be shown that RPP contributions are also age related, with average contribution per tax filer increasing with age and decreasing rapidly after age 55 (see table 5). Also, as can be seen in figure 2, RPP assets have grown much faster than RRSP assets, at least since 1984. This may look surprising given that RRSP contributions have grown faster than RPP contributions. However, the change in asset levels is not only determined by annual contributions but also by withdrawals and by investment income. If we first look at withdrawals, we see a high level of early RRSP withdrawals, representing 54 percent of total RRSP withdrawals in 1995, for example, compared with only 6 percent for RPPs. This contributes to slowing the accumulation of RRSP assets. Moreover, since RPP assets are much greater than RRSP assets, RPP interest accumulates at a faster pace. As indicated in Tax Expenditures and Evaluations 2000, the tax expenditure associated with investment income was 156 percent larger for RPPs than for RRSPs in 1996. This implies that the annual level of RPP investment income is proportionally greater than the level of RRSP investment income. This suggests that although demographic factors may play a role in the determination of RPP contributions, wealth effects may have more than offset demographic changes by reducing the need to contribute to RPPs.
To test this hypothesis, we have also estimated two models for RPP contributions with OLS. In the first model, we have regressed the RPP contribution rate on net financial wealth, the population share variables, the RRSP contribution rate, the real long-term interest rate, the average marginal personal income tax rate, and \( Q_{91t} \). (The results are presented in appendix C.) The second model replaces the population share variables by the total age/dependency ratio. The results in both models support the view that demographic factors are an important determinant of RPP contributions, as the demand for RPPs is reduced either by an increase in the proportion of the population aged 35-54 and 55-64, or, alternatively, by a decrease in young and old dependants relative to the working-age population. However, the demand for RPPs is less sensitive than the demand for RRSPs to demographic factors.

The results also support the view that net financial assets are an important determinant of RPP contributions. In particular, the models suggest that the rapid growth in net financial assets created strong disincentives to save through RPPs, despite the shock of the baby boom generation. The models also confirm that there is some degree of asset switching from RPPs to RRSPs. Indeed, an increase in the RRSP contribution rate has a small negative impact on RPPs. Asset switching, however, does not seem to have dominated movements in RPP contributions.
Finally, it can be shown that these models are good predictors of the evolution of RPP contributions since 1966.

**CONCLUSION**

In this article, we have explored the extent to which the popularity of the RRSP program since the 1970s is explained by demographic change. We have estimated an econometric equation of RRSP contributions and incorporated the population age structure among the potential determinants. Our key finding is that the shock of the baby boom has indeed been largely responsible for the rapid growth of RRSP savings since the mid-1970s, leaving little room for the rate-of-return effect and the enrichment of the program through time to explain the program’s popularity.

On the basis of these results, we can anticipate that when baby boomers retire over the next several years, RRSP savings will fall, perhaps even gradually returning to levels reached during the 1970s as a proportion of income. This in turn will have implications for PIT revenues. Taking all the elements together, we can anticipate that over the next several decades, net government tax expenditure associated with RRSPs will decrease as a proportion of total PIT revenues. The positive effect on government finances will partly offset rising pressures coming from health expenditures and public pension benefits in an aging society.

**APPENDIX A  STATIONARITY TESTS**

As mentioned in the empirical analysis, when we use econometric methods to test economic relationships, we have to be concerned about the possibility of spurious co-movements between variables. Spurious regressions arise because many economic time series exhibit non-stationarity (that is, they have a unit root). For example, spurious regressions are likely to occur when the $R^2$ is greater than the $DW$ statistic. To check for the presence of a unit root, we have applied the augmented Dickey-Fuller (ADF) and Philip-Perron tests to the series. It must be noted, however, that stationarity tests are generally not very powerful in finite sample, meaning that the

| TABLE 5  RPP Contributions by Age Group, 1997 |
|-----------------|-----------------|-----------------|
| Age             | Number of tax filers, thousands | RPP$^a$, $ thousands | Contribution per tax filer, $ |
| < 25            | 2,323            | 215,600         | 93 |
| 25-34           | 3,559            | 3,148,400       | 885 |
| 35-44           | 4,117            | 6,686,900       | 1,624 |
| 45-54           | 3,103            | 6,662,000       | 2,147 |
| 55-64           | 1,591            | 2,049,900       | 1,288 |
| 65 +            | 562              | 70,200          | 125 |

$^a$ Amount estimated by use of the pension adjustment.

variables may be I(0) but the tests not powerful enough to reject the hypothesis that they are I(1). For that reason, the results must be interpreted with care. In our selection criteria, we assume that the series are stationary or trend stationary, if at least one of the two tests rejects the presence of a unit root.

According to our examination of the series, we cannot reject in most cases the hypothesis that the series are stationary in logarithm form, with the exception of the two wealth-to-income series, $W_f/Y$ and $W_h/Y$ (see table A1). However, the presence of these two variables in the model is well supported by the theory and may well be important in the specification. Therefore, to avoid the possibility of a misspecification bias, we have kept the two wealth variables in the model, but, alternatively, we estimate the model without these variables to test the sensitivity of the results.

In addition, some of the key variables, such as $S_{RRSP}/Y$, are found to be non-stationary in level form. This result implies that the series must be transformed in logarithm form for the estimation.

### APPENDIX B SPECIFICATION TESTS

In addition to the $R^2$ and $DW$ statistics, we have also applied the Lagrange multiplier ($LM$) to test for the presence of serial correlation and the Arch test to check for the possibility of heteroscedasticity in the error term. Along with these statistics, we also present the standard error of the regression, $\sigma$, and the sum of square residual, SSR. The test results are shown in table A2.

Overall, the $LM$ test rejects the presence of serial correlation, with the exception of the result in column 4-8 at a 7 percent probability value. The Arch test does not detect the presence of heteroscedasticity. Finally, $\sigma$ and SSR suggest that the regression results in columns 4-7 and 4-5 minimize the in-sample forecast error for the RRSP contribution rate.

### TABLE A1 Stationarity Tests

<table>
<thead>
<tr>
<th>Period</th>
<th>ADF</th>
<th>Philip-Perron</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\log(S_{RRSP}/Y)$</td>
<td>1965-1999</td>
<td>3.3$^b$</td>
</tr>
<tr>
<td>$S_{RRSP}/Y$</td>
<td>1965-1999</td>
<td>1.6</td>
</tr>
<tr>
<td>$S_{RRSP}/Y$</td>
<td>1970-1999</td>
<td>1.0</td>
</tr>
<tr>
<td>$\log(S_{RRSP}/Y)$</td>
<td>1965-1999</td>
<td>2.8$^c$</td>
</tr>
<tr>
<td>$\log(W_f/Y)$</td>
<td>1970-1999</td>
<td>3.6$^b$</td>
</tr>
<tr>
<td>$\log(W_h/Y)$</td>
<td>1960-1998</td>
<td>0.3</td>
</tr>
<tr>
<td>$\tau$</td>
<td>1960-1999</td>
<td>3.2$^b$</td>
</tr>
<tr>
<td>$\log(S_{QPP}/Y)$</td>
<td>1966-1999</td>
<td>2.6$^c$</td>
</tr>
<tr>
<td>$\tau$</td>
<td>1965-1997</td>
<td>3.6$^a$</td>
</tr>
</tbody>
</table>

$^a$ Non-stationarity rejected at a 1 percent critical level.

$^b$ Non-stationarity rejected at a 5 percent critical level.

$^c$ Non-stationarity rejected at a 10 percent critical level.
APPENDIX C  RPP CONTRIBUTION RATE EQUATION

Estimation Period: 1965 to 1997

Model 1
\[
\log(S_{RRPP}, t/Y_t) = -2.2 - 2.63 \log(W_{t-1}/Y_{t-1}) + 0.017 \rho_t + 1.52 \tau_t - 0.11 \log(S_{RRSP}, t/Y_t) + 0.017 \rho_t + 1.52 \tau_t - 0.11 \log(S_{RRSP}, t/Y_t)
\]
\[
+ 7.4P_{3554}, t + 14.9P_{5564}, t + 0.10Q_{91t}, t
\]
\[
(3.8) (2.6) (6.8)
\]
\[R^2 = 0.95 \quad DW = 1.73\]

Model 2
\[
\log(S_{RRPP}, t/Y_t) = 0.24 - 2.41 \log(W_{t-1}/Y_{t-1}) + 0.019 \rho_t + 2.03 \tau_t - 0.18 \log(S_{RRSP}, t/Y_t)
\]
\[
(0.4) \quad (-9.0) \quad (2.9) \quad (2.2) \quad (-2.1)
\]
\[-0.84Agedep_t + 0.127Q_{91t}, t
\]
\[
(-4.4) \quad (8.9)
\]
\[R^2 = 0.95 \quad DW = 1.78\]

\(a\) t statistics are in parentheses.

NOTES

1 For a comprehensive survey of the Canadian and US literature on the savings effects of tax-assisted savings plans, see G.C. Ruggeri, Tax-Based Saving Incentives and Public Policy in Canada, Working Paper Series no. 2000-04 (Fredericton: University of New Brunswick, Department of Economics, 2000).

2 See Canada, Department of Finance, Tax Expenditures and Evaluations 2000 (Ottawa: Department of Finance, 2000).

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11 Supra note 4.

12 Supra note 10.


17 The same argument holds for the tax expenditure associated with RPPs.

18 Data from the survey of Canadian pension plans indicates that in early 1997, 90 percent of RPP members belonged to plans with compulsory membership. See Statistics Canada, Pension Plans in Canada, catalogue no. 74-401.

19 The projections are based on the United Nations median demographic projection for Canada.
20 Supra note 15.
21 Supra note 4.
22 Supra note 8.
23 Supra note 9.
24 Daly has developed a life cycle model that incorporates two types of savings, tax-deductible RRSPs and non-tax-deductible savings. It can be shown from that model that tax-deductible RRSP savings enable agents to do lifetime income averaging for tax purposes to minimize the discounted value of tax payments. See Michael J. Daly, “The Role of Registered Retirement Savings Plans in a Life-Cycle Model” (1981) vol. 14, no. 3 The Canadian Journal of Economics 409-21.
31 See Statistics Canada, Retirement Savings Through RPPs and RRSPs, 1991-1997, catalogue no. 74F0002XIB.
32 See supra note 5.
33 The regression ends in 1997 because of the lack of information to calculate $\tau$ in 1998 and 1999.
34 Lars A. Bovenberg and Owen Evans, “National and Personal Saving in the United States” (1990) vol. 37, no. 4 International Monetary Fund Staff Papers 636-69.
36 Statistics Canada, National Balance Sheet, catalogue no. 13-214-XPB.
37 Statistics Canada, Quarterly Estimates of Trusteed Pension Funds, catalogue no. 74-001-XPB.
38 Statistics Canada, National Income and Expenditure Accounts, catalogue no. 13-201-XPB.
39 Revenue Canada, Tax Statistics on Individuals (Ottawa: Revenue Canada, various years).
40 From the periodical Bank of Canada Review.
41 Statistics Canada, The Consumer Price Index, catalogue no. 62-001-XPB.
43 The problem of heteroscedasticity occurs when the variance of the error term is not constant. Autocorrelation means that the error term in one period is correlated with the error term in the preceding period.
44 Since the marginal tax rate appears in the real after-tax interest rate variable and as a separate variable, it can be argued that this introduces multicollinearity in the equation and makes the
rate-of-return variable insignificant. To verify this, the equation was re-estimated by removing
the marginal tax rate variable and by keeping the real after-tax rate in the equation. Also,
alternatively, a nominal interest rate and a before-tax real rate variable were included to replace
the real after-tax rate. In all cases, the interest rate variable remained negative and not
marginally different from zero.

45 Supra note 25.
46 Supra note 9.
47 Supra note 15.
48 A dummy variable equal to one from 1991 to 1997 and zero otherwise, not shown in table 3,
was also tested to see whether the changes made in 1991 raised the level of contributions rather
than the growth. Its effect turned out to be insignificant.
49 Supra note 30.
50 This is calculated using the federal tax expenditure of $6.5 billion on RRSP contributions, plus
52 percent of this amount to approximate the provincial equivalent in tax expenditure, divided
by RRSP contributions from taxable returns of $24.7 billion. Data are taken from Revenue
51 Early withdrawals are defined here as withdrawals made before age 55.
53 Supra note 2.