Université de Montréal

« Retirement Savings of Canadian Households : an Econometric Analysis for 1992 and 1996»

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Mémoire présenté à la faculté des études supérieures
En vue de l'obtention du grade de
Maître ès Sciences (M.Sc.)
En Sciences Économiques

Août,1999

Université de Montréal
Faculté des études supérieures

Ce mémoire intitulé :

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a été évalué par un jury composé des personnes suivantes :

Mémoire accepté le :

SUMMARY

In Canada taxpayers have an opportunity to save on their taxes through a program entitled the Registered Retirement Saving Plan, one of the most important tax deferred savings vehicles offered. RRSPs were first introduced in Canada in 1957. The contribution limits were increased substantially in the early 1970s, and RRSPs were widely promoted. Since then, they have become a prominent form of Canadian saving. RRSP contributions now exceed the total of employee and employer contributions to employer-provided pension plans (Revenue Canada, Tax Statistics on Individuals, Edition 1998). The RRSP option is especially attractive considering that the Canada Pension Plan, historically responsible for providing retirement benefits to all Canadians over age 65 when they retire, is in a precarious situation due to demographic changes. These factors would have us believe that a large number of Canadians take advantage of the RRSP program to save on their taxes, as well as to assure their old ages with a sufficient level of wealth. In fact, only one-third of Canadian families who had access to the RRSP option contributed to such a plan in 1997 (Globe and Mail, March 1998, Calculations using data from Statistics Canada).

This paper describes a model for predicting the outcome of the RRSP decision-making process for households. In this paper, we will explore a two-equation model for estimating households' behavior toward the decision to contribute in a RRSP and the amount of contribution. Our approach will integrate two groups of characteristics of households : one being demographic with age, gender, family

size, location, education, and marital status and the other being financial with income, pension, debt and non liquid assets. We expect our empirical results to be consistent with previous researches based on the Individual Retirement Account (IRA), the American *alter ego* of the Canadian Registered Retirement Saving Plan (RRSP).

The main purpose of this paper is to develop a model that demonstrates a framework of Canadian households' behavior regarding their decisions to contribute to their own retirement wealth. It is still very early to draw conclusions about the households decisions and behaviors because the government is still very present as a source of retirement income. However, it is helpful to observe contemporary trends in order to determine the means of improving the information given to the general population regarding RRSPs.

RÉSUMÉ FRANÇAIS

Ce mémoire de maîtrise, intitulé « Retirement Savings of Canadian Households : an Econometric Analysis for 1992 and 1996 », étudie la situation de l'épargne retraite au Canada. Plus spécifiquement, nous effectuons une analyse économétrique à deux étapes sur la décision de contribuer à un régime enregistré d'épargne retraite et, le cas échéant, sur le montant de la contribution effectuée. Au Canada, les payeurs d'impôt se voient offerte la possibilité de sauver de l'impôt en contribuant à un Régime Enregistré d'Epargne Retraite (REER), et ce, depuis son introduction en 1957. Les limites de contribution permises furent considérablement augmentées au début des années soixante-dix, ce qui contribua largement à promouvoir les REER. Depuis, ils sont devenus l'une des plus importantes formes d'épargne au Canada. Les contributions faites à un REER excèdent maintenant le nombre total de contributions faites par les employés et leurs employeurs dans des plans de retraite financés par les employeurs.

Ce mémoire est divisé en trois sections principales. Une brève revue de l'historique de la retraite et des programmes d'épargne retraite actuellement offerts aux canadiens est présentée en première partie. La deuxième partie intitulée 'revue de littérature', présente une revue de quatre études portant sur les contributions faites dans un programme d'épargne retraite aux Etats-Unis. Notre modèle économétrique ainsi que les résultats empiriques sont introduits en

troisième partie. Principalement, un modèle d'évaluation du processus de prise de décisions des ménages est présenté. Une méthode d'estimation des comportements des ménages à l'égard de leur décision de participer ou non a un REER et du montant de leurs contributions est développée.

Premièrement, il est important de mentionner que l'épargne retraite est un concept relativement nouveau. Historiquement, les personnes âgées étaient prises en charge par des membres de leur famille. L'urbanisation de la société ainsi que la diminution de la taille des familles firent en sorte que les gens se tournèrent de plus en plus vers les gouvernements pour une assistance à la retraite. Les gouvernements répondirent par l'établissement de différents programmes de support aux revenus des retraités. Les individus désirant prendre leur retraite plus tôt que l'âge prescrit par les gouvernements ou désirant jouir d'un revenu supérieur à celui assuré par les plans gouvernementaux de retraite ont maintenant l'opportunité de contribuer à des plans de pension privés. Nous nous sommes intéressés, dans cette étude, aux comportements des individus face à cette possibilité d'augmenter leur revenu à la retraite.

De plus, nous présentons en première partie les différents programmes privés et publics d'épargne retraite auxquels les Canadiens ont accès. Pour les Canadiens, le revenu à la retraite provient généralement de trois sources : de programmes gouvernementaux, du Canadian Pension Plan ou Régime des Rentes du Québec, ou de sources privées. Les programmes gouvernementaux

(Sécurité de la Vieillesse, Supplément de Revenu Garanti et Allocation au Conjoint) sont des programmes sociaux financés par les gouvernements et payant des bénéfices à tous les individus âgés de 65 ans et plus. Le Canadian Pension Plan et le Régime des Rentes du Québec sont également des programmes gouvernementaux assurant, quant à eux, un revenu à la retraite ainsi que des bénéfices en cas de décès ou d'invalidité à tous les individus payant des prestations. Ces derniers plans couvrent tous les travailleurs âgés de 18 à 70 ans ayant des revenus d'emploi. De moins de 4% du revenu d'emploi de leur implantation jusqu'à la fin des années 80, les contributions faites au CPP ou au RRQ atteindront près de 10% au début du prochain millénaire. Le CPP et le RRQ sont financés selon le système du 'pay-as-you-go'. La situation démographique actuelle du Canada, notamment la retraite prochaine de la génération du 'Baby-boom', met en péril le futur de ces programmes. Les sources privées de revenus à la retraite incluent les plans de pension privés financés par les employeurs ainsi que les plans de pension individuels tel le Régime Enregistré d'Epargne Retraite.

Contribuer à un plan REER est spécialement intéressant puisque le Régime des Rentes du Québec (RRQ) et le Canadian Pension Plan (CPP), historiquement responsables de fournir un revenu à la retraite pour tous les Canadiens âgées de plus de 65 ans, risquent éventuellement d'être dans une situation précaire due aux changements démographiques actuels. Nous serions ainsi porté à croire qu'un nombre important de Canadiens profite d'un REER dans le but d'épargner

de l'impôt et de s'assurer un revenu suffisant à la retraite. Toutefois, seulement un tiers des foyers canadiens ayant accès à un REER contribua à un tel plan en 1992.

La deuxième partie résume quatre études américaines effectuées sur les IRA (Individual Retirement Account) et les 401K. Ces études introduisent différents modèles économétriques d'estimation de la participation ainsi que des contributions faites dans ces programmes. Ces études influencèrent le choix des variables indépendantes de notre modèle. A la différence de ces modèles économétriques qui n'estimaient que la participation ou bien la contribution monétaire des ménages, nous construisons un modèle permettant d'estimer ces deux variables dépendantes de manière complémentaire.

En troisième partie, nous introduisons notre modèle économétrique. Nous utilisons un modèle d'estimation à deux étapes tel que défini par Heckman (1979). La première variable dépendante que nous désirions estimer est une variable dichotomique pour la contribution à un REER une année donnée. Nous estimons cette première équation à l'aide d'un probit sur la décision de contribuer ou non à un REER. De cette régression nous retirons un estimateur pour l'inverse du ratio de Mills. Nous utilisons ensuite cet estimateur comme variable dans notre seconde équation. Cette procédure a pour but d'éliminer l'effet du biais de sélection possiblement présent dû au choix non aléatoire de nos variables indépendantes. La variable dépendante de notre seconde équation est

le montant de contribution à un REER en 1992 et en 1996. Nous estimons cette seconde équation à l'aide de la méthode des moindres carrées ordinaires. De toutes les variables utilisées dans les études antérieures que nous avons consultées, nous avons conservé : l'âge du chef de famille, le revenu total du ménage, la taille du ménage et la valeur nette des avoirs du ménage. Nous avons également utilisé quelques variables dichotomiques pour modéliser le sexe, la participation dans un plan de pension autre qu'un REER, le lieu de résidence (province), le niveau d'éducation, le statut marital, la profession ainsi que la langue parlée par le chef de famille.

Finalement, les résultats empiriques sont présentés et analysés. Nous observons que les résultats de nos régressions sont généralement consistants avec ceux des études antérieures. Les coefficients estimés pour la première équation sont positifs et significatifs pour le revenu, l'âge, la participation dans un autre type de pension, ainsi que la valeur nette des avoirs. Tous ces facteurs influençant positivement la probabilité qu'un individu contribue à un REER. Par contre, la taille du ménage a un effet négatif sur la participation à un REER. Nous observons également, à l'aide de nos variables dichotomiques, que le sexe n'influence pas significativement la prise de décision de contribuer à un REER, que le niveau d'éducation a un effet positivement croissant sur la probabilité de contribuer et que les individus étant mariés sont significativement plus portés à contribuer que ceux étant célibataires, divorcés ou autres. De plus, les ménages dont la langue maternelle du chef de famille est l'anglais ont davantage tendance

à contribuer que les ménages parlant toute autre langue. Pour ce qui est de l'influence du lieu de résidence sur la décision de contribuer à un REER, les résultats pour 1992 et 1996 ne furent pas assez similaires pour nous permettre d'émettre une conclusion satisfaisante.

L'objectif de ce mémoire était de développer un modèle démontrant une structure dans les comportements des ménages canadiens concernant leurs décisions de contribuer à leur propre richesse à la retraite. Notre approche intégra deux groupes de caractéristiques des ménages : le premier groupe étant démographique, avec l'âge, l'éducation, le sexe et le statut marital du chef de famille, la taille du ménage ainsi que la province de résidence et le niveau d'éducation; le second groupe étant financier, avec le revenu total du ménage, la participation dans un plan de pension autre qu'un REER, ainsi que les avoirs nets du ménage. Les résultats empiriques obtenus suite à la régression de ces variables furent généralement consistants avec ceux de recherches antérieures basées sur l'IRA (Individual Retirement Account), l'alter ego américain du REER. Il est évidemment encore tôt pour conclure quoi que ce soit au sujet du comportement d'épargne en vue de la retraite des Canadiens puisque les gouvernements sont encore, et promettent de l'être encore longtemps, très présents en tant que source de revenu à la retraite. Cependant, il est important d'observer les tendances actuelles dans le but de déterminer quels sont les moyens d'améliorer et de mieux cibler les plans privés d'épargne retraite tel que le REER.

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INTRODUCTION

The Canadian population is growing older. From 1996 to 2006, the population ages 65 and over is projected to increase by 61.8% while the labor force, ages 20 to 64, will only increase by 11.8 %[1]. This fact demonstrates that demographic changes due to the retirement of the baby boom generation will have a major impact on the ratio of retirees to workers. The ratio of the number of people ages 65 and over to the number of people ages 20 to 64 is expected to grow from 19.9% in 1996 to 28.8% in 2016. The results conclude that only three working Canadians will support each person receiving Canada / Quebec Pension Plan (CPP) benefits, compared to five today.

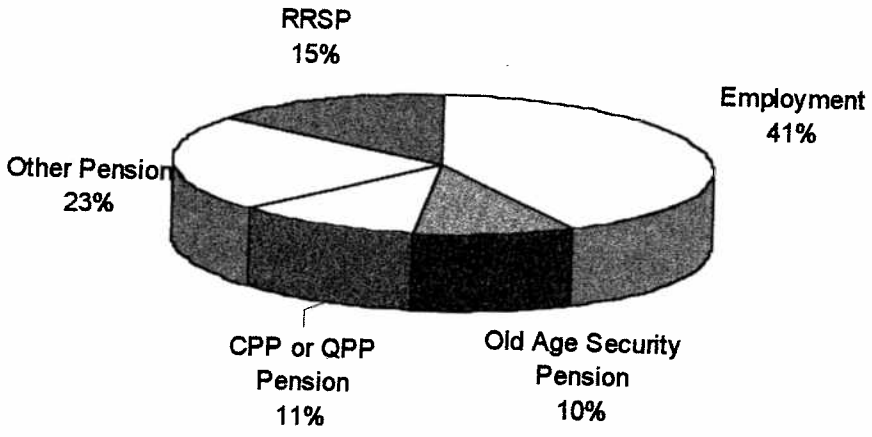
Yet, based on a Gallup Poll from October 1994[2], less than 30% of Canadians under the age of 50 are confident they will receive Old Age Security (OAS) and CPP benefits. Costs for both OAS and CPP are expected to rise significantly because of the changes to the demographic makeup of the population previously mentioned.

In the future, the Canadian government may take actions to resolve this problem by decreasing OAS, CPP and QPP benefits. This aspect leads us to believe that Canadians will need to find a more effective way to save for retirement to compensate for the loss in working income (increase in contributions) and the loss in governmental assistance (decrease in benefits). An effective way to save

[1] Statistic Canada, Cansim, matrix 6900 « Population Estimates for 1996 and Projections for the Years 2001, 2006, 2011, and 2016 »

for retirement would be through the use of private pension plans, such as the Registered Retirement Saving Plan. A Registered Retirement Savings Plan (RRSP) is an individual retirement savings plan; it is the principal deferred tax savings vehicle that is offered to Canadians. We will study private pension plans, particularly the RRSP, even though they accounted for only about 13 to 15% of the income of the elderly (65 years and over) Canadians between 1992 and 1996.

Figure 1 : Sources of Income of the elderly, 1996



Source : Calculation using Revenue Canada, Tax Statistics on Individuals – 1998 Edition (1996 taxation year)

In the future, individuals will have to assume more responsibility to prepare for their own retirement needs and rely less on governmental assistance programs.

[2] retireweb.com

Thus, in order to examine the behavior of Canadians concerning their own retirement savings, we will build a two-step econometric model to estimate the factors influencing the decision to contribute to a RRSP and the contributions made by the households.

This report is divided into three principal sections. First, we briefly review the history of retirement and discuss the Canadian situation concerning retirement savings programs and benefits. Second, we review four econometric studies that have previously investigated the subject of retirement savings contributions. Third, we present our variables and an econometric model providing us with empirical results. The data used to perform our analysis of retirement savings of Canadians comes from the 1992 and 1996 Surveys of Family Expenditures prepared by the Household Surveys Division of Statistics Canada.

PART I

HISTORY OF RETIREMENT

Retirement saving is indeed a new concept. In days earlier, it was not a matter of particular concern if a person reached old-age without adequate means of support. Elderly members of a family resided with, and were supported by, younger members of the family. The traditional approach to old-age care and support has been weakened by the increasing urbanization of society, changes in housing conditions, greater geographical mobility, and many other economic and social developments. As a result, society began to look increasingly to governments and employers for old-age support. The governments responded by establishing various programs of old-age income maintenance. However, some decades later, these programs seem to have developed some deficiencies in perspective to the individuals. The individuals who want to retire earlier than the retirement age stipulated by the government and want to have a higher level of income than the one guaranteed by the public plans or who simply do not believe that those plans will be effective when they reach retirement have now the opportunity to use private pension plans (McGill and Grubbs, 1989).

Inadequate planning is not the only reason responsible for the present uncertainty of government pension programs. The retirement systems are an essential component of the most developed social protection models. Despite that, in a world where international competition makes the collective burden of

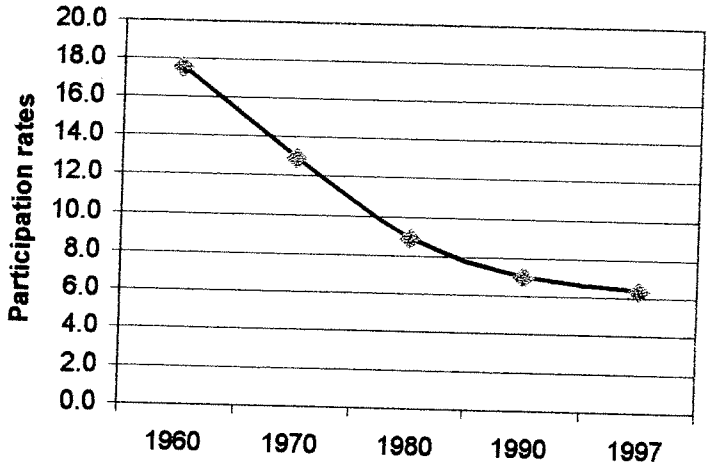
solidarity unbearable for the economic agents, they appear today like a luxury more and more costly (Szij, 1993).

As mentioned earlier, the age of retirement is another reason to contribute to a private pension plan despite the public and/or an employer sponsored plan. The age of retirement is a strategic variable; it is nevertheless also influenced by social and governmental pressure. The age of admissibility to a public pension program is determined by the government and is according to the demographic parameters and constraints of the programs. Hence, those who desire to retire before the age determined by the government must contribute to a private pension plan in order to meet their needs.

> "In recent years the hard core of long duration unemployment at the younger ages and the generalized effect of automation have placed increasing stress on early retirement. Other factors which have influenced the trend include the improvement in longevity, extension of social insurance and pension programs, and the widespread acceptance of age 65 as the normal retirement age" (McGill and Grubbs, 1989).

Habits of early retirement have been taken and explain the decline in labor force participation by the aged. The following figure shows the decline in the activity rate of the elderly through the period 1960-1997.

Figure 2 : Participation rates of the elderly, 1960-1997



Source : Labour Force Statistics, OECD, 1998

At the same time, the capacity to save for old-age was reduced by social changes.

> "Several developments within the last half-century have magnified the difficulties of accumulating an old-age estate. [...] A greatly improved and expanded industrial plant is pouring forth a vastly increasing quantity of consumer goods, of infinite variety, exerting relentless pressure on all classes of individuals to spend all or the greater portion of their income. High pressure advertising and liberal extension of installment credit have conspired to tie up the worker's income even before it is earned. As a result, systematic provision for old age has become a secondary consideration in the budget calculations of the majority of families" (McGill and Grubbs, 1989).

Thus savings for old age diminished. Today, society places a large temptation on the individual to spend the majority of their savings on a variety of material goods. Therefore, individuals may be irrational and find it difficult to sacrifice a part of their present well-being and lifestyle for an uncertain and seemingly distant future.

A second factor that has complicated the accumulation of an estate in most countries is the general rise in personal and corporate income taxes during the past decades. The individuals see their net income reduced and, hence, must decrease their consumption to maintain the same level of saving, which is usually not a likely option for most individuals.

INSTITUTIONAL INFORMATION

This section will discuss the Canadian retirement savings programs, private as well as public, and will give an overview of their American *alter ego*.

For Canadians, retirement income has generally come from three sources :

1- Government programs (Old Age Security, Guaranteed Income Supplement, Spouse's Allowance)
2- Canada / Quebec Pension Plan
3- Private source
   a) Employer sponsored pension plans (defined benefit, defined contribution)
   b) Personal savings (RRSP, others)

Today, there is a fear of eroding government programs (OAS clawbacks, possible reduced CPP benefits) and reduced benefits or coverage under employer sponsored plans.

> "Canada's retirement income system is supposed to perform two important tasks. The first is to ensure that elderly people have incomes high enough to allow them to live in dignity no matter what their circumstances were during their working years. The second is to maintain a reasonable relationship between income before and after retirement so that old age does not bring a drastic reduction in a person's standard of living. [...] Neither one of these objectives is being fully met. More than 600,000 people 65 and older live in poverty. Many workers with average incomes experience a sharp drop in their living standards

when they retire". (Report by the National Council of Welfare, Summer 1999)

Thus, it is the responsibility of the individual to augment government programs and any employer benefits to have an adequate income throughout retirement. An understanding of the level of benefits from the first and second sources would allow the individual to determine the need for additional retirement savings by way of a personal savings plan.

The following table published in the *Evaluation Report – Old Age Security Program*, prepared by Health and Welfare Canada in September 1992, provides a break down of the income sources for elderly Canadians in 1989 :

Table I : Sources of Income of Elderly Canadians in 1989

Income Source	Unattached Men	Unattached Women	Couples
OAS / GIS / SA	28.9%	41.3%	24.9%
C / QPP	17.7%	13.6%	14.2%
Private Pensions	20.1%	13.2%	16.9%
Investments	22.6%	23.5%	26.2%
Other	10.7%	8.4%	16.8%
Total	100.0%	100.0%	100.0%

Note : Couples include couples with both aged 65 or more.
Source : National Council on Welfare

Note that we use data from 1989, 1992 being the last year the National Council on Welfare established this specific breakdown.

First source : Government Programs

Old Age Security

The Old Age Security program is a government sponsored social program paying benefits to individuals of the age of 65 and older. It provides a monthly pension to all Canadian residents who meet the age requirements. The OAS program is financed from general tax revenue. In 1996, there were 3,275,960 individuals receiving OAS pension benefits costing approximately $14.7 billion annually. Hence, OAS cost approximately 1.8% of the Gross Domestic Product of $833.1 billion that year.

Guaranteed Income Supplement

Those age 65 and older and receiving OAS benefits may also be entitled to receive benefits from the Guaranteed Income Supplement (GIS), another important federal program for seniors. The GIS benefits depend on the individuals status. They were introduced in 1967 to help pensioners who have little income other than their Old Age Security pensions. The purpose of these benefits are to provide an adequate floor of income to the disadvantaged elderly.

The government income support programs in the first level of the retirement income system provide a minimum guaranteed income for older Canadians. Unfortunately, the basic income supports from the government are not large enough to keep all seniors out of poverty. (National Council of Welfare, Summer 1999)

Second Source : Canada / Quebec Pension Plan

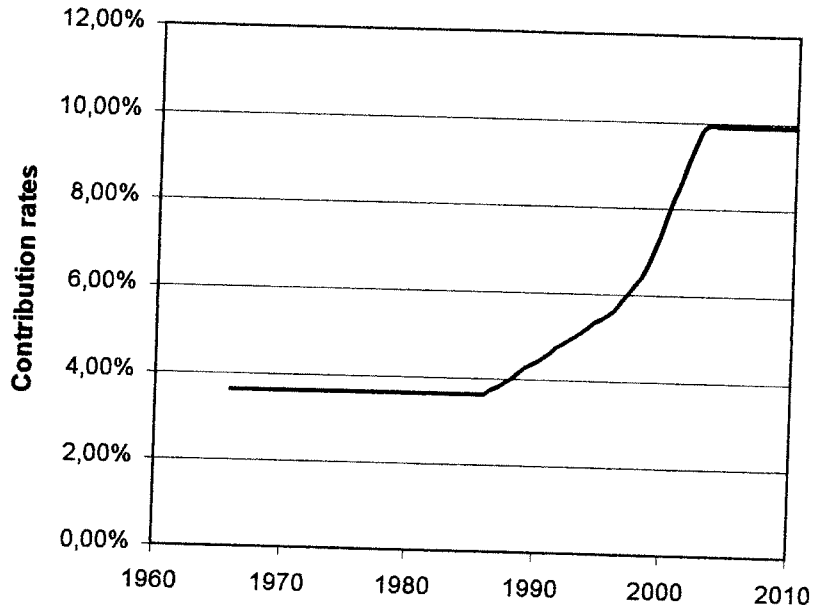
The second source of retirement income is made up of the CPP and QPP. The Canada Pension Plan is a government program established in 1966 to provide all members of the labor force in Canada with retirement income, death, and disability benefits. The plan covers all employed and self-employed persons between the ages of 18 and 70 who have employment earnings, except residents of the Quebec province (The Quebec Pension Plan is a separate plan legislated by the Province of Quebec which has similar benefits and a contribution rate identical to the CPP). The benefits received are based on the earnings and the total number of years of contributions by the employee to the plan.

Like the programs that made up the first source of the retirement system, the CPP and QPP are run by governments. But unlike the first source plans, they are financed by contributions from workers and employers rather than by the 'public purse'. The funding of the C/QPP comes entirely from the contributions it receives from employees and employers. The contributions are automatically deducted from the individuals earnings.

In 1996, over 3.0 million Canadians received CPP retirement benefits of about $15.5 billion and 1 million received benefits under the similar Quebec Pension Plan. This represented almost two-thirds of total CPP expenditures. (Revenue Canada, Taxation Statistics on Individuals - 1998 Edition (1996 taxation year)).

Figure 3 shows the contribution rates in the CPP from its establishment in 1966 to the projected year 2010. From 1966 to 1986 the contribution rate to the CPP was stable at 3.60% of the earnings. Between 1987 and 1996 this rate increased by 0.2% every year. In 1996, the contribution rate begins to increase more rapidly to reach the steady rate of 9.90% by the year 2003.

Figure 3 : Contribution Rates in the CPP, 1966-2010



Source : Canadian Pension Plan, Seventeenth Actuarial Report as at 31 December 1997, Office of the Superintendent of Financial Institutions

The CPP is financed essentially on a pay-as-you-go basis. In a pay-as-you-go system, contributions by today's workers finance the benefits of today's recipients. Therefore, the program relies on the continuing ability of each working generation to pay for the pensions of preceding generations. The demographic situation in Canada today, including the coming retirement of the

baby boom generation, is going to jeopardize the future of the CPP (Francois Normand, Le Devoir, March 4, 2000).

Third Source : Private Sources

Currently, the first two sources of retirement income provide enough money to keep pensioners out of abject poverty and to ensure a basic level of income, but not much more. Most pensioners need other sources of income to avoid a drastic drop in their standard of living after leaving the paid labor force. This is where private sources of income come into action.

Employer Sponsored Pension Plans

Registered Pension Plans (RPP) are employee retirement benefit programs provided by employers or unions to employees in both the public and private sectors. They are often referred to as private pension plans to make a distinction between them and the public pension system. The RPP is controlled by provincial and federal pension legislation. There are numerous types of plans which differ in regards to coverage, membership, benefits, retirement ages and so on. In 1996, 3.6 million Canadians contributed to a RPP for a total of $6.9 billion compared to 6 million of Canadians making $23.8 billion of RRSP contributions (Table III). The personal pension plan being considerably more popular than the employer-sponsored plan. Table IV shows that the RPP is the

only pension plan that have seen a decrease in its number of participants and contributions for the ages less than 65 between the years 1992 and 1996.

Registered Retirement Saving Plan

A Registered Retirement Savings Plan (RRSP) is an individual retirement savings plan. This type of savings plan allows the individual to invest his personal income and receive tax benefits. The amount saved in an RRSP plan is tax deductible within certain limits while the investment earnings of the account are not taxed. Money can be withdrawn from the account at any time before retirement, but these withdrawals are taxable. At a given age, currently 69, the account must be converted to an annuity or a Registered Retirement Investment Fund (RRIF) and taxes must be paid.

RRSP contributions are a maximum of $13,500 or 18% of previous year earned income less the Pension Adjustment (PA). In general, the PA is calculated as 9 times the benefits under an Registered Pension Plan (RPP) or Deferred Profit Sharing Plan (DPSP) less $1,000 resulting from the annual contribution to the RPP. The PA system is an attempt to equalize tax deferred savings programs in Canada so members of a company sponsored RPP do not have any advantage by accruing benefits in the plan and also being able to contribute the same amount to their RRSP as someone who is not a participant of an RPP.

The following tables compare the different sources of income for the Canadians for 1992 and 1996 and the contributions made to retirement programs. The number of beneficiaries or contributors and the total amount of income or contributions are presented for the population ages less than 65 and for those ages 65 and over.

Table II : Income and contributions in retirement programs in Canada, 1992 taxation year (in 1996$)

	Less than 65 years			65 years & over		
	Number	Amount ($'000)	Average by individual	Number	Amount ($'000)	Average by individual
INCOME						
Employment	10,557,520	327,687,786	31,038 $	179,470	4,026,893	22,438 $
Old Age Security Pension	0	0	0 $	1,630,030	7,496,667	4,599 $
CPP or QPP benefits	671,930	3,679,122	5,475 $	1,526,470	8,641,835	5,661 $
Other Pension	512,590	7,981,957	15,572 $	1,097,840	12,184,328	11,098 $
RRSP	528,980	3,058,874	5,783 $	138,840	906,197	6,527 $
CONTRIBUTIONS						
RPP	3,592,780	7,064,954	1,966 $	40,400	54,592	1,351 $
RRSP	4,526,780	14,570,315	3,219 $	167,530	856,196	5,111 $
CPP or QPP	10,713,330	5,711,378	533 $	44,830	16,502	368 $

Source : Revenue Canada, Tax Statistics on Individuals - 1994 Edition (1992 taxation year)

Table III : Income and contributions in retirement programs in Canada, 1996 taxation year

	Less than 65 years			65 years & over		
	Number	Amount ($'000)	Average by individual	Number	Amount ($'000)	Average by individual
INCOME						
Employment	12,804,070	349,587,611	26,801 $	239,570	4,580,346	19,119 $
Old Age Security Pension	40	44	1,100 $	3,275,920	14,659,538	4,475 $
CPP or QPP Pension	1,149,050	5,874,920	5,113 $	2,879,500	14,355,701	4,985 $
Other Pension	623,860	10,289,436	16,493 $	1,468,980	15,235,461	10,371 $
RRSP	880,490	4,383,248	4,978 $	134,030	903,428	6,740 $
CONTRIBUTIONS						
RPP	3,551,990	6,804,774	1,916 $	41,100	61,115	1,487 $
RRSP	5,838,670	23,045,394	3,947 $	161,330	711,112	4,408 $
CPP or QPP	12,137,830	7,169,072	591 $	44,190	19,497	441 $

Source : Revenue Canada, Tax Statistics on Individuals - 1998 Edition (1996 taxation year)

It is interesting to observe that people aged 65 and over with employment income receive less than 75 percent of the average employment income of the overall population. Both years, RRSPs provided higher benefits on average than the Old Age Security Pension and Canadian / Quebec Pension Plan to the individuals aged 65 and over. It is also the one in which the contributions were the greatest.

Table IV : Number and amount of contribution variations in retirement programs in Canada between 1992 and 1996

	Less than 65 years		65 years & over	
	Number (%)	Amount (%)	Number (%)	Amount (%)
INCOME				
Employment	21.28	6.68	33.49	13.74
Old Age Security Pension			100.97	95.55
CPP or QPP Pension	71.01	59.68	88.64	66.12
Other Pension	21.71	28.91	33.81	25.04
RRSP	66.45	43.30	-3.46	-0.31
CONTRIBUTIONS				
RPP	-1.14	-3.68	1.73	11.95
RRSP	28.98	58.17	-3.70	-16.95
CPP or QPP	13.36	25.57	-12.98	4.22

Source : Calculation from Revenue Canada, Tax Statistics on Individuals - 1994 and 1998 Editions

The previous table shows that the number of beneficiaries increased more than the total amount of benefits received between 1992 and 1996 for the individuals aged less than 65 years, except for the RRSPs and other pensions. Surprisingly, the number of beneficiaries and amount received from RRSPs decreased slightly between 1992 and 1996. Further, the contributions made decreased as well. Interesting fact, the amount of contributions to the CPP / QPP programs by the population aged less than 65 years increased by 25.57% while the number of participants increased by only 13.36%, which is consistent with the constant increase in the contribution rate.

Individual Retirement Account and 401(k) in the United States

It is essential to gain an understanding of the IRA and 401(k) savings plan available in the United States as well, since we will see these programs used in the models reviewed in the section Review of Literature.

Individual Retirement Account

An Individual Retirement Account (IRA) is a personal retirement savings plan available to everyone under age 70½ in the United States. In Canada, since 1997, the age limit to contribute to a RRSP is 69.

The maximum contribution in an IRA, under current law, is $2,000 per year. This is the major difference between RRSPs and the IRAs. The IRA contribution limit is quite low compared to the RRSP's. Like RRSPs, contributions are tax deductible when made, earnings accrue tax deferred, and taxes are paid upon withdrawal. Unlike RRSPs, a penalty tax of 10 percent generally applies to withdrawals that occur before age 59½.

Basically, an IRA allows a person, whether covered by an employer-sponsored pension plan or not, to save money for use in retirement while allowing the savings to grow tax-free.

401(k) plans

Finally, we will define briefly the 401(k) plans. Whether or not a worker contributed in a 401(k) plan in 1993 is the dependent variable of the Bassett, Fleming and Rodrigues model we will study in our next section entitled Review of Literature. A 401(k) is a type of retirement plan that allows employees to save and invest for their own retirement. In a 401(k), the employees authorize their employer to deduct a certain amount of money from their paycheck before taxes are calculated, and to invest it in a 401(k) plan. The employee can choose from a variety of different investment options offered by the company to invest the savings. In some cases, an employer may even match a percentage of the employees contributions. The American federal government established the 401(k) in 1981 with special tax advantages, to encourage people to prepare for retirement. The dollar limit of the amount that can be deferred is adjusted annually by the Treasury department of the United States to reflect changes in the cost of living. For instance, the dollar limit in 1993 was $8,994. Even though a 401(k) plan is a retirement plan, the employee is permitted access to the funds in the plan before retirement under certain restrictions.

The 401(k) company retirement plans differ greatly from the Individual Retirement Accounts. The 401(k) plan must be offered by the employees company to allow them to make contributions. The only requirement to contribute to an IRA is to have earned compensation. The 401(k) is a tax-deferred plan; no taxes are paid on the contributions or any account earnings

until the money is withdrawn. IRAs still offer part of the advantage of tax-deferred investing because no taxes are paid on any account earnings until the money is withdrawn. Another major difference between 401(k) and IRAs is that money can be borrowed from a 401(k), depending upon the company's plan, while borrowing from an IRA is not permitted under any circumstances. An individual can contribute in both plans independently if he wishes to.

PART II

REVIEW OF LITERATURE

This section will present four American studies of retirement savings. Those studies were written between 1987 and 1998. The first and second one are presented briefly; they are simple models of IRA participation and contribution. The Gale and Scholz, and Bassett, Fleming, and Rodrigues models are presented more extensively. They are econometric analyses of the American households decisions to participation in and contribute to the IRA and 401(k). The construction of the Canadian model, presented in this paper, was greatly based on those two studies for the choice of variables.

Table V : Summary of US Studies

Authors / Title	Sample	Dependent Variable, Method and Model	Independent Variables
Cherie J. O'Neil and Rodney Thompson (1987) Participation in Individual Retirement Accounts : An Empirical Investigation	IRS's 1979-1982 Approximately 45,000 tax returns / year	IRAj is a binary variable where IRAj = 1 if individual j made an IRA contribution in time t and 0 otherwise Logit IRAj = b0 + b1X1 + ... + bnXn	1) Marginal Tax Rate 2) Presence of Interest Income 3) Filing Status 4) Geographic Location
James E. Long (1990) Marginal Tax Rates and IRA Contributions	IRS's 1983 Individual Tax Model File 37,894 tax returns	IRA amount of contribution One and Two-limit Tobit	1) Total Marginal Tax Rate 2) State Marginal Tax Rate 3) Disposable Income 4) Liquid Financial Wealth 5) Number of Dependents 6) Dummy for participation in a private retirement plan 7) Dummy for whether the tax payer would have owed money to the IRS if no IRA contributions had been made 8) Dummy identifying taxpayers who used income averaging
William G. Gale and John Karl Scholz (1994) IRA and Household Saving	1983-1986 Survey of Consumer Finance 3,824 households	Actual amount of IRA saving Maximum-likelyhood and Ordinary Least-Squares SI = XB + u	1) Age 2) Age squared 3) Income 4) Pension dummy 5) Education 6) Family size 7) Non-IRA financial assets 8) Debt 9) Nonliquid assets 10) IRA dummy
William F. Basset and Michael J. Fleming and Anthony P. Rodrigues (1999) How Workers Use 401(k) Plans : The Participation, Contribution and Withdrawal Decisions	April 1993 Current Population Survey (Survey of Employee Benefits Supplement) 5,658 observations	Whether to participate in a 401(k) or not Probit and OLS	1) Employer offers a Match Rate 2) Log Family Income 3) Age 4) Job tenure 5) Education level dummies 6) Dummy Home ownership 7) Dummy 401(k) only pension plan 8) Dummy married 9) Dummy has children

Participation in Individual Retirement Accounts : an Empirical Investigation is the first study that we review. The authors, Cherie J. O'Neil and Rodney Thompson, present a model that is useful in assessing the influence of the Tax Reform Act of 1986 (TRA'86) on IRA' s. The most influential section of this study, in our point of view, is their modeling of the IRA participation. The model examines the characteristics that make a distinction between qualified taxpayers who do and do not make IRA contributions. They use a logit model, the decision to contribute being a qualitative decision.

Model of IRA contributions : $IRAj = \beta_0 + \beta_1 X_1 + \ldots + \beta_n X_n$

IRAj = 1 if individual j made an IRA contribution in time t

= 0 otherwise

X_k = independent variables that influence the decision to contribute to an IRA

The independent variables used to specify the logit model are the following : the individual's *Marginal Tax Rate* (MTR) that measures the value of the tax shield, a dummy for the presence of *interest income*, a dummy for the *filing status*, and finally a variable for the *geographic location*.

The empirical results found show that the marginal tax rate and the presence of interest income are significant variables in the decision to participate in an IRA. The single filing status had a negative sign which indicates that single taxpayers are less likely to have contributed to an IRA.

The second study presented, Marginal Tax Rates and IRA Contributions, was written by James E. Long in 1990. The author used a sample of individual tax returns to investigate whether the amount of IRA contributions was related to the marginal tax rate. Like in the O'Neil and Thompson study, the main purpose of this paper was to find the impact of the tax rate on IRA. Unlike the O'Neil and Thompson study however, the dependent variable was not the participation in an IRA but the dollar amount of contributions.

An instrumental variable was used in the estimation of the effect the tax rate had on contributions. "First, the actual effective state marginal tax rate is regressed on the average state marginal income tax rate applying to a 'synthetic' tax return reporting fixed levels of income, deductions, and exemptions" (Long, p.145). Then, the predicted state marginal tax rate (SMTR) from this regression was assigned to each tax return as a proxy for the pure tax incentive for IRA contributions.

The IRA contributions equation includes several independent variables suggested by previous studies : the *disposable income*; the stock of *liquid financial wealth*; the *number of dependents* reported by the tax payer; a dummy variable for *participation in a private retirement plan* (the Keogh plan in this case); a variable indicating whether the tax payer would have *owed money* to the IRS if no IRA contributions had been made; and a dummy variable identifying taxpayers who used *income averaging*.

Long uses a two-limit Tobit maximum likelihood technique instead of the ordinary least squares regression. The OLS would not be appropriate for estimating the determinants of IRA contributions because of their gathering around zero and the maximum allowable.

Long uses one equation which he estimates for three categories of taxpayers separately. He distinguishes two-earner couples, one-earner couples, and single taxpayers. The interest of doing so is to identify the differences in private retirement savings behavior associated with marital status and the number of earners in the household. The results of the estimated determinants of IRA contributions follow the expectations. The coefficient of the tax rate variable is positive and highly significant in each equation. The variable INCOMESQ tells us that IRA contributions rise with income at an increasing rate for two-earner couples only. The coefficients of WEALTH are positive but relatively small, implying that the liquidity condition did not have a very significant impact on contributions. As predicted, the addition of a dependent lowers the IRA contributions, especially for the Single Persons category. The coefficient on the OWE variable is positive and large, consistent with the fact that taxpayers prefer making a contribution in a retirement plan rather than giving money to the IRS. Finally, the coefficient of KEOGH, representing the participation in a private pension plan, appears to be non-significant.

The third study that we review was published by William G. Gale and John Karl Scholz in 1994. IRA and Household Saving examines the effect of Individual Retirement Accounts (IRAs) on private and national saving. They construct a model of dynamic utility maximization that generates closed-form equations for IRA and other savings. Gale's and Scholz's purpose was not to study the use *per se* of IRA but to find out whether they raise national savings. Even though the purpose is not the same, this study was found interesting for the modeling of IRA and savings and the empirical results it presents.

The empirical specification of the Gale and Scholz model is complex, made of three equations : (1) Desired IRA Saving, (2) Actual IRA Saving, and (3) Actual Other Saving.

$$(1)\quad SI^* = X\beta + \mu$$

$$(2)\quad SI = \begin{cases} 0 & \text{if } SI^* \leq 0 \\ X\beta + \mu & \text{if } 0 < SI^* < L \\ L & \text{if } SI^* \geq L \end{cases}$$

$$(3)\quad So = \begin{cases} X\gamma 1 + \varepsilon 1 & \text{if } SI^* \leq 0 \\ X\gamma 2 + \varepsilon 2 & \text{if } 0 < SI^* < L \\ X\gamma 2 + \eta(SI^* - L) + \varepsilon 2 & \text{if } SI^* \geq L \end{cases}$$

Where $\eta = \delta X$ measures the spill over of excess desired IRA saving into other saving, β, $\gamma 1$, $\gamma 2$, and δ are parameter vectors to be estimated, L is the upper limit on IRA contributions, and μ, $\varepsilon 1$, and $\varepsilon 2$ are errors.

We will only consider equations (1) and (2), Actual Saving, since the purpose of this report is not to evaluate the substitutability between two ways of saving but to analyze the effects of different variables on a particular savings program, the Registered Retirement Saving Plan.

The data used in the empirical analysis was found in the 1983-1986 Survey of Consumer Finances (SCF). The survey contains interviews from a random sample of 3,824 U.S. households in 1983, along with a supplemental survey of 438 high-income households. In 1986, 2,822 of these households were re-interviewed.

Furthermore, they present various characteristics of households with and without IRAs in 1986. Among these characteristics we find the median age, the percentage married, the percentage with pension, the average years of education, the average family size, the median three year income (1983-1985), the median non-IRA financial assets, and the median net worth. We do not present the results here but we will use some of those variables in our own model.

The dependent variable, S_I, is the actual IRA savings amount contributed, while X represents the selected independent variables, and is chosen to be consistent with previous research.

First, they follow previous empirical studies by including demographic variables as *Age* (for the head of household's age in years), *Age-squared* (to capture possible hump-shaped saving profiles), *Education* (average value of years of education), and *Family Size* (number of persons in the family). They also build a variable to examine the effect of current *Income* (sum of household's reported income in '100,000$). Next, they use disaggregated components of wealth as *Non IRA Financial Asset* (level of checking, saving, and money market accounts, certificates of deposit, stocks, bonds, mutual funds, cash value of life insurance, and other financial asset in '10,000$), *Debt* (debt on credit cards, mortgages, property, other business or consumer loans in '10,000$), and *Non-Liquid Asset* (value of home and gross value of property and business assets in '100,000$). Finally, they use a *Pension Dummy* (1 if household owns a pension, 0 otherwise) and an *IRA Dummy* (1 if household reported having an IRA the year before, 0 otherwise).

Table VI : Estimates of coefficients

VARIABLES	Maximum-likelihood estimates			Ordinary least-squares estimates		
	Coefficient	Standard error	t statistic	Coefficient	Standard error	t statistic
B :						
Constant	-33.233	4.926	-6.746	-5.294	1.066	-4.963
Age	0.791	0.206	3.829	0.184	0.047	3.920
Age squared	-8.359	2.206	-3.789	-1.902	0.505	-3.762
Education	0.676	0.113	5.950	0.128	0.027	4.820
Family size	-0.331	0.198	-1.667	-0.049	0.048	-1.009
Income	0.771	0.259	2.972	0.270	0.078	3.445
Non-IRA financial assets	-0.027	0.034	-0.795	-0.007	0.007	-0.961
Debt	0.118	0.059	1.988	0.058	0.018	3.142
Nonliquid assets	-0.161	0.135	-1.198	-0.072	0.041	-1.757
Pension dummy	2.278	0.679	3.353	0.536	0.171	3.127
IRA dummy	7.745	0.651	11.890	2.428	0.173	13.966
Number of observations	1,483					
Log likelihood	-5.51397					

Source : Gale and Scholz's calculations using the 1983-1986 Survey of Consumer Finances

Table VI presents estimates of equation (2) with a savings threshold of $100,000. Estimates are generally consistent with previous studies and *a priori* theorizing. "We jointly estimate S_1 and S_0 by maximum-likelihood assuming that (μ, ε_j) are distributed bivariate normal with standard deviations σ_μ, σ_j and correlation $\rho_{\mu,j}$, j=1,2" (Gale and Scholz, Appendix C).

For purposes of comparison, single-equation, ordinary least-squares (OLS) estimates of IRA savings are also presented in table VI. OLS estimates of IRA savings follow roughly the same relative sign and significance pattern as the maximum-likelihood (ML) estimates, but the OLS constant is larger, and the other coefficients are smaller than the ML estimates. "This is precisely the expected pattern when constraints on contributions are binding" (Gale and Scholz, p.1246).

An alternative approach for Gale and Scholz model would have been to estimate a two-limit Tobit specification for IRA saving, but "[...] this faces a similar problem as the estimates that use OLS in the first stage : for limit contributors the expected value of μ is positive and negatively correlated with $X\beta$" (Gale and Scholz, p.1249).

IRA purchases are positively and significantly correlated with education and income. They are also positively related with debt, which had a theoretically ambiguous relationship to IRA purchases. "The terms on Age indicate that conditioning on other attributes, IRA contributions peak at age 47" (Gale and Scholz, p.1245). The results of the two dummy variables tell us that households with a pension, as well as households who had contributed in an IRA in the former year (1983), contribute significantly more to an IRA account than other households. Finally, the family size, NIFA balances, and non liquid asset balances are negatively correlated with IRA purchases but are statistically non-significant.

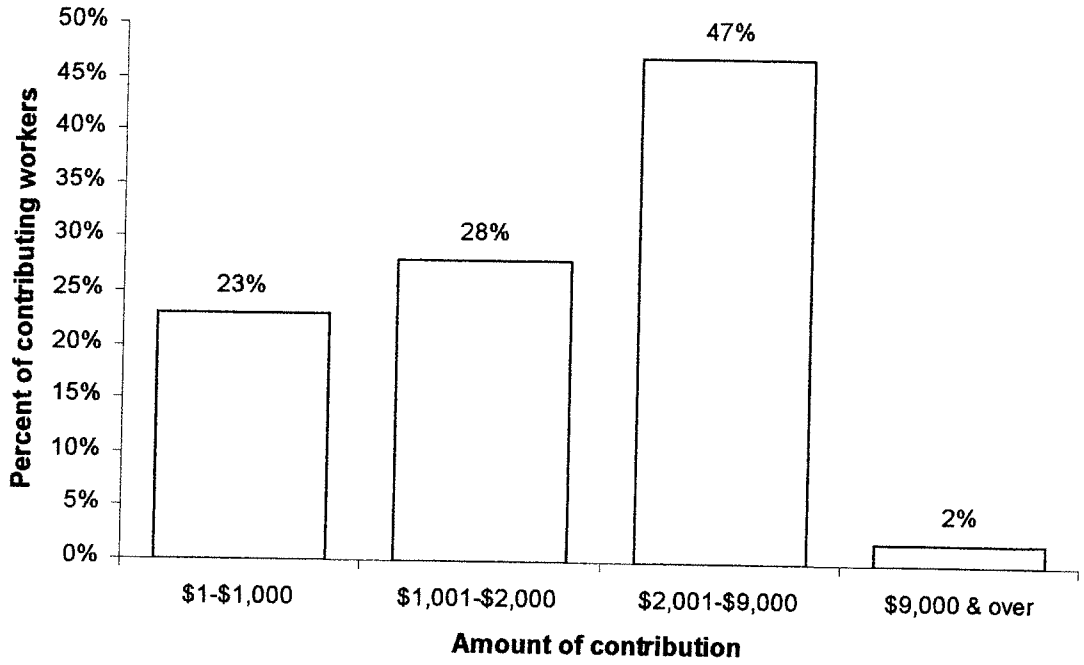
The previous review of Gale and Scholz's study, IRA and Household Saving, is useful to the purpose of this report because it presents a formal model of retirement savings purchases. We will use the independent variables as an inspiration for our own model.

The fourth study that we examine, in this study of the Canadian retirement savings, is an American research on the 401(k) retirement plan. How Workers Use 401(k) Plans : The Participation, Contribution, And Withdrawal Decisions (William F. Bassett, Michael J. Fleming and Anthony P. Rodrigues, 1999) determines that sixty-five percent of eligible workers participate in 401(k) plans. The participation rises with income, age, job tenure, and education. One of the interesting findings of their research suggests that many workers, particularly those with low incomes, do not use 401(k) plans to save for retirement. They used data from the April 1993 Current Population Survey and its Survey of Employee Benefits supplement (CPS) to examine how workers use 401(k) plans. While 81 percent of workers with family incomes of at least $75,000 choose to participate, only 36 percent of workers with family incomes less than $15,000 participate. Bassett, Fleming and Rodrigues find that besides income, other factors are positively related to the participation decision, including age, job tenure, education, home ownership, and whether the 401(k) is the only employer-sponsored retirement plan. Data from the U.S. Department of Labor "Private Pension Plan Bulletin" illustrate that the percent of workers participating in 401(k) plans increased from about 8 to 23 percent in the 1983-1993 decade. In that same period of time, the 401(k) contribution increased from 20 to 70 billion dollars of 1993. This rapid growth of 401(k) plans implies that more workers are making critical decisions regarding their retirement savings. Hence, employee 401(k) participation and contribution decisions are an increasingly important determinant of retirement saving.

The authors' participation and contribution analyses are limited to the 19,200 survey participants aged 18 to 64 who work at least 20 hours per week and who are not self-employed. However, most of their analysis is based on a sample of 8,129 individuals who are offered a 401(k) plan by their employer. In their analysis, Bassett, Fleming and Rodrigues define 401(k) participation by a planned contribution for 1993 and nonparticipation by the lack of a planned contribution for 1993. Their results are very similar when participation is defined more broadly as any worker reporting participation in a 401(k) plan regardless of whether or not contributions are planned for 1993.

For workers who participated, the mean contribution rate was seven percent of income. The mean dollar amount contributed in 1993 was US$2,715 for workers who participated. The following figure represents the distribution of contributions among workers who participated in 1993.

Figure 4 : Distribution of workers who made a contribution in a 401(k) in 1993



Approximately half (51%) of the annual contributions were less than $2,000, and just under half (47%) were between $2,000 and $9,000, while the remaining 2% exceeded the 1993 tax-deferred maximum of $8,994.

Unlike the other studies that we examine in this paper, the Bassett, Fleming and Rodrigues study makes no attempt to measure whether 401(k) plans change total household saving or change aggregate national saving.

Bassett, Fleming and Rodrigues assert that some characteristics of the household related to the propensity to save should be correlated with the participation decision. These characteristics are presented in table VII.

Table VII : Characteristics of workers offered 401(k) plans by participation status, 1993

	Participate	Do Not Participate
Has match rate (%)	75.0	66.8
	(43.3)	(47.1)
Family income	$53,625.60	$40,536.50
	($30,258.50)	($24,898.70)
Age (years)	40.5	36.8
	(10.0)	(10.6)
Job tenure (years)	10.4	7.1
	(8.3)	(7.8)
Has high school diploma (%)	96.5	93.3
	(18.5)	(25.0)
Has college degree (%)	39.6	29.3
	(48.9)	(45.5)
Home owner (%)	79.8	65.7
	(40.2)	(47.5)
401(k) is only pension plan (%)	55.1	45.6
	(49.7)	(49.8)
Married (%)	70.8	61.7
	(45.5)	(48.6)
Has children (%)	44.8	43.7
	(49.7)	(49.6)
Number of observations	5.658	5.658

Note : Mean and standard deviation (in parentheses) of various variables for workers that do and do not choose to participate when offered a 401(k) plan by their employer.

Source : Bassett, Fleming and Rodrigues calculations, based on data from the Current Population Survey

We observe the importance of family income in the decision of participation. Age is another important characteristic influencing the propensity of workers to contribute. Job tenure, as well as education level are related factors in the decision to participate in a 401(k) since that may affect knowledge of the program by the employee. Home ownership has an ambiguous relation with participation; it is positively correlated with the propensity to save but is also a measure of household wealth. Marital status and children are both likely to reduce savings because they increase the demand for goods and thus reduce income.

Table VIII : 401(k) Participation models

Explanatory Variable	Match Rate Dummy Model	
	Probit	OLS
Intercept	-5.31	-1.96
	(0.44)	(0.12)
Has match rate	0.33	0.09
	(0.04)	(0.01)
Log (family income)	0.43	0.12
	(0.04)	(0.01)
Age	0.01	0.002
	(0.002)	(0.001)
Job tenure	0.02	0.01
	(0.003)	(0.001)
Has high school diploma	0.32	0.10
	(0.10)	(0.03)
has college degree	0.15	0.04
	(0.04)	(0.01)
Home owner	0.29	0.09
	(0.05)	(0.02)
401(k) is only pension plan	0.53	0.14
	(0.04)	(0.01)
Married	-0.23	-0.07
	(0.05)	(0.01)
Has children	0.02	0.01
	(0.04)	(0.01)
Number of observations	5,658	5,658
Log likelihood	-2,796	-
Adjusted R-squared	0.10	0.10

Note : Coefficients and standard errors (in parentheses) from probit and ordinary least squares models estimating participation decision. The OLS standard errors are heteroskedasticity consistent.

Source : Bassett, Fleming and Rodrigues calculations, based on data from the Current Population Survey

As can be seen with the model results, having an employer match rate is positively related to participation. Income, age, job tenure, education, home ownership and 401(k) being the only retirement plan offered are also positively correlated with plan participation. Being married is negatively correlated while workers with children are not significantly less likely to participate.

The OLS results provide estimates of the change in participation probability (expressed in percentage points) associated with a change in each explanatory

variable. The results found by Bassett, Fleming and Rodrigues show that the participation rate rises by 9% when the 401(k) plan is matched by an employer. A family income of an additional $1,000 is associated with a rise in participation of 0.3%. An additional year of age raises participation by 0.2%, while an additional year of experience raises participation by 1%. Workers holding a high school diploma have a 10% higher participation rate than those without , while holders of a college degree raise the participation rate another 4%. Home owners are 9% more likely to participate than others. Participation is much more likely (14%) when the 401(k) plan is the only retirement plan offered. Finally, married employees are 7% less likely to participate than single employees.

In conclusion, the Bassett, Fleming and Rodrigues models suggest that household characteristics influence the decision to participate in a 401(k) plan.

PART III

SPECIFICATION

Presented in the Specification section will be an econometric model of Registered Retirement Saving Plan contributions. The ideas presented in the models of IRA contributions for American households will be adapted to this study, thus enabling us to investigate the Canadian situation. The data we will use in this analysis come from the 1992 and 1996 Surveys of Family Expenditures prepared by the Household Survey Division of Statistics Canada. The survey conducted in 1992 contained a random sample of 9,492 households that were interviewed, while the survey of 1996 contained 10,417 interviewed households. The variables that are to be used in this study come strictly from the above data base.

Definitions of Variables

Our model is a two-step model composed of two dependent variables. The first dependent variable is whether the individual contribute to a RRSP or not. The second dependent variable in our model is RRSPc, which is the amount of contributions made by the household in a RRSP in the year studied. The effect of different variables on the decision to contribute and the amount contributed will be determined.

Nine independent variables were selected based on the previous American studies :

- *Income before taxes* includes income from wages and salaries, income from self-employment, investment income, government transfer payments, and income from other sources

Bassett, Fleming and Rodrigues, Long, and Gale and Scholz also used a variable for income in their study. In the three studies, the hypothesis of a positive impact on contributions was verified. In this study, the income before taxes of the family is used and not exclusively the income of the individual. We surmise that the decisions and choices of the allocation of assets are made by the family and not by the head of household alone.

- *Age*	24	if age 24 years and under
	25-69	actual age

Notice that the maximum age in our sample is 69, the age at which the RRSP account must be converted to an annuity or a Registered Retirement Investment Fund (RRIF) and taxes must be paid. Due to changes in the way Statistics Canada collected data for age, we had to limit our sample to the age range 24-69 in order to maintain a common system for the two years we are studying.

Bassett, Fleming and Rodrigues used the variable *Age* in their study of the 401(k) participation and contributions. An additional year of age was found to positively influence both the participation and contribution decisions of the employees.

The variable *Age* was also found in the Gale and Scholz study. They also used the variable *age-squared* to capture a possible hump-shaped savings profile. The age of the head of household was found to be positively and significantly correlated to the contributions amount while the contribution was reaching a peak at age 47.

O'Neil and Thompson did not use a specific variable to model the effect of the age on the participation in an IRA. However, they did consider that their variable of marital status could be a substitute for age based on the assumption that single taxpayers are younger than the other filing status.

- *Sex (dummy)* 0 if female
  1 if male

None of the previous studies considered made a distinction between men and women in their models. It seems appropriate in our study of the Canadian behaviors to determine if gender has an influence in the amount contributed towards retirement.

- *Family Size* includes all persons who were members of the household as of December 31, of the year studied.

The family size or the number of dependents was used in the two equations of IRA contributions as found in previous studies. People with larger families may face higher current expenditures and thus are less likely to put money into an illiquid IRA.

Although Bassett, Fleming and Rodrigues did not use a specific variable to model the effect of the number of family members on the 401(k) participation and contribution, they did use a dummy for *has children*.

- *Pension dummy* includes retirement or pension funds other than RRSPs, Quebec and Canada Pension Plan (Q/CPP), and other government retirement and pension funds

Inspired by the three last studies that have been presented, we use a dummy for contribution in another type of retirement or pension funds. This may allow us to determine the rate of substitution between RRSPs and other plans.

- *Net Assets* we build this variable by subtracting the data for *debts* from those for *Non-liquid asset* obtained from the survey.

- *Debt* includes amounts outstanding on mortgages or loans for dwellings owned and occupied in the year studied.

- *Non liquid Assets* value of dwelling owned at December 31, of the year studied.

In Gale's paper, the variable debt included debt on credit cards, mortgages, property, and other business or consumer loans. The availability of the data only allows us to use mortgage as people's debt evaluation.

The same problem arises when evaluating the non-liquid assets. In Gale and Scholz study, non-liquid assets were defined to be the value of home, gross value of property, and business assets. Because of the availability of the data, only the value of the dwelling represents the non-liquid assets of the household. Home ownership may be an important factor, households may not want to tie up funds in an IRA until they have purchased a home.

The relationship between net assets and contributions is hard to predict since the different studies found different conclusions. In Gale and Scholz, the empirical analysis demonstrated that non-liquid assets had a negative effect on IRA contribution while Long's results of financial wealth showed the opposite. In both cases however, the results were non-significant.

- *Province (dummy)* geographic code for the province of residence

The O'Neil and Thompson model of participation in an IRA was the only model that considered the geographical location. Using a dummy for the different provinces is valuable in the sense that it allows us to display the influence of income, education, and other demographic variables, as well as the difference between legislation among the different regions of the census.

- *Education (dummy)*	dEduc1	less than 9 years
	dEduc2	some or completed secondary education
	dEduc3	some post-secondary non-university
	dEduc4	post-secondary certificate or diploma
	dEduc5	university certificate or diploma

The level of education was present in the Bassett, Fleming and Rodrigues and in the Gale and Scholz models but it was not present in the other models. According to Gale and Scholz, people with higher levels of education would be more financially sophisticated and would find the transaction costs of holding an account less burdensome than others. Thus, households with higher education should be more likely to make higher contributions in their retirement savings account. The empirical results of their study actually show that IRA purchases and education were positively and significantly correlated.

- *Marital status (dummy)*	dMarried	married to a household member
	dSingle	never married
	dOther	separated, divorced, widowed, etc.

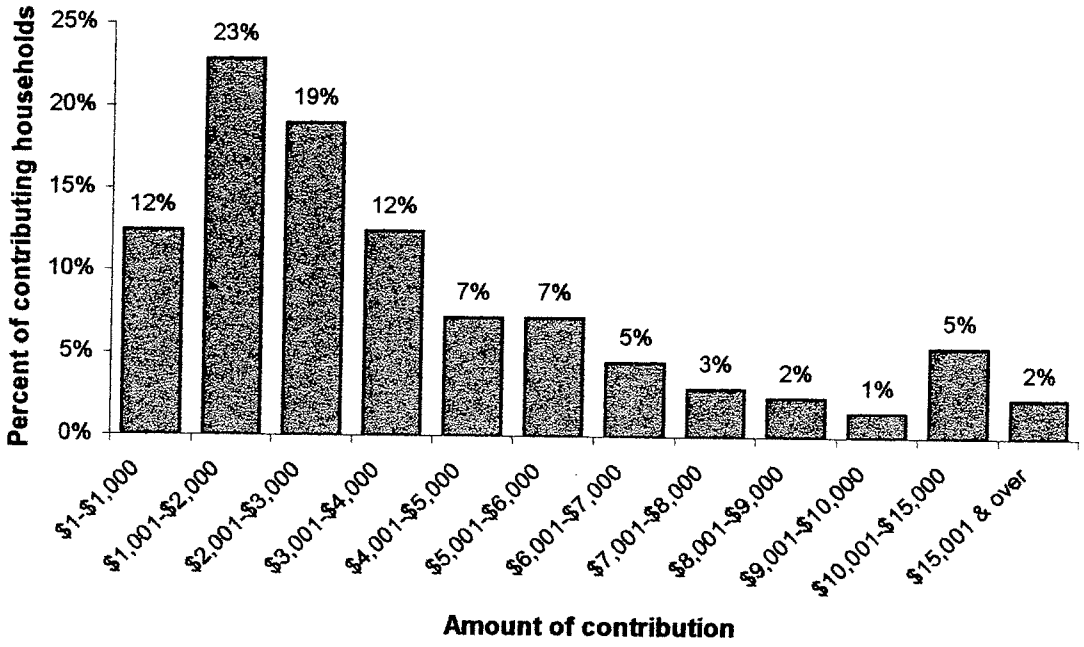
We expect to find, similar to previous studies, that married couples contribute more in their IRA than any other filing status.

Unfortunately, the next two variables were unavailable in the 1996 survey. In order to make the comparison between the years 1992 and 1996 possible, they will not be used in our first specification model. However, they are certainly interesting and will be used in a further specification model.

- *Occupation*	dummy variable for the type of occupation of the head of household. 10 categories of occupation were selected in addition to a dummy for unemployment.
- *Language*	dummy variable for the language spoken by the head of household : Denglish, DFrench, DLOther

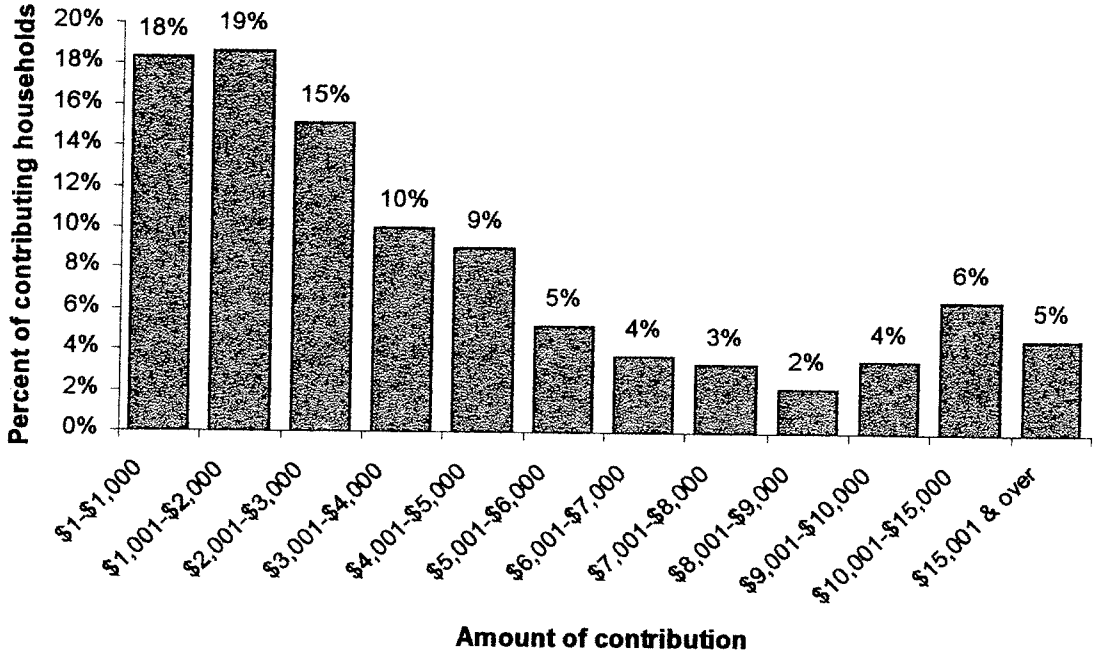
EMPIRICAL ANALYSIS

Figure 5 : Distribution of households who made a contribution to a RRSP in 1992



Source : Calculation from 1992 "Surveys of Family Expenditures", Statistics Canada
Note : adjusted for inflation using $ of 1996.

Figure 6 : Distribution of households who made a contribution to a RRSP in 1996



Source : Calculation from 1996 "Surveys of Family Expenditures", Statistics Canada.

Figure 5 and 6 show that the distribution of contributions has moved slightly to the right between 1992 and 1996. The percentage of people contributing less than $2,000 remained stable between 1992 and 1996 at approximately 35%. Meanwhile, the percentage of individuals contributing between $2,001 and $8,000 increased from 46% in 1992 to 53% in 1996. However, the changes are obvious when reviewing the percentage of households contributing an amount of $8,001 and over. In 1992, only 8% of the individuals contributing to an RRSP made a contribution of $8,001 and over while this percentage increased to 15% in 1996. The shift to the right in the RRSP contribution distribution may be

explained by the period of recession previous to 1992. When compared, the year of 1996 was a far better year of economic prosperity than that of 1992. Hence, the amounts invested in retirement savings were clearly higher in 1996. Another factor may explain the important increase in RRSP contributions in the past years. Since 1990, it is allowed to defer RRSP contributions to following years. Thus, people can accumulate contribution room and invest in a RRSP when the economic situation is better.

Table IX : Characteristics of Households With and Without RRSPs in 1992

Characteristics	Households			
	All	Did not Contribute	Contributed to an RRSP	Withdrew from an RRSP
RRSP contribution or withdrawal	1 068 $	0 $	4 035 $	- 6 344 $
Income	51 734 $	40 899 $	71 362 $	51 644 $
Age	43.4 years	42.8 years	44.0 years	47.3 years
Sex				
Male	59.3%	56.8%	63.7%	60.8%
Female	40.7%	43.2%	36.3%	39.2%
Family Size	2.75	2.67	2.91	2.60
Has another pension plan	17.9%	13.5%	26.5%	13.7%
Net Asset	68 925 $	49 685 $	101 600 $	84 357$
Provinces				
Ontario	37.0%	35.3%	39.8%	39.4%
Quebec	27.3%	30.0%	23.3%	21.1%
Newfoundland	1.7%	2.1%	1.2%	1.1%
Prince-Edward-Island	0.4%	0.5%	0.4%	0.5%
Nova Scotia	3.2%	3.6%	2.4%	2.9%
New Brunswick	2.5%	2.7%	2.2%	1.7%
Manitoba	3.7%	3.4%	4.3%	2.3%
Saskatchewan	3.3%	3.1%	3.5%	3.7%
Alberta	9.3%	8.1%	11.2%	11.7%
British Columbia	11.6%	11.1%	11.9%	15.7%
Education				
Less than 9 years	12.4%	15.9%	6.3%	10.8%
Some or completed secondary	42.1%	46.6%	34.8%	36.5%
Some post-secondary non-university	8.7%	8.7%	8.7%	8.7%
Post secondary certificate or diploma	22.0%	18.8%	26.9%	27.1%
University certificate or diploma	14.8%	10.0%	23.3%	16.9%
Marital Status				
Married	66.6%	60.4%	76.9%	72.3%
Single	14.6%	16.9%	11.2%	10.0%
Other (separated, divorced, widowed)	18.8%	22.7%	11.9%	17.7%
Number of households	8037	4966	2703	368

Source : Calculation using 1992 Survey of Family Expenditures, Statistics Canada

Note : Using $ of 1996

Table X : Characteristics of Households With and Without RRSPs in 1996

Characteristics	Households			
	All	Did not Contribute	Contributed to an RRSP	Withdrew from an RRSP
RRSP contribution or withdrawal	1 724 $	0 $	5 088 $	- 5 740 $
Income	52 762 $	39 615 $	72 041 $	48 602 $
Age	43.9 years	44.2 years	43.0 years	47.7 years
Sex				
Male	56.8%	54.8%	59.6%	57.8%
Female	43.2%	45.2%	40.4%	42.2%
Family Size	2.72	2.59	2.9	2.7
Has another pension plan	18.4%	28.9%	2.4%	26.3%
Net Asset	66 374 $	49 282 $	89 206 $	79 452 $
Provinces				
Ontario	36.8%	34.7%	39.6%	38.5%
Quebec	26.9%	31.0%	21.8%	19.1%
Newfoundland	1.8%	2.1%	1.4%	1.5%
Prince-Edward-Island	0.4%	0.5%	0.4%	0.5%
Nova Scotia	3.1%	3.4%	2.7%	3.2%
New Brunswick	2.4%	2.7%	1.9%	2.2%
Manitoba	3.7%	3.4%	4.0%	4.5%
Saskatchewan	3.2%	3.0%	3.5%	2.6%
Alberta	9.0%	7.1%	11.5%	12.0%
British Columbia	12.7%	12.1%	13.2%	15.9%
Education				
Less than 9 years	9.6%	13.6%	4.0%	9.9%
Some or completed secondary	40.0%	45.2%	31.7%	37.5%
Some post-secondary non-university	8.1%	8.1%	8.1%	9.2%
Post secondary certificate or diploma	26.4%	22.0%	32.3%	28.5%
University certificate or diploma	16.3%	11.1%	23.9%	14.9%
Marital Status				
Married	65.2%	57.0%	76.1%	71.2%
Single	16.9%	20.3%	12.9%	10.1%
Other (separated, divorced, widowed)	17.9%	22.7%	11.0%	18.7%
Number of households	8651	4852	3383	416

Source : Calculation using 1996 Survey of Family Expenditures, Statistics Canada

Tables IX and X present data on demographic and financial characteristics for various groups in 1992 and 1996. Weights were applied to adjust for geographical distribution.

First, we are going to look at the financial characteristics results. The data show that the households who made contributions in 1992 increased their account at an average of 4,035$ while those who made a withdrawal decreased their account an average of 6,344$. In 1996, the households who made contributions increased their account an average of 5,088$ while those who made a withdrawal decreased theirs an average of 5,740$. The average amount contributed in a RRSP increased more than $1,000 between 1992 and 1996 while the withdrawals were 600$ less in 1996 than they were 4 years earlier. We observe large differences in income and net assets between households who contributed to a RRSP and those who did not. Actually, we observe that the mean amounts, for these two characteristics, were nearly two times higher for the households contributing to a RRSP in 1992 as well as in 1996. More than 25% of the households who contributed to an RRSP in 1992 were participating in another type of retirement or pension plan while this proportion was reduced to less than 14% for households who did not contribute or who made a withdrawal.

Among the demographic information provided by tables IX and X, we find the mean age and the gender of the head of households. The mean age of the individuals who contributed to a RRSP in 1992 was 44.0 years while the mean

age of those who made a withdrawal was 47.3 years. In 1996, they were respectively 43.0 and 47.7 years. This trend suggests that younger individuals begin to make contributions to a RRSP. Of all the people who made a contribution to a RRSP, 36.3% were women in 1992 while they totaled 40.4% in 1996. Of those without RRSP, the proportion of women was 43.2% in 1992 and 45.2% in 1996. A logical conclusion, based on the gender results, is that the proportion of women as head of household has grown between 1992 and 1996. The family size is the next demographic variable that is considered. The average family size of the households who contributed to a RRSP was considerably larger, with 2.9 members in both years, than the size of those who did not. There is also a noticeable difference in the level of education between the two groups. As predicted, the individuals with a higher level of education are more present in the contributing group. In 1992, 58.9% of the head of households who contributed had post-secondary education while 37.5% of those who did not contribute had more than secondary education. In 1996, those results were similar with 64.3% of the contributors having post-secondary education and 41.2% of the non-contributors having more than secondary education. Finally, it is obvious from the results that married couples are present in a higher proportion in the households who contributed than in any other category. More than three-quarters of the households who contributed were composed of a married couple in both years, while married couples composed two-third of the whole sample.

Empirical Specification

The model described in this section utilizes a two-step procedure, as defined in James J. Heckman 1979's "Sample Selection Bias as a Specification Error", to eliminate the bias that results from using non randomly selected samples to estimate behavioral relationships. The sample selection bias may arise in our model because of sample selection decisions we made.

Firstly, we estimate the parameters of the probability that RRSP (Contribution to a RRSP) > 0 using probit analysis for the full sample. From this estimator, we can estimate the inverse of Mill's ratio. All of these estimators are consistent. Secondly, we enter the estimated value of the inverse of Mill's ratio as a regressor in the second equation. The variable RRSP being observed, it is possible to estimate the parameters of the second equation by ordinary least squares. The empirical results were obtained using the "Heckman" function with the econometrics program Stata.

Regression Model for 1992 and 1996

We first estimate a probit for the decision to contribute to a RRSP using some of the independent variables previously defined. From this estimation, we obtain an estimator for the inverse of Mills' ratio, which is a monotone decreasing function of the probability that an observation is selected into the sample. We will use this estimator as a regressor in our second-step.

First Equation

$$\begin{aligned} RRSP = {} & \beta_1 + \beta_2 Income + \beta_3 Age + \beta_4 df + \beta_5 Family\ Size + \beta_6 Net\ Assets + \\ & \beta_7 dPension + \beta_8 dQue + \beta_9 dNFL + \beta_{10} dPEI + \beta_{11} dNS + \beta_{12} dNB + \\ & \beta_{13} dManitoba + \beta_{14} dSask + \beta_{15} dAlb + \beta_{16} dBC + \beta_{17} dEduc1 + \\ & \beta_{18} dEduc3 + \beta_{19} dEduc4 + \beta_{20} dEduc5 + \beta_{21} dSingle + \beta_{22} OtherStatus \\ & + \varepsilon \end{aligned}$$

Where $RRSP = 1$ if contribution > 0
$RRSP = 0$ if contribution ≤ 0

The variables dOntario, dEduc2, and dMarried have been omitted to avoid the dummy trap. Those variables were selected because they were, according to Table IX and X results, the most important subgroup of their categories.

Table XI : Results of Regression for 1992 - First Step

RRSP Contributions	Probit		
	Coefficient	Standard error	Pr > |z|
Constant	-1.4329	0.0031	0.0000
Income	1.74E-05	2.20E-08	0.0000
Age	0.0034	4.73E-05	0.0000
DFemale*	0.0013	0.0011	0.2200
Family Size	-0.0842	0.0005	0.0000
Net Asset	1.37E-06	6.67E-09	0.0000
Dpension	0.2028	0.0012	0.0000
DQuebec*	0.0008	0.0012	0.5300
DNewfoundland	-0.1705	0.0041	0.0000
DPrinceEdwardIsland	0.0900	0.0074	0.0000
DNovaScotia	-0.0920	0.0030	0.0000
DNewBrunswick	0.0837	0.0032	0.0000
DManitoba	0.3525	0.0026	0.0000
DSasketchewan	0.2809	0.0027	0.0000
Dalberta	0.2110	0.0017	0.0000
DBritishColumbia	-0.0337	0.0016	0.0000
DEduc1	-0.1785	0.0018	0.0000
DEduc3	0.1191	0.0018	0.0000
DEduc4	0.2121	0.0013	0.0000
DEduc5	0.1770	0.0015	0.0000
DSingle*	-0.0014	0.0018	0.4100
DOtherStatus	-0.1798	0.0016	0.0000
Pseudo R^2	0.1704		
Number of observation	8037		

Note : * Coefficients are not significantly different from 0 at 0.05 level

Source : Calculations using the 1992 Survey of Family Expenditures

Probit is a statistical technique that measures the impact of explanatory variables on the probability of an individual choosing from a pair of discrete outcomes (such as whether or not to contribute to a RRSP). The results of the probit regression procedure indicate the level of probability of each variable to have an impact on the participation in a RRSP. In other words, it expresses how likely the different variables are to have an impact on the decision to contribute or not to a RRSP.

The estimates for 1992 simply show that a higher level of income, higher net assets and a contribution to another pension plan induce a higher probability to contribute to a RRSP. While the coefficient for dfemale is positive, it is not significant. The negative sign of the family size coefficient indicates that having a larger family is a factor that reduces the probability to participate to the plan.

The results display that, throughout Canada, residents of the provinces of Newfoundland, Nova Scotia, and British Columbia are less likely to contribute to a RRSP than those of Ontario, the results for the province of Quebec were not significant. Similarly, older people and individuals with higher education are always more likely to contribute. Further, households with other filling status (separated, divorced, widowed) are less likely to contribute than married ones, the coefficient for single head of households was not significant

The Chi-Square test for the probit regression model indicates that the null hypothesis, that there is no significant relationship between the independent variables and the dependent variable, can be rejected. Further, as indicated by the "Pseudo R2", the model's ability to explain the variation in the dependent variables was about 17%.

Second Equation

$$RRSPc = \beta_1 + \beta_2 IMR + \beta_3 Income + \beta_4 Age + \beta_5 Age^2 + \beta_6 df + \beta_7 Family\ Size + \beta_8 Net\ Assets + \beta_9 dQuebec + \beta_{10} dNFL + \beta_{11} dPEI + \beta_{12} dNS + \beta_{13} dNB + \beta_{14} dMan + \beta_{15} dSas + \beta_{16} dAlb + \beta_{17} dBC + \beta_{18} dSingle + \beta_{19} dOtherStatus + M$$

Table XII : Results of Regression for 1992 - Second Step

RRSP Contributions	Ordinary Least Square		
	Coefficient	Standard error	t
Constant	-1832.4320	43.0598	-42.5560
Mills' Ratio	1904.5970	15.4782	123.0510
Income	0.0683	0.0002	420.8340
Age	-48.9110	1.6207	-30.1790
Age2	0.9832	0.0177	55.3980
DFemale	-80.6970	4.9035	-16.4570
Family Size	-432.2900	2.3617	-183.0400
Net Asset	0.0077	0.0000	265.6870
DQuebec	-297.7460	6.0530	-49.1900
DNewfoundland	-562.1320	21.0060	-26.7610
DPrinceEdwardIsland	556.6380	36.8840	15.0920
DNovaScotia	-162.2960	14.8199	-10.9510
DNewBrunswick	170.0560	15.4854	10.9820
DManitoba	750.7850	11.6707	64.3310
DSasketchewan	1098.8560	12.6150	87.1000
Dalberta	1263.8490	7.7828	162.3910
DBritishColumbia	-99.2540	7.4360	-13.3480
DSingle	-385.9894	8.5645	-45.0680
DOtherStatus	-539.6770	8.2307	-65.5690
R^2	0.2511		
Number of observation	2703		

Note : Coefficients are all significantly different from 0 at 0.05 level

Source : Calculations using the 1992 Survey of Family Expenditures

The dependent variable of the second equation corresponds to the amount contributed to a RRSP by the household in the year studied. Table XII presents estimates of the second equation, estimated by ordinary least squares. In addition to the variables already included in the first equation, the variable age^2

is included to capture possible hump-shape saving profiles. Although, the terms regarding age do not indicate the presence of such profiles for 1992. As indicated by the R^2, the model's ability to explain the variation in the dependent variables is about 25%.

Table XIII : Results of Regression for 1996 – First Step

RRSP Contributions	Probit		
	Coefficient	Standard error	Pr > |z|
Constant	-1.8907	0.0038	0.0000
Income	1.45E-05	1.91E-08	0.0000
Age	0.0008	5.09E-05	0.0000
DFemale	0.0551	0.0010	0.0000
Family Size	-0.1231	0.0004	0.0000
Net Asset	1.30E-06	6.44E-09	0.0000
Dpension	1.0862	0.0020	0.0000
DQuebec	-0.0458	0.0012	0.0000
DNewfoundland	-0.1013	0.0038	0.0000
DPrinceEdwardIsland*	-0.0148	0.0072	0.0390
DNovaScotia*	-0.0027	0.0028	0.3420
DNewBrunswick	-0.0392	0.0032	0.0000
DManitoba	0.1560	0.0025	0.0000
DSasketchewan	0.2635	0.0027	0.0000
Dalberta	0.2171	0.0017	0.0000
DBritishColumbia	-0.0381	0.0015	0.0000
DEduc1	-0.1876	0.0021	0.0000
DEduc3	0.0828	0.0018	0.0000
DEduc4	0.2163	0.0012	0.0000
DEduc5	0.2351	0.0014	0.0000
DSingle	-0.0960	0.0016	0.0000
DOtherStatus	-0.2037	0.0015	0.0000
Pseudo R^2	0.2137		
Number of observation	8651		

Note : * Coefficients are not significantly different from 0 at 0.05 level

Source : Calculations using the 1996 Survey of Family Expenditures

The estimates for 1996 show some similarities with 1992. The level of income, the level of net assets and a contribution in another pension plan remained positive influences on the decision to contribute. The age, education and married

filling status were also correlated with a higher probability to contribute. The family size remained a negative influence on the probability to contribute to a RRSP in 1996. One variable did not have the same outcome for the two years : the gender. In 1996, being a woman had a significant positive impact on the contribution decision, meaning that women were more likely than men to contribute to a RRSP, while the results for 1992 were not significant.

Table XIV : Results of Regression for 1996 – Second Step

RRSP Contributions	Ordinary Least Square		
	Coefficient	Standard error	t
Constant	-5551.6810	55.4503	-100.1200
Mills' Ratio	2069.1840	18.1694	113.8820
Income	0.1043	0.0002	638.5460
Age	121.8664	2.3570	51.7030
Age2	-1.0974	0.0265	-41.3820
Dfemale*	-7.6854	6.4186	-1.1970
Family Size	-733.1542	3.3019	-222.0390
Net Asset	0.0041	0.0000	106.1770
DQuebec	143.1517	8.3664	17.1100
DNewfoundland	-548.2219	26.3356	-20.8170
DPrinceEdwardIsland	753.8735	49.5156	15.2250
DNovaScotia	1014.4570	19.2443	52.7150
DNewBrunswick*	26.1441	22.3004	1.1720
DManitoba	141.2275	16.0936	8.7750
DSasketchewan	750.8763	17.0521	44.0340
Dalberta	1074.8480	10.4539	102.8180
DBritishColumbia	396.6393	9.7408	40.7190
DSingle	-412.4222	11.1832	-36.8790
DOtherStatus	174.5329	11.3846	15.3310
R^2	0.2504		
Number of observation	3383		

Note : * Coefficients are not significantly different from 0 at 0.05 level

Source : Calculations using the 1996 Survey of Family Expenditures

In general, the empirical results found are consistent with previous studies. The coefficient for the variable *Income* is positive and highly significant for both years. The results of *Age* were found to be non-significant in the 1992 model. In 1996, the terms of *Age* indicate that older heads of households contribute significantly more to a RRSP than their younger counterparts, and we find that, conditioning on other attributes, RRSP contributions reach a peak at age 55.5. This result is consistent with Gale and Scholz who had found a lower peak at age 47 in their own regression of IRA contributions, which can be attributed to the lower average age of the contributors in their study. The dummy variable for the gender, *df*, is found to be significant for 1996 but non-significant for 1992. Hence, we cannot properly determine here whether the gender of the head of household has an impact on the amount contributed to a RRSP. In both years, the *family size* is negatively correlated with RRSP purchases and is statistically significant. The addition of a member to the household, other factors constant, diminishes the amount contributed annually to a RRSP between 430$ to 730$. Our results for *Net Assets* are consistent with Long but not with Gale and Scholz. Households with higher *Net Assets* contribute relatively more to a RRSP. The dummies for the provinces indicate that, of all the Canadian provinces, households from the Prairie Provinces (Alberta, Saskatchewan and Manitoba), Prince-Edward-Island and New Brunswick contributed more than the households from Ontario in 1992. In 1996, the results were quite different, only households from Newfoundland had smaller contributions than those from Ontario. Finally, the other filling status (separated, divorced, widowed) had lower contribution rates than that of married

couples in 1992 but higher in 1996. However, single heads of household always contribute less than their married counterparts.

In the previous section, we built our models using the variables that were available for both the years 1992 and 1996. The Household Survey Division of Statistics Canada modified its Survey of Family Expenditures in 1996. For instance, the questions regarding the language spoken and the occupation of the reference person were no longer present in the 1996 Survey. Presented here are the results of the 1992 regression using all the appropriate variables available.

Table XV : Characteristics of Households With and Without RRSPs in 1992, including variables for occupation and language

Characteristics	Households			
	All	Did not Contribute	Contributed to a RRSP	Withdrew from a RRSP
RRSP contribution or withdrawal	1 056 $	0 $	3 993 $	-6 318 $
Income	52 028 $	41 146 $	71 838 $	51 268 $
Age	43.3 years	42.7 years	43.8 years	47.4 years
Sex				
Male	59.4%	56.7%	64.0%	60.4%
Female	40.6%	43.3%	36.0%	39.6%
Family Size	2.75	2.68	2.91	2.61
Has another pension plan	18.1%	13.6%	26.7%	14.4%
Net Asset	68 524 $	49 264 $	101 352 $	83 306 $
Provinces				
Ontario	37.2%	35.2%	40.5%	39.0%
Quebec	27.4%	30.3%	23.2%	20.8%
Newfoundland	1.7%	2.0%	1.2%	1.1%
Prince-Edward-Island	0.4%	0.5%	0.4%	0.5%
Nova Scotia	3.2%	3.6%	2.5%	2.6%
New Brunswick	2.5%	2.7%	2.2%	1.7%
Manitoba	3.7%	3.4%	4.2%	2.4%
Saskatchewan	3.3%	3.2%	3.6%	3.7%
Alberta	9.2%	8.0%	11.0%	11.6%
British Columbia	11.4%	11.1%	11.2%	16.6%
Education				
Less than 9 years	12.2%	15.7%	5.9%	11.4%
Some or completed secondary	42.1%	46.7%	34.7%	35.5%
Some post-secondary non-university	8.6%	8.7%	8.6%	9.2%
Post secondary certificate or diploma	22.0%	18.7%	27.1%	27.3%
University certificate or diploma	15.1%	10.2%	23.7%	16.6%
Marital Status				
Married	66.8%	60.8%	76.9%	72.2%
Single	14.4%	16.6%	11.2%	9.3%
Other (separated, divorced, widowed)	18.8%	22.6%	11.9%	18.5%
Occupation				
Management, administration	12.3%	8.3%	19.6%	13.1%
Professional, technical	11.7%	8.8%	16.9%	10.9%
Teaching	3.9%	3.0%	5.8%	2.8%
Clerical	9.4%	8.9%	10.4%	9.7%
Sales	5.8%	5.2%	7.0%	5.6%
Services	9.8%	11.1%	7.6%	7.6%
Farming, fishing	2.4%	2.6%	2.1%	1.0%
Mining, processing	3.5%	3.6%	3.3%	2.8%
Fabricating, assembling	5.8%	5.9%	5.7%	5.1%
Construction	5.3%	5.3%	5.5%	4.3%
Other occupation	6.4%	6.8%	6.2%	3.5%
Not working	23.7%	30.5%	9.9%	33.6%
Language				
English	57.8%	54.8%	62.8%	62.4%
French	27.9%	30.8%	23.4%	22.2%
Other	14.3%	14.4%	13.8%	15.4%
Number of households	7655	4727	2581	347

Source : Calculation using 1992 Survey of Family Expenditures, Statistics Canada
Note : Using $ of 1996

Table XV provides us with the same information as table IX, with the addition of some household characteristics. The additional information included is concerning the occupation of the head of household and the language spoken in the household. The results are slightly different from table IX and the size of the sample is inferior, because in estimating the model we excluded households from the sample if, for instance, they declared an income inferior to zero. It can be observed that managers, administrators, professionals, clerical and workers of the service sector were the major occupations and occupied 43% of the total number of contributors. The occupations were more widespread in regard to those who did not contribute. Although, the sector of services was the major occupation of this group which consisted of more than 10% of the non contributing households. We notice that almost 30.5% of those who did not contribute were unemployed while this proportion was around 10% for those who contributed. Note that the group of non contributors also include households where the reference person is retired and may receive alternate types of retirement benefits other than RRSP withdrawals.

The variable *language* informs us of the composition of the language groups. The highest percentage of those who contributed comes from households where the reference person was speaking English as its principal language. These results were consistent with the regression results showing that households from Quebec made smaller contributions than households from most of the other provinces.

The Regression Model for 1992 including variables for occupation and language of the head of household

First Equation

$$RRSP = \beta_1 + \beta_2 Income + \beta_3 Age + \beta_4 df + \beta_5 Family\ Size + \beta_6 Net\ Assets + \beta_7 dPension + \beta_8 dQue + \beta_9 dNFL + \beta_{10} dPEI + \beta_{11} dNS + \beta_{12} dNB + \beta_{13} dManitoba + \beta_{14} dSask + \beta_{15} dAlb + \beta_{16} dBC + \beta_{17} dEduc1 + \beta_{18} dEduc3 + \beta_{19} dEduc4 + \beta_{20} dEduc5 + \beta_{21} dSingle + \beta_{22} dOtherFilings + \beta_{23} dAdmin + \beta_{24} dtechn + \beta_{25} dteach + \beta_{26} dclerc + \beta_{27} sales + \beta_{28} dfarm + \beta_{29} dmining + \beta_{30} dfabr + \beta_{31} dconst + \beta_{32} dOtherProf + \beta_{33} Unempl + \beta_{34} dFrench + \beta_{35} dLOther + \varepsilon$$

Where RRSP = 1 if contribution > 0
RRSP = 0 if contribution ≤ 0

Second Equation

$$RRSPc = \beta_1 + \beta_2 IMR + \beta_3 Income + \beta_4 Age + \beta_5 Age^2 + \beta_6 df + \beta_7 Family\ Size + \beta_8 Net\ Assets + \beta_9 dQue + \beta_{10} dNFL + \beta_{11} dPEI + \beta_{12} dNS + \beta_{13} dNB + \beta_{14} dMan + \beta_{15} dSas + \beta_{16} dAlb + \beta_{17} dBC + \beta_{18} dSingle + \beta_{19} dOtherStatus + \beta_{20} dFrench + \beta_{21} dLOther + \varepsilon$$

Table XVI : Results of Regression for 1992, including variables for occupation and language of the head of households – First Step

RRSP Contributions	Probit		
	Coefficient	Standard error	Pr > |z|
Constant	-1.6548	0.0036	0.0000
Income	1.50E-05	2.39E-08	0.0000
Age	0.0101	5.37E-05	0.0000
DFemale	0.0489	0.0012	0.0000
Family Size	-0.0860	0.0005	0.0000
Net Asset	1.62E-06	7.07E-09	0.0000
Dpension	0.1629	0.0013	0.0000
DQuebec	0.0221	0.0020	0.0000
DNewfoundland	-0.1689	0.0043	0.0000
DPrinceEdwardIsland*	-0.0061	0.0076	0.4200
DNovaScotia	-0.0968	0.0031	0.0000
DNewBrunswick	0.0624	0.0033	0.0000
DManitoba	0.2861	0.0027	0.0000
DSasketchewan	0.2600	0.0028	0.0000
Dalberta	0.1653	0.0018	0.0000
DBritishColumbia	-0.0769	0.0018	0.0000
DEduc1	-0.1509	0.0019	0.0000
DEduc3	0.0975	0.0019	0.0000
DEduc4	0.1936	0.0014	0.0000
DEduc5	0.1668	0.0018	0.0000
DSingle	-0.0068	0.0019	0.0000
DOtherStatus	-0.2100	0.0017	0.0000
Dadmin	0.3399	0.0022	0.0000
Dtechn	0.2335	0.0023	0.0000
Dteach	0.0563	0.0031	0.0000
Dclerc	0.2360	0.0023	0.0000
Dsales	0.2495	0.0026	0.0000
Dfarm	0.1967	0.0036	0.0000
Dmining	0.1300	0.0031	0.0000
Dfab	0.1614	0.0026	0.0000
Dconst	0.1819	0.0027	0.0000
DOtherProf	0.1833	0.0026	0.0000
Dunemp	-0.3877	0.0022	0.0000
Dfrench	-0.0909	0.0020	0.0000
DOtherLanguage	-0.0424	0.0016	0.0000
Pseudo R^2	0.1919		
Number of observation	7588		

Note : * Coefficients are not significantly different from 0 at 0.05 level

Source : Calculations using the 1992 Survey of Family Expenditures

Table XVII : Results of Regression for 1992, including variables for occupation and language of the head of households – Second Step

RRSP Contributions	Ordinary Least Square		
	Coefficient	Standard error	t
Constant	-1920,4750	41,8057	-45,9380
Mills' Ratio	1222,7590	12,2701	99,6530
Income	0,0599	0,0001	465,1930
Age	9,7691	1,6421	5,9490
Age2	0,2679	0,0180	14,8830
DFemale	-59,6649	4,8288	-12,3560
Family Size	-393,9303	2,3201	-169,7880
Net Asset	0,0074	0,0000	263,4410
Dquebec*	11,9713	9,9142	1,2070
DNewfoundland	-409,1491	20,6047	-19,8570
DPrinceEdwardIsland	585,1821	36,0552	16,2300
DNovaScotia*	8,8361	14,3696	0,6150
DNewBrunswick	229,0559	15,0589	15,2110
DManitoba	675,9040	11,3475	59,5640
DSasketchewan	1046,7420	12,1864	85,8950
Dalberta	1258,7600	7,5405	166,9330
DBritishColumbia	-20,6508	7,5178	-2,7470
DSingle	-308,6252	8,4308	-36,6070
DOtherStatus	-381,2680	7,9563	-47,9200
Dfrench	-321,0924	9,9127	-32,3920
DOtherLanguage	26,3127	6,6459	3,9590
R^2	0,2596		
Number of observation	2581		

Note : * Coefficients are not significantly different from 0 at 0.05 level

Source : Calculations using the 1992 Survey of Family Expenditures

The addition of the variables *occupation* and *language* only slightly affects the results of the regression. The signs of the coefficients remain generally the same. The dummies for Services and English were omitted to avoid the dummy trap. We observe that all the coefficients for the occupation dummies are positive, implying that any category of occupation is more likely to contribute than people working in the service sector.

Everything being equal, a household where the reference person has French as a principal language contributes significantly less than other households. The results show that the French speaking households contribute on average $321.09 less annually than English speaking households.

The probit model results show that households of all occupations, except unemployed, are more likely to contribute than households where the reference person works in the service sector. However, the administrators and professionals are the groups most likely to contribute.

We do not use a Tobit regression in any of our models, like other studies have done, because we surmise that there is no bunching of households reporting the maximum contributions allowed. To support that statement, The Globe and Mail reported in March 1998 that only 13% of the total RRSP contribution room available was used. The most recent edition of *Taxation Statistics*, shows that more affluent Canadians account for proportionately more retirement savings, especially RRSP contributions. On average, those under age 45 used 11.0 percent of their RRSP room, while those 45 and over used 18.6 percent.

CONCLUSION

The Canadian situation regarding public pension plans is being jeopardized by the demographic situation. Thus, it is appropriate to examine how households value another possible source of income, private savings, in order to avoid being affected by anticipated future governmental decisions. The purpose of this study was to evaluate the Canadian households behavior towards Registered Retirement Savings Plan to gain an early understanding of the factors that affect the decision to contribute and the amounts contributed in that specific private retirement savings program.

This paper has utilized a data source that provides the amount of individual taxpayer contributions to RRSPs. From that source, a model of contribution behavior has been established and estimates of the impact of specific variables on the contribution decision and amount have been found. The same model was applied to the years 1992 and 1996. The age and the gender of the head of household had a significant positive impact on the contribution decision only in 1996. The results found them to be non significant in the 1992 model. The family size and making a contribution in another pension plan had a negatively, statistically significant, impact on the amount of contributions made to a RRSP in both years. We notice, looking at the results, that there are important variations in contributions throughout the different Canadian provinces. This may derive from different preferences between individuals, as well as from a higher valorization for private savings in some provinces deriving from publicity or

differences in provincial legislation. The amount of contributions made to a RRSP rises as the level of education rises, with a large gap between the two first levels (less than 9 years and some or completed secondary education) and the last two levels (post-secondary certificate or diploma and university certificate or diploma). As predicted in our specification, head of households with higher education are more likely to make contributions to a RRSP, consistent with more-educated people finding transaction costs less burdensome.

Those empirical results, generally consistent with results of previous studies, provide us with various types of information about the way different groups of households manage their retirement savings. The effect of the level of education on the decision to participate to a RRSP or not suggests that a better system of information offered to people would probably reduce the gap between more and less-educated households. The differences in contribution among the residents of the different Canadian provinces could also be abolished if we determine whether the propensity of the individuals to save or the quality of the information about RRSP is at the origin of the differentiation.

Following our review of the Canadian situation concerning the public retirement savings plans and the modeling of the private retirement savings, we can conclude that the best plan offered to Canadians for their own retirement savings, the RRSP, is very likely to see an important increase in popularity in the next decades. Today, RRSP benefits represent only 3% of all retirement income

sources for the typical couple ages 65 and over, while government pensions provide 33% of their over-all income.[3] In the decades to follow, the process of reduction in public pension benefits will lead to a lower share of governmental contribution in elderly wealth. The prediction we make here is that the loss in public pension benefits will have to be replaced by private retirement savings benefits; if the individuals soon take the responsibility to save for their own retirement. Therefore, accurate information must be given to the individuals to assist them in understanding the situation and the actual need to count more on their own resources for their elder years rather than on the government.

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[3] Globe and Mail, March 1998

APPENDIX A : LIST OF VARIABLES

RRSP :	decision to contribute in a RRSP in a determined year
RRSPc :	Amount of contribution in a Registered Retirement Savings Plan
Age :	Age of head of household
Income :	Income of household before taxes
Df :	Dummy for female (head of household)
Family Size :	Number of persons a member of household at December 31, of the year studied
Dpension :	Dummy for contribution in another pension fund
Net asset :	Value of net asset (Non liquid asset-debt) owned at December 31, of the year studied
Dprov :	Dummy for provinces
Deduc :	- educ1 : less than 9 years of education - educ2 : some or completed secondary school - educ3 : some post secondary education - educ4 : post secondary certificate or degree - educ5 : university degree
Dmarie :	Dummy for married or common-law
Dsingle :	Dummy for single (never married)
Dmsother :	Dummy for other filling status (separated, divorced, widowed)
Dadmin :	Manager, administrator (head of household)
Dtechn :	Professional, technical
Dteach :	Teaching
Dcler :	Clerical
Dsales :	Sales
Dfarm :	Mining, process, etc
Dfab :	Fabricating, assembly, etc
Dconst :	Construction
Dpother :	Other occupation
Dunemp :	Not working
Denglish :	Dummy for english language spoken (head of household)
Dfrench :	Dummy for french language spoken
Dlother :	Dummy for other language

APPENDIX B : SUMMARY OF EMPIRICAL RESULTS FOR THE YEARS 1992, 1992 PLUS AND 1996

	Coefficients											
	1992				1992 PLUS				1996			
	First Step Probit	Significant	Second Step OLS	Significant	First Step Probit	Significant	Second Step OLS	Significant	First Step Probit	Significant	Second Step OLS	Significant
Constant	-1,4329	yes	-1832,43	yes	-1,6548	yes	-1920,475	yes	-1,8907	yes	-5551,681	yes
Inverse of Mills' Ratio	-	-	1904,59	yes	-	-	1222,759	yes	-	-	2069,184	yes
Income	1,74E-05	yes	0,0683	yes	1,50E-05	yes	0,0599	yes	1,45E-05	yes	0,1043	yes
Age	0,0034	yes	-48,9110	yes	0,0101	yes	9,7691	yes	0,0008	yes	121,8684	yes
Age2	-	-	0,9832	yes	-	-	0,2679	yes	-	-	-1,0974	yes
DFemale	0,0013	no	-80,6970	yes	0,0489	yes	-59,6649	yes	0,0551	yes	-7,6854	no
Family Size	-0,0842	yes	-432,29	yes	-0,086	yes	-393,9303	yes	-0,1231	yes	-733,1542	yes
Net Asset	1,37E-06	yes	0,0077	yes	1,62E-06	yes	0,0074	yes	1,30E-06	yes	0,0041	yes
Dpension	0,2028	yes	-	-	0,1629	yes	-	-	1,0862	yes	-	-
DQuebec	0,0008	no	-297,746	yes	0,0221	yes	11,9713	no	-0,0458	yes	143,1517	yes
DNewfoundland	-0,1705	no	-562,132	yes	-0,1689	yes	-409,1491	yes	-0,1013	yes	-548,2219	yes
DPrinceEdwardIsland	0,0900	yes	556,638	yes	-0,0061	no	585,1821	yes	-0,0148	no	753,8735	yes
DNovaScotia	-0,0920	yes	-162,296	yes	-0,0988	yes	8,8361	no	0,0027	no	1014,457	yes
DNewBrunswick	0,0837	yes	170,056	yes	0,0624	yes	229,0559	yes	-0,0392	yes	26,1441	no
DManitoba	0,3525	yes	750,785	yes	0,2861	yes	675,904	yes	0,1560	yes	141,2275	yes
DSasketchewan	0,2809	yes	1098,856	yes	0,2600	yes	1046,742	yes	0,2635	yes	750,8763	yes
Dalberta	0,2110	yes	1263,849	yes	0,1653	yes	1258,76	yes	0,2171	yes	1074,848	yes
DBritishColumbia	-0,0337	yes	-99,254	yes	-0,0769	yes	-20,6508	yes	-0,0381	yes	396,6393	yes
DEduc1	-0,1785	yes	-	-	-0,1509	yes	-	-	-0,1876	yes	-	-
DEduc3	0,1191	yes	-	-	0,0975	yes	-	-	0,0828	yes	-	-
DEduc4	0,2121	yes	-	-	0,1936	yes	-	-	0,2163	yes	-	-
DEduc5	0,1770	yes	-	-	0,1668	yes	-	-	0,2351	yes	-	-
DSingle	-0,0014	no	-385,9894	yes	-0,0068	yes	-308,6252	yes	-0,0960	yes	-412,4222	yes
DOtherStatus	-0,1798	yes	-539,677	yes	-0,2100	yes	-381,268	yes	-0,2037	yes	174,5329	yes
Dadmin	N/A	N/A	N/A	N/A	0,3399	yes	-	-	N/A	N/A	N/A	N/A
Dtechn	N/A	N/A	N/A	N/A	0,2335	yes	-	-	N/A	N/A	N/A	N/A
Dteach	N/A	N/A	N/A	N/A	0,0563	yes	-	-	N/A	N/A	N/A	N/A
Dclerc	N/A	N/A	N/A	N/A	0,2360	yes	-	-	N/A	N/A	N/A	N/A
Dsales	N/A	N/A	N/A	N/A	0,2495	yes	-	-	N/A	N/A	N/A	N/A
Dfarm	N/A	N/A	N/A	N/A	0,1967	yes	-	-	N/A	N/A	N/A	N/A
Dmining	N/A	N/A	N/A	N/A	0,1300	yes	-	-	N/A	N/A	N/A	N/A
Dfab	N/A	N/A	N/A	N/A	0,1614	yes	-	-	N/A	N/A	N/A	N/A
Dconst	N/A	N/A	N/A	N/A	0,1819	yes	-	-	N/A	N/A	N/A	N/A
DOtherProf	N/A	N/A	N/A	N/A	0,1833	yes	-	-	N/A	N/A	N/A	N/A
Dunemp	N/A	N/A	N/A	N/A	-0,3877	yes	-	-	N/A	N/A	N/A	N/A
Dfrench	N/A	N/A	N/A	N/A	-0,0909	yes	-321,0924	yes	N/A	N/A	N/A	N/A
DOtherLanguage	N/A	N/A	N/A	N/A	-0,0424	yes	26,3127	yes	N/A	N/A	N/A	N/A
R^2	0,1704		0,2511		0,1919		0,2596		0,2137		0,2504	
Number of observation	8037		2703		7588		2581		8651		3383	

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