SECURITY FOR SOCIAL SECURITY:

IS PRE-FUNDING THE ANSWER?

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ABSTRACT

In the United States, President Clinton has proposed creating larger social security funds and investing a portion of them in the private sector. Others have suggested more radical reforms such as moving Social Security from a Defined Benefit scheme to a Defined Contribution plan based on the Chilean model. Canada has moved to a system of greater pre-funding for the C/QPP in order to cap contribution rates at 9.9 percent. These proposals are based on the goal of creating higher investment returns, in order to make social security benefits easier to finance in the long run.

The important public policy issues inherent in such proposals are numerous: questions of whether pre-funded social security plans are demographically immune; whether pre-funding social security can increase gross national savings and worker productivity; whether there are better ways to create a healthy economy; whether social security is best offered as a defined-benefit plan or a defined-contribution plan. This paper reviews each of these important public policy issues in the context of recent social security policy initiatives in Canada and the U.S.

After an extensive review of the literature the paper concludes that greater pre-funding of social security will not, of and by itself, create a more secure system.

I. INTRODUCTION

This paper discusses the issues surrounding the manner of financing the social security systems in Canada and the U.S., which is an important public policy agenda item at this time. The paper critiques moves toward greater pre-funding of social security. There are numerous authors now speaking in favor of some form of greater pre-funding (see, for example, Robson, 1995, Slater, 1995, World Bank, 1994, Taverne, 1995, Kotlikoff et al, 1996, Pesando, 1997, and Ferrara and Tanner 1998). At the moment, they appear to have the ear of policymakers and do not require further support. Instead, the purpose of this paper is to pose important questions that need to be answered by policymakers before any move is made toward greater pre-funding of social security.

Actuaries, by their training, have a natural pre-disposal to favor pre-funding. As stated by Miles Dawson (1917):

> ...actuaries approach it as if it were settled in advance that there ought to be a reserve and after a good deal of study and investigation are not so certain they are right.

The reason for this is that actuaries tend to work with private sector pension plans which must be pre-funded, in fact, fully pre-funded. This is because, no matter who the employer is, any company can cease to exist at any moment which would leave an under-funded pension with future promised benefits and no way to pay them. This is not true of a government social security system, however. By definition, the government will always be there (maybe not the same ruling party, but the government) to see that future promised benefits are, in fact, met with actual benefits. Thus, it is very dangerous to try to create analogies between private pensions and public social security schemes. They are remarkably different animals. In fact, this author would go so far as to say:

Proposition 1: Social Security is not a large private sector pension. It is instead, a macroeconomic means of wealth transfer, whereby workers transfer wealth to the elderly through their social security contributions. This is true whether the plan is pre-funded or pay-as-you-go.

For the discussion that follows, the meanings of the words *pay-as-you-go* and *funded* need to be carefully understood. Neither word is taken in its absolute meaning. For example, pay-as-you-go funding does not mean no contingency fund at all. In fact, the paper assumes that any system that carries only a small contingency (for example, one year of benefit expenditures) is a pay-as-you-go system. Similarly, funded does not mean absolutely fully funded; any scheme that creates investable funds measurably larger than a small contingency reserve is included in the category of "pre-funded" schemes.

Until recently, both the Old Age, Survivors and Disability Insurance (OASDI) system in the U.S. and the Canada/Quebec Pension Plans (C/QPP) in Canada would have been labeled as pay-as-you-go. However, that will not remain true. In Canada, recent government amendments to the C/QPP raise the contribution rate from 6.0 percent to 9.9 percent (split equally between employer and employee) by 2003 and create a fund worth five years of benefit expenditures. In the U.S., the Intermediate projections of the 'fund'

indicate that it is expected to be worth a maximum of 3.64 years of benefits and expenses in 2013. The maximum cash balance according to the Intermediate projections is $4.4 trillion in 2020 (OASDI Trustees Report, 1999). Thus, neither OASDI nor the amended C/QPP would be referred to as pay-as-you-go today or in the near future.

Any social security system will have mandatory worker contributions and a set of promised benefits to today's and future retirees. To determine the key variables in setting the required contribution rate for any retirement system, we outline two equations.

First, we show the equation that would be necessary in an Individual Account system where each worker provides for his or her own benefits and benefits are indexed to the cost of living (e.g. Consumer Price Index). For every dollar of benefit expected at age 65, the required contribution is:

$$C = \frac{\int_{65}^{\infty} e^{-dx} \; l_x \; dx}{\int_{20}^{65} e^{-dx} \; l_x \; dx} \qquad \text{assuming contributions start at age 20}$$

where: d is the real rate of interest earned on the invested funds, after inflation (both before and after retirement)

and l_x is the probability of being alive at age x.

Normally, mortality is relatively easy to predict on a macro-economic basis (although it is not for any individual). Thus, if one is attempting to establish guidelines for a social security system defined by Individual Accounts, then one variable is life expectancy, but the most important variable is the rate of return on invested assets.

Now, let us proceed to show the parallel equation that would be required for a pure pay-as-you-go social security system where contributions made by workers in the morning are paid out as benefit dollars to retirees by the end of the working day. No investment income is earned on the social security dollars. Here:

$$C = \frac{\int_{65}^{\infty} e^{-rx} \; L_x \; dx}{\int_{20}^{65} e^{-rx} \; L_x \; dx}$$

where: r is the rate of increase of national wages on which contribution are made

and L_x is the actual number of people in the system aged x.

Thus, we can see that a pay-as-you-go financed social security system is very dependent of the ratio of retirees to workers, and on the rate of increase in covered wages. The latter, covered wages, is in turn, very dependent on the growth rate of the recognized labour force (i.e. there may be an underground or cash economy) and the productivity of the workers. For example, if the ratio of retirees to workers were to double in one generation (say 25 years) but workers were to become more productive by 2.8 percent per

annum (a high rate of increase) then, in theory, workers could support this doubling of the Dependency Ratio with the same contribution rate (all else equal). This is because, at 2.8 percent per annum, productivity would exactly double in 25 years.

Proposition 2: The contribution rate required for a fully-funded social security system is highly dependent on the real rates of return realized on invested assets. The contribution rate required for a pay-as-you-go social security system is highly dependent on the ratio of dependents to workers and the rate of increase in covered wages. The latter, in turn, is dependent on the growth rate of the labour force and the growth rate of worker productivity.

One important goal often stated in favor of reform is the stability of contribution rates. As discussed, the contribution rates for a fully funded scheme are a function of the real rates of return earned by the funds. Thus, a truly fully funded scheme does not create stable contribution rates. Contribution rates rise and fall inversely to real interest rates, as private pension actuaries can attest. In fact, contribution rates fluctuate more than interest rates because each year's contribution must cover both the value of the benefits earned for the year and the actuarial experienced gain or loss on the benefits for all past years.

On the other hand, pure pay-as-you-go system has contribution rates that rise and fall with the ratio of retirees to workers and the rate of increase of (contributory) national income. Thus, a pure pay-as-you-go system also cannot expect long-term stable contribution rates.

Proposition 3: There is nothing inherent in the mechanisms of a fully-funded social security system to make it any more stable than a pay-as-you-go system.

Both financing extremes would require immediate attention if any variable evolves other than the modeled expectations. However, either a pay-as-you-go system with a small contingency fund or a partially funded system that can use its reserves to soften the immediate need for contribution rate changes can result in achieving level and stable contribution rates for long periods.

There is one extra risk inherent in a pay-as-you-go social security system that does not come through in the actuarial formula, and that is political risk. Any pay-as-you-go system can be financed in its early years with relatively small contributions since there are normally very few full beneficiaries in a new system. As time goes along, pay-as-you-go systems can require significant increases in the contribution rate. This can be met by opposition by workers and voters. One response can be to renege on promised benefits. This can be done by re-designing the social security system (if the voters support such a move). For example, in the 1996 reform to the Canada/Quebec Pension Plans, the plan benefits were reduced by 10 percent. This was an essential element in achieving a long-term contribution ceiling of 9.9 percent.

So, one must be concerned about the political stability of the sponsoring agency who backs the social security system. In countries like Canada and the United States, this should not be a huge problem, but in countries with corrupt governments, it is. However, this author would offer the following comment:

Proposition 4: In a country with a corrupt government, the only thing riskier to the worker than a pay-as-you-go social security system is a funded social security system.

Certainly, it is terrible if retirees suddenly find that they are not being paid the benefits they were promised. However, I would submit that it is even worse if government officials abscond with workers funds thus leaving retirees with no benefits and workers with no assets.

II ADVANTAGES OF PAY-AS-YOU-GO FINANCING

While pay-as-you-go financing has the disadvantage of being demographically sensitive, there are several advantages of government-sponsored pay-as-you-go schemes.

1. The entire working population can be covered relatively easily. In 1996 in Canada, only 47 percent of workers were covered by employer pension plans--only 33% for private sector workers (Statistics Canada, 1997). In the U. S., the percentage of all workers participating in pension plans declined from 46 percent in 1979 to 44 percent in 1993 (Rejda, 1998, p75).

2. Benefits can be immediately vested and are fully portable, important features for the mobile work force of today. This is not the norm in private plans today.

3. Because contribution income immediately becomes benefit pay-out, no problem exists with indexing benefits to wages. In fact, there exists a source of 'actuarial discounting' for years with real productivity gains if benefits are indexed to cost of living and contributions are indexed to average wages (the norm). Indexation has remained only a future hope for private plans.

4. Administrative costs are usually very low per unit of cash flow, much lower than for private plans. The C/QPP administrative costs are only 1.3 percent of cash flow (OSFI, 1998). For OASDI, the comparable figure is 0.8 percent (OASDI Trustee's Report, 1999). No private plan operates at expense ratios that are this low. Many smaller private plans have expense ratios that are four to five times as large thus negating any potentially higher gross rate of return on assets of a pre-funded plan.

III. WHY THE INTEREST IN GREATER PRE-FUNDING OF SOCIAL SECURITY?

Many industrialized nations are currently considering some form of higher pre-funding of their social security systems; including both Canada and the U.S.. The supporters of these various proposals claim that today's younger workers and tomorrow's working generation will be better off with a changed social security system. But after a half century of relative stability in the philosophical underpinnings of social security, why the apparent sudden interest in change?

One of the driving forces for reform is the impending dramatic shift in the demographics underlying social security. These forces have been widely analyzed and well understood. First, life expectancy has improved substantially and is continuing to improve. Statistics for the U.S. are given in Table 1.

TABLE 1
LIFE EXPECTANCY IN THE UNITED STATES

Year	At Birth		At Age 65	
	Male	Female	Male	Female
1920	55.6	57.6	12.2	12.7
1960	66.8	73.2	12.9	15.8
1990	71.8	78.8	15.1	19.0
1998*(est)	73.4	79.4	15.7	19.2

Source: U. S. Life Tables.
*OASDI Trustees Annual Report, 1999, p62.

TABLE 2
LIFE EXPECTANCY IN CANADA

| Year	At Birth		At Age 65	
	Male	Female	Male	Female
1931	60.0	62.1	13.0	13.7
1951	66.3	70.8	13.3	15.0
1971	69.3	76.4	13.7	17.4
1991	74.6	80.9	15.7	19.9

Source: Statistics Canada, Life Tables, Canada and the Provinces (several).

More important, however, are the well known impending demographic dependency shifts as the baby boom moves out of the labor force and into retirement and is replaced by the baby-bust cohort. This fast approaching force is seen clearly in Figure 1 that follows.

The graphs in Figure 1 are called population pyramids. They are actually sideways population histograms, with males on the left and females on the right. The histograms (bars) represent the number of people (or equivalently the percentage of the population) in each of twenty age groups (i.e. five-year age groups). The last group at the top is the total of all those aged 90 and over.

Figure 1

Changes in the Age Structure
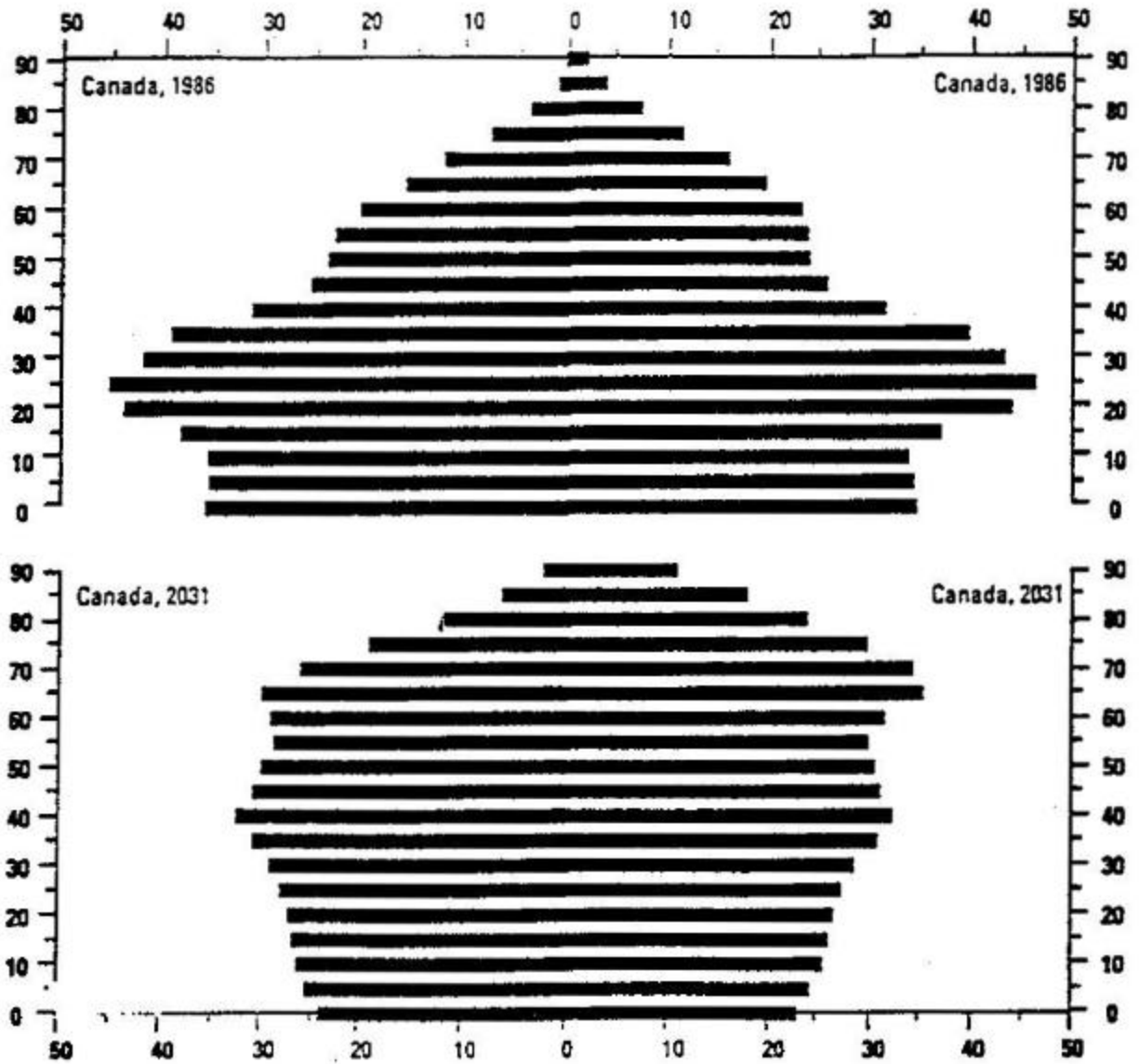
Canada's Age Structure: 1986 and projected for 2031

North America has already experienced the economic impact of the baby boom in its youth and in its entry into the labor force. When baby boomers bought homes, house prices and mortgage rates rose measurably. When they entered the workforce, youth unemployment rates skyrocketed. Their entry into the labor force has also been blamed for dampening rates of productivity improvement as business chose to buy cheap labor instead of more expensive capital.

Those who favor pre-funding of social security to some extent argue that the resultant large asset pools can be invested to aid in overcoming the impact of these demographic shifts on pay-as-you-go contribution rates. Through enhanced economic growth, it is said, faster wealth creation makes larger wealth transfers possible. For example, assume that the cost of retirement income security and health care for the aged today costs 12.5% of all wages from all workers. That means that a worker who is paid for a 40-hour week has to work 5 hours to take care of the benefits for the dependent elderly. Assume that over the next 35 years the ratio of elderly to workers doubles. With no change in worker productivity, each worker would have to contribute 25% of wages, or work 10 hours, to fund the benefits for the dependent elderly. However, if every worker were to become twice as productive (which would require only 2% improvement per annum for the 35 years), then each worker would produce enough goods and services to meet the needs of the dependent elderly in the same 5 hours it takes today.

In fact, Emery and Rongve (1999) argue that if you assume economic growth, then every generation is wealthier than the previous generation. Thus, if pay-as-you-go rates rise, we may be asking the future generation to pay a larger percentage of wages to finance Social Security, but this may still leave them with more disposable income than today's workers. Accelerating the rate of increase in social security contributions today, Emery and Rongve argue, could be intergenerationally regressive. If financing is left as pay-as-you-go, future cohorts may pay higher taxes but still have higher consumption than workers today because of their higher wages.

In terms of the direct funding of social security in Canada and the U.S., the ability of enhanced worker productivity to solve the financing problems as projected is more limited. In both Canada and the U.S., the accrual of social security benefit rights is linked to a wage base that is indexed to national wages. Thus, any productivity improvements that are reflected in national wages prior to retirement automatically create larger social security benefits at retirement. After retirement, again in both Canada and the U.S., benefits are indexed to cost of living as measured by the consumer price index (CPI). Thus, it is only after retirement that increased worker productivity creates a discount rate in terms of the cost of social security. To achieve the full cost benefit of gains in productivity, price-indexed pre-retirement formulas would be necessary. For a full discussion of this matter, see Moorhead and Trowbridge (1977).

If pre-funding social security results in faster wealth creation, then why wasn't social security established on a fully funded basis from the beginning? There are several basic reasons (other reasons are listed later in the paper). First, pay-as-you-go financing allows for significant benefits to citizens already retired at the inception of the plan (or soon to

retire). Full benefits under a fully-funded system can take up to 40+ years to accrue. Second, with no assets, there is no danger of the government influencing the economy inappropriately through the use of the social security funds. Similarly there is no chance of "socialism" through the back door as there could be if the government used social security funds to buy private sector assets. [For a more complete discussion of the history of this debate within OASDI, see Derthick (1979, Chapters 10/11).]

If social security is financed on a pay-as-you-go basis, then the implicit 'rate of return' of such a financing arrangement is the rate of increase of employment earnings (subject to social security contributions, Treuil (1981)). This, in turn, is normally highly correlated to the total of the growth rate of the labor force (including part-time work) and the per-worker rate of productivity increase (*ibid.*).

A fully funded social security scheme has an actuarial discount rate equivalent to the real rate of interest (real rates because social security benefits are indexed to inflation).

According to the Canadian Institute of Actuaries (CIA, 1996, p.3), in the 1960s demographic and economic variables, if assumed long-term into the future, favored pay-as-you-go financing on the basis of cost. In particular, in the 1960s in Canada, reasonable actuarial assumptions would have been as follows (*ibid.*):

Senior dependency ratio*	0.33
Annual increase in real wages	2.0%
Real rates of return	2.0%

These underlying assumptions would have led to the following projected costs for Canadian social security as a percentage of payroll for pay-as-you-go versus fully funded arrangements.

Funding Arrangement	Projected Cost as Percentage of Payroll
Pay-as-you-go (mature plan)	11.0%
Fully funded	16.5%

But times have changed. The future is not what it used to be. Today's long-term assumptions in Canada would be closer to the following (CIA 1996):

Senior dependency ratio	0.40
Annual increase in real wages	1.0%
Real rates of return	4.0%

These factors lead to the following projected costs (*ibid.*):

* The Senior dependency ratio is the ratio of Canadians aged 65+ to the number of Canadians in the Labor Force.

Funding Arrangement	Projected Cost as Percentage of Payroll
Pay-as-you-go (mature plan)	14.5%
Fully funded	7.2%

While factors in the U.S. would not favor pre-funding to the same extent, because real interest rates are lower and annual wage increases higher than in Canada, the same forces now also favor fuller funding in the U.S. as well.

Thus the following statement from Keith Ambachtsheer seems logical (1995):

> Just as pay-go financing makes sense when real interest rates are lower than real GDP growth prospects (i.e. the mid-1960's), so a conversion to pre-funding makes sense when real interest rates are higher than real GDP growth prospects (i.e. the mid-1990's).

Proposition 5: The fact that both of the major North American social security systems were essentially started as pay-as-you-go systems was not a mistake. Further, just as a funded system may make more sense today, it is entirely possible that economic variables could shift and once again favour pay-as-you-go financing.

In fact, the requisite economic relationships that favour fuller funding may be unsustainable. National debt is being reduced; inflation remains under control. The result of a lower debt ratio and controlled inflation ultimately should be lower interest rates and higher GDP growth. This would result in financing assumptions which once again favor a pay-as-you-go arrangement.

As the CIA report "Troubled Tomorrows" (CIA, 1995, p. 23) wisely concluded:

> Should Canada abandon the pay-as-you-go approach? We think not. No retirement income system--funded or unfunded, public or private--is free from risk. Any attempt to fund or replace Canada's public pension plans will be expensive in the short term, with no guarantee of a commensurate reduction in long-term cost. Today's environment favours funded retirement savings plans, but tomorrow's environment, like the environment of the 1960's might not.

But is a pre-funded scheme more secure? How long will factors favoring pre-funding last? Can productivity rates be increased by pre-funding social security? Are pre-funded plans demographically immune (i.e. could fully-funded plans provide promised retirement benefits to the baby boom purely from the funds on hand regardless of the size of the labor force in the next generation)? Would switching back and forth between financing arrangements be accepted as good public policy? These are the questions that should be posed by public-policymakers before any switch in funding methods is adopted. The remainder of the paper explores many of these issues.

IV. IS A FUNDED PENSION DEMOGRAPHICALLY IMMUNE?

Clearly the most serious challenge for pay-as-you-go financing of social security is the rapidly shifting ratio of retirees to workers over the next 40 years. Would a fully-funded social security system (e.g., Mandatory Individual Retirement Accounts) be demographically immune?

One of the problems that exists with any discussion around the optimal financing arrangement for social security is confusion between what is true on a micro-economic basis (i.e. for one person or a small group) and what is true on a macro-economic basis (e.g. in an economy as large as the U.S.).

This is sometimes referred to as the *Fallacy of Composition* whereby it is assumed that what is true for an individual will necessarily be true in aggregate. [see Barr (1993) and Krugman (1996)]. For example, if I stand at a concert, I can see better, but if everyone stands, then no one has an improved view. Clearly, for an individual to save for retirement, consumption must be foregone during one's working lifetime, with money set aside in savings. These funds are then used to buy goods and services post-retirement. This system appears to be workable regardless of the ratio of retirees to workers since every worker funds his/her own benefits in full. Thus, it would seem logical for a nation to provide for its citizens' post-retirement needs by designing a fully-funded social security scheme that accumulates enough money to buy everyone's full post-retirement consumption needs.

Francisco Bayo (1988, 178) Deputy Chief Actuary of OASDI says this will, in fact, not work:

> For Social Security, you cannot accumulate assets; that is, claims from somebody else's production. If we have a large amount of money in the Social Security trust funds, we have a claim on ourselves, which does not have much meaning. The truth is, whatever is going to be consumed--be it a product that you can get a physical hold of, or services that are very difficult to hold--those products cannot be stockpiled. They have to be provided at the time of consumption. No matter what kind of financing we are going to have in our Social Security program, you will find that the benefits that will be obtained by the beneficiary in the year 2050 will have to be produced by the workers in the year 2050, or just a few years earlier.

Nicholas Barr (1993, 220) says it even more strongly:

> The widely held (but false) view that funded schemes are inherently 'safer' than PAY-AS-YOU-GO is an example of the fallacy of composition. For *individuals* the economic function of a pension scheme is to transfer consumption over time. But (ruling out the case where current output is stored in holes in people's gardens) this is not possible for society as a whole; the consumption of pensioners as a group is produced by the next generation of workers. From an *aggregate* viewpoint, the economic function of pension schemes is to divide total production between workers and pensioners, *i.e.* to reduce the consumption of workers so that sufficient output remains for pensioners. Once this point

Thus, a review of the literature indicates strongly that pre-funded social security systems do not overcome the impact of the impending demographic shifts. (The paper discusses the countervailing impact of foreign investment later). The pension income of any decade must come out of the national income of that decade. However, there may still be reasons to consider a pre-funded scheme as economically advantageous.

Proposition 6: A fully-funded social security system is not demographically immune. A fully-funded system is as dependent on the next generation of workers and their productivity as a pay-as-you-go system.

V Does Pre-funding Social Security Increase Savings and/or Productivity?

Barr (1993, p.223) admits that declines in the working aged population can be offset by increased productivity amongst the remaining workers or by increased labor force participation rates (for example, among women), so long as output is maintained. It is also, in principle, possible to maintain the consumption of both workers and pensioners with goods produced abroad, provided the country has sufficient overseas assets to do so.

> The crucial variable is output. A decline in the labor force causes problems for any pension scheme only if it causes a fall in output; the problem is solved to the extent that this can be prevented. The choice between PAYGO and funding in the face of demographic change is therefore relevant only to the extent that funding (as is sometimes argued) systematically causes output to be higher (*ibid.*).

Thus, we have arrived at two important truths. First, no pension plan, private or public, pre-funded or pay-as-you-go, is demographically immune (see Schieber and Shoven 1994). Second, the real security behind any pension plan is a healthy economy. Wealth cannot be transferred until it is created. And the more wealth that is created, the easier it is to transfer some to the retired elderly.

Proposition 7: For pre-funding to have any consequence on the security of social security, three requirements must be satisfied (all three); namely:

- **Pre-funding must increase gross national savings**
- **Those increased savings must be invested so as to increase worker productivity**
- **The pre-funding must be the best way to achieve the first two requirements.**

If there is an alternative public policy that can increase savings and worker productivity either more efficiently or with less risk, then (by definition) it should be the preferred route (this assumes that no two alternatives have exactly the same impact).

Given these three criteria, how does the literature grade the pre-funding of social security as the preferred proposal?

Does the pre-funding of social security increase gross national savings (versus, for example, increased hoarding or increased surplus on the current account of the balance of payments)? There is an abundance of literature on this topic [for example, see Ricardo (1817), Daly (1981), Aaron (1982), Barr (1993), Burbidge (1987), Atkinson (1995), Hughes (1996), Feldstein (1996)], but no clear conclusion. This turns out to be a very difficult question if you allow for behavioral response (or Ricardian equivalence).

For example, we would think that the creation of a pay-as-you-go social security system, which creates no assets but does provide real retirement income benefits, would necessarily decrease gross national savings. However, the literature finds that this intuitive impact can easily be offset (and was in the U.S. after the introduction of OASDI) by two behavioral responses. First, if the provision of social security results in earlier possible retirements for workers than would otherwise be possible, those workers will then save as much as before the provision of pay-as-you-go social security to achieve earlier retirement (that is, they still have to save as much privately because they are now providing for a longer period in retirement).

Second, according to the literature, we must factor in the desire of people to create bequests to the next generation before we can know the impact of pay-as-you-go social security on gross national savings. That is, when younger workers provide their parents with retirement income security through pay-as-you-go social security, their parents, in turn, work hard to provide an inheritance for their children. Equivalently, there may be the removal of a negative bequest through the advent of social security in that workers no longer need to directly support their parents in retirement. The game may, therefore, be a zero net sum (see Barro 1974 and Poterba 1994).

Of importance here is the replacement rate provided by the social security system. In this regard, Canada and the U.S. are very similar. In both countries, a worker consistently earning the average industrial wage will realize a replacement ratio of about 40% from the total social security system (in Canada this includes Old Age Security and perhaps some Guaranteed Income Supplement). Poorer workers realize higher replacement ratios, and wealthier workers less. However, the social security system does not in and of itself, provide full retirement income security—far from it. Thus, other forms of savings are essential. The arguments above about behavioral response may not be as applicable to systems that do provide full retirement income security (for example, some European systems).

Hughes (1996) reviews fourteen time-series papers which attempt to answer the question: "Is there any evidence that social security reduces personal saving?" Six of the papers contend that the answer is "yes", while eight of the papers conclude that the answer is "no". He also reviews eight cross-section studies on the same topic. Four papers conclude that social security does reduce total personal savings, while four find exactly the opposite.

In conclusion, the creation of pay-as-you-go social security did not decrease national savings. However, there is still an intuitive sense that fuller funding of social security would increase national savings. Again, however, a review of the literature is not conclusive.

In Chile, in 1980 when the social security system was financed on a pay-as-you-go basis, the gross national savings rate was 21.0%. In 1981, Chile introduced a mandatory individual retirement savings scheme requiring 10% contributions from all workers (and nothing from the employer). The Chilean gross national savings rate dipped substantially in the early 1980s, and stood at 18.8% until 1991 (Uthoff 1993). In a more recent paper, Holzmann (1997) finds empirical evidence of both increased national savings and enhanced worker productivity in Chile after the 1981 social security reforms. However, Holzmann concludes that:

> The direct impact of the (social security) reform on private saving was low, or perhaps even negative.

According to Holzmann, the increase in national savings and the increase in worker productivity were because of higher growth rates in the economy not social security reform.

Hughes (1999, p50) demonstrates that in 1975, net cash flow to pension funds in Ireland were 0.8 percent of the Irish GNP while the Net National Savings rate was 13.7 percent. By 1994, pension cash flow had grown to 1.6 percent of GNP while Net National Savings had fallen to 11.4 percent of Irish GNP. He states (*ibid,.*) that similar patterns are evident for the United Kingdom and the United States, both of which have well-developed occupational and personal pension schemes.

Hughes (1996) reviews three papers to see if there is any evidence that personal pension plans increase savings. One papers supports the contention, while the other two find no evidence of increased savings. In a later paper Hughes (1999, p51) lists "Pension Assets/GNP" versus "National Savings/GNP" for sixteen countries, and finds that there is no correlation between pension assets and Net National Savings at all. This is supported by work done by the International Social Security Association (1998, p21) as presented in the following table.

Table 3

**Growth in Private Pension Assets
Relative to Gross National Savings
1980-1991**

| Country | Gross Saving (% of GDP) | | Pension Assets (% of GDP) | | Change |
	1980	1988	1980	1991	1991-1980
Canada	23.1	20.3	18.7	35.0	16.3
Denmark	20.3	15.0	26.3	60.0	33.7
France	25.4	19.8	1.0	3.0	2.0
Germany	23.7	22.2	2.6	4.0	1.4
Japan	34.4	31.2	3.2	8.0	4.8
Netherlands	23.9	22.3	46.0	76.0	30.0
Switzerland	28.0	28.4	51.0	70.0	19.0
U.K.	17.7	16.8	28.1	73.0	44.9
U.S.	19.5	16.1	40.7	66.0	25.3

Source: International Social Security Association, 1998, p21

Further, if there are tax incentives for funded pension plans, then the tax costs of pre-funding must be factored in to any estimate of national impact. That is, any increase in national savings may be offset by a drop in government tax revenues (Hughes, 1999, p58).

Even if gross national savings are increased, has the history of such schemes shown that these savings are invested in a manner that increases worker productivity?

Again, the literature is inconclusive. For every plan that seems to create a healthier economy, there are examples where funds are used for purely political purposes, to reward political friends, to prop up failing industries, or even straight fraud on the part of the political masters. According to Rosa (1983, p. 212), the experiences of Sweden and Japan (from whom one might expect above average results in this matter):

> Offer powerful evidence that this option may only invite squandering capital funds in wasteful, low-yield investments [which] should give pause to anyone proposing similar accumulations elsewhere.

Finally, even if the answers to our first two questions were positive, should greater pre-funding of social security be the preferred policy option? Aaron (1982), after lengthy empirical analysis of the U.S. savings rates (personal, plus business, plus government, less depreciation) and labor force participation rates from 1930 to the late 1980s, says no.

> If our objective is to increase the rate of capital accumulation, we should ask which instruments are best for achieving that end. Prominent on the list would be direct assaults on the federal deficit, incentives to business investment, and the withdrawal of incentives

that promote inefficient investments...I conclude also that if we wish to increase capital formation, the proper objective is the total saving rate, and that raising social security payroll taxes or cutting social security benefits is a poor device for achieving that objective unless we favor them on other grounds. (Aaron 1982, p. 51-52)

Proposition 8: The best way to increase national savings is not to move to a fully-funded social security system. Rather it is to pay down the national debt.

The International Social Security Association (1998, p42) points out the if the pension reform is to generate additional capital, then transition liabilities should be financed through tax increases or reduced spending. Savings will not increase if the liabilities are financed through increased borrowing. Financing the transition liabilities through borrowing will cause increases to the public debt and the new taxes required to service that debt will offset any contribution savings.

J. D. Brown (1972) provides another reason for not using social security to create investable funds as the preferred public policy alternative. He argues that social security should not become an instrument of fiscal policy. If the plan is pre-funded to any great extent, then contribution rates or benefits might be moved up or down for the impact that would have on the general economy (for example, to dampen inflation). Social security should not be manipulated for such general fiscal motives, according to Brown. This 'fiscal policy' effect was seen in the Singapore National Provident Fund in the early 1980s. When substantial wage awards were made, these were 'mopped up' by concomitant increase in the rate of contribution to the Provident Fund (Deutsch and Zowall 1988, p.72-81).

To conclude, pre-funded social security systems do not overcome the impact of the impending demographic shifts. The pension income of any decade must come out of the national income of that decade.   Thus, pre-funded or not, a macro-economic social security system is as dependent on the future generation of workers as is a pay-as-you-go system.

In conclusion, there is no evidence that pre-funded plans increase either national savings or worker productivity. The literature is inconclusive on both points (Feldstein, 1996).

VI. OTHER DESIGN ISSUES

A wide variety of proposals for pre-funding of social security have been put forth. We examine several of these proposals in their broadest aspect (that is, not with any particular proposal in mind) and attempt to outline their advantages and disadvantages. These proposals include both a shift from pay-as-you-go social security to more pre-funding, with assets invested in the private sector (such as is occurring now in Canada), but no benefit structure changes, and the more radical change where a pay-as-you-go system is replaced by a defined contribution individual-account system such as in Chile.

A. Keep Social Security as a Defined-Benefit Plan, with Greater Pre-funding

Keeping social security as a defined-benefit plan, as is now the case in most systems, (including Canada and the U.S.,) has a number of advantages, including low administrative costs. Also, by continuing the defined benefit nature of the program, all participants share in the risks inherent in saving for retirement, including inflation, mortality, selection of investments, and the risk of variable rates of interest at the time when accumulated assets are used to buy a retirement annuity or other retirement income vehicle. Further, it is relatively easy to include important ancillary benefits in a defined-benefit plan, such as disability income and survivor income benefits, without having to take regard for the risk profile of any individual participant.

However, the establishment of a higher level of pre-funding, and the creation of significant investable funds, as is happening in Canada and proposed in the U.S., have many associated problems. First, to the extent that the assets are invested in government bonds, has anything changed over a purely pay-as-you-go system? Workers are both social security contributors and taxpayers, and it is doubtful that they care about the destination of their paycheck deductions, only the total. In this regard, as the social security system builds up pre-funded assets and buys government bonds, governments can use these funds to finance their expenditures while either not raising taxes or actually lowering them. Thus, workers experience higher social security contributions than would be necessary under pure pay-as-you-go financing, but lower general tax rates. The total, however, has not changed as to size or timing.

Similarly, when the baby boomers start to retire, they will demand the return of their government bond IOU. While social security contribution rates will not have to rise when this demographic shift takes place, taxes will have to be raised to pay off the redeemed bonds (unless the government is completely debt free and running on operating surplus). Again, the total burden on workers is exactly the same, in both size and timing, as it would have been under pure pay-as-you-go financing.

Proposition 9: Macro-economically, there is very little difference between a pay-as-you-go social security system and a funded system where the assets are all government bonds.

As an aside, the impact on an individual worker may not be equivalent, however. This is because of the difference in effect between a progressive tax regime versus a flat (some would say regressive) payroll tax for social security. Thus in the lifetime of a worker in the baby-boom generation, the impact of fuller funding would be an increased regressive social security payroll tax but decreased progressive income taxation during the working years, and an increased progressive income tax during retirement.

Thus, except for the important psychological impact that by each generation paying for its social security 'in full', they gain a higher moral level of claim on their prospective benefits, the pre-funding of social security with all assets being government bonds seems rather pointless. In reality, the financing is still pay-as-you-go. The total cost of social

security to the workers has not changed in any way. In fact, it may work against the creation of a healthier, more productive economy, if these funds are merely used by the government to finance deficits based on consumption-targeted spending (e.g., welfare payments). This may be especially important in the U.S. where the OASDI annual surplus is included in the unified federal budget and can be used to mask deficits. The only real debate here is whether payroll taxes (which is what social security contributions are seen to be) have a different impact on labor force productivity than other forms of taxation. This matter is discussed later in the paper.

B.   What if the Decision is to invest in Private-Sector Assets?

First, we would have to determine whether the macro-economic balance sheet has changed at all. That is, if social security stops buying government bonds and buys corporate debt and equities, but the private sector commensurately decreases its purchase of corporate debt and equities and substitutes government bonds, then nothing has changed in total.

If the result is not a zero-sum game, then presumably governments have to find new financing for their debt. One would expect the government would have to raise its bond interest rates to make this happen. Ultimately, these higher interest charges fall back onto the workers in the form of increased taxes. Even if a zero-sum game is not the outcome, the ability of a pre-funded system to create more savings is highly debatable, as is the ability of such savings (if realized) to create higher productivity (as indicated by the previous literature review).

As an aside, 'increased saving' could have a perverse effect if that inhibits consumer spending. By saving, we could create the 'paradox of thrift', whereby business does not spend on plant and equipment when consumption declines, even with enhanced savings. This is exactly what happened in the Great Depression.

Other issues need to be addressed. Who will decide how these assets are to be invested? Could the funds be used for political purposes, for lemon-aid (that is, to prop up ailing industries), or will they end up producing higher levels of wealth creation? Can avoidance of political influence be guaranteed? Should the investment of these assets be restricted to the domestic market? If so, will that not mean that the social security funds (and government) will have an undue level of control over domestic capital markets and society? This was discussed in some detail in the U.S. in 1935 (see Derthick 1979).

What if the investment is done passively, to achieve an index rate of return? Can the capital markets remain efficient if the majority of investment funds are passively invested? Such funds follow the market rather than leading it. Private capitalism works because management is forced by stockholders to excel. How do purely passive funds cause such excellence?

Are there enough high-quality assets available to invest wisely the trillions of dollars that will become available? This is a particularly interesting point. The funds of a pre-funded social security scheme will build up rapidly now as the baby boom pre-funds it benefits. However, the same baby-boomers will also be saving in their own pension plans and individual accounts for the remainder of their retirement needs. In fact, there are many who claim that today's hot stock market is the result of the influx of these new funds (without any increased pre-funding of social security). Thus, it could be argued that the social security system will be buying when asset values are high.

Then, when the baby boom retires, it will force the liquidation of the social security funds to a great extent, again at the same time as the baby-boomers are liquidating their other retirement plan assets. As stated by Schieber and Shoven (1994):

> This could depress asset prices, particularly since the demographic structure of the United States does not differ that greatly from Japan and Europe, which also will have large elderly populations at the time.

Figure 2

Net Flow of Assets Into or Out of
Pension and Retirement Savings
1995 to 2065
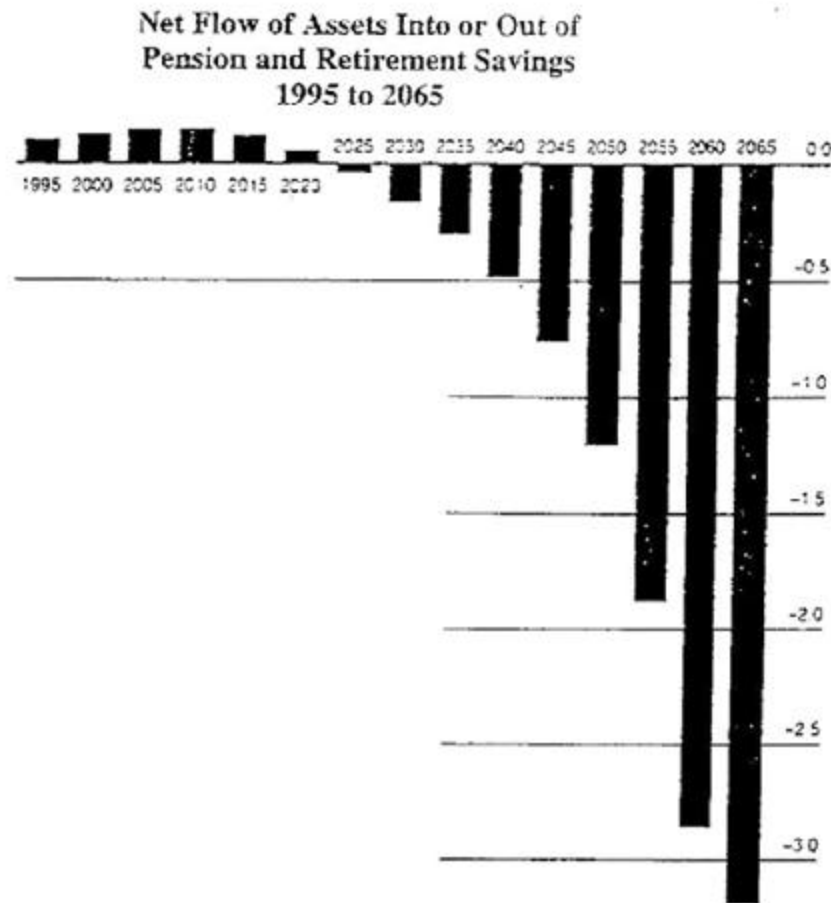
Source: Schieber and Shoven, 1996

Thus, it can be logically argued that a pre-funded social security system may be doomed by being in the position of buying high and selling low (relatively speaking). That is, at the very least, the high rates of return now projected by supporters of privatization may not accrue. In other words, the assumptions upon which the arguments for pre-funding social security are based may be unachievable. The move to pre-funding is grounded on the assumption that real rates of return will continue to exceed the growth rate in real wages. If that weren't true, then pay-as-you-go financing would be preferred. However, how can we continue to expect these current high real rates if we create trillions of dollars of new gross national savings and investable funds that are then liquidated over time as the baby boom retires?

Offshore investment might be preferable for at least three reasons. First, as previously stated, the domestic capital market may not be large enough for the prudent investment of such large funds. Second, diversification of risk in any portfolio is generally advised. Third, by investing in countries that do not share the aging populations of Canada or the U.S. (that excludes all of Europe, Japan, Australia, and New Zealand), or countries where workers do not care to retire at some fixed or early age (presumably developing nations), it might be possible to dampen the impact of the impending retirement of the baby-boom generation in North America. This might be referred to as demographic profile diversification. Interestingly, this might also decrease or eliminate the need for government-sponsored foreign aid.

However, this is not without some significant investment risk, currency exchange risk and political difficulties. One could expect heated debate if it were suggested that social security should build up large investable funds, only to have them invested offshore.

There are other problems associated with pre-funded social security, however, even if invested widely in the private sector. First, pre-funded schemes are exposed to the risk of unforeseen inflation (that is, inflation that decreases real rates of return) because of the length of time between contribution and payment of retirement income. In this regard, inflation nearly destroyed several funded schemes in Europe earlier in this century (for example, France and Germany—see Linton 1935, p. 365). This may be one reason that these schemes now use close to pay-as-you-go financing. Pre-funded provident funds that exist in many developing countries are also experiencing problems with the effects of inflation.

Second, with the creation of these large investment funds, there will be strong and continuous pressure to expand social security benefits in an era when such expansion would be misguided public policy. The history of the C/QPP provides strong evidence for this. Because of low early contribution rates and a healthy contingency fund, politicians steadily increased the benefits of the C/QPP during its first 25 years. Based on previous actuarial projections, of the 14.2% ultimate pay-as-you-go contribution rate required to fund the mature C/QPP, 2.4 percentage points come from the expansion of benefits just mentioned (Canada 1996, p. 46). This argument was also used to defend basic pay-as-you-go financing for OASDI over its early years [see Derthick (1979, Chapter 11)].

Finally, the creation of funds to invest requires that social security contribution rates must be set higher initially, in the short run, than those required under pure pay-as-you-go financing. Is this optimal public policy? There are several reasons why the answer might be no.

First, there is evidence that social security contributions, whose impact is the same as payroll taxes, could hurt job creation.

> [In Canada] These [social security contribution rate] increases have had and will continue to have a negative impact on the labor force. By [between 1986 and] 1993, the rise in contributions by employers and employees had reduced employment and the participation rate by nearly 26,000 jobs and 0.12 percentage points, respectively. By the year 2016, the increase in C/QPP contributions will have reduced the participation rate by approximately 0.5 percentage points. (Italianno 1996)

This effect is especially pronounced if social security taxes are levied on only part of the worker's income (for example, in Canada, C/QPP contributions are levied only up to the year's maximum pensionable earnings, $37,400 in 1999, which is roughly the average industrial wage, while in the U.S., contributions to OASDI cease at $72,600 in 1999). Raising social security contribution rates could have the effect of providing an incentive to pay for overtime instead of hiring new staff. Would it not be preferable to assist job creation now, even if it means higher potential contributions when the baby boom retires, but also when there could easily be labor shortages?

Second, social security contributions are a part of total government taxation. There must be a maximum rate of taxation beyond which actual cash tax receipts decline. Prior to this, resistance to increased taxation will be evident in the proportion of the economy that evades taxation (that is, the underground or cash economy). So long as there exists government debt, is it optimal government policy to increase social security funds or would it be preferable to increase some other form of tax and decrease the deficit and the debt? The level of noncompliance in the Chilean system can be partly explained by this taxation-limit phenomenon.

Third, there may be better ways to increase national savings rates and productivity than to pre-fund social security. Any government action that increases saving for retirement could be substituted for pre-funded social security if the goal is to increase savings and productivity. Clearly, the increased (mandatory) contribution rates needed to pre-fund social security will decrease the total dollars that can be saved for retirement in any other vehicle and lessen the amount invested in private alternatives. It is surprising, therefore, not to hear more opposition to the pre-funding of social security from private-sector-retirement professionals.

Mandating employer-sponsored private pensions or even creating stronger incentives (or weaker disincentives) to private pensions and individual savings accounts (RRSPs in Canada) could have the same effect on savings and productivity. In fact, it might be preferable because it does not bring with it the possibility of undue government influence and does not create any pressure for increasing social security benefits (Derthick 1979,

Chapter11). Is it not better to concentrate on the economic goals directly, rather than on the attempt to achieve them as a by-product of social security financing?

It seems very strange that in both Canada and the U.S. the government is seriously considering larger pre-funding of social security, while at the same time putting more limits on the ability of employers and workers to save through private pension schemes and individual accounts (see federal budgets in both countries over the past ten years). As long as there is an alternative to pre-funded social security that can have the same probability of enhancing savings and productivity, then, for the reasons just listed, it should be the preferred public policy.

Earlier it was noted that the pre-funding of social security might create a higher moral claim for the generation that paid for the full cost of benefits. This argument is stronger if the assets so created are invested in the private sector, as opposed to buying government bonds. Through the social security system, workers would become owners of capital and could expect to receive a fair rate of return on the capital after they retire. Although this is a strong argument, it still depends entirely on this capital being new and additional and on the capital being used to enhance worker productivity. Again, the basic truths have not changed.

C. Change Social Security to a Defined-Contribution Plan

Another possibility is to turn the present defined-benefit social security system into a defined-contribution scheme in which participants decide how their individual funds are invested. This is an analogy to the Chilean social security reforms, which are discussed more in Section VI. Several countries have reformed their pension systems along the same lines as Chile did in 1981, including Peru in 1993, Argentina in 1994, Colombia in 1994, and Mexico in 1997. Others considering it are Bolivia and Ecuador.

These proposals have some advantages and some disadvantages.

As to advantages, the scheme would allow for universal coverage of workers, immediate vesting, and full portability. It would also, in theory, provide billions of dollars of investable funds, the potential impact of which has been discussed in detail previously. The supporters of Mandatory Retirement Savings Plans replacing defined-benefit Social Security are many (see, for example, World Bank, 1994, Robson, 1995 and Ferrara and Tanner, 1998), and their arguments will not be repeated here.

There are, however, also several disadvantages to defined-contribution MRSPs. First, whereas pay-as-you-go schemes can create immediate benefit payments to the elderly, a defined contribution scheme cannot do so for a very long time (at least thirty years).

Second, all of the risks of a defined contribution plan, including the investment risk, the inflation risk, and the mortality risk fall on the shoulders of the individual worker instead of being shared across the entire working population. As a result one should expect

workers to invest in relatively low risk investments which, in turn, will result in lower long-term rates of return than modeled by proponents of these reforms. This is extremely important since every 1 percent of extra return over the lifetime of a worker results in a pension that is about 24 percent larger (Adams, 1967). Schieber (2000) illustrates this well in the diagram that follows. In the diagram, Schieber shows the replacement ratio that a worker could realize if they had saved 6 percent of pay each year over a forty-year working lifetime (shown by year of retirement at age 65).

Figure 3

Variation in Benefits due to
Market Variations in Stock Values
(Assumes a 6% Contribution Rate)
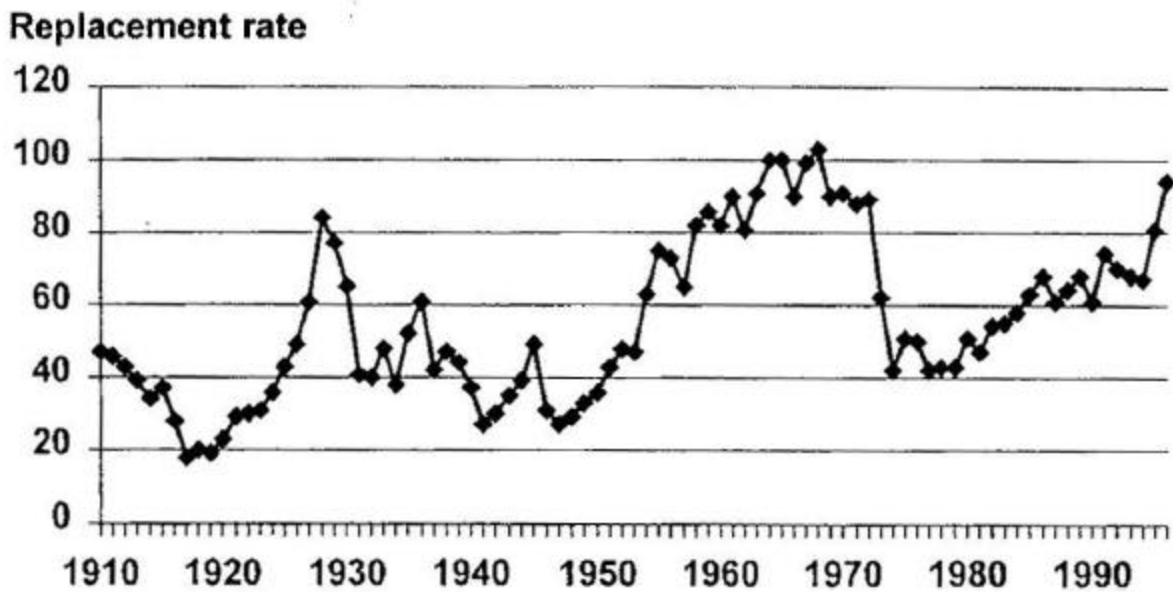
Source: S. Schieber (2000)

Obviously, rates of interest at the time of retirement are of critical importance if the worker is forced to annuitize, as is the case in some countries.

Third, the ancillary benefits of the present OASDI and C/QPP, including Disability Income benefits, Orphans benefits, and Death benefits would be lost or have to be replaced in some new scheme. It must be remembered that these ancillary benefits are about one-third of the total package of coverage. Reformers suggest that participants should buy private insurance to replace these benefits. These costs are not immaterial

(e.g., one-third of the OASDI contribution rate). Also, solutions must be provided for those who cannot get private coverage.

Fourth, administrative expenses for such a scheme can be expected to run at 12 to 15 percent of cash flow (as in Chile) versus the 0.8 percent expense ratio for OASDI. Thus much of the anticipated higher gross rates of investment return would be lost to the higher expense ratios (see, also, Mitchell and Zeldes, 1996, and Emery and McKenzie, 1999). Also, the impact of these additional expenses can be expected to be regressive since smaller account balances of poorer workers will experience larger percentage expenses than larger account balances. This isn't just true in developing nations as can be seen from the following data from Australia.

Table 4

**Administrative Costs in Australian
Individual Account Plans in 1997**

Average Balance	Administrative Costs as a Percent of Assets
$ 1,000	14.820%
$ 5,000	2.964
$10,000	1.482
$20,000	0.741
$30,000	0.494

Source: Schieber (2000)

Fifth, as mentioned earlier there may well not be enough high quality assets available to match the investable funds that would now be available. In periods of poor investment returns (which are inevitable) the government may be blamed, and may be asked to provide minimum guarantees (which lead to economic distortions and possible worker selection against the system). At the very least, one can predict that a switch by the government to a defined contribution system at this time will curse the workers with the inevitability of 'buying high' and 'selling low'. This is because these new investment funds will be entering the market place at the same time as the baby-boomers are hitting their maximum savings years, and then will be liquidated at the same time as the entire baby-boom generation will also be in a liquidation mode.

Sixth, there is no wealth redistribution in the scheme. A worker who is poor throughout his or her working lifetime is guaranteed poverty in retirement. Similarly, the wealthy worker is guaranteed a wealthy retirement, aided by the significant tax advantages that would be provided by the scheme.

Seventh, without special legislation, women would retire with lower retirement income than men of identical work and contribution records, because of the higher female life expectancy.

Eighth, the transition generation will have to pay twice: first to fund the new defined-contribution scheme and second to pay for the massive accrued liability of the present pay-as-you-go scheme. In this regard, it must be remembered that it will be 30 to 40 years before the new defined-contribution scheme can pay out anything close to full benefits.

Ninth, if the Chilean experience is any indication, there will probably be a need for some government guarantees of minimum benefits and/or minimum investment performance under the new system (which, unless designed skillfully, can be open to abuse and anti-selection).

Finally, one might ask if there is political justification for a free government forcing individual saving when there is no wealth redistribution component. As long as there is some income redistribution, then there is a general welfare argument that can be used to defend such systems, but what happens when there is no wealth distribution?

Proposition 10: There is nothing in the history of any country's social security system or in the literature on social security that supports the contention that more funding of social security leads to either:

> **--higher national savings rates, or**
> **--improved worker productivity.**

Thus, one cannot conclude that reform of social security to a more funded system is the best way to achieve these laudable goals.

VII The Chilean Model Reviewed

The new Chilean social security system was decreed in 1981. Rather than a government-run pay-as-you-go scheme(s), as had previously existed in Chile, the new system requires that employees contribute 10 percent of pay to one of fifteen investment fund agencies (called AFP's). There is also a 3.5 percent (approximately) contribution to cover disability income benefits and survivor benefits (provided by private insurance companies). Employers do not contribute, nor do members of the military or the self-employed. At the time that these 13.5 percent contributions were mandated, workers were granted an 18 percent pay increase (employers incurred this increase but saw their large social security contributions disappear).

Eighty-six percent of eligible workers are affiliated with the new system, but only 55 percent of the labor force are contributing members. Daykin (1999, p15) states that there are 5 million people in the economically active population, but only 3 million people are currently contributing. Of the remaining, 1.5 million are self-employed or working in the informal economy; only 50,000 of these have opted to contribute to the AFP system. This represents a high level of non-compliance, apparently mostly from poor workers

who will receive the minimum benefit regardless. The government is responsible for all accrued liabilities of the old pay-as-you-go system, and has issued recognition bonds equal in value to the accrued social security benefits for all previous participants who qualify (workers who only had a very short work history under the old social security system were not given any recognition of their accrued benefits). The government also limits the extent to which the rate of return provided by one pension fund may fall below that of the average AFP rate of return, and, after annuitization, guarantees annuity payments if the insurance company fails (100 percent of the minimum pension is guaranteed, plus 75 percent of the rest of the benefit up to a specified limit). Finally, the government guarantees a minimum benefit under the new system for those who have at least 20 years of coverage under both the old and new plans. The cost of these guarantees will be financed through general tax revenues, which is equivalent to pay-as-you-go financing.

If the new AFP-system can earn an average 7 percent real rate of return over the lifetime of the average worker, that the new system should provide benefits as large as the old pay-as-you-go system (assuming only a small change in life expectancy). While the plan did earn such rates in its early years, it has not more recently. In the long run, 7 percent real rates of return would be considered to be very high for a mature economy (e.g., Canada or the U.S.).

Under the new plan about 40 percent of total assets are invested in government bonds, which means that to that extent the new plan is still pay-as-you-go.

In 1980, under the old pay-as-you-go financing system, Gross National Savings in Chile were 21.0 percent of GDP. After the introduction of the new mandatory individual savings scheme, savings rates dipped in the 1980s and stood at 18.8 percent of GDP in 1991 (Uthoff, 1993).

Obviously, the system only includes wage and salaried employees (e.g., not homemakers), and retirement benefits are a direct function of lifetime earnings. That is, there is no redistribution of wealth in the system except for the guaranteed minimum benefit.

All risks (e.g. the investment risk, inflation, life expectancy) are transferred to the individual worker, except for the minimum guarantees listed above.

This generation of workers will, in effect, be paying twice, once to fund their own retirement through the new system (through contributions), and once to pay off the recognition bonds for the accrued liabilities of the old pay-as-you-go system (through general taxation).

AFP expense ratios for sales commissions, advertising, and general administration are high. Daykin (1999, p14) states that these total 20 percent of contribution income (higher for lower wage earners and lower for higher contributors, since part of the fee is flat rate which make them regressive). Some estimates now put total sales costs as high as 26

percent of contributions (Orgill, 1996), as sales people, trying to maximize their commissions, encourage members to switch funds often. This is such a concern that Chile is considering placing restrictions on the ability to switch (such restrictions already exist in Argentina). These Chilean expense ratios compare to ratios of 0.8 percent for OASDI. Almost all (99.8 percent) of the assets are invested in the Chilean economy. This appeared to be sound policy in the early years of the system as rates of return averaged 13 percent. However, in 1995, the AFPs experienced net losses as the Santiago Bourse performed badly (Orgill, 1996). There is now general discussion about diversifying the investment funds outside of Chile.

So while the Chilean system of mandatory individual savings accounts has been

> …studied and touted as a model from Britain to Uzbekistan, Chile's free-market pension system is suddenly facing a host of challenges: falling returns, soaring costs, and an over-dependence on local economic savings (*ibid)*.

Similar problems are now surfacing in the reformed Mexican Defined Contribution system as outlined in detail by Maupome-Carvantes, 1999)

VIII How Big is the Problem?

If one accepts that social security is a wealth transfer scheme, as previously argued, then one obvious solution to the population aging problem is to attempt to keep a larger percentage of the labour force in active participation for a longer time. This would effectively move these workers from idle retired beneficiaries of social security to active productive contributors to social security. A natural question to ask is: "How big a delay in retirement would provide stability for the future financing of the Canadian social security system?".

This part of the paper attempts to answer this important question by exploring the relationship between the Wealth Transfer Index, a statistic defined by Brown and Bilodeau (1997), and retirement age, which is the age at which the workers in an economy cease to be economically productive. The Wealth Transfer Index (WTI), appropriately expressed as ratio of consumption demand to labour productivity, is a barometer for the demand for wealth placed on the workers of an economy. This part of the paper will explain why a relationship between this statistic and retirement age must exist. Using Canadian historical median retirement age data, compiled by Statistics Canada, and calculated values of the WTI for the same period a relationship between the WTI and actual historic retirement ages is discovered.

This part of the paper then goes on to look at what might happen when the well-documented demographic shift occurs in Canada due to the baby-boom/baby-bust tidal wave. The aged dependency ratio is expected to increase dramatically from its present

level, reaching 45% in 2036. A practical application of the WTI model suggests that the baby-boom cohort may experience a rise in the normal retirement age in the period 2017-2034. They will, in effect, be forced to retire at ages that will allow for an 'acceptable' transfer of wealth from the workers to dependent Canadians.

Using past relationships between the WTI and actual retirement age, we project the median retirement age, for Canadian workers up to 2041.

The Wealth Transfer Index (WTI)

The WTI, developed by Brown and Bilodeau (1997), is a statistic that measures the relative supply of and demand for wealth among the Canadian population. It is defined as:

$$WTI = [(1.866*Y) + (1*U) + (4.636*A)]/LF$$

where Y = Youth, 0-19
U = Unemployed adults
A = Aged, 65 and over
LF = The Employed Labour Force aged 20-64

The weights of 1.866, 1, and 4.636 were derived by McDonald and Carty (1980,16,17) for the Task Force on Retirement Income Policy (1979) and depict relative wealth transfer weights for the young, unemployed adults, and the elderly. The weights do not have any meaning by themselves—they are only weights relative to a weight of '1' for unemployed adults. It is important to note that the transfers to the aged are almost exactly 2.5 times the transfers to youth. These weights are based on total payments for health care, education, unemployment transfers, and retirement income security made by any government (federal, provincial or municipal). While this does not represent the totality of dependency costs, it does capture the key macro-indicators. It should be noted that a factor for productivity improvement should be included in the denominator for comparisons of wealth transfers over a period of years. For example, even if the demand for goods and services by dependants were to grow, the increased demand for wealth transfer could be met if the work force became more productive.

There are problems with the use of this index as is. First, the study on which the weights are derived is now twenty years old. It is true that in 1982 Foot (1982, 135) corroborated the weights (and suggested that in the United States, the ratio of transfers to the Aged would be about 3 times the transfers to Youth), but no later data exist. There are many reasons that over that twenty year time span the weights would have shifted. Educating the young has become more expensive. Health care for the elderly has also. Some social security payments (e.g. Old Age Security and the Guaranteed Income Supplement) are indexed to inflation, while others (e.g. the Canada/Quebec Pension Plans) are indexed (prior to retirement) to wages. Further, ad hoc amendments to all of these plans have

taken place over this twenty year period. At the end of the day, however, these data are all that are available.

Figure 4 outlines the historical and projected distribution of youth, adult and aged in Canada up to 2100.

Figure 4
Distribution of Historical and Projected Population by Age Group
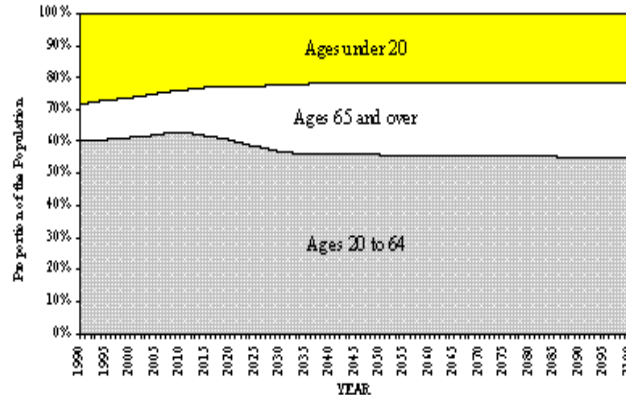
Source: Office of the Superintendent of Financial Institutions, 1998

Clearly, this 'aging' of the population will create a heavy demand for wealth transfer from the workers to the elderly, which could create pressure for an increase in taxes and other contributions from the workers' earnings, all else being equal.

However, this shift could mean that baby boomers will simply not be able to retire at the ages currently accepted as the norm. There are several reasons for this some of which have been mentioned previously in the paper.

Assume that the massive baby boom cohort attempted to retire at ages now accepted as normal. As the baby boomers attempted to liquidate their assets, to buy goods and services, these asset prices could become depressed. Further, because the much smaller baby bust generation is now the only source of labour, production in the economy could suffer a slump, whilst demand for consumption goods and services remains level. The expected result would be price inflation. To the extent that the retirement decision is dependent on the real value of assets accumulated versus the current cost of goods and services, then it is clear why some baby boomers might be forced to postpone their exit from the workforce (see also, Schieber and Shoven, 1994). Employers, as well as governments, would also be expected to provide incentives for later retirement since there would be a decline in the supply of labour (Statistics Canada, 1996, 39). In other words, the baby boomers might be forced to adjust to new ages of retirement that would continue to allow a constant wealth transfer from a stable work force to all dependent Canadians.

Appendix 1 gives calculated values for the WTI based on data for the years 1976 to 1998, yearly productivity improvements for the same period, and median retirement ages for Canada for the years 1976 to 1995 (Statistics Canada, 1999). Statistics Canada has only published data on age of retirement since 1976, so no earlier periods could be analyzed.

A linear regression model of the average retirement age was fitted against the wealth transfer index (WTI), adjusted for annual labour productivity improvements. The median retirement age for a particular year was regressed on the resultant WTI of that same year. Significant overall regression was obtained with an R-Square statistic of .55. The results for this model are presented in Appendix 2. The regression equation is:

Median Retirement Age (years) = 55.40 + 3.47* Adjusted Wealth Transfer Index

A second regression model (also accounting for labour productivity improvements in the calculation of the WTI) was fitted. The median retirement age for a year was regressed on the wealth transfer index lagged six years. That is, the retirement age of year *t* was regressed on the wealth transfer index of year *t-6*. Results for this model were impressive, with an R-square statistic of .91 and are given in appendix 2. The obtained regression equation is:

Median Retirement Age (years)= 52.77 + 4.22* Adjusted Wealth Transfer Index (lagged)

Lagging the wealth transfer index (WTI) used in the regression model is plausible because individuals, employers and governments all need time to make adjustments to accommodate new realities. The lags involved can basically be categorised into three categories – recognition, decision and implementation lags. First, the agent involved (individual, employer or government) needs to identify and recognize that a wealth transfer shift has occurred (either up or down). Once this has been identified, time is needed to respond (e.g. by changing the tax rate). This could take years. Finally, after a response decision has been reached, time would be required for implementation of the suggested course of action. For example, if the wealth transfer index declined, it might be possible for governments to lower taxes or for manufacturers to lower prices, or for employers to enhance pension benefits. Any of these actions would allow earlier retirement. As a second example, with the impending demographic profile where the baby bust generation will be the source of labour, it might be expected that both employers and governments would offer late retirement incentives. However, they would require time to identify the need, and then to implement the incentives. It would also take time for the employee to factor these incentives into his or her retirement decision. Thus, a six-year time lag is completely plausible.

The regression results, particularly the lagged WTI model, show the existence of a strong positive correlation between the WTI and Median Retirement Age. The WTI quantifies the economic force that "decides" the average age at retirement as a ratio of consumption demand to production. Because of this definition of the WTI and the regression results

above, it might be plausible to infer a causal relation between the WTI and Median Retirement Age.

Projections on Future Retirement Age in Canada

The previous section provides us with a model (Model #2) which will now be used to model the retirement age for Canadian workers in the future. To this end, we also need to project the Wealth Transfer Index in the future. Statistics Canada (1994) has projected the 1993 Canadian population to 2041 under four different sets of assumptions (low-growth, medium-growth, and two high-growth projections). This paper employs the medium-growth projection (Projection #2), since it is considered to be the most realistic and since Brown and Bilodeau (1997) used the same assumption in their paper. These data provide us with information on the number of young (ages 0 to 19), adult (ages 20 to 64) and elderly (ages 65 and up) in Canada up to 2041.

To determine the number of employed and unemployed adults, we use a method similar to Brown and Bilodeau. Historical participation rates and unemployment rates for various age and sex groups are available from Statistics Canada (1984, 1989, 1995b) up to 1994. We then use an ARIMA* time series methodology to project these rates up to 2006, after which the rates are held constant. The participation rates are segregated between the sexes and different age classes while the unemployment rate is obtained for the entire adult population. By knowing the number of people in the various age and sex categories, the model forecasts the number of employed and unemployed Canadians up to 2041.

The model assumes an annual increase in productivity consistent with the historical increase from 1976 to 1998 (in terms of 1986 dollars). The productivity increase during this period has averaged 0.9% compounded per annum. The WTI (adjusted) up to 2041 is then found using the projected population and employment data, with the labour force component adjusted to reflect productivity improvements.

Using the 6-year lagged regression we obtained in the previous section (model #2) we are able to project the median retirement age in Canada up to 2047. The result is displayed in Figure 5. If the retirement age rises, it is assumed that these workers have the labour force participation rates of those aged 60-64.

* For more information on the ARIMA (Autoregressive Integrated Moving Average) process see Chapter 4 of *Time Series and Analysis: Forecasting and Control* by Box and Jenkins, 1976.

Figure 5

Median Retirement Age in Canada
(1996 to 2047)
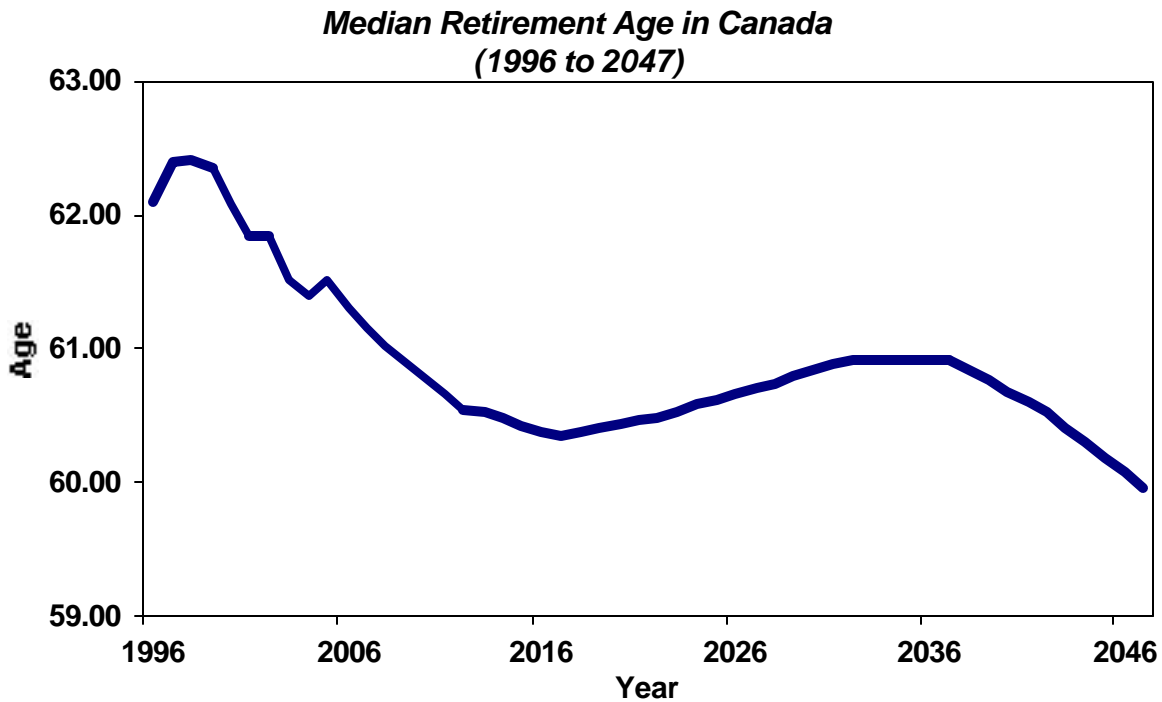
From Figure 5, we can see that the median retirement age is projected to generally decrease until 2017, where it reaches a local minimum of 60.3 years. After this date, the increase in the number of elderly and the decrease in employed adults results in a higher median retirement age as workers must stay longer in the workforce to achieve a constant wealth transfer index. The increase is projected to last until 2034 where the median retirement age is 60.9 years. After that, the retirement age is again projected to decrease. In 2041 the median retirement age is forecast to be 60.6 years; it will be 60.0 years in 2047.

Note how little a shift in the retirement age is needed to create stability in the Wealth Transfer Index. The retirement age need only shift from a local minimum of 60.3 years in 2017 to 60.9 years in 2034. Of course, this is completely dependent on being able to achieve productivity increases of 0.9 percent per annum. However, this analysis makes one wonder if the recent social security reform was really worth all the pain.

In the appendices, we also show future projected retirement ages with 1.5% per annum productivity growth, and no productivity growth. Finally, we show that the annual rate of productivity growth required for no increase in retirement age is 1.29% per annum.

Proposition 11: A shift in the labour force retirement age from 60.3 years in 2017 to 60.9 years in 2034, assuming a per annum productivity increase of 0.9 percent, would result in a stable demand on workers for Wealth Transfer. A per annum Productivity Increase of 1.29 percent would mean that the retirement age would never have to rise.

We conclude that, historically, workers have retired at the earliest possible age that was affordable given the limits on the potential transfer of wealth. We further conclude that this will continue to be true, whether legislated by government or not.

If true, the retirement age experienced by the work force is just another resultant variable in a macro economy that must operate in balance. That is, the variable "retirement age" is just another balance-point variable that will be decided by economic realities, not government legislation.

IX CONCLUSION

This paper has explored at some length issues with respect to greater pre-funding of social security. The thesis is that any public policy that purports to enhance the security of social security must satisfy (all) three criteria:

- It must increase gross national savings.
- Those savings must be used in a manner that increases worker productivity.
- There cannot exist a better method of achieving the first two stated goals.

This paper has reviewed a variety of currently proposed alternatives to the financing of social security under these three criteria and has found many unanswered questions and unsatisfied concerns. In fact, there is no conclusive evidence in the literature that greater pre-funding of social security will solve the problems created by rapid population aging.

Proposition 12: In short, proposed moves to higher levels of pre-funding of social security in both Canada and the U.S. require further public policy debate. Society should not rely on fuller funding of social security to solve the problems inherent in providing retirement income security to an aging population.

This is of extreme importance as the Canadian government has already legislated changes that will result in greater pre-funding of social security, and the U.S. seems poised to do so.

Proposition 13: The three ingredients that will provide security for social security are:
    1. A healthy and growing national economy.
    2. An efficient and accurate records administration system.
    3. An honest government.

These cannot be attained by changing the way you finance social security, In fact, the method of financing social security may be close to irrelevant to its future security.

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Appendix 1

Median Retirement Age (MRA) and Wealth Transfer Index (adjusted and unadjusted) for years 1976 through 1998

Year	MRA	Productivity increase	WTI	WTI-adjusted
1976	65.00	1.89%	2.962	2.962
1977	64.92	0.00%	2.927	2.872
1978	65.00	0.00%	2.847	2.793
1979	64.92	0.46%	2.747	2.696
1980	64.83	0.00%	2.684	2.622
1981	64.92	0.92%	2.617	2.556
1982	64.83	2.28%	2.721	2.633
1983	64.67	3.13%	2.708	2.559
1984	64.75	1.73%	2.639	2.413
1985	64.67	-0.43%	2.571	2.307
1986	64.58	0.43%	2.515	2.267
1987	63.25	0.00%	2.488	2.232
1988	63.83	0.00%	2.443	2.192
1989	63.33	0.43%	2.441	2.190
1990	62.92	0.85%	2.475	2.210
1991	62.58	1.68%	2.582	2.284
1992	62.33	0.41%	2.636	2.289
1993	61.83	1.65%	2.632	2.274
1994	62.33	1.21%	2.605	2.209
1995	61.75	-0.40%	2.583	2.159
1996		2.81%	2.579	2.166
1997		0.78%	2.551	2.073
1998			2.506	2.017

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Appendix 2

Regression Results for Model 1

Regression Statistics	
Multiple R	0.741
R Square	0.549
Adjusted R Square	0.524
Standard Error	0.821
Observations	20.000

ANOVA

	df	SS	MS	F	Significance F
Regression	1.000	14.775	14.775	21.926	0.000
Residual	18.000	12.130	0.674		
Total	19.000	26.905			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	55.399	1.817	30.493	0.000	51.582	59.215
Wealth Transfer Index	3.474	0.742	4.683	0.000	1.916	5.033

Regression Results for Model 2

Regression Statistics	
Multiple R	0.953
R Square	0.908
Adjusted R Square	0.901
Standard Error	0.361
Observations	14.000

ANOVA

	df	SS	MS	F	Significance F
Regression	1.000	15.513	15.513	118.952	0.000
Residual	12.000	1.565	0.130		
Total	13.000	17.078			

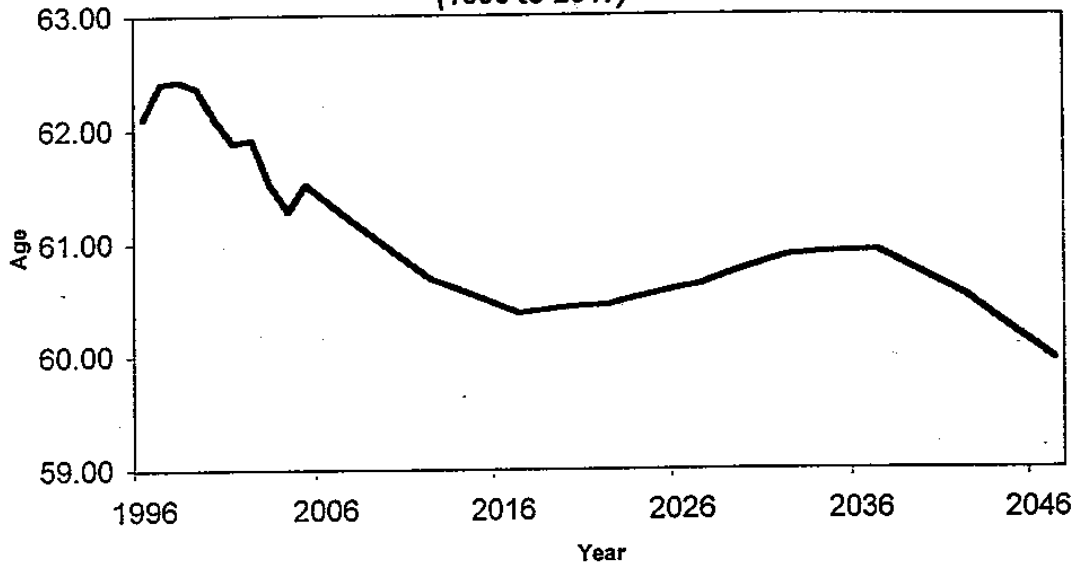|	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	52.772	0.980	53.874	0.000	50.638	54.906
Wealth Transfer Index (lagged)	4.217	0.387	10.907	0.000	3.375	5.059

Appendix 3

Overlay plots of actual vs predicted average retirement age for Canada
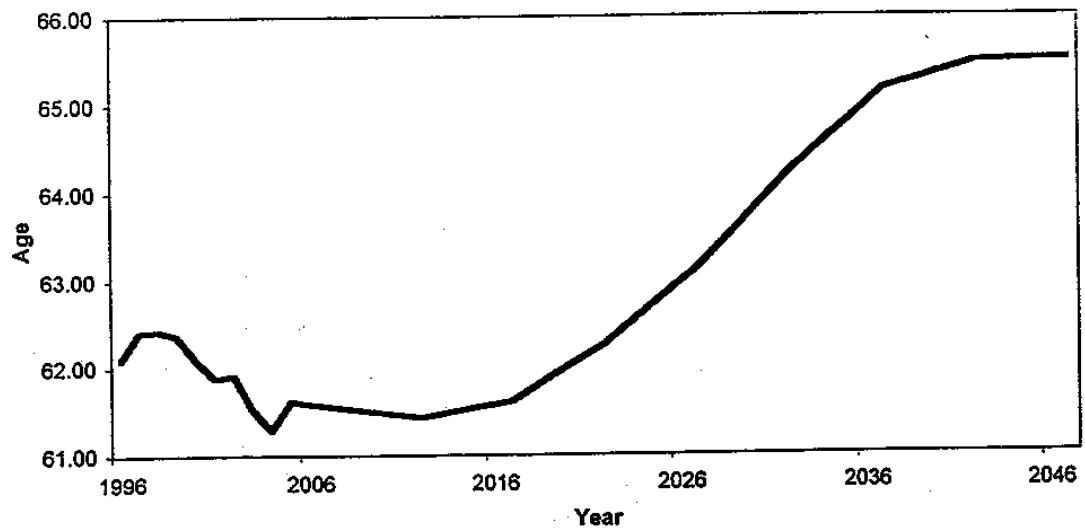
Model 1
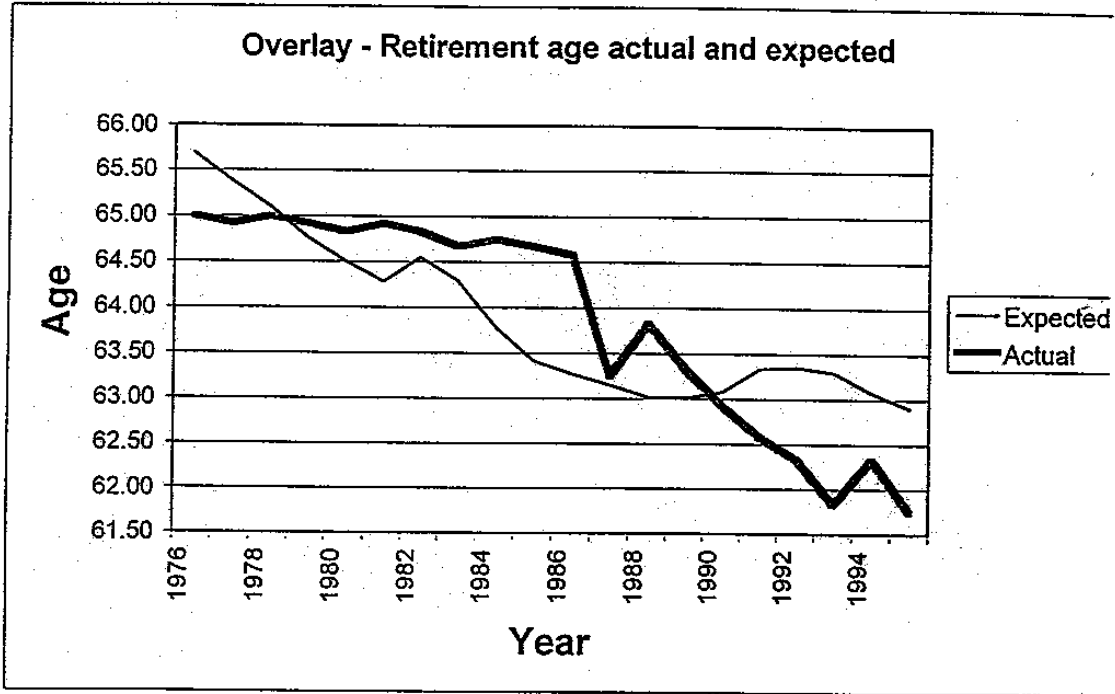
Median Retirement Age in Canada
with Productivity Improvements of 0.9% per annum
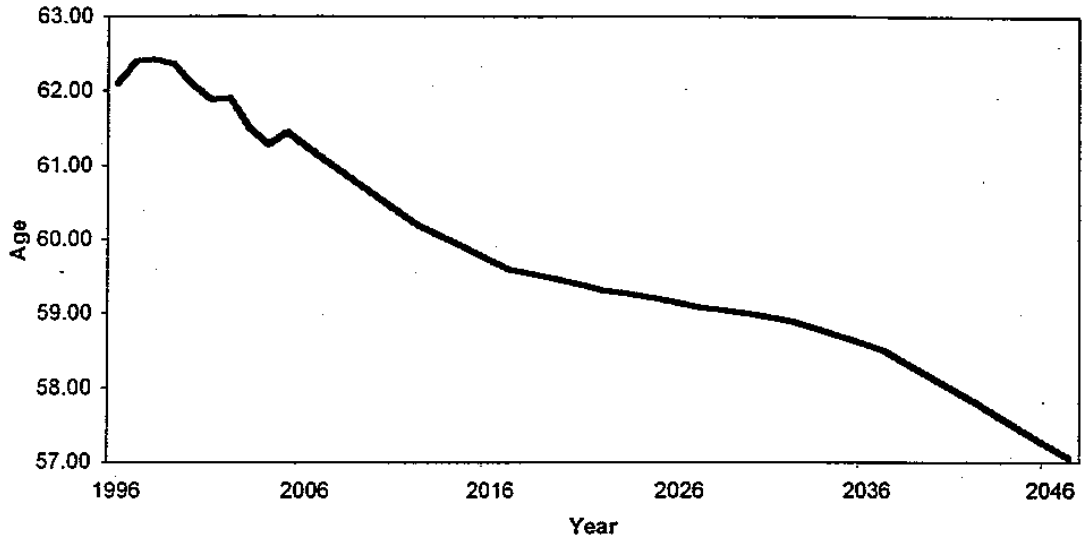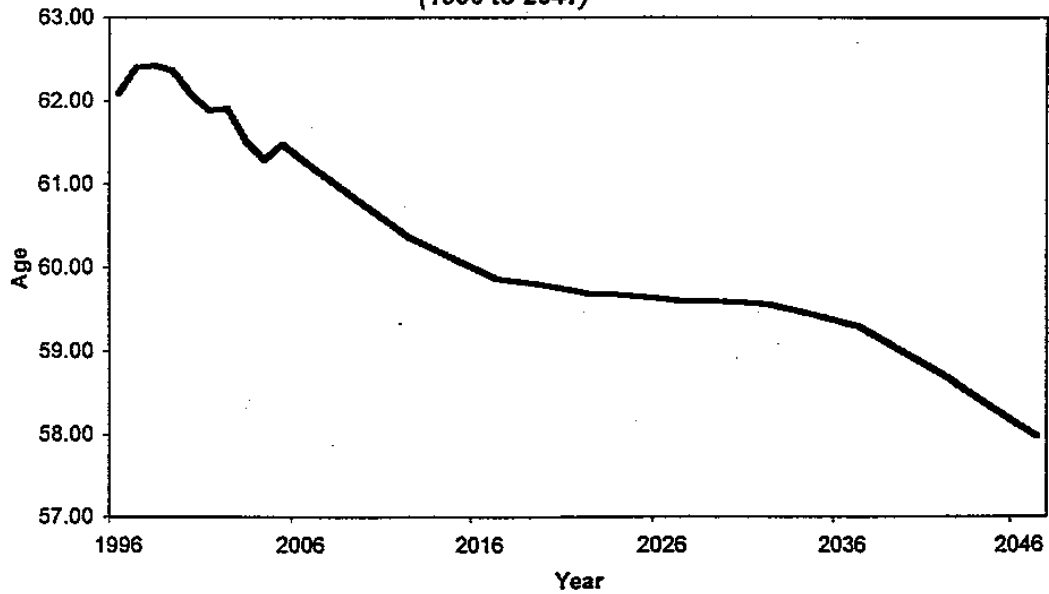### (1996 to 2047)

Median Retirement Age in Canada
with Productivity Improvements of 0.0% per annum
(1996 to 2047)

Median Retirement Age in Canada
with Productivity Improvements of 1.5% per annum
(1996 to 2047)

Median Retirement Age in Canada
with Productivity Improvements of 1.2895% per annum
(1996 to 2047)

Overlay plots of actual vs predicted average retirement age for Canada
(1982-1995)

Model 2

Overlay - using six year lag