
THE FUTURE COST OF THE CANADIAN PUBLIC PENSION PLANS

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By the public pension plans I mean the combination of the Canada Pension Plan (CPP), the Quebec Pension Plan (QPP), the Old Age Security Plan (OAS), the Guaranteed Income Supplement (GIS), and Spouse's Allowance (SPA). The apparent costs of these plans have been deceptively low--at least the required contribution rates from both employers and employees have been considerably lower than in the US and UK plans. There are several reasons for this.

First the CPP and QPP were only established in 1966, and provided only partial benefits for the first ten years. Secondly Canada has a young population, although it is aging. As these plans were established essentially on a pay-as-you-go basis, initial costs were much below ultimate costs. The other plans are financed out of general revenue, and there is no identifiable contribution towards them; they are not part of C/QPP.

Actuarial reports on the CPP and QPP were regularly released, but the general public never paid much attention to the long-range cost estimates. The eleventh report on the CPP was released in early 1990, while the sixth report on the QPP was released a bit earlier; both were prepared as of December 31, 1988. The first actuarial report on OAS, as of the same date, was released in October 1990.

CPP and QPP are earnings-related contributory plans providing pension, disability, and survivor benefits. Earnings covered are approximately the average earnings in Canada, \$32,200 in 1992. The maximum pension payable in 1992 for retirement at age 65 is \$636.11 per month. While the CPP and QPP are very similar, they are not quite identical. The major differences are in the benefits to surviving spouses and orphans. There also differences in the definition of and eligibility requirements for disability benefits.

The OAS is a demogrant paid at age sixty-five to anyone who meets certain residence requirements, irrespective of earnings. A full pension (\$374.07 per month at January 1, 1992) requires forty years of residence, and is prorated if there is less than forty years. As the proration was only introduced in 1977, anyone who was resident in Canada on July 1, 1977 is allowed to receive the maximum pension, if resident in Canada for the ten years preceding the date of application. There is no identified contribution for OAS.

In addition to these plans there is also the Guaranteed Income Supplement (GIS), and Spouses Allowance Plan (SPA). These programmes are income-tested. No actuarial reports have ever been released on these plans.

There has been little, if any, controversy in Canada among actuaries regarding the funding of the C/QPP, probably because from their introduction they were intended to operate essentially on a pay-as-you-go basis, with a contingency fund equal to two years benefit payments. There

has been little suggestion from the actuarial community that more conservative funding methods should be used. Canadian actuaries seem to believe that pay-as-you-go is appropriate for social insurance plans. This has not stopped periodic scare stories about the funds running out of money, with the authors of the scare stories not realizing that the plan always was to increase contributions. For essentially political reasons the initial contribution rate of 3.6% was set at well above the initial cost in order to build up a fund.

Quebec wanted a fund which could be used to make investments in the province, and as a result the QPP fund has always had a wide range of investments, including equities. Naturally the other provinces wanted access to the fund too.

The CPP was invested in provincial government bonds, using a formula that matched net contributions from the province with investments in it. The provincial bonds bore coupons at the going rate. As long as the interest was not needed to pay benefits, it was lent back to the province. As benefits under the CPP increased, the amount available to be lent to the provinces decreased. The provinces probably never contemplated that their bonds would ever be redeemed, or that the interest would become an actual expenditure. I am not aware of any study showing the effect of the maturing of the CPP on provincial finances, although the provinces are obviously aware of the effect.

The 1964 Actuarial Report on the CPP, prepared before its inception, indicated that in its first year, 1966, a

contribution rate of 0.10% was sufficient. Of course the rate would increase steadily, but a rate in excess of 3.6% would not be required before the early 1980's.

The first actuarial report, prepared as of December 31, 1969, indicated that the cost of benefits for 1970 was only 0.55%, that the cost would not exceed 3.6% until 1985, and that the ultimate cost would be 5.00%, based on assumptions of "reasonable stability". On assumptions of "moderate inflation" the corresponding figures or years were 0.55%, 1988, and 4.46%. Space precludes describing these assumptions, and reference should be made to the report itself. It must be remembered that there have been many improvements in both the CPP and QPP since their inception, which is one reason why the long-range cost estimates in the latest reports are considerably above those in the first reports.

Throughout this paper references are to total contribution rates. These rates are paid only by the self-employed; for the employed, they are divided equally between employees and employers.

These actuarial reports are not conventional reports, but cash-flow projections. For each year a projection is made of retirement, disability, surviving spouse, orphan and death benefits, to which are added expenses to obtain total expenditures. The income, consisting of contributions and investment income, is also projected. From these the size of the fund is determined. The reports are excellent examples of actuarial technique and contain much valuable information. For example, rates of disability for women are

lower than for men. While this may surprise insurance company actuaries, the result is common in social insurance schemes. The reports are worthy of close study.

Comments will be made first on the CPP report, and then more briefly on the QPP report. There will not be any discussion of the various sensitivity tests included in the reports for reasons of space.

The 1985 report revealed that the 3.6% contribution rate would no longer be sufficient to provide benefits and would have to be increased, as had been forecast in all previous reports. As a result the contribution rate was increased by 0.20% per year from 1987 to 1991 when it would reach 5.2%, and by 0.15% per year until 2011, when it would be 7.6%. Thereafter the contribution rates were determined by the "fifteen year formula", which gives an annual rate of increase determined so as to produce a fund equal to two years of benefits at the end of fifteen years. Rates in the legislation are set only for a twenty-five year period.

The 1988 report indicated that contributions would have to be increased more rapidly. The fund, which was projected to be 370% of a year's benefits at the end of 1989, would drop below the target of two years' benefits in 2000, and would be down to three months in 2014.

The following table compares the pay-as-you-go rates in the 1985 and 1988 reports, and shows the scheduled contribution rates adopted after the 1985 report. It should be remembered that the pay-as-you-go rates make no allowance

for investment income, currently around four billion dollars, while the scheduled contribution rates do.

YEAR	1985 REPORT	1988 REPORT	INCREASE	SCHEDULED RATE
1990	5.63%	6.14%	0.51%	4.40%
2000	6.75	7.43	0.68	5.95
2010	7.88	8.61	0.73	7.45
2020	10.09	10.91	0.82	
2030	12.03	13.04	1.01	
2050	11.49	13.04	1.55	
2100	11.50	13.75	2.25	

There are a number of reasons for the increases. A major one was a greater than expected utilization of the recently introduced early retirement provision allowing a retirement pension to be paid as early as age sixty, subject to a reduction of 0.5% for each month between early retirement and the sixty-fifth birthday. Previously retirement could not occur before age sixty-five. By itself, this added about 0.3%.

Changes in both the mortality and fertility assumptions also led to increases. Mortality is now based on the 1985-87 Canada Life Tables, adjusted for future improvements, rather than the 1980-82 tables. The fertility assumption was reduced from 2.00 for all of Canada to 1.85 for all of Canada and 1.80 for Quebec. On the other hand, a change in the assumption with respect to immigration, from 0.302% of the population to 0.400%, decreased costs.

Changes in population characteristics, revealed by the 1986 census, also resulted in increases. Differences in benefits in pay, other than early retirement, in the intervaluation period resulted in increases in some years and decreases in others. Differences between assumed and actual economic performance in the intervaluation period led to a reduction. "Improvements in valuation methods and actuarial techniques" resulted in both increases and decreases, depending upon the year

Among the economic assumptions the long term rate of increase in earnings has been reduced from 5.0% to 4.8%, while the assumption with respect to increases in the consumer price index (CPI) and the rate of return on new bond issues were maintained at 3.5% and 6.0% respectively. These are ultimate rates, with those for 1989 being 4.4%, 4.8%, and 10.9%. The increase in earnings reduces to 3.0% by 1992, before increasing to 4.8% in 1996. The increase in the CPI decreases to 2.5% in 1994, (with a blip to 5.7% in 1991 to reflect the introduction of the Goods and Services Tax [GST]), and then increases to 3.5% in 1996. (The GST was assumed to be at 9% as originally proposed, rather than the 7% actually implemented.) The interest rate on new bonds declined monotonically to 6.0% in 1996. The overall combined effect was an increase in costs.

A spread of 130 basis points between the rates of increase in earnings and increase in the CPI in the long run may be regarded as optimistic. In a letter in "The Actuarial Update" of the American Academy of Actuaries in January 1992, Roland E. (Guy) King argues that a spread of 110 basis points is not appropriate for United States Social Security.

In pay-as-you-go funding a reduction in the spread reduces contributions more than it does benefits, at least in the short term. Thus if this assumption is optimistic, contribution rates may rise even more rapidly than indicated.

A table in the report, reproduced at the end of this paper, shows the effect of all these changes on decennial pay-as-you go contribution rates. Some changes have their biggest impact in 1990, while in others it does not occur until 2100. Some have a monotonically increasing effect, some go up and down, and some have both positive and negative effects. Interestingly, added together they produce a monotonically increasing series, starting at 0.51% in 1990 and reaching 2.25% in 2100.

The QPP report was prepared using similar actuarial techniques. It must be remembered that this report is based on the population of Quebec, while that for the CPP uses the population of Canada, excluding Quebec. The demographics are, not surprisingly, a bit different.

There are also differences in the actuarial assumptions. The fertility rate is 1.4 until 1993, increasing thereafter until it reaches 1.8 in 2013. Net migration was set at a total of six thousand persons in 1989, increasing by five hundred per year until it reached eighteen thousand in 2013, remaining at that level thereafter. As a percentage of the Quebec population these are 0.087% and 0.238%. While these are considerably lower than the CPP assumption of 0.400%, they are based on Quebec

experience; net migration to Quebec was generally negative in the preceding twenty-five years

As in the CPP, mortality was assumed to improve continuously. Disability rates were generally higher than for the CPP, reflecting the different definition of disability. It was assumed that a smaller percentage would take advantage of the early retirement provisions than in the CPP, presumably because of the greater number of disability retirements.

Among the economic assumptions the long term rate of increase in earnings is 6%, inflation is 4.5%, and the return on new investments is 7.8%: these apply from 2000 on. The corresponding assumptions for 1989 were 5.3%, 4.3%, and 11.1%. The corresponding CPP long term assumptions were 4.8%, 3.5%, and 6.0%. The CPP actuaries seem to be more optimistic about long term inflation. The spread between earnings and inflation in the long term is 150 basis points, compared with the CPP's 130.

Higher rates of inflation and increases in earnings increase contributions more than benefits. The interest assumption reflects the different investment policies of the two plans. In any event the interest assumption is not an important one in plans that are essentially pay-as-you-go.

Naturally all these differences in assumptions produced different results. Even more significantly the QPP actuaries assumed that contribution rates would continue to increase by 0.2% per year up to 2034, after which the contribution rate would remain level at 13.2%. In the CPP

report the annual increase was assumed to reduce to 0.15% in 1992, and remain at that level, as specified in the legislation, until 2011, after when it was determined by the "fifteen year formula".

Consequently the QPP fund did not develop the same run-down as the CPP fund, remaining in excess of two years of benefits until 2020, after when it decreased to fourteen months of benefits by 2050. (The QPP report projected results only until 2050 while the CPP report made projections to 2100.)

In November 1990 the federal Department of Finance suggested increased contribution rates. Following a meeting with provincial finance ministers, agreement was reached on a slightly different set of increases. The current increase of 0.20% would continue until 1996, instead of reducing to 0.15%, and would then increase to 0.25% until 2006, after which it would revert to 0.20%. Contribution rates after 2016 have not been set. The following table shows the old and new contribution rates, and compares them with the pay-as-you-go rates in the 1988 report.

YEAR	OLD	NEW	PAY-AS-YOU-GO
1996	5.35%	5.60%	7.24%
2001	6.10	6.85	7.50
2006	6.85	8.10	7.95
2011	7.60	9.10	8.80
2016		10.10	9.91

Quebec has agreed to the same contribution rates for the QPP for at least the next five years. Contribution increases of up to 0.20% can be made by regulation under the CPP, while larger ones require an amendment to the legislation.

In November 1991 the twelfth report on the CPP was released. This showed the effects of a bill to amend the CPP introduced in October 1991. This increased the level of flat-rate children's benefits by \$35.00 per month, introduced the new contribution rates described above, and made some administrative and technical changes that had little financial effect. As a result the CPP fund continues to decline when related to benefits paid, but it remains at over two years of benefits until 2019. After then it declines to twenty months of benefits by 2035, but thereafter increases, reaching two years' benefits by 2052. The pay-as-you-go rates shown above have increased by 0.03% as a result of the benefit increase.

The 1988 report on the CPP also showed results on an entry-age normal basis. Using the same actuarial assumptions, the annual cost was 10.22% and the unfunded actuarial liability at the end of 1988 was \$338 billion.

The question is whether Canadians will be willing to pay the high contribution rates required in future. The 1964 report on the CPP indicated a cost of somewhat over 7% by 2050, if the mean of the high and low cost estimates is taken. Now rates of around 13% by 2050 seem likely. While part of the increase has come about because of differences between the original actuarial assumptions and the

experience, such as improving mortality, most has been because of benefit increases. It is all too easy to grant benefit increases when a plan is funded on a pay-as-you-go basis when the increase in costs will not occur until well into the future. The long term increase in costs was revealed whenever increases were made, but the general public paid little or no attention.

Contributions to the C/QPP increased by 10% from 1991 to 1992. This resulted from a combination of a 4.3% increase in the contribution rate itself, and 5.6% increase in covered earnings: the latter increases with increases in covered earnings and is \$32,200 in 1992. One financial writer, commenting on this increase which is well above the inflation rate, and knowing that there would be similar increases for the foreseeable future, predicted a taxpayers' revolt, and that the C/QPP as presently constituted would not survive. Benefits would either be reduced, or taxed back, as is OAS. (This tax-back is described below.) On the other hand, another observer suggested that, as there was little objection to the 39% increase in unemployment insurance premiums from January 1991 to January 1992 there should be little to the C/QPP increase. This comment, however, was made after the increase was announced, but before the increased premiums had actually been paid; there have been complaints after they were implemented.

The first report on OAS did not attract nearly as much attention. This is the first time there has been a formal report, although the Society of Actuaries Committee on Social Insurance gave cost estimates at a meeting in Anaheim, California in April, 1988.

While the actuarial assumptions for this report are essentially the same as for that on the CPP, the economic assumptions from 1989 to 1994 are somewhat different. The OAS report was prepared later than the CPP one, and the economic assumptions were modified to take into account actual experience in 1989, the 1990 federal budget, and the GST being set at 7% rather than 9%.

OAS applies to all Canadians, while the CPP applies to employed Canadians, excluding residents of Quebec. Hence the basic demographics are somewhat different.

The following table expresses the cost of OAS as a percentage of total earnings, not covered earnings under the CPP.

YEAR	COST
1990	3.51%
2000	3.59
2010	3.54
2020	4.15
2030	4.75
2050	3.72
2100	2.12

These costs do not take into account the "claw back" tax recently introduced. This tax is 15% of taxable income in excess of a certain threshold (\$51,765 in 1991) to a maximum of OAS benefits received. The government actuaries considered this a part of the tax system, and not a part of

OAS. OAS benefits in 1991 amounted to \$4,381 so anyone with taxable income of \$80,972 or more had all OAS benefits taxed-back.

Canadians do not seem to be aware of the cost of OAS, probably because there is no identified cost for it. As the top rate of the federal income tax is 29%, before adjustments for basic credits and surcharges on high earners, it is apparent that well over ten percent of the federal income tax goes towards financing OAS.

No formal actuarial reports have ever been made on the GIS/SPA programmes. Again the Society's Committee on Social Insurance made some estimates which were given at the Anaheim meeting. The cost was put between one and two percent of earnings, depending upon the year and assumptions used.

The pension part of Canada's social security system is indeed expensive. In 1992 the contribution to C/QPP is 4.8%, while the cost of OAS is 3.65%. By 2015 the corresponding figures will be 9.90% and 3.81%. By ²⁰⁴⁰~~2014~~ they will have reached 13.18% and 4.31%. After then the C/QPP contribution should be stable, while the cost of OAS will decline. To this should be added another 1% or so as the cost of GIS/SPA.

In addition to this is the cost of unemployment insurance. In 1992 contribution to this are 7.2% of covered earnings, which currently are \$36,920. Five twelfths of the cost is paid by employees. Contributions to unemployment insurance are currently more than to C/QPP! Then there is

the cost of medicare which is financed mostly out of general tax revenue, including provincial sales taxes. Comments on the cost of medicare are beyond the scope of this paper, but are substantial.

Canada's social insurance system is more costly than most Canadians believe, and will get more so as the population ages. Canadians are beginning to complain about their level of taxes, but are disinclined to accept cutbacks in benefits. The "claw-back" of OAS was objected to widely, and it only affected those with higher incomes. Whether they will accept the higher costs, or whether cut-backs will be necessary is difficult to predict.

RECONCILIATION OF COSTS FROM THE 1985-1988 REPORTS ON THE
CANADA PENSION PLAN

	<u>1990</u>	<u>2000</u>	<u>2010</u>	<u>2020</u>	<u>2030</u>	<u>2050</u>	<u>2100</u>
	%	%	%	%	%	%	%
Tenth Report rates:	5.63	6.75	7.88	10.09	12.03	11.49	11.50
I. Improvement in valuation methods and actuarial techniques(1)	-0.14	0.12	0.12	0.01	-0.07	-0.12	-0.21
II. Experience update							
A. Demographic(2)	0.04	0.08	0.13	0.22	0.33	0.13	0.06
B. Economic(3)	-0.10	-0.19	-0.19	-0.18	-0.16	-0.10	-0.09
C. Benefits in pay(4)	<u>0.59</u>	<u>0.20</u>	<u>0.20</u>	<u>0.16</u>	<u>-0.05</u>	<u>-0.02</u>	<u>-0.09</u>
Sub-Total II	0.53	0.09	0.14	0.20	0.12	0.01	-0.12
III. Changes in assumptions							
A. Demographic							
i) mortality(5)	-0.02	0.03	0.16	0.27	0.38	0.49	1.04
ii) fertility(6)	0.00	0.00	0.00	0.07	0.25	0.71	1.05
iii) migration(7)	<u>-0.04</u>	<u>-0.11</u>	<u>-0.16</u>	<u>-0.21</u>	<u>-0.17</u>	<u>-0.02</u>	<u>0.01</u>
Sub-Total A	-0.06	-0.08	0.00	0.13	0.46	1.18	2.10
B. Economic	<u>0.18</u>	<u>0.55</u>	<u>0.47</u>	<u>0.48</u>	<u>0.50</u>	<u>0.48</u>	<u>0.48</u>
Sub-Total III	0.12	0.47	0.47	0.61	0.96	1.66	2.58
Total I + II + III	0.51	0.68	0.73	0.82	1.01	1.55	2.25
Eleventh Report rates:	6.14	7.43	8.61	10.91	13.04	13.04	13.75

- (1) Age by age basis, 15% and child-rearing drop-out provisions, credit-splitting on marriage or union breakdown.
- (2) Population characteristics (update from 1981 Census to 1986 Census).
- (3) Actual participation rates, average earnings and rates of increase in prices and earnings for 1986, 1987 and 1988.
- (4) The effect of higher than expected early retirement rates is 0.27%, 0.09%, 0.16% and 0.12% for 1990, 2000, 2010 and 2020, respectively.
- (5) Mortality reductions and effect of AIDS.
- (6) 1.85/1.80 versus 2.0/2.0 for Canada/Quebec.
- (7) 0.4% versus 0.302%.