Reforms to the Canadian Pension Plan: An Intergenerational Perspective

Author: Sean Stewart

This is a summary of master's in economics thesis for Tilburg University. You can view the full thesis and code here.

This thesis analyzes the impact of the 2016 reforms to the Canadian Pension Plan using generational accounts. I develop a simulation in python of the Canadian Pension Plan and calculate the changes in the generational accounts for the cohorts born between 1955 and 2019. I find that the reforms increase the generational accounts of both the male and female cohorts proportional to the number of years they work in the reformed system. This represents an increase in intergenerational transfers from the young to the old, but not a pure transfer due to the steady-state funding mechanism. And due to the structure of the reforms, the short-term financial position of the CPP improves.

Research Question: *How have the 2016 reforms to the Canadian Pension Plan affect the generational accounts of current and future cohorts?*

What is the Canadian Pension Plan?

The Canadian Pension Plan (CPP) is the government run defined benefit pension system that all workers in Canada participate in through a mandatory payroll tax. Retirement benefits begin at age 65 and are determined based on average salary, and number of years worked.

Where does the money come from?

The CPP is funded through a hybrid pay-as-you-go (PAYG) and funded system. This means that expenditures are partially paid by current contributions, and partially by investment income generated by the CPP investment fund.

What did the 2016 reforms change?

In 2016, the government expanded the coverage of the CPP. The reforms presented three major changes: first increase the replacement rate in retirement from 25% to 33% of average earnings, second raise the maximum income covered from 100% of the Canadian average to 114% and third raise the contribution rate from 9.9% to 11.9%. The reforms will be phased in over a seven-year period starting 2019. These changes increase the pension benefit by up to 50% but the reforms do not affect current retirees. Current workers will see an increase in their benefit proportional to the number of years they work in the reformed system.

Table 1: Summary of Changes

	Old CPP	Reformed CPP
Contribution Rate	9.90%	11.90%
Replacement Rate	25%	33%
Pensionable Income	100% Canadian Average	114% Canadian Average

What is a Generational Account?

A generational cohort is represented by a group of people born in the same year. A generational account is defined as the net present value of contributions paid, and benefits received over their remaining lifetime of an entire generation. A generational account of zero means that the generation is expected to receive in benefits exactly what they paid in contributions.

Methodology

To analyze the reforms I recreate (and verify) the model used in the CPP actuary report. The simulation was built in three parts: the population projection which includes births, immigration, and mortality, the economic parameters, which includes the labor force participation rate, income distribution, productivity, and inflation, and finally the pension system and its reforms. The output of the model matched those in the latest actuary's report.

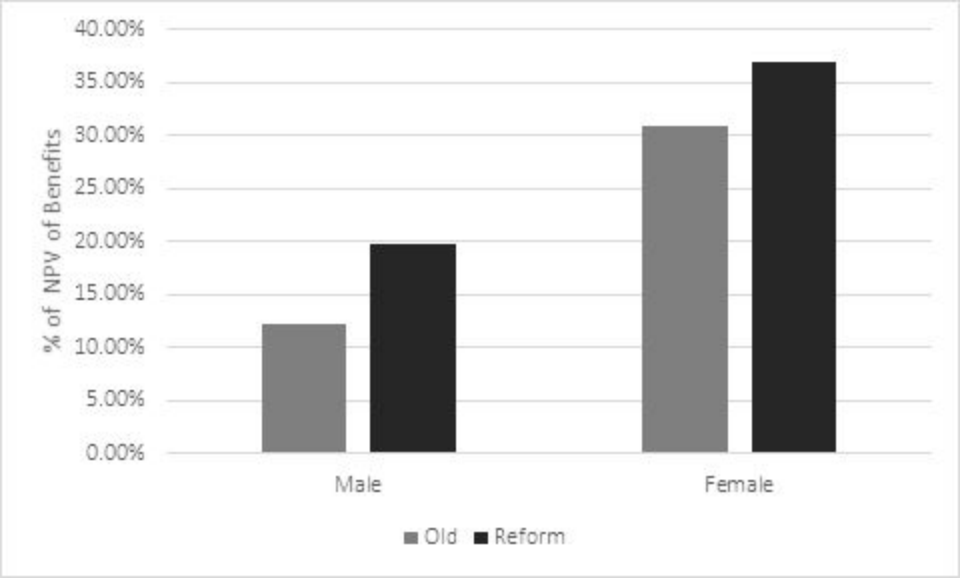
How much did the generational accounts change?

The best place to start the analysis is by looking at the 2001 cohort since this cohort works entirely in the old system or the reformed system. Thus, the full effect of the reforms will be reflected in their generational accounts. To make the generational account figures easier to compare, they are divided by the net present value of their received benefits.

Table 2: Best-Estimate - Generational Account for 2001 Cohort

Account	Old	Reform	Change
Male	12.19%	19.73%	7.54%
Female	30.98%	36.88%	5.90%
Internal Rate of Return	2.35%	2.62%	0.27%

Best-Estimate - Generational Account for the 2001 Cohort



For both the male, and female cohorts, the reforms increase the value of their generational accounts by 5.9 – 7.5 percentage points. This change results in an increase in the internal rate of return of 0.27 percentage points which represents an increase in the intergenerational transfer from the young to the old. But since the move to steady-state funding this does not represent a pure intergenerational transfer, since part of each generation's contributions are being invested in the investment fund. As expected, the generational account is larger for females than for males due to differences in mortality.

How did the reforms impact the financial position of the Canadian Pension Plan?

The government uses several metrics to measure the financial position of the CPP such as the minimum-contribution rate required to maintain financial stability, the first year the CPP goes into deficit, the ratio of financial assets to expenditures (A/E ratio), and the theoretical pay-as-you-go rate needed to fund expenditures in any given year (PAYG rate).

Table 3: Best-Estimate - Minimum Contribution Rates

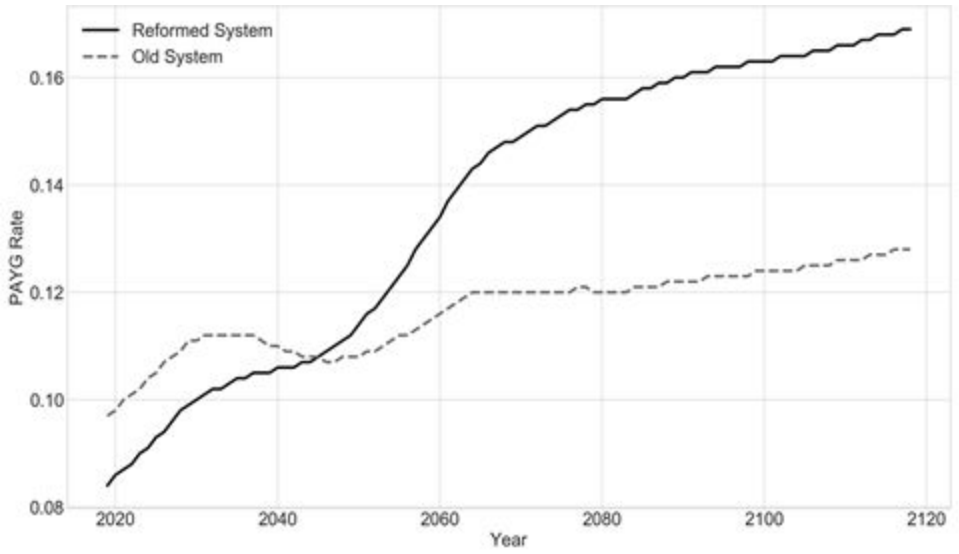
	Minimum Contribution Rate		First Year of Deficit		A/E 2100	
Scenario	**Old**	**Reform**	**Old**	**Reform**	**Old**	**Reform**
Best-estimate	9.70%	10.60%	2021	2053	10.28	22.14

The most important financial metric is the minimum contribution rate since if it exceeds the contribution rate paid by participants then this indicates the CPP is not financially stable. It appears that the reforms push the minimum contribution rate up from 9.7% to 10.6%. This was expected due to the larger future benefits, but notice how close each minimum contribution rate is to their respective statutory contribution rate. In the old system the minimum contribution rate only has 0.3 percentage points to rise before it exceeds the contribution rate of 9.9%, while in the reformed system the minimum contribution rate has 1.4 percentage points to rise before it exceeds the contribution rate of 11.9%. This indicates that the reformed system has more space to absorb a shock before the minimum contribution rate exceeds the current contribution rate paid by participants.

Under the old CPP system, the first projected year of deficit is 2021, while the reforms push this date back until 2055. These additional years in surplus allow the investment fund to grow faster. Due to the additional investments, and the additional time the investment fund is not in deficit, the fund is projected to be 21.1x expenditures by 2100 for the reformed system, compared to 10.3x times for the old system.

An interesting result is the initial decline in the PAYG rate. This is driven by the increase in pensionable earnings. Even though expenditures do not rise much in the short term, the amount of income that participants are paying contributions on increases immediately, which thus pushes down the PAYG rate. That is, until the new enhanced benefits start to be paid out, and the full effect of the reforms are reflected.

Chart 2: Best-Estimate - PAYG Rates



Conclusion

In conclusion the CPP reforms increase the generational accounts by an average of 5.9 percentage points for females, and 7.4 percentage points for males. The internal rate of return increases by 0.27 percentage points which represents an increase in the intergenerational transfer from the young to the old. But because the CPP is not a pure PAYG system, it does not represent a pure intergenerational transfer.

The reforms improve the financial position of the CPP in the short term since contributions increase immediately. That does not mean that the system has less risk, but only that the type of risk has shifted. Demographic risk was pushed into the future and will be at its highest when the full increase in benefits start to be paid out, while financial risk increases in the present. The CPP investment fund is already one of the largest sovereign wealth funds in the world and will continue to grow while it invests its financial surpluses. Can it maintain its current growth rate over the long run? If it does not the consequences are higher contribution rates, or lower benefits for participants.