

Social Security: Equity and Cost Optimization

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Most common types of

GOVERNANCE FRAMEWORK

for Social Security Programs

- **Public systems**
 - **Defined Benefit**
 - **Paygo financing**
 - **Centralized administration**
- **Private systems**
 - **Defined Contribution**
 - **Full funding**
 - **Fragmented pools** (financial institutions)

Overall ADMINISTRATIVE CHARGES as a % of contributions

- **Centralized Administration**
 - **OASDI (United States): 1%**
 - **CPP (Canada excl. Quebec): 1.3%**
 - **QPP (Quebec): 1.5%**
- **Fragmented Pools**
 - **UK: 40%**
 - **Latin American (7): 42%**
 - **Difference due to**
 - **scale of operations**
 - **transfers**
 - **profit margins**
 - **abuses**

INTERNAL RATE OF RETURN

1. **GROSS** (before administrative charges)

(a) **PAYGO**: economic growth

$$e = (1+p)*(1+s) - 1$$
$$= -0.2\% + 4\% = 3.8\%$$

p=demographic increase s = increase in average covered earnings

(b) **FUNDING**: yield on assets

Diversified portfolio

$$i = ((1+k)*(1+t)-1)/(1-x)$$
$$= ((1.03)*(1.01)-1)/(1-0.4243)$$
$$= 7.0\%$$

Government bonds

$$i = 6\%$$

2. **Net** (after administration charges)

$$e \text{ (public)} = 3.8\% - 0.13\% = 3.67\%$$

$$i \text{ (priv.div.portf.)} = 7.0\% - 1.56\% = 5.44\%$$

$$i \text{ (pub.gov.bonds)} = 6.0\%$$

$$i \text{ (pub.div.portfolio.)} = 7.0\%$$

FUNDING compared to PAYGO

- **Higher IRR ==> lower cont. rate (CR)**
- **If paygo===funding, why not FUNDING?**
 - **Higher take-home pay**
 - **Better compliance with the system**
- **Equity: intra and inter-generational**
- **Entitlement based on ownership**
- **CR not affected by fertility-related aging**
- **Lower volatility of CR from year to year via larger cushion provided by the fund**

CONCLUSION

The best of two worlds

1. **Centralized administration of publicly sponsored programs**

+

2. **Funding (diversif. portfolio) of privately sponsored programs**

=

3. **A FUNDED (diversified portfolio) PUBLIC program
... DB or DC**

Funding Issues

1. Investment risk

- higher in developing countries
- likely the same at the private and public levels
- if government cannot be trusted for managing investments, can it be trusted for supervising private financial private institutions?
- are gov. bonds more productive?
- control mechanisms: CPP & QPP

2. Role of funded social security on economic growth: **catalyst**

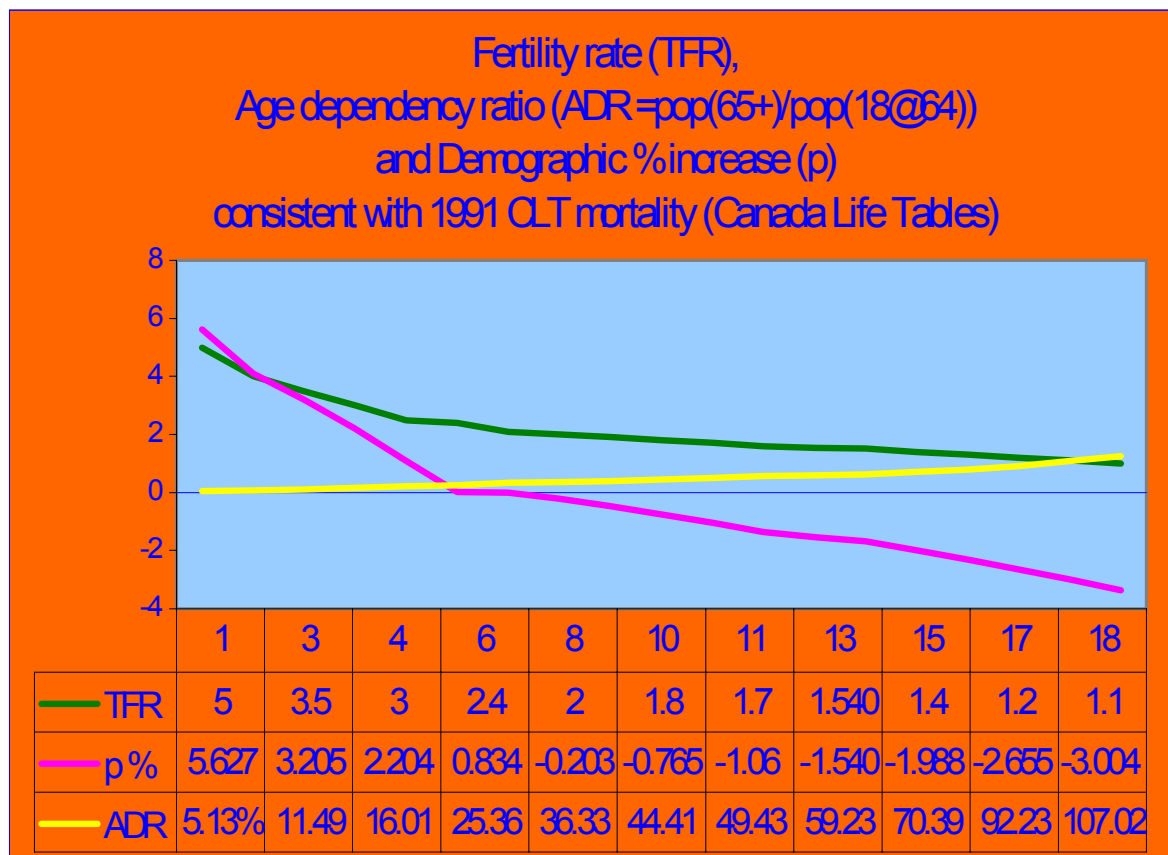
3. From paygo to funding:

- **transition costs**
- **opportunity for fuller funding: CPP, QPP**

4. Defined Benefit versus Defined Contribution: **not an issue**

Effect of AGING on PENSION COSTS

1. Lower FERTILITY



2. Lower MORTALITY

annual decline over 100 years	Canadian (1991 CLT) unisex life expectancy at age 65
0.00%	18.12 (100%)
0.75%	24.47 (135%)
1.50%	26.77 (147%)

Correlation between assumptions (continued)

- **Productivity increases longevity,
i.e. induces aging:**
 - **20th century experience
(GDP, longevity)**
 - **lower mortality of higher earners**
 - **Recessions**
 - =higher unemployment rate**
 - =higher incidence of disability**
 - =higher mortality**
- **Productivity decreases with aging**
- **These two apparently contradicting theories might indicate that there is a limit to aging or to productivity or to both, or that the pace of both factors can only shrink as they increase.**

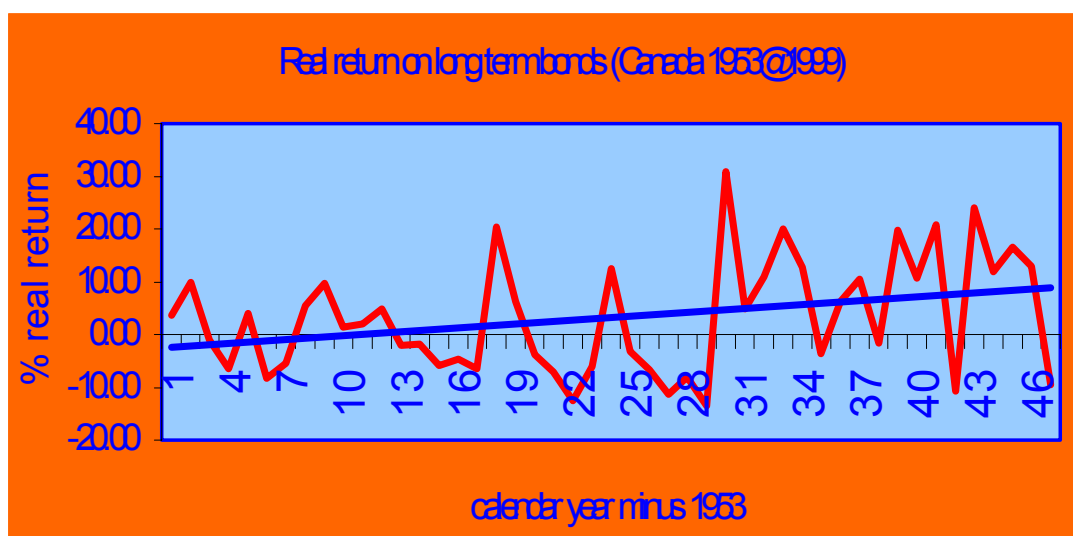
Correlation between assumptions (continued)

Real return on assets >
Productivity grossed-up for taxes

$$i_r > t/(1-x)$$

i.e. Nominal return on assets >
Productivity grossed-up for inflation+ taxes

$$i > (1+t)*(1+k)/(1-x)$$



Correlation between assumptions (continued)

	Canadian experience 44-year averages (1953-1997)	20-year averages (1977-1997)
Average increase in total population (p)	1.54%	1.18%
Average nominal increase in GDP (e)	8.18%	7.06%
Average inflation (k)	4.21%	4.87%
Average real rate of increase in GDP ($e_r = ((1+e)/(1+k)) - 1$)	3.81%	2.09%
Residual productivity ($t = ((1+e_r)/(1+p)) - 1$)	2.23%	0.90%
Nominal wage increase $s = ((1+t)*(1+k)) - 1$	6.54%	5.81%
Average gross nominal return on long-term bonds (i)	7.71%	12.46%
Tax rate (x)	45.0%	45.0%
Net real return ($l_{nr} = ((1+i*(1-x))/(1+k)) - 1$)	0.02%	1.90%
Average real return on bonds (l_r)	3.35%	7.24%

- The fall in demographic increase matches a fall in economic growth.

- The productivity rate gets lower with the aging of the population.
- The real return (on bonds) net of taxes is positive, though higher than productivity only for the 20-year period.

Pension Cost Formula

(earnings-related retirement benefits)

$$CR = \frac{BR * PVB(ELBP, IRR - c)}{ACC(CP, IRR - s)}$$

PAYGO: $IRR = e = p + s$

$$CR = \frac{BR * PVB(ELBP, p + s - c)}{ACC(CP, p)}$$

ENTRY AGE: $IRR = i$

$$CR = \frac{BR * PVB(ELBP, i - c)}{ACC(CP, i - s)}$$

The above expressions imply the return of accumulated contributions in case of death before retirement.

CR = contribution rate

BR = benefit rate

CP = contributory period

i = yield o pension assets

PVB = present value of benefits (annuity-due)

ACC = accumulation-due of contributions

c = benefit indexation rate

ELBP = expected length of benefit period

s = increase in average earnings

p = demographic increase

