



Office of the Superintendent of  
Financial Institutions Canada

Bureau du surintendant des  
institutions financières Canada

Office of the Chief Actuary

Bureau de l'actuaire en chef

# 23<sup>rd</sup> Actuarial Report on the Canada Pension Plan as at 31 December 2006 and its Peer Review Process

*Presentation to the Board of Directors of the Canada  
Pension Plan Investment Board*



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16 June 2008

Canada 

# Presentation

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- Purpose of the CPP Actuarial Report
- Demographic and Economic Assumptions
- CPP, a Partially Funded Pension Plan
- Uncertainty of Results
- Strengthening the Accountability and Peer Review



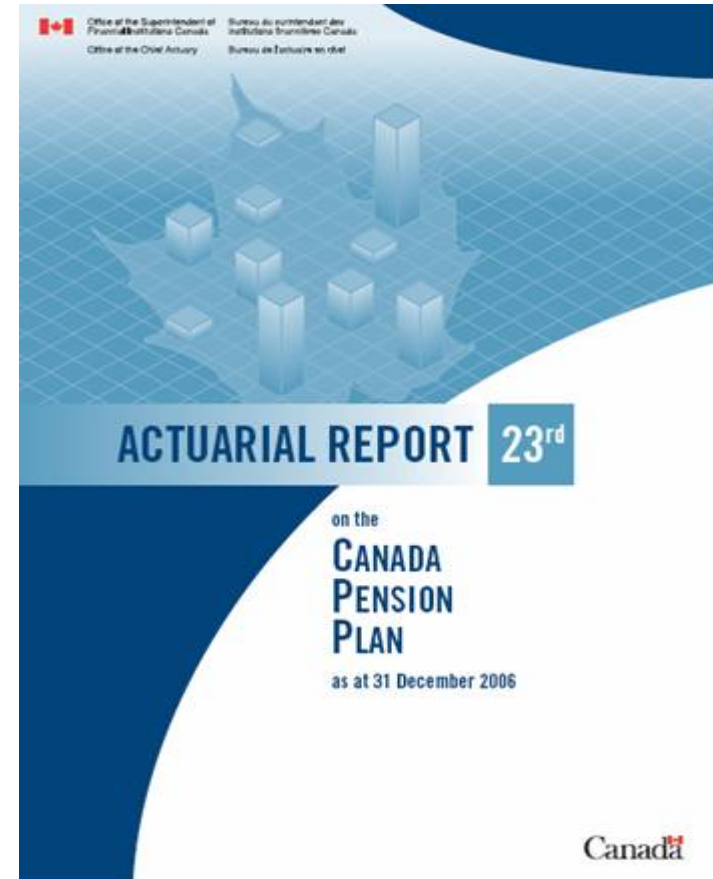
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# Purpose of the CPP Actuarial Report



- Tabled by the Minister of Finance on 29 October 2007
- Inform on the current and projected future financial status of the Canada Pension Plan
- Calculate the minimum contribution rate



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# Consultations on Assumptions

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- CPP and QPP seminars were organized to get opinions from a wide range of experts in the fields of demography, economics and investments.
- Federal and provincial officials attended these seminars.



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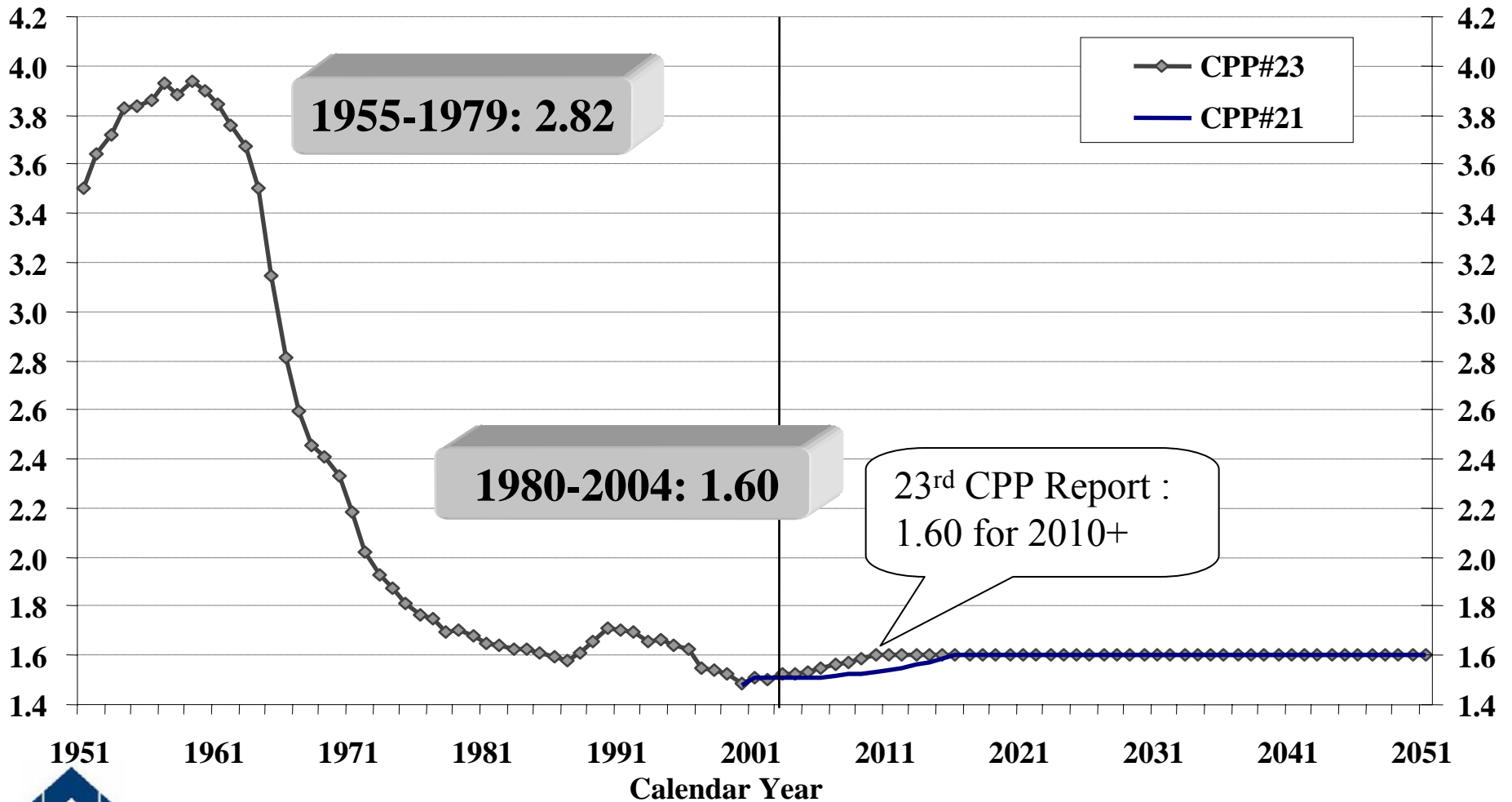


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# Fertility Rate

( Children per woman)



**Panel's view: reasonable**

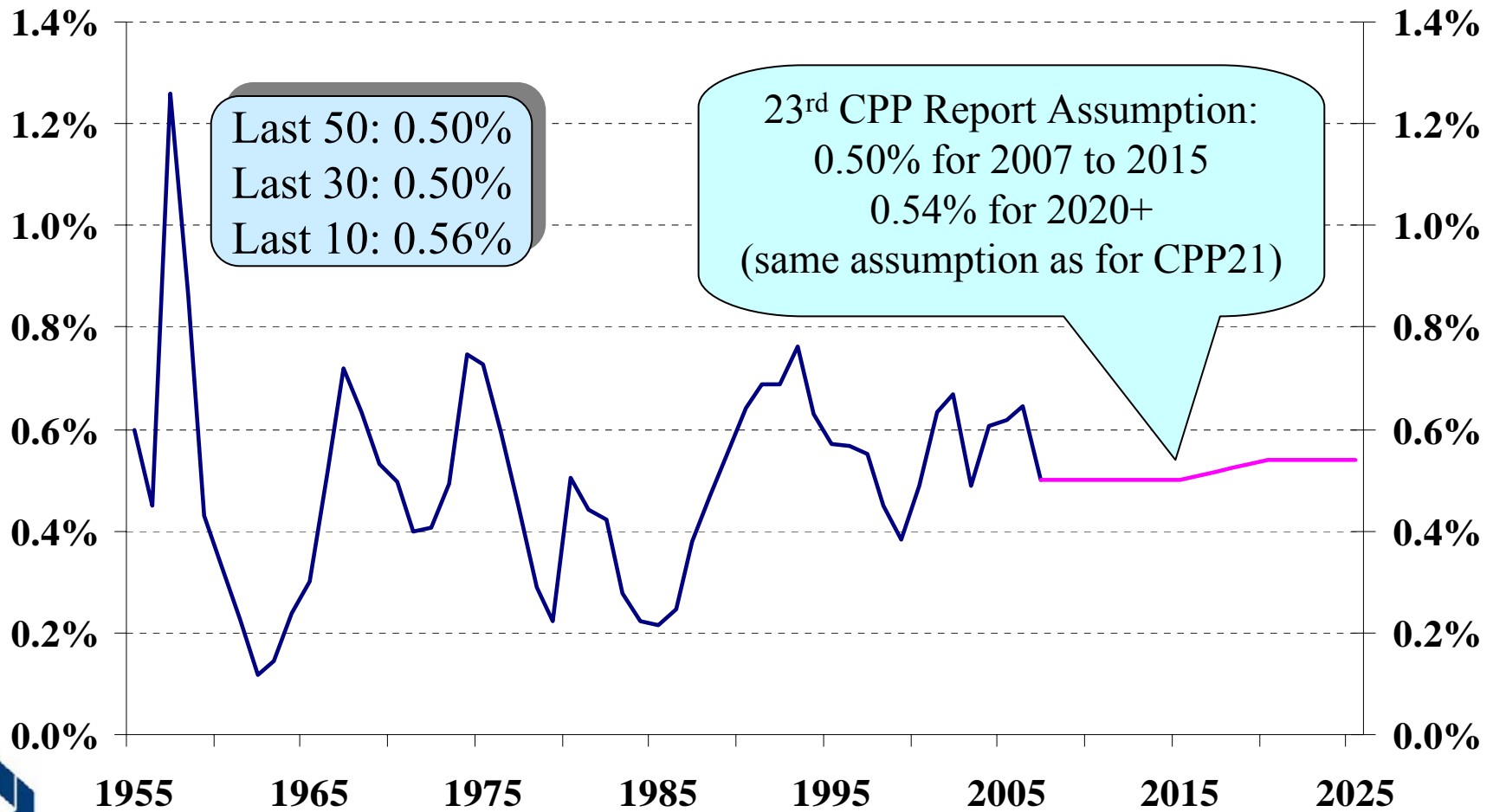


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# Net Migration Rate



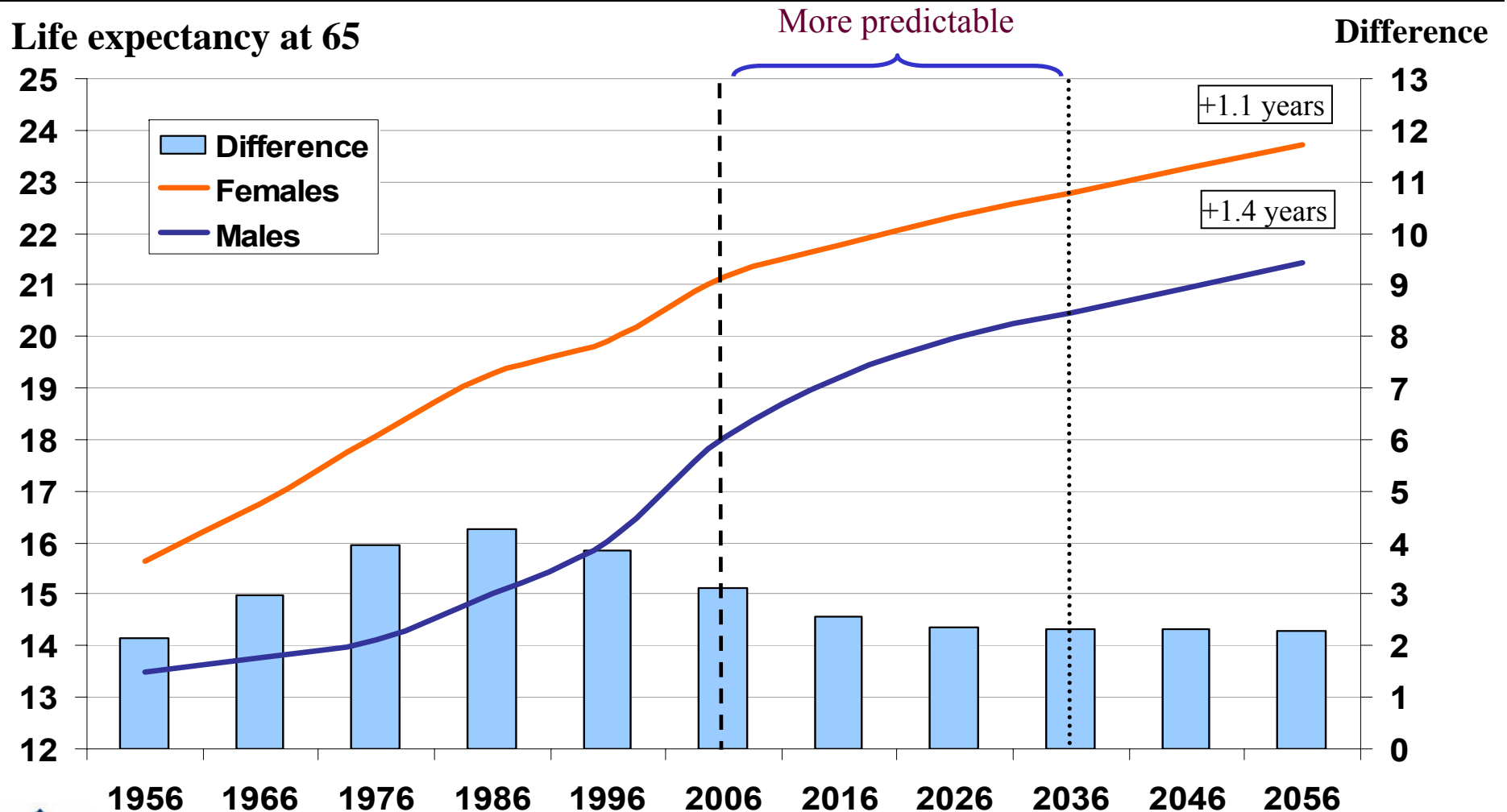
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Panel's view: reasonable

# Increase in Life Expectancies at 65\*

\*Life expectancies shown are without assumed future mortality improvements.



*More contributors are expected to reach the retirement age of 65.*

*Retirement beneficiaries are expected to receive their benefit for a longer period.*

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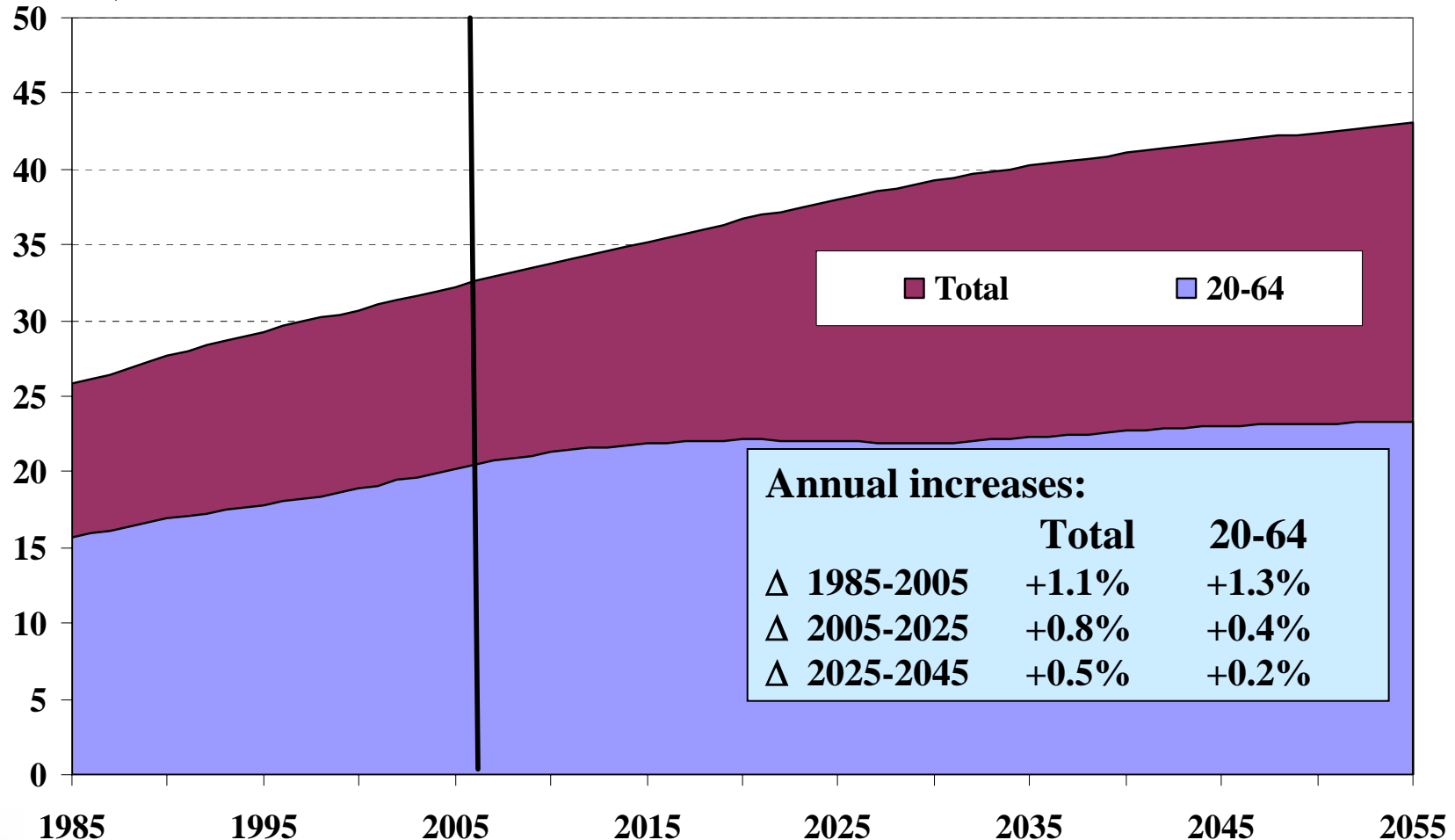
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**Panel's view: reasonable**



# After 2025, almost all of the projected population increase will come from migration

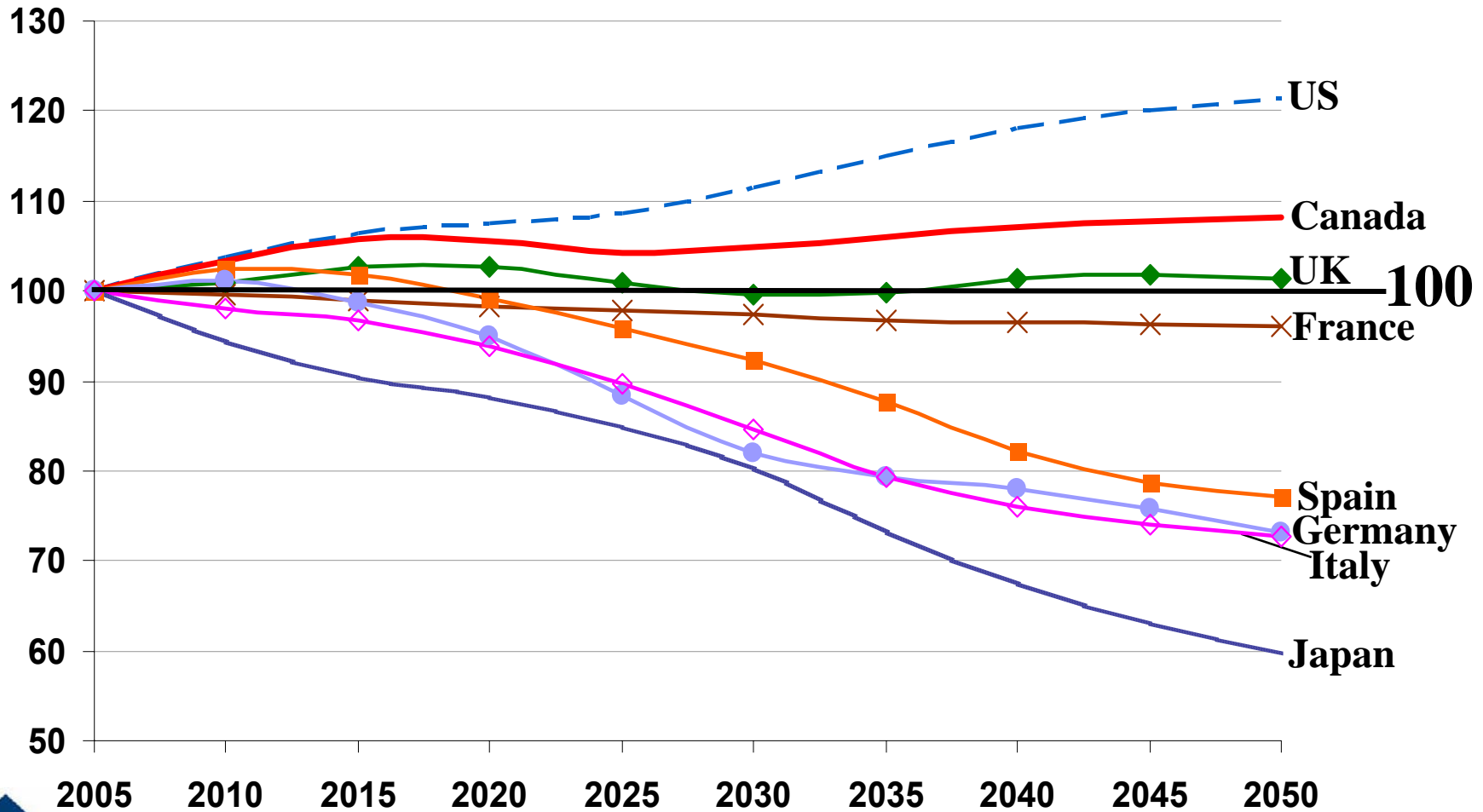
(in millions)



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# Working Age Population (ages 20-59) (indexed 2005=100)



Source: United Nations Population Division, World Population Prospects: The 2006 Revision

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# Economic Assumptions

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- Participation rates
  - Employment increase (Job creation rate)
  - Unemployment rate
  - Inflation rate
  - Increase of average employment earnings
  - Interest rate and rate of return by asset class
- } # of earners

Sources: *Historical Trends, Recent Experience, PEAP (U of T), Conference Board, Department of Finance, CIA Report on Canadian Economic Statistics, Watson Wyatt Economic Expectations Survey, Canada Revenue Agency, Bank of Canada, CPP/QPP Seminars, CPPIB*

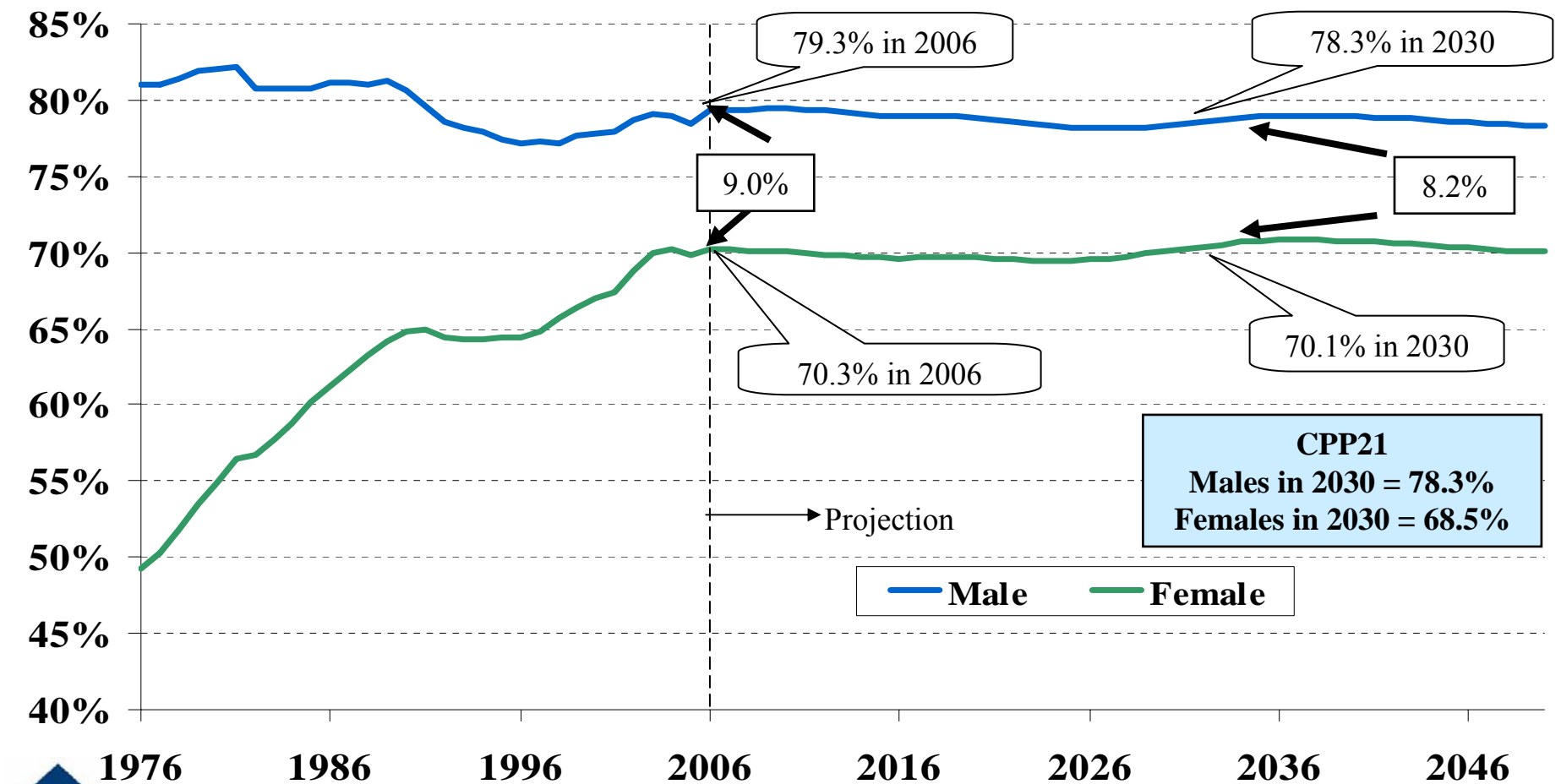


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# Gap between male and female participation rates will continue to decrease but at a slower pace

## Participation Rates of 15-69 (Canada)

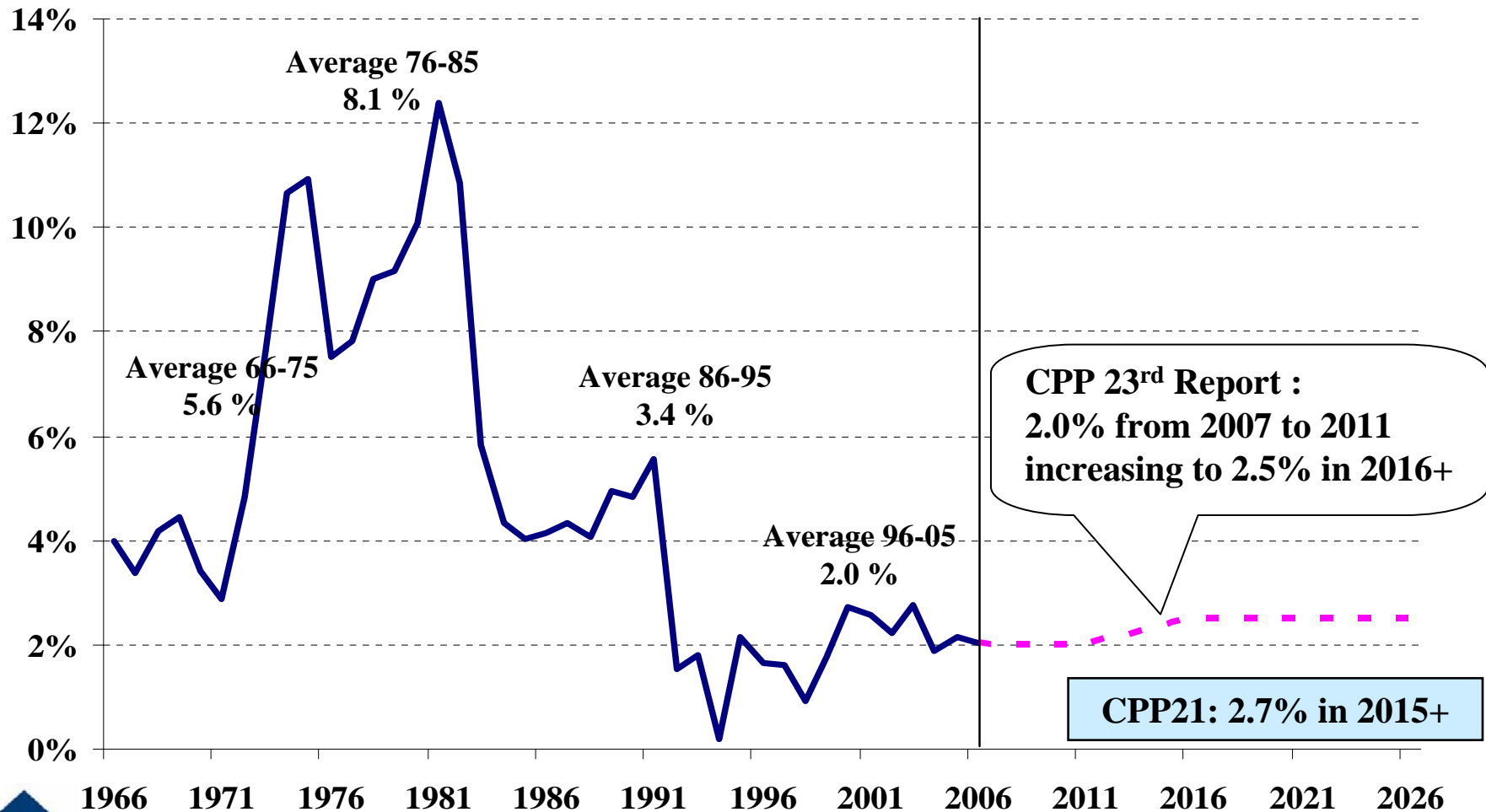


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**Panel's view: reasonable**

# Annual Increase in Consumer Price Index

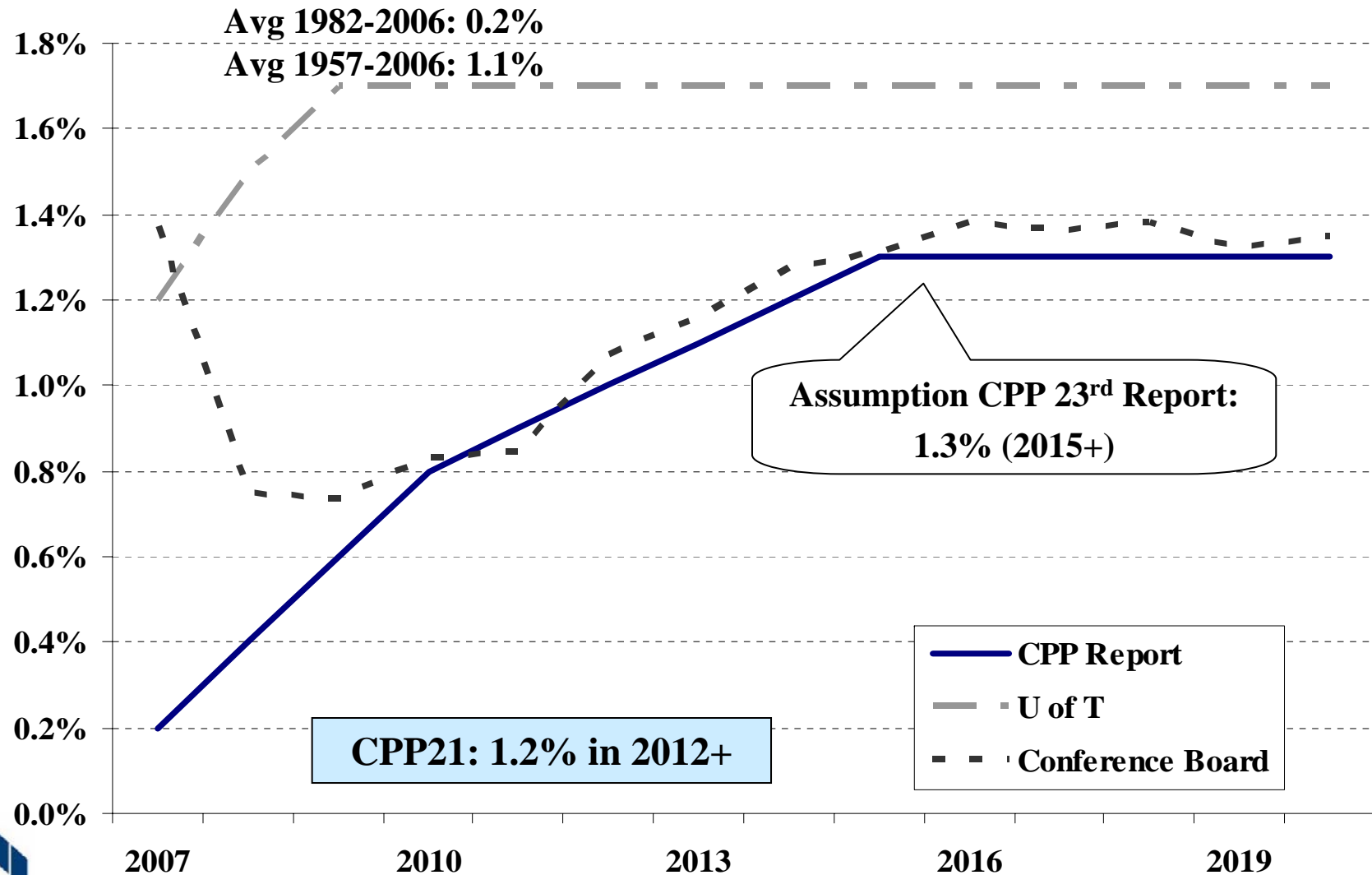


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Panel's view: assumption is within, but towards the high side of, the reasonable range.

# Annual Increase in Real Wages

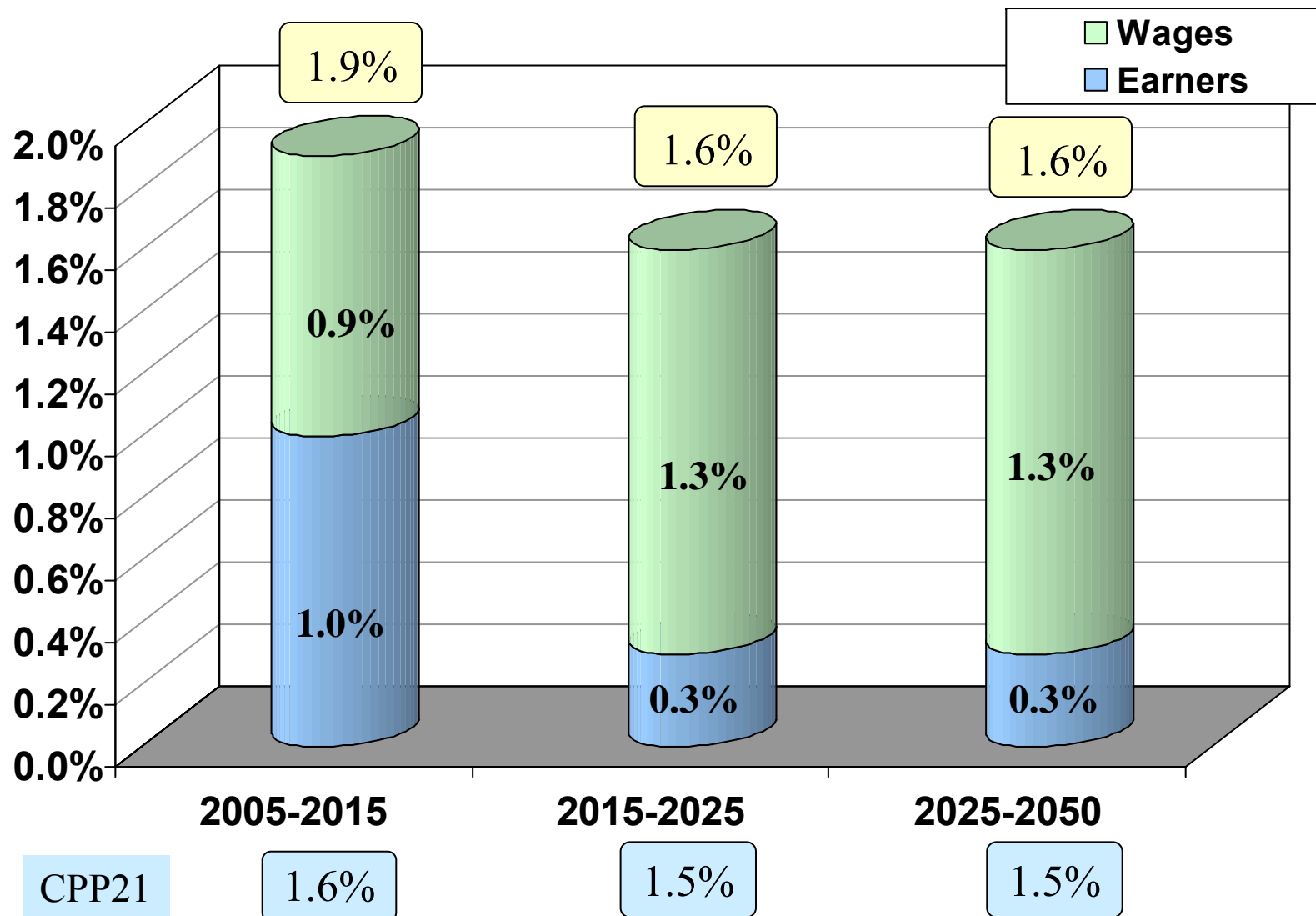


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**Panel's view: reasonable but somewhat low within the range of expert opinion.**

# Real Increase of Total Employment Earnings (18-69, Canada less Québec)



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# CPP reference portfolio consists of 65% equity and 35% debt

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## Evolution of CPP Asset Mix

	<b>Fixed Income</b>	<b>Equity</b>	<b>Inflation-Sensitive</b>
<b>2007</b>	28%	65%	7%
<b>2010</b>	30%	60%	10%
<b>2015</b>	30%	60%	10%
<b>2020</b>	35%	55%	10%
<b>2025</b>	40%	50%	10%



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**Panel's view : Ultimate asset mix is a little more heavily weighted to fixed income than they would have expected.**



# Real Rate of Return by Asset Class

	(2007-2011)	<u>CPP23 (2025+)</u>		<u>CPP21 (2033+)</u>	
	↓	Rate	Mix	Rate	Mix
• Canadian Equities:	(3.5%)	5.1%	15%	4.6%	15%
• Foreign Equities:	(3.5%)	5.1%	35%	5.0%	30%
• RE & Infrastructure:	(2.9%)	3.95%	10%	4.0%	10%
• Marketable Bonds:	(2.7%)	3.2%	39.5%	3.4%	44.5%
• Cash:		1.0%	0.5%	1.5%	0.5%
• Total Real Return		4.22%		4.1%	

***Average Real Rate of Return (2007-2016): 3.8%***



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**Panel's view: long-term assumption is within, but towards the low side of, the reasonable range.**

# Presentation

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- Purpose of the CPP Actuarial Report
- Demographic and Economic Assumptions
- **CPP, a Partially Funded Pension Plan**
- Uncertainty of Results
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# CPP, a Partially Funded Pension Plan

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- *Steady-state funding*: replaces the original pay-as-you-go financing to build a reserve of assets equivalent over time to about five and a half years of benefit expenditures or about 25% of Plan liabilities.
- *Incremental full funding*: requires that changes to the CPP that increase benefits or add new benefits be fully funded (eg: increase in eligibility for disability benefits for long-term contributors).



# CPP, a Partially Funded Pension Plan

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## **Sources of Income**

- CPP follows the 70:30 Rule (Contributions:Investment Earnings).
- When the A/E ratio reaches approximately 5.5, 30% of revenues will come from investment earnings.
- Sources of income of fully-funded pension plans are the opposite (the 30:70 Rule).

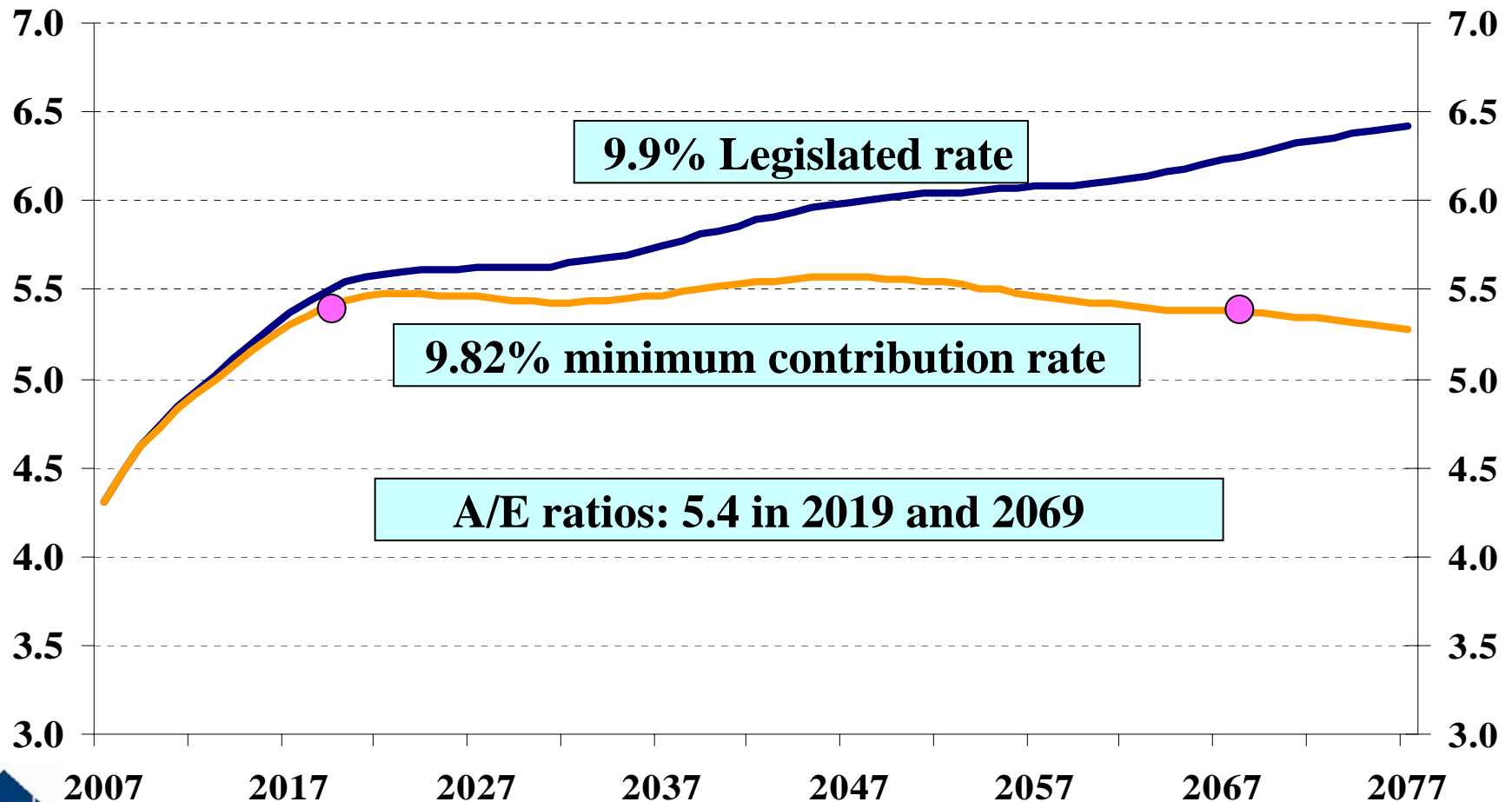
## **How annual benefits are paid**

- From 2007 to 2019, contributions exceed benefits.
- Once the A/E ratio reaches about 5.5, annual contributions will equal approximately 90% of annual benefits paid.
- In 2050, 31% of investment earnings is required to pay benefits.



# CPP, a Partially Funded Pension Plan

## Evolution of Asset/Expenditure Ratio

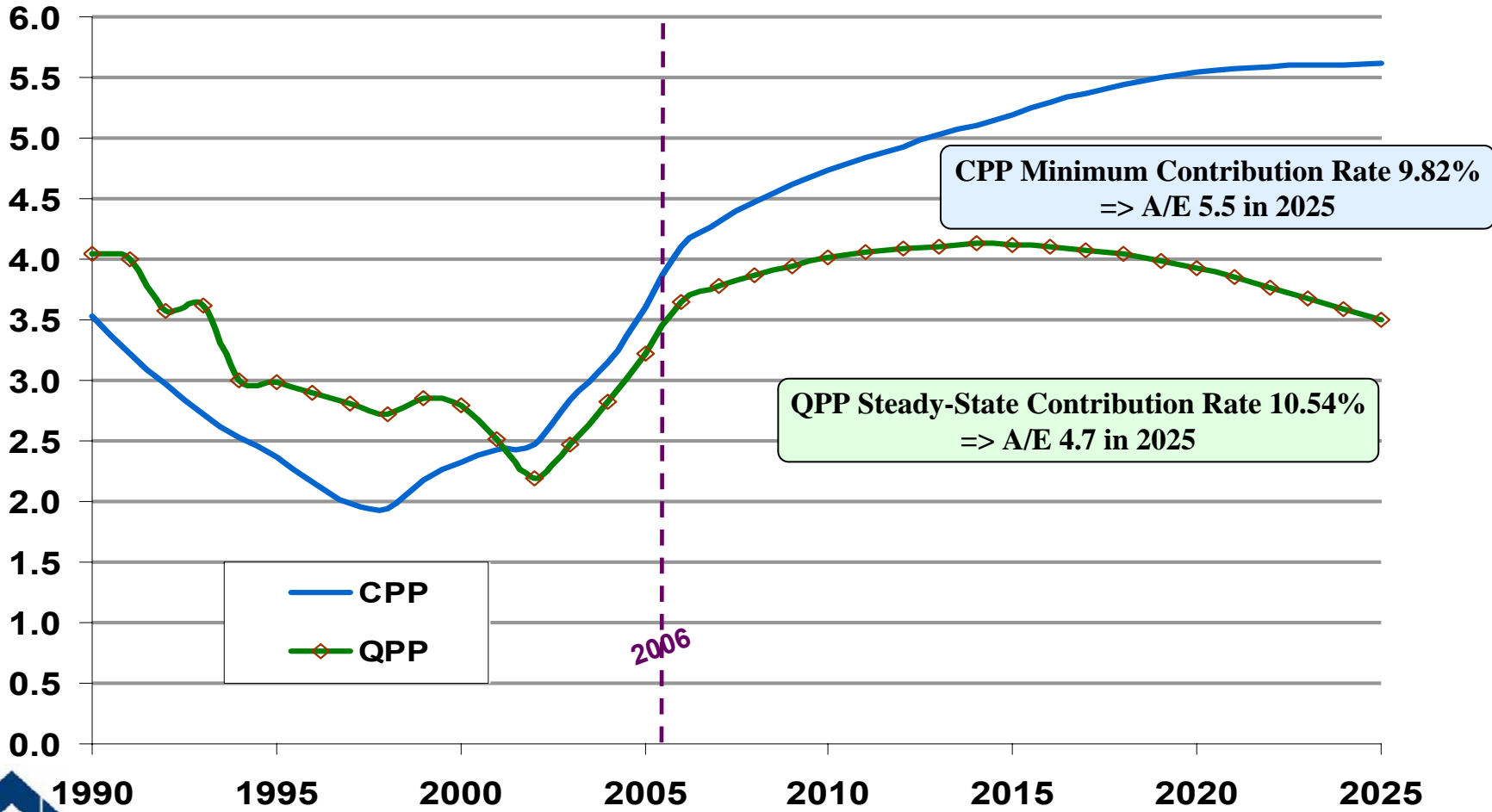


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# CPP/QPP, Partially Funded Pension Plans

C/QPP Evolution of Asset/Expenditure Ratios (with 9.9% contribution rate)



In 2020, CPP/QPP assets are projected to be equal to 17% of the GDP.



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# Higher projected life expectancies have more than offset better-than-anticipated experience

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## Reconciliation of the Minimum Contribution Rate

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	<b>Minimum Rate</b>
<b>Actuarial Report as at 31 December 2003</b>	<b>9.77</b>
<b>Better investment experience (2004 to 2006)</b>	<b>(0.09)</b>
<b>Higher participation and job creation rates (2004 to 2006)</b>	<b>(0.04)</b>
<b>Contribution rate with no change in assumptions</b>	<b>9.64</b>
<b>Higher projected life expectancies</b>	<b>0.16</b>
<b>More people asking their retirement benefit at age 60</b>	<b>0.05</b>
<b>Others (including Bill C-36)</b>	<b>(0.03)</b>
<b>Report as at 31 December 2006</b>	<b>9.82</b>

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Over three-year periods, benefits and contributions are easier to project than investment earnings.

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## Financial Status – 1998 to 2006

Actual minus Expected

(in billions of \$)

	<u>Contributions</u>	<u>Investment Earnings</u>	<u>Benefits</u>	<u>Assets</u>	
<b>1998 to 2000</b> (T. 67, p. 121)	+1.2	+0.1	-0.1	+1.4	(+3%)
<b>2001 to 2003</b> (T.78, p. 122)	+1.7	-1.1	-0.1	+0.7	(+1%)
<b>2004 to 2006</b> (T.16, p. 39)	<u>+0.1</u>	<u>+15.9</u>	<u>0.0</u>	<u>+16.0</u>	(+16%)
<b>1998 to 2006</b>	+3.0	+14.9	-0.2	+18.1	(+19%)

**The CPP assets of \$ 36 billion at year-end 1997 were projected to reach \$ 96 billion at year-end 2006. The actual value is \$ 114 billion.**



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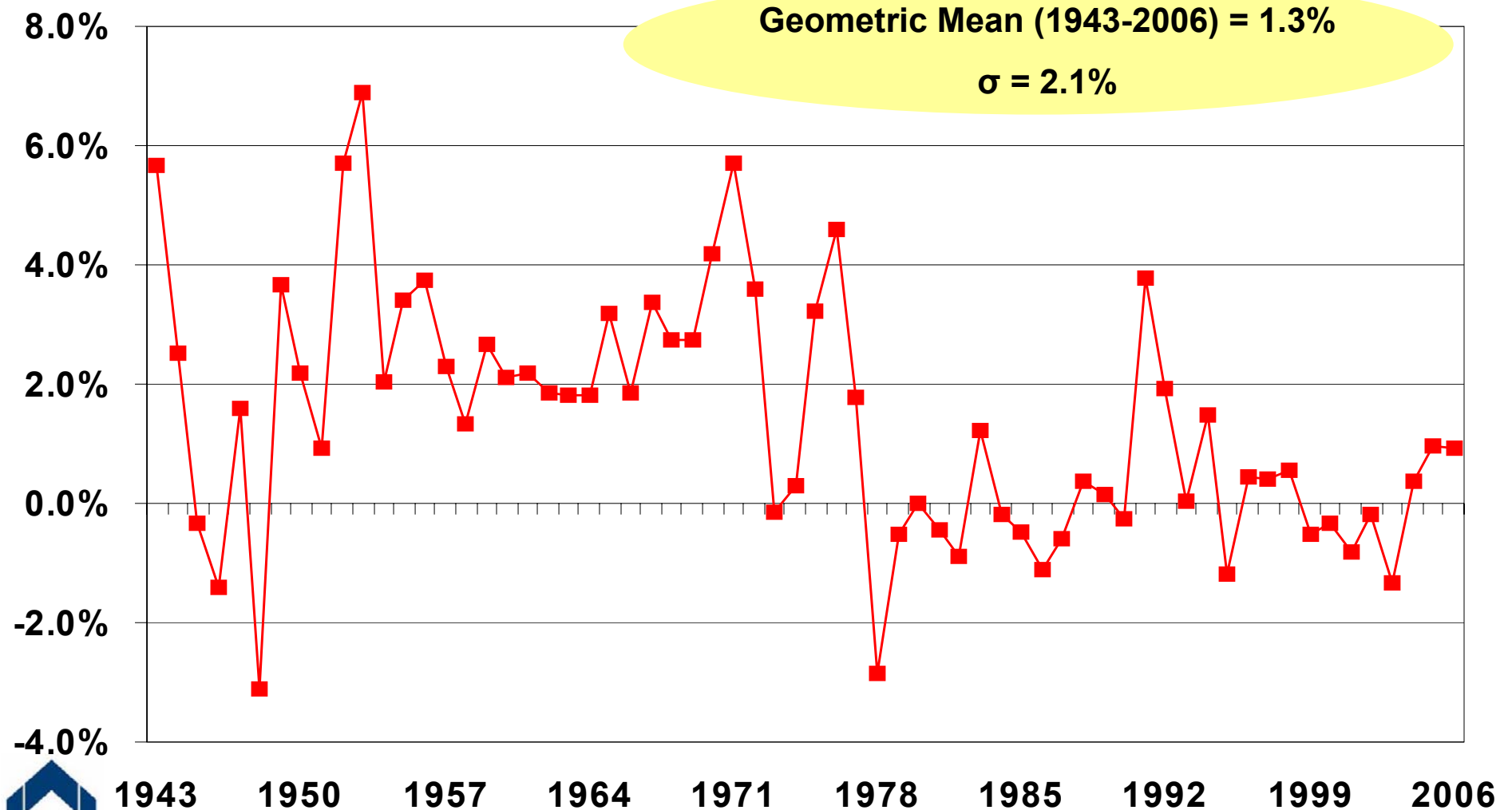
# Uncertainty of Results

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- Younger and Older populations → 9.1% and 10.7%.
- Equity shock -10% in both 2009 and 2010 → 9.82% to 9.98%. Assets reduced by \$28 billion by end of 2010.
- Individual tests show that minimum rate could vary significantly from best-estimate if other than best-estimate assumptions are realized over projection period. Examples are :
  - Higher Life Expectancies at 65 → 9.82% to 10.2%
    - Males 25 vs. 22 years in 2050 (currently 19)
    - Female 28 vs. 24 years in 2050 (currently 22)
  - Higher retirement benefit uptake at age 60 → 9.82% to 10.0%
    - Males from 40% to 60%
    - Females from 45% to 65%



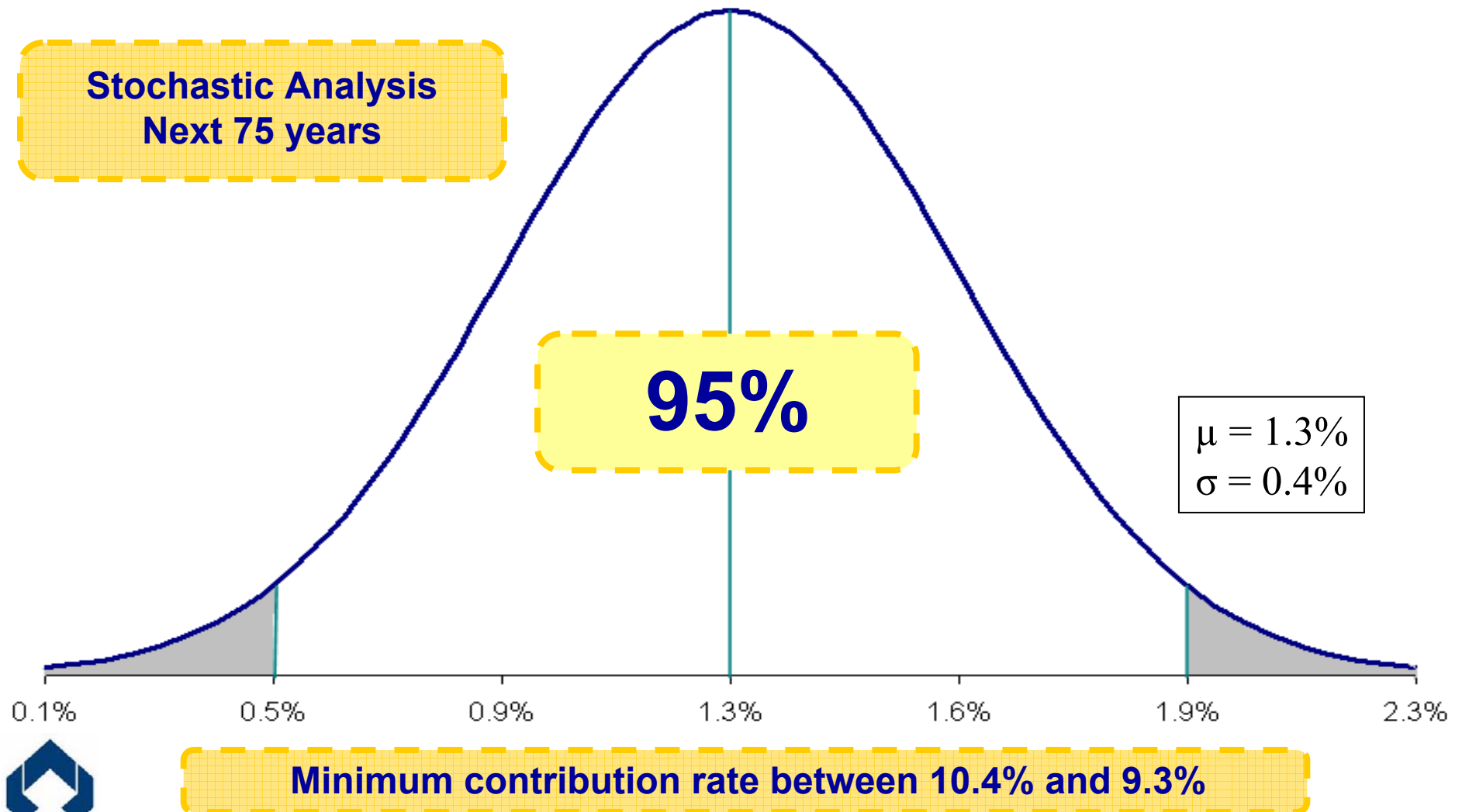
# Historical Real Wage Increase



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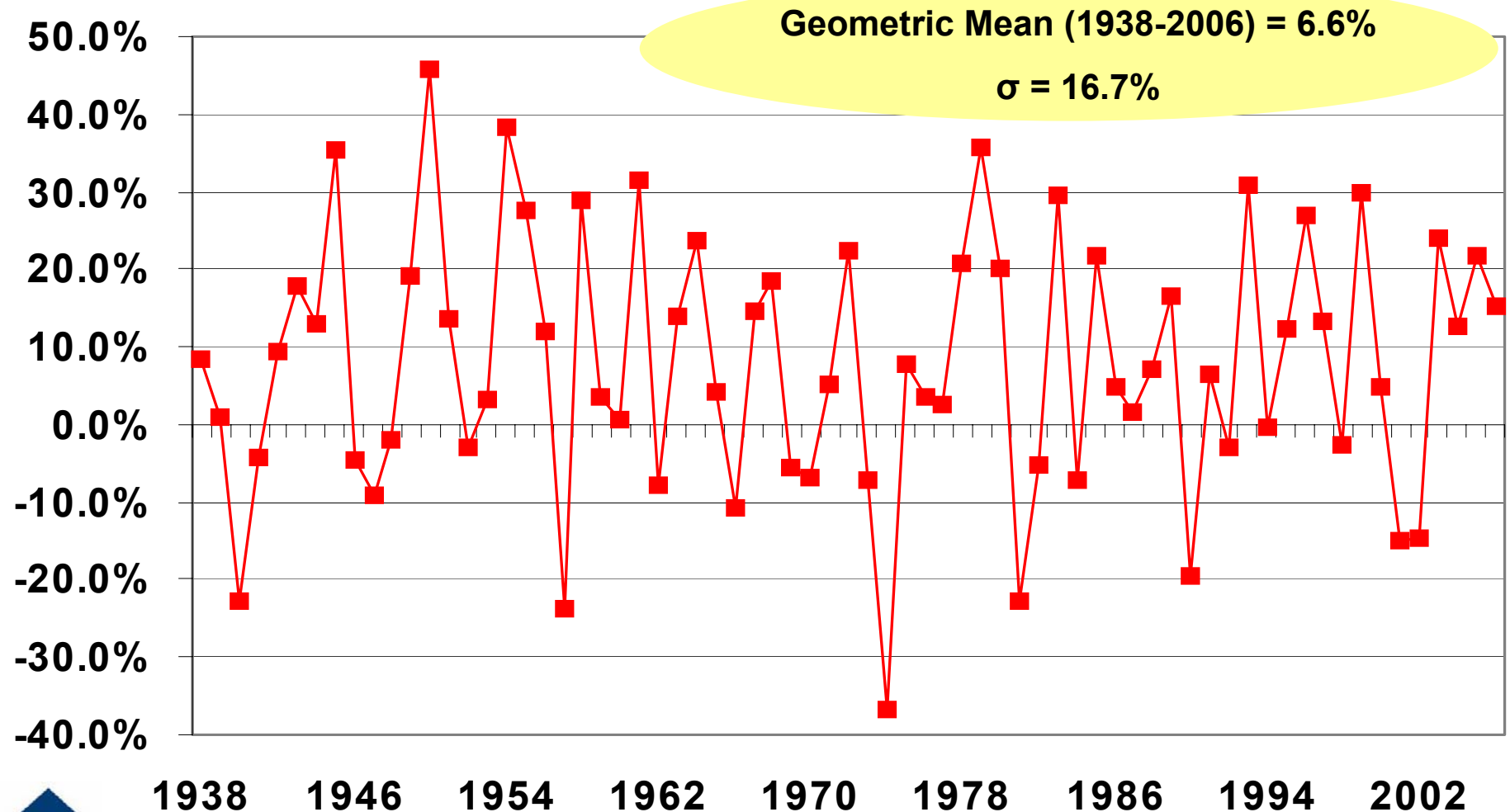
Using the experience of the last 64 years, ending in 2006, the projected average real wage increase will be in the range 0.5% to 1.9% with 95% probability.



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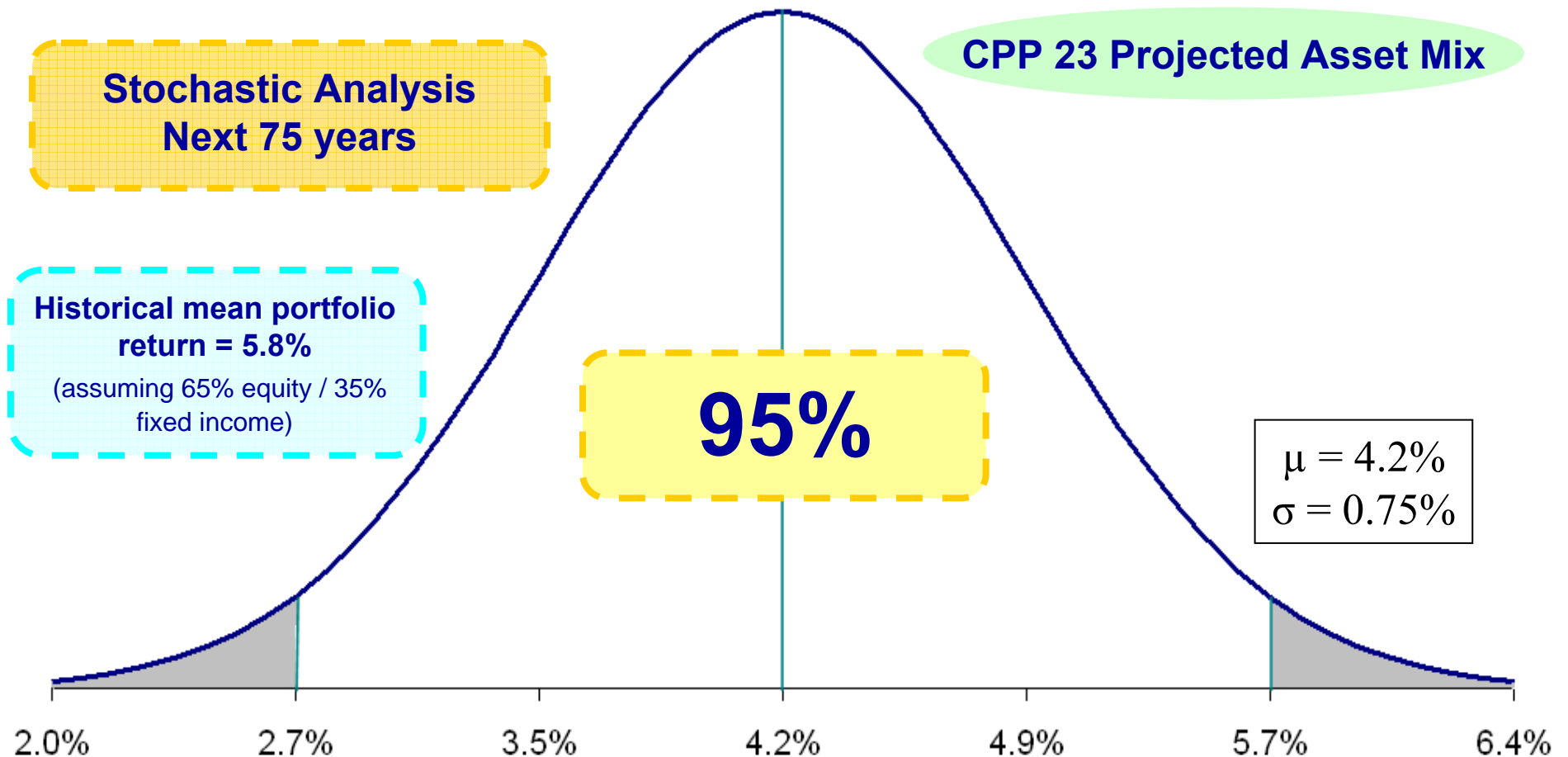
# Historical Canadian Equity Real Return



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Using the experience of the last 69 years, ending in 2006, the projected average real rate of return will be in the range 2.7% to 5.7% with 95% probability.

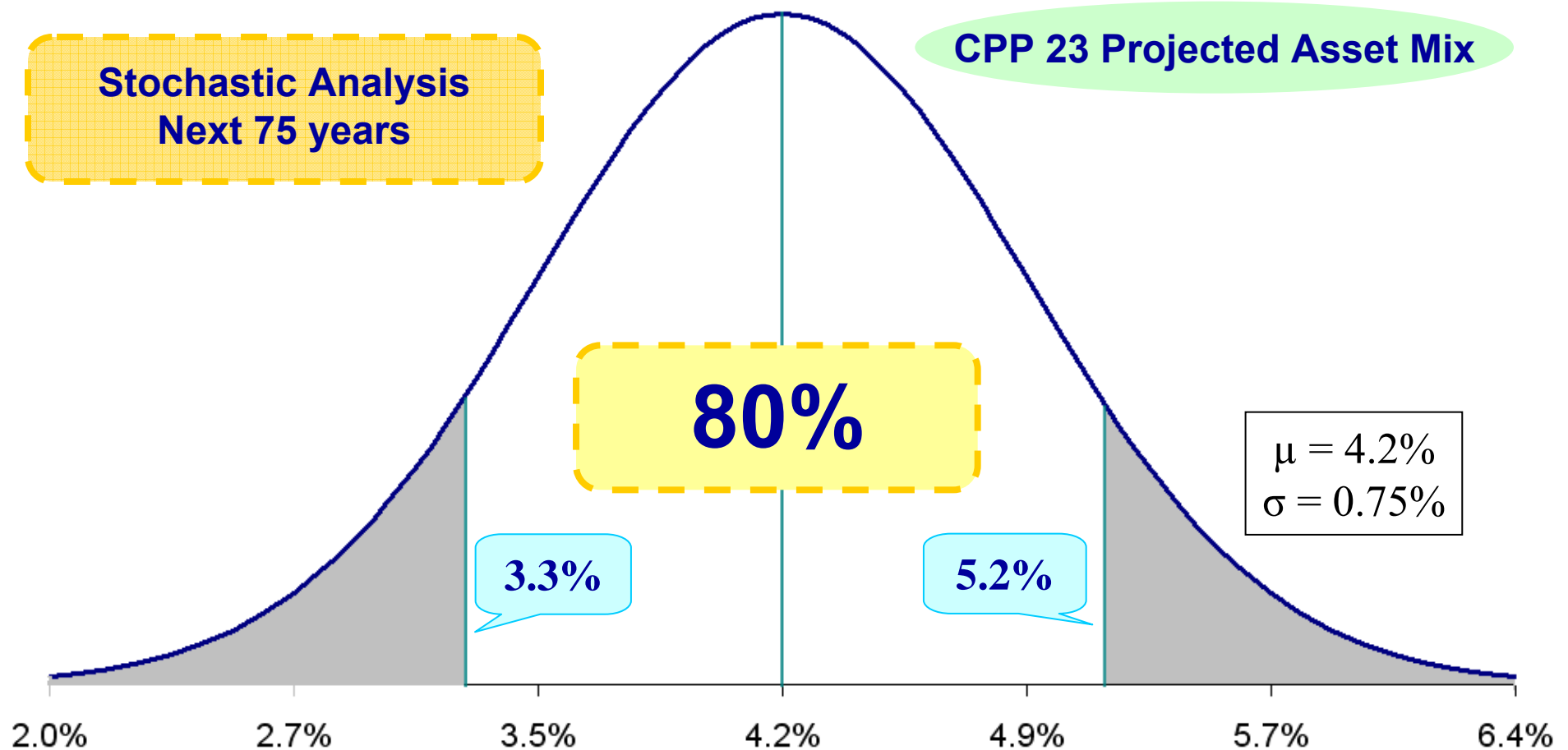


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**Minimum contribution rate between 10.7% and 9.0%**

Using the experience of the last 69 years, ending in 2006, the projected average real rate of return will be in the range 3.3% to 5.2% with 80% probability.

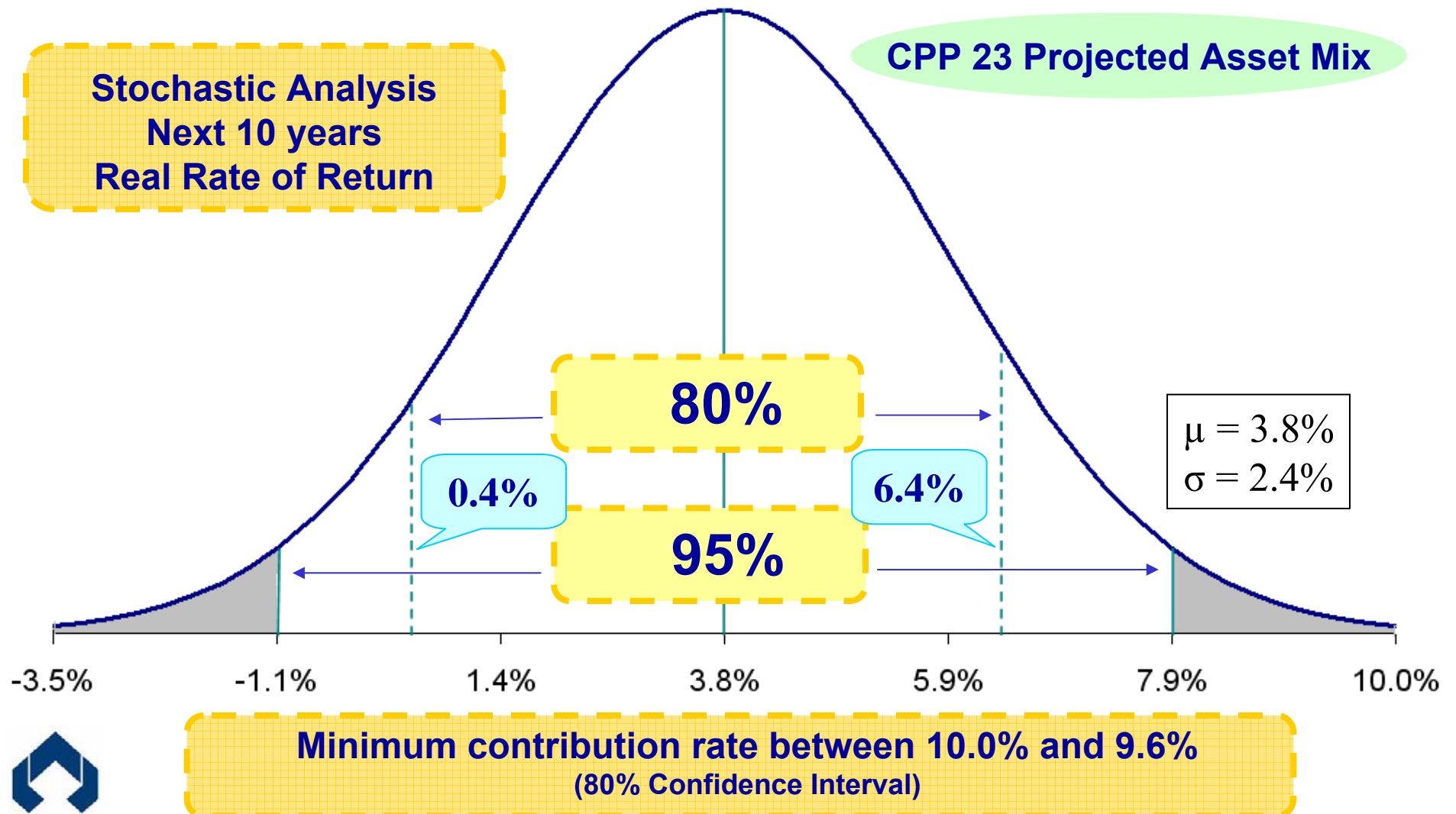


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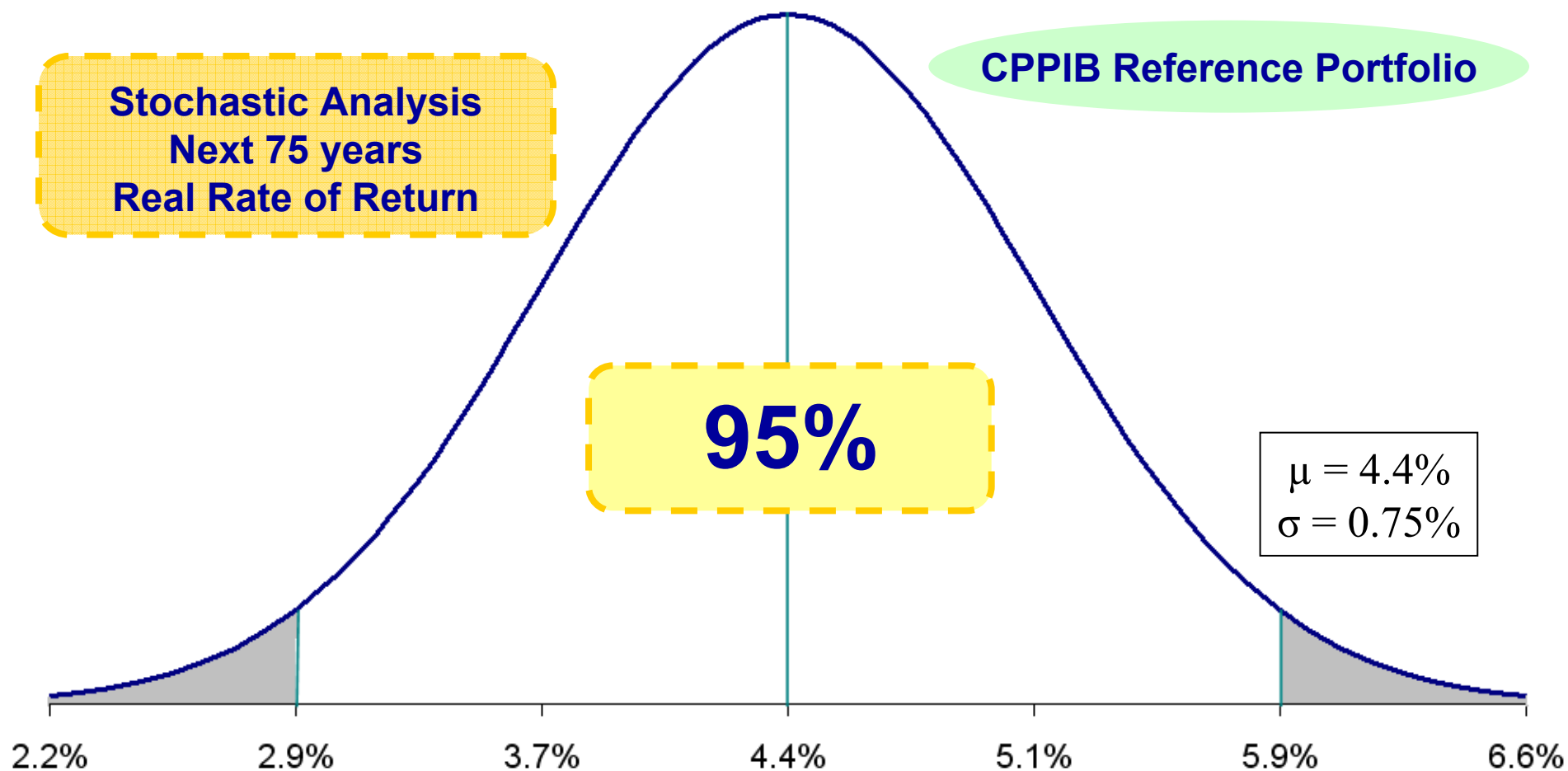
Minimum contribution rate between 10.3% and 9.3%

If the projection period is reduced to 10 years from 75 years, a wider confidence interval will result.





# Changing to the CPPIB Reference Portfolio produces similar results.



# Sustainability of the 9.9% Contribution Rate Under Extreme Conditions for the next 6 years (2007-2012)

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## Asset Mix of CPP 23

## Minimum Contribution Rate

Prob {Real Return  $\leq$  -0.3%} = 10%

-0.3%

9.96%

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Real Rate of Return

3.4  $\rightarrow$  4.2%

9.82%

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Prob {Real Return  $\geq$  12.4%} = 10%

12.4%

9.37%

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# Strengthening the Accountability in 1997

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- Federal and provincial governments took meaningful steps to strengthen the transparency and accountability of actuarial reporting. They endorsed plans:
  - to review the CPP every three years, instead of every five years as before. Therefore, frequency of actuarial reporting was increased to three years with a further requirement to produce the report within one year of the valuation date.
  - to consult regularly with experts on assumptions to be used in actuarial reports;
  - to establish regular peer reviews of future actuarial reports on the CPP.
  - to supply actuarial information to Canadians in a timely manner.



# CPP has been peer reviewed four times since 1998

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- Role of the Auditor General and Selection Process
- Overseeing of the Peer Review by GAD
- Terms of Reference
  - Is the professional **experience** of the Chief Actuary and his staff adequate for carrying out the work required?
  - Does the work comply with professional **standards of practice** and statutory requirements?
  - Did the Chief Actuary have access to the **information** required?
  - Were the actuarial **methods and assumptions** used reasonable?
  - Does the actuarial report fairly **communicate** the results?



# The Review Panel confirmed that...

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- the staff is competent and qualified to carry out the work required;
  - the work complies with all relevant professional standards of practice and statutory requirements;
  - the Chief Actuary had access to the data and he completed relevant tests on the data as might be expected ;
  - actuarial methods and assumptions are reasonable;
  - assumptions are, in the aggregate, reasonable, but towards the high-cost side of the reasonable range;
  - the report fairly communicates the results;
- and made twelve recommendations on data, methodology, assumptions, communications of results and other actuarial issues.



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*March 2008*

# The panel found...

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- That each of the major assumptions was within the reasonable range.
- In their view,
  - six of the nine major assumptions are near the centre of the reasonable range, and
  - three assumptions are within, but towards the high or low side of, the reasonable range.





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23<sup>rd</sup> Actuarial Report on the Canada  
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*Appendix*

**Issues Looking Forward, the OECD Countries**



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# Provision of Retirement Income Security – What is Required?

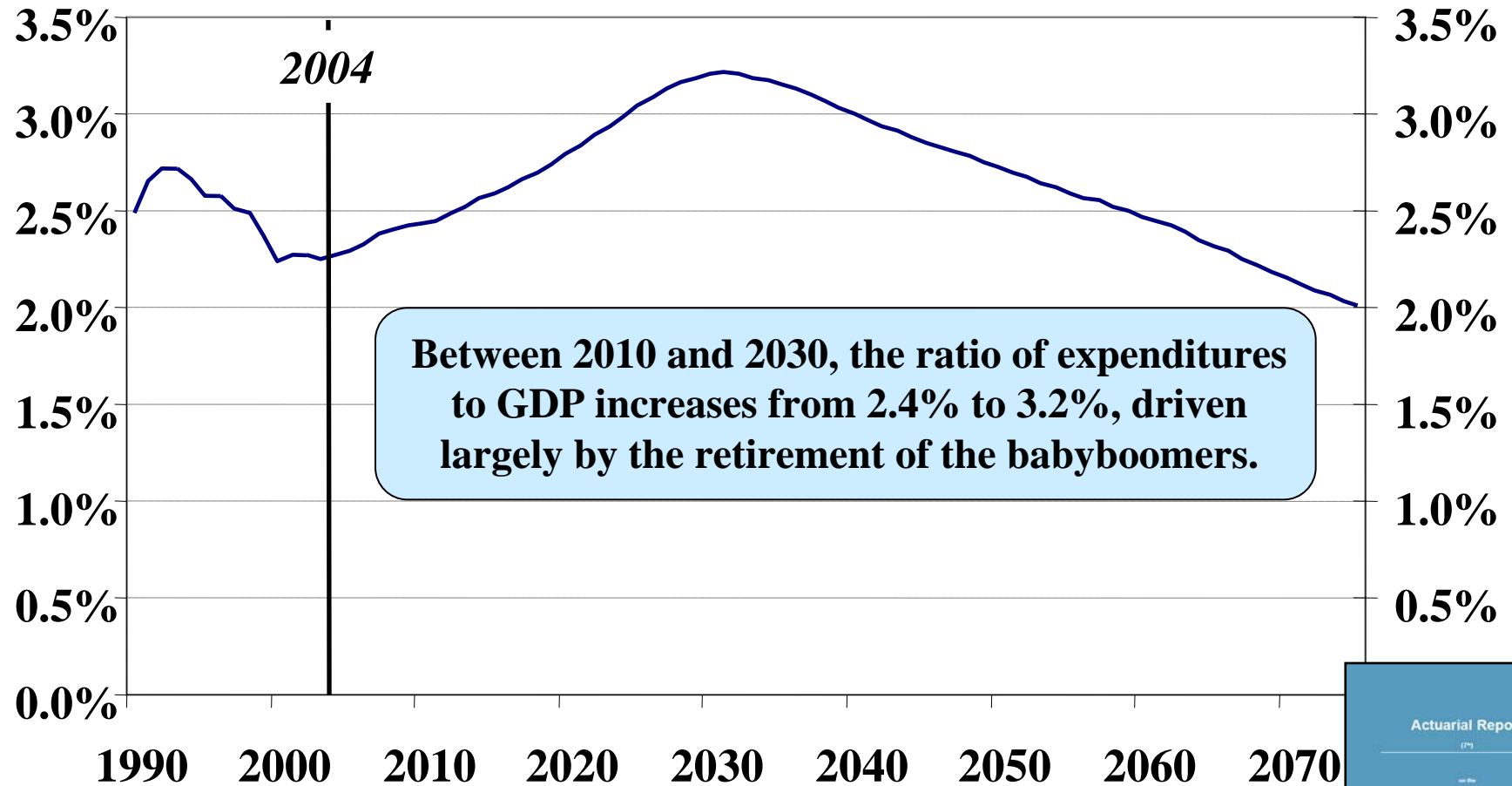
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- A retirement system built on the principles of:
  - Intergenerational equity
  - Solidarity: society protects all individuals and collectively ensures a basic level of assistance/standard of living for low-income retirees
  - Responsibility: retirement income security is a shared responsibility between the government, society, employers and individuals
- Incentives to remain in the labour force



# OAS Program Financing

Evolution of Old Age Security Expenditures in % of GDP



Between 2010 and 2030, the ratio of expenditures to GDP increases from 2.4% to 3.2%, driven largely by the retirement of the baby boomers.

\$28 billion in 2004; \$37 billion in 2010; \$110 billion in 2030

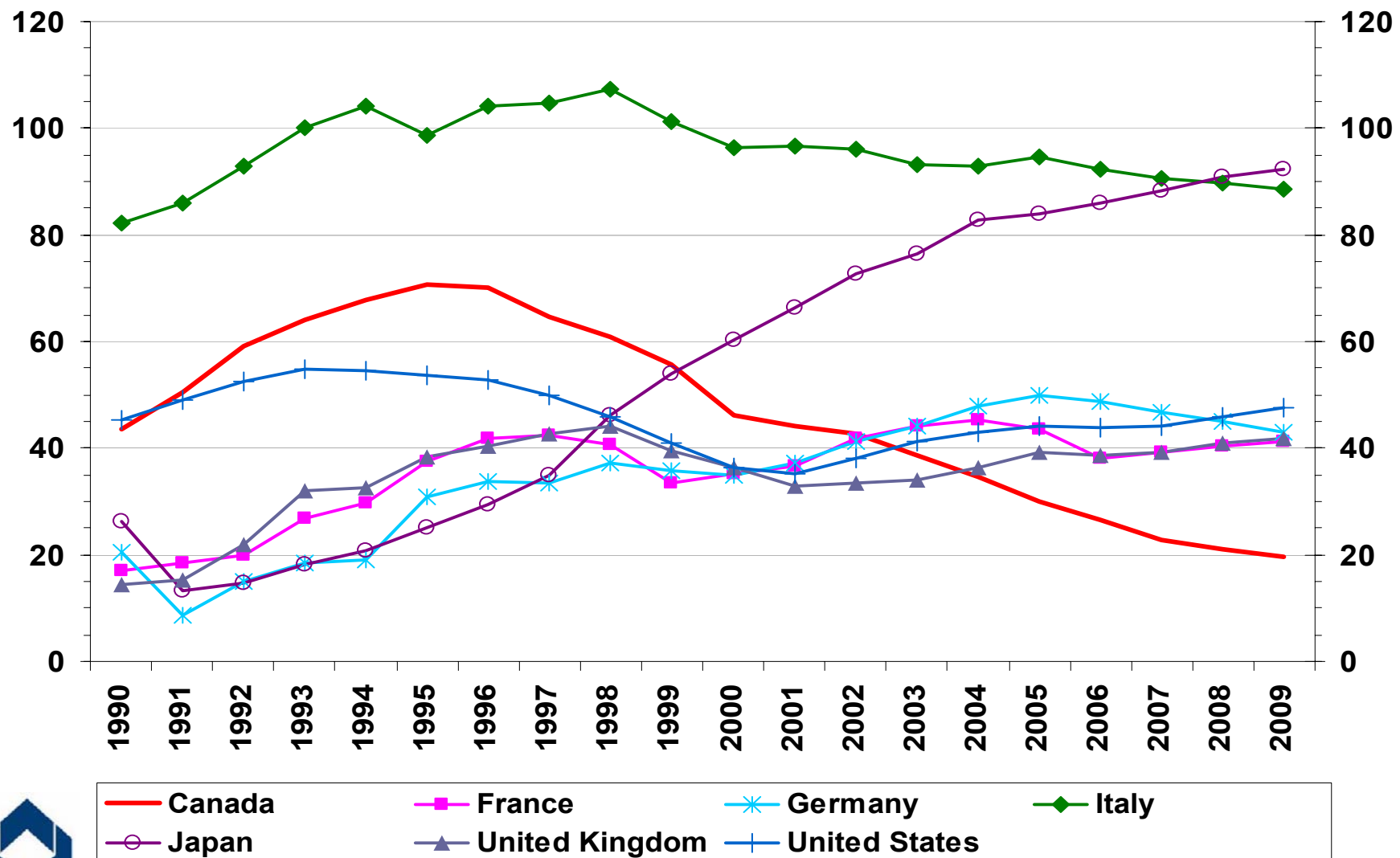


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# Government Net Financial Liabilities as % of GDP (G7 Countries)



Source: OECD Economic Outlook No. 82 Database (Annex Table 33)



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## OECD Countries – Increases in Normal Retirement Ages of State Pension Plans

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	<b>From</b>	<b>To</b>	<b>Transition Period</b>
<b>Austria</b>	60 (F)	65 (F)	2024-2033
<b>Belgium</b>	60 (F)	65 (F)	by 2009
<b>Czech Republic</b>	57 (F) 60 (M)	65	by 2030 (proposed)
<b>Denmark</b>	65	67	2024-2027
<b>Germany</b>	65	67	2012-2029
<b>Iceland</b>	67 → 65 → 67		late 1980s – early 2000s



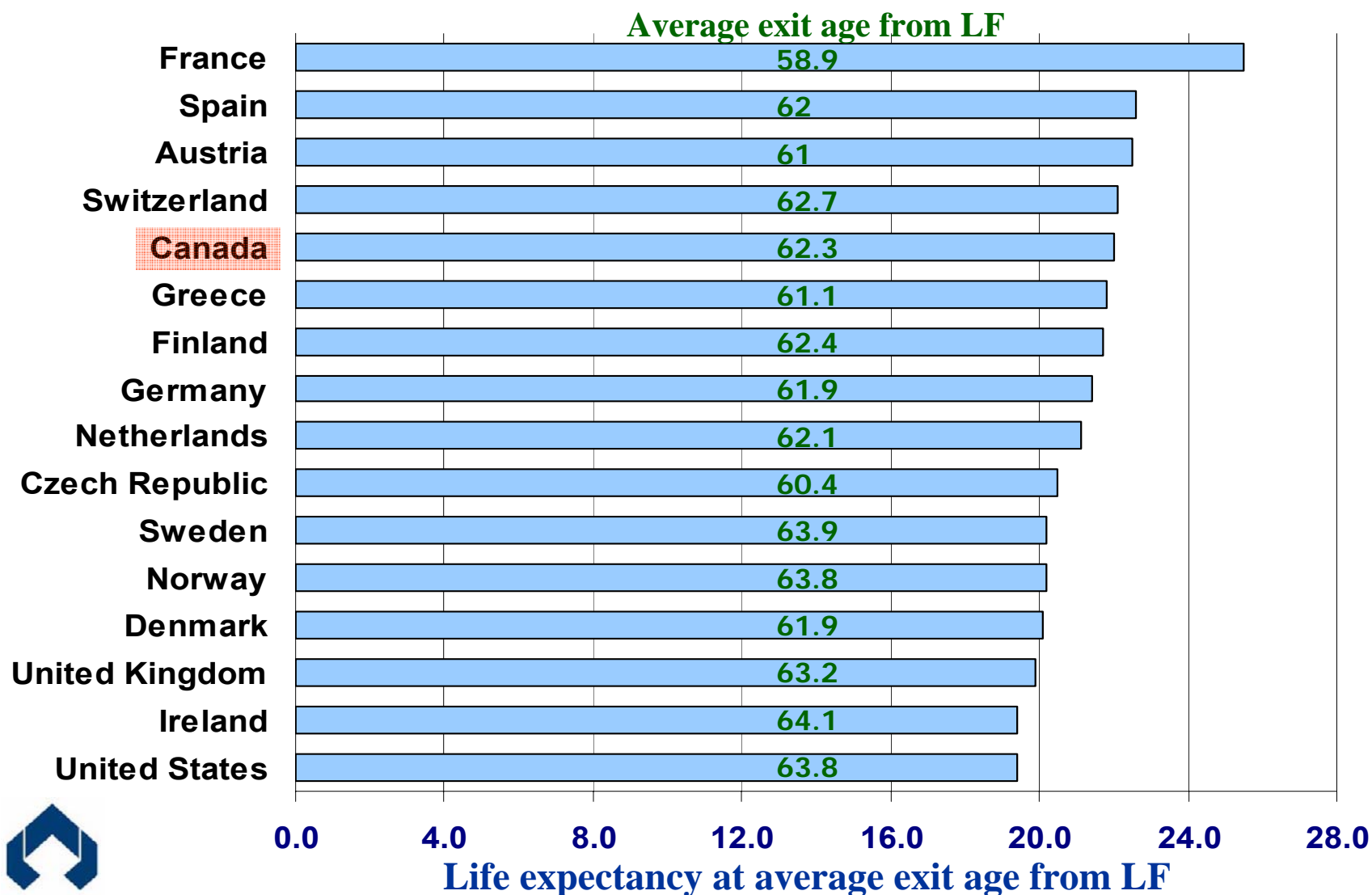
## OECD Countries – Increases in Normal Retirement Ages of State Pension Plans

*...(cont'd)*

	<b>From</b>	<b>To</b>	<b>Transition Period</b>
<b>Ireland</b>	Social insurance pensions: retirement pension paid from 65, old age contributory pension paid from 66		
<b>Japan</b>	60	65	2000-2025 (M) / 2030 (F)
<b>Norway</b>	70	67 (new ERA 62)	1973  (proposed as part of new pension system 2010)
<b>South Korea</b>	60	65	2013-2033
<b>UK</b>	60 (F)	65 (F)	2010-2020
	65 (M, F)	68 (M, F)	2024-2046
<b>U.S.</b>	65	66	2002-2008 (year attained 65)
	66	67	2020-2026 (year attained 66)



# OECD Countries – Life Expectancy at Average Exit Age from Labour Force\*

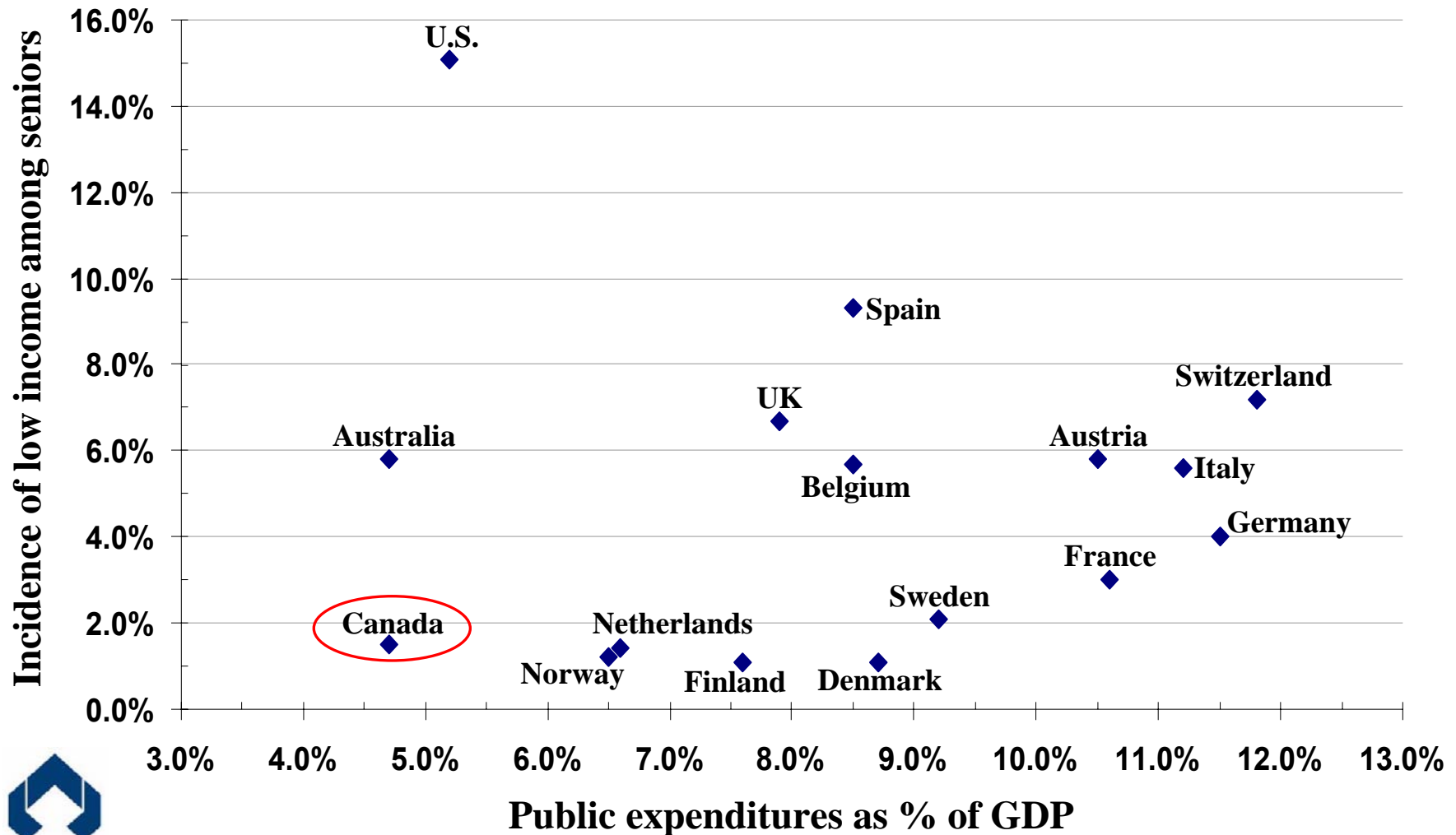


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\*Life expectancies are for 2006 except for U.S. (2004) and UK (2005).  
For Canada and U.S., effective average age of retirement is shown. 46  
Sources: Eurostat, OECD, OCA, U.S. National Center for Health Statistics.

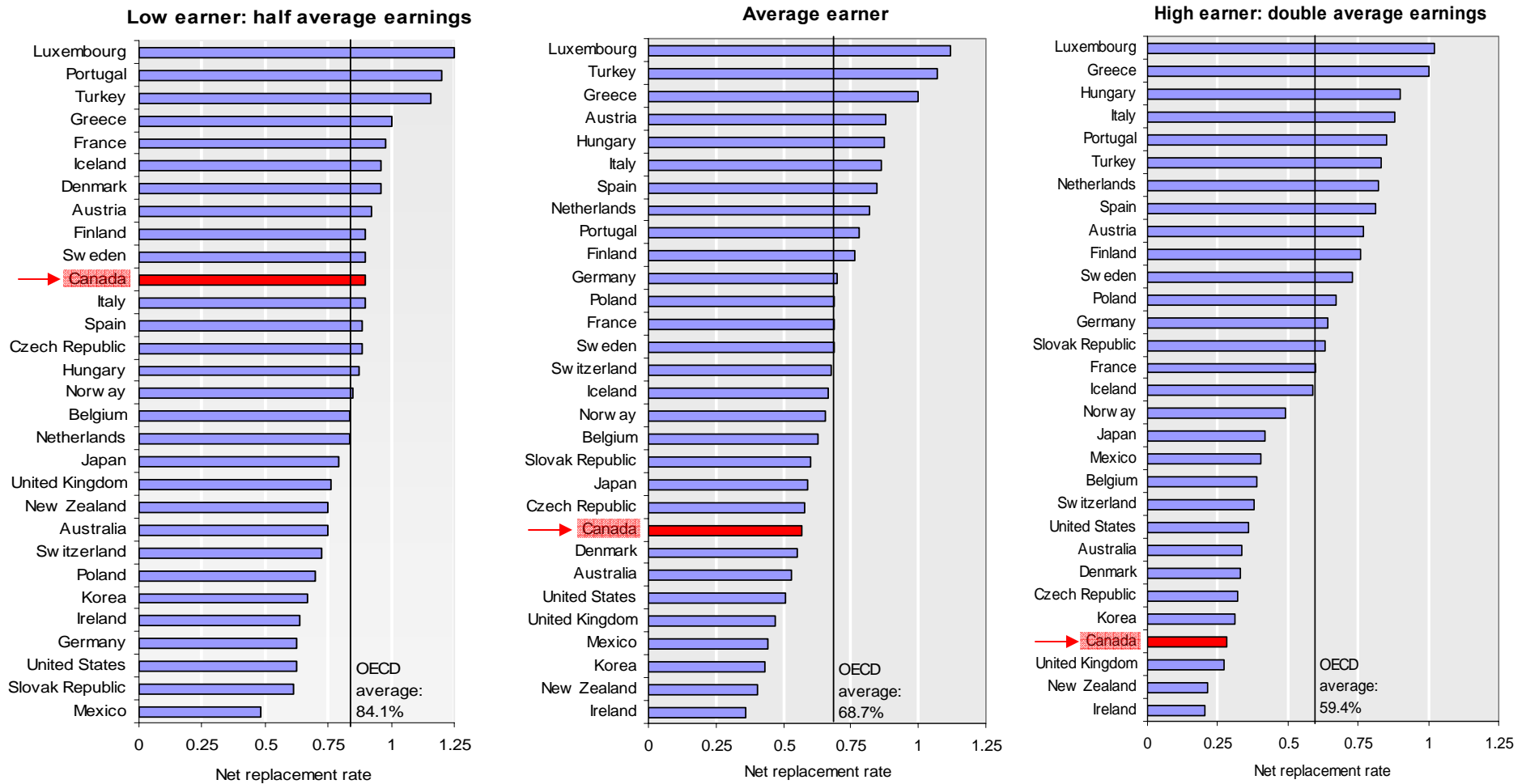
# OECD Countries – Incidence of Low Income Among Seniors vs. Old Age Income Security Program Expenditures, as % GDP



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Sources: Luxembourg Income Study (LIS) Key Figures for incidence of low income among seniors using 40% of median  
 OECD Social Expenditures Database, 1980-2001 for government expenditures on old-age income security programs as % of GDP  
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# OECD Countries – Net Replacement Rates at Different Earnings Levels (% of individual pre-retirement earnings)



Source: OECD pension models.

OECD Policy Brief: Solving the Pensions Puzzle, March 2005

Note: Chart reproduced by the OCA



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# An Efficient Retirement System Provides:

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- Diversification of sources of retirement income ✓
- Diversification of funding approaches ✓
- Reasonable economic cost of public pensions (% of GDP) ✓
- Reduction of poverty among seniors ✓
- Reduction of income inequalities ✓
- Maintenance of standard of living at retirement ✓

