



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

Issues Being Addressed in the 22nd Actuarial Report on the Canada Pension Plan as at 31 December 2006

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



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5 June 2006

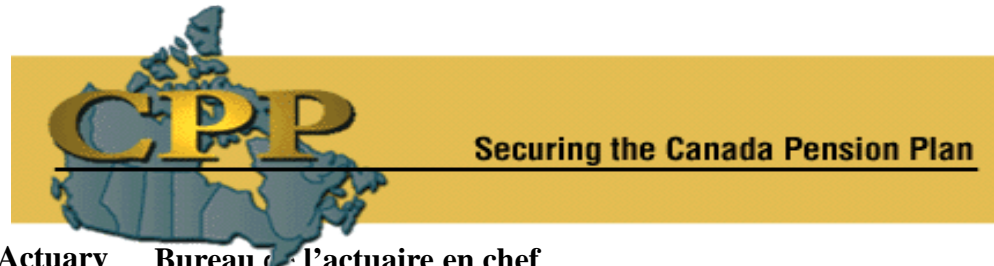
Canada 

Presentation

1. Purpose of the CPP Actuarial Report
2. Demographic and Economic Assumptions
3. Main findings
4. Steady-State Funding
5. Peer Review Process
6. Next Actuarial Report – Reference portfolio
7. Issues Looking Forward



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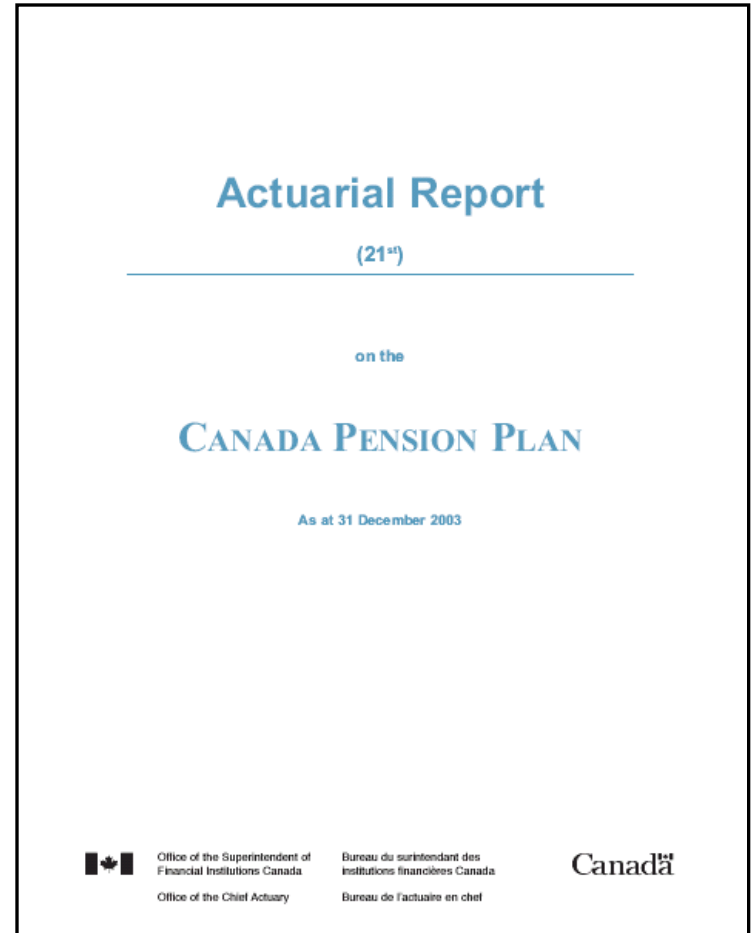


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Purpose of the CPP Triennial Actuarial Report



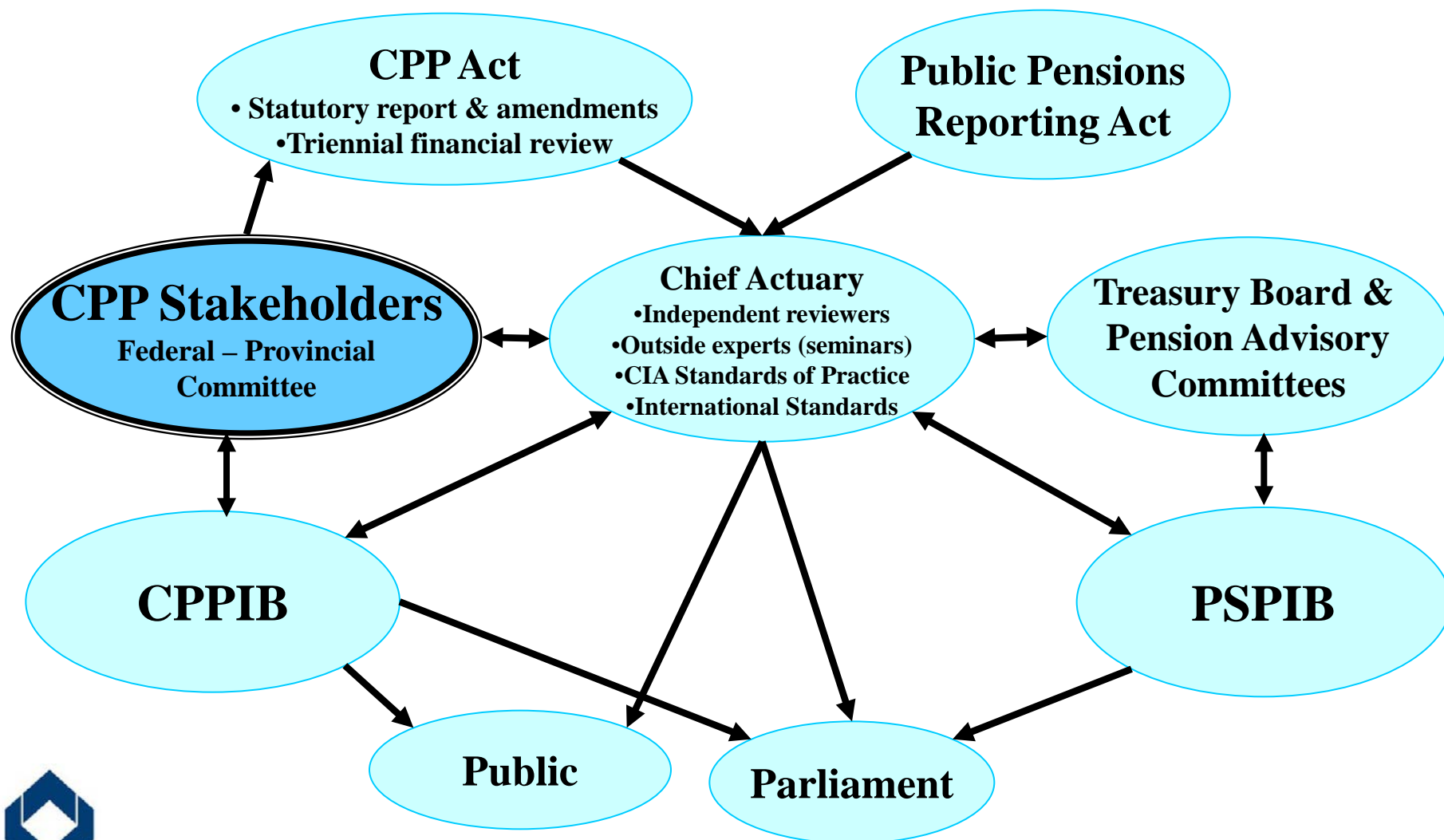
- 21st Actuarial Report Tabled by the Minister of Finance on 8 December 2004
- Inform on the current and projected future financial status of the Canada Pension Plan
- Calculate the steady-state contribution rate



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Responsibilities of the Office of the Chief Actuary

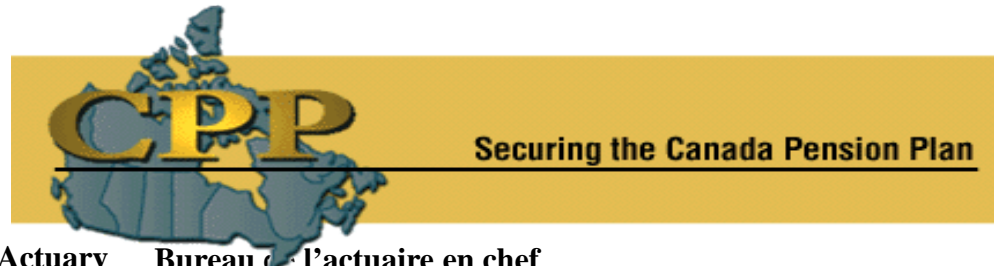


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Demographic Assumptions

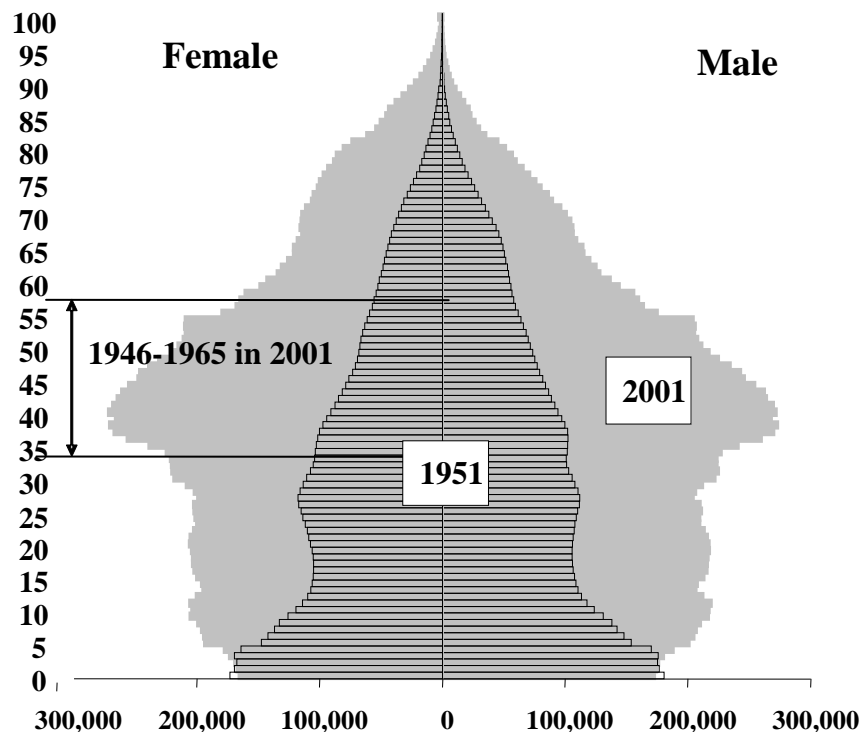
- Fertility
(Number of births)

- Migration

- *Mortality*
(*Life expectancy*)

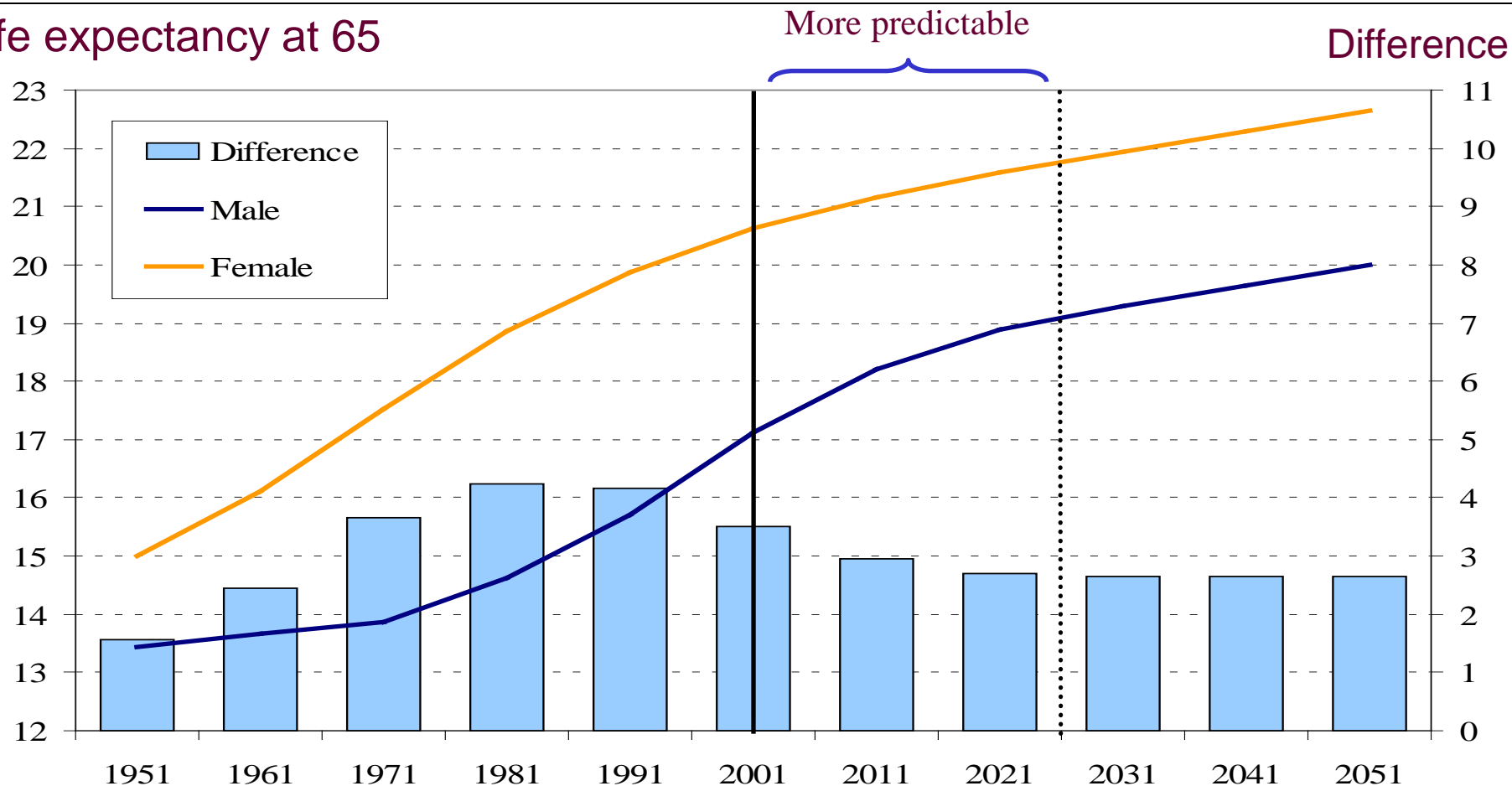
- Disability Rates
 - Retirement Rates
- } Benefit Assumptions

Age Profile of Canada's Population, 1951 & 2001



Increase in Life Expectancies

Life expectancy at 65



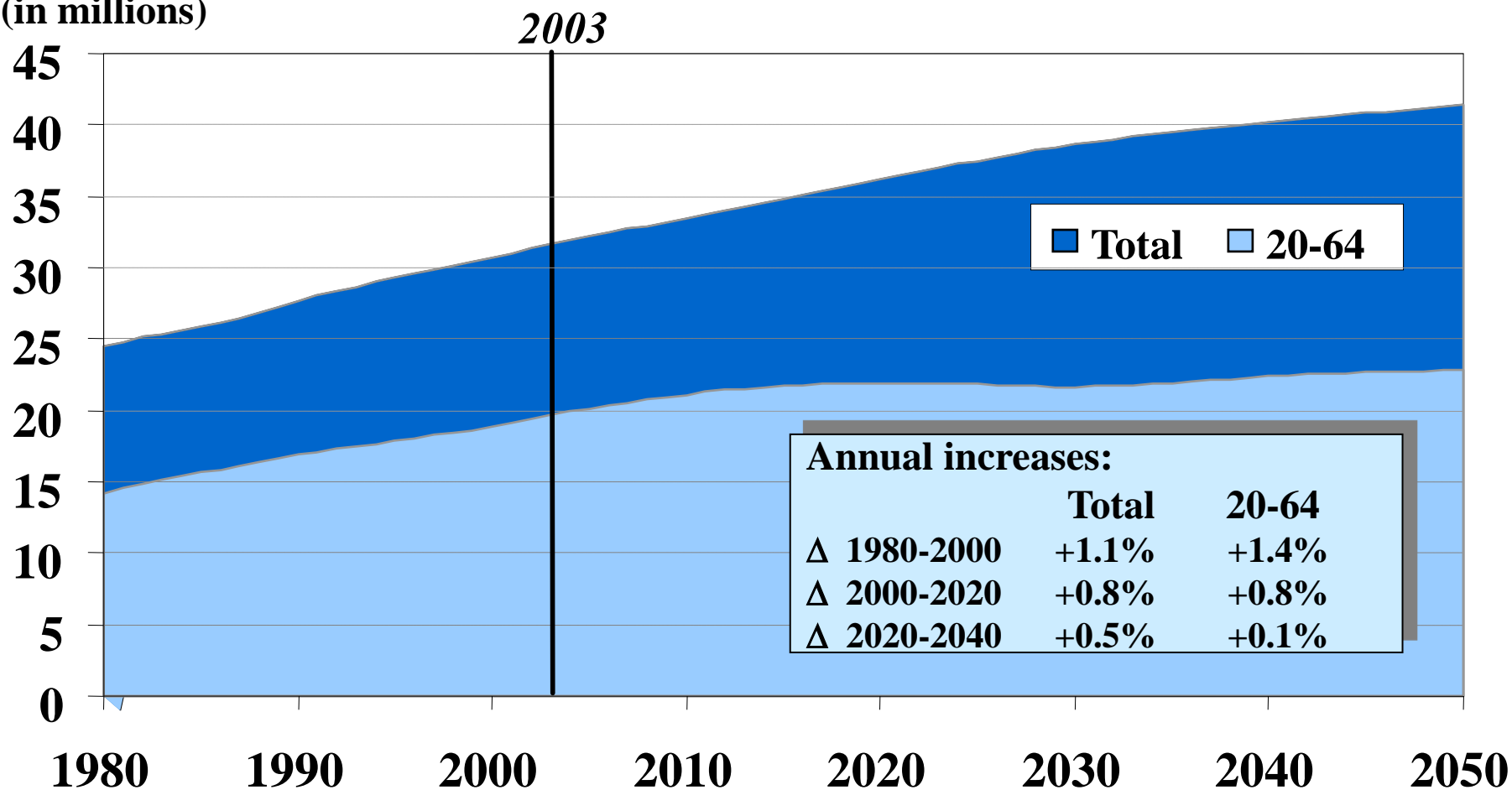
More contributors are expected to reach the retirement age of 65.

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



Working Age and Total Population (Canada)

(in millions)



After 2025, almost all projected population increase will come from migration.



Economic Assumptions

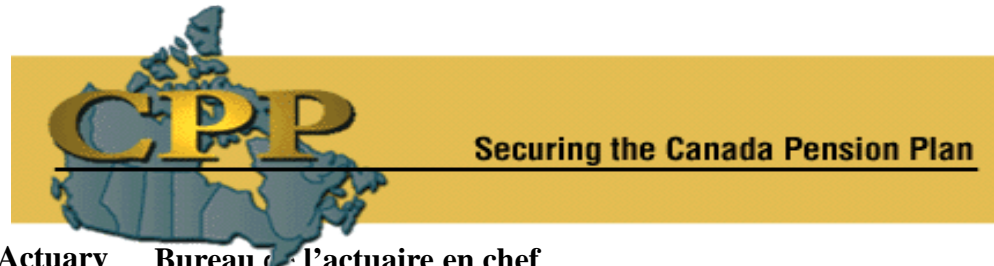
- Participation rates
 - Employment increase (Job creation rate)
 - Unemployment rate
 - *Inflation rate*
 - *Increase of average employment earnings*
 - *Interest rate and rate of return by asset class*
- } # of earners

Sources: Historical trends, Recent experience, PEAP from U of T., Department of Finance estimates, Conference Board, Report on Canadian Economic Statistics by CIA, CPPIB, Watson Wyatt Economic Expectations Survey, CPP seminars



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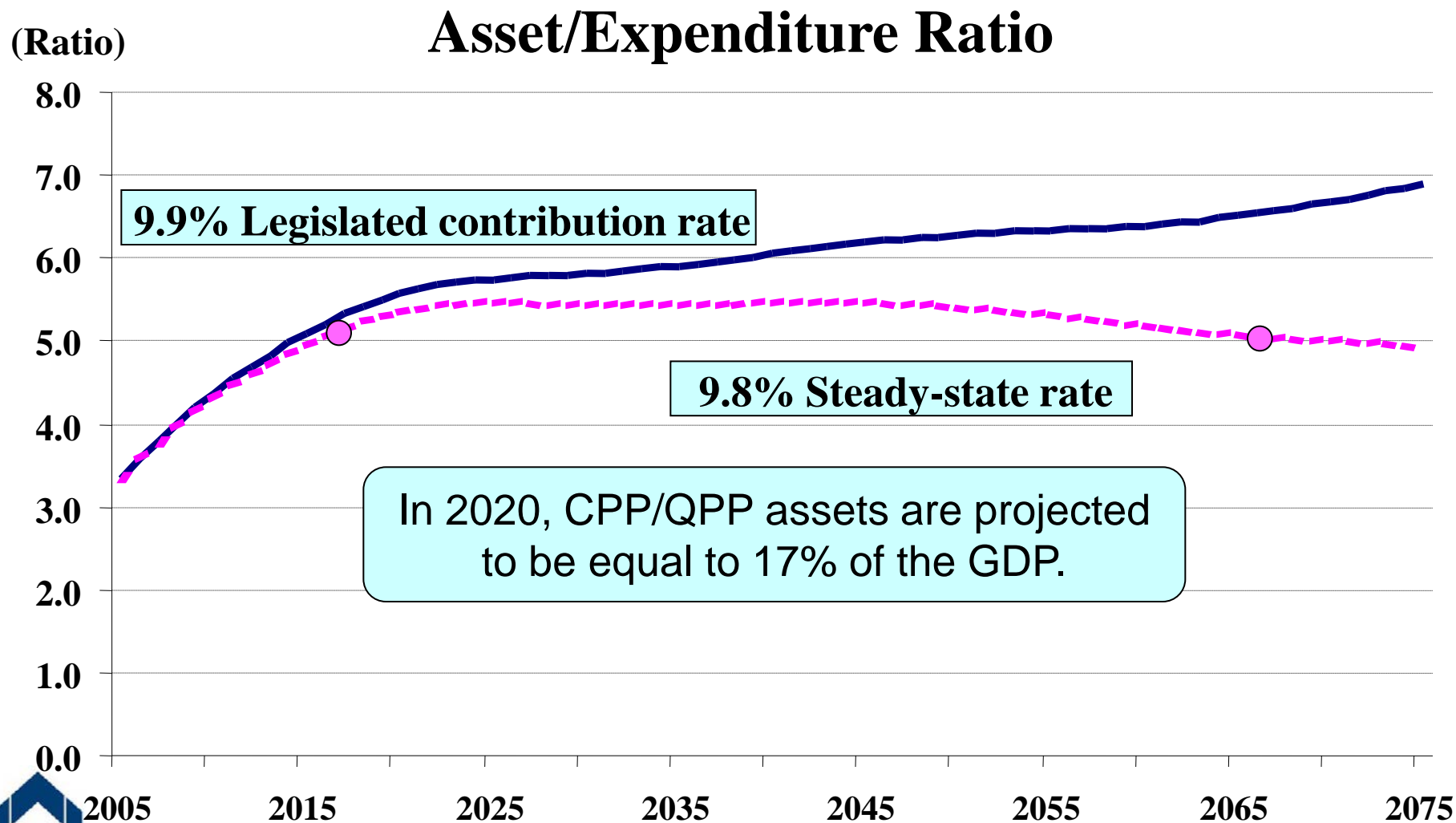


Main Findings – 21st CPP Actuarial Report

- Despite the projected substantial increase in expenditures as a result of the aging of the population, the actuarial report confirms that the Plan will meet its obligations and remain financially sustainable over the projection period.
- From 2004 to 2021, contributions are more than sufficient to cover expenditures. (*until 2014 for QPP*)
- Asset/Expenditure ratio increases from 3.1 to 5.6 over that period and reaches 6.3 in 2050.



Main Findings – 21st CPP Actuarial Report

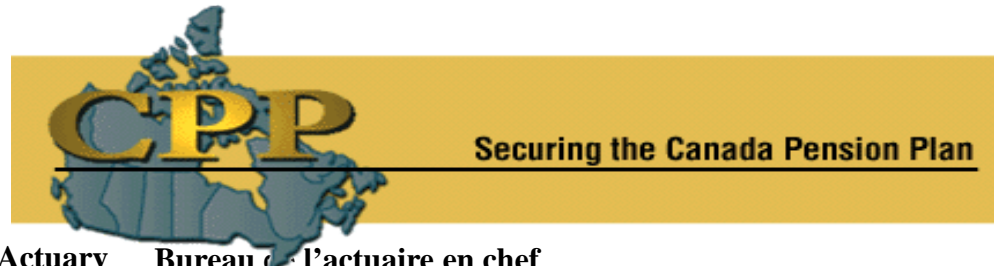


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CPP Steady-State Funding

- The current legislated contribution rate is 9.9%.
- The steady-state contribution rate is 9.8%.
- If the legislated contribution rate is higher than the steady-state rate, the funding status of the Plan will increase over time.
- The higher this rate is set above the steady-state rate, the faster the Plan will become more funded.



CPP Steady-State Funding

- If legislated contribution rate is lower than the steady-state rate AND if finance ministers cannot reach agreement on a solution, then default provisions apply:
 - Contribution rate increased by $\frac{1}{2}$ of excess over three years, subject to maximum increase of 0.2% per year
 - Benefits frozen until next review (3 years)
 - At end of three years, next review performed to determine financial status of Plan.



CPP Steady-State Funding

Sources of Income

- CPP follows the 70:30 Rule (Contributions:Investment Earnings).
- When the A/E ratio reaches approximately 5.0, 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

- Until 2022, contributions exceed benefits. Once the A/E ratio reaches about 5.0, annual contributions will equal approximately 90% of annual benefits paid.



CPP Steady-State Funding

Percent of investment earnings used to pay benefits

Year	Contribution Rate	
	9.8%	9.9%
2030	27%	24%
2040	31%	26%
2050	34%	29%

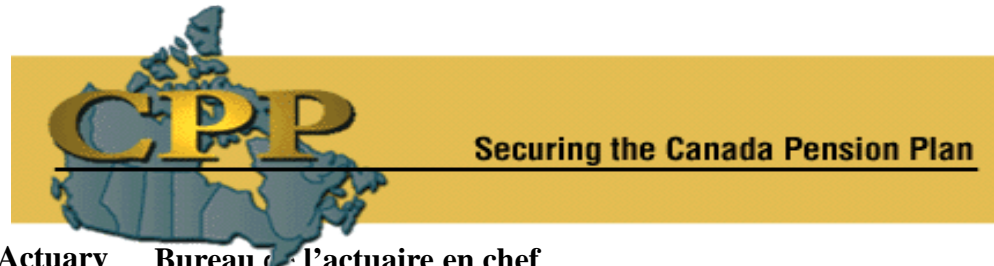


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Independent Peer Review Process

- Auditor General and Selection Process
- Overseeing of the Peer Review by the UK Government Actuary's Department
- The Independent Review Panel confirmed:
 - That actuarial standards of practice were met;
 - That assumptions were reasonable;
 - That the report fairly communicates the results;
 - The actuarial conclusions reached by the Chief Actuary about the soundness of the CPP.
- and made a series of recommendations.

March 2005



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Strengthening the Accountability

- **Federal and provincial governments took meaningful steps to strengthen the transparency and accountability of actuarial reporting. They endorsed :**
 - an increase in the frequency of actuarial reporting from every five years to every three years;
 - regular consultations by the Chief Actuary with experts on assumptions to be used in actuarial reports;
 - regular peer reviews of future actuarial reports on the CPP.

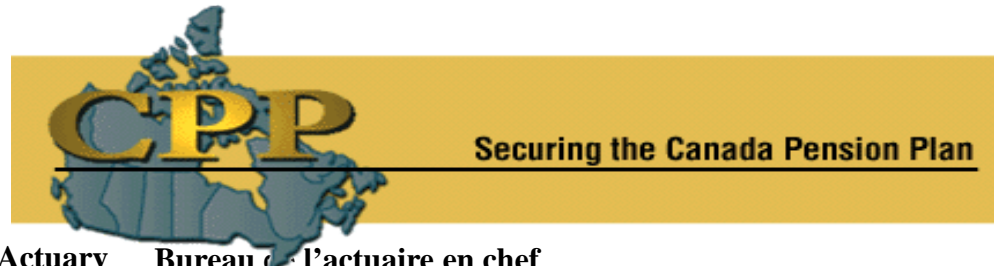


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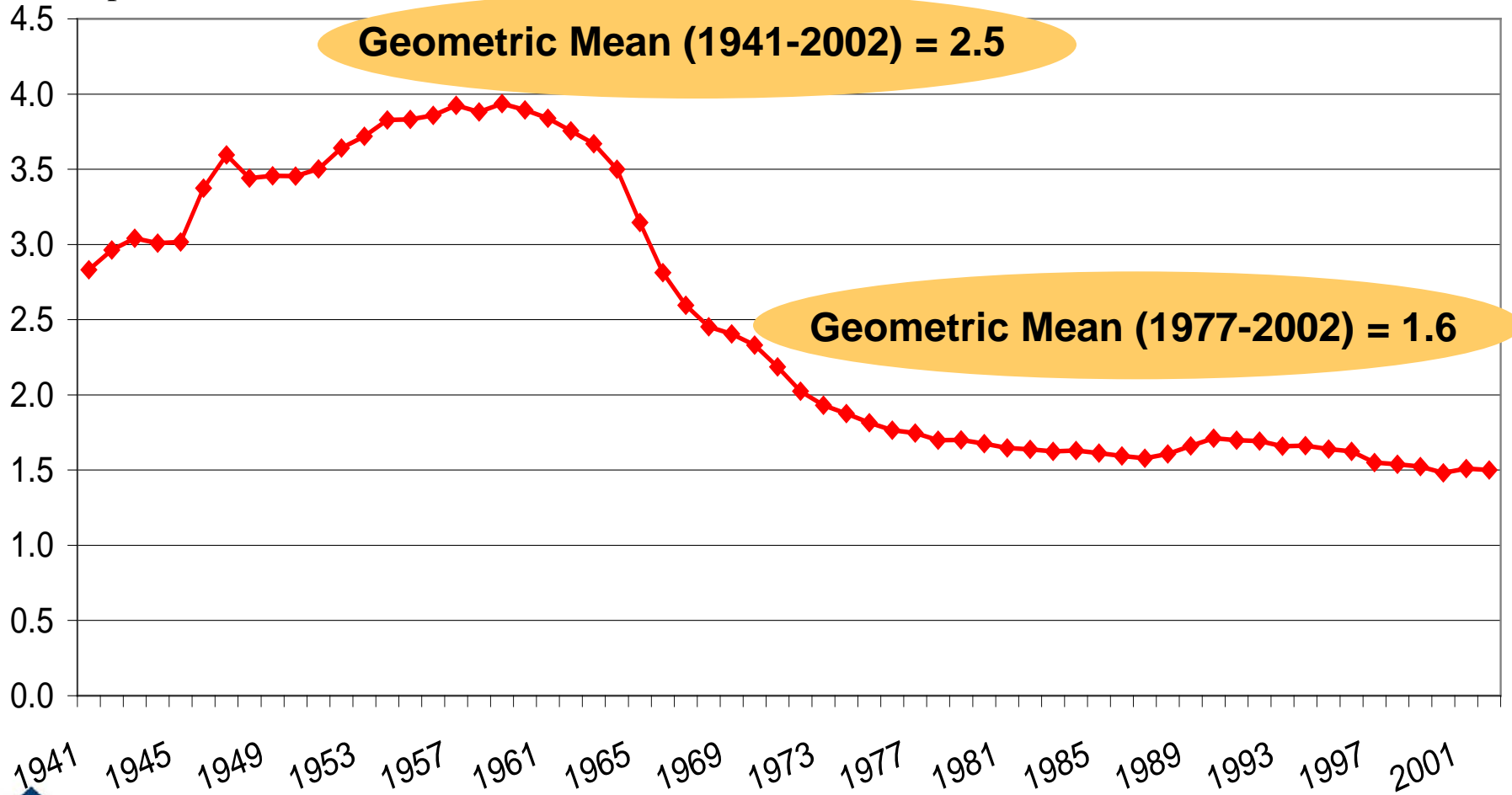
CPP Actuarial Report as at 31 December 2006

- Stochastic analysis
 - Determine confidence intervals for assumptions such as fertility, migration, wages increases, investment returns
- Uncertainty of results
 - a new section will be added explaining the uncertainty involved in estimating future contribution rates
- CPP reference portfolio and asset mix
- Assumptions influenced by the opinion of the peer reviewers



Historical Fertility Rate

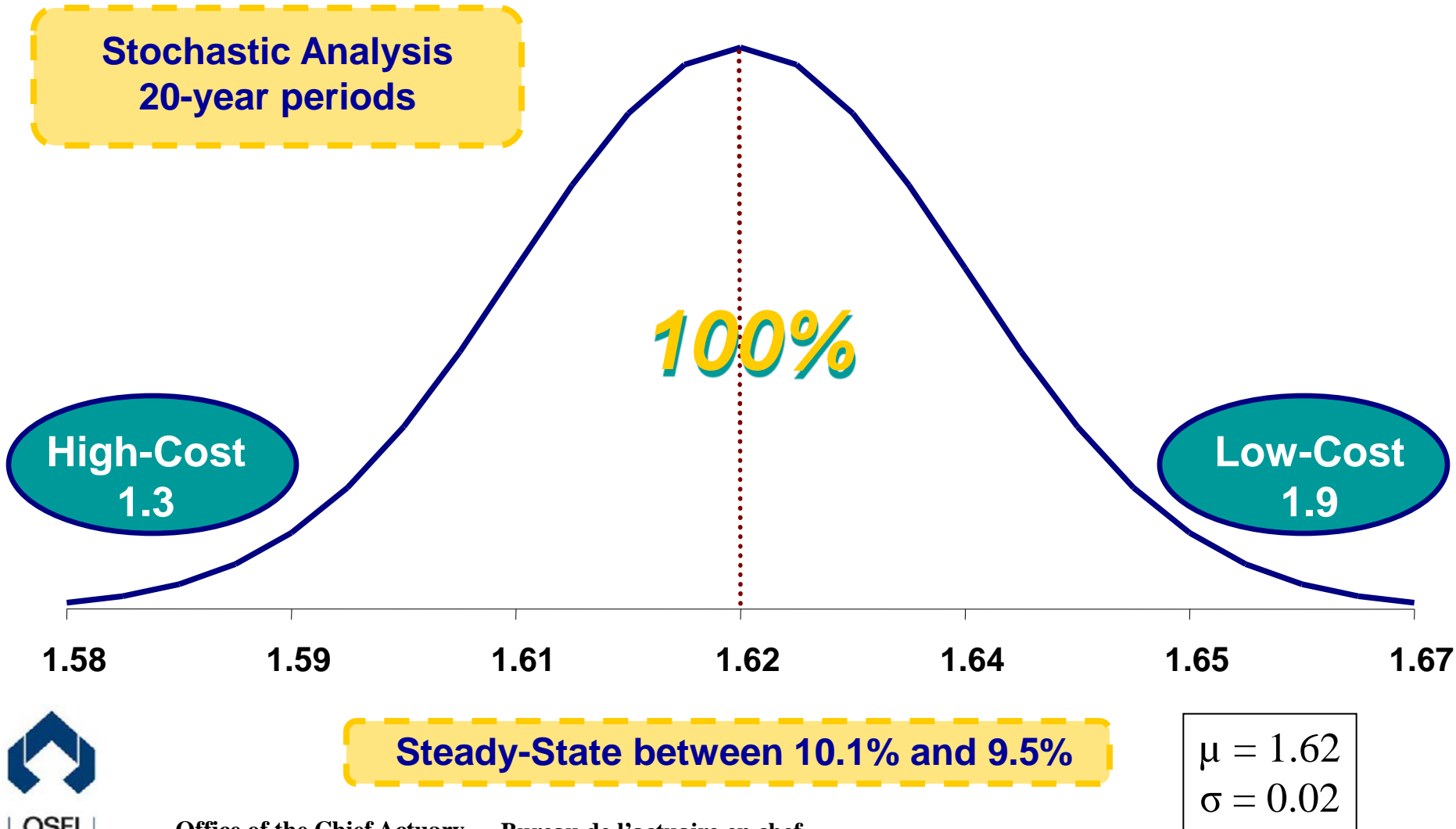
(Children per woman)



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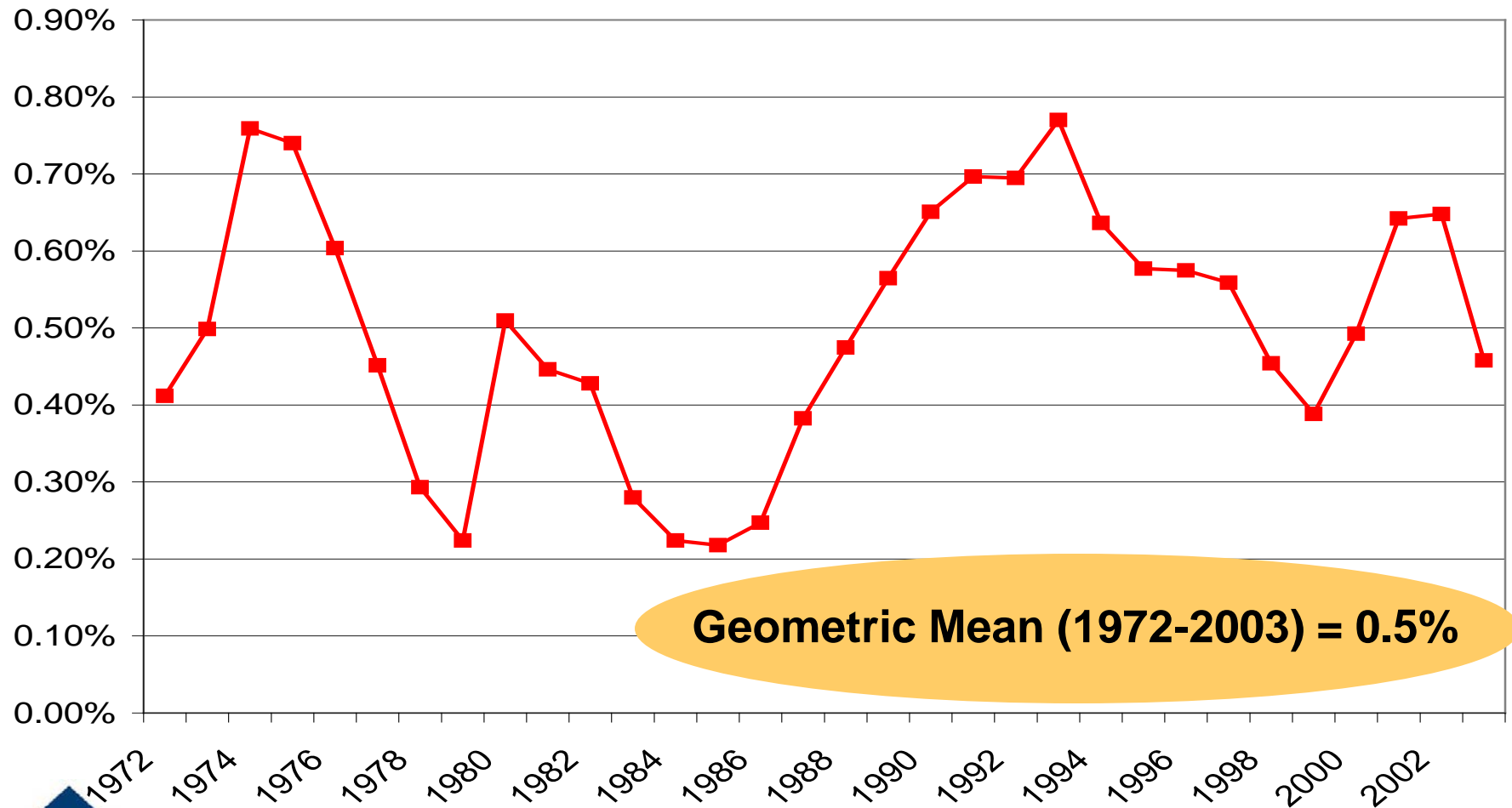
Fertility Rates (1977-2002)



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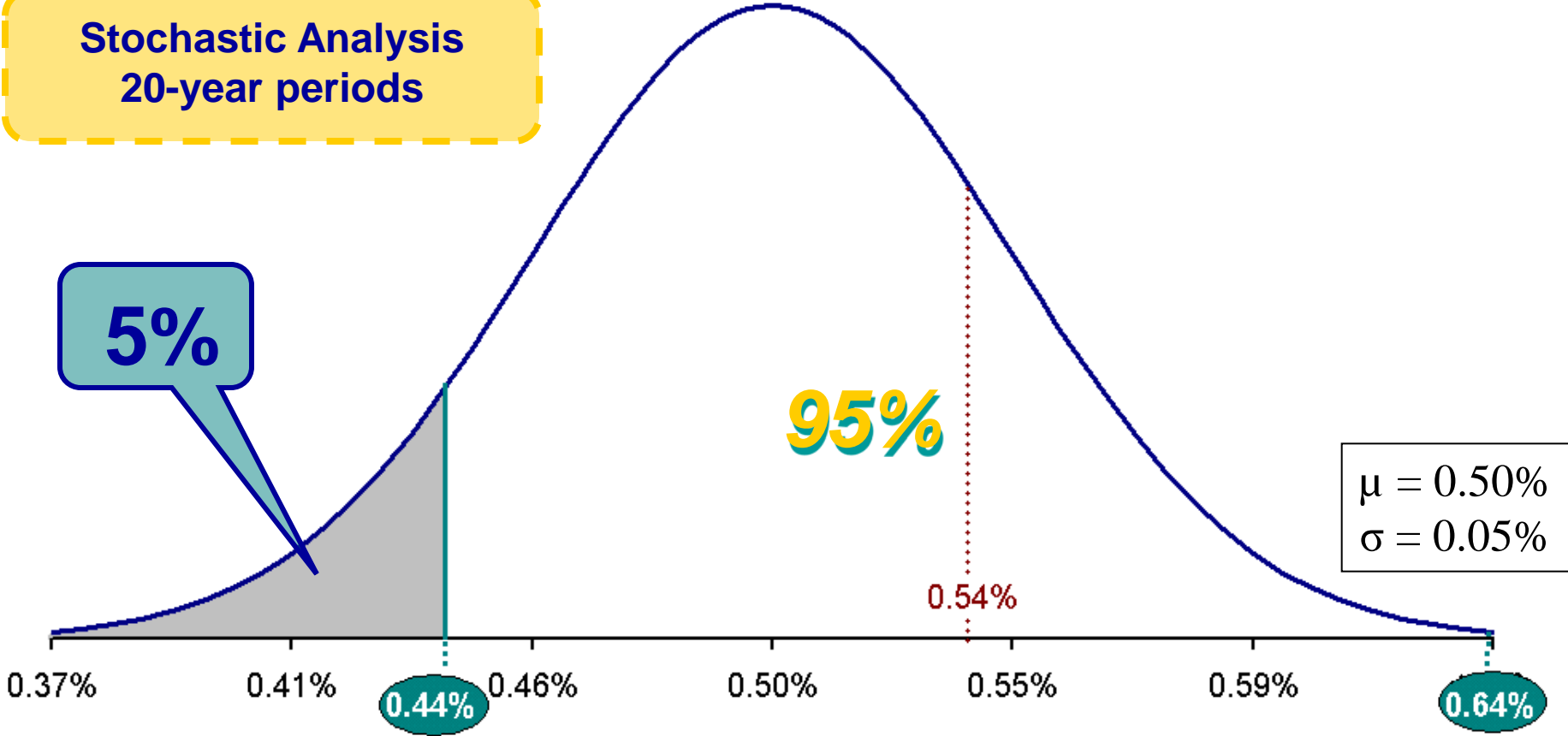
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Historical Net Migration Rates



Net Migration Rates (1972-2003)

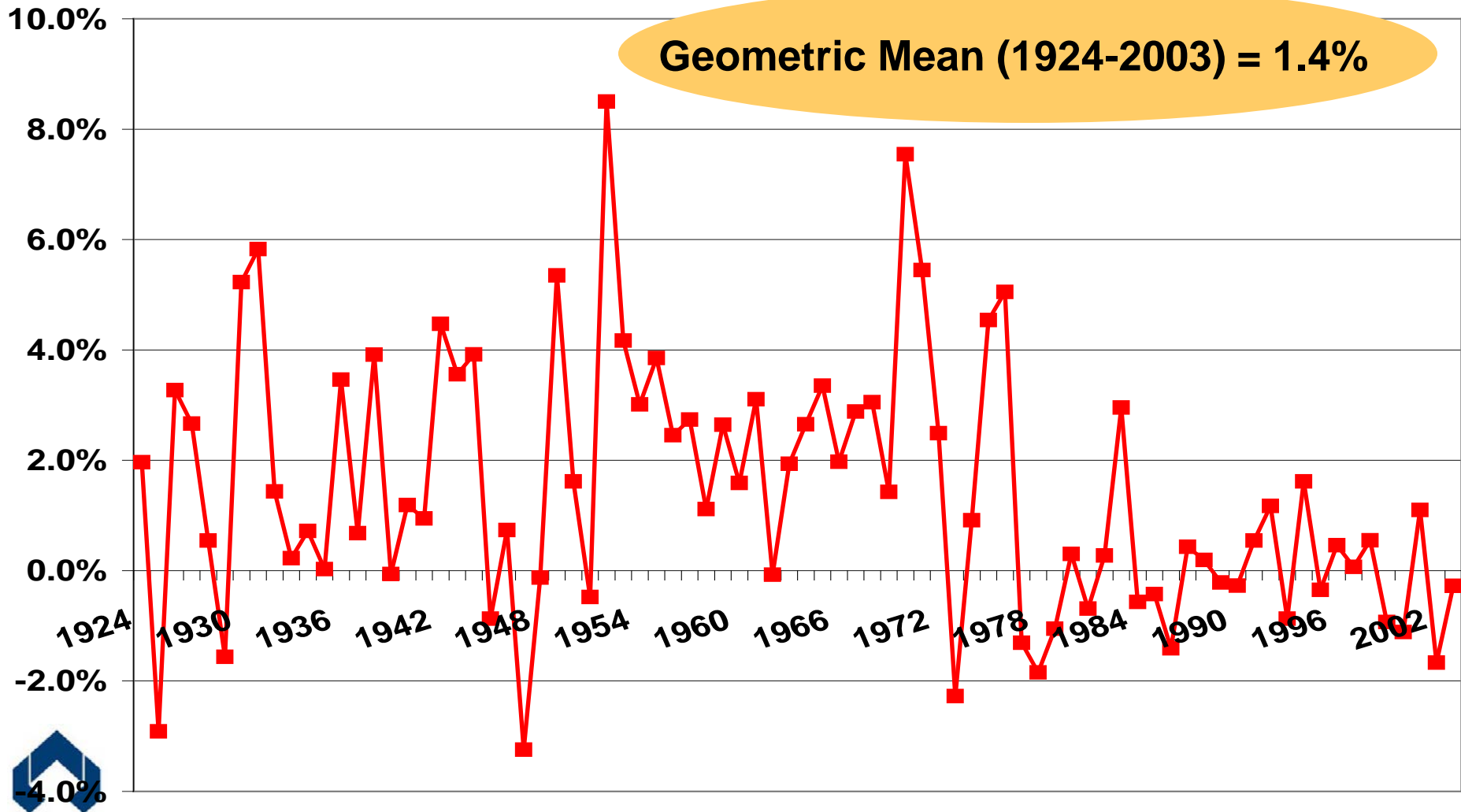
Stochastic Analysis
20-year periods



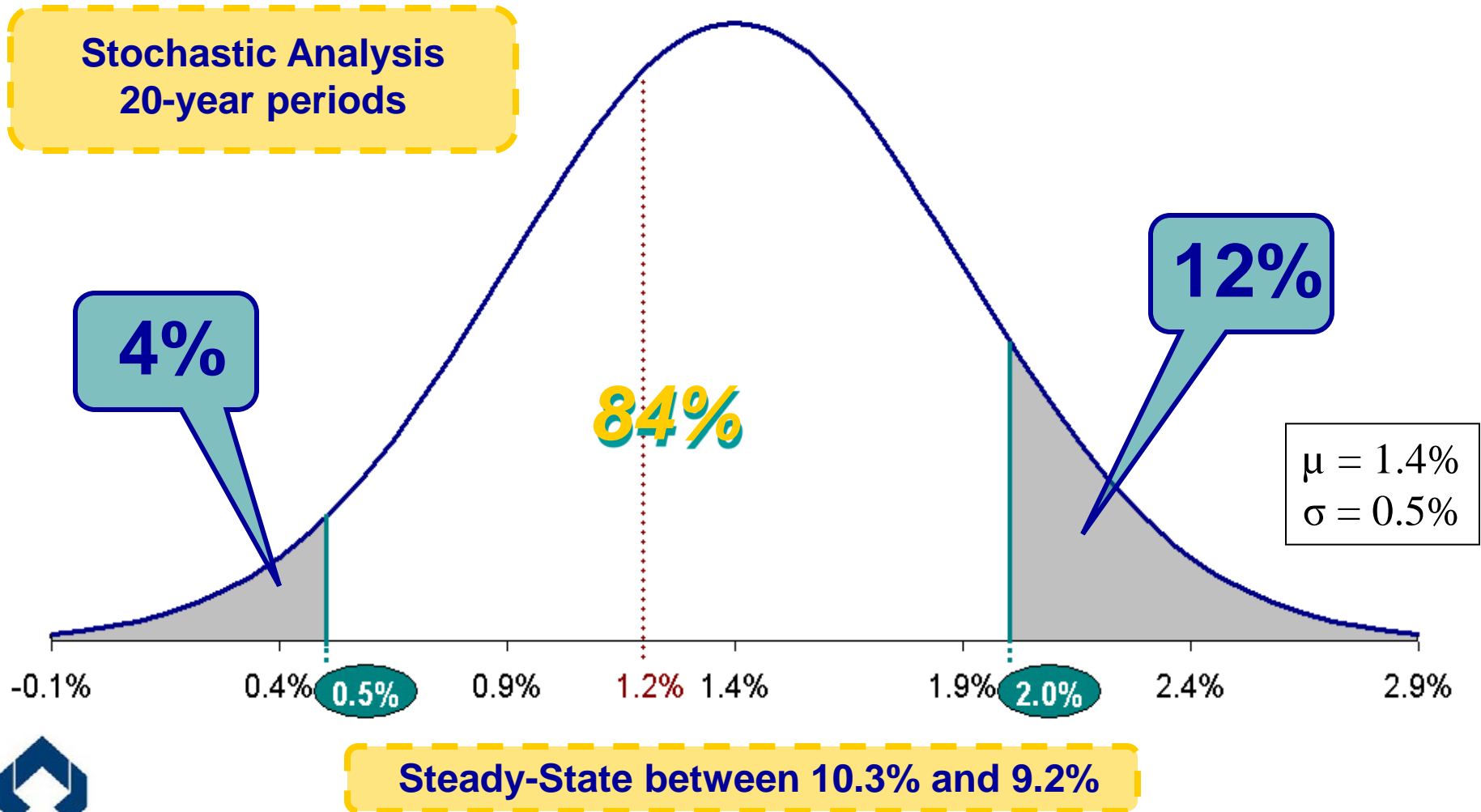
Steady-State between 9.9% and 9.6%



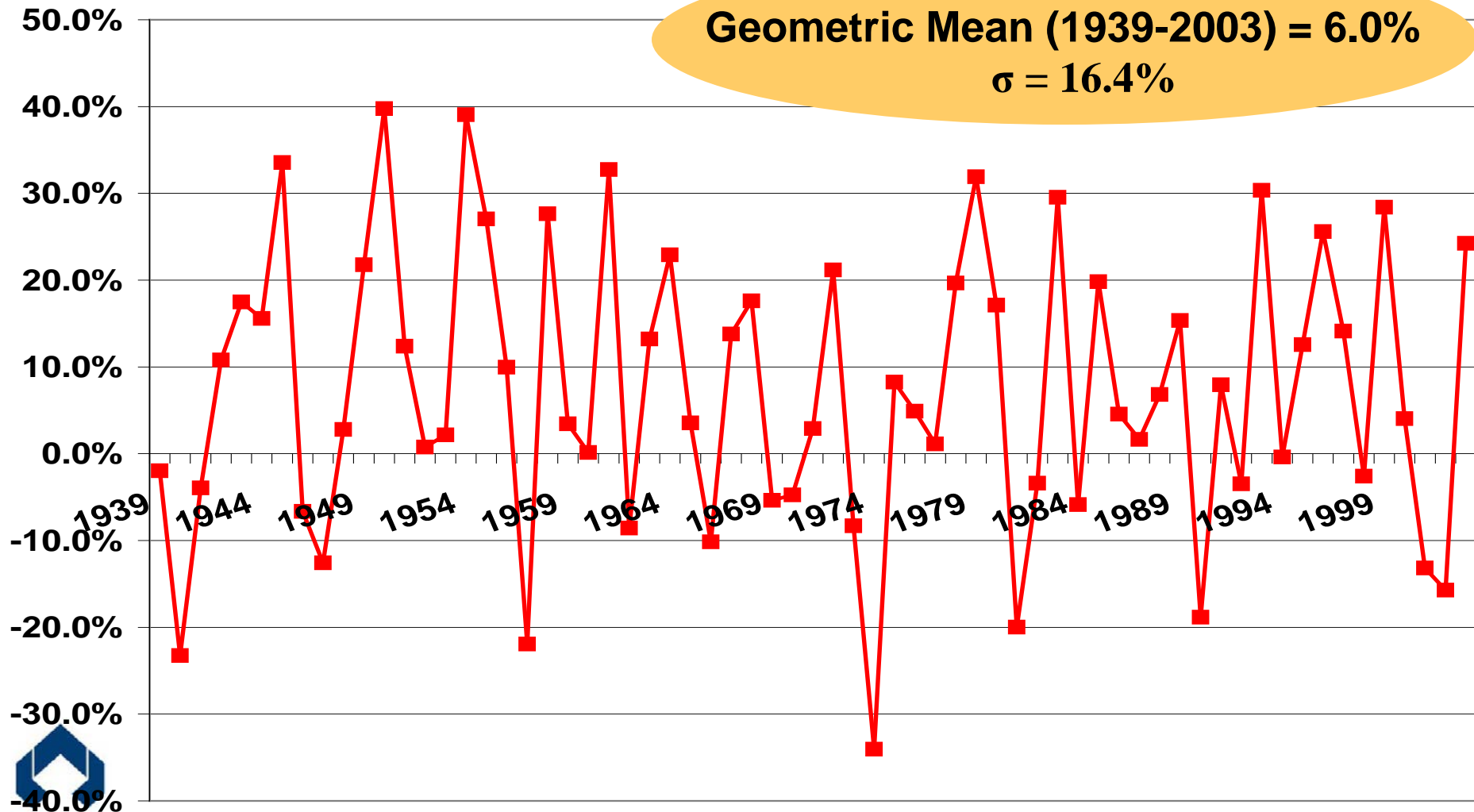
Historical Increase in Real Wages



Real Wage Increase (1924-2003)



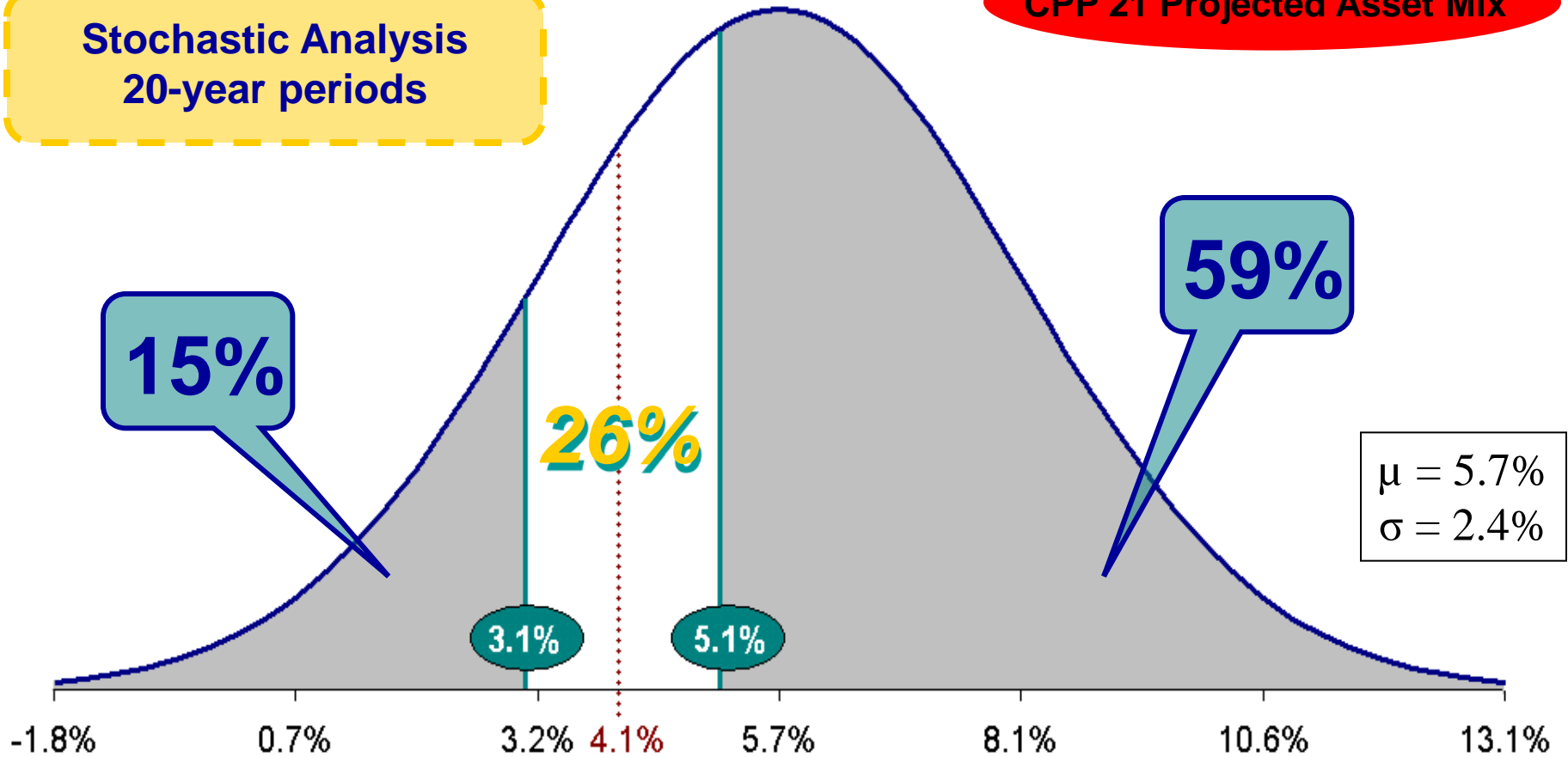
Historical Canadian Equity Return



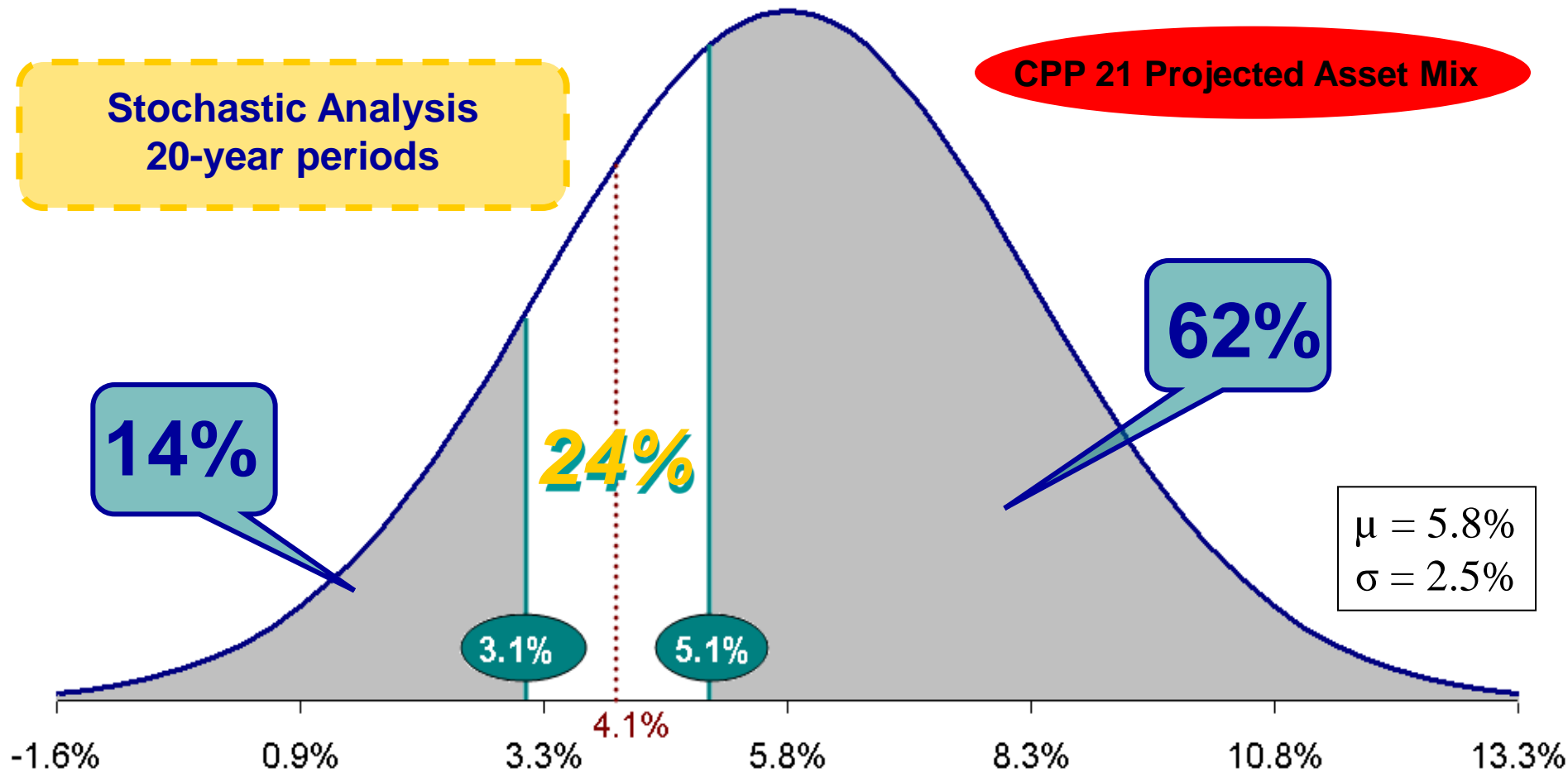
Real Rates of Return (1939-2003)

Stochastic Analysis
20-year periods

CPP 21 Projected Asset Mix

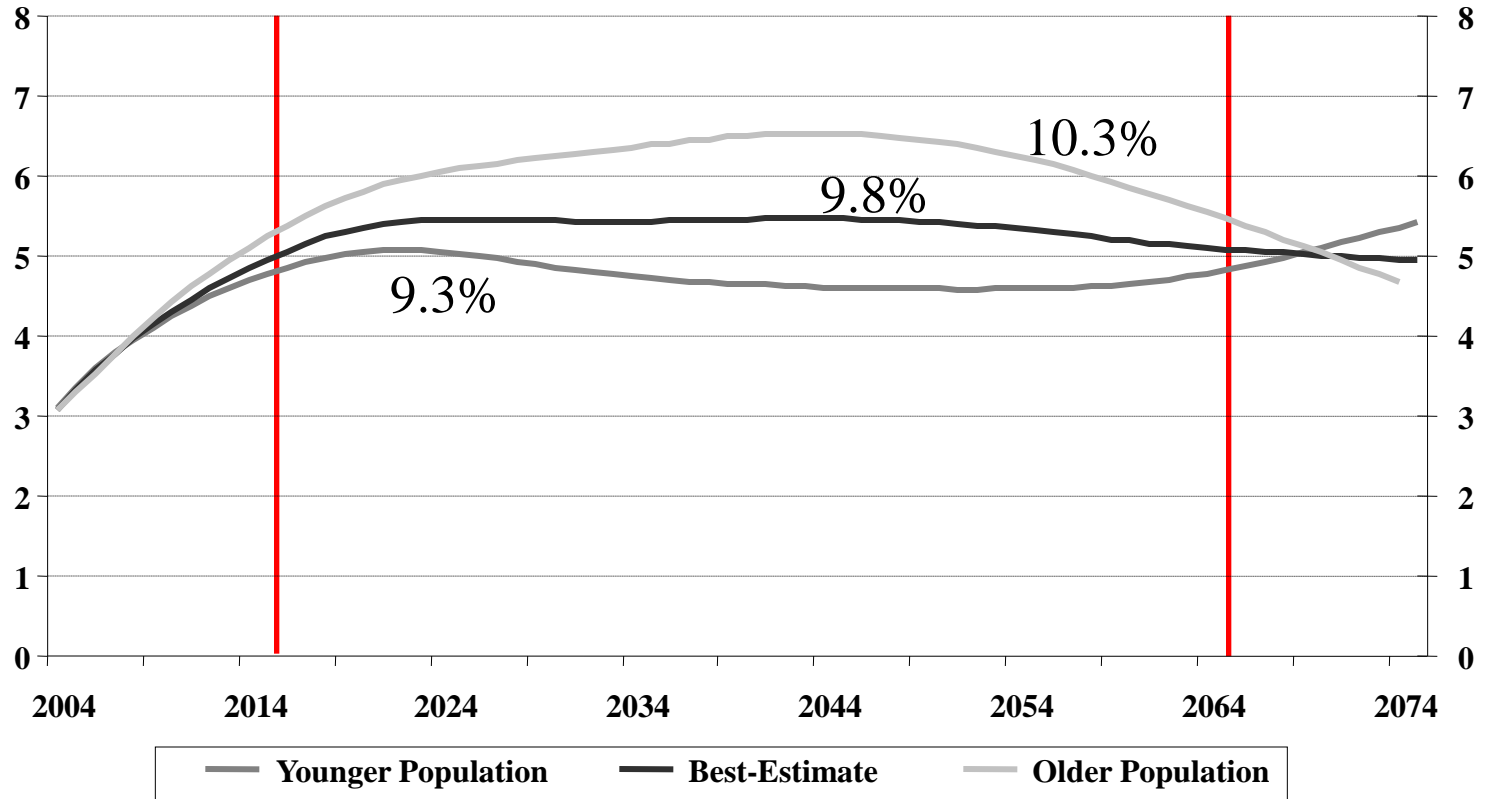


Real Rates of Return (1938-2005)



Uncertainty of Results and potential volatility of future contribution rates

A/E Ratio Under Alternative Population Scenarios (Steady-State)



Recommendation #4: Apply more sophisticated stochastic analysis to develop more consistent sensitivity tests.



Asset Mix Assumption (CPP 21)

- Peer review of CPP 18 stated that CPPIB has not yet adopted a long-term asset mix policy.
- Short-term asset mix was provided in the CPPIB Annual Report for fiscal year 2004.
- Expected asset mix in fiscal year 2006
 - 35% fixed income securities
 - 65% variable income securities
- Since OCA takes a long-term view of the CPP, it is necessary to formulate a long-term assumption about the CPPIB asset mix even though little guidance was provided by the CPPIB at that time. In that regard, the OCA most welcomes the concept of a notional CPP reference portfolio.



Asset Mix Assumption (CPP 21)

- From 2006-2020
 - 65% Variable Income
 - 35% Fixed Income
- Transition period from 2021-2024
(*QPP transition period from 2015-2025: 70%-30% to 60%-40%*)
- After 2025
 - 55% Variable Income
 - 45% Fixed Income



Alternative Asset Mix Scenarios

« A 65-35 Policy Embodies Stewards' Revealed Risk Preference »

	<u>100% Equities</u>	<u>CPP 21</u> (65%-35%)	<u>100% Bonds</u>
Contribution Rate	9.5%	9.9%	10.5%
Expected Net Cash Flow 2007-2016	\$24.4 B	\$40.2 B	\$63.9 B
Last Year of Positive Net Cash Flow	2018	2021	2026
Percent of Investment Earnings to Pay Benefits in 2050	41.2%	29.2%	22.7%



Sustainability of the 9.9% Contribution Rate Under Extreme Conditions for the next 6 years (2004-2009)

Asset Mix of CPP 21

Steady-State Rate

Lowest real rate of return

(1969-1974)

-3.8%

10.0%

Long-term real rate of return

4.1%

9.8%

Highest real rate of return

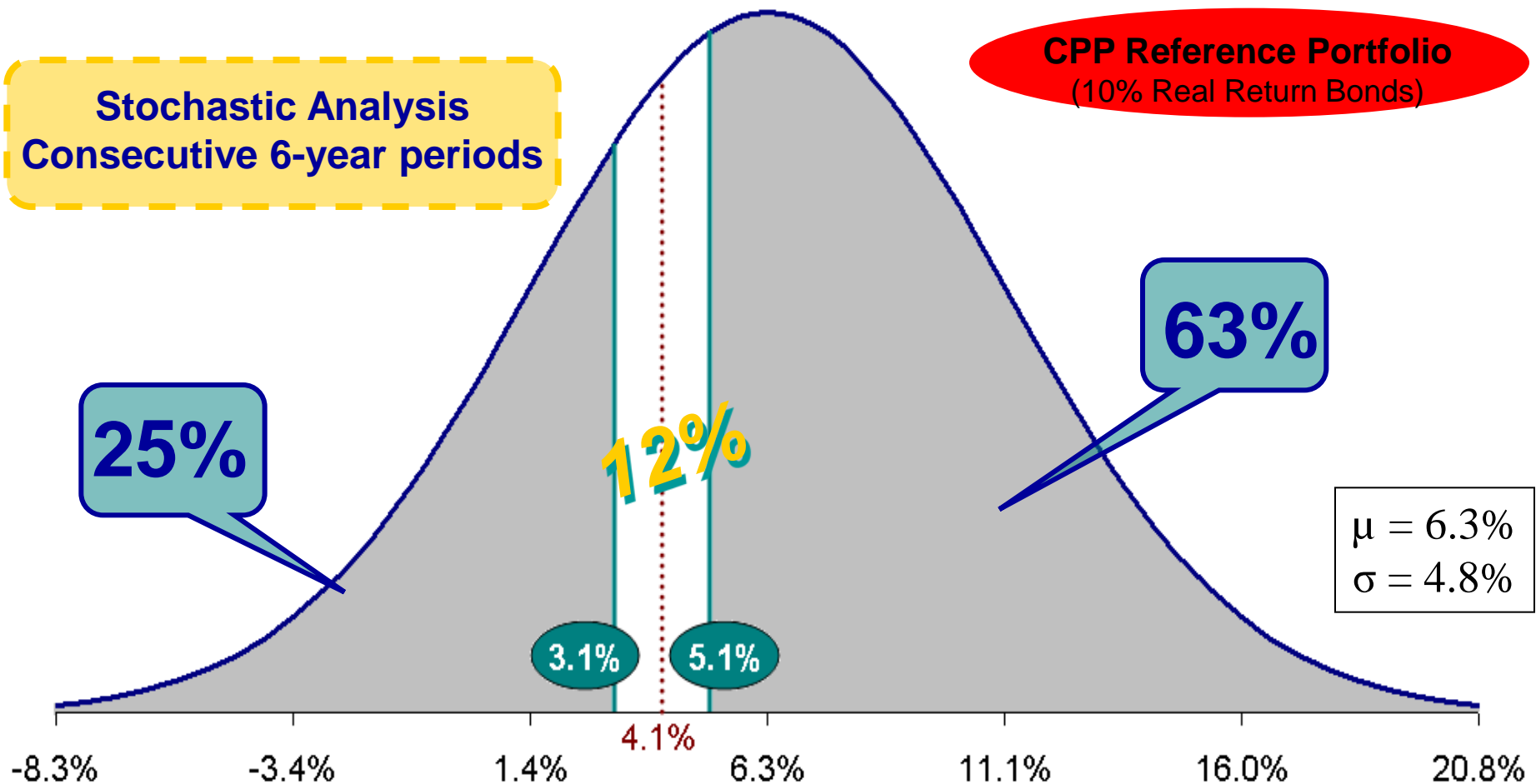
(1993-1998)

16.3%

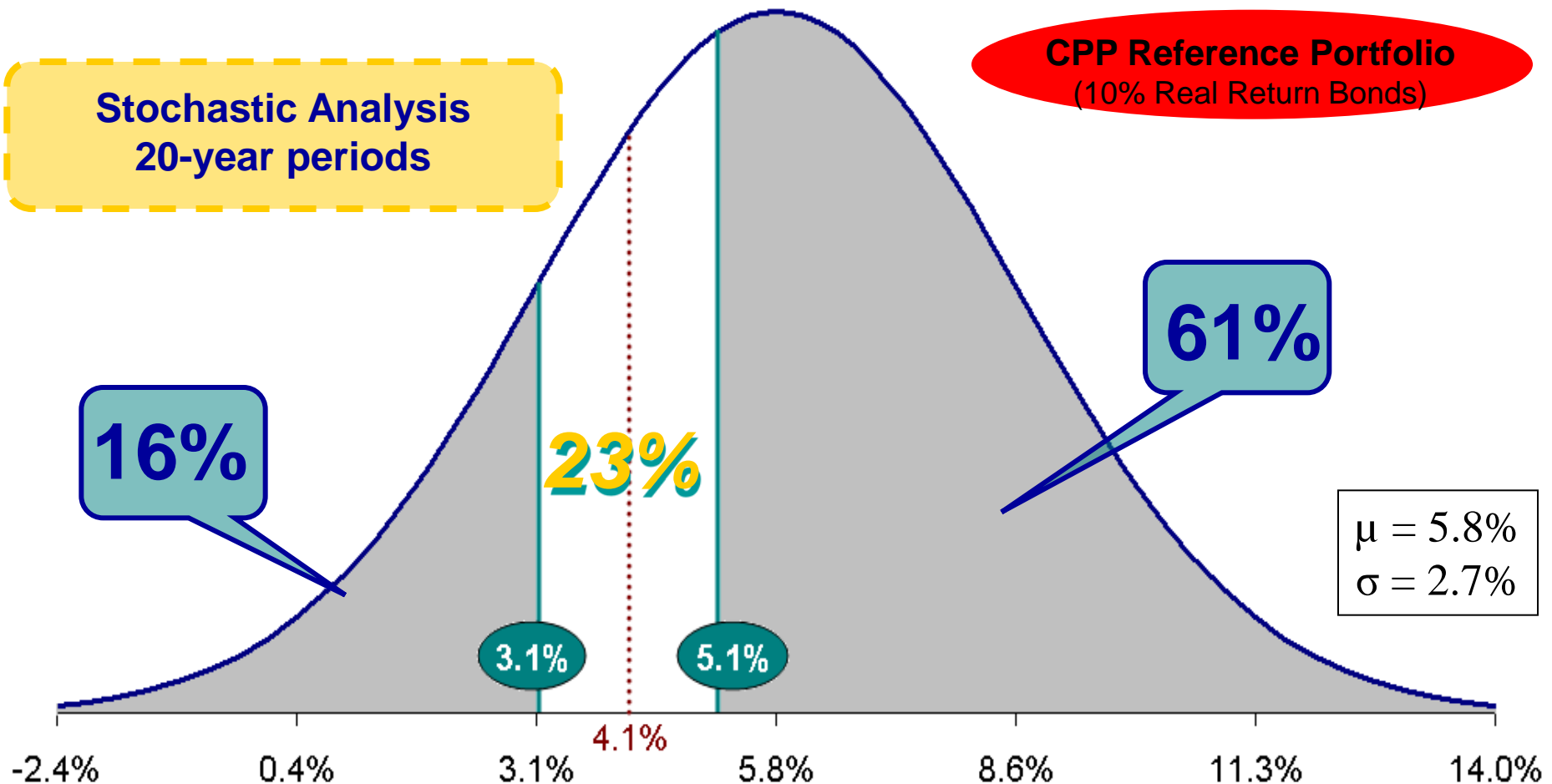
9.4%



Real Rates of Return (1938-2005)



Real Rates of Return (1938-2005)

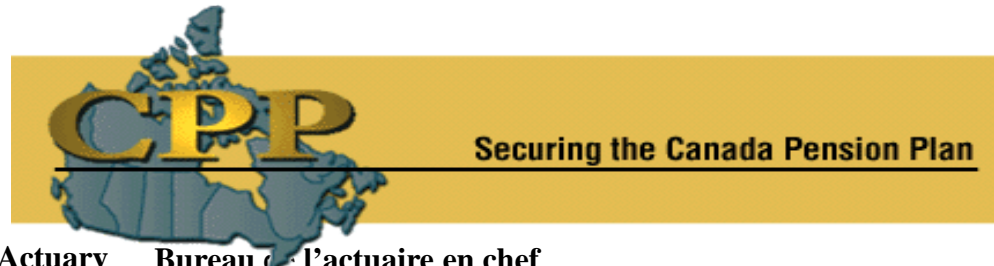


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Issues Looking Forward

- Economic value of the pension promise
- Actuarial study on optimal funding of the CPP



Economic Value of Pension Promise

- What would be the implications of purchasing a benefit equal to the CPP in the private annuity market?

Annuitant	Maximum CPP Benefit (\$)	Private Annuity Lump Sum (\$) ¹	Implied Real Rate of Return ²	Implied CPP Lump Sum (\$) ³	Implied/Private
Male, 60	570	137,496	0.70%	91,894	67%
Male, 65	814	167,628	0.17%	112,213	67%
Female, 60	570	151,816	1.05%	101,726	67%
Female, 65	814	187,467	0.82%	128,430	69%

1. Cost of purchasing an annuity that will provide monthly benefit equal to max CPP benefit
2. Implied rate of return on annuity purchased in the private market if CPP mortality assumptions are used
3. Cost of purchasing an annuity that earns the return assumed in CPP21 and assumes CPP mortality

- Only 2/3 of the CPP benefit can be provided by an insurance provider for the same capital.



Normal Cost vs Rate of Return

Rate of Return	Normal Cost * (as % of contributory earnings)	Liabilities (in billions)	Funded Ratio
4.1%	5.5%	\$584	11.6%
3.5%	6.5%	\$649	10.4%
3.0%	7.5%	\$710	9.5%
2.5%	8.9%	\$781	8.7%
2.0%	10.1%	\$863	7.8%

* Normal cost for calendar year 2004



Optimal Funding of the CPP

- OCA Actuarial Study
- Examine different ways and objectives of funding a social insurance scheme
- Discuss history and funding of the CPP
- Examine appropriateness and robustness of CPP steady-state funding methodology using sensitivity analysis

