



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

Actuarial Reports

on the Pension Plans for the Public Service, Canadian Forces and Royal Canadian Mounted Police

as at 31 March 2008

Presentation to the Federal–Provincial Pensions Conference
Ottawa, 23 November 2009



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Presentation

The purpose of this presentation is to provide you with a brief overview of how our liabilities materialize, how they are quantified and how they are financed.

- 1. Role and Responsibilities of the Office of the Chief Actuary**
- 2. Membership and Plan Provisions**
- 3. Assumptions Used in Actuarial Reports**
- 4. Current Service Costs and Liabilities**
- 5. Stochastic Analysis: a tool to measure uncertainty of results**
- 6. Issues Going Forward**



The *Public Pensions Reporting Act* defines the legislative responsibilities

- Each pension plan legislation requires, in accordance with the *Public Pensions Reporting Act*, that a cost certificate and actuarial valuation report be prepared, filed with the designated Minister and tabled before Parliament
- *Public Pensions Reporting Act*
 - Section 3: Chief Actuary must conduct actuarial reviews
 - Section 5: Describes content of cost certificate
 - Section 6: Describes content of valuation report



Cost certificate is composed of...

- Current service cost of the plan
 - An amount sufficient to cover the cost of all future benefits accrued in respect of one year of service; or
 - % of pensionable payroll that, if contributed from the date of hire to the expected retirement date, would accumulate to the value required to pay all future benefits to plan participants
- Contributions for prior service elections
- Special payments made by Government to cover any deficits

In doing so, the actuary is responsible for all assumptions used to set contribution rates.

Actuary measures the actuarial liabilities

- Actuarial liabilities of the plans
 - For pensioners, the present value of all future benefits, discounted using actuarial assumptions- projected yields on the Account (pre-April 2000 service) or the Fund (post-March 2000 service);and,
 - For contributors, the present value, discounted using actuarial assumptions (projected yields on the Account or the Fund) of all future benefits accrued as at that date in respect of all prior service.
- Solvency valuation not required



Actuary evaluates the financial status of the plans

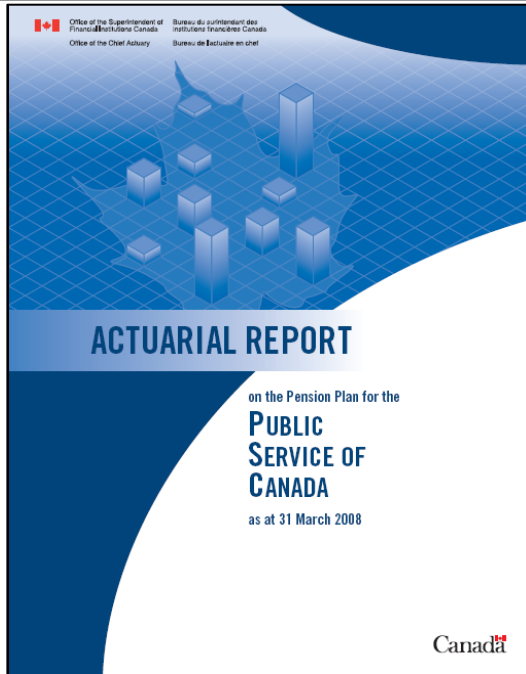
- Evaluate financial status of the plan (actuarial surplus / deficit)
 - Best estimate of the difference between plan assets and the actuarial liabilities of the plan
 - Generally calculated as the excess of assets over the actuarial liability, which is the expected present value of future benefits attributable to service to date
 - May vary depending on the actuarial assumptions and methods used

Presentation

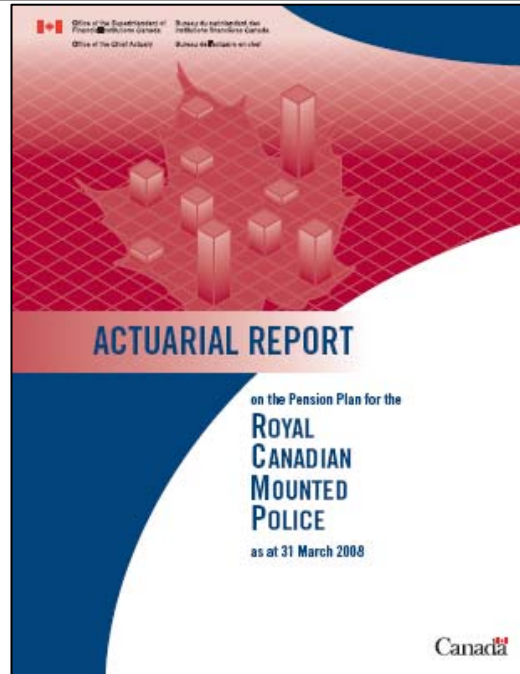
1. **Role and Responsibilities of the OCA**
2. **Membership and Plan Provisions**
3. **Assumptions Used in Actuarial Reports**
4. **Current Service Costs and Liabilities**
5. **Stochastic Analysis: a tool to measure uncertainty of results**
6. **Issues Going Forward**



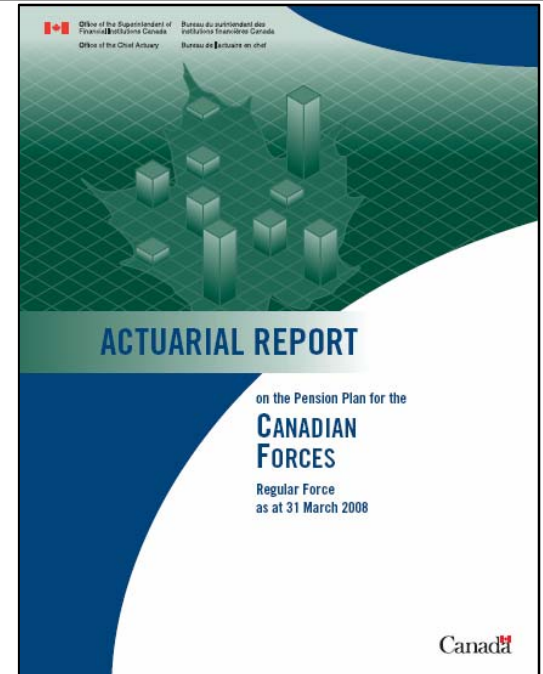
Membership



295,000 contributors
248,000 beneficiaries



21,000 contributors
15,000 beneficiaries



67,000 contributors
109,000 beneficiaries

Public Service: Avg. Age at retirement has been 58* with 26 years of service

RCMP: Average Age at retirement has been 54* with 31 years of service

CF: Average age at retirement has been 45* with 25 years of service

*Average over past three years



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Plan Provisions

Retirement Benefit (Immediate Annuity)

- 2% per year of service
 - ✘ # of years of service not exceeding 35
 - ✘ highest average of pensionable earnings over 5 years
- Payable at retirement age 60 or age 55 with 30 YS (*PS*)
- Payable at retirement age with 25 YS (*RCMP*)
- Payable at retirement age with 20/25 YS (*Canadian Forces*)
- Reduced at 65 by 0.625% (in 2012) x CPP Average maximum pensionable earnings x # of years of CPP service (max. 35)

Effective January 1, 2008, the factor of 0.7% was gradually reduced to .625% over five years.
- Pensions are fully indexed to increases in the CPI
- Disability, survivor and children benefits are also provided



Plan Provisions - Financing Member Contributions

Calendar Year	2008	2009	2010	2011	2012	2013+
Contribution rates on earnings up to the maximum covered by the CPP/QPP	4.9%	5.2%	5.5%	5.8%	6.1%	6.4%
Contribution rates on any earnings over the maximum covered by the CPP/QPP	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%

The increase in member contribution rates decreases the Government's contribution, but has no effect on the total cost of the Plan.



Average working and retirement life

Public Service of Canada

26 years of service

27 years in retirement

Age 32

Age 58

Age 85

Royal Canadian Mounted Police

31 years of service

32 years in retirement

Age 23

Age 54

Age 86

Canadian Forces

25 years of service

39 years in retirement

Age 20

Age 45

Age 84

2 years more in retirement for women



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Valuation Assumptions

for PSSA, CF, RCMP Actuarial Reports – 31 March 2008

Economic Assumptions

- Inflation rate (From 2.0% in 2010 to 2.4% in 2016 and thereafter)
- Real wage increases (from 0.8% in 2012 to 1.1% in 2016)
- Real rate of return (4.0% first four years and 4.3% thereafter for post-March 2000 service)

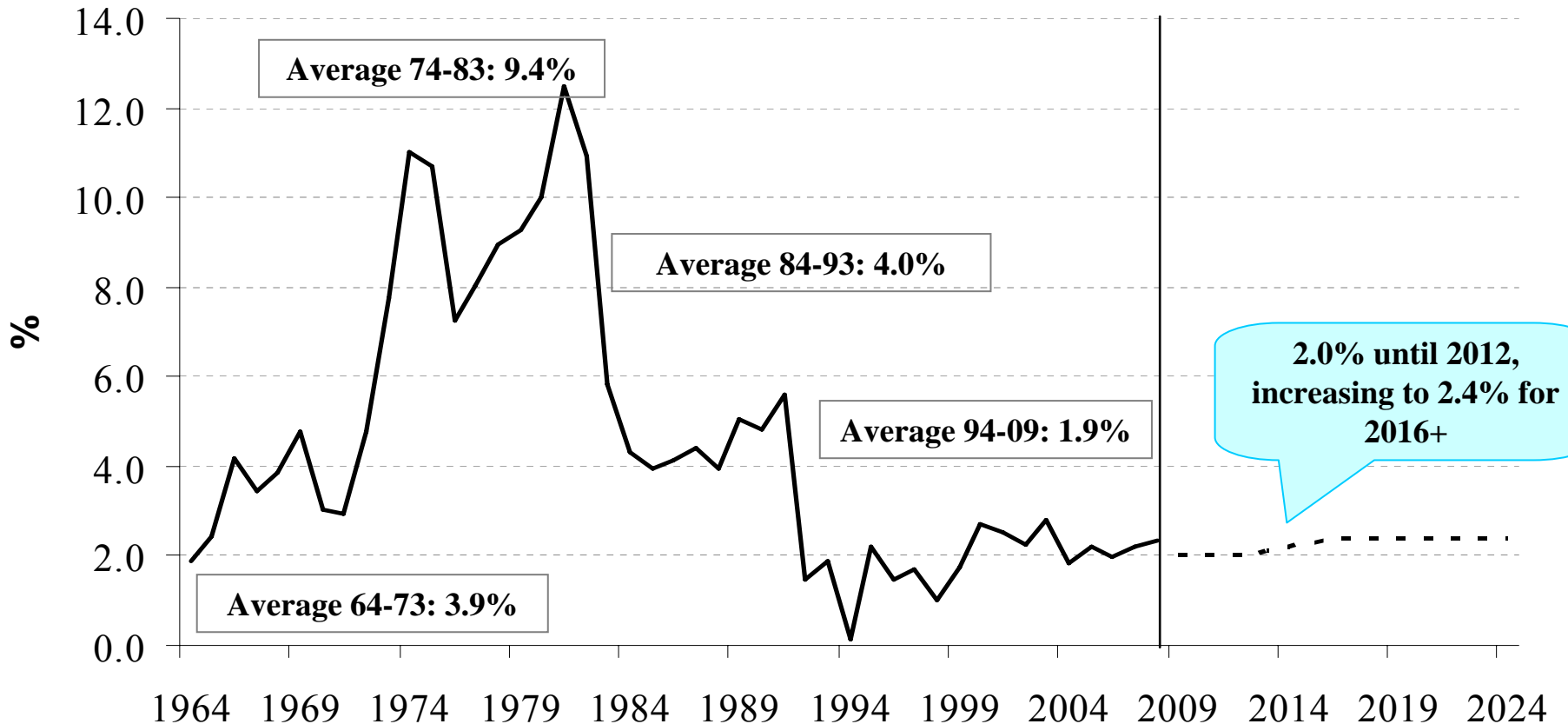
Demographic and Other Assumptions

- Promotional and seniority salary increases
- Number, age, sex, initial salary of future new members
- Rates of retirement
- Rates of termination / Rates of disability
- Mortality rates and life expectancies
- Proportion of members married
- Administrative expenses



Despite large fluctuations in the past, the rate of inflation has been very stable, at around 2%, since 1992

Annual Increase in Consumer Price Index



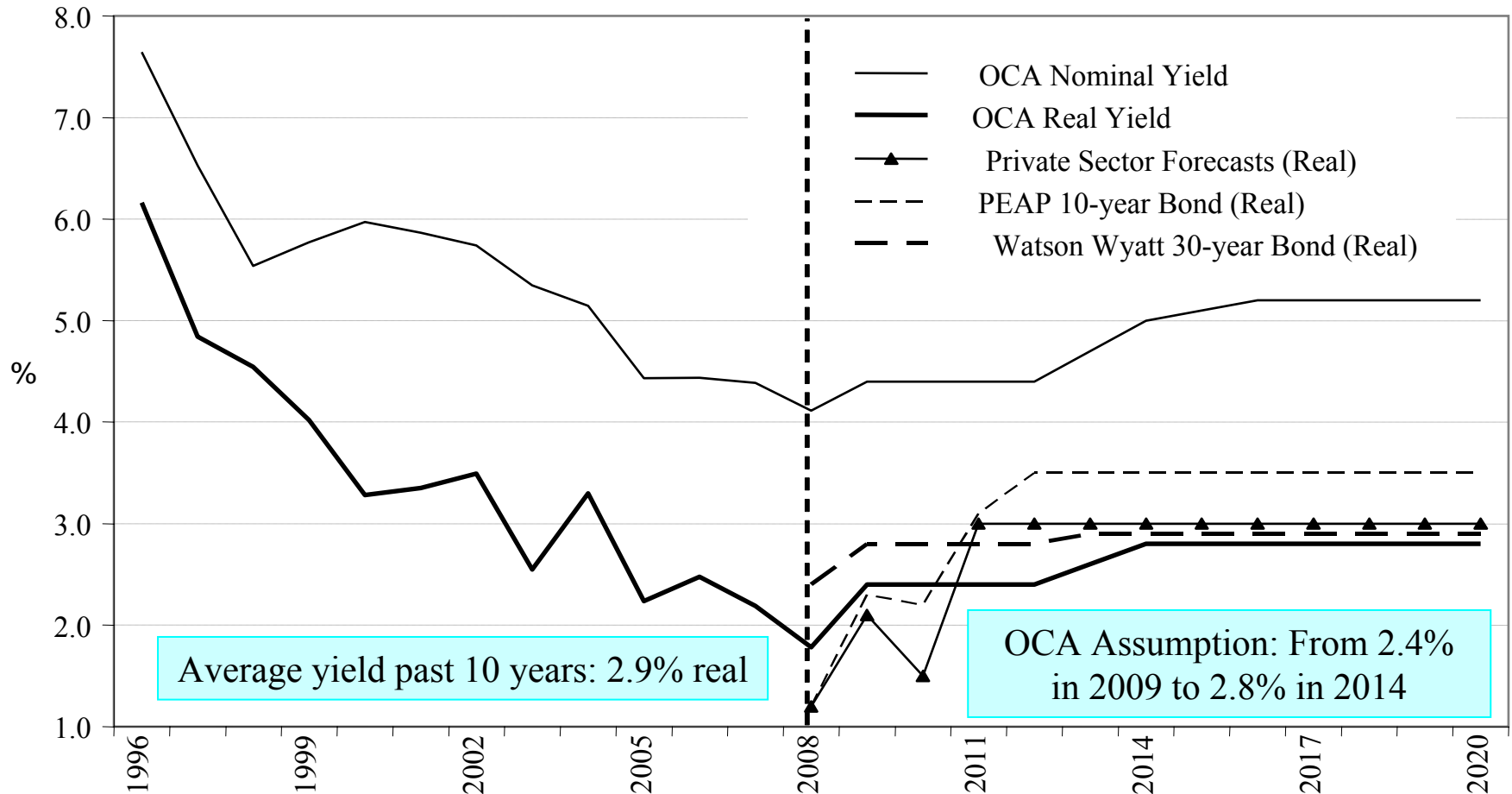
- **Various pension plans assume inflation rate between 1.9% and 2.8%**
- **An independent panel of actuaries has indicated that the CPP long-term assumption of 2.5% was within the reasonable range.**



Assumptions Underlying Real Rate of Return

- “Risk-free” rate
- Equity risk premium (additional return over bonds)
- Real rate of return by asset class
- Asset mix policy: short-term versus long-term

Government of Canada Long Marketable Bonds: a good proxy for the risk-free rate



Average yield past 10 years: 2.9% real

OCA Assumption: From 2.4% in 2009 to 2.8% in 2014

1990 to 2008: *Government of Canada Marketable Bonds, Average Yield: Over 10 Years (VI22487)*

2009+ : *Projections*



The fixed income portfolio is a mix of four types of bonds whose assumed yields vary by level of risk.

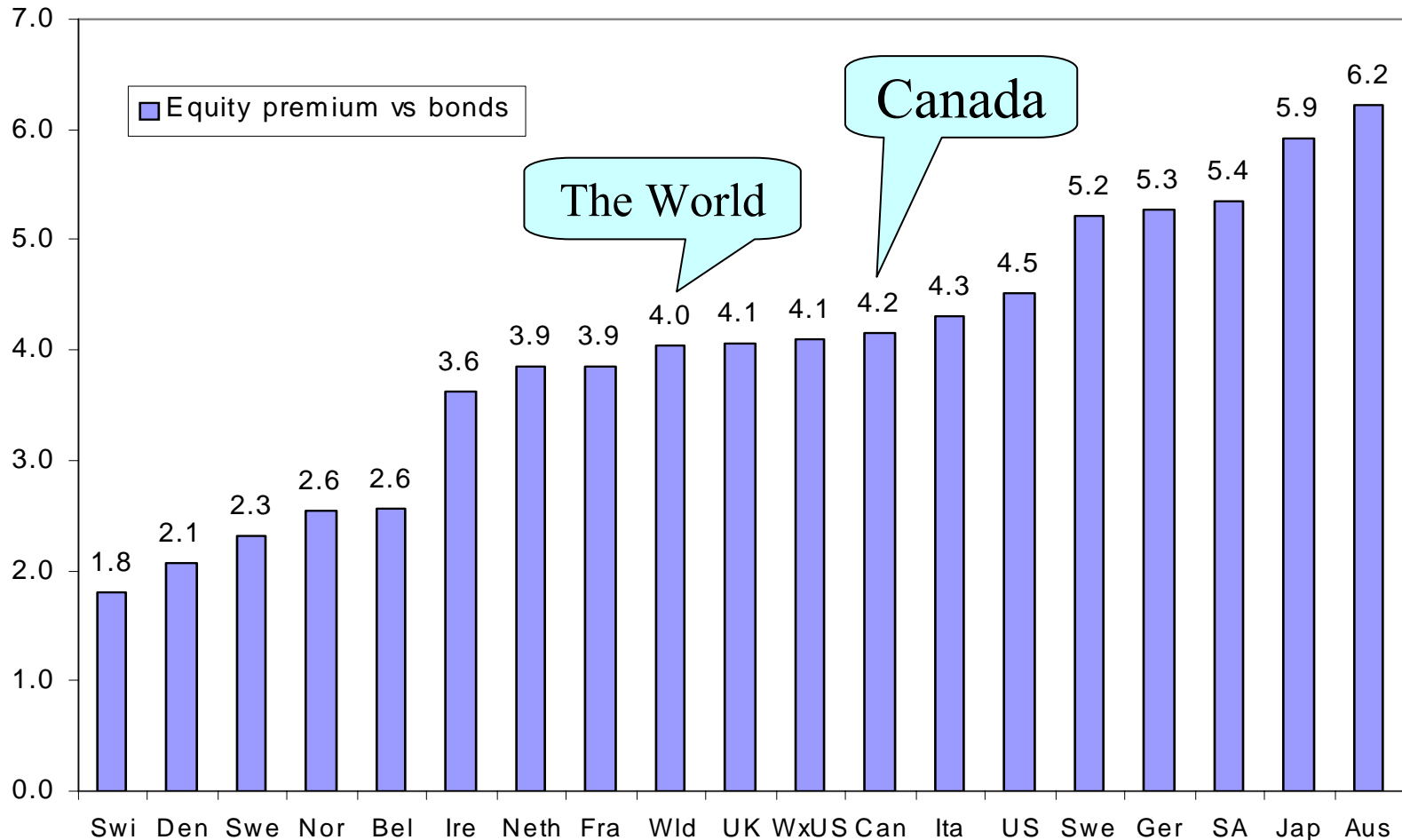
- The following table summarizes the mix of bonds, along with the assumed spread earned over federal bonds:

	Federal	Provincial	Corporate	Real Return
Proportion in portfolio	20%	40%	30%	10%
Spread over federal bonds	-	+40 bps	+100 bps	-40 bps

- It is assumed that only high quality corporate bonds are purchased.
- The real rate of return on fixed income securities is assumed to be 2.8% until 2012 and to increase to 3.2% in 2014 and remain level thereafter.



Over the 106-year period 1900-2005, Canada experienced an equity risk premium of 4.2%.

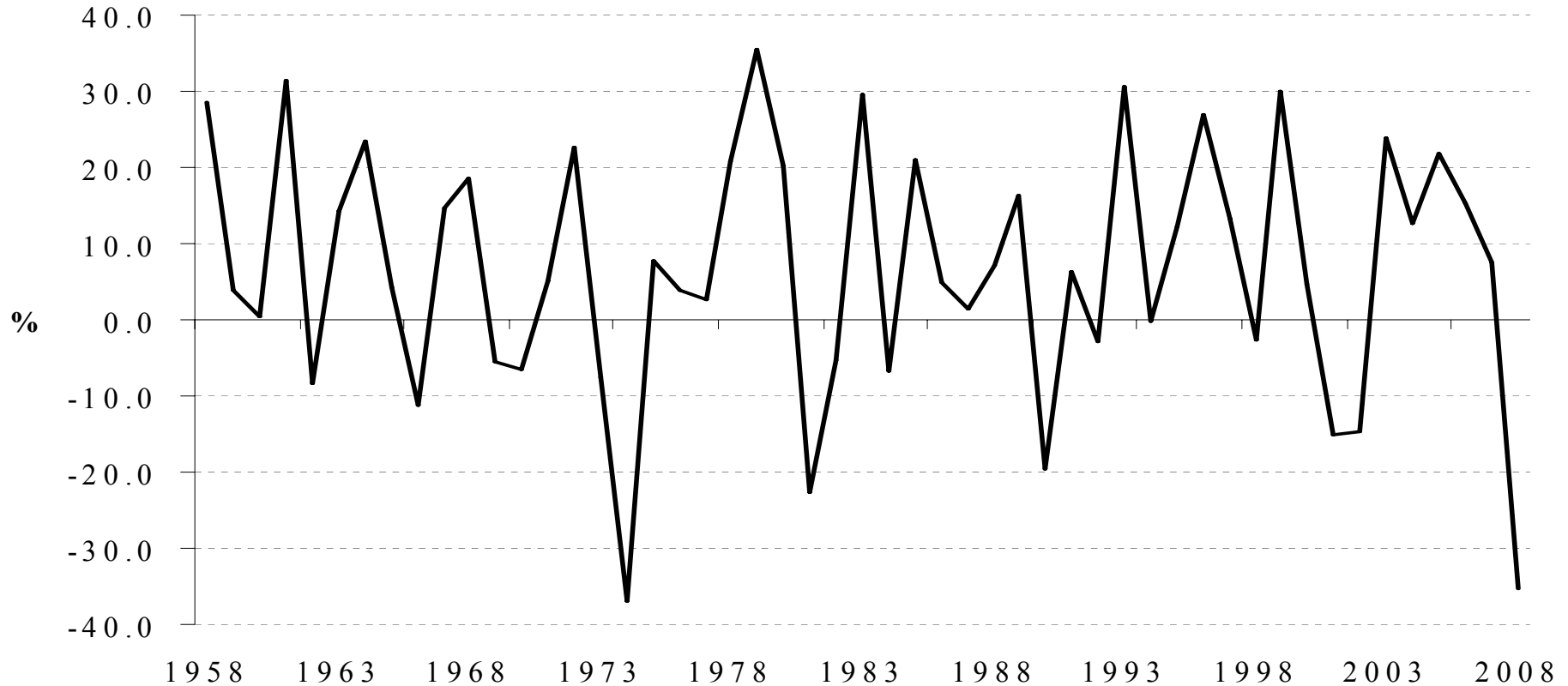


Source: *The Worldwide Equity Premium: A Smaller Problem* by Dimson, Marsh and Staunton (April 2006)

Over the 109-year period ending in 2008, the Canadian equity risk premium has been 3.7%.



Over the last 50 years, Canadian equities have earned an average real return of 5.1% with a standard deviation of 16.6%.



- **Over the same period, U.S. equities have earned an average real return of 5.5%.**
- **Over the same period, the U.S. equity risk premium in \$CDN has exceeded the Canadian ERP by around 50 basis points at 1.7% compared to 1.2%.**

Since 2003, peers have decreased equity holdings in favor of alternative investments such as real return assets.

	Asset Mix Policy of Peer Plans (actual holdings)					
	2003/2004			2008/2009		
	Fixed Income	Equity	Real Return	Fixed Income	Equity	Real Return
PSPIB¹	34%	65%	1%	26%	53%	21%
CPPIB¹	1%	97%	2%	32%	57%	11%
CDPQ²	39%	49%	12%	54%	31%	15%
OMERS²	25%	63%	12%	18%	51%	31%
OPSEU²	39%	61%	0%	43%	42%	15%
Teachers' ²	38%	46%	16%	28%	41%	31%
ABP²	50%	40%	10%	53%	37%	10%

1. As at 31 March 2004 and 31 March 2009
2. As at 31 December 2003 and 31 December 2008



The best estimate asset mix has its fixed income holdings increase over time as the Plan matures and the fund grows.

Asset Mix

Plan Year	Fixed Income Securities	Canadian Equity	U.S. and Foreign Equity	Real Estate and Infrastructure
2009	25%	28%	30%	17%
2010	25%	25%	30%	20%
2011	25%	25%	30%	20%
2012	25%	25%	30%	20%
2013	27%	23%	30%	20%
2014+	30%	20%	30%	20%



Real Returns by Asset Class (%)

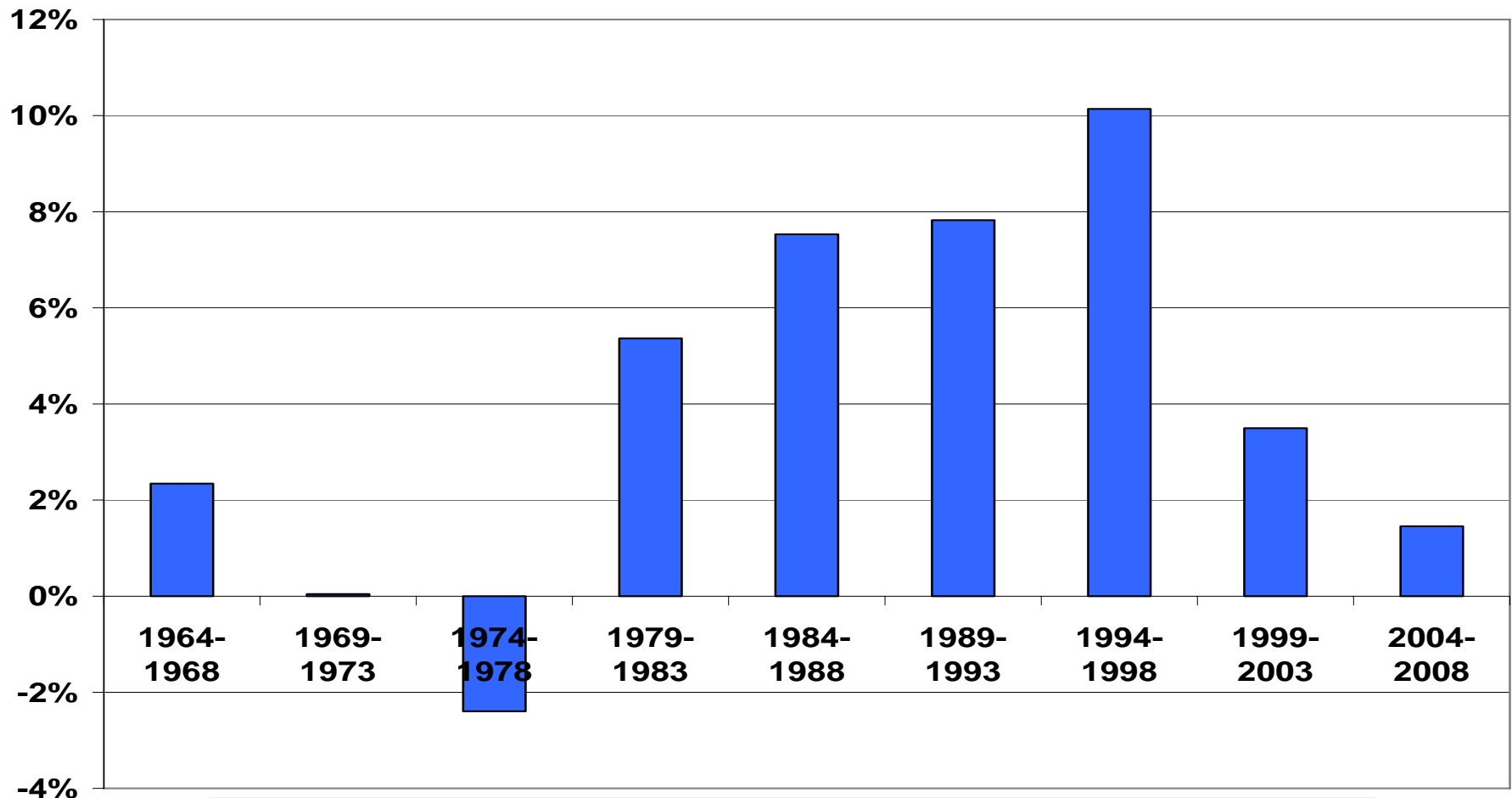
Plan Year	Fixed Income Securities	Canadian Equity	U.S. and Foreign Equity	Real Estate and Infrastructure	Overall Return
2009	2.8	4.7	4.7	3.6	4.0
2010	2.8	4.7	4.7	3.6	4.0
2011	2.8	4.7	4.7	3.6	4.0
2012	2.8	4.7	4.7	3.6	4.0
2013	3.0	4.9	4.9	3.8	4.2
2014+	3.2	5.1	5.1	4.0	4.3

- The risk-free interest rate (Long-Term Canada Bonds) increases from 2.4% to 2.8% in 2014.
- The equity risk premium is set at 2.3%.
- Based on a long-term asset mix of 30% in fixed income securities, 50% in equities and 20% in real estate and infrastructure, the expected long-term real rate of return is 4.3%.

An independent panel of actuaries has indicated that the 4.2% assumption for the ultimate annual real rate of investment return on CPP assets was within, but towards the low end of, the reasonable range.



5-Year Average Real Rate of Return of Assets of Canadian Registered Pension Plans



Average 1969-2008 : 4.1% (Average 1967-2006: 4.8%)

Source: CIA Report on Canadian Economic Statistics 1924-2008, RBC Dexia Investor Services

Mortality Assumptions - Life Expectancy

Average Age at Death for a Person Aged 65 in 2008

	<u>Males</u>	<u>Females</u>
CPP (Canada Pension Plan)	84.4	87.1
Public Service	84.7	87.3
CF (Other ranks)	83.7	-
CF (Officers)	85.9	88.0
RCMP (Regular Members)	85.7	89.3

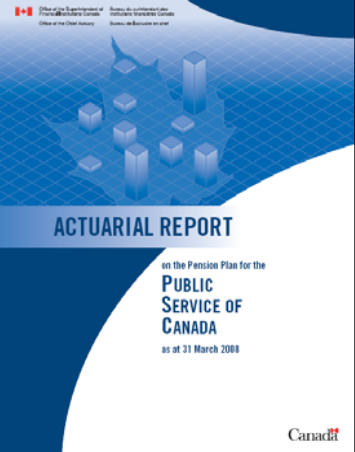
Life expectancies are expected to increase by about 1 to 1.5 years in 2025.



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Current Service Cost (2008-2009)

Public Service Pension Plan

	Member Portion	Government Portion	Current Service Cost	<i>2005 Report</i>
Contribution rate	6.1%	12.4%	18.5%*	18.0%
	(33%)	(67%)	(100%)	
Contributions	\$1,090M	\$2,231M	\$3,321M	

Ratio Government/Members 2.03
(expected at 1.92 in 2010-11)

* Expressed as a percentage of pensionable payroll : \$18.0 billion

* Higher cost because of lower short-term real rate of return and improved CPP coordination factors.



Projection of Public Service Liabilities

	<u>Pension Fund</u> (Service After March 2000)		<u>Superannuation Account</u> (Service Before April 2000)		<u>Fund Liabilities/ Total Liabilities</u>
	Liabilities (\$ billions)	Ratio of Liabilities: Actives/Total	Liabilities (\$ billions)	Ratio of Liabilities: Actives/Total	
2008*	28	84%	87	39%	24%
2015	68	70%	91	25%	43%
2025	164	59%	74	6%	69%
2035	321	51%	48	0%	87%

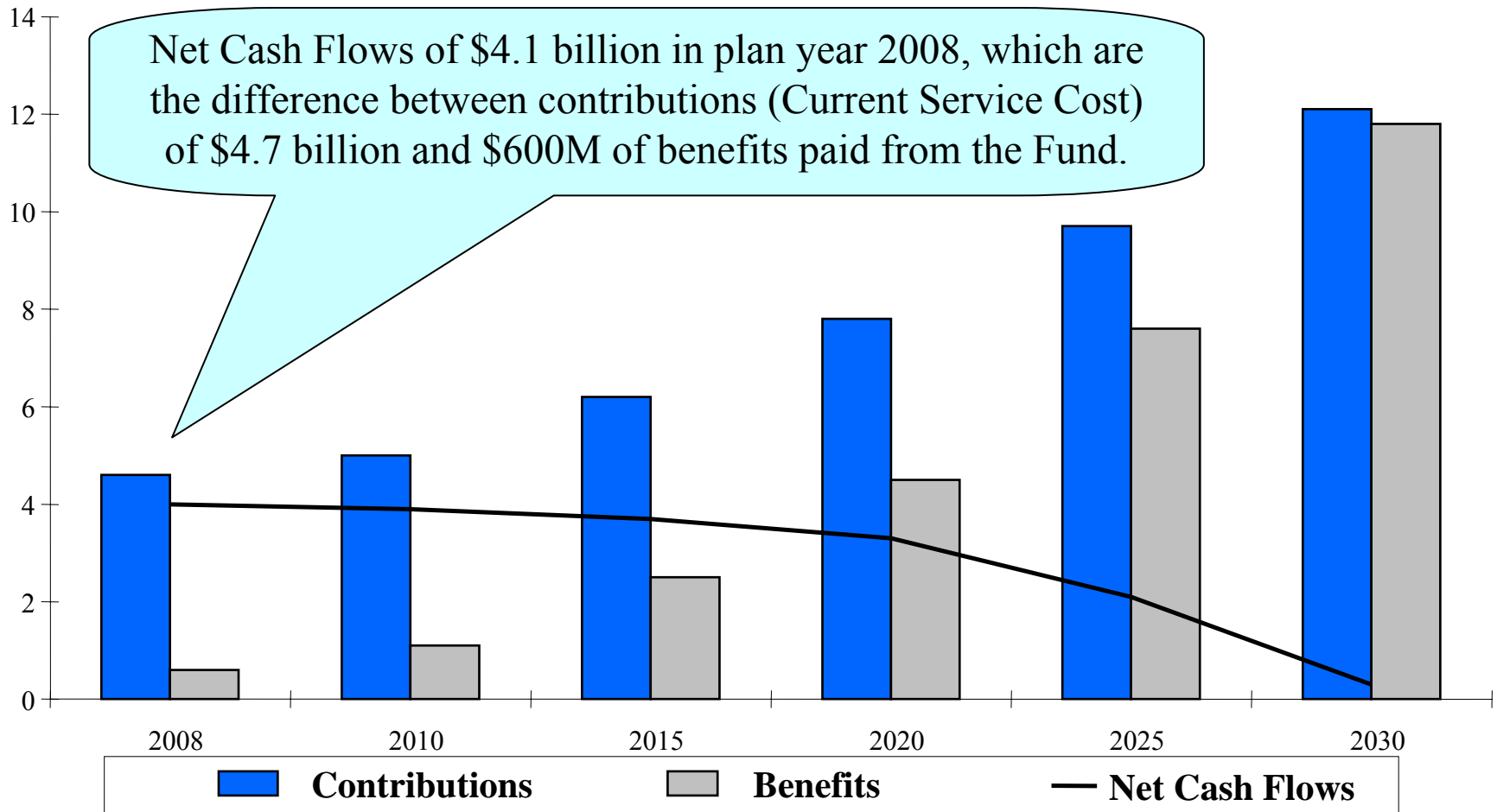
* Actuarial surplus of \$972 million (Fund); Notional actuarial excess of \$4.6 billion (Account) as at 31 March 2008.

•Tangible assets backing the liabilities invested through PSP Investments could be long-term since the liabilities are heavily weighted towards the actives, thus reducing the assets/liabilities mismatch or, said differently, net cash flows are expected to be positive until 2030.

•PSP Investments is managing the assets of one of the youngest pension plans in Canada.



Evolution of Net Cash Flows of the Funds (post-March 2000 service)



In 2008, benefits paid from the Superannuation Accounts (pre-April 2000 service) reached \$7.2 B.

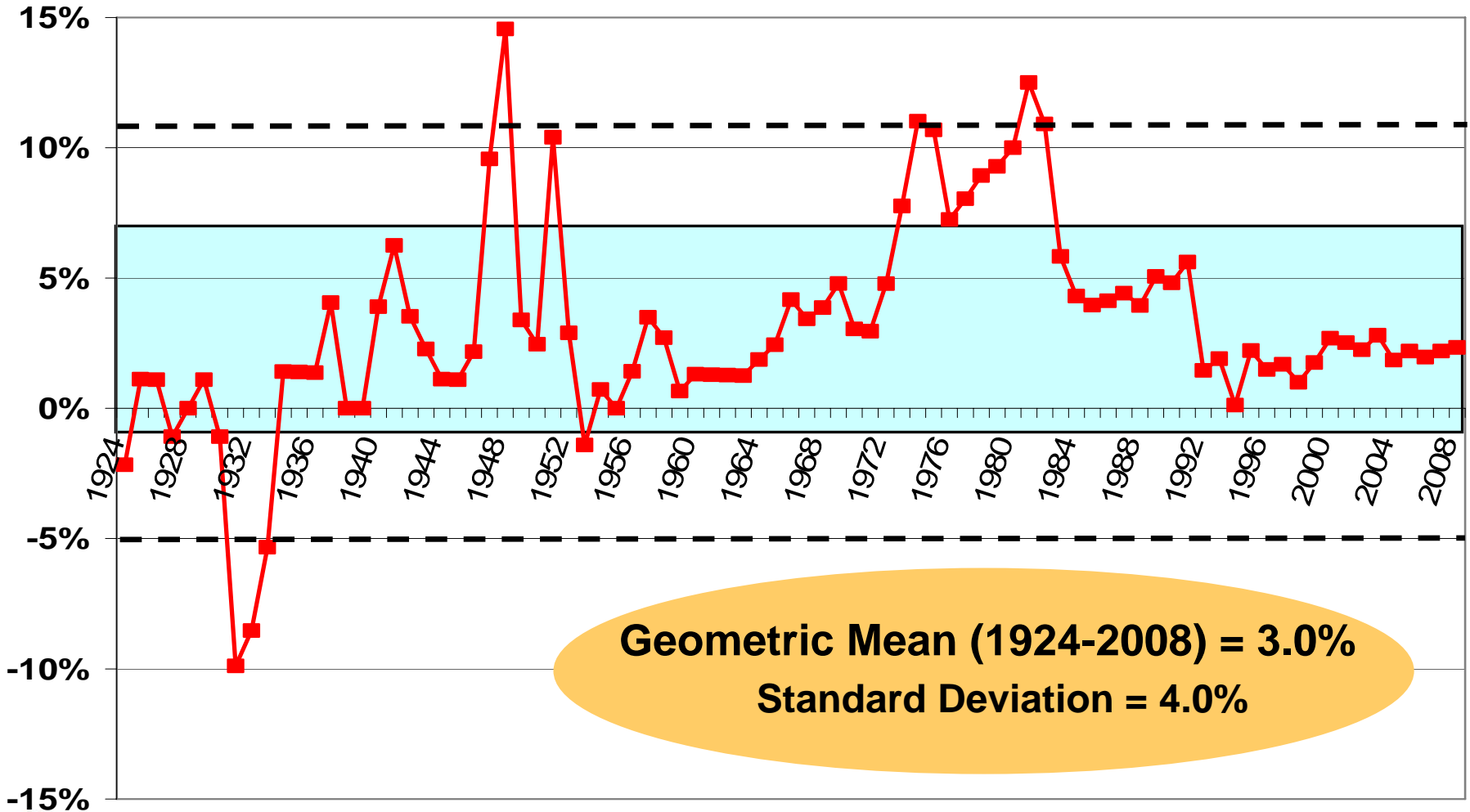


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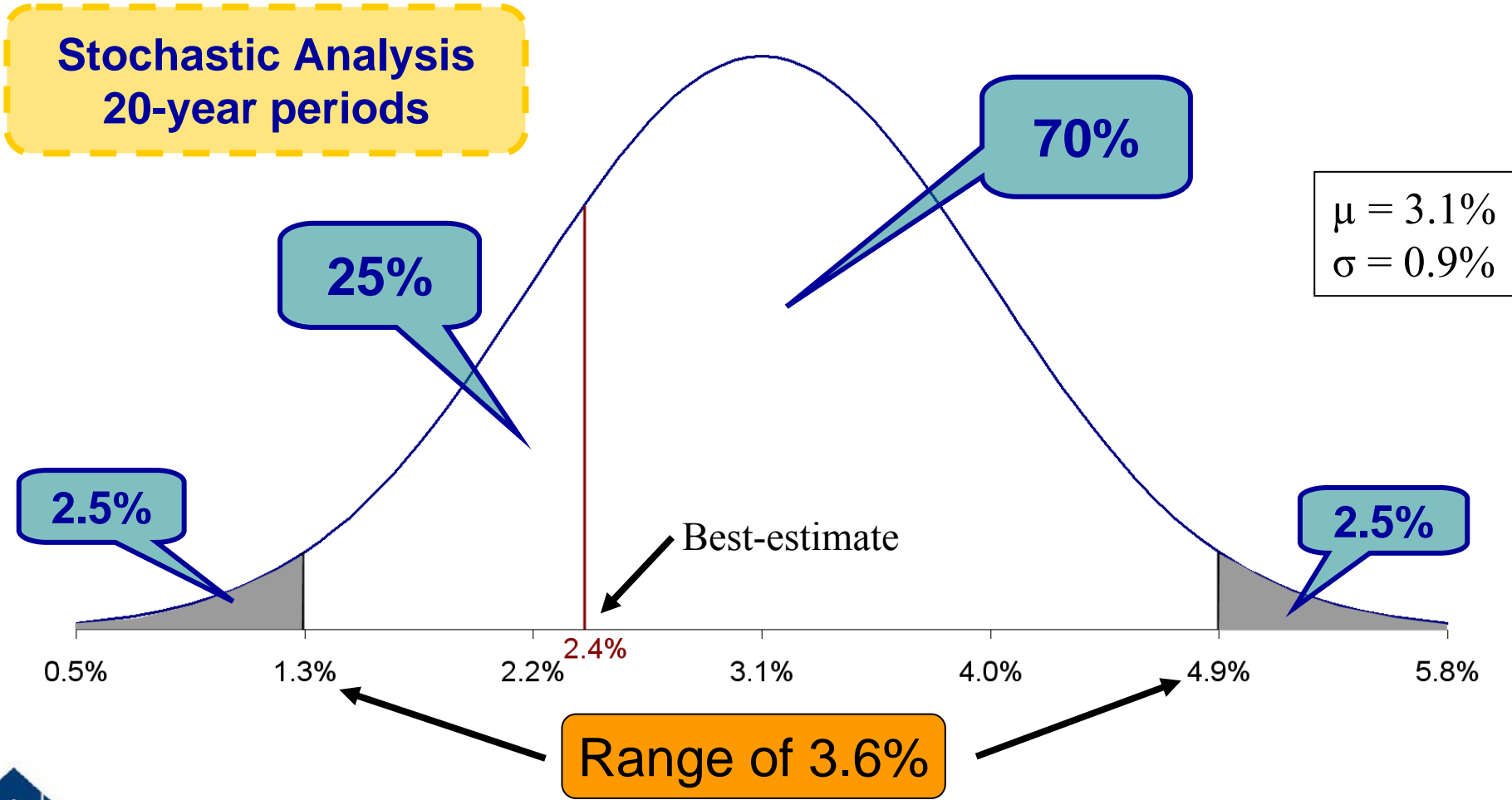
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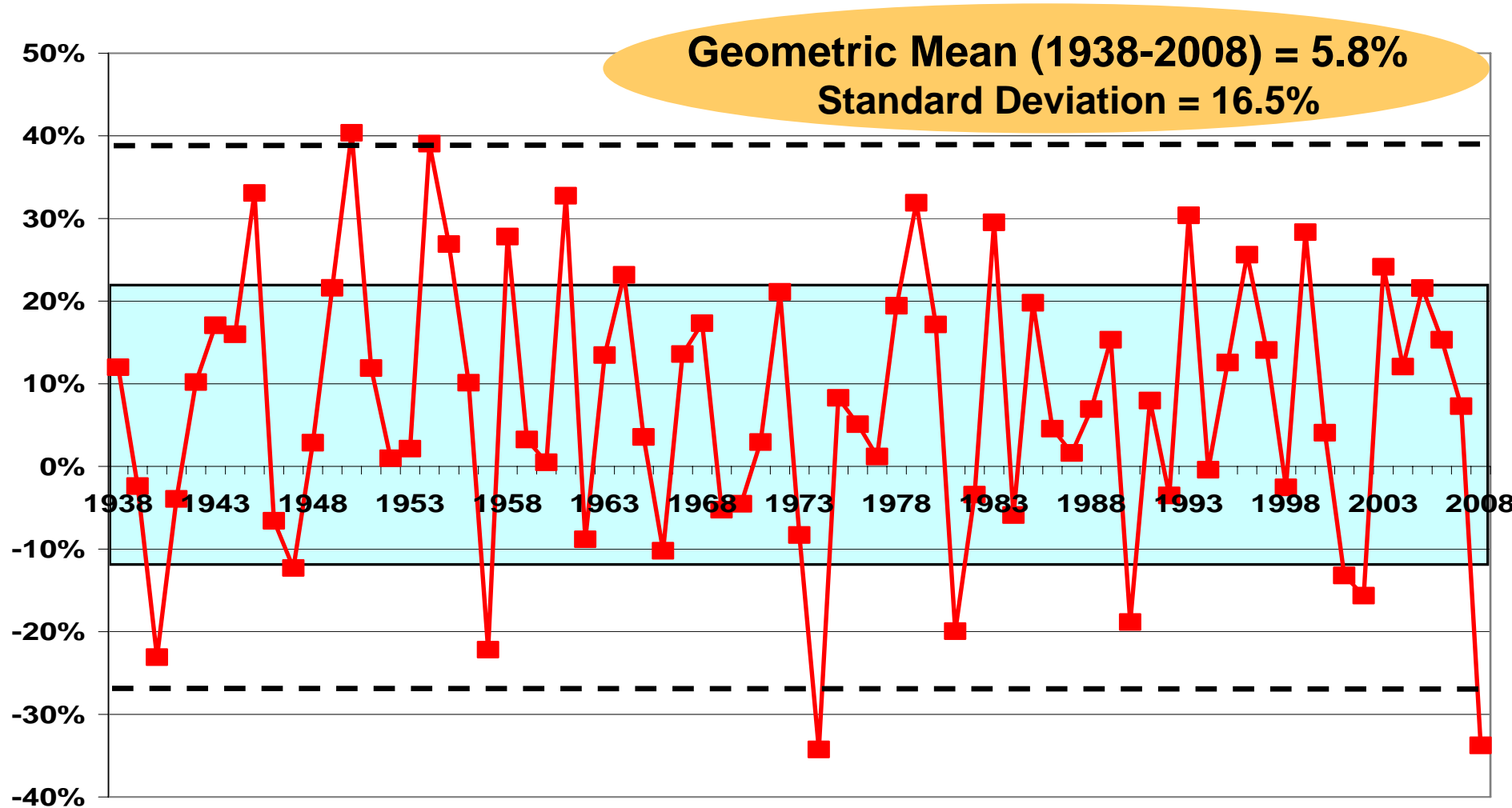
Historical Inflation (1924-2008)



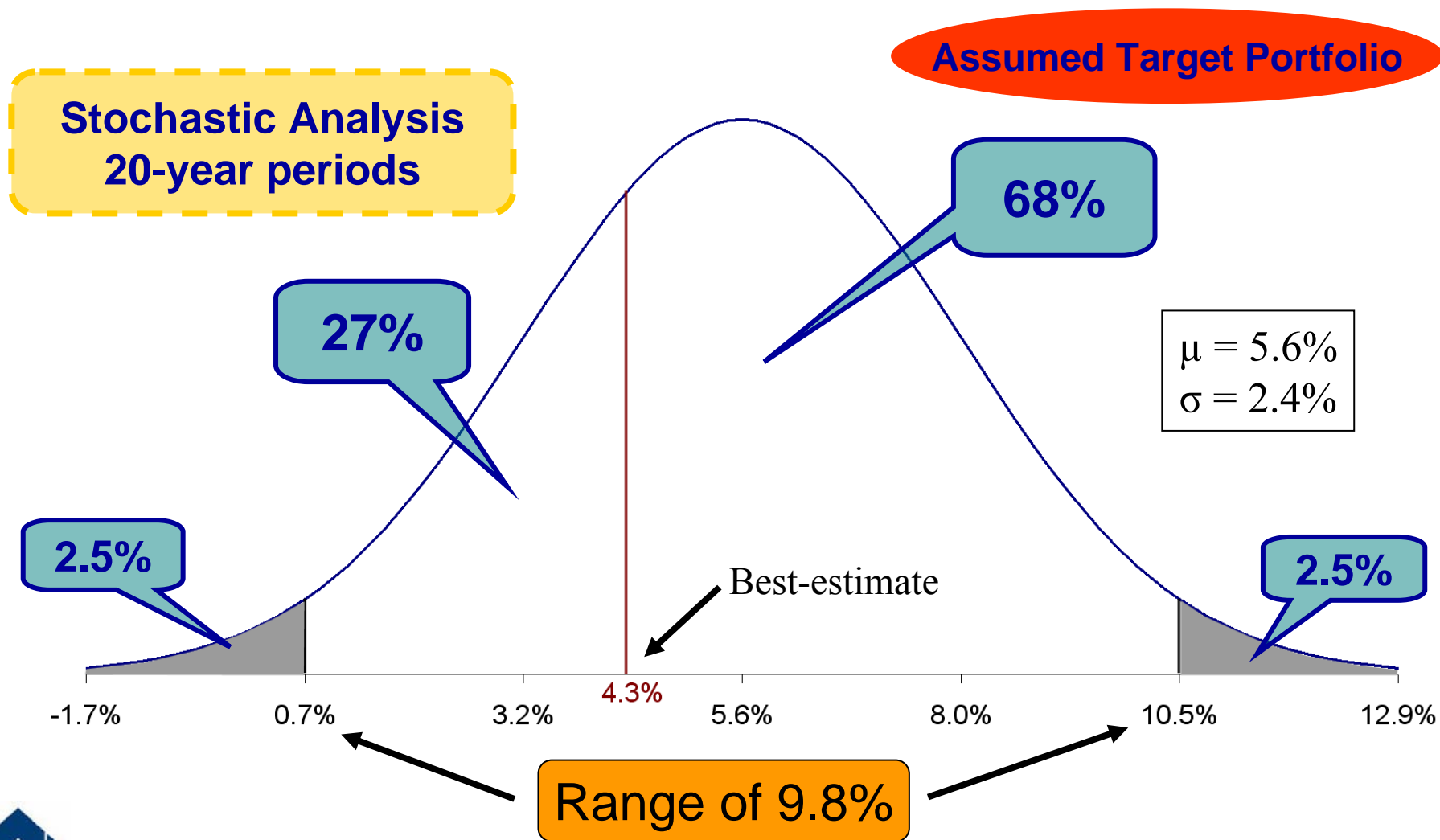
Using the experience of the last 85 years, ending in 2008, the projected average inflation rate over a 20-year period will be in the range 1.3% to 4.9% with 95% probability.



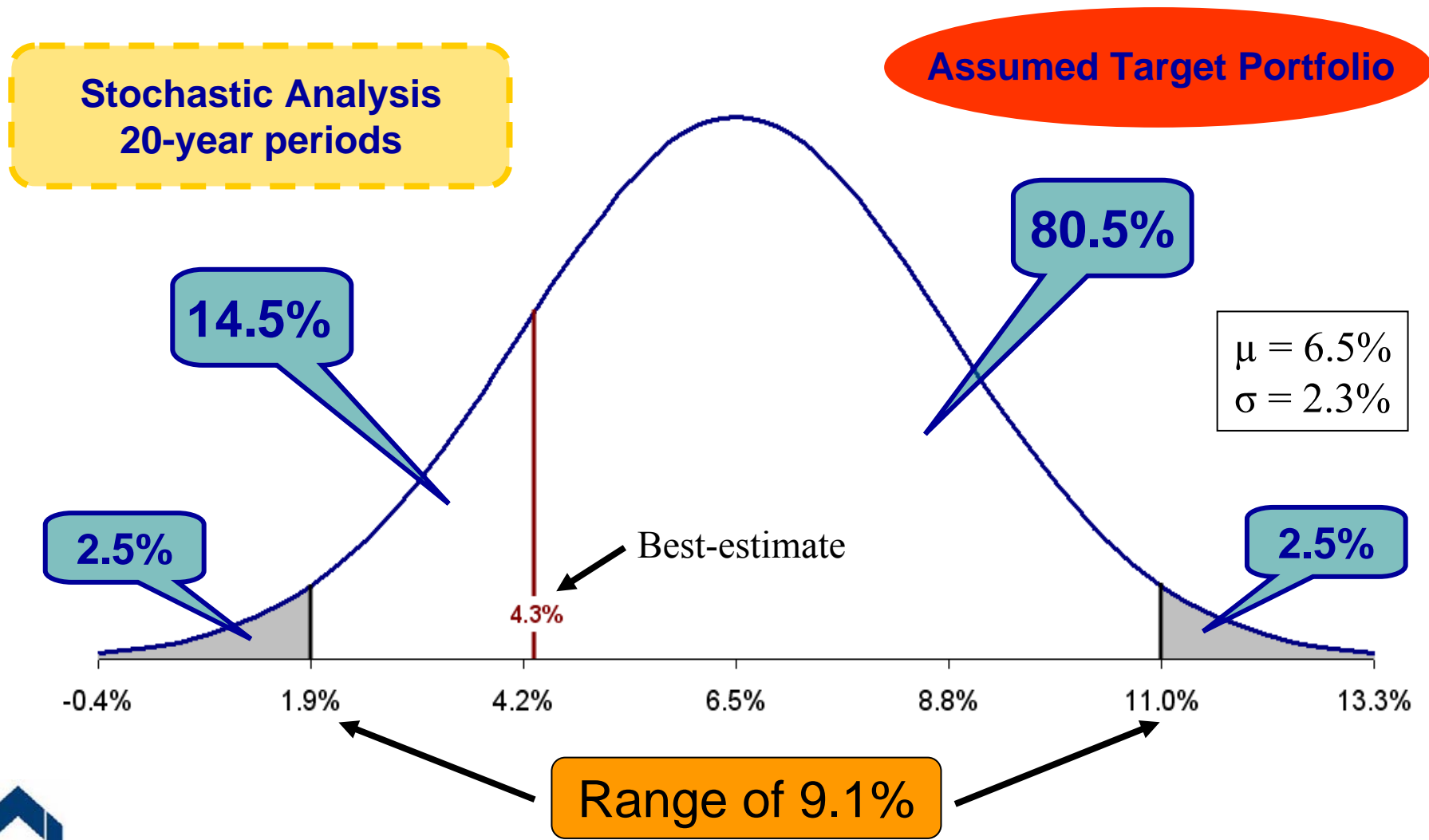
Historical Canadian Real Equity Returns (1938-2008)



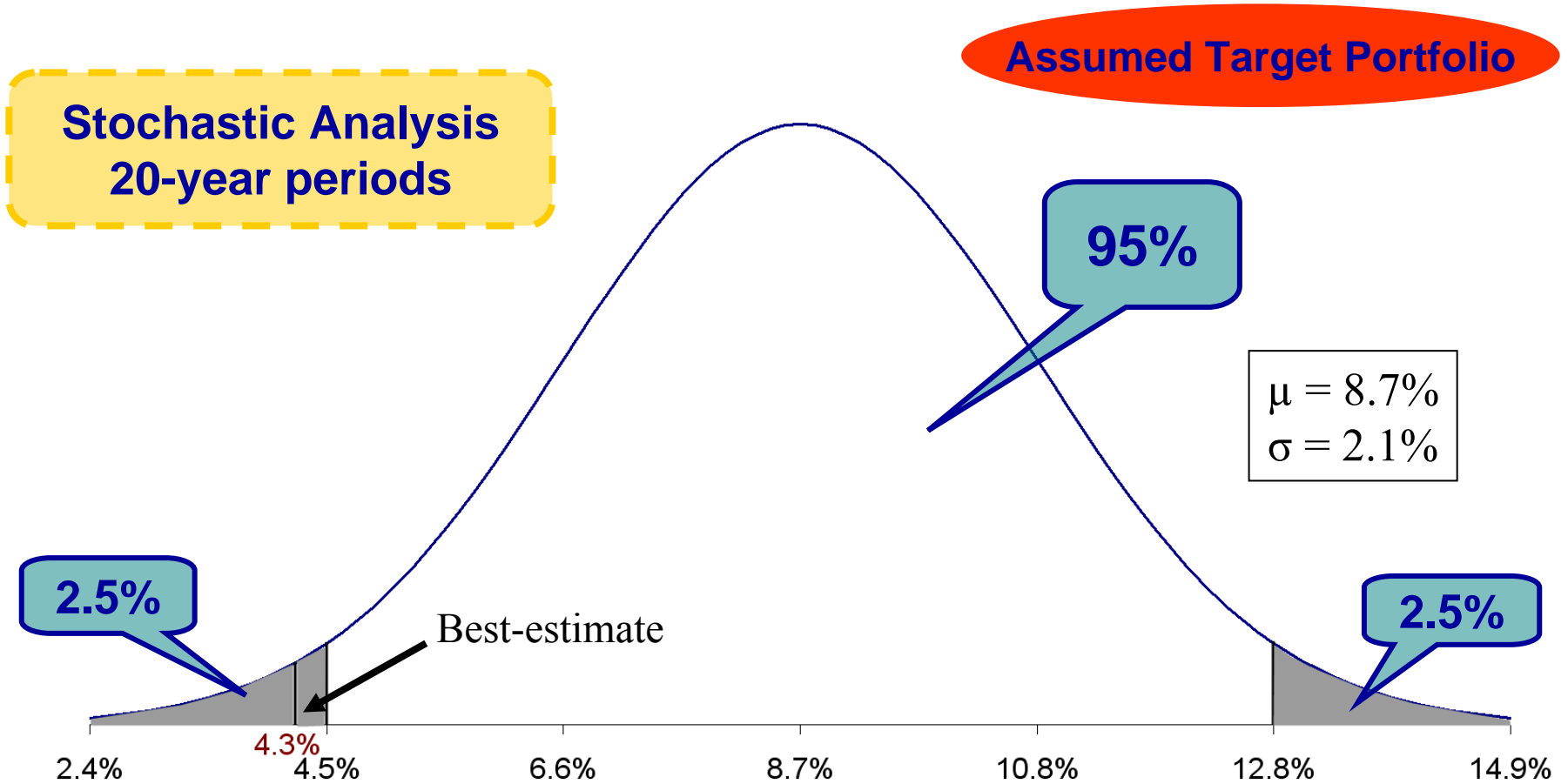
Using the experience of the last 71 years, ending in 2008, the projected average real rate of return over a 20-year period will be in the range 0.7% to 10.5% with 95% probability.



By removing a 10-year period (1973-1982) of high inflation, 10,000 generated scenarios produced a median real rate of return of 6.5%.



Using the experience of the last 25 years, ending in 2006, which is the most favorable period of recent history (1982-2006), 10,000 generated scenarios produced a median real rate of return of 8.7%.



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Actuarial Opinion

- The report was prepared pursuant to the *Public Pensions Reporting Act* and in accordance with accepted actuarial practice and, in particular, with the Canadian Institute of Actuaries' Standards of Practice.
 - The valuation data are sufficient and reliable;
 - The assumptions are, individually and in aggregate, appropriate for the purpose of determining the financial status as at 31 March 2008;
 - The methodology employed is appropriate;
 - At the time of preparing this report, the global economy and financial markets were going through a difficult period. Should the deterioration of financial markets continue, the impact will be reflected in the next actuarial valuation as at 31 March 2011.

Sensitivity of Projected Pension Fund Surplus Public Service - as at 31 March 2011

(\$ million)

Assumption(s) Varied	Projected Actuarial Value of Assets	Projected Actuarial Value of Liability	Projected Actuarial Surplus
None (i.e. current basis)	44,070	42,716	1,354
Investment return			
- if 2% higher annually next 3 years	44,985	42,716	2,269
- if 2% lower annually next 3 years	43,175	42,716	459
- if minus 20% for plan year 2009	36,012	42,716	(6,704)

Public Service Funded Ratio and Current Service Cost for Different Portfolios

Portfolios	# 1	# 2	# 3	# 4	Best-Estimate	# 5	# 6
Equity	0%	0%	15%	35%	50%	65%	80%
Fixed Income	100%	100%	80%	55%	30%	15%	0%
Real return investments	0%	0%	5%	10%	20%	20%	20%
Expected Real Return	2.8%	3.2%	3.5%	4.0%	4.3%	4.6%	4.9%
3-year Standard Deviation	5.9%	6.0%	5.6%	5.9%	6.5%	7.4%	8.3%
Funded Ratio as at 31 March 2008	76%	83%	88%	98%	103%	109%	116%
Current Service Cost**	26.2%	23.8%	22.1%	19.7%	18.5%	17.3%	16.2%

** Current Service Cost required to maintain full funding.



Eliminating Investment Risk of Defined Benefit Plans

- Invest solely in real return bonds
 - Investment policy of 100% risk-free securities, such as Government of Canada real return bonds, to match the pattern of liabilities.
 - Will eliminate almost all investment risk but at an excessive cost.
 - Will be to the detriment of current and future contributors.
 - Will not produce a return sufficient to maintain the plan at status quo.

 Benefits scaled back or contributions increased.



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Appendix

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Public Service

Canadian Forces

Royal Canadian Mounted Police

as at 31 March 2008

Presentation to the Federal–Provincial Pensions Conference

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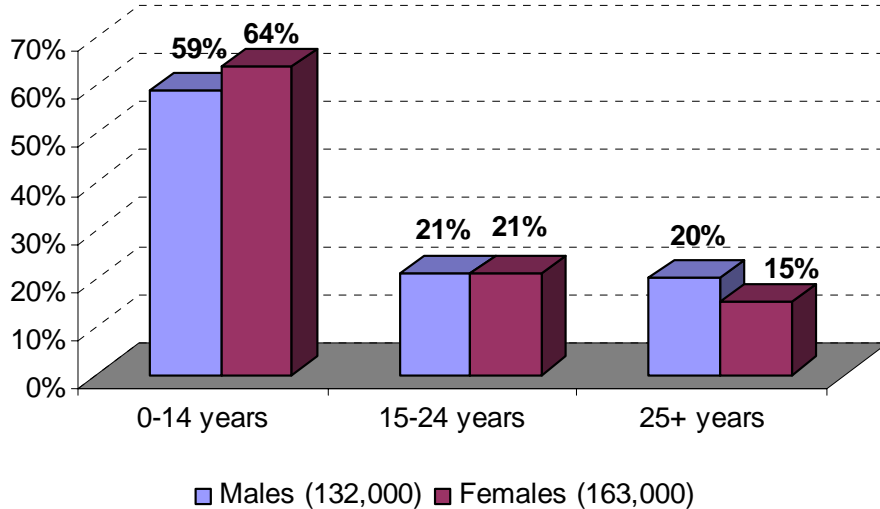
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Thank you

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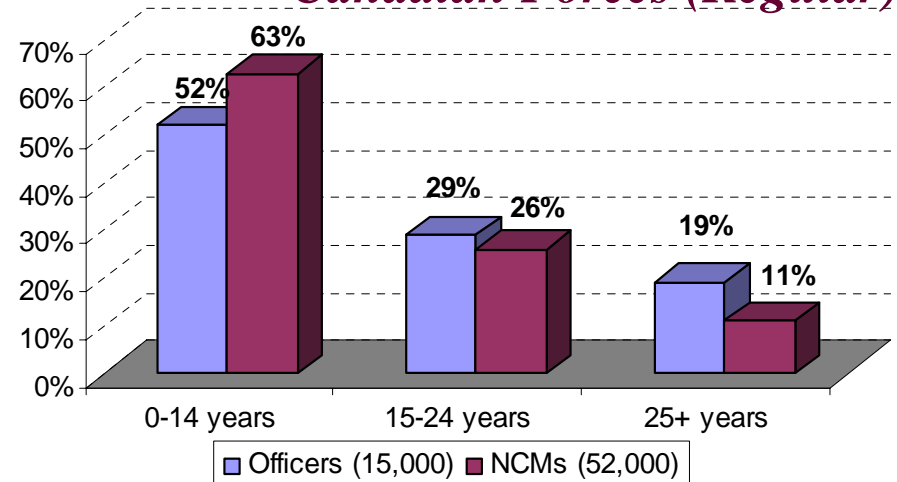
Membership Active Members (31 March 2008) (by length of service)

Public Service



62% of active members have less than 15 years of service

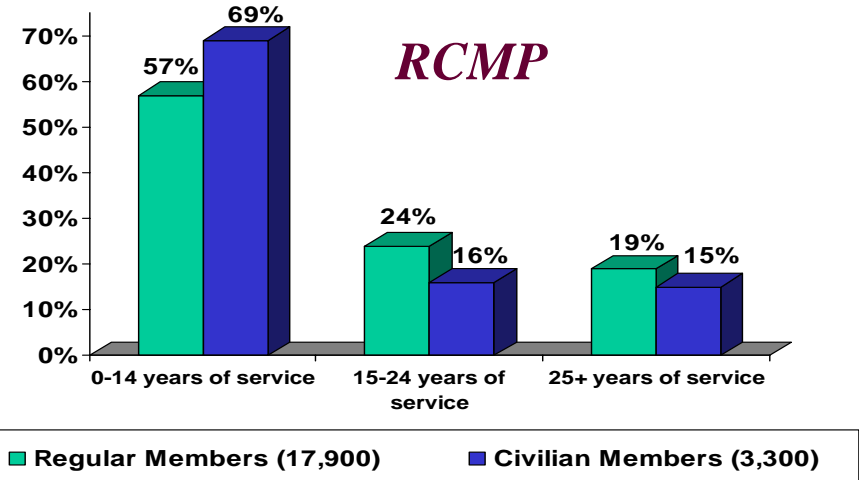
Canadian Forces (Regular)



61% of active members have less than 15 years of service



RCMP



59% of active members have less than 15 years of service



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Membership

Number of Beneficiaries

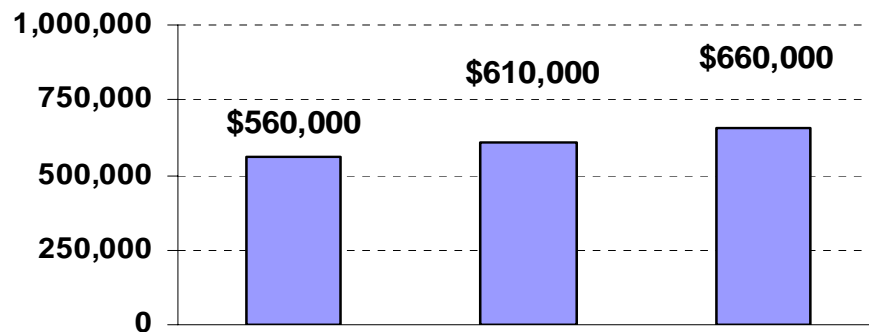
	PS (March 2008)	CF (March 2008)	RCMP (March 2008)
Retirement pensioners	177,200	73,900	11,500
Disability pensioners	13,000	11,900	1,500
Survivors	57,500	23,300	1,700
TOTAL	247,700	109,100	14,700

**TOTAL AMOUNT PAID \$7.8 B
(2007-2008)**

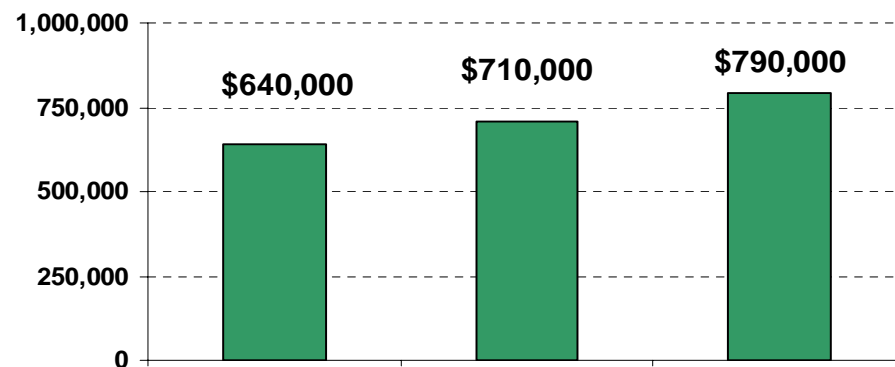
Value of the Pension Promise

* 4.3%, 3.5% and 2.8% are real discount rates used to value the pension promise

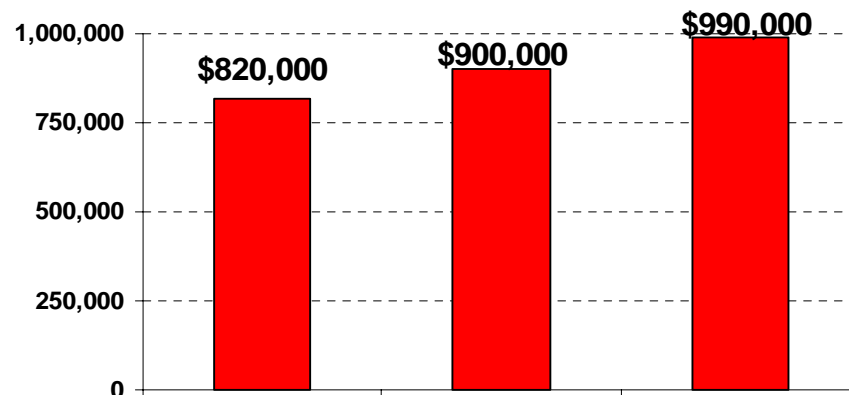
(Public Service – male, age 60
with 28 years of service eligible to an
unreduced pension of \$40,000)



(Canadian Forces – male officer, age 45
with 25 yrs of service eligible to an
unreduced pension of \$35,000)



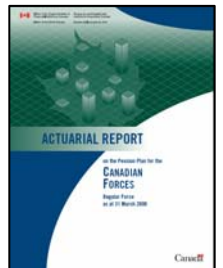
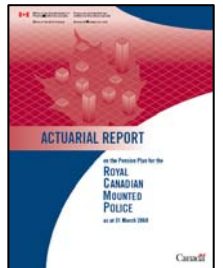
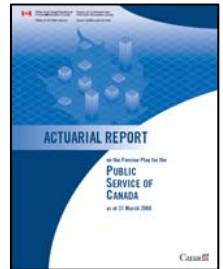
(RCMP – male, age 54 with
31 years of service eligible to an
unreduced pension of \$50,000)



Retirement Rates

Expected ages at retirement for a typical plan member

- *PS: For a member aged 44 with 12 years of service, the expected retirement age is 59.*
- *RCMP: For a Regular Member aged 39 with 13 years of service, the expected retirement age is 55.*
- *CF: For a member aged 35 with 11 years of service, the expected retirement age is 49.*



Balance Sheets as at 31 March 2008

	Public Service (in billions of dollars)		Canadian Forces (in billions of dollars)		RCMP (in billions of dollars)	
	Superannuation Account	Pension Fund	Superannuation Account	Pension Fund	Superannuation Account	Pension Fund
Actuarial Value of Assets	91.6	29.0	44.2	8.0	12.0	2.8
Actuarial Liabilities	87.0	28.0	42.4	7.7	11.5	2.8
Excess of Actuarial Value of Assets over Liabilities	4.6		1.8		0.5	
Actuarial Surplus/(Deficit)		1.0		0.3		-

