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Financial Institutions Canada

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SOCIETY OF ACTUARIES

Office of the Chief Actuary

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Mortality projections for Social Security Programs in Canada and its implications

Jean-Claude Ménard, Chief Actuary

Office of the Chief Actuary

Office of the Superintendent of Financial Institutions Canada



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7 January 2011, Orlando, United States

Canada 

Presentation

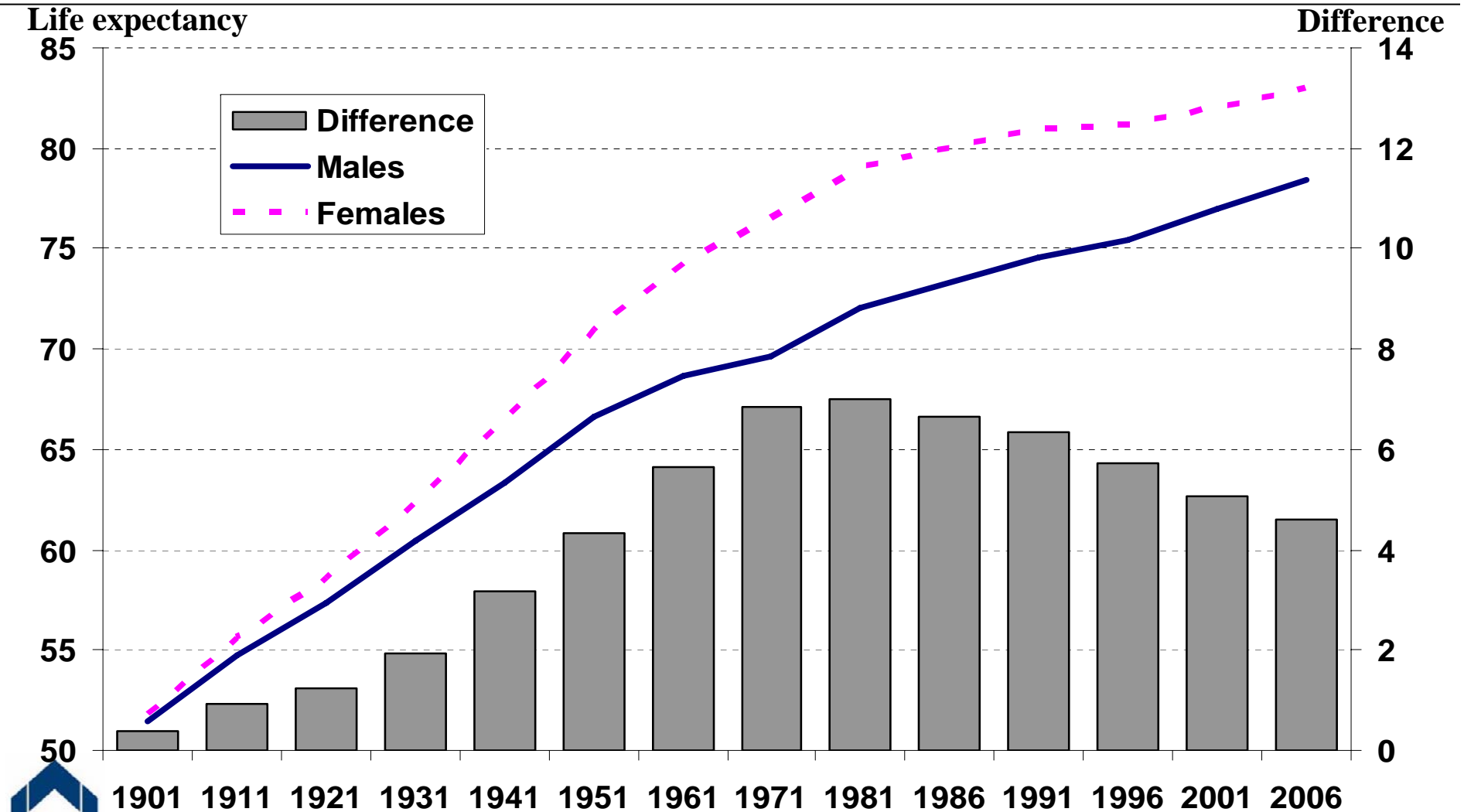
- **Canadian Mortality Trends over the past century**
- **Canada Pension Plan Mortality Experience**
- **Mortality Projections – 25th CPP Actuarial Report**
- **International Comparison and uncertainty of results**



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Life Expectancy at Birth



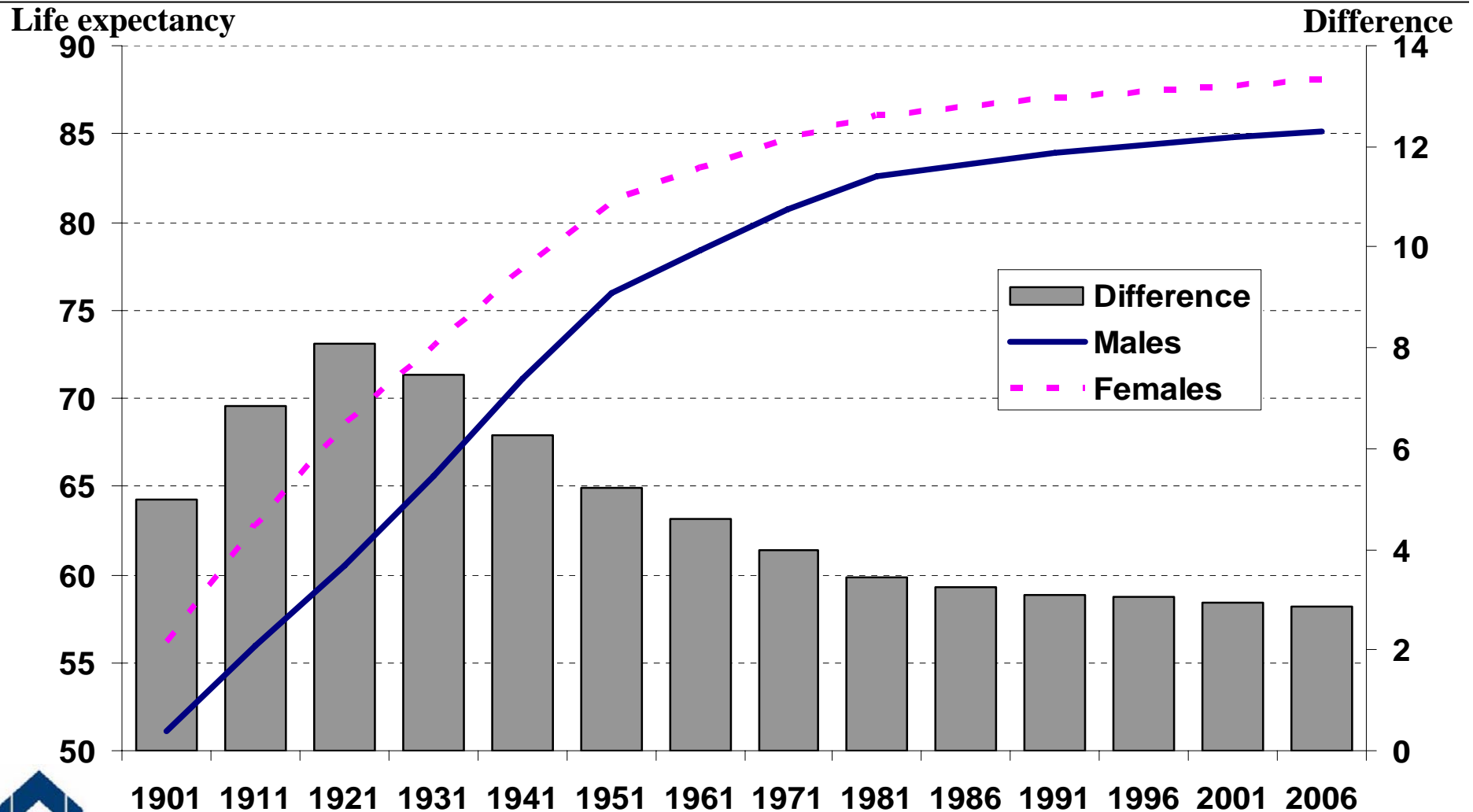
Source : Life Tables for Canada, Statistics Canada



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Life Expectancy at Birth (Cohort Base)



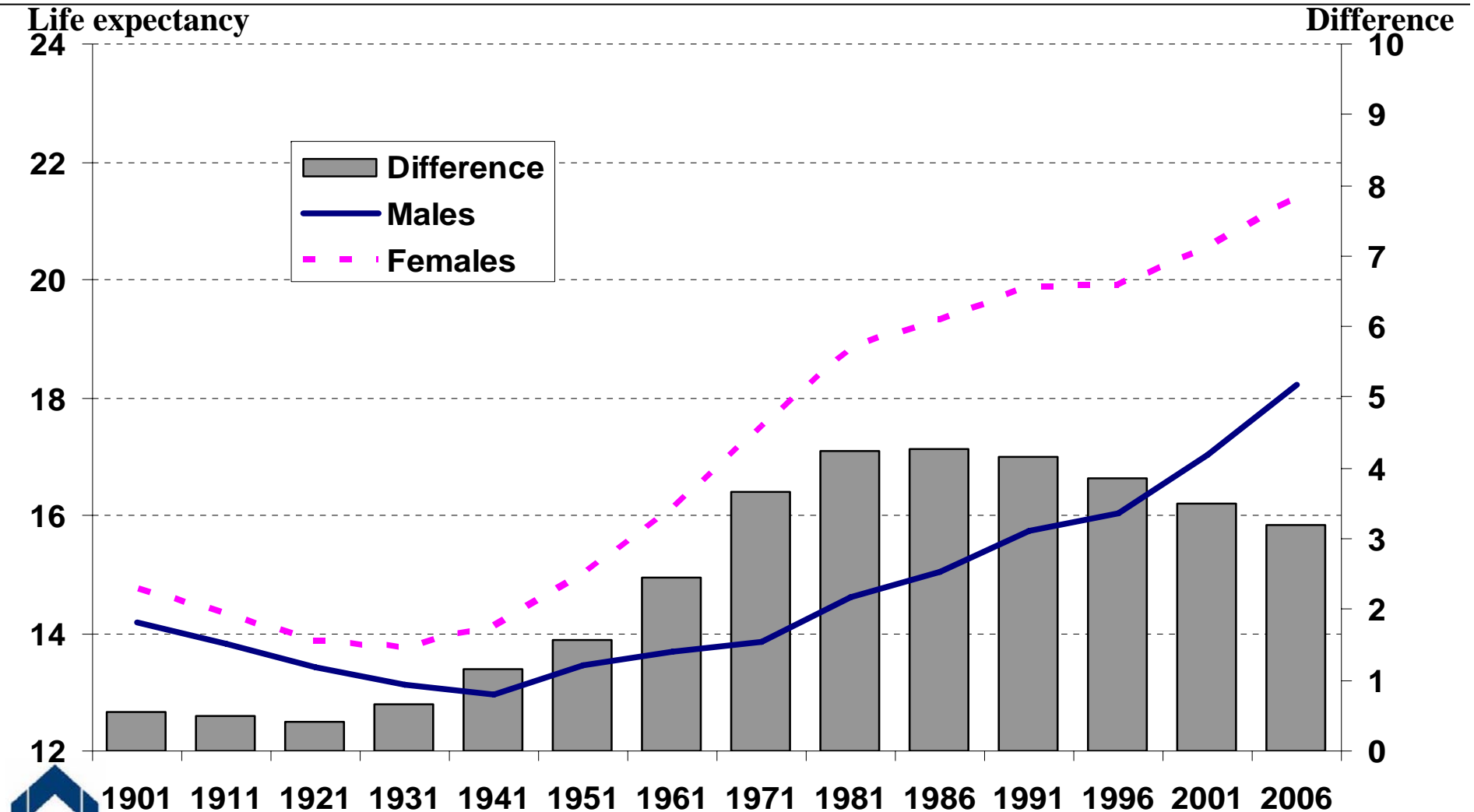
Source : Life Tables for Canada, Statistics Canada and Office of the Chief Actuary, 25th CPP Actuarial Report



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Life Expectancy at Age 65



Source : Life Tables for Canada, Statistics Canada



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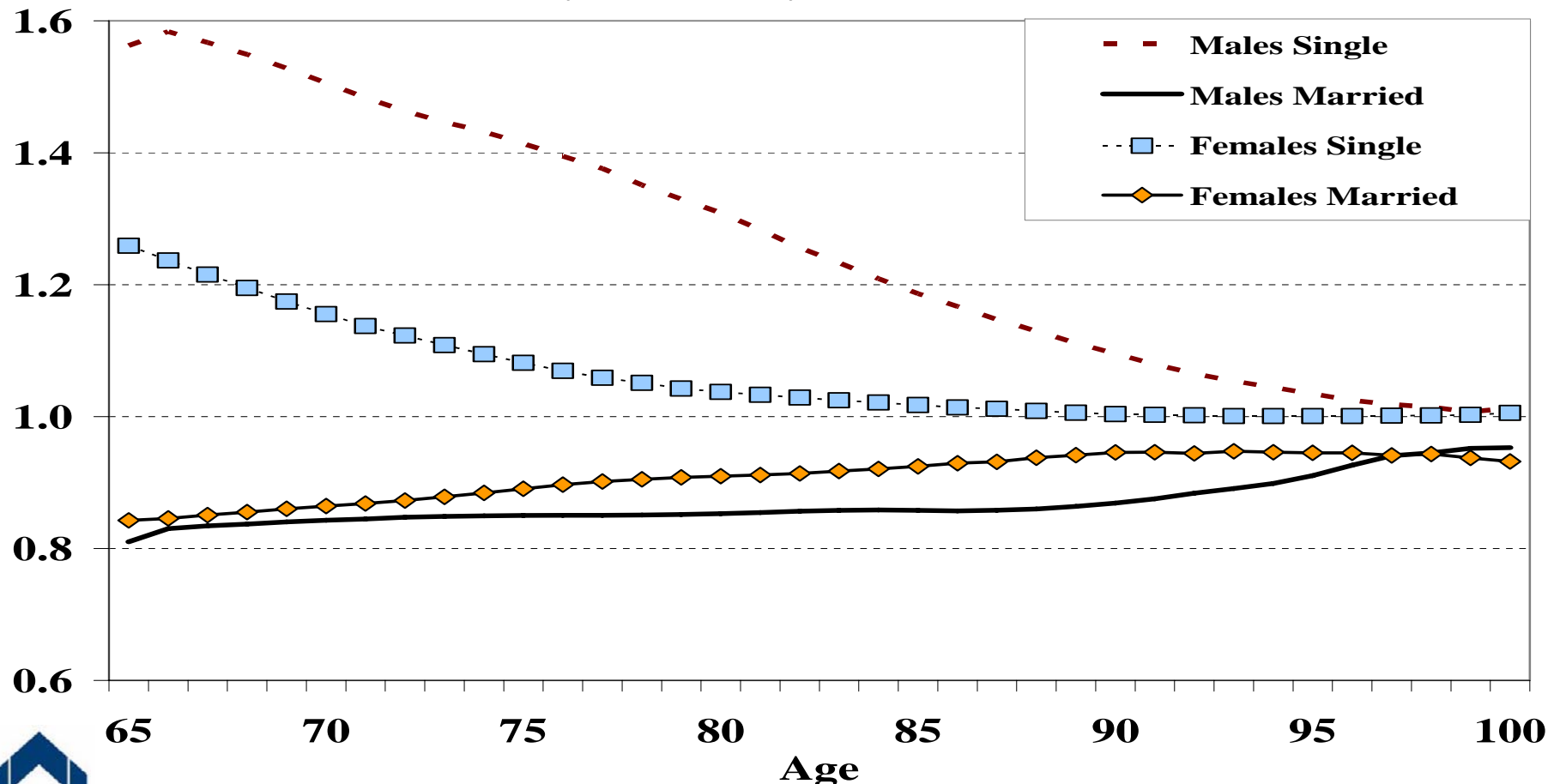


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The marital status tends to impact men more than women.
The difference is three years for men and one year for women.

Mortality Ratios by Marital Status



Source : Office of the Chief Actuary, Table 3, Addendum to Actuarial Study no 5, November 2006

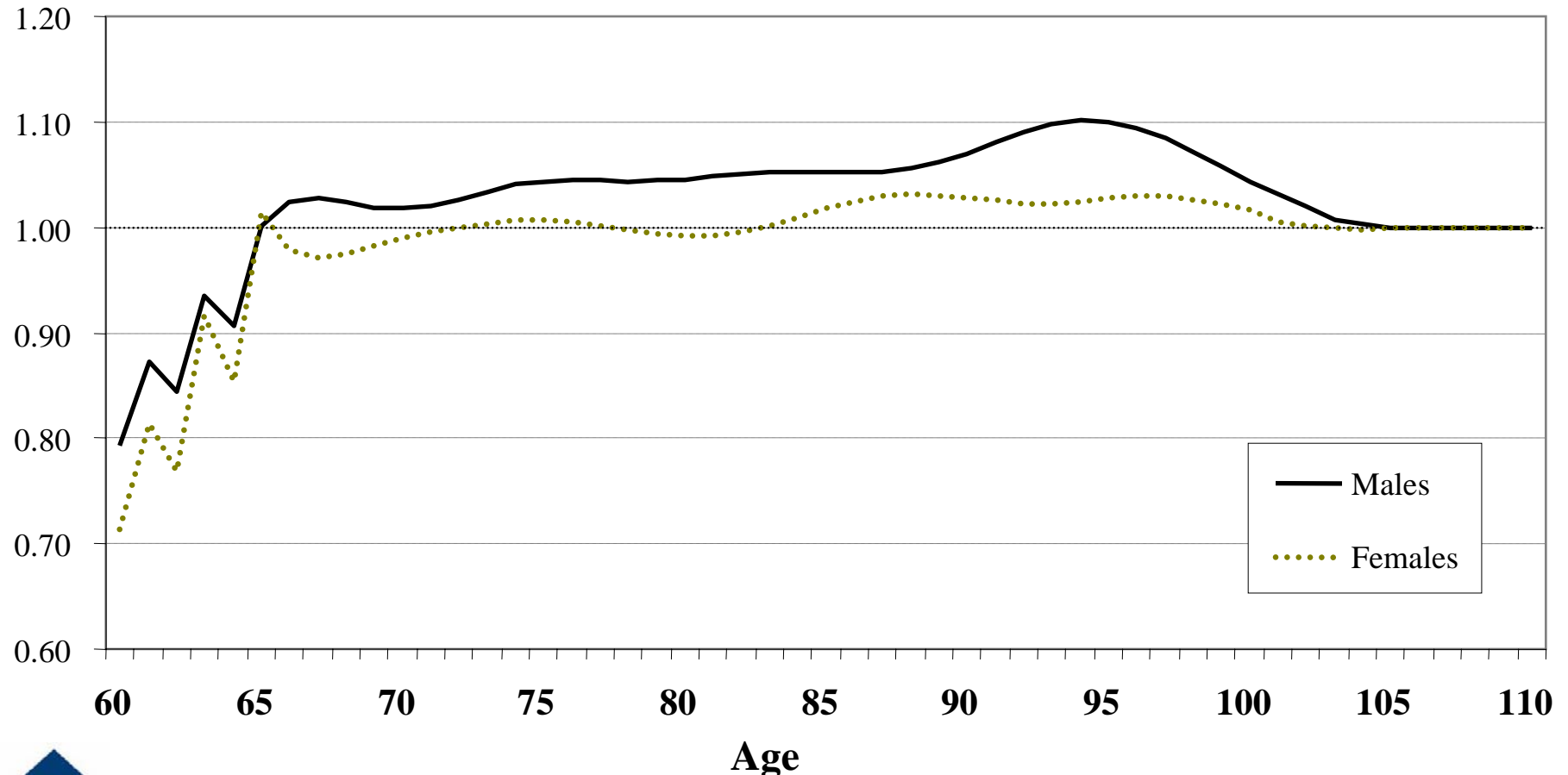


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Canada Pension Plan Male beneficiaries tend to die sooner than general population

Ratio of Canada Pension Plan beneficiaries over Population Mortality



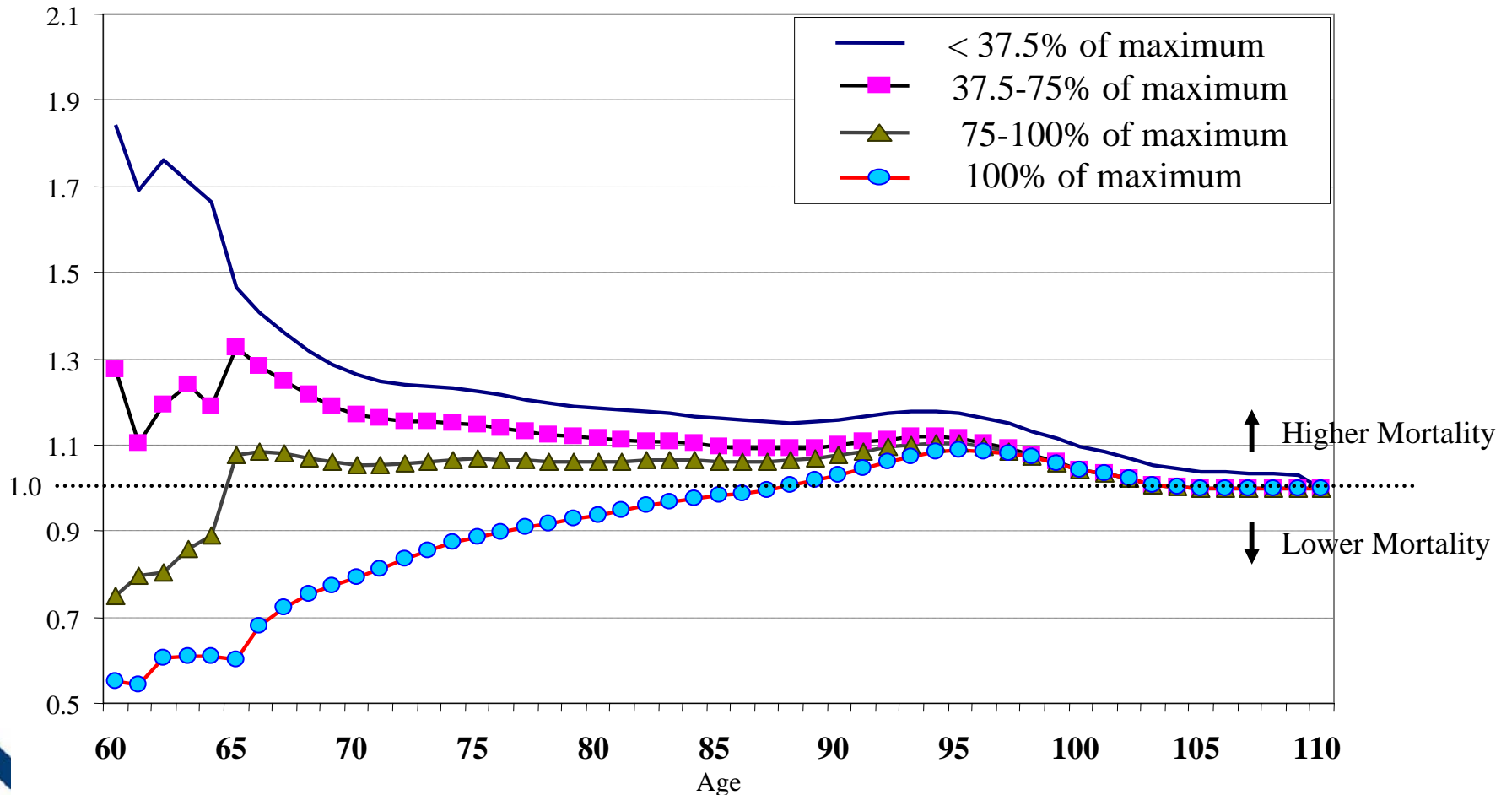
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Source : Office of the Chief Actuary, Table 16, Actuarial Study # 7, July 2009

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At 60, male beneficiaries with a maximum pension live three years longer than male beneficiaries with a lower pension.

Ratio of CPP Male beneficiaries mortality by level of pension over general population



Source : Office of the Chief Actuary, Tables 16 and 20, Actuarial Study # 7, July 2009

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Contribution to increases in life expectancy at birth has gradually shifted to elderly, more so since 1985

Change attributable to (in years)	Males			Females		
	1925-1965	1965-1985	1985-2005	1925-1965	1965-1985	1985-2005
Infant mortality (<1)	5.8	1.2	0.2	4.6	1.0	0.2
Child mortality (1-14)	2.5	0.3	0.2	2.5	0.3	0.1
Young adult mortality (15-44)	2.1	0.6	0.6	3.9	0.4	0.2
Older adult mortality (45-64)	0.1	1.3	1.5	1.9	0.8	0.7
Elderly mortality (65+)	0.3	1.0	<u>2.6</u>	2.2	<u>2.3</u>	1.7
Estimated Multivariate Effect	-0.1	-0.1	-0.2	-0.4	-0.2	-0.1
Total Change in Life Expectancy	10.7	4.3	4.8	14.7	4.6	2.8



Canadian Annual Mortality Improvement Rates (%)

Age Group	Males (%)		Females (%)	
	1976-1991	1991-2006	1976-1991	1991-2006
45-64	2.7	2.3	1.9	1.5
65-74	1.6	2.7	1.5	1.5
75-84	0.8	2.2	1.2	1.5
85-89	0.4	1.5	1.0	1.0
90-94	0.0	0.8	0.5	0.5
95+	(0.1)	0.4	0.3	0.1
15-64	2.6	2.4	2.0	1.5
65+	<u>1.0</u>	<u>2.1</u>	<u>1.0</u>	<u>1.1</u>
0-84	1.8	2.4	1.5	1.5

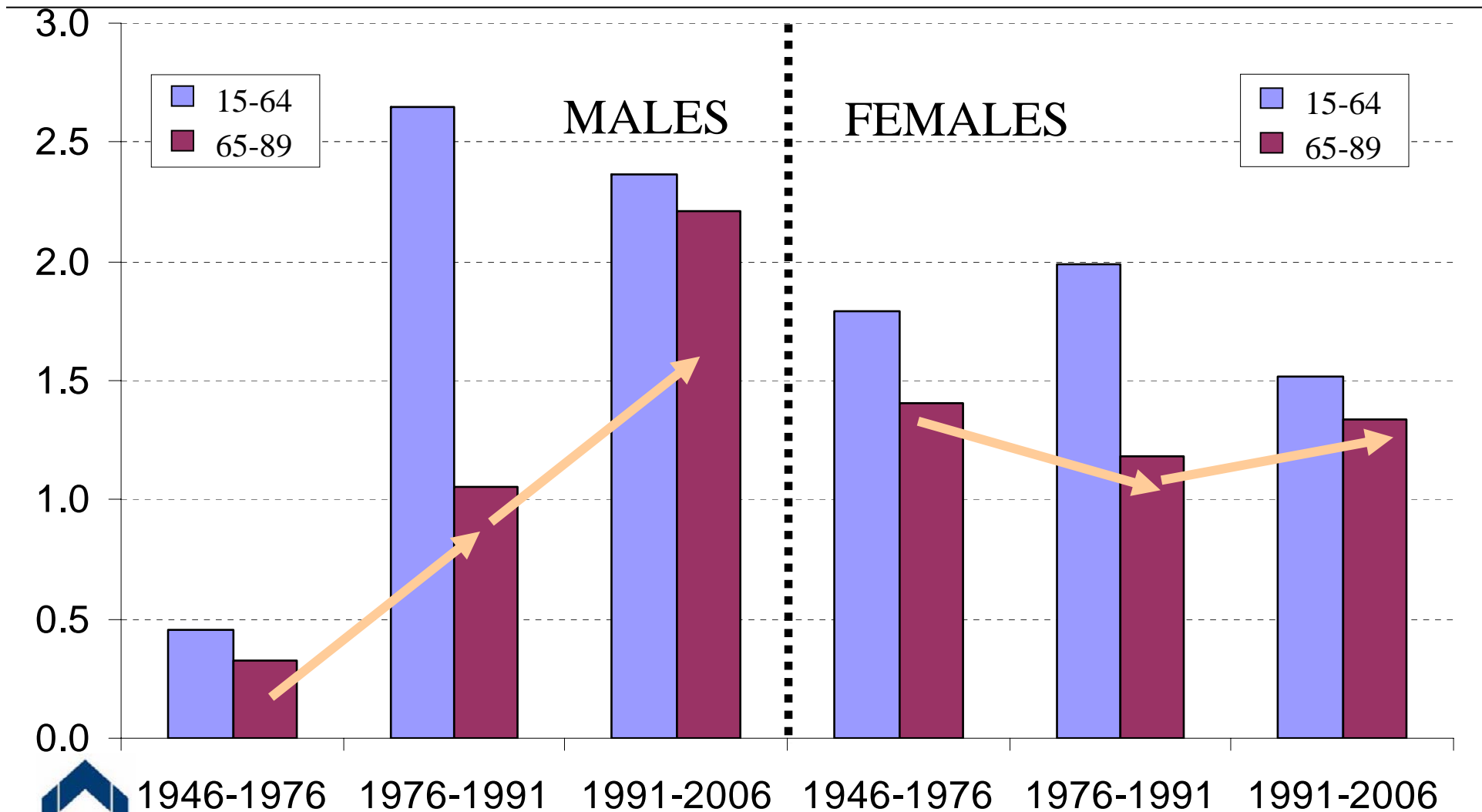


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Source : Estimated by OCA based on data from Canadian Human Mortality Database, Dept. of Demography of University of Montreal

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Average Annual Rates of Mortality Improvement (%) (2006 Population-Weighted)



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1946-1976

1976-1991

1991-2006

1946-1976

1976-1991

1991-2006

Source : Estimated by OCA based on data from Canadian Human Mortality Database, Dept. of Demography

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of University of Montreal

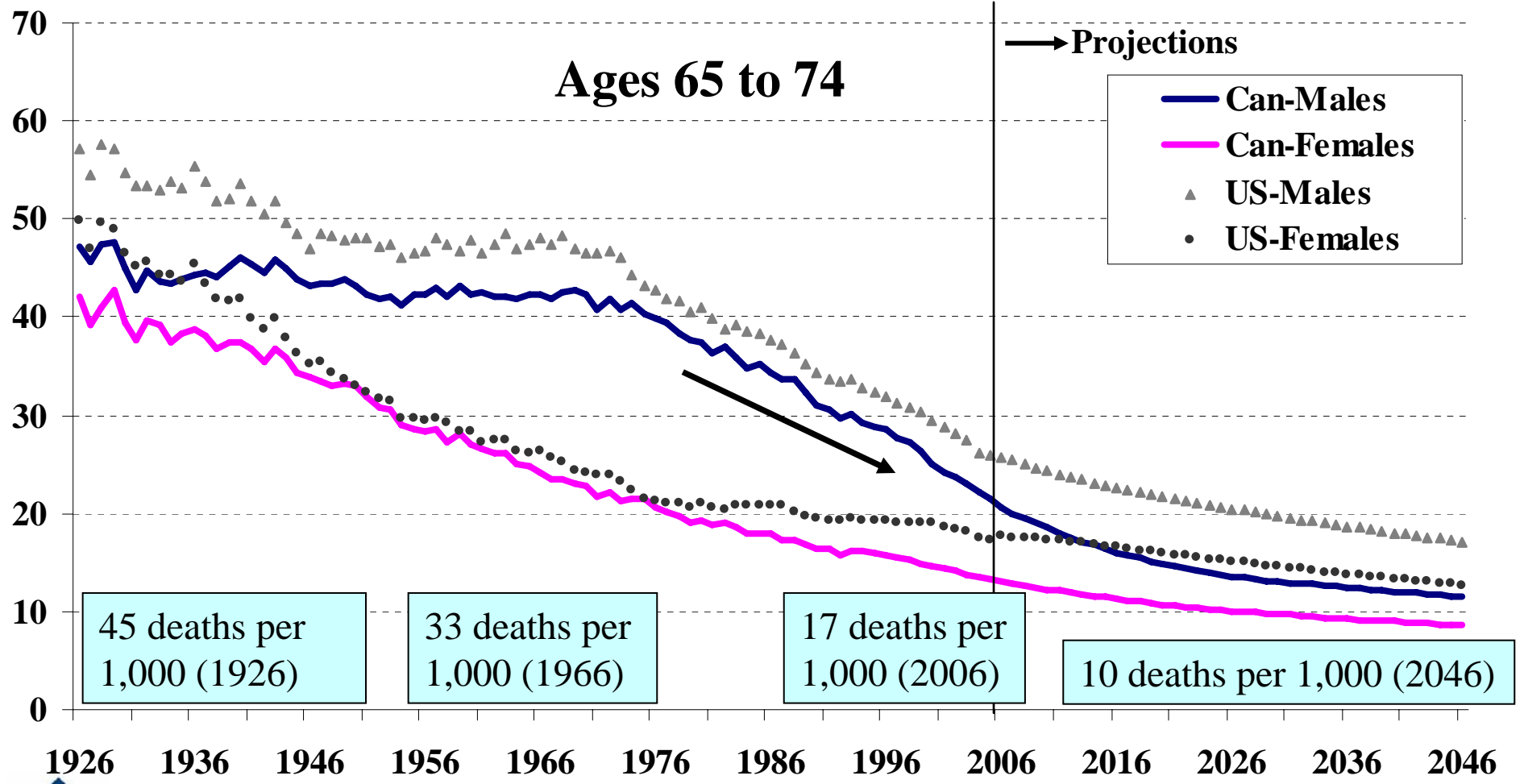
Annual Mortality Improvement Rates (%)

	CPP#25 Assumptions					
	Males			Females		
	2007-2011	2012-2030	2031+ ULT	2007-2011	2012-2030	2031+ ULT
15-44	2.6	1.7	0.8	1.4	1.1	0.8
45-64	2.1	1.5	0.8	1.3	1.1	0.8
65-74	2.6	1.7	0.8	1.5	1.1	0.8
75-84	2.1	1.4	0.7	1.5	1.1	0.7
85-89	1.5	1.0	0.5	1.0	0.8	0.5
90-94	1.0	0.7	0.4	0.5	0.5	0.4
95-99	0.6	0.4	0.3	0.3	0.3	0.3

- Initial (2007-2011) annual mortality improvement rates are based on actual experience over the last 15 years (1991-2006), by age and sex.
- Ultimate improvement rates are set to about ½ of females last 15 years experience and are generally higher than those used in the previous report for ages below 75.
- For the next 20 years (2007-2026), the average mortality improvement rates are 1.8% and 1.2% for males and females, respectively, aged between 65 and 84.



Mortality rates have dropped significantly over the last 40 years. However, this reduction is expected to slow down due to already low mortality rates



Source : Office of the Chief Actuary, 25th CPP Actuarial Report and 2009 OASDI Trustees Report

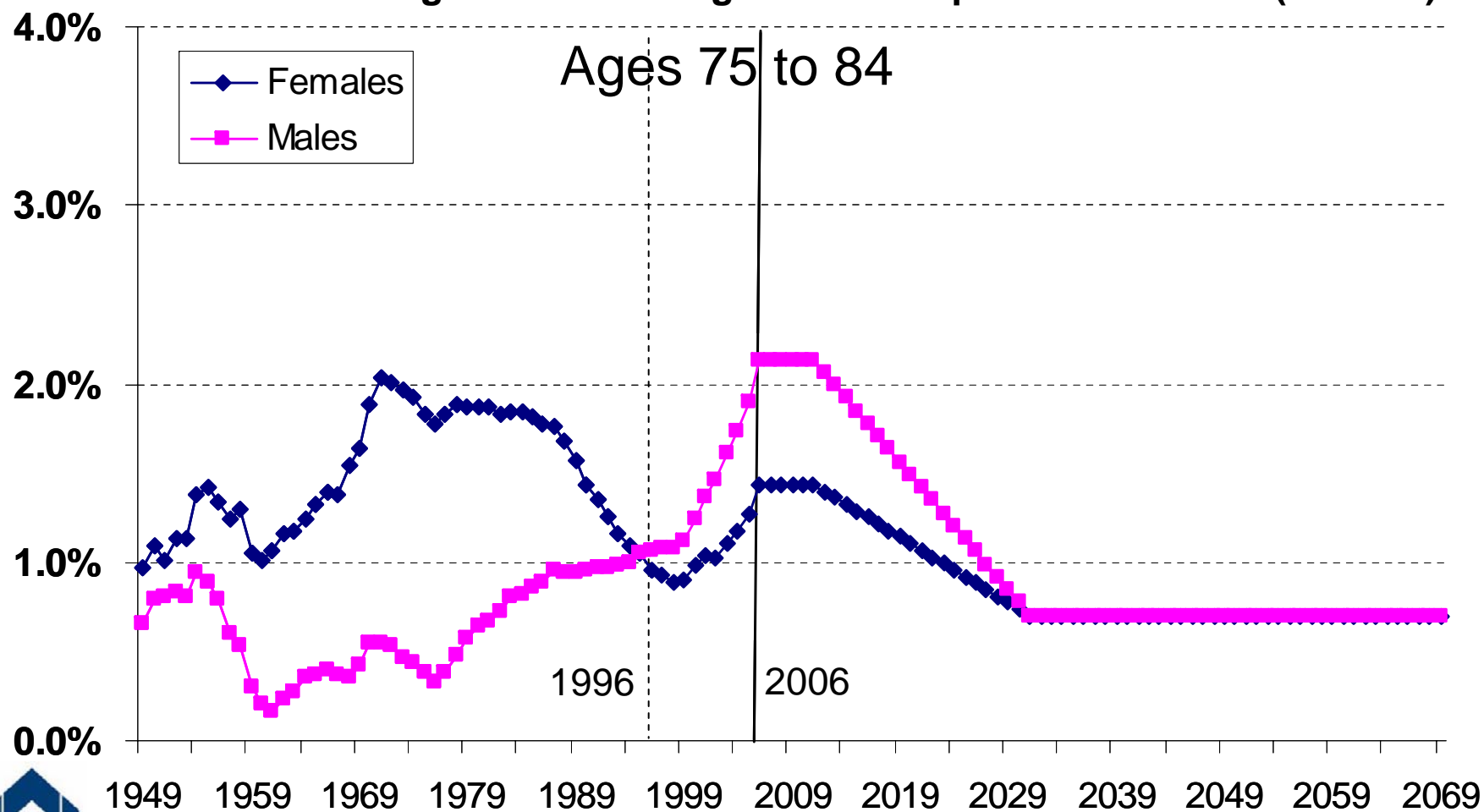


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Since 2000, elderly mortality rates are decreasing at a faster pace than in the previous decade

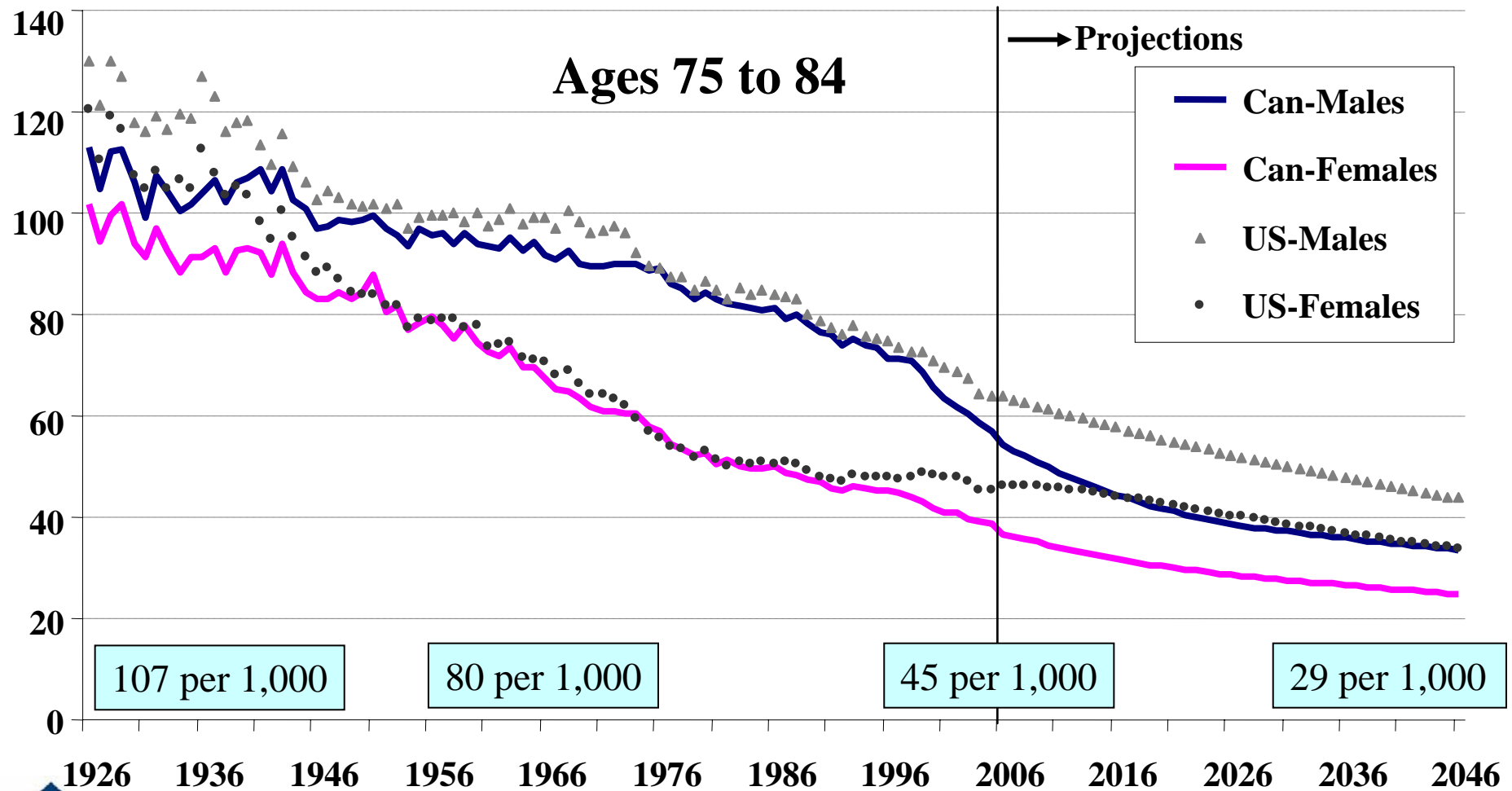
Moving 15-Year Average Annual Improvement Rates (Canada)



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Elderly mortality rates have decreased over the last 80 years, more so over the last 40 years

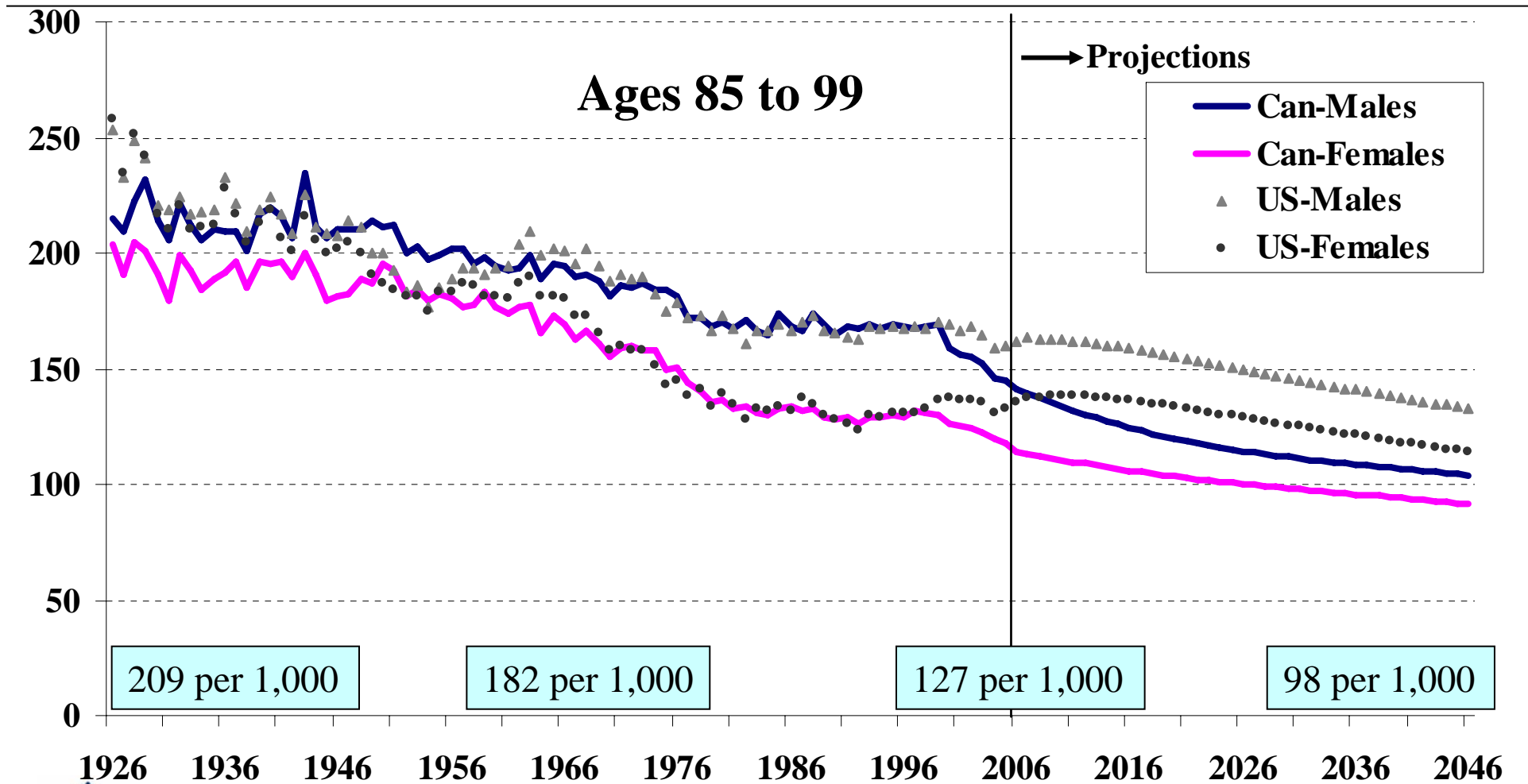


Source : Office of the Chief Actuary, 25th CPP Actuarial Report and 2009 OASDI Trustees Report

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Projected Canadian male mortality rates are lower than US female mortality rates in 2008



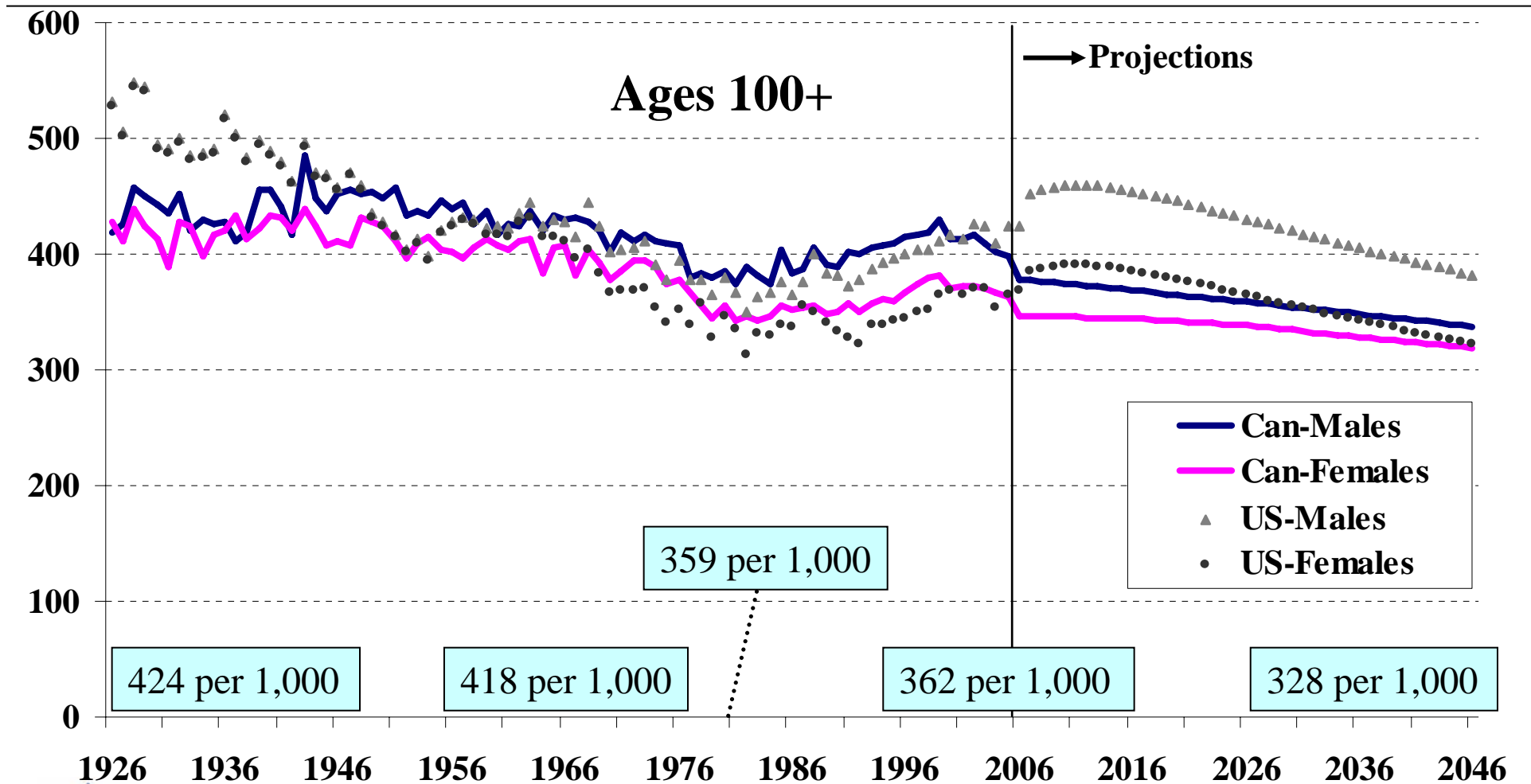
Source : Office of the Chief Actuary, 25th CPP Actuarial Report and 2009 OASDI Trustees Report



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Current mortality rates for the oldest are about at the same level as 25 years ago



Source : Office of the Chief Actuary, 25th CPP Actuarial Report and 2009 OASDI Trustees Report



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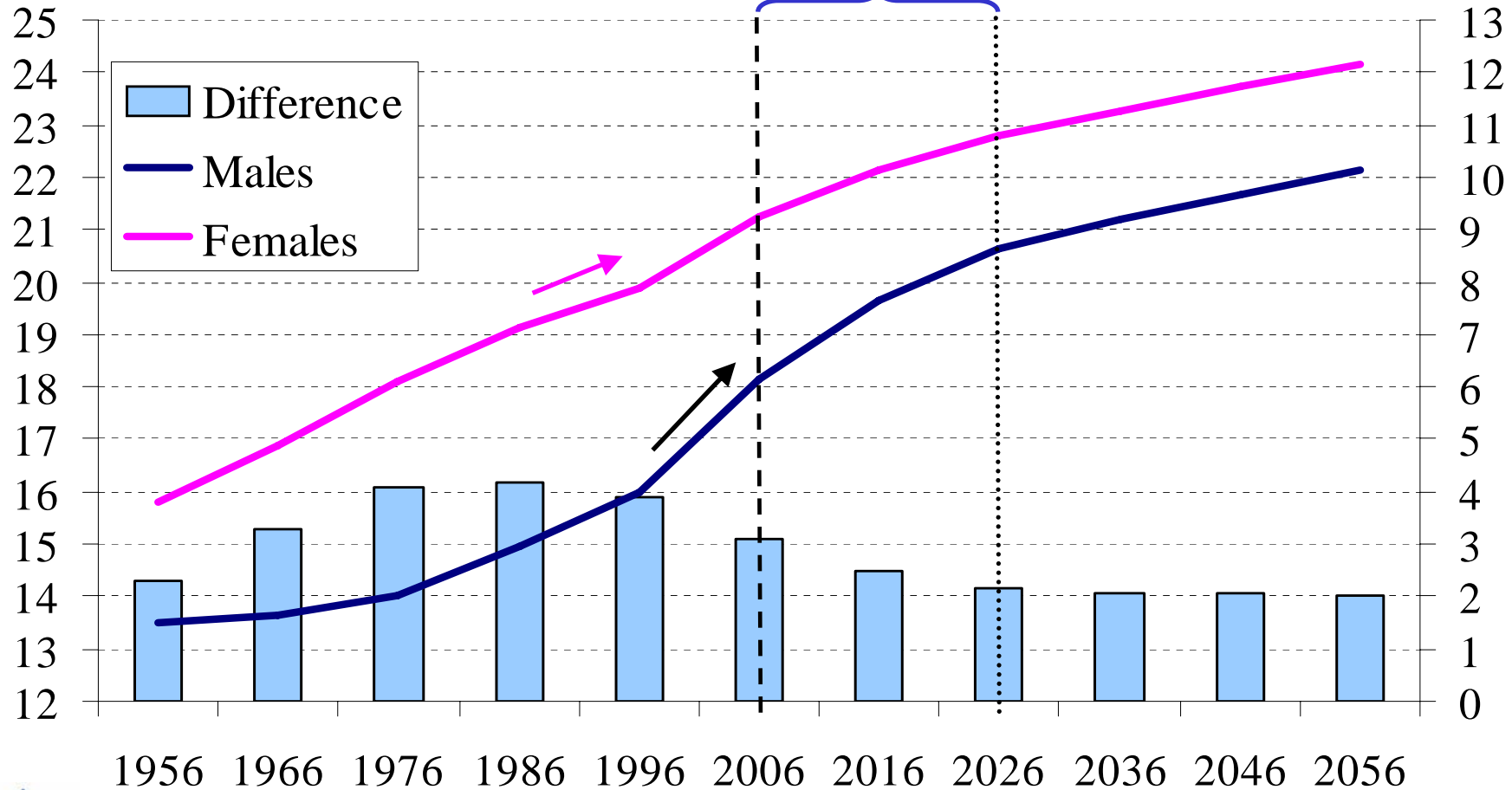
Increase in Life Expectancy at 65*

*Life expectancies shown are without assumed future mortality improvements.

Life expectancy at 65

More predictable

Difference



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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Life Expectancy

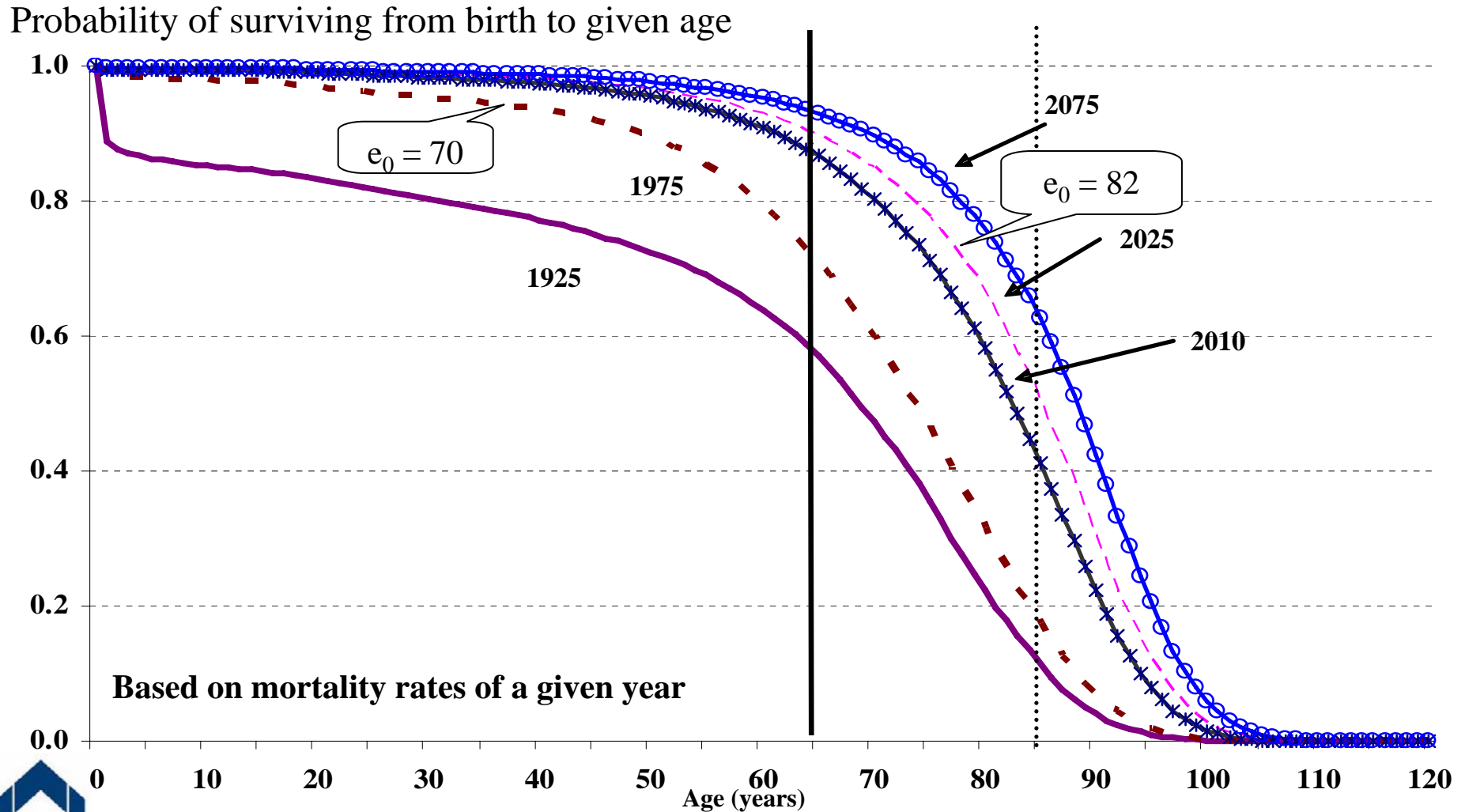
(with future improvements)

	For a newborn (Number of years)			<i>Previous report</i>
	1966	2010	2050	2050
Males	79.6	85.4	88.1 (+0.7)	87.4 (+1.8)
Females	83.9	88.3	90.5 (+0.3)	90.2 (+1.7)

	For a person aged 65 (number of years)			<i>Previous report</i>
	1966	2010	2050	2050
Males	13.8	20.2	22.6 (+0.7)	21.9 (+1.4)
Females	18.2	22.6	24.6 (+0.4)	24.2 (+1.0)



70% of males could expect to die between ages 12 and 83 (1925),
 between 67 to 92 (2010) and between 75 and 96 (2075)



Source : Office of the Chief Actuary, 25th CPP Actuarial Report



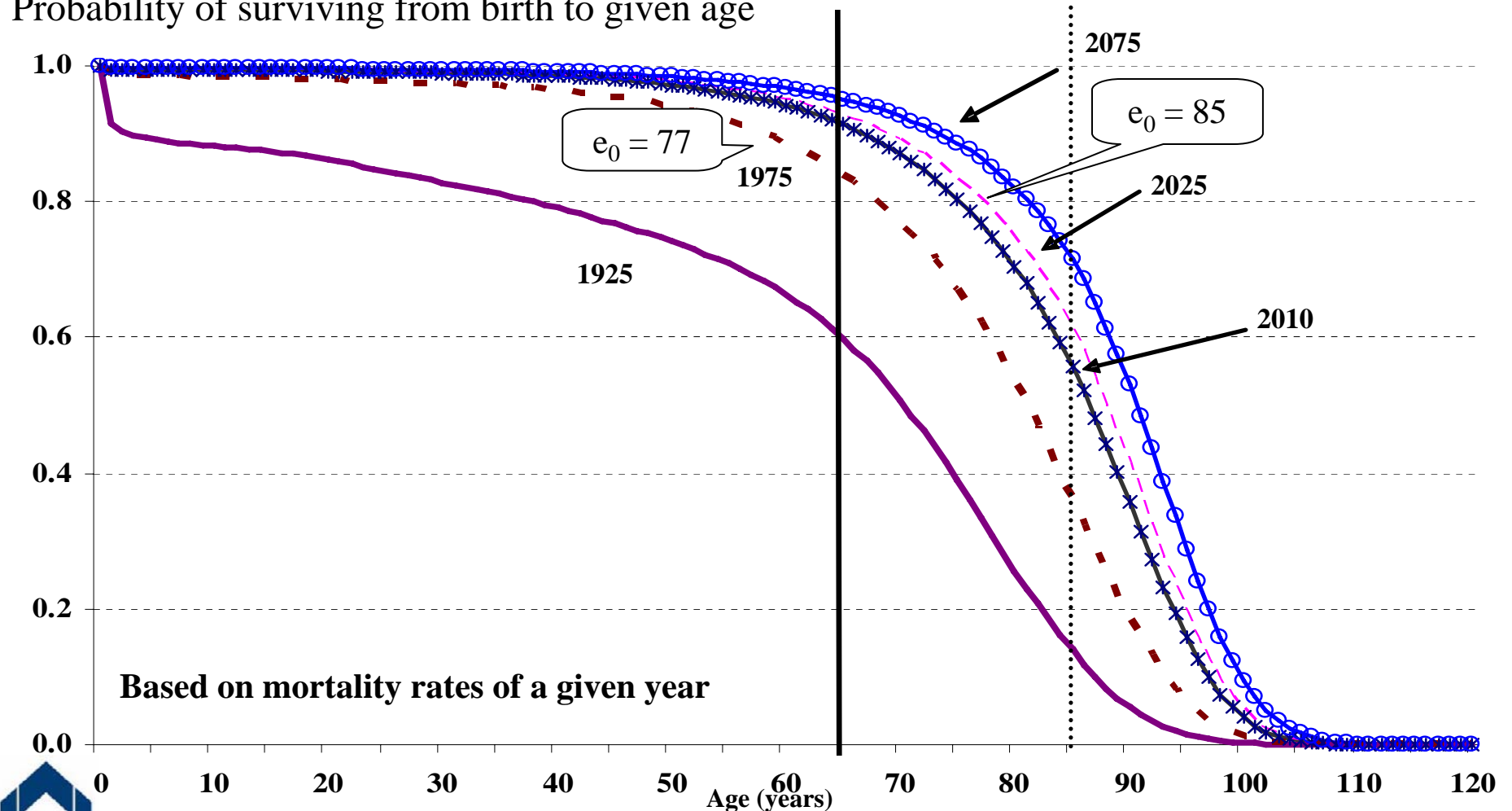
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70% of females could expect to die between ages 24 and 84 (1925),
 between 72 and 95 (2010) and between 79 and 98 (2075)

Probability of surviving from birth to given age



Source : Office of the Chief Actuary, 25th CPP Actuarial Report



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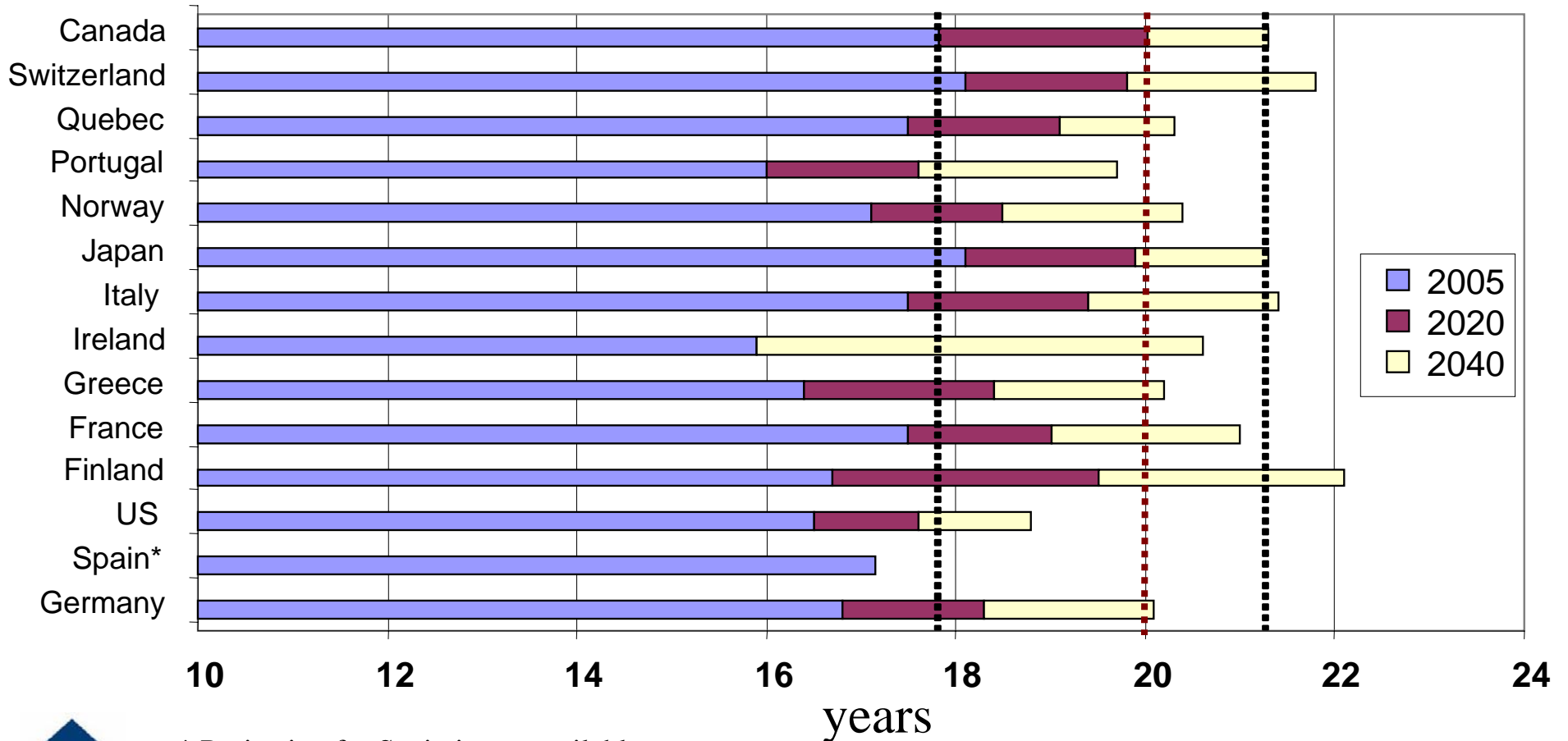
Presentation

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Canada is currently ranked 3rd and is expected to maintain its relative position over time

Life Expectancy at 65 - Males



* Projection for Spain is not available.

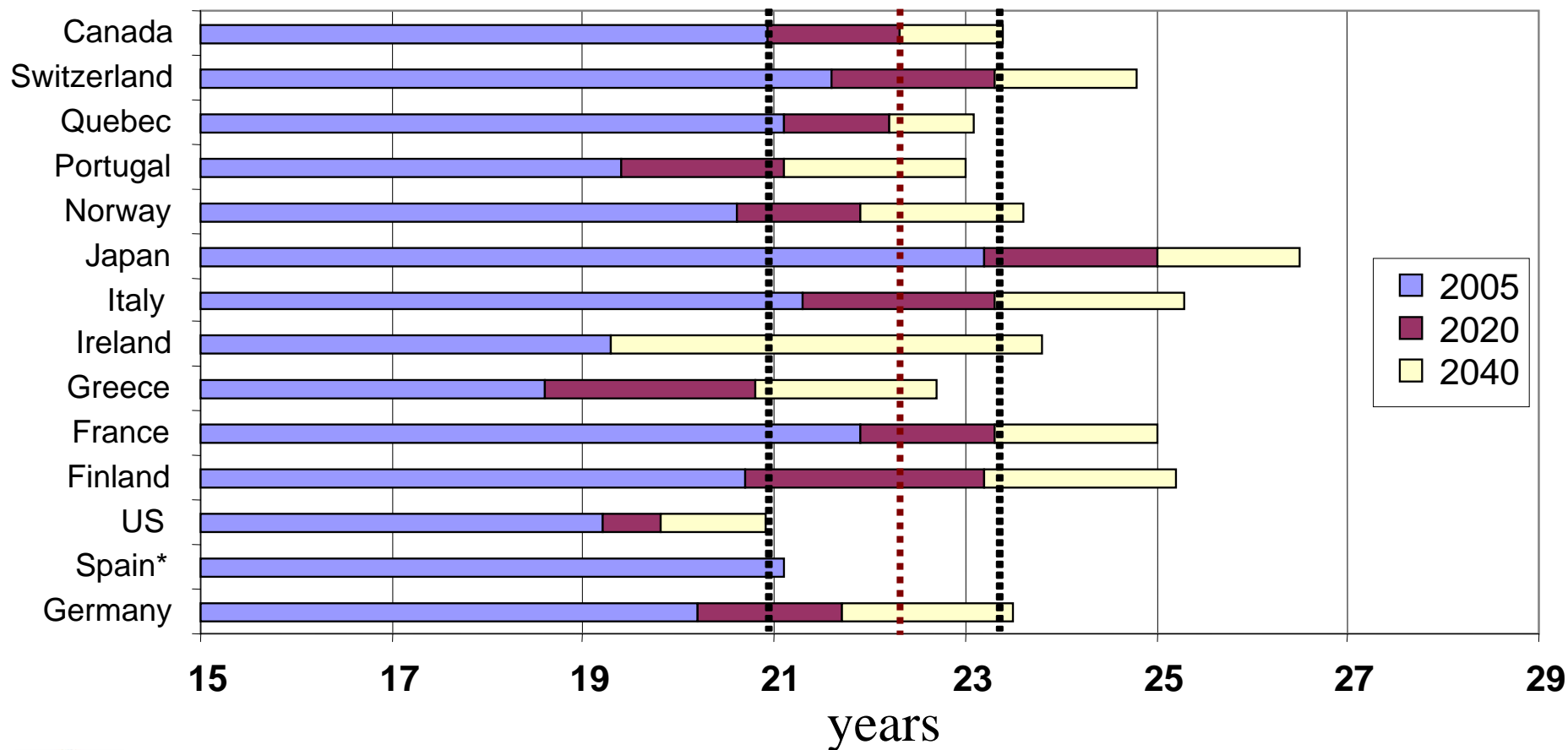


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Canada is currently ranked 6th and is expected to maintain its relative position over time

Life Expectancy at 65 - Females



* Projection for Spain is not available.



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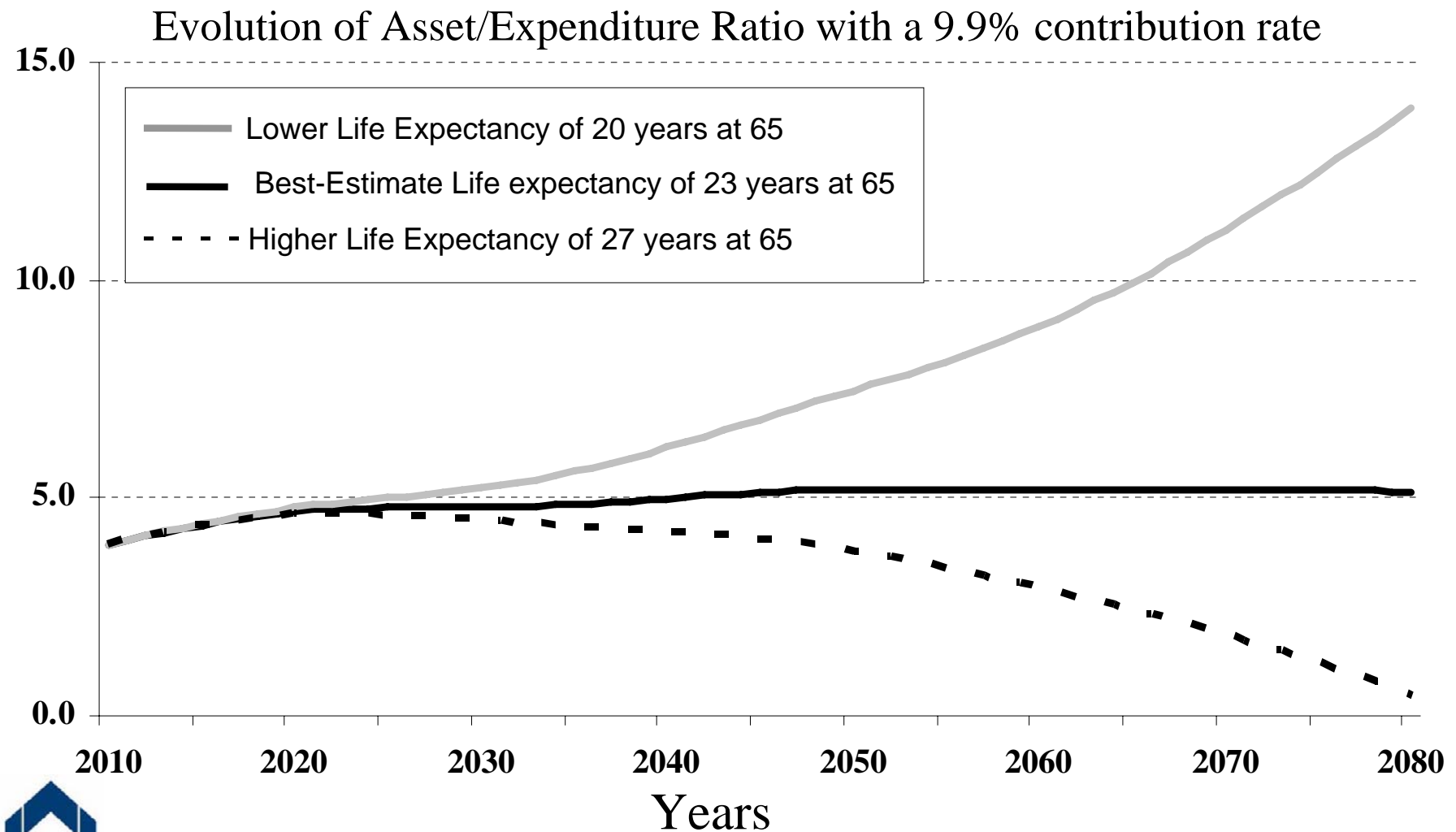
Stochastic scenarios are generated within a 80% confidence interval (CI)

Canadian Life Expectancies, with future improvements after the year shown

At birth		Actuarial Report	Lower CI	Higher CI
Males	2010	85.4	80.2	89.2
	2050	88.1	80.1	92.8
	2075	89.4	80.6	94.5
Females	2010	88.3	81.8	92.8
	2050	90.5	80.5	95.9
	2075	91.7	80.0	97.5
At 65				
Males	2010	20.2	19.1	21.3
	2050	22.6	19.2	25.2
	2075	23.7	19.1	27.0
Females	2010	22.6	21.0	24.1
	2050	24.6	20.2	27.9
	2075	25.7	19.6	29.6



Stochastic scenarios within a 80% confidence interval produce minimum contribution rates between 9.3% and 10.3%



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To live beyond 100... for half of the population

- If mortality rates decrease at the same pace as observed over the past 15 years, a life expectancy of 100 could be attained in 140 years for males and in 120 years for females.
- It makes sense that life expectancy would increase the most if mortality reduction happens at the older ages, as this is where most people die.
- Using the “age mapping” (a mathematical technique), life expectancy of 100 is also achievable if the maximum life span increases to 142 years for males and 134 years for females



LIVING
to 100

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Thank you

