

Deep fried beaver tails:

A Canadian perspective on longevity risk and solutions

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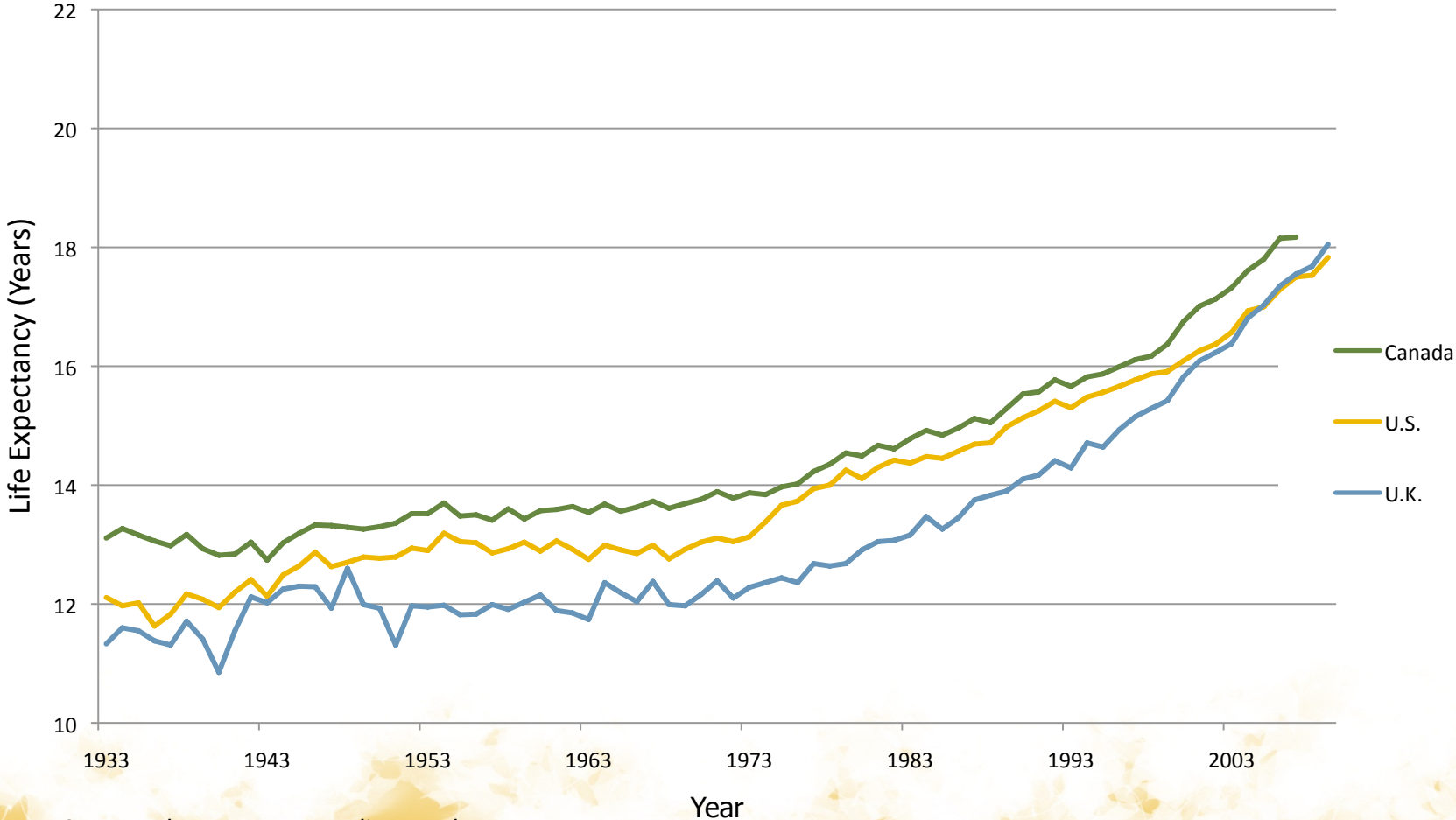




How does Canadian longevity stack up?

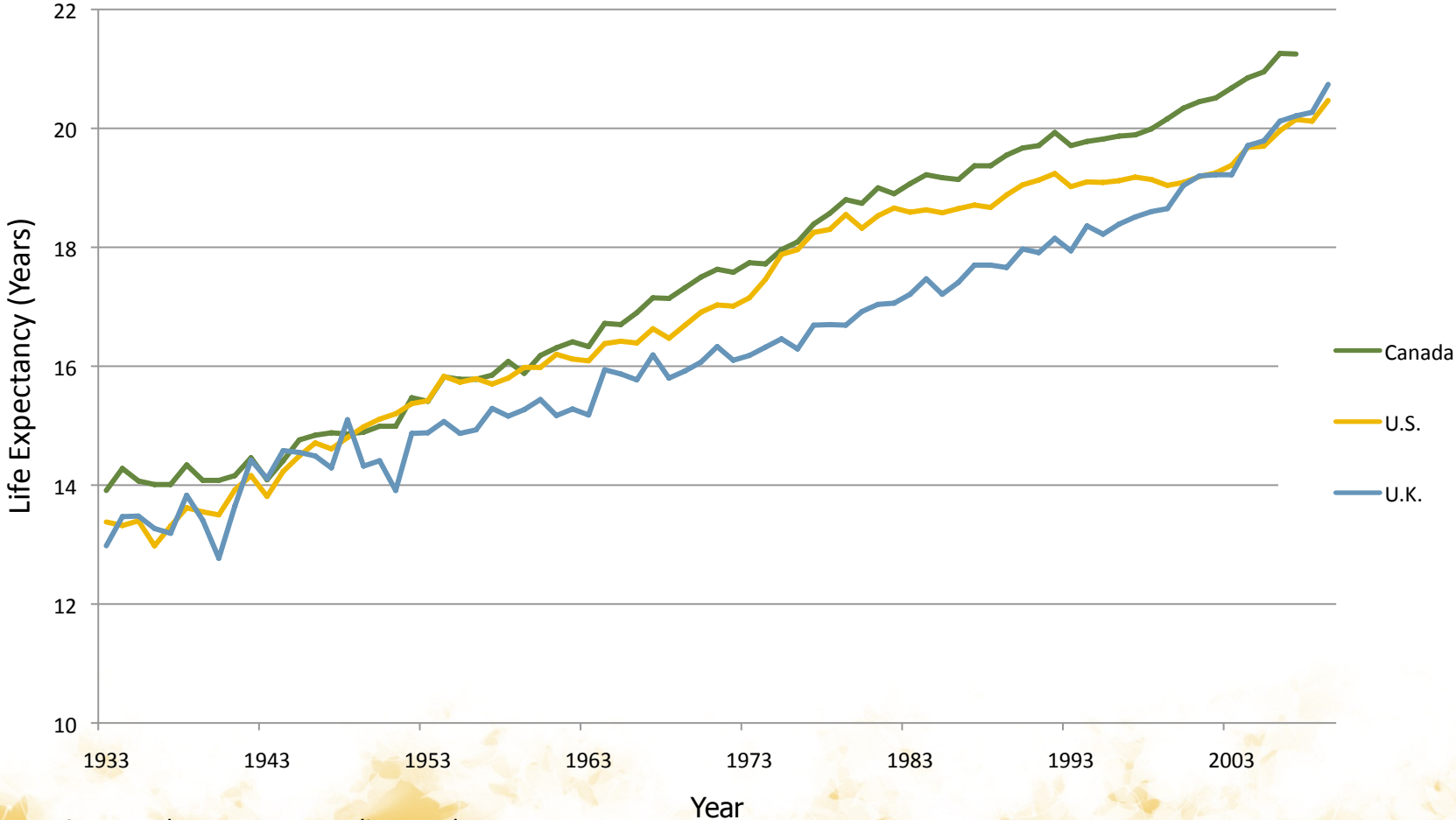


Population life expectancy at age 65 by country (male)



Source: The Human Mortality Database

Population life expectancy at age 65 by country (female)



Source: The Human Mortality Database

Canadian tables contain smaller margins

Country	Current population life expectancy at age 65 ¹	Table life expectancy at age 65 ²	Margin vs. population
Canada			
Males	18.2	18.4	0.2
Females	21.3	21.3	0.0
U.S.			
Males	17.8	18.4	0.6
Females	20.5	20.6	0.1
U.K.			
Males	18.1	19.6	1.5
Females	20.7	21.9	1.2

¹2007 figures (Canada) and 2009 figures (U.S. and U.K.) from Human Mortality Database

²Canada (UP94 and AA scale to 2007), U.S. (RP2000 and AA scale to 2009), U.K. (S1P and CMI 2011 with 1% ultimate rate to 2009)

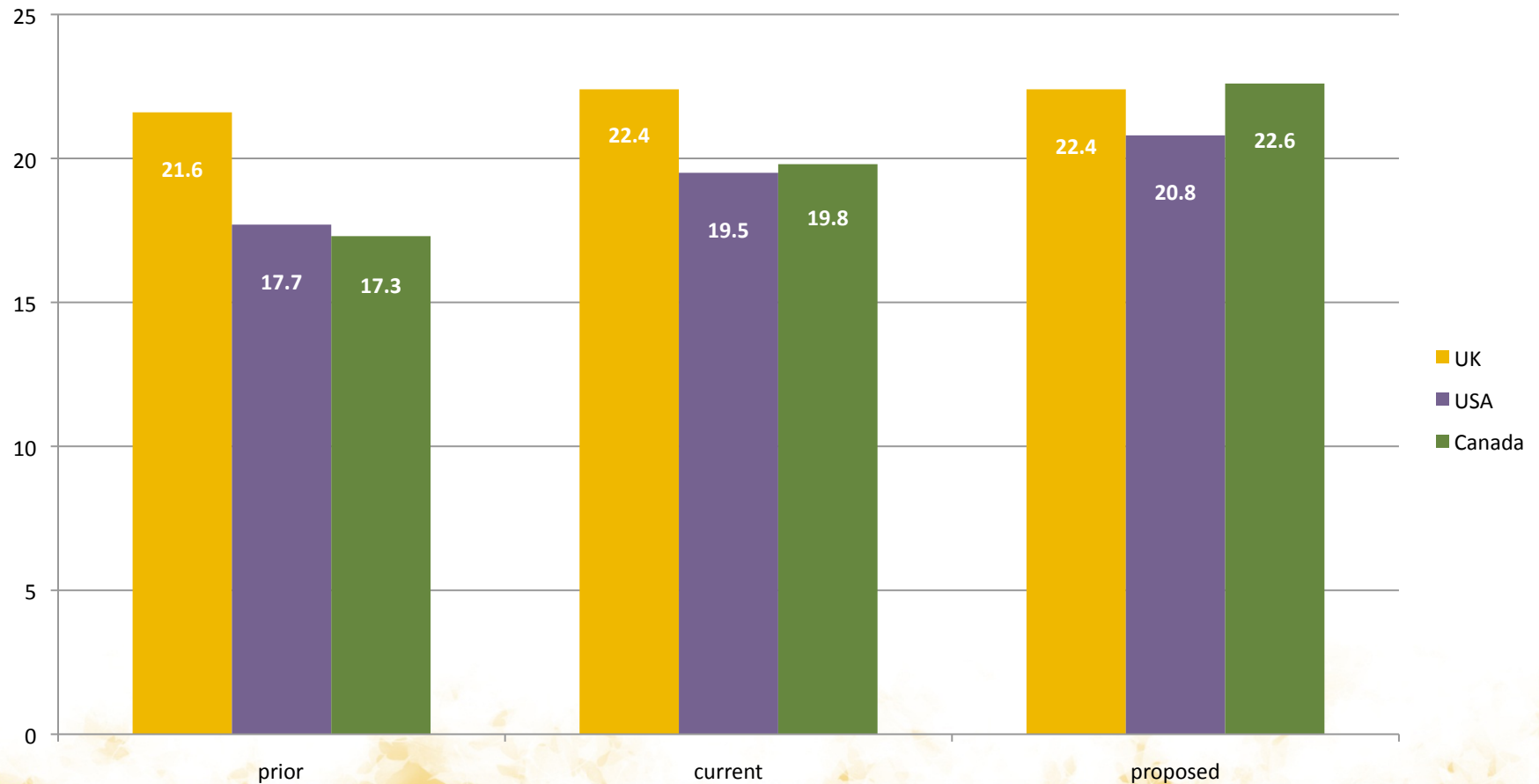
Projection scales lag recent population experience

Country	Actual increase in age 65 life expectancy ¹ (years per decade)	Table increase in age 65 life expectancy ² (years per decade)	Slippage (years per decade)
Canada			
Males	1.5	0.8	0.7
Females	0.9	0.4	0.5
U.S.			
Males	1.4	0.8	0.6
Females	0.8	0.4	0.4
U.K.			
Males	2.1	0.7	1.4
Females	1.5	0.8	0.7

¹Average over last 20 years ending in 2007 (Canada) and 2009 (U.S. and U.K.) from Human Mortality Database

²Average over next 20 years starting in 2012 using AA scale (Canada and U.S.) and CMI 2011 with 1% ultimate rate (U.K.)

Life expectancy assumptions used by pension plans (65 year old male in 2013)



Prior: S1P + CMI 2009 with a 1% ultimate rate in U.K., RP2000 in U.S., UP94 in Canada

Current: average assumed by U.K companies in 2012 for accounting disclosures in U.K., RP2000 + AA in U.S., UP94 + AA in Canada

Proposed: average assumed by UK companies in 2012 for accounting disclosures in U.K., RP2000 + BB in U.S., UP94 + PP04i in Canada

Evolving Canadian longevity underwriting



UK is more advanced than Canada

Factors Correlating with Mortality Rates	Direct Influence on Mortality Rates	Usefulness as a Proxy Variable in	
		Life Insurance	Pensions
Age	Very High	Very High	Very High
Gender	Very High	Very High	Very High
Medical History	Very High	Very High	Very Low
Genetics	High	Very Low	Very Low
Smoking Status	High	Very High	Very Low
Diet	High	Very Low	Very Low
Obesity	High	Moderate	Very Low
Occupation/Socioeconomic Class	High	Low	Moderate
Alcohol consumption	Moderate	Moderate	Very Low
Regular exercise	Moderate	Very Low	Very Low
Exposure to stress	Moderate	Very Low	Very Low
Wealth	Moderate	Very Low	Very Low
Marital Status	Moderate	Very Low	Moderate
Education	Moderate	Low	Low
Medical Underwriting	Low	High	Very Low
Family Medical History	Low	High	Very Low
Geographical Location	Low	Very Low	Low
Postcode	Low	Moderate	High
Benefit Amount	Low	Low	High

Mortality Research Working Group Report 2008 (page 8):

<http://frc.org.uk/getattachment/93496dab-c9ec-4b13-a24e-6b304199822d/Mortality-Research-Working-Group-Report.aspx>

Canadian longevity underwriting

Industry

**Pension Plan
Experience**

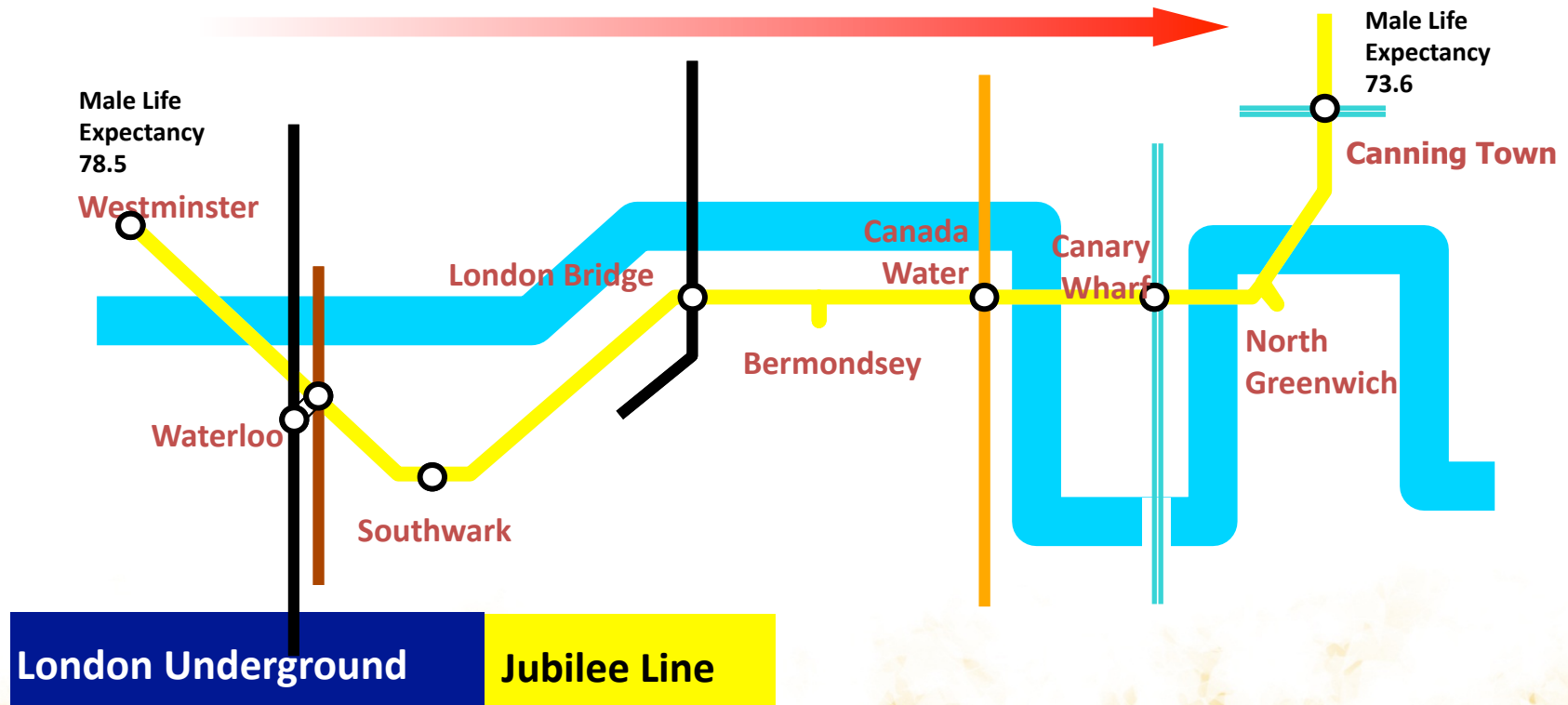
Reinsurer Pricing

Postal Codes

“The London effect”

Differences in Male Life Expectancy within a small area in London

Travelling east from Westminster, every two tube stops represent over one year of life expectancy lost



Source: Analysis by London Health Observatory of ONS and GLA data for 2004-08. Diagram produced by Department of Health

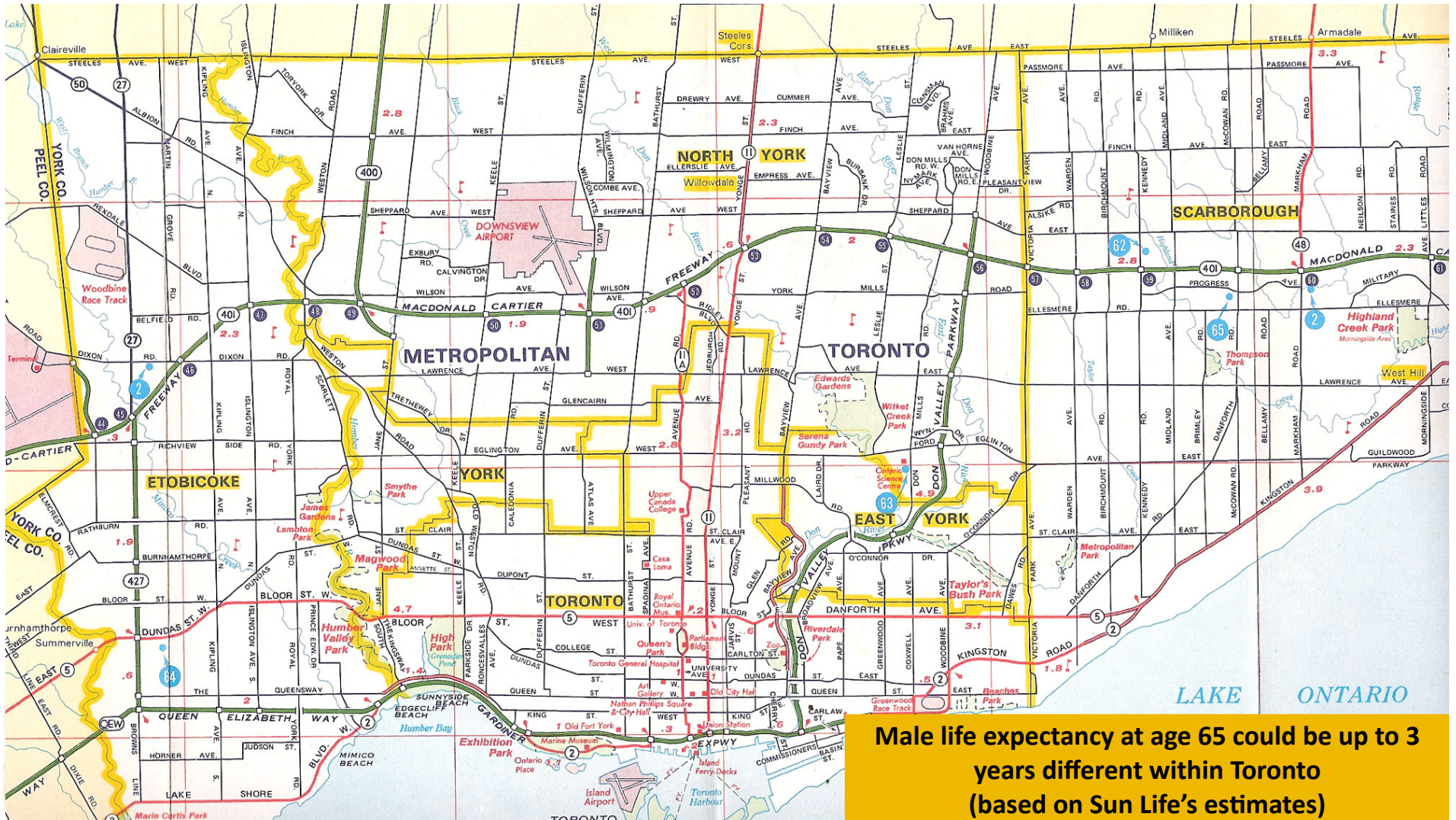
Canadian life expectancy by province

	2007-2009
	Life Expectancy at Age 65 (Both Sexes)
Canada (overall)	20.2
British Columbia	20.7
Ontario	20.3
Alberta	20.2
Quebec	20.1
Saskatchewan	19.7
Manitoba	19.6
New Brunswick	19.5
Nova Scotia	19.3
Prince Edward Island	19.3
Newfoundland and Labrador	18.2
Territories	16.9

**2.5 years
difference in life
expectancy across
Canada
(excluding
territories)**

Source: Statistics Canada

“The Toronto effect”



Canadian risk transfer solutions



Global DB pension market

	DB pension liabilities (estimates)	Closed DB plans	2011 risk transfer deals (estimated)
Canada	\$1 trillion	40%	\$1.4 billion
US	\$3 trillion	40%	\$1.7 billion*
UK	£2 trillion	70%	£12 billion

* Includes \$800M of group annuities purchased for individual members, typically from DC plans

UK solutions are available in Canada

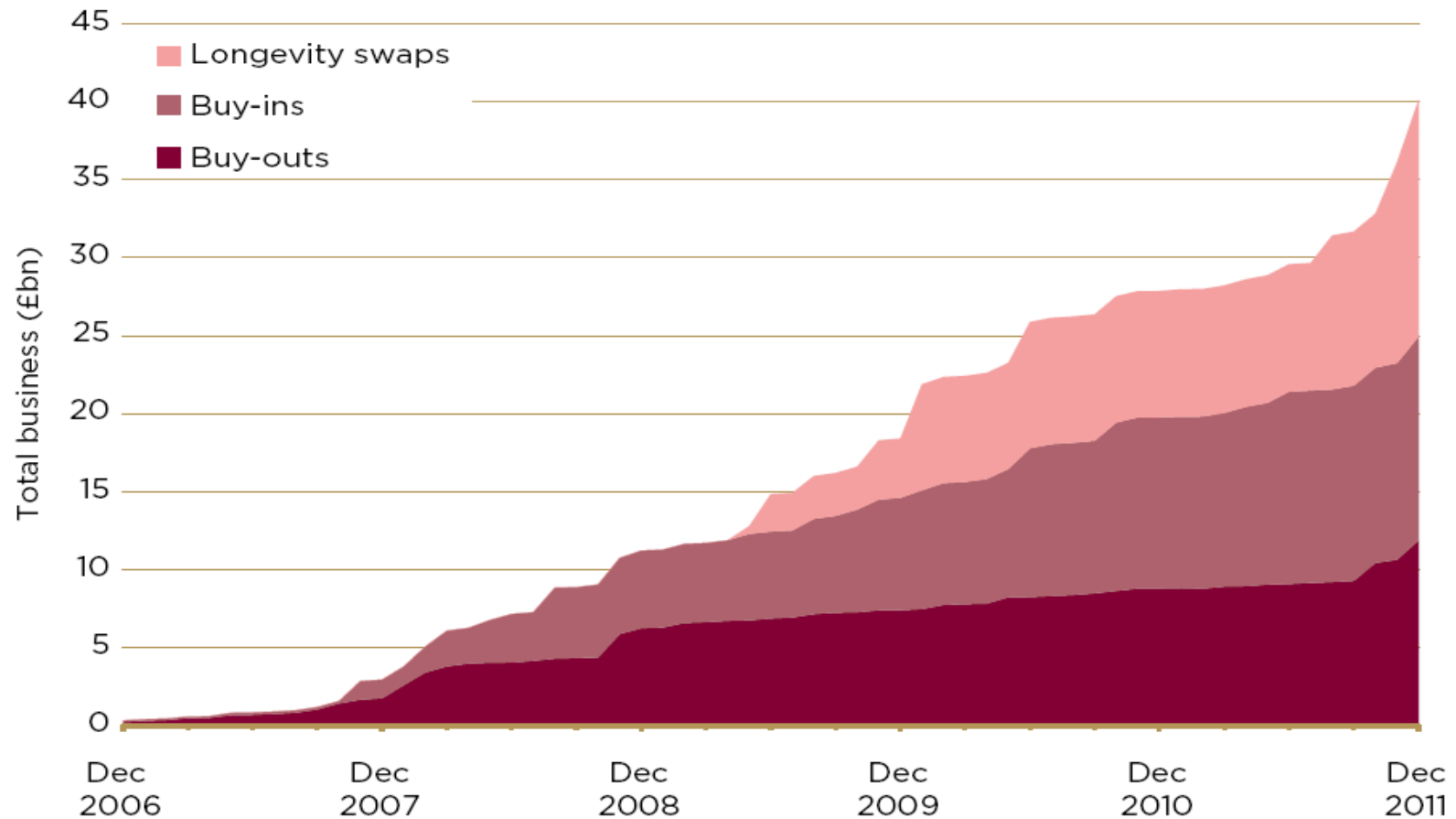
	Group annuities	Liability driven investing	Longevity insurance
Investment risk	✓	✓	
Longevity risk	✓		✓
Inflation risk	✓	✓	
Operational risk	✓	✓	✓

Pension risk transfer – U.K. vs. Canada

	U.K.	Canada
Annuity buy-ins	Common and popular	Interest just starting
Longevity risk deals	12+ deals since 2009 covering over £14 bn of liabilities	None to date
Collateral	Common for longevity deals and some buy-ins	Not common for pension risk transfer
Segregated fund	Common for larger deals	Not common

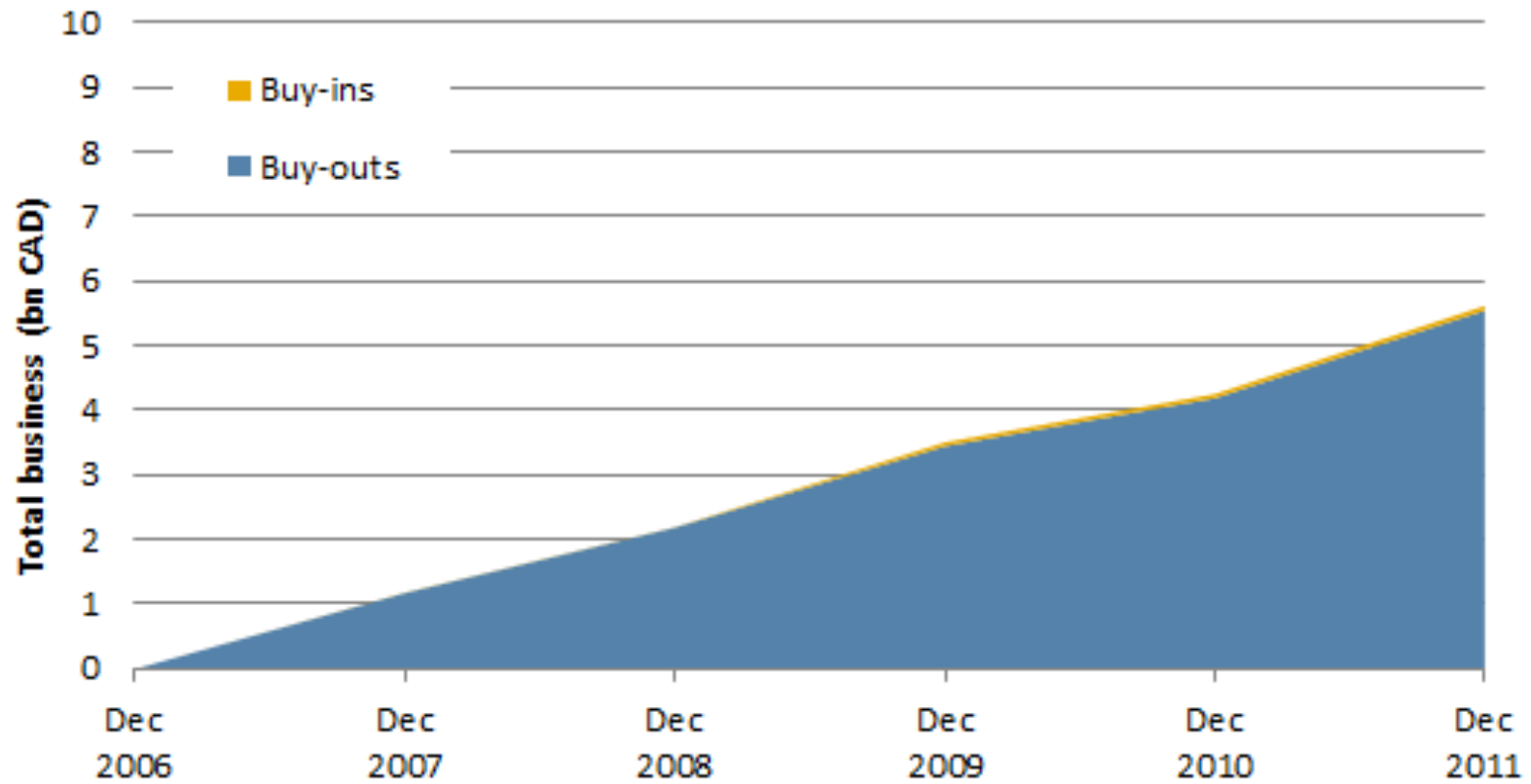
UK risk transfer transactions

Buy-outs, buy-ins and longevity hedges



Source: Lane Clark & Peacock LLP

Canadian risk transfer transactions



Source: Sun Life Financial estimates

Why Canadian annuities are a good value



Annuities aren't expensive compared to bonds

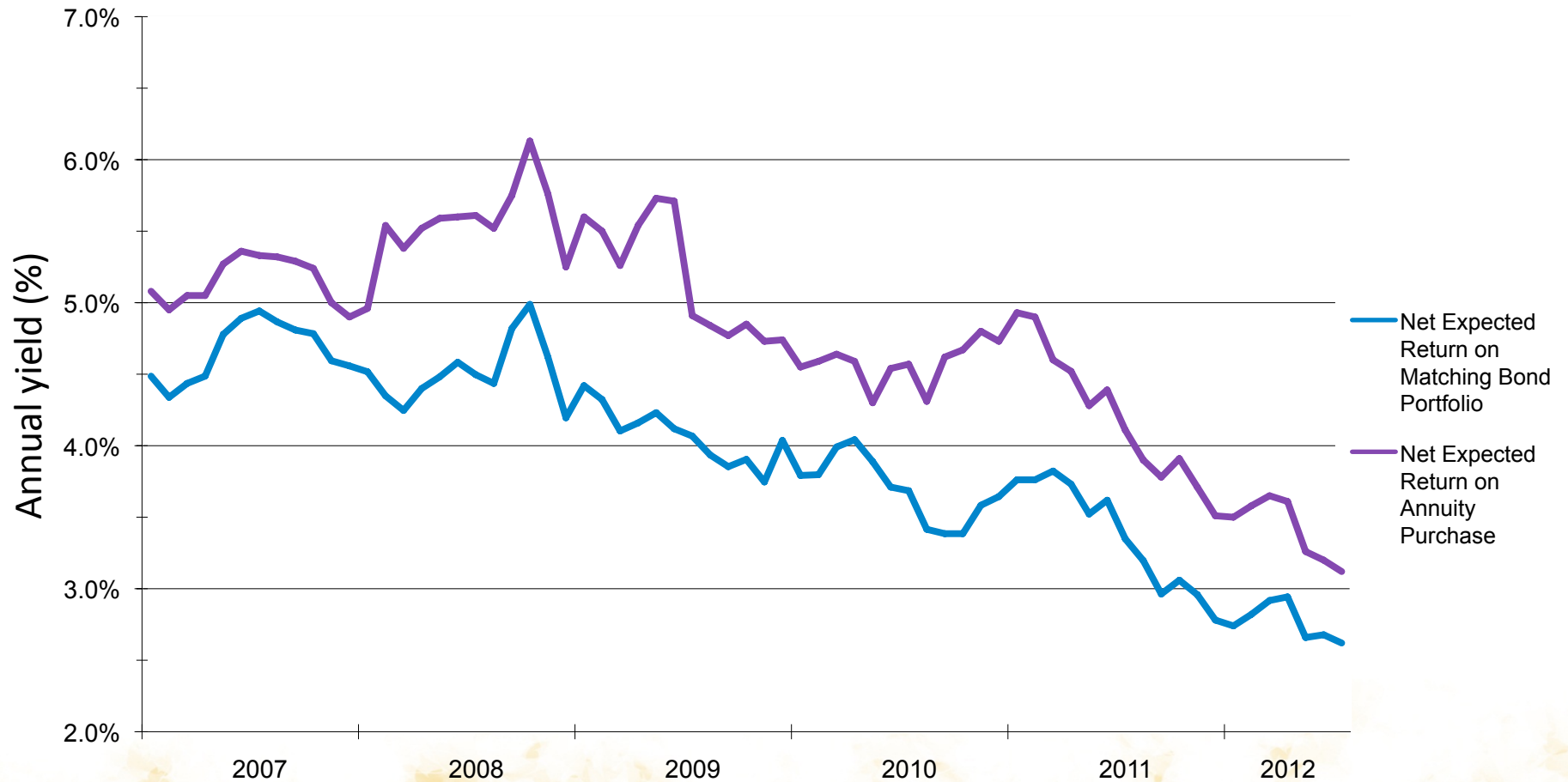
	Hypothetical Pension Plan
Gross expected return on matching bond portfolio	2.72%
Investment manager and administrative expenses	<u>-0.10%</u>
Net expected return on matching bond portfolio	2.62%

	Insurer
Annuity pricing rate (CIA proxy, based on UP94G)	2.97%
Adjustment for duration difference (14 to 10 years)	-0.15%
Adjustment for life expectancy longer than UP94G	<u>0.30%</u>
Net expected return on annuity purchase	3.12%

For this hypothetical plan, a switch to annuities can increase yields by 0.5%

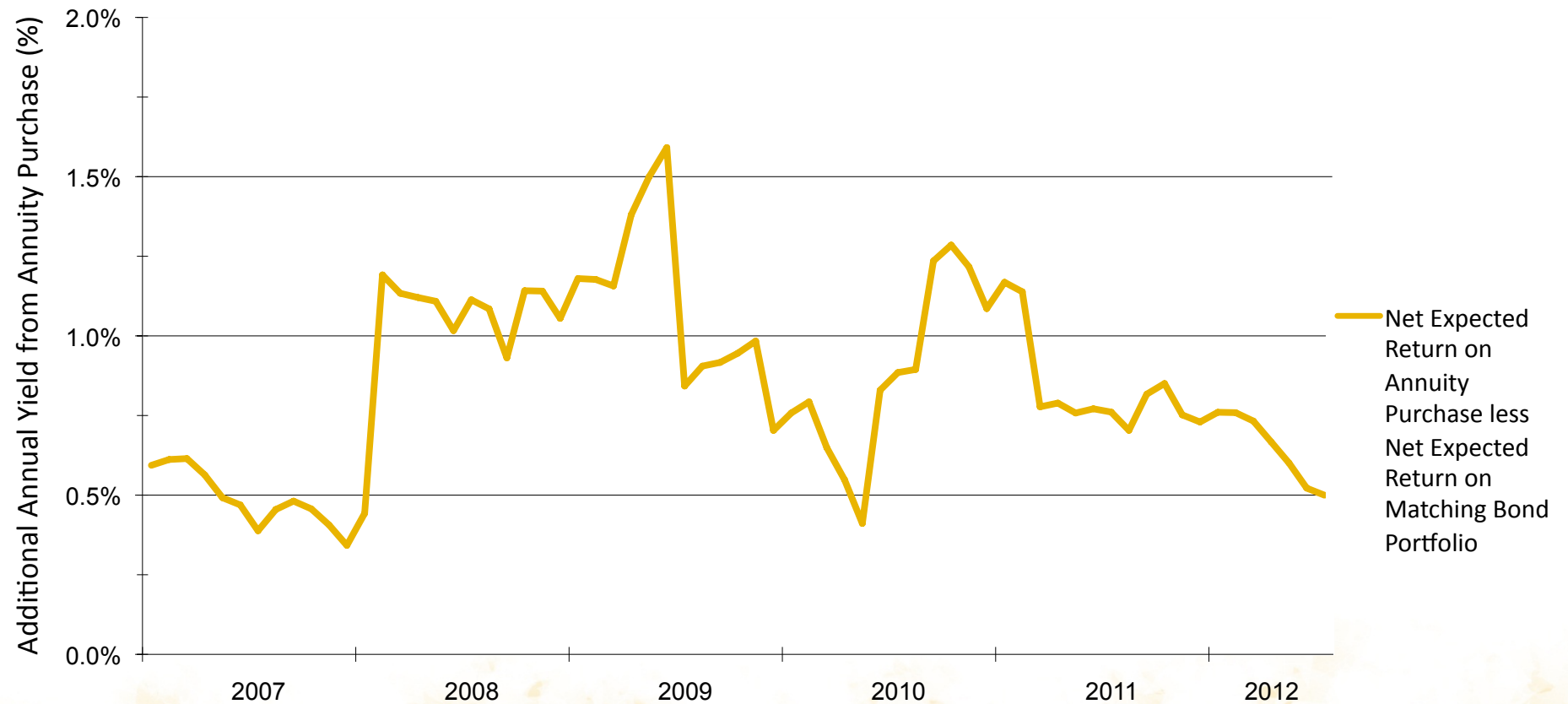
Rates are at: July 31, 2012
Bond Portfolio Mix: 45% DEX Long, 55% DEX Universe (annualized yield)
Bond Portfolio Duration: 10 years
Source: PC Bond, a business unit of TSX Inc. and Sun Life estimates

...and haven't been historically



Source: PC Bond, a business unit TSX Inc. and Sun Life

Higher yields + risk transfer = Super Bonds



Source: PC Bond, a business unit TSX Inc. and Sun Life