



ACTUARIAL
 SOCIETY
OF SOUTH AFRICA

QUANTIFYING RISK, ENABLING OPPORTUNITY

CSI report back

Update on the 2005-2010 in-fund
SA pensioner mortality study

Gary Velcich, chairman – pensioner
mortality sub committee, CSI

velcichg@aforges.co.za

Meet the chairman and the sub committee



Some background

- No previous comprehensive study undertaken of mortality of pensioners paid by SA pension funds
- CSI committee does investigate life office (“compulsory purchase”) annuitant mortality
- Why? Problem has always been sourcing data and interpreting each fund’s different systems, procedures, systemic data errors, etc.

Purposes of investigation

1. Absolute levels of mortality vs. published (UK) experience
 - ie. is PA(90) a good fit? Age adjustments?
2. Trends, particularly qx improvements
3. Anything unexpected in the data to feed back to actuaries?
4. Perhaps consider graduating for SA standard table

Mortality data sources



Mortality data sources

- Large defined benefit pension funds
 - 21 large DB funds
 - Incl. government and parastatal
 - One large pensions consultancy
- Six year period from 2005 to 2010
- Excludes pensioners who purchased annuity at retirement
- But will include bulk in- and out-sourcing of pensioners where payroll managed by administrator

Data sources by industry

Industry classification	Total 2005 - 2010	
	Exposure	Deaths
Government	1 473 108	44 149
Transportation	429 153	23 913
Engineering	324 082	19 181
Mining and minerals	221 081	9 277
Energy	145 061	5 548
Local government	123 998	7 455
Post and telecommunications	95 689	2 485
Other	469 996	21 007
	3 282 169	133 015

Data issues ...

Very large data sets: biases overwhelm smaller data

Gender	Including or excluding <u>largest</u> data set	
	Including	Excluding
Male	43%	50%
Female	57%	50%

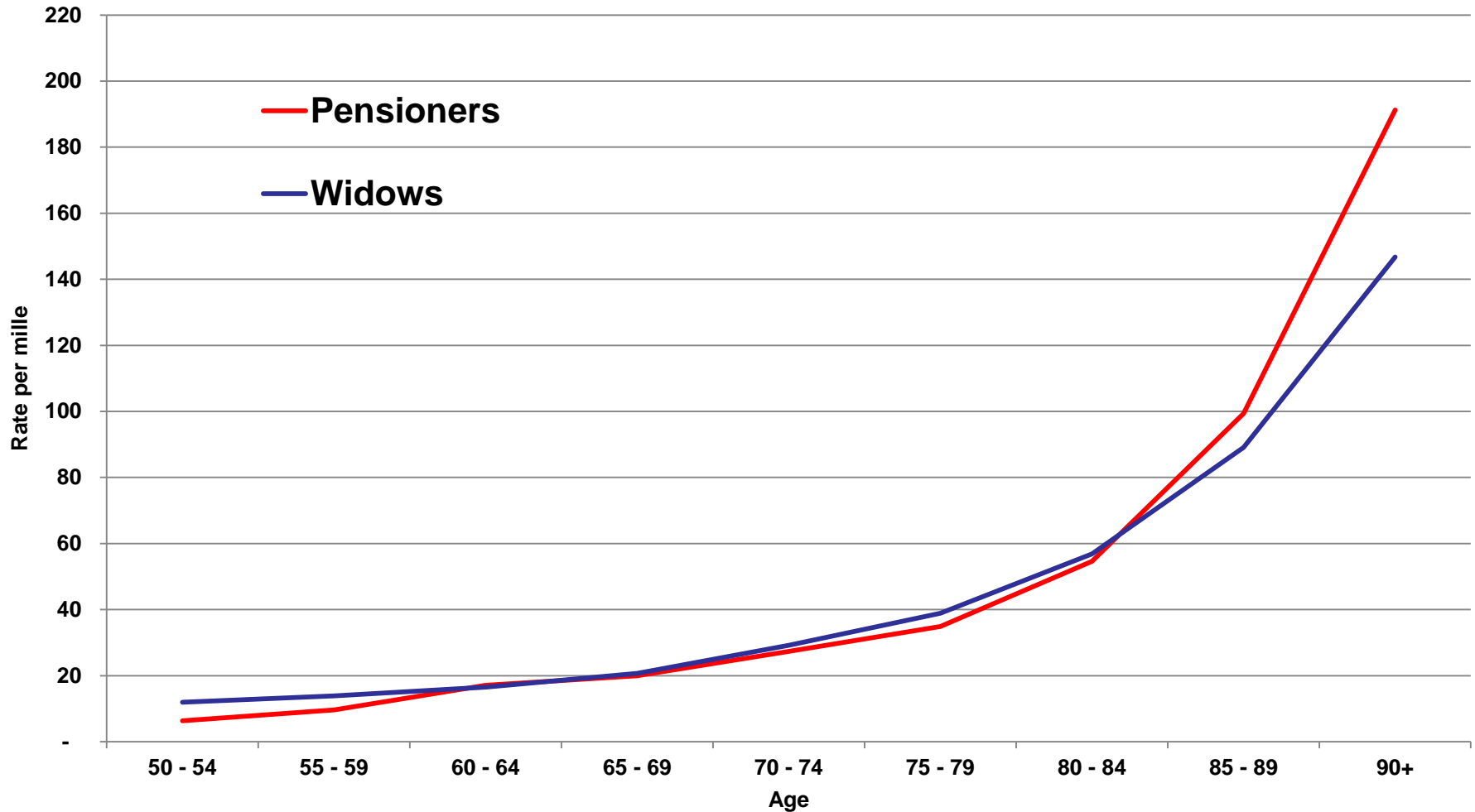
- Acceptable if you can control for the variable (such as gender, income, etc.)
- But plays havoc with different admin practices, definitions of ill health early, etc.

Data issues ...

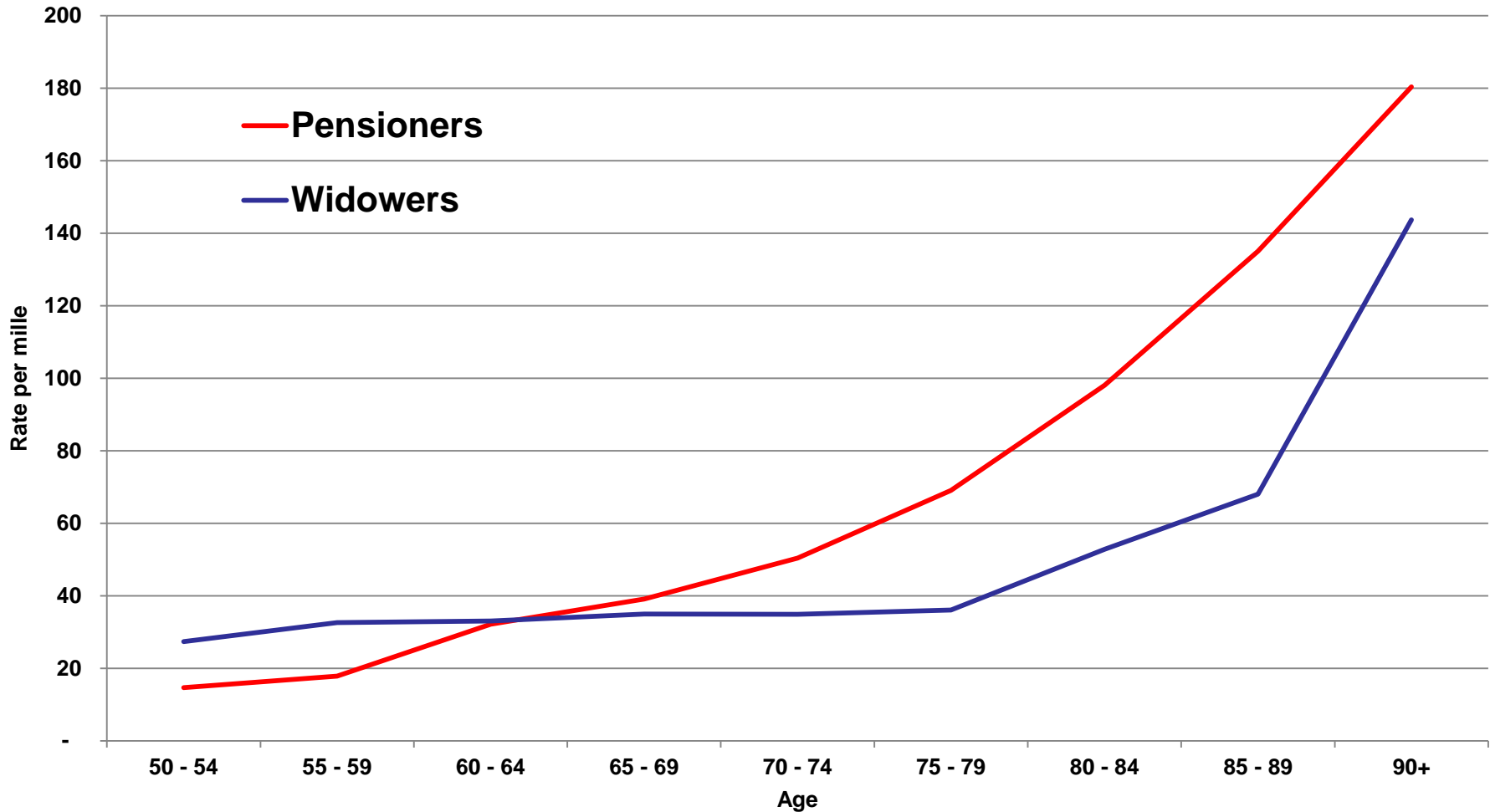
Example:

- In retirement: how does the passing away of your spouse affect your own mortality?
- And does it depend on whether you are male or female?
- Let's see what the data sets tell us.

Rates: pensioners and widowers (females)



Rates: pensioners and widowers (males)



Data issues ... (cont)

- Issue here is ‘simply’ a data recording issue
 - Way spouse’s pension is set up leads to overstatement of exposure
 - Used male spouse’s date of retirement
- The real question is what other unidentified issues are there in the remaining data sets...

What investigations are we doing?

- Initial rates analysis
 - By gender, amounts, industry
 - Pensioners compared to widow(ers)
 - Ill-health, voluntary compared to normal
- Standard table investigations
 - Is PA(90) appropriate?
 - Age and percentage adjustment
 - Sufficient data to consider improvement projections?

1. Analysis by amounts vs. lives, broken down by industry

Rates investigation: by industry, amounts

Industry classification †	A/E to PA(90) based on amounts
Local government	1.29
Retail	1.28
Energy	1.26
Financial services sector	1.14
Manufacturing	1.14
Engineering	1.06
Motor vehicle industry	1.04
Food and beverage	1.03
IT and communications	1.02
Petrochemical industry	1.01
Education and research	0.94
Post and telecommunications	0.83
† <i>have excluded Government</i>	1.03

Analysis by amount vs. lives

- You will recall your actuarial studies
 - Socio economic benefits of higher income
 - Indicator of higher education, easier lifestyle, access to healthcare
 - Could reflect extent of manual labour pre retirement, given your industry grouping
 - Relationship with levels of smoking
- So, is the relationship real and significant?

Rates investigation: by industry

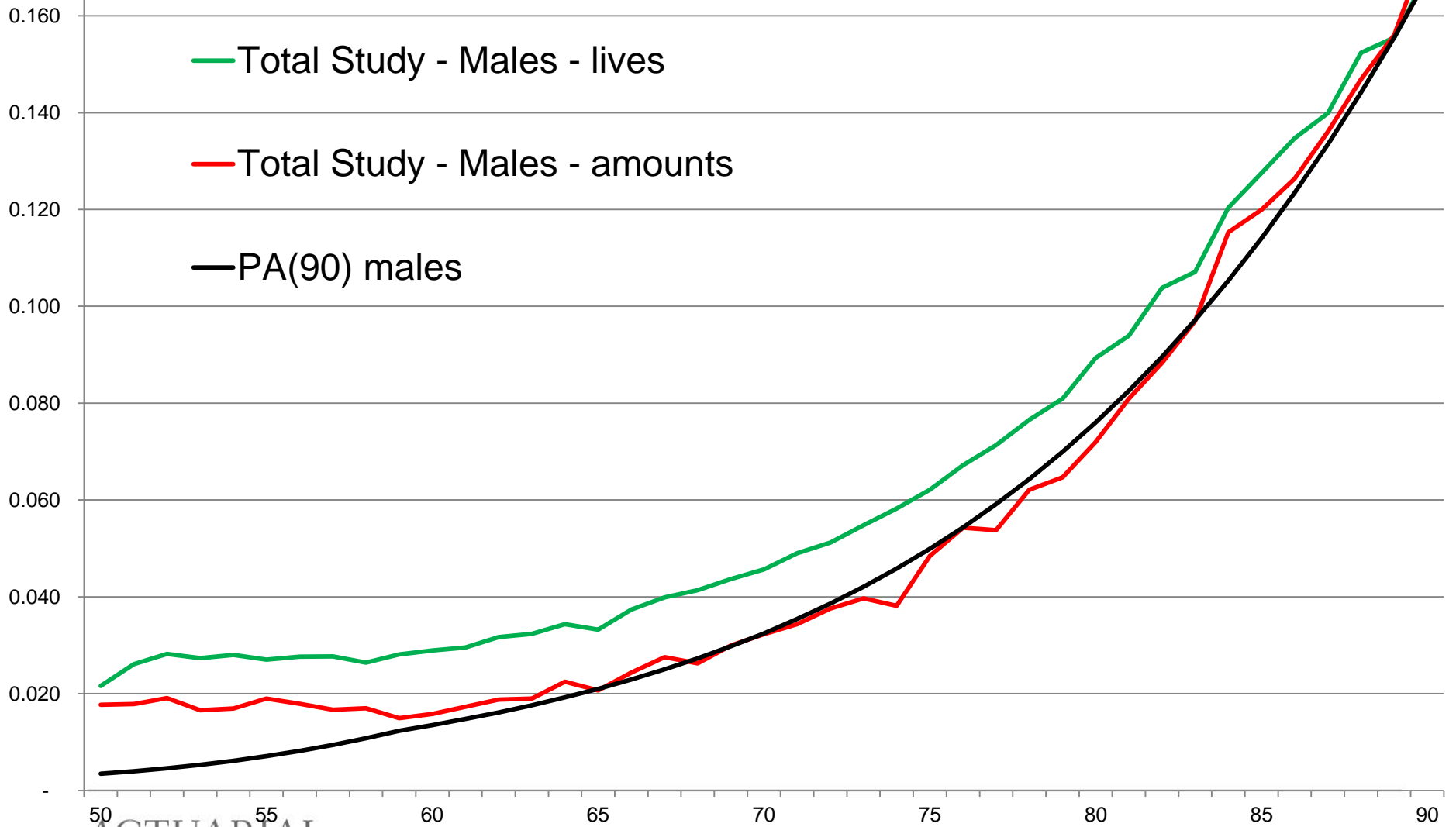
Industry classification	A/E to PA(90) based:	
	Amounts	Lives
Local government	1.29	1.81
Retail	1.28	1.42
Energy	1.26	1.59
Financial services sector	1.14	1.22
Manufacturing	1.14	1.33
Engineering	1.06	1.43
Motor vehicle industry	1.04	1.36
Food and beverage	1.03	0.90
IT and communications	1.02	1.16
Petrochemical industry	1.01	1.23
Education and research	0.94	1.25
Post and telecommunications	0.83	1.22
	1.03	1.27

Analysis by amount vs. lives

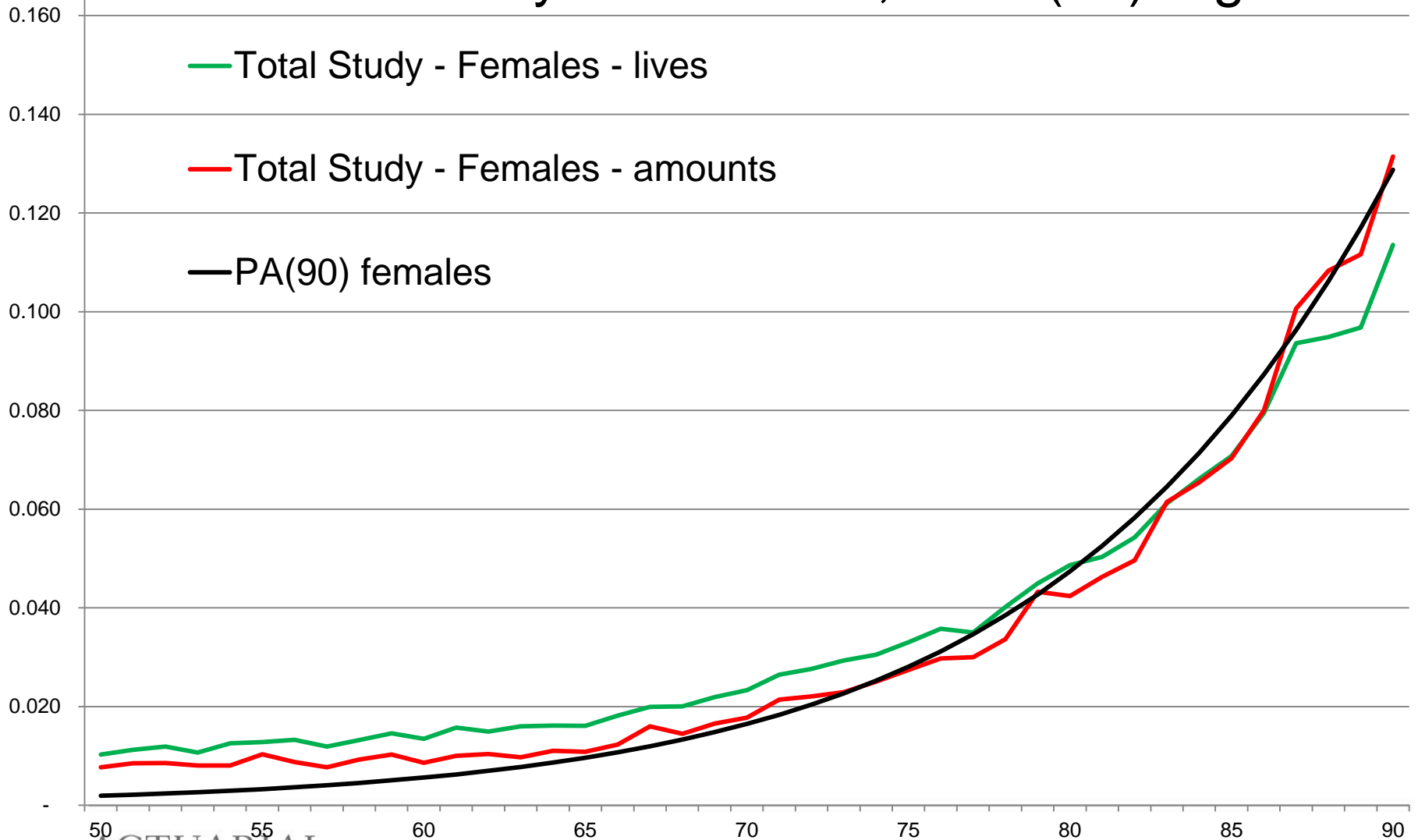
- Yes, would conclude that it is significant!
- Although suggests that there are potentially other effects in the data sets
- Some very large swings in A/E ratios which would need further investigation.

2. Overall level of mortality by age

Very high early mortality, tends to PA(90) after



Female mortality much lower; is PA(90) a good fit?



Comments on analysis by age

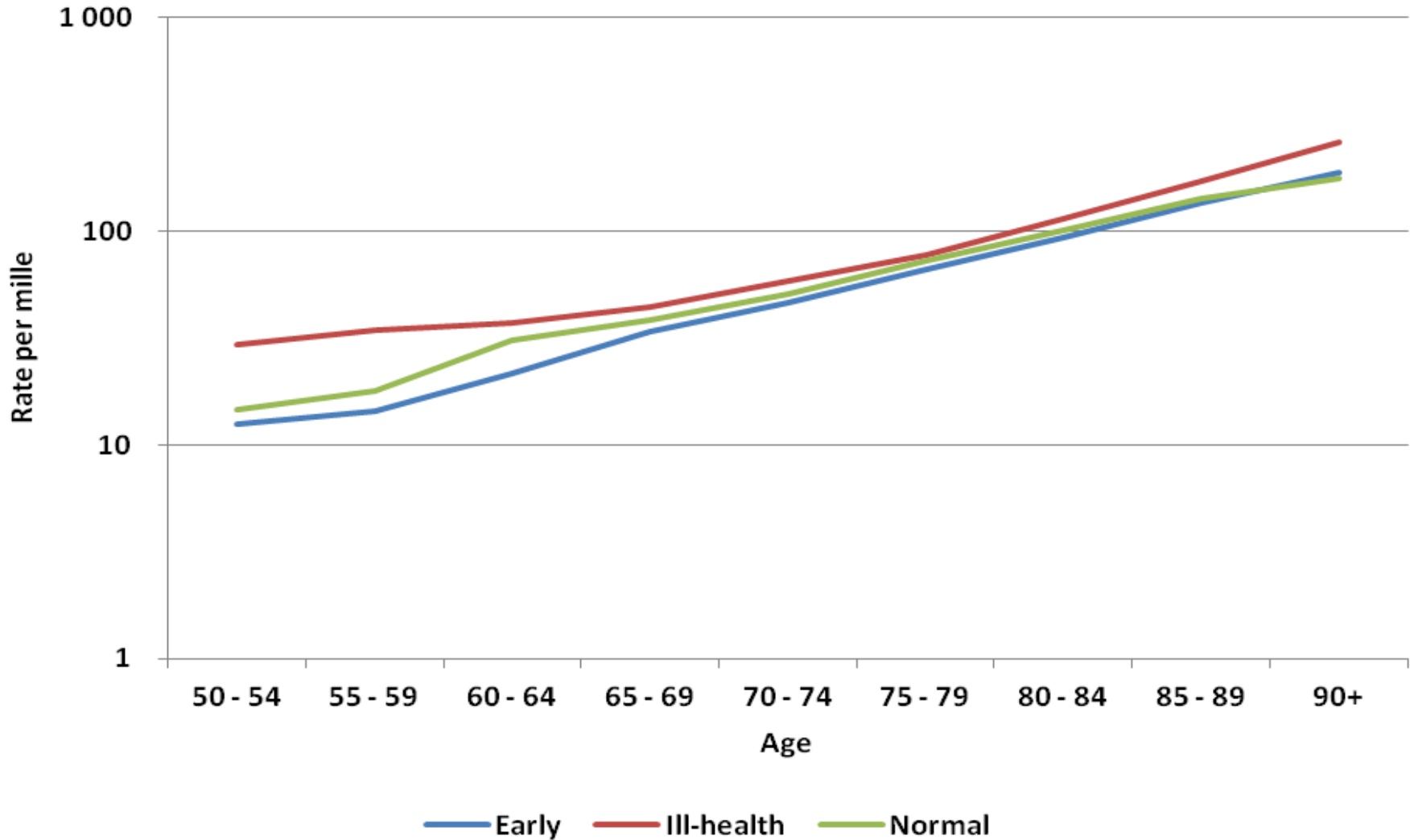
- Is shape of PA(90) still appropriate?
 - Perhaps not for certain age groups
 - Similar effect noticed in annuitant investigation
- Heterogeneity in the data
- And no easy and consistent way to address this
 - Effect has probably not been high on actuaries' minds: heavier mortality early on leads to a release of liability
 - Focus has been on improvements in longevity

3. Analysis by type of retirement: normal vs. ill health vs. voluntary

Types of retirement

- 81 percent have known pension type
 - 20% early retirements
 - 39% ill-health (ave. age 54 females, 51 males)
 - 41% normal ret. (ave. age 62 females, 61 males)
- 19 percent unknown / other pension type
 - 50% have retirement age < 58
 - Assumed ill health early retirement

Rates: ill-health and normal (males)



4. Improvements in longevity

Improvements in longevity

- No immediate evidence in the data
- Suspended pensioner records may be masking actual deaths, especially in 2009 and 2010 data sets
 - Will need some clever statistical analysis to extract trends
- Interested to note current overall mortality not very different to PA(90) at later ages
 - Could suggest limited improvements to date relative to this table?

Where to from here?

Horatio Caine, CSI Miami:

“The only thing that matters is the evidence.”

Actuarial Society, CSI SA:

“The evidence is confounding; it does not want to confess.”



Where to from here?

1. Finalise checking of data and calculations
 - Review discussions with funds
2. Comparison to standard tables
3. Comparison to annuitant results / international
4. Construction of table / adjustment factors?
5. Study outputs
 - CSI report
 - Specific contributing funds results
 - ASSA conference presentation

Questions

The CSI Committee:

“More glamorous and cutting edge than CSI Miami.”

