Mortality in Ireland: Past & Projected

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10th June 2010

Preface

That the life-form as we have it
is inadequate in itself; but that
having discovered the compensatory devices
of Love and the creative and religious imaginations
we should gather in each generation
all the good we can from the past,
add our own best and,
advancing in our turn
outward into the dark,
leave to those behind us,
with Acts of Hope and Encouragement,
a growing total of Good (adequately recorded),
the Arts and the Sciences,
with their abstractions and techniques
- all of human endeavour -
in a flexible and elaborating
time-resisting fabric
of practical and moral beauty…

Thomas Kinsella (2006), from *Blood of the Innocent.*

How Important is Mortality?

- Mortality is important
  - Obvious at personal level

- Comparative Measures
  - Economist Intelligence Unit's *Quality of Life Index* gives life expectancy at birth weighting a weighting of 19.0%
    - a marginally higher weighting than GDP per person
  - United Nation's Human Development Index (HDI), gives mortality an equal weight (at 33%) with material well-being.

- Mortality and longevity is at least as important as income and wealth
  - How much would you pay for an extra year of life?

- [It is not about the economy, stupid!]

Dreaming of Immortality

- Early tales in many cultures tell of improbable longevity
  - Tír na nÓg and Oisín's several hundred year visit there,
  - Excepting Cain and Abel, the lifespan of the first ten men mentioned in the Bible averaged more than 850 years, with Methuseh the longest lived at 969 years (Boldsen & Paine (1995)).

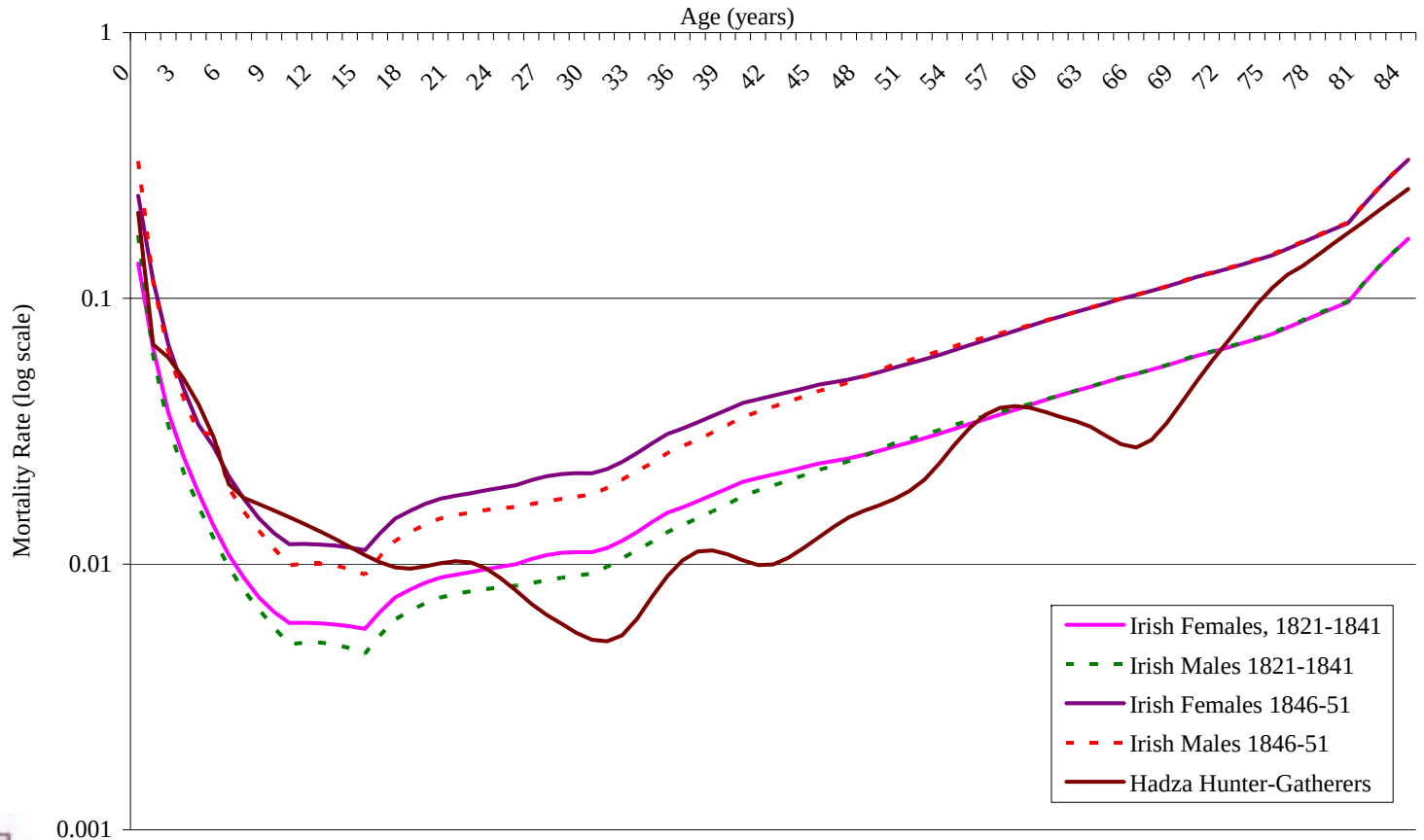
- Age exaggeration a common feature in earlier cultures.
  - Easton (1799) gives a list of supposed centenarians that ever lived numbering 1,712, of which no less than 145 were mainly resident in Ireland.
  - The list includes St. Patrick (122 years), St Kevin of Glendalough (120 years), and the oldest reported Irish person, the Countess of Desmond (145 years) who died in 1612.

- de Grey (2004) gives dream a modern formulation:
  - Actuarial Escape Velocity: when increase in life expectancy equals or exceeds 1 year with the passage of each calendar year.

Eras of Man in Ireland

	Dates	Generations Ago	% of total inhabited time
Early Mesolithic	7000-5500BC	360-300	17
Later Mesolithic	5500-4000BC	300-240	17
Neolithic	4000-2400 BC	240-176	18
Copper Age	2400-2200 BC	176-168	2
Bronze Age	2200-600 BC	168-104	18
Iron Age	600BC-400AD	104-64	11
Early Middle Ages	400-1000 AD	64-40	7
Late Middle Ages	1000-1550 AD	40-18	6
Pre Famine	1550-1850 AD	18-6	3
Post Famine	1850-Present AD	6-0	2

Mortality Curves:
Pre and During the Great Famine



3 Stages to Human Life

- Stage 1: Childhood & Youth
  - Dependency
  - Education
- Stage 2: Maturity
  - Reproduction
  - Responsibility
  - Economic/Social Contribution
- Stage 3: Faced toward Death
  - Dependency
  - Decrepitude

Outline

- Mortality in Context
- Irish Mortality: Past Trends
  - Long-term, by calendar year
  - Long-term, by year of birth
- Projecting Mortality Rates
  - Method 1: Logarithmic Method
  - Method 2: Targeting Approach
- Trends in Mortality at Advanced Ages in Ireland
  - Form of Curve: does mortality rate limit to 1?
- Snapshot of Mortality by Social Class
- The Decisions
  - Resource Allocation
  - The 4th Stage of Human Life

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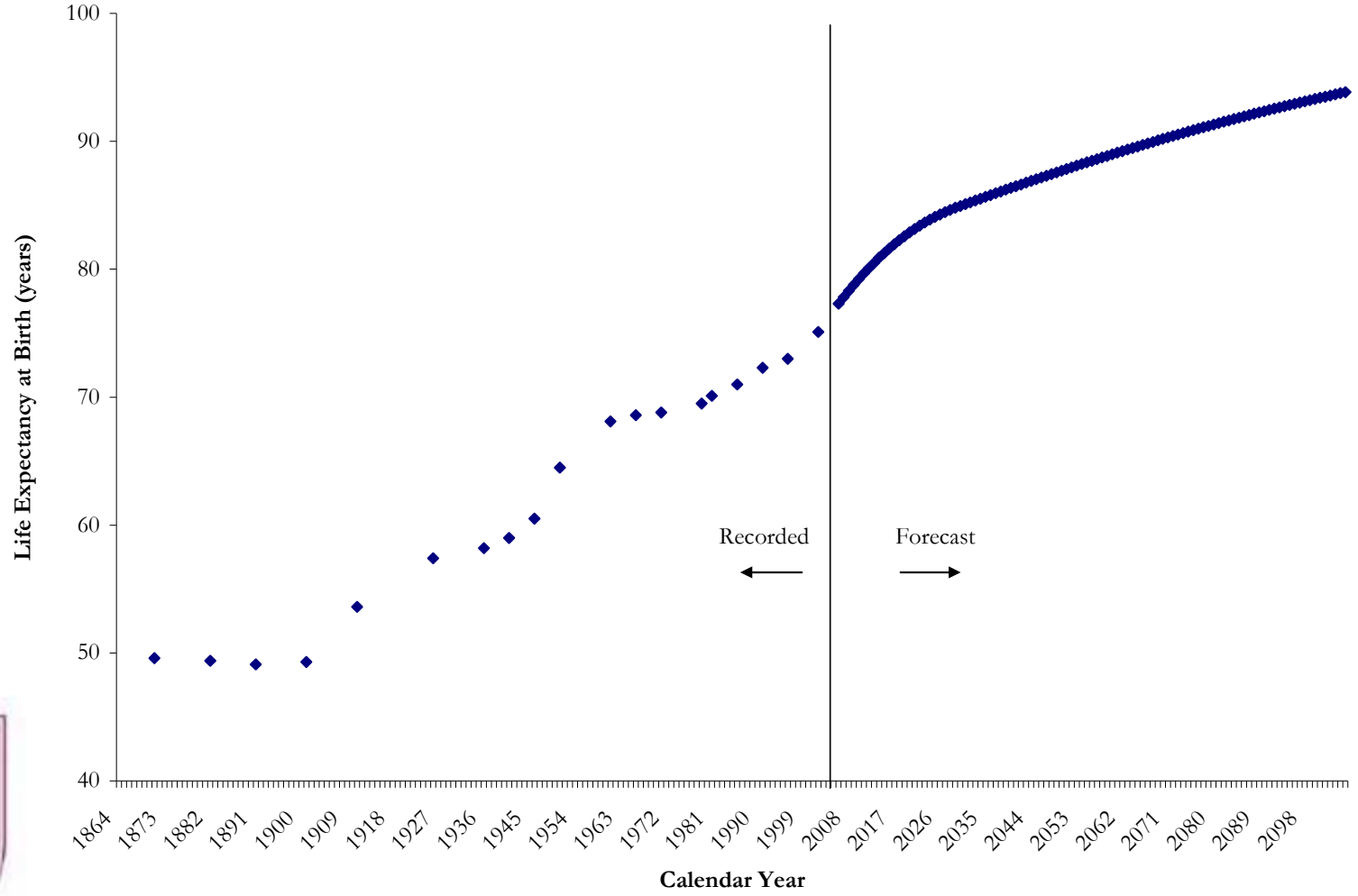
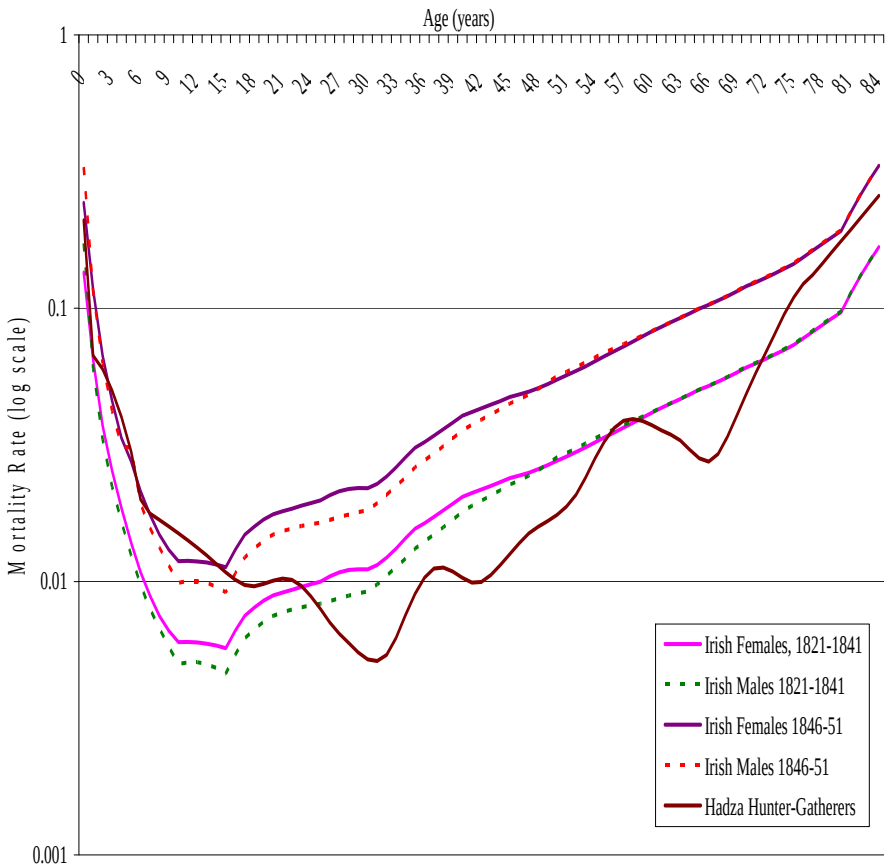
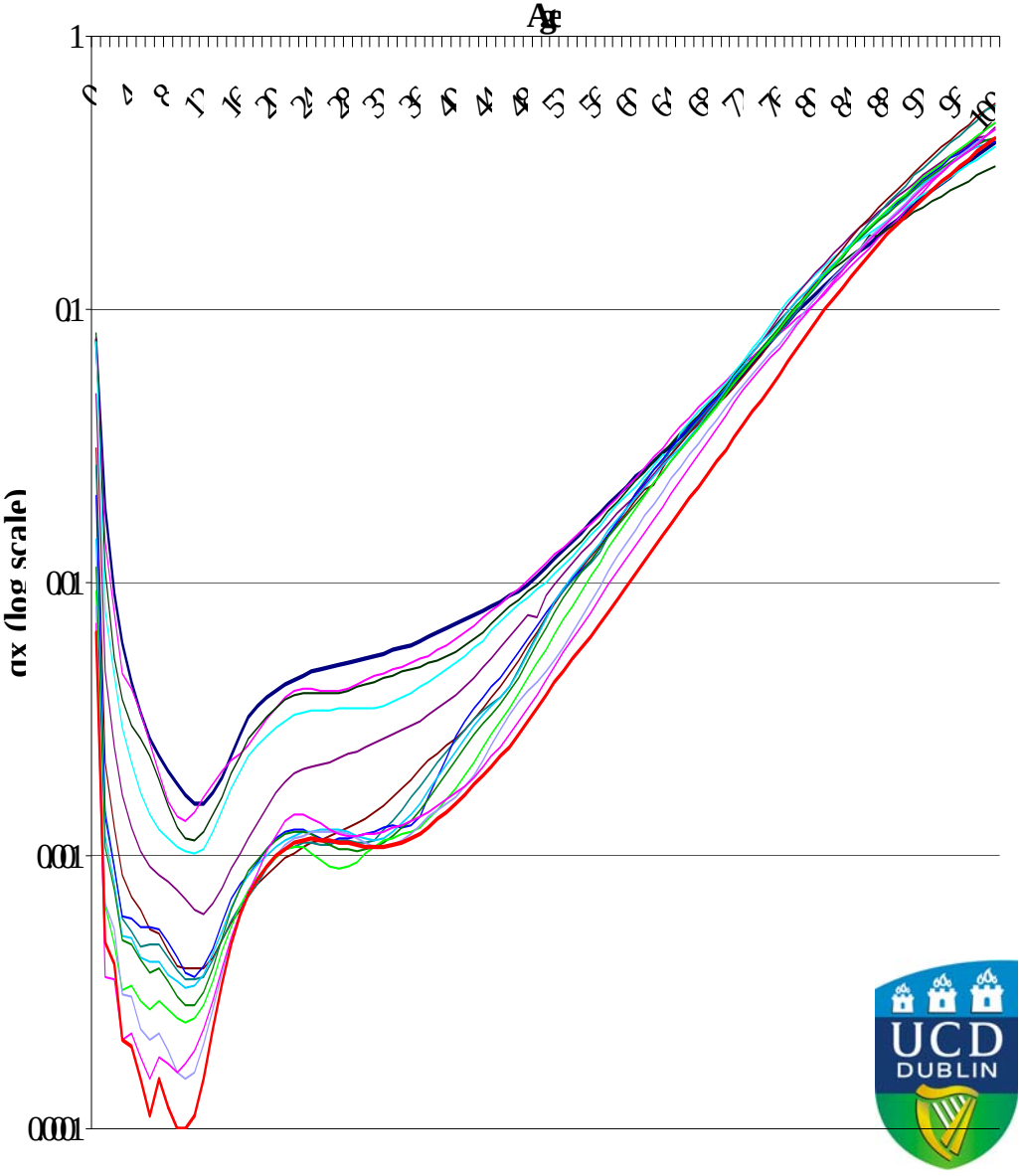
Recorded and Forecast (Period) Life Expectancy at Birth for Male in Ireland

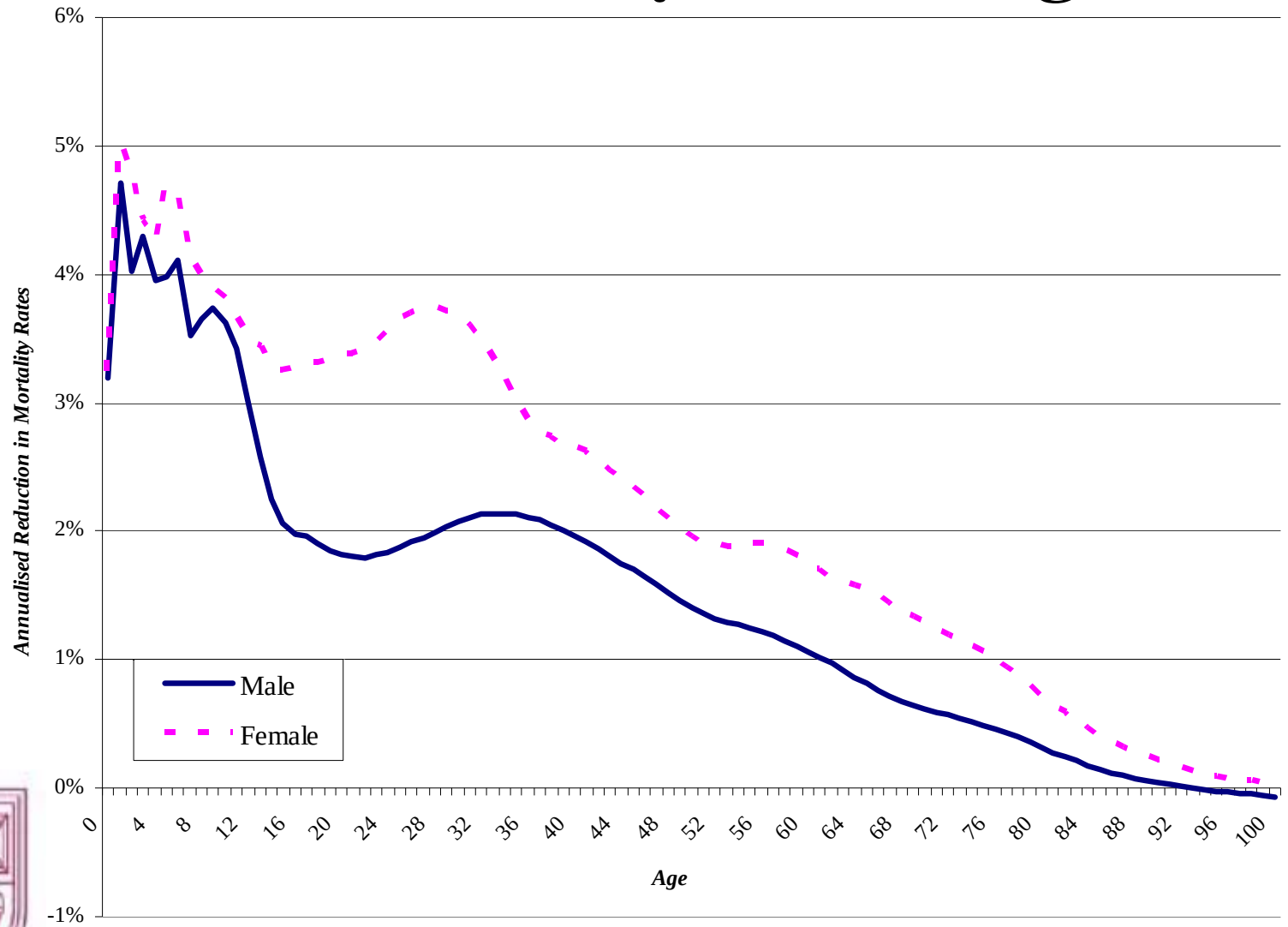


Modern Times Compared

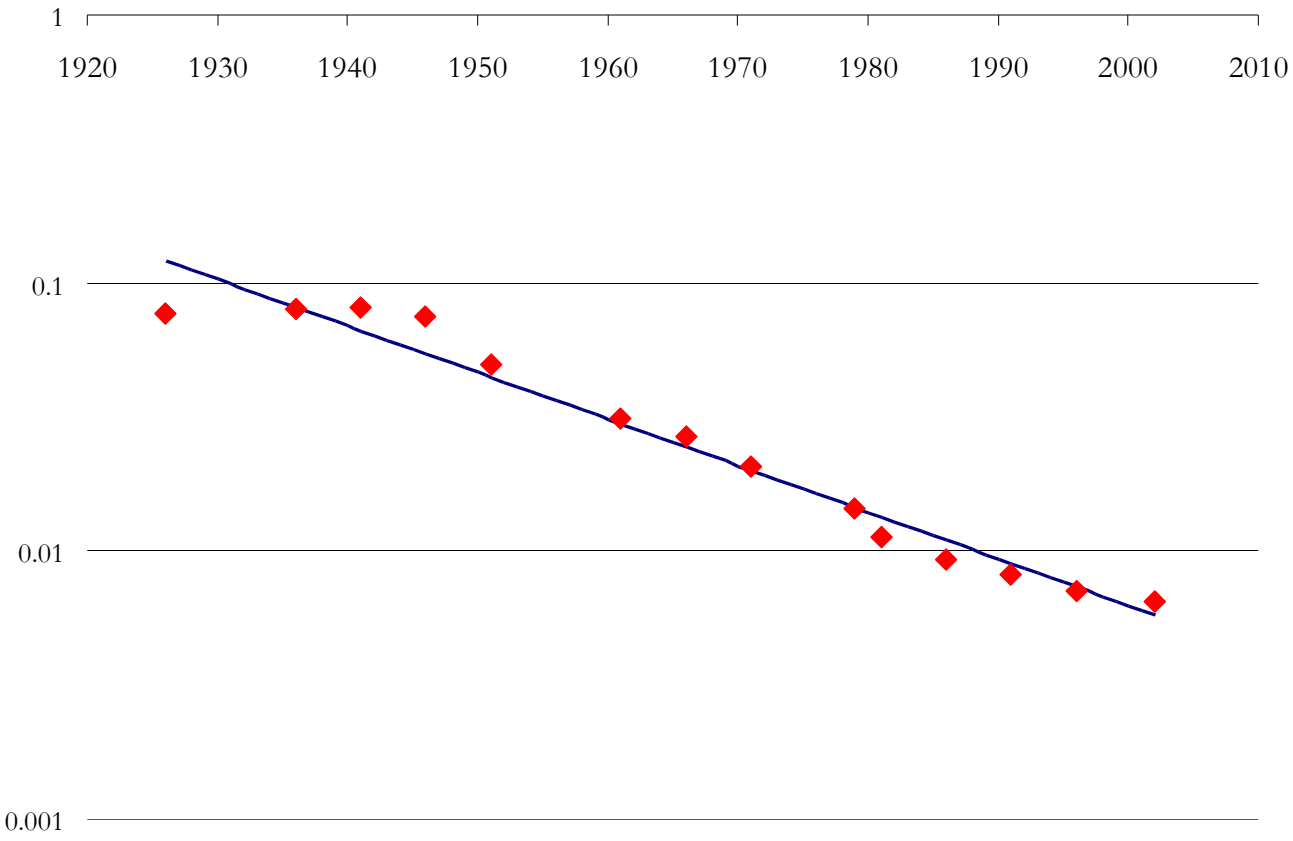




Percentage Fall (p.a.) in Mortality Rate, 1926-2002, by sex and age

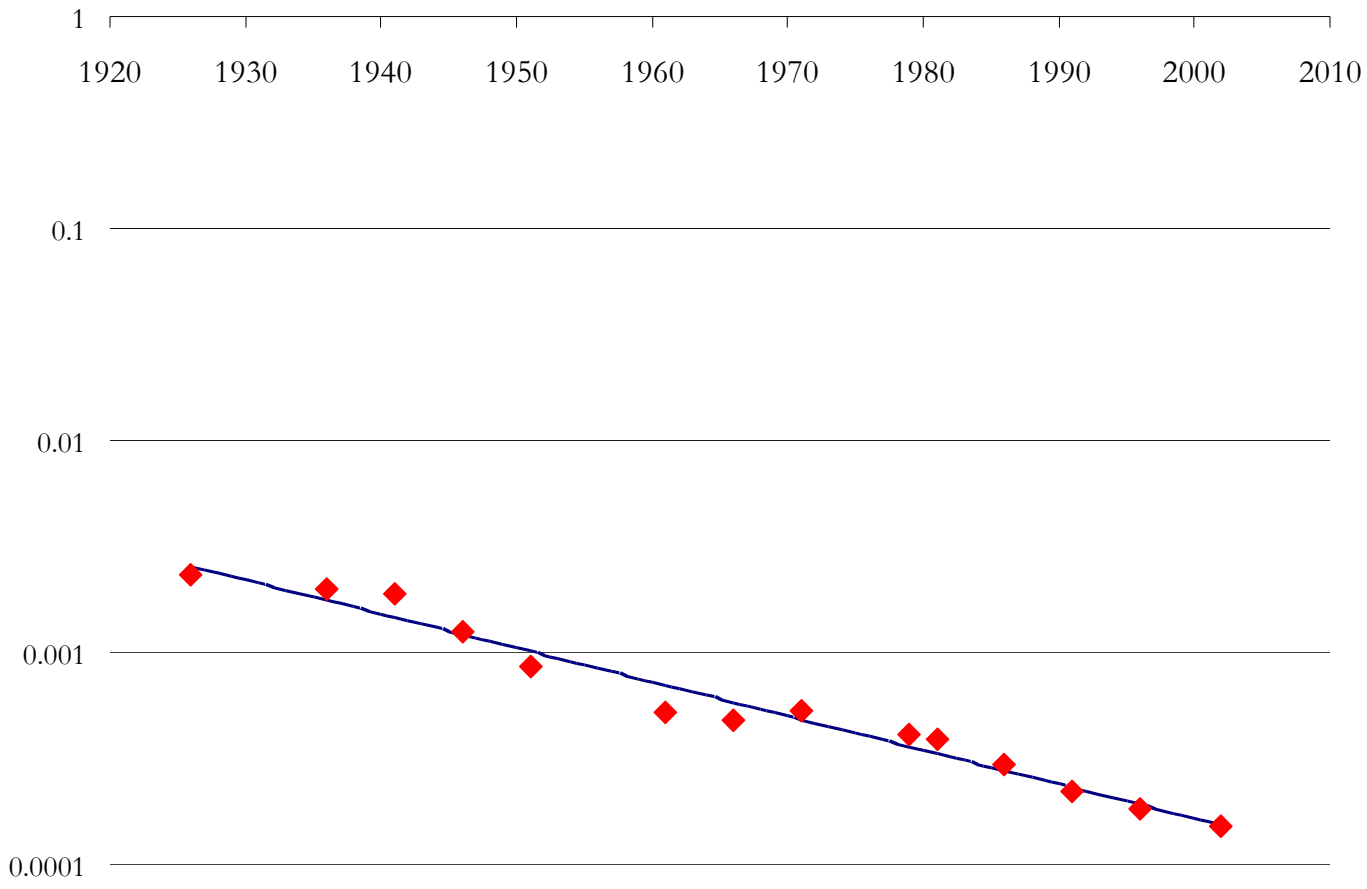


Linear Regression of Log q_x when x=0 (Males)



R^2 is 0.96

Linear Regression of Log q_x when x=7 (Males)



R^2 is 0.97

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Percentage Fall (p.a.) in Irish Male Mortality Rate over Decade Ending

Age	1941	1951	1961	1971	1981	1991	2001
0	-0.39	4.87	4.47	4.02	5.93	3.16	2.13
10	**2.59**	**4.91**	**5.72**	0.40	2.59	6.10	3.14
20	0.70	**6.98**	**6.01**	-2.44	0.20	1.20	-0.17
30	1.24	5.17	**5.87**	**1.34**	**1.22**	-0.51	0.14
40	1.66	3.54	3.63	-0.05	**1.91**	**3.02**	0.42
50	0.88	1.53	1.87	-0.31	**1.19**	**3.67**	**1.81**
60	0.32	1.11	0.52	-0.53	0.80	**2.11**	**3.30**
70	-0.10	0.28	0.66	-0.66	0.27	1.28	**3.02**
80	-1.16	-0.96	0.83	0.27	-0.07	1.16	1.68
90	0.56	-2.40	-0.78	1.23	0.18	0.46	0.95

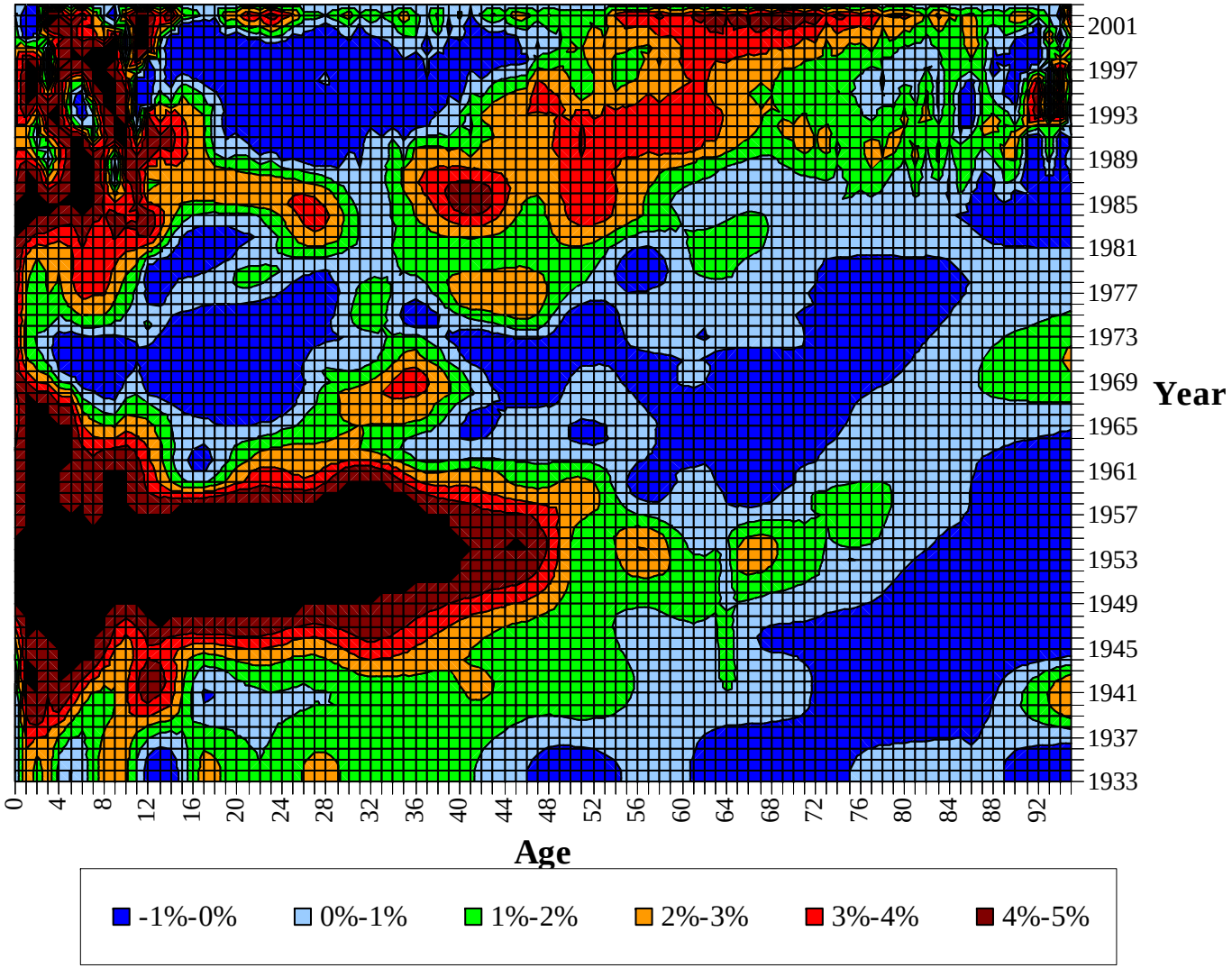
Annualised rate of improvement over each five-year period, 1931-2001, by quinquennial ages, Irish Males

Year	*1931*	*1936*	*1941*	*1946*	*1951*	*1956*	*1961*	*1966*	*1971*	*1976*	*1981*	*1986*	*1991*	*1996*	*2001*
Age															
0	-0.3	-0.3	-0.5	1.6	8.1	4.5	4.5	3.1	5.0	4.5	7.3	3.8	2.5	2.9	1.3
5	0.0	0.0	4.1	8.9	9.3	4.9	4.9	6.0	-3.2	3.0	2.3	6.7	6.9	1.9	10.3
10	2.2	2.2	3.0	2.1	7.6	5.7	5.7	1.8	-1.0	1.6	3.6	3.1	6.7	5.9	0.3
15	0.4	0.4	2.2	2.6	12.8	9.2	-0.6	-0.6	-3.5	2.3	-0.5	2.8	5.9	3.2	-8.8
20	1.4	1.4	0.0	3.4	10.5	10.1	1.6	-1.6	-3.2	0.4	0.0	2.7	-0.2	-1.4	-0.3
25	1.8	1.8	0.5	2.8	8.7	8.9	3.5	0.7	-1.0	-1.4	1.6	3.4	-2.5	-2.5	-0.1
30	1.9	1.9	0.6	3.9	6.4	8.0	3.7	4.0	-1.4	2.2	0.2	0.7	1.9	-8.0	1.7
35	1.6	1.6	1.0	3.8	5.4	6.8	2.0	3.1	4.6	-1.6	0.6	2.0	-4.2	0.9	2.7
40	1.3	1.3	2.1	2.0	5.0	5.7	1.5	0.3	-0.4	3.7	0.1	4.5	2.1	-3.1	1.4
45	0.2	0.2	2.0	1.1	4.2	5.2	1.1	1.8	-3.4	3.3	1.1	2.9	2.9	0.5	0.9
50	-0.4	-0.4	2.1	1.1	2.0	1.9	1.8	0.0	-0.6	0.8	1.6	3.6	3.0	0.8	2.6
55	0.0	0.0	1.3	0.8	1.2	2.5	-0.1	0.9	-0.4	0.5	-0.5	2.7	3.6	1.2	3.5
60	0.1	0.1	0.5	0.8	1.5	0.1	0.9	-1.2	0.1	0.5	1.1	0.6	3.9	3.2	2.9
65	-0.9	-0.9	1.2	-0.1	1.6	1.2	-0.9	-0.6	-0.6	1.0	1.1	0.2	3.2	1.7	4.0
70	-1.2	-1.2	0.9	-0.5	1.1	1.1	0.2	-1.6	0.2	0.3	0.2	0.5	2.0	1.4	4.4
75	0.0	0.0	-1.8	-1.3	1.1	1.0	1.0	-0.1	-0.6	-0.7	0.4	0.4	2.4	0.6	3.4
80	0.7	0.7	-3.0	-1.8	-0.3	0.9	0.9	0.7	-0.2	-0.5	0.3	0.0	2.1	1.0	2.3
85	0.5	0.5	-1.4	-1.6	-2.3	0.2	0.2	0.9	0.8	-0.1	0.2	-0.3	2.0	0.5	1.5
90	-0.2	-0.2	1.3	-1.7	-3.1	-0.8	-0.8	0.8	1.7	0.3	0.1	-0.6	1.9	0.5	-0.3
95	-1.0	-1.0	4.3	-2.3	-3.6	-1.4	-1.4	0.5	2.6	0.6	0.0	-1.0	1.3	-0.5	5.5
95	-1	-1	4.3	-2.3	-3.6	-1.4	-1.4	0.5	2.6	0.6	0	-1	1.3	-0.5	5.5

Annualised rate of improvement over each five-year period, 1931-2001, by quinquennial ages, Irish Males, only >3% shown

Year	*1931*	*1936*	*1941*	*1946*	*1951*	*1956*	*1961*	*1966*	*1971*	*1976*	*1981*	*1986*	*1991*	*1996*	*2001*
Age															
0					8.1	4.5	4.5	3.1	5.0	4.5	7.3	3.8			
5			4.1	8.9	9.3	4.9	4.9	6.0				6.7	6.9		10.3
10			3.0		7.6	5.7	5.7				3.6	3.1	6.7	5.9	
15					12.8	9.2							5.9	3.2	
20				3.4	10.5	10.1									
25					8.7	8.9	3.5					3.4			
30				3.9	6.4	8.0	3.7	4.0							
35				3.8	5.4	6.8		3.1	4.6						
40					5.0	5.7				3.7		4.5			
45					4.2	5.2				3.3					
50												3.6			
55													3.6		3.5
60													3.9	3.2	
65													3.2		4.0
70															4.4
75															3.4
80															
85															
90															
95			4.3												5.5

Map of Improvements in Male Mortality (% pa average fall over 5 years centred in calendar year shown)



Cohort Effect: Data-mining?

- Cohort effect
  - [UK] Office of Population Censuses & Surveys (1995), Willets (1999, 2004), ONS (2008), Barker's fetal origin (1998,) Ben-Schlomo & Kuh (2002), Finch & Crimmins (2004),…
- Rediscovered
  - Derrick (1927), Kermack et al. (1934)
  - Fell out of use in meantime (Kuh & Davey Smith 1993)
- Cumulative impact of lifetime exposures (environment, diet, etc) on mortality by age
- But is it explained simply by smoking habit pattern in population over time? (see Murphy (2010))
- Inimical environments do not seem to leave lasting damage…

Irish Cohort Mortality: (Males)
Pre, During and Post Great Famine

	1871	1882	1891	1901	1911	1926
	qx	qx	qx	qx	qx	
7	0.0051	0.0044	0.0037	0.0037	0.0032	0.001893
12	0.0029	0.0027	0.0026	0.0026	0.0022	0.001229
17	0.0050	0.0046	0.0044	0.0044	0.0037	0.002673
22	0.0078	0.0073	0.0073	0.0068	0.0055	0.003895
27	0.0087	0.0084	0.0088	0.0083	0.0067	0.003938
32	0.0091	0.0091	0.0096	0.0094	0.0075	0.004502
37	0.0093	0.0095	0.0100	0.0100	0.0080	0.00504
42	0.0105	0.0110	0.0112	0.0113	0.0093	0.006205
47	0.0126	0.0136	0.0132	0.0133	0.0115	0.008687
52	0.0160	0.0179	0.0172	0.0171	0.0155	0.012166
57	0.0205	0.0240	0.0232	0.0226	0.0218	0.018223
62	0.0301	0.0344	0.0339	0.0324	0.0291	0.027748
67	0.0467	0.0502	0.0508	0.0475	0.0371	0.041003
72	0.0697	0.0728	0.0752	0.0707	0.0524	0.06301
77	0.1012	0.1047	0.1104	0.1052	0.0782	0.098765
82	0.1409	0.1498	0.1552	0.1528	0.1178	0.14024
87	0.1906	0.2144	0.2116	0.2188	0.1784	0.186047

Irish Cohort Mortality: (Females) Pre, During and Post Great Famine

	1871	1882	1891	1901	1911	1926
	qx	qx	qx	qx	qx	qx
7	0.0051	0.0048	0.0042	0.0047	0.0037	0.0025
12	0.0033	0.0033	0.0035	0.0036	0.0029	0.0020
17	0.0048	0.0050	0.0054	0.0054	0.0045	0.0038
22	0.0058	0.0063	0.0065	0.0061	0.0054	0.0049
27	0.0072	0.0077	0.0081	0.0073	0.0064	0.0058
32	0.0083	0.0089	0.0092	0.0085	0.0073	0.0060
37	0.0088	0.0094	0.0094	0.0095	0.0081	0.0068
42	0.0096	0.0104	0.0103	0.0107	0.0093	0.0080
47	0.0106	0.0120	0.0120	0.0120	0.0107	0.0095
52	0.0136	0.0159	0.0162	0.0157	0.0145	0.0132
57	0.0187	0.0225	0.0233	0.0220	0.0213	0.0192
62	0.0291	0.0338	0.0354	0.0331	0.0284	0.0274
67	0.0467	0.0515	0.0543	0.0505	0.0350	0.0375
72	0.0699	0.0752	0.0799	0.0751	0.0492	0.0543
77	0.1006	0.1068	0.1143	0.1098	0.0742	0.0806
82	0.1382	0.1487	0.1568	0.1551	0.1124	0.1157
87	0.1842	0.2046	0.2089	0.2143	0.1703	0.1622

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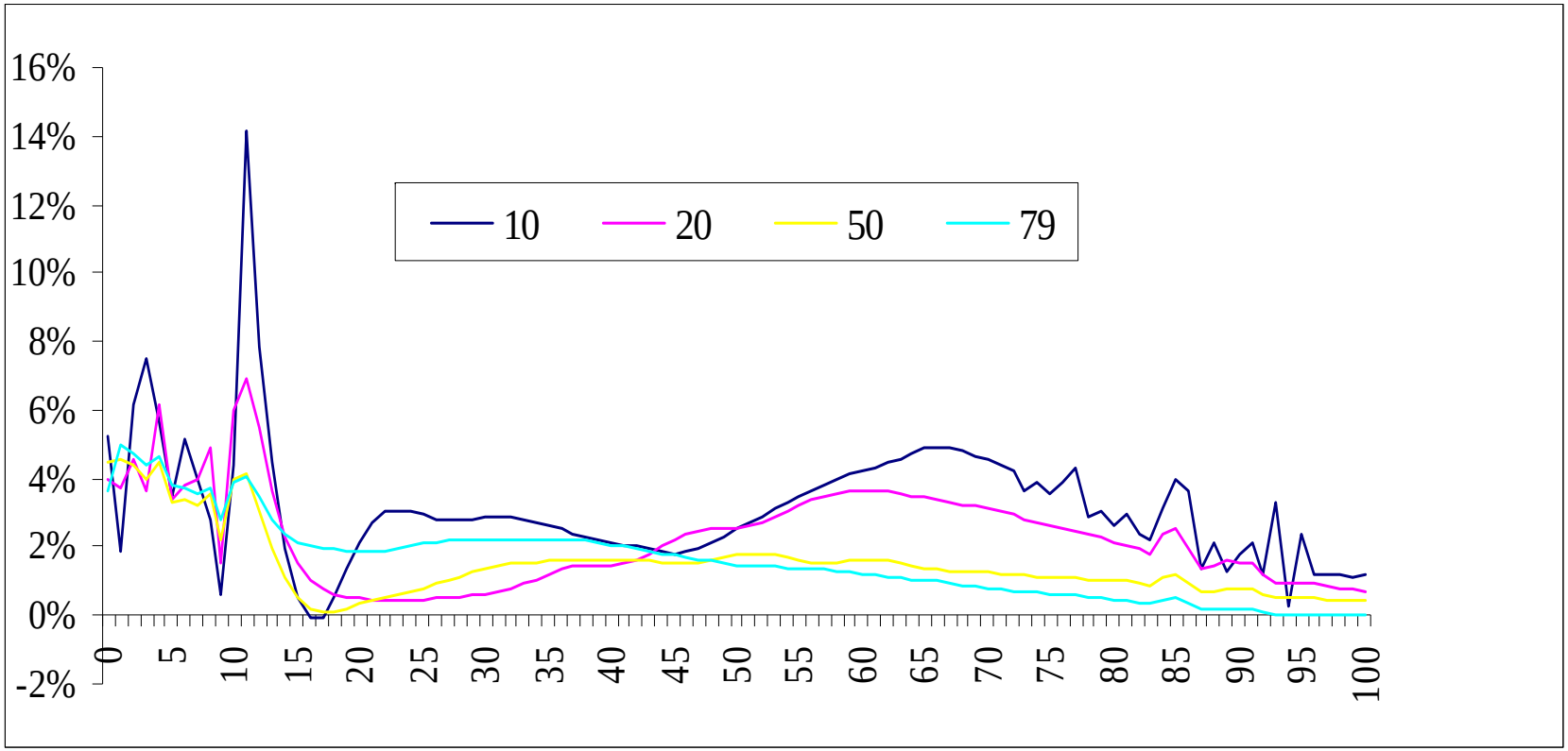
Annualised Average Rate of Decline with age over 10 Years, 20 Years, 50 Years and 79 Years Ending 2005, Irish Males



Projection Method 1: Logarithmic Method

	Based on log-linear trend over *n* years ending 2005, where *n*=	Period LE in 2021		Period LE in 2041		Cohort LE in 2006	
		Age 0	Age 65	Age 0	Age 65	Age 0	Age 65
Males	10 Years	82.20	20.37	87.42	23.37	93.40	19.59
	20 Years	80.85	19.29	85.08	22.50	90.78	18.68
	50 Years	78.95	17.70	81.34	19.27	84.52	17.42
	Since 1926 (79 Years)	78.48	17.10	80.21	17.90	81.63	16.86
Females	10 Years	85.51	22.83	89.65	26.18	94.94	22.62
	20 Years	84.74	22.16	88.31	25.01	93.47	21.99
	50 Years	83.92	21.26	86.58	23.16	90.09	21.05
	Since 1926 (79 Years)	83.29	20.58	85.18	21.70	87.15	20.33

Method 2: Targeting Method
Official Mortality Projections for Ireland (2008)

Key assumptions:

- Current rates of improvement fall to long-term rate of 1.5% p.a. for all ages up 90 years.
- Fall in current rate to long term rate Linear over next 25 years
- No improvements assumed after 100 years of age
- Between age 90 years and 100 years of age, rate of improvement in each future calendar year found by interpolating between rate by age at 90 and 100.

	Parameter	*Period LE in 2021*		*Period LE in 2041*		*Cohort LE in 2006*	
		Age 0	*Age 65*	*Age 0*	*Age 65*	*Age 0*	*Age 65*
Males	Central Projection Basis	83.1	21.1	86.5	23.7	91.0	20.6
	Initial Decline Up 1.0% p.a.	84.1	21.8	87.5	24.5	91.8	21.2
	Initial Decline Down 1.0% p.a.	82.1	20.3	85.4	22.9	90.1	19.8
	Long-term Decline Up 0.5% p.a.	83.4	21.3	87.6	24.6	93.0	20.8
	Long-term Decline Down 0.5% p.a.	82.9	20.9	85.4	22.9	88.6	20.3
Females	Central Projection Basis	85.5	22.9	88.2	25.1	92.5	22.7
	Initial Decline Up 1.0% p.a.	86.3	23.4	89.1	25.6	93.1	23.2
	Initial Decline Down 1.0% p.a.	84.6	22.1	87.4	24.3	91.9	22.1
	Long-term Decline Up 0.5% p.a.	85.7	22.9	89.2	25.8	94.3	22.9
	Long-term Decline Down 0.5% p.a.	85.2	22.5	87.3	24.2	90.4	22.4

See *Whelan (2008) Projecting Population Mortality for Ireland.* Journal of the Statistical and Social Inquiry Society of Ireland, Vol. XXXVII, *(2007/2008)*, available at *www.ssisi.ie.*

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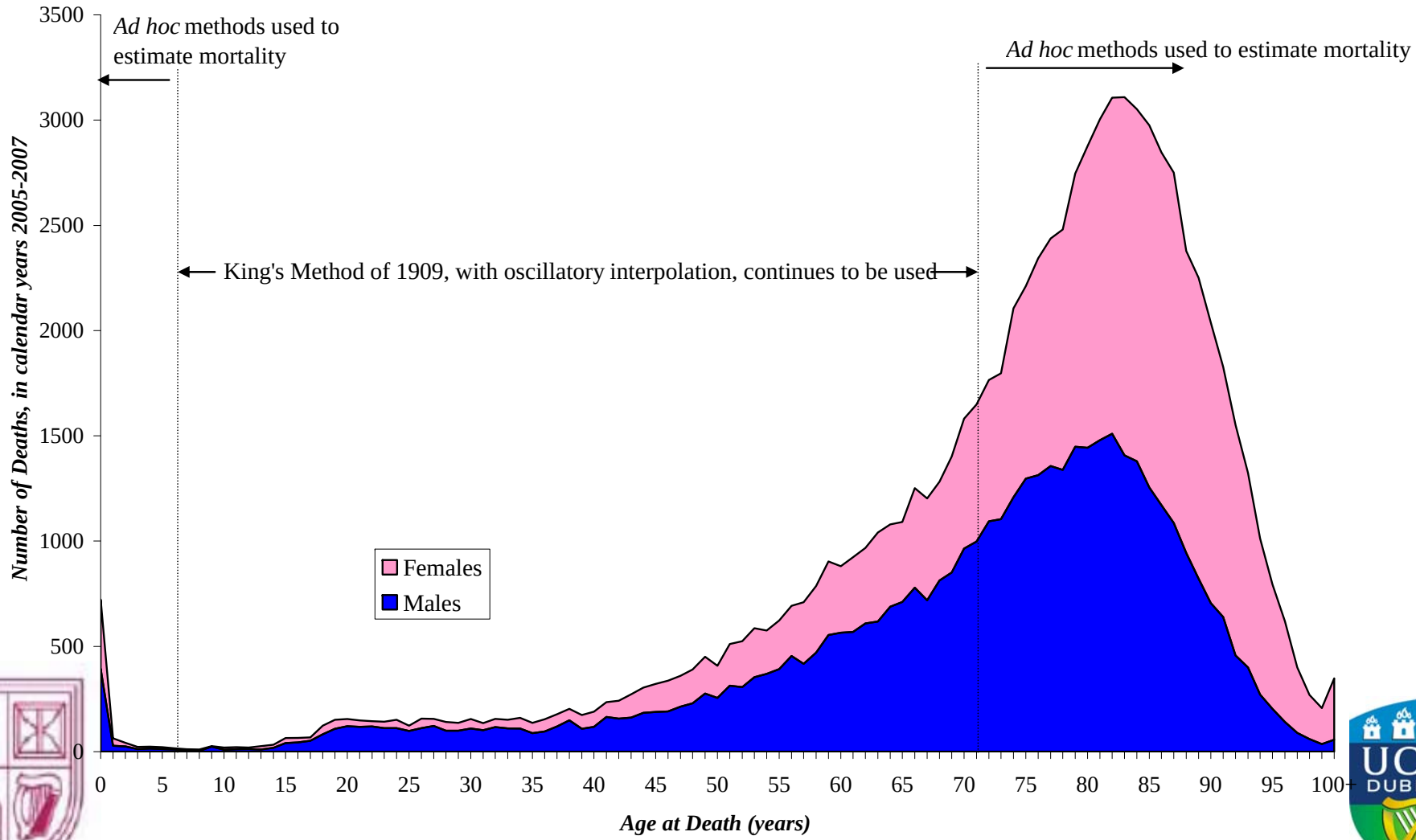
"…as little forecasting as possible should be done…Forecasts should flow from analysis of the past. Anyone who has not bothered with analysis should not forecast."

John Hajnal, 1955, *The prospects of population forecasts*. JASA, 50, 309-22 (Quote is from p. 321)

Number of Deaths, by Age and Gender, Republic of Ireland, Over Three Calendar Years 2005-2007

With Notes on How Mortality Rates Derived therefrom for Irish Life Table 15.

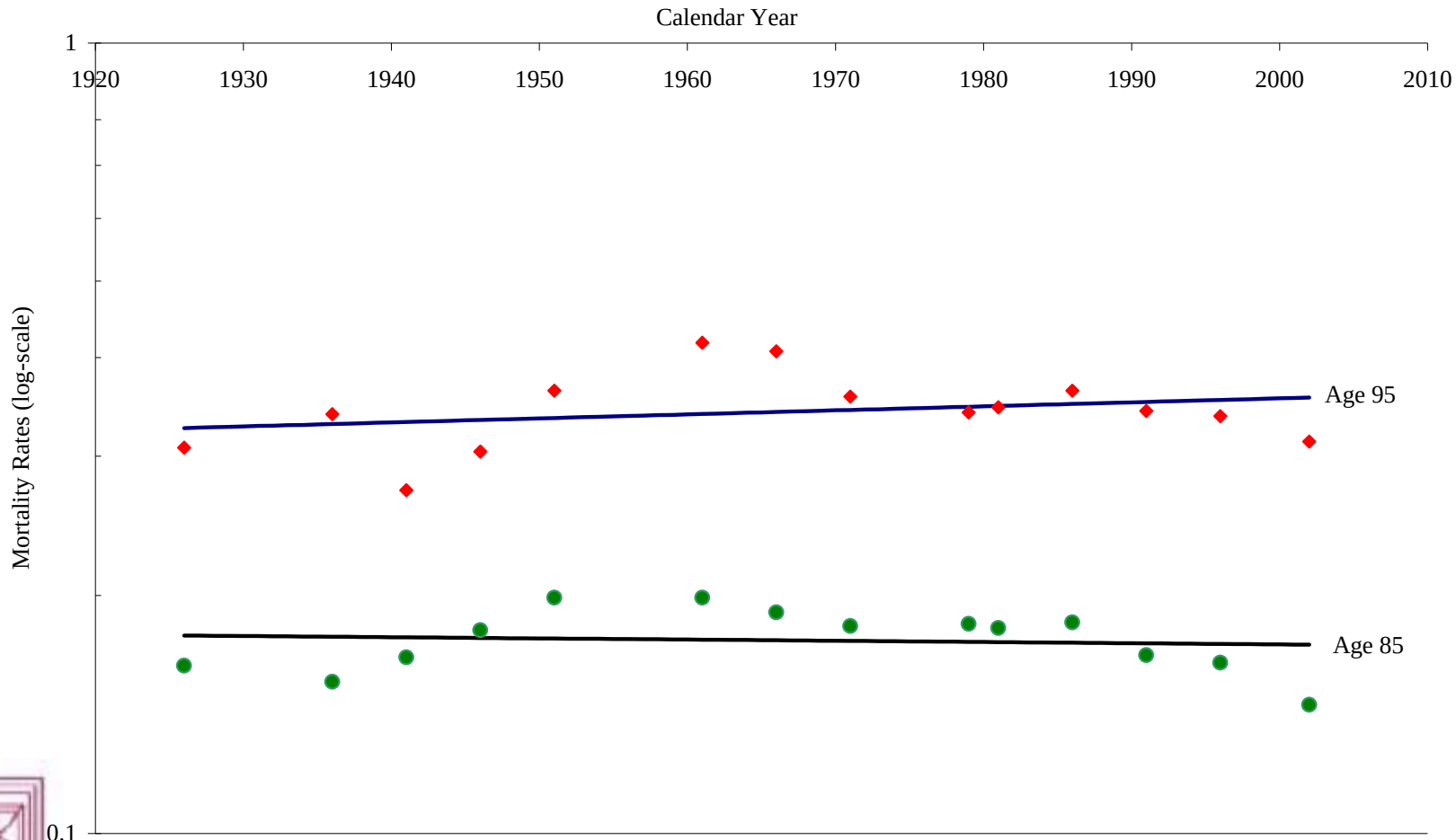


Mortality Projections

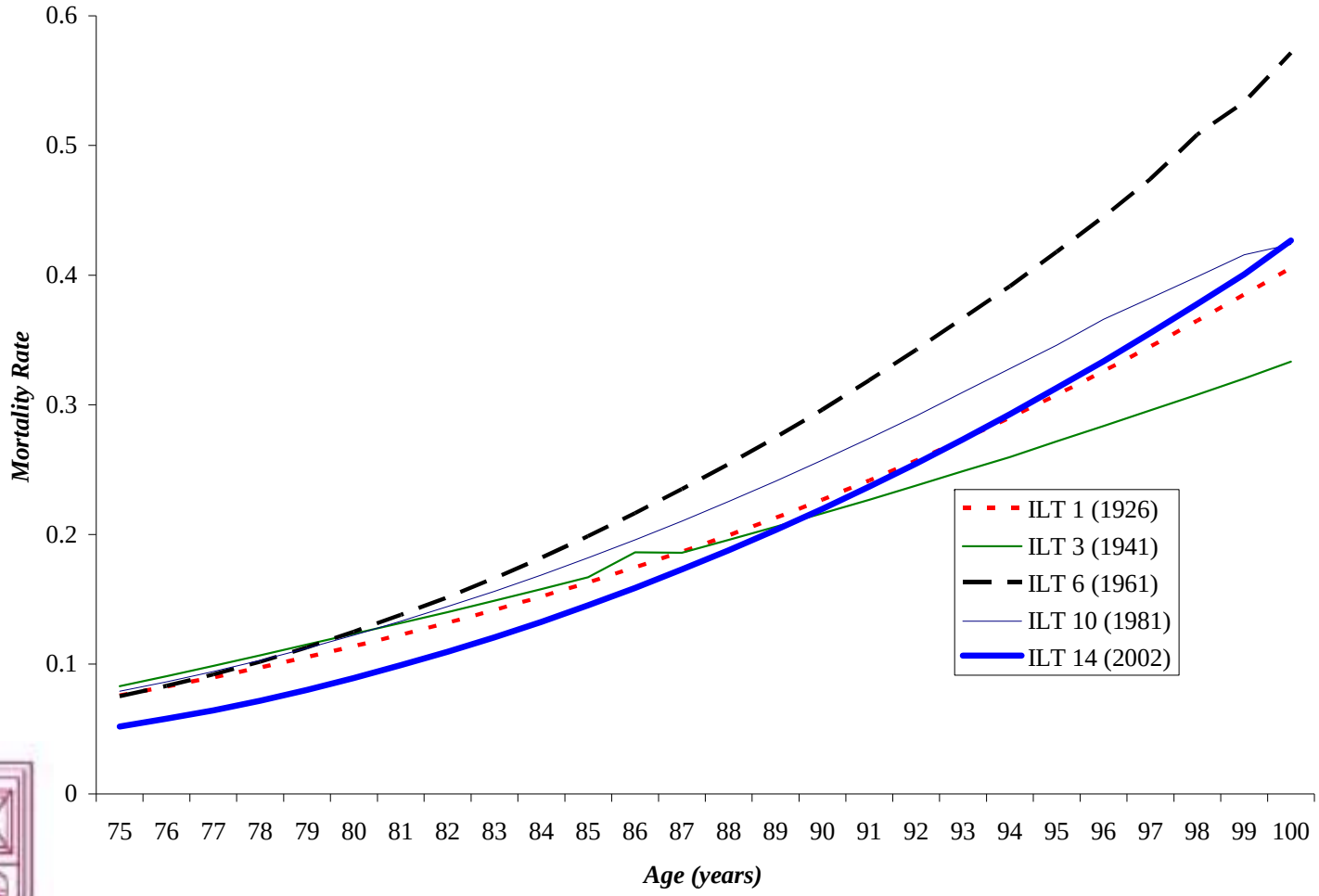
- Projections of future life expectancies depend largely on how mortality at later ages changes.
  - (Period) Life expectancy for male aged 0 by ILT15 (2005-07) is 76.8 years
  - If no mortality
    - prior to age 65 then this life expectancy would increase by 4.8 years
    - prior to age 85 then this life expectancy would increase by 13.2 years

- (CSO) Forecast cohort life expectancy for male borne in 2006 is, coincidentally, 76.8 + 13.2 + 1 =91 years!

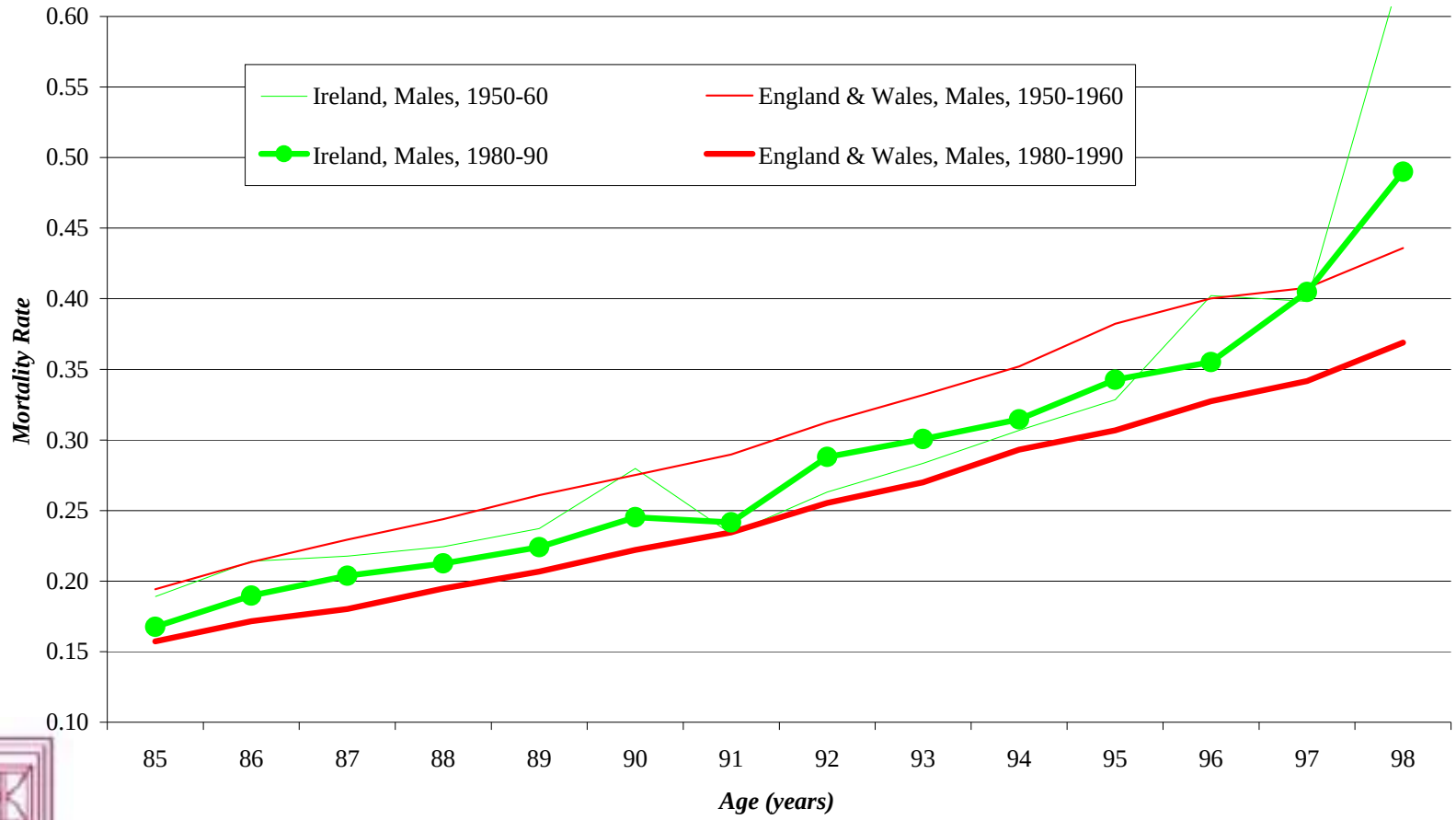
Linear Regression of Log q_x when x=85 and 95 (Males)



3. Mortality Curves at older ages from Irish Life Tables, Male, 1926-2002



Comparison of Mortality Rates for Males ages 85 to 98 years, Ireland and England & Wales over decades 1950-60 and 1980-90.



Graduation Formulae (correcting for type 3 error)

Classic Laws

Gompertz's Law (Gompertz (1825)): $\mu_x = ae^{bx}$

Makeham's Law (Makeham (1860)): $\mu_x = c + ae^{bx}$

Perks's Law (or Logistic Model) (Perks (1932)): $\mu_x = c + \frac{ae^{bx}}{1+\alpha e^{bx}}$

Weibull's Law (Weibull (1951)): $\mu_x = ax^b$

Pragmatic models (based on goodness of fit for older ages over many mortality experiences):

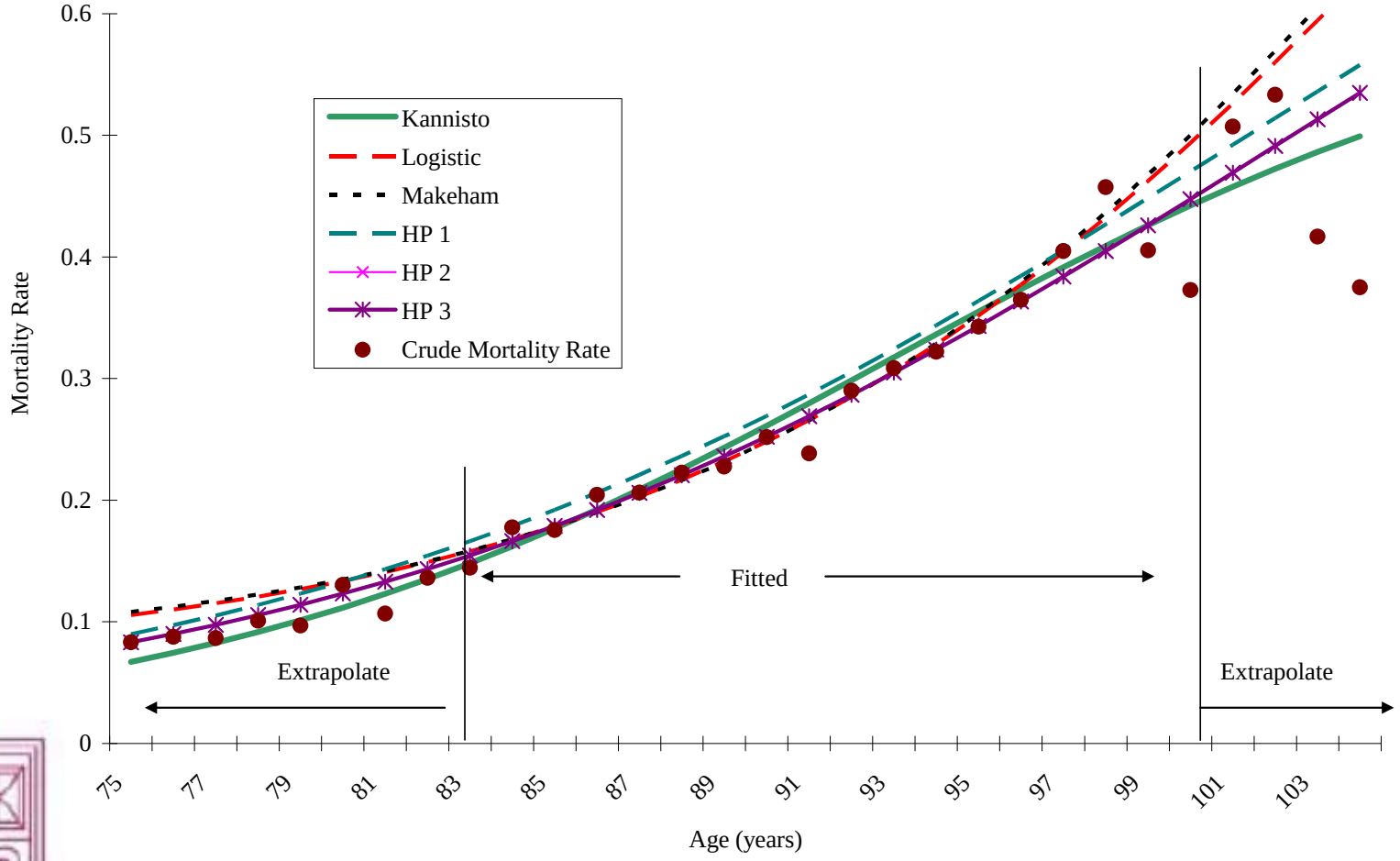
Heligman-Pollard 1 (Heligman & Pollard (1980)): $q_x = \frac{GH^x}{1+GH^x}$

Heligman-Pollard 2: $q_x = \frac{GH^x}{1+KGH^x}$

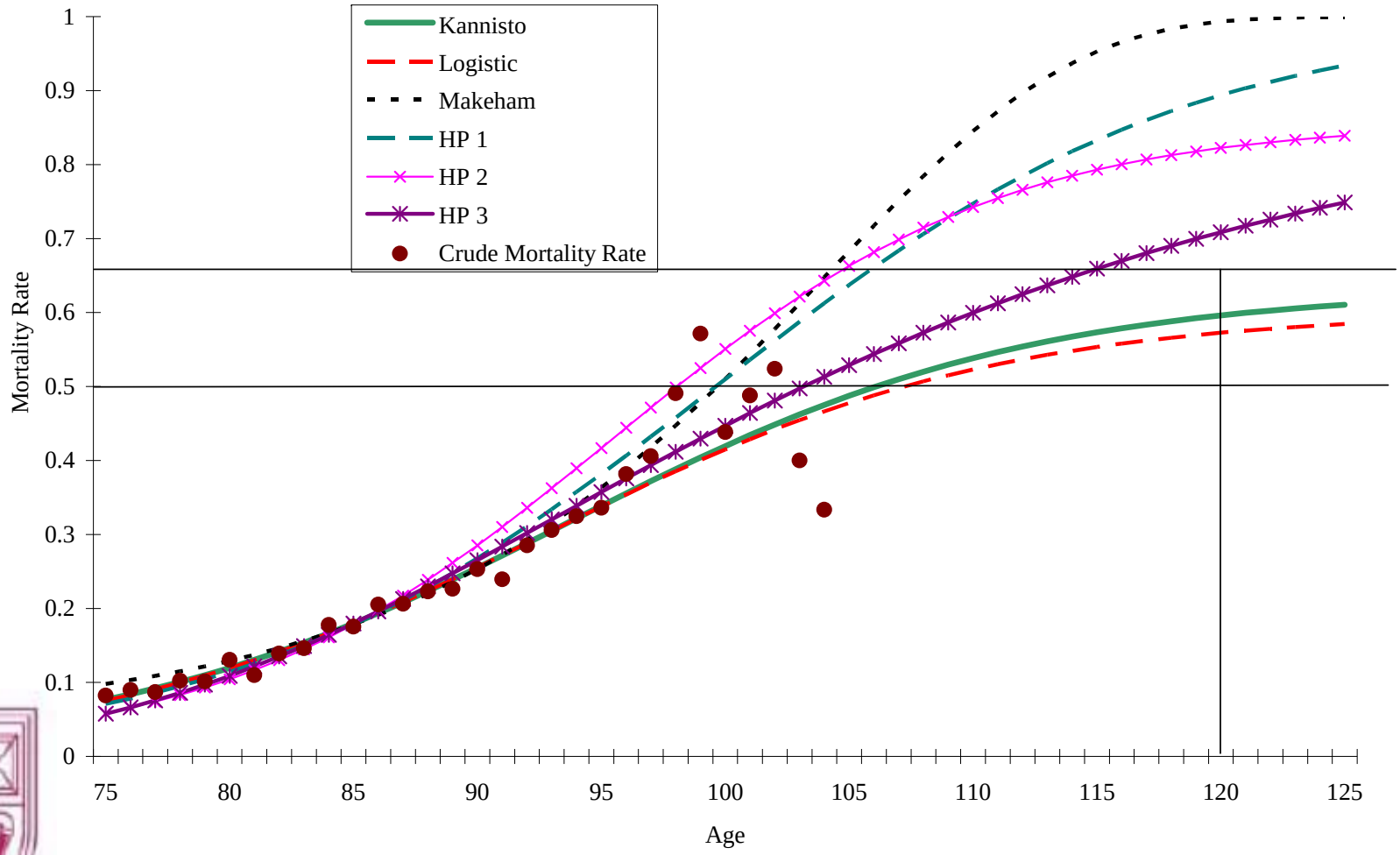
Heligman-Pollard 3: $q_x = \frac{GH^{x^\kappa}}{1+GH^{x^\kappa}}$

Perks's Law-Kannisto Version (Thatcher *et al.* (1998)) $\mu_x = \frac{ae^{bx}}{1+ae^{bx}}$

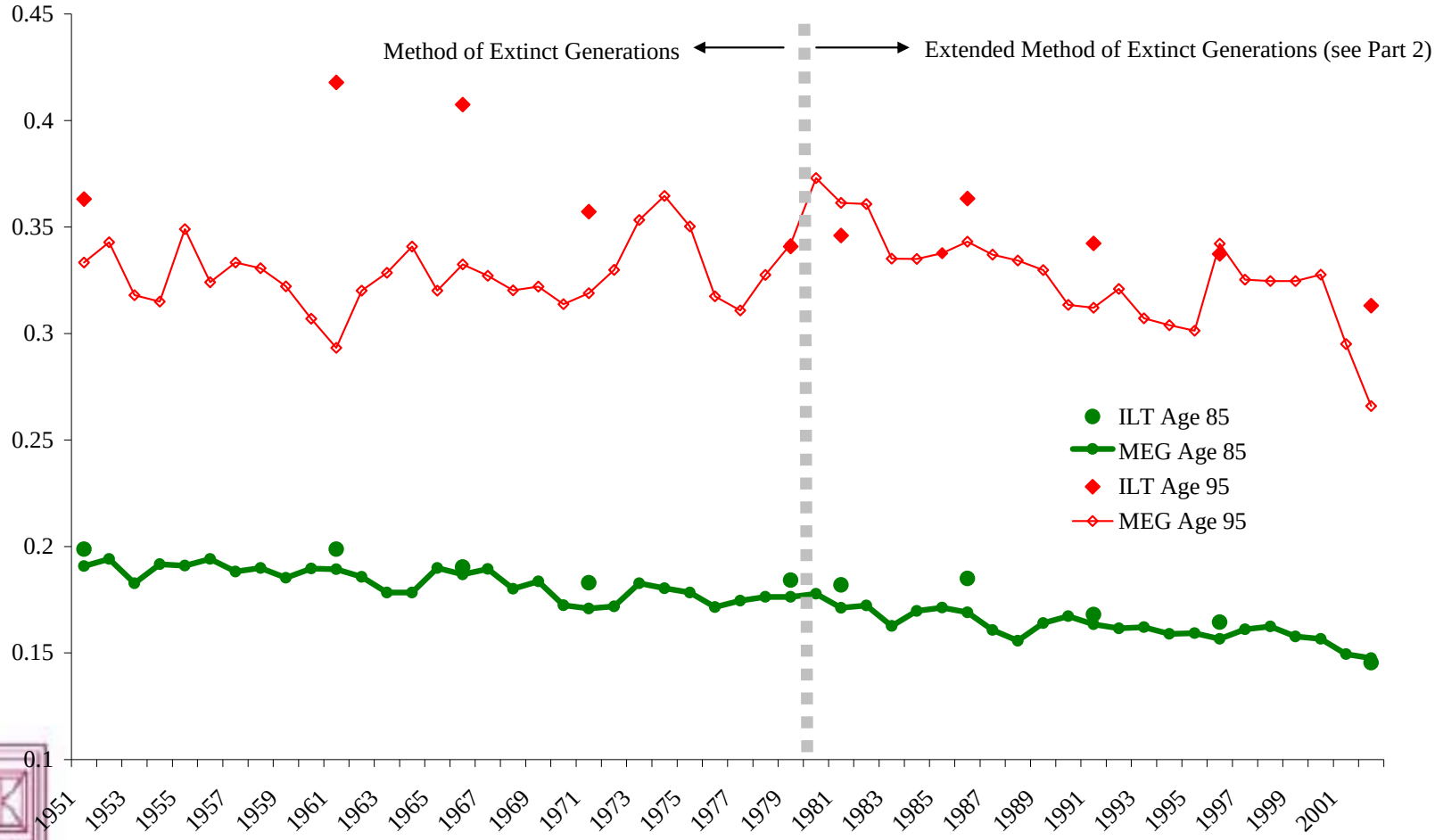
Mortality laws fit to Crude Mortality Rates (by method of extinct generations), Irish Male cohorts born, 1885-1995



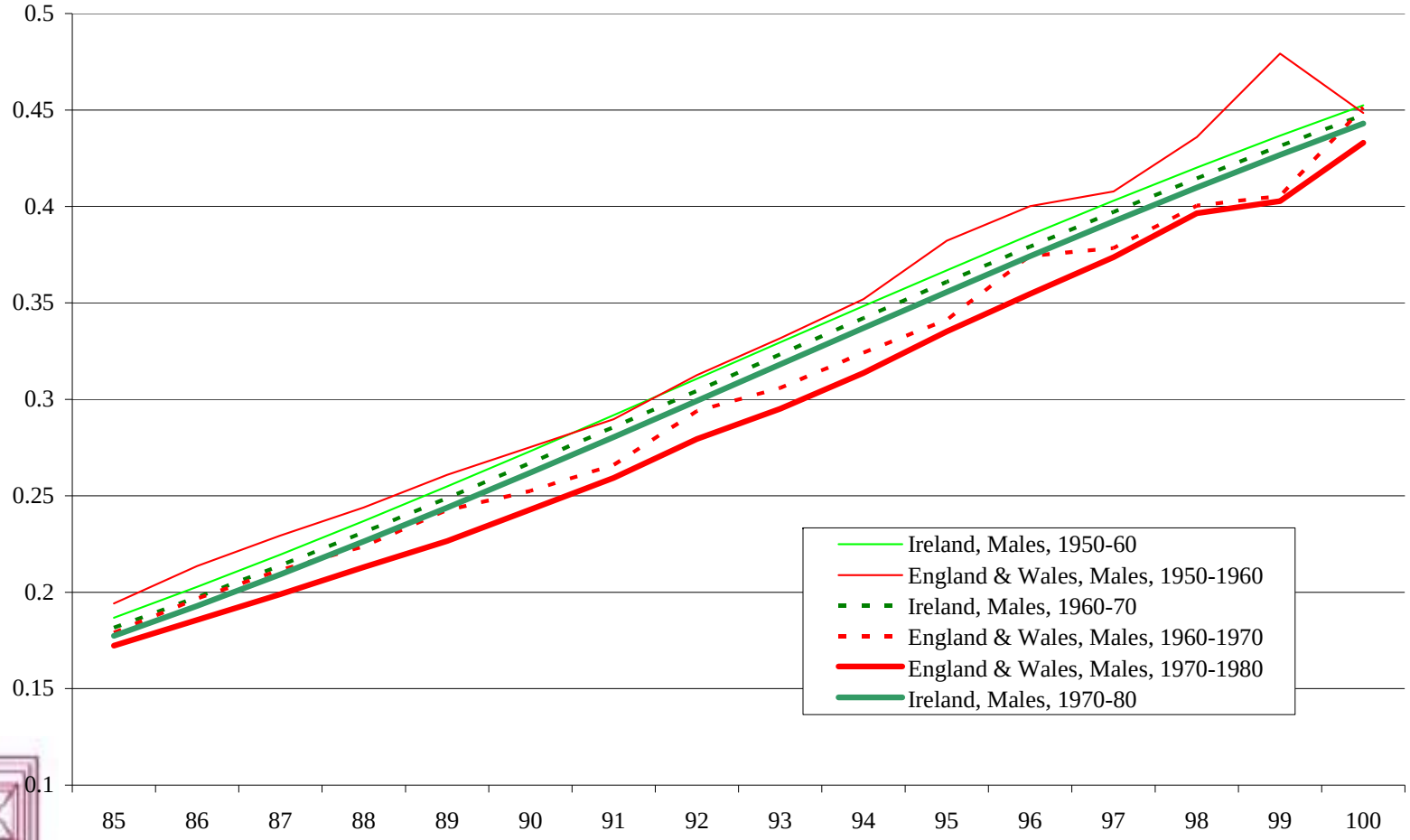
Mortality laws fit to Crude Mortality Rates, Irish Males, 1970-1980 and compared with crude rates (by method of extinct generations), By Minimised Weighted Relative Error in Age Range 83-100 years and Extrapolated



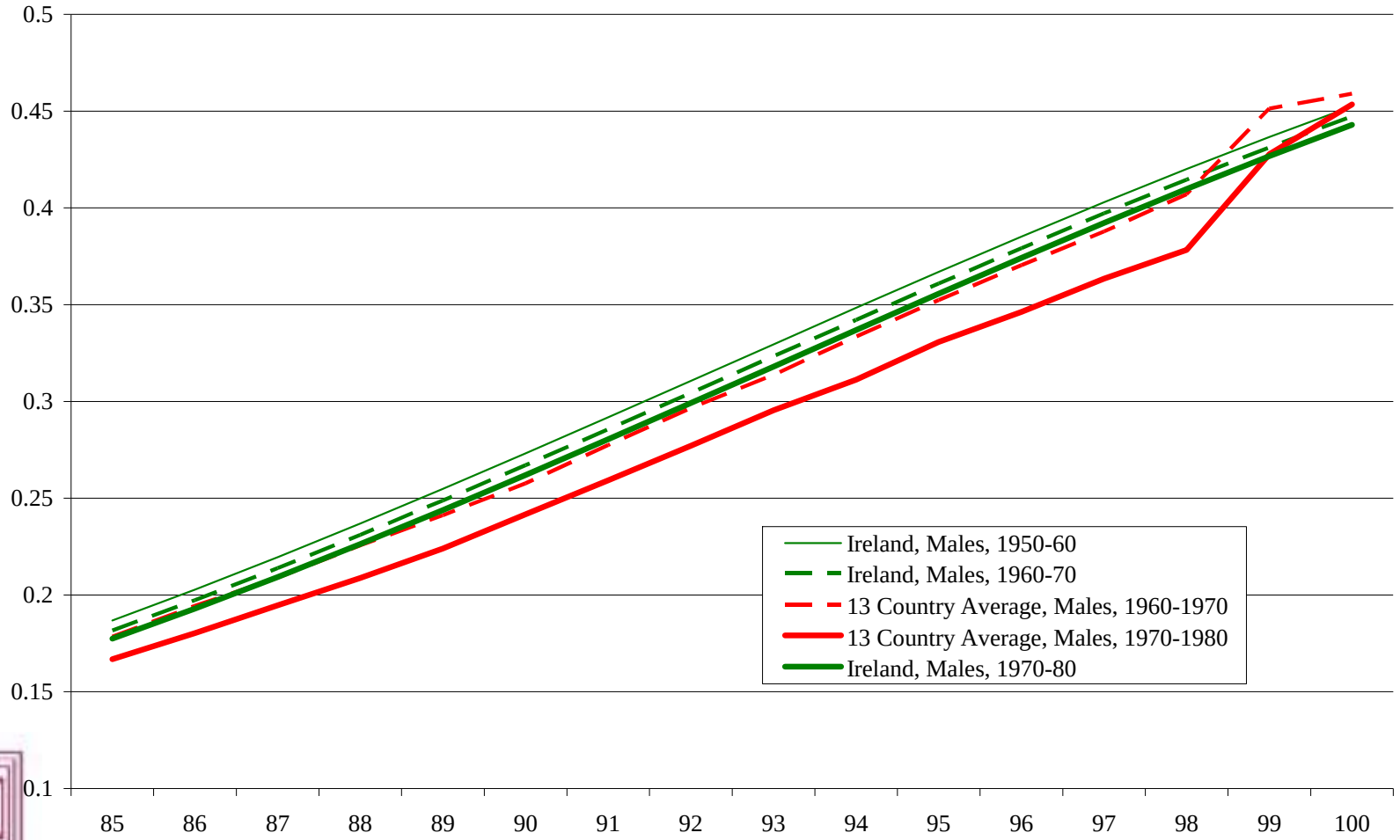
Re-estimating Irish Mortality at Advanced Ages



Mortality Rates for Males ages 85 to 100 years, Irish Experience Graduated, compared with crude rates in England & Wales, over decades 1950-60, 1960-70, and 1970-80



Comparison of Mortality Rates for Males ages 85 to 100 years, Ireland and 13 Developed Country Average over decades 1950-1960, 1960-70 and 1970-80



Outline

- Mortality in Context
- Irish Mortality: Past Trends
  - Long-term, by calendar year
  - Long-term, by year of birth
- Projecting Mortality Rates
  - Method 1: Logarithmic Method
  - Method 2: Targeting Approach
- Trends in Mortality at Advanced Ages in Ireland
  - Form of Curve: does mortality rate limit to 1?
- Snapshot of Mortality by Social Class
- The Decisions
  - Resource Allocation
  - The 4th Stage of Human Life

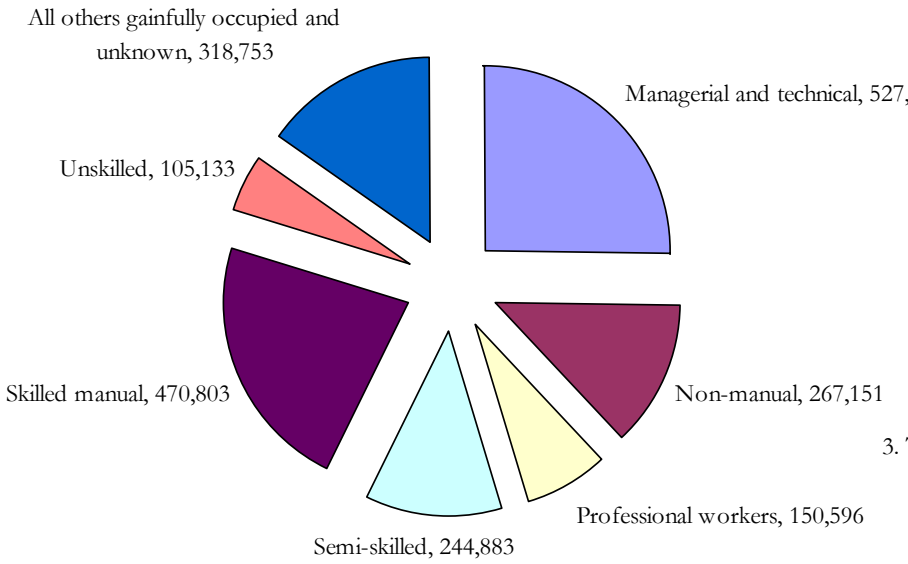
Mortality by Social Class in 2006

- Last week CSO kindly provided me with deaths and exposed to risk in census year 2006 broken down by
  - Gender
  - Age
  - Stage left full-time education (primary, secondary, third-level, not stated)
  - By occupation (professional, managerial and technical, other non-manual, skilled manual, semi-skilled manual, unskilled, other employees)

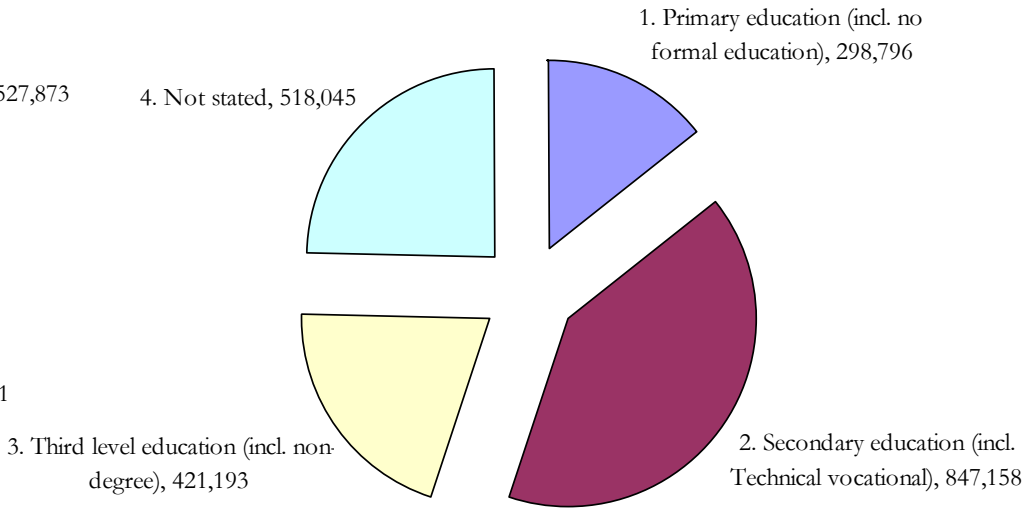
- So, for one of first times, we can see variation of population mortality in Ireland

Breakdown of Irish Males, 2006

By Occupation

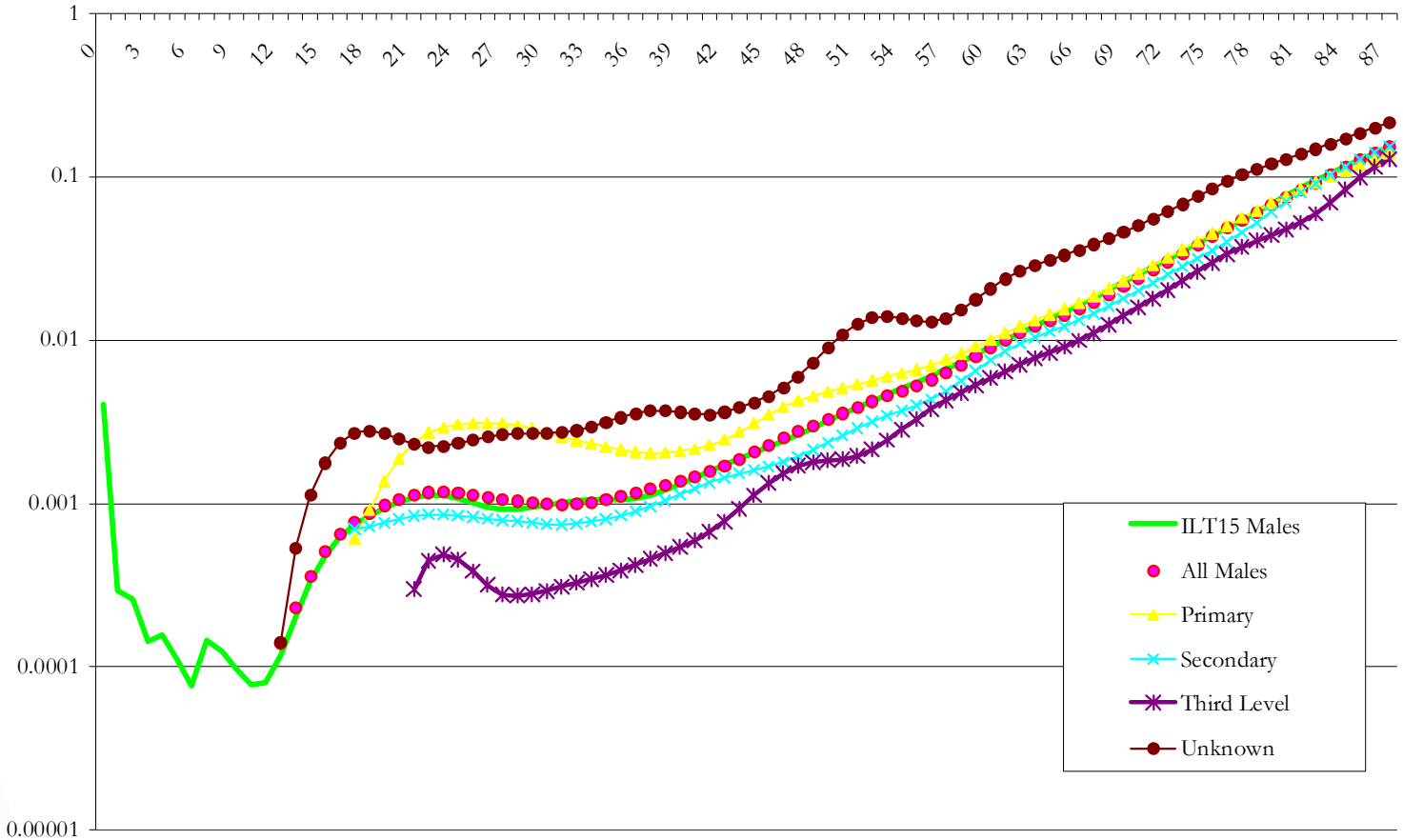


By Education



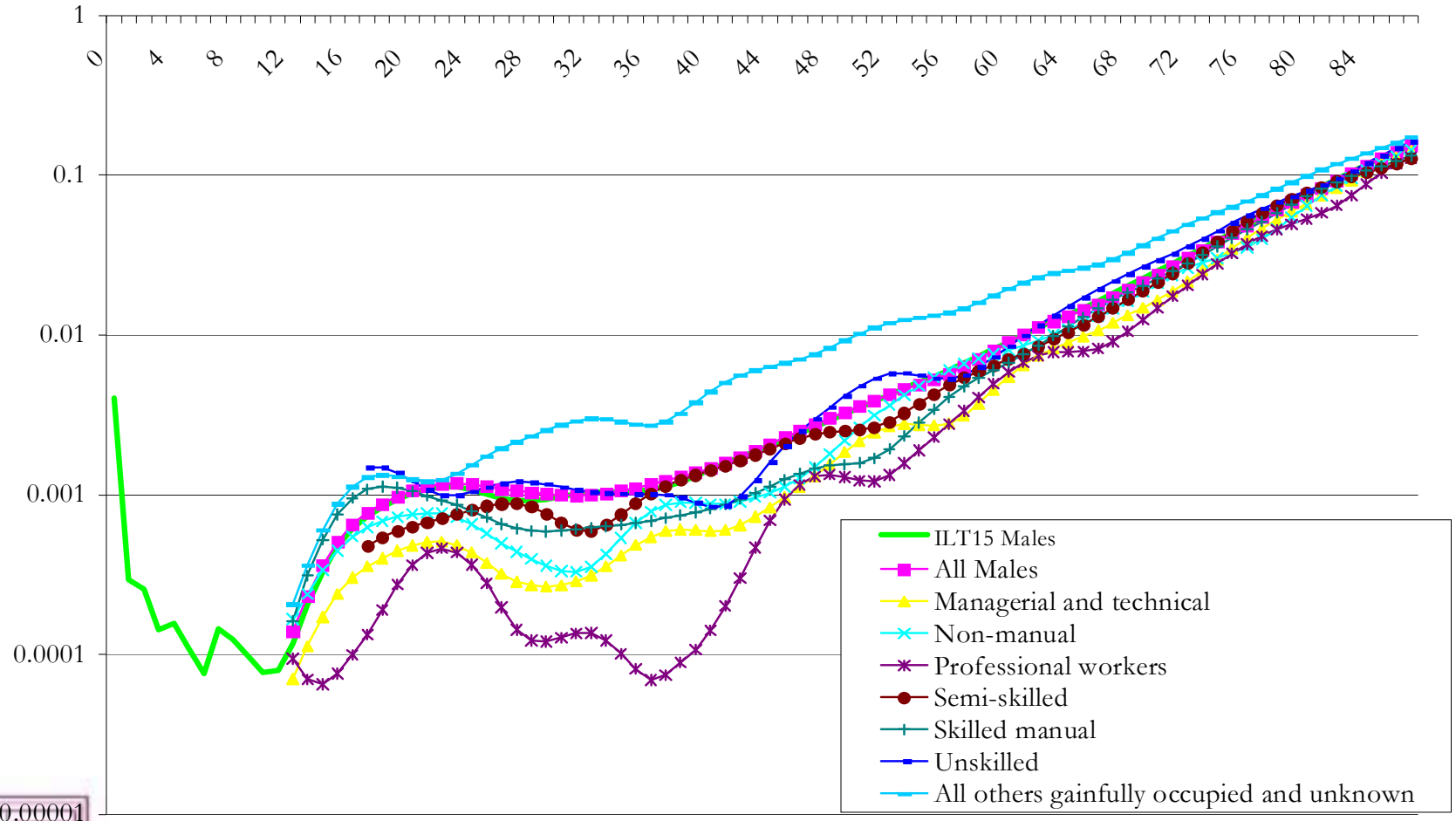
Mortality Curves: By Education

Males in Ireland 2006



Mortality Curves: By Occupation

Males in Ireland 2006



Life Expectancy from Age 18

Males in Ireland 2006

		Years +/-
All Males	59.4	
Managerial and technical	62.7	3.3
Non-manual	61.4	2
Professional workers	64	4.6
Semi-skilled	60.6	1.2
Skilled manual	61.2	1.8
Unskilled	58.6	-0.8
All others gainfully occupied and unknown	52.7	-6.7

		Years +/-
All Males	59.4	
Primary	57.2	-2.2
Secondary	61.0	1.6
Third Level	63.5	4.2
Unknown	51.0	-8.3

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Immediate Improvement Possible

Nolte & McKee (2008) studied for preventable deaths up to age 75 years,

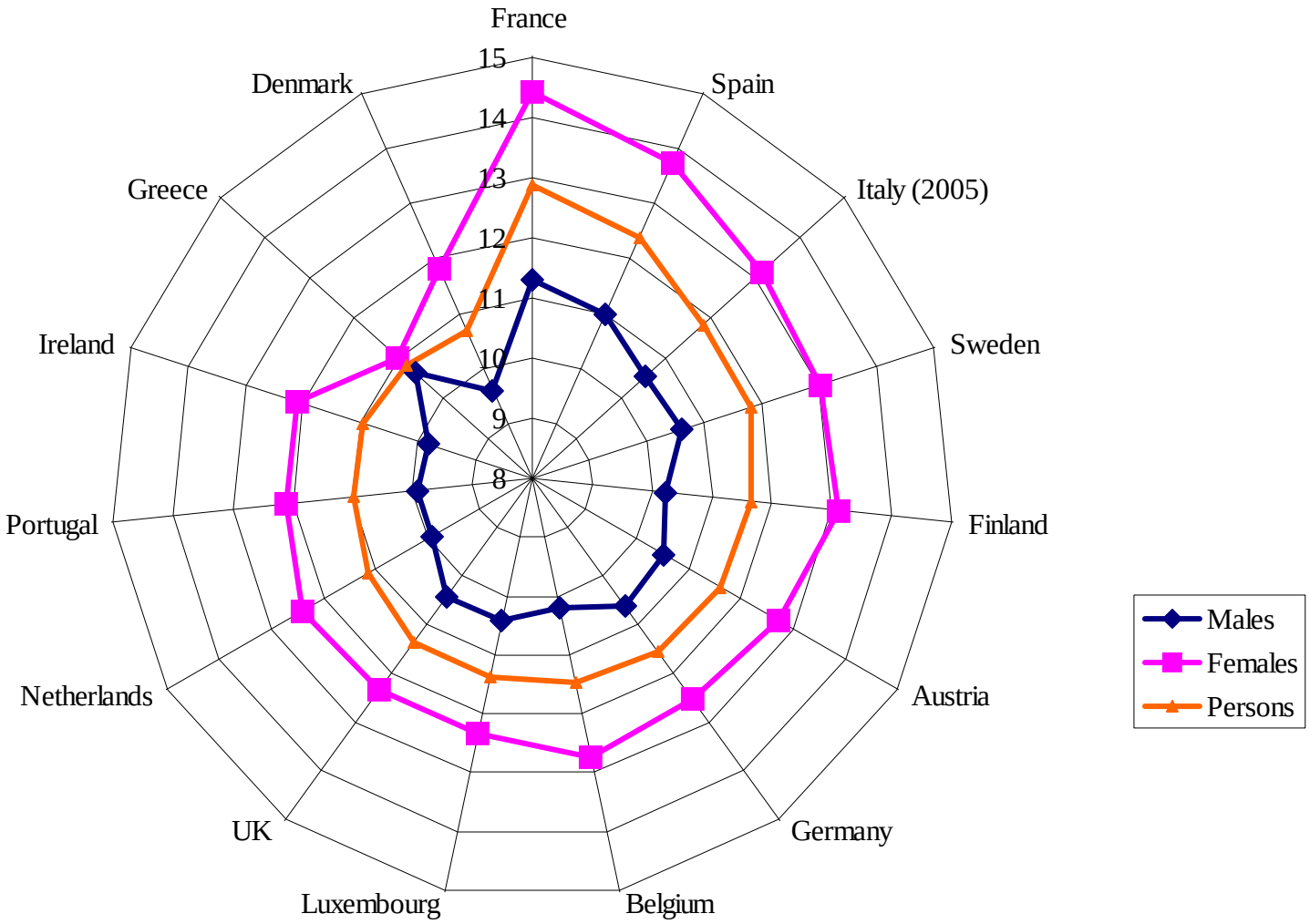
with 26% of female mortality

and 33% of male mortality

currently deemed 'amenable' to medical prevention.

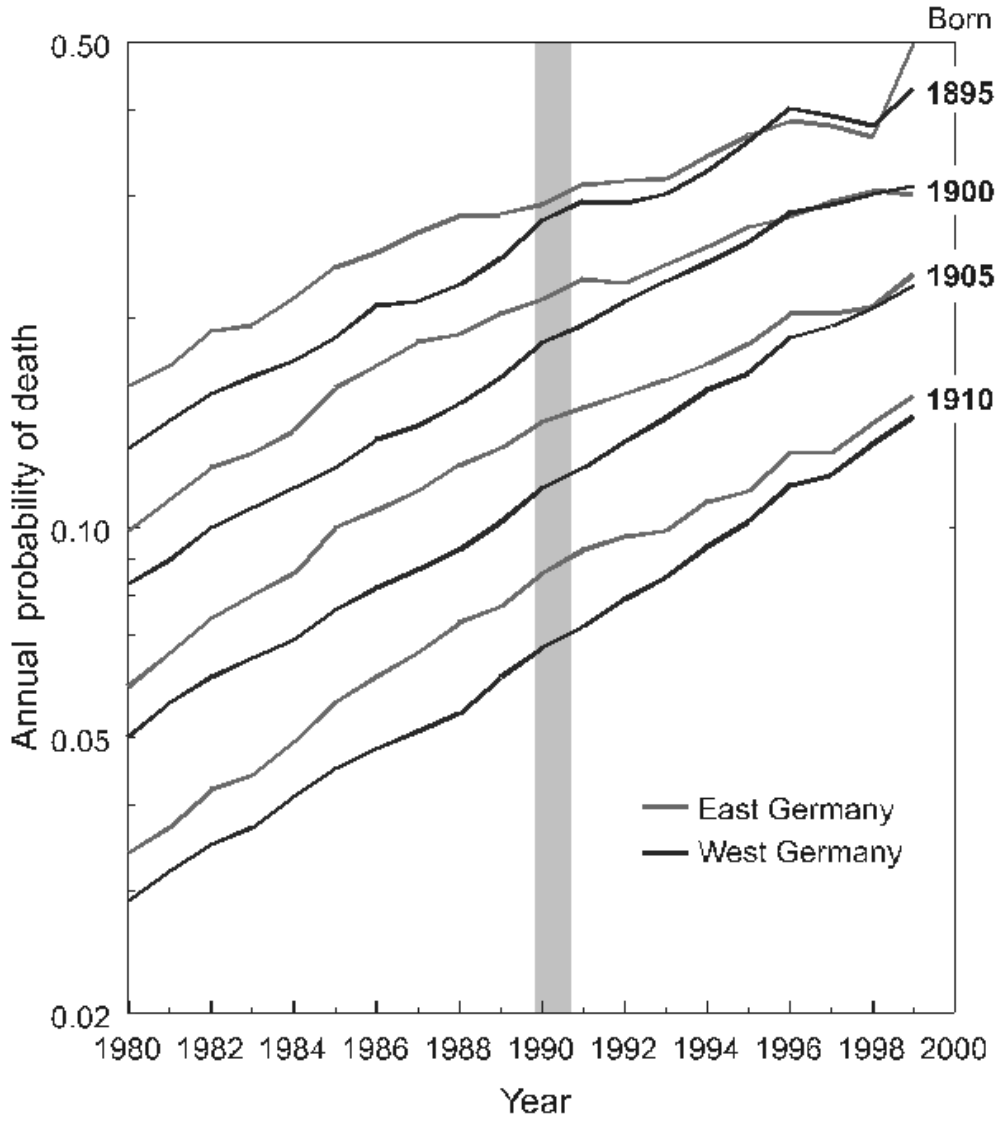
Ireland ranks 17th worst out of the 19 OECD countries studied.

Expectations of Life at Age 75, 2006



Source: Table 5, Irish Life Tables No. 15, CSO (2009)

East and West German death rates for cohorts born around 1900



From *Broken Limits to Life Expectancy*,
Vaupel & Kistowski, *AGEING HORIZONS, Issue No. 3, 6–13.*

Dream or Nightmare?

- Oscar Wilde – prolonged youth
  - Wilde (1891), A Picture of Dorian Gray.

- Jonathan Swift – ever ageing
  - Swift (1726), *Travels into Several Remote Nations of the World, in Four Parts. By Lemuel Gulliver, First a Surgeon, and then a Captain of several Ships*. Reference is to Part III, when he considers the plight of the struldbrugs during his visit to Luggnagg

- Wilde dream is more representative…
  - Recent research indicates that extensions to life expectancy are extensions to healthy life expectancy

    ….Manton & Gu (2001), Feedman et al. (2002), Robine & Michel (2004), Manton et al. (2006), Christensen et al (2008), Engberg et al. (2008),….

3 Stages to Human Life

- Stage 1: Childhood & Youth
  - Dependency
  - Education
- Stage 2: Maturity
  - Reproduction
  - Responsibility
  - Economic/Social Contribution
- Stage 3: Faced toward Death
  - Dependency
  - Decrepitude

4 Stages to Human Life

- Stage 1: Youth
  - Dependency
  - Education
- Stage 2: Maturity
  - Responsibility, Reproduction
  - Economic/Social Contribution
- **Stage 3: THE NEW STAGE…IN CURRENT RETIREMENT PERIOD**
  - **? Personal achievement ?**
  - **? Personal fulfilment ?**
- Stage 4: Faced toward Death
  - Dependency
  - Decrepitude

2 Decisions to Make

1: Bequeath extra years of life or extra wealth to future generations?

Should we devote extra resources to increase length of life greater than the historic 0.25 addition per calendar year to approach nearer Actuarial Escape Velocity?

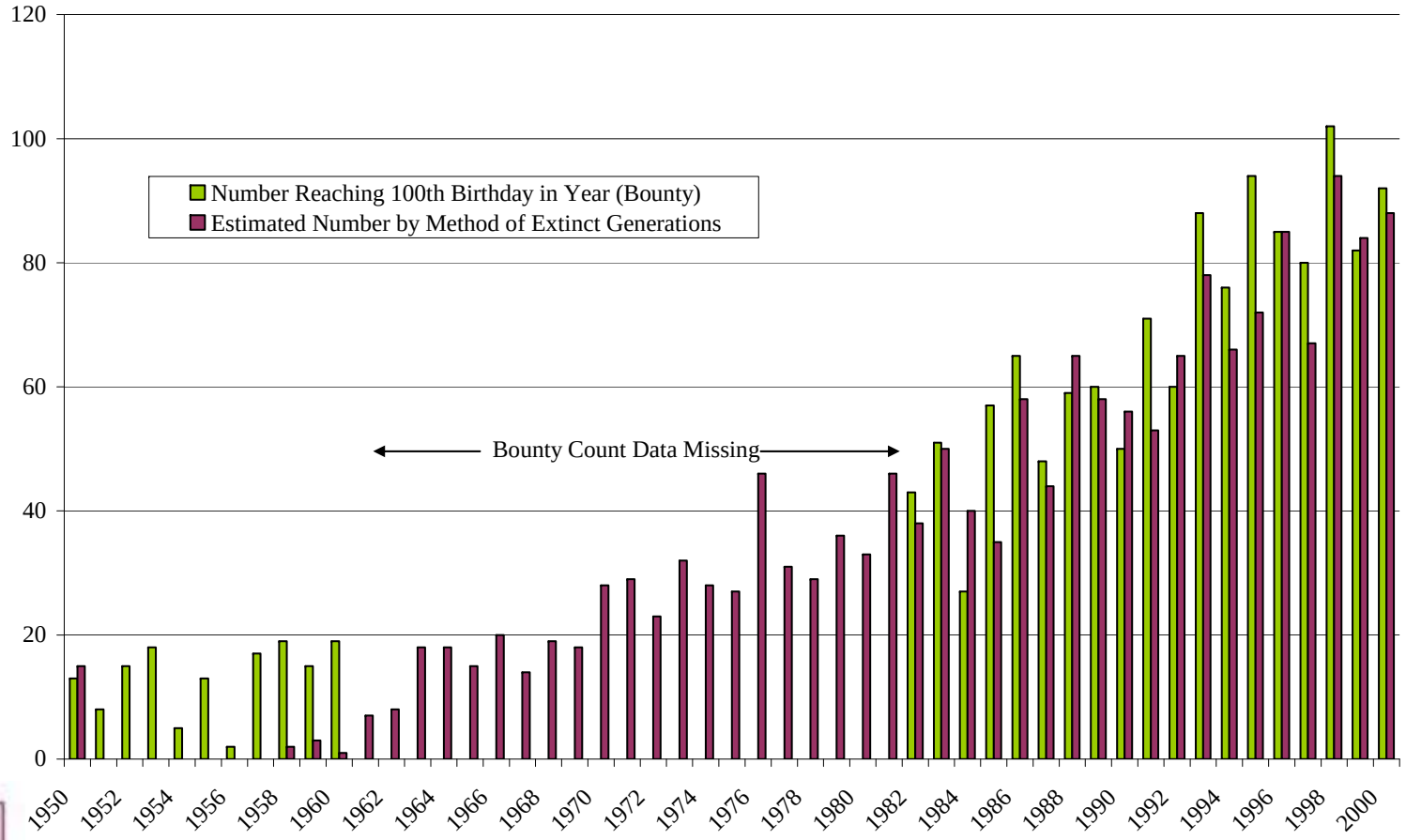
2: What to do with new 3rd Stage in Human Life?

Key References

- *Mortality in Ireland at Advanced Ages: Part 1: Crude Rates, 1950-2006*. Annals of Actuarial Science, Vol. 4, Part 1, (2009), 33-66.
- *Mortality in Ireland at Advanced Ages: Part 2: Graduated Rates, 1950-2006*. Annals of Actuarial Science, Vol. 4, Part 1, (2009), 67-104.
- *Projecting Population Mortality for Ireland*. Journal of the Statistical and Social Inquiry Society of Ireland, Vol. XXXVII, *(2007/2008)*, currently available at *www.ssisi.ie.*
- *One Nation in Old Age. Newsletter of Society of Actuaries, Early 2009.*
- *A Principled Approach to the National Pensions Debate. Irish Pensions Magazine. Vol. 2 Spring 2007, 12-15. [Cover Story]*
- *Valuing Ireland's Pension System.* Quarterly Economic Commentary, Economic & Social Research Institute, Summer 2007, 55-80.
- **Available from my website at http://www.ucd.ie/statdept/staff/shane/**

Number of Persons in Ireland Reaching 100th Birthday in each calendar year,

by Bounty Awards and Estimated by Method of Extinct Generations



Government's New Proposal for New Stage 3

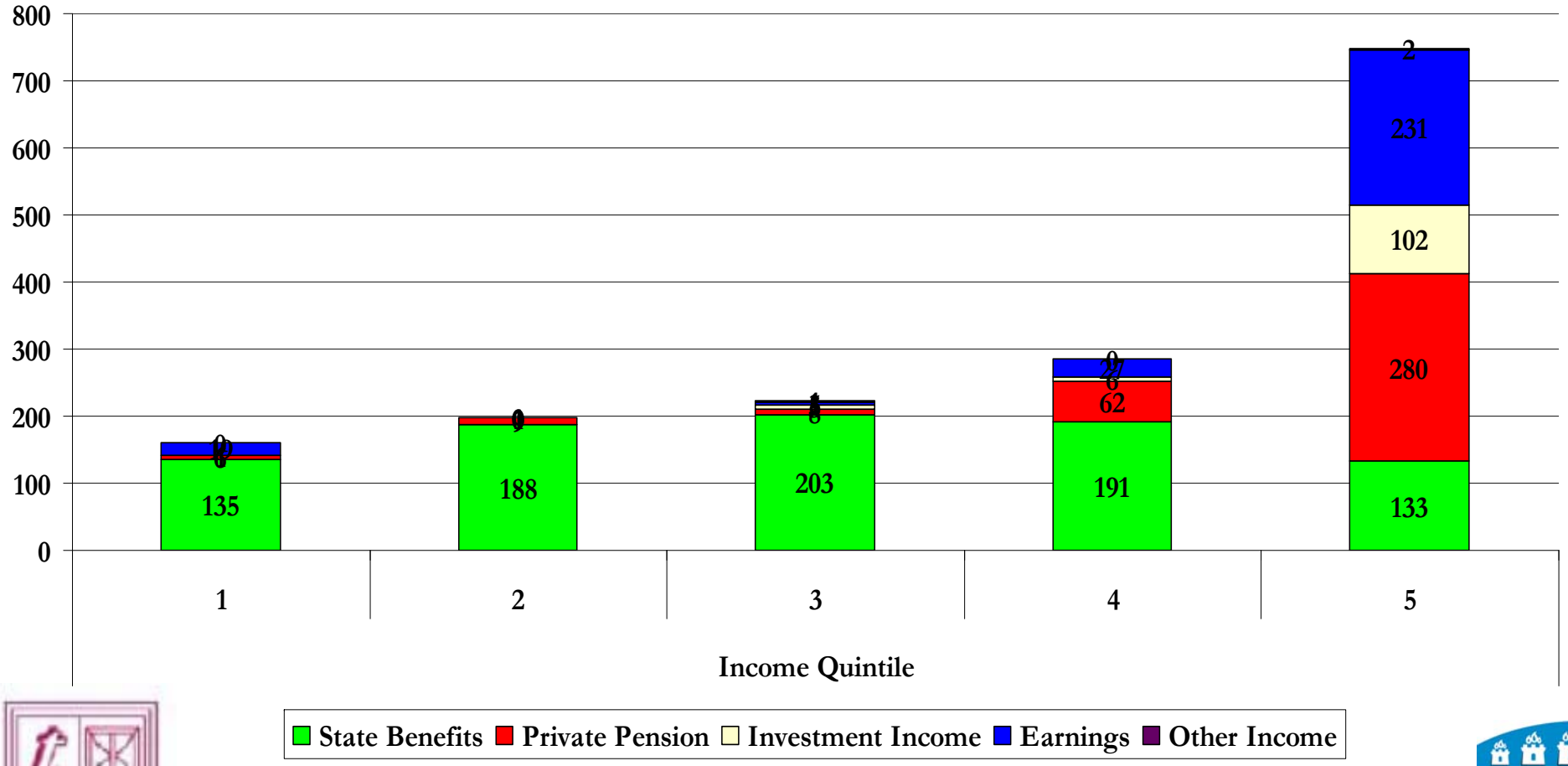
- Government's New Proposal (2010)
  - postpone our retirements and save more for ourselves
  - "increasing the state pension age is essential" (p.13). So proposal is to increase it to age 68 years.
  - fill the void with maybe "flexible working arrangements" for the elderly,
  - maybe modest voluntary saving schemes supported by the inertia created by "auto-enrolment".

- Ireland has a high incidence of age-related relative poverty
  - more than double the OECD average
  - only Mexico and Korea record higher rates.

- Reason: State pension in Ireland is currently one of the lowest state pensions in the developed world.

Distribution uneven

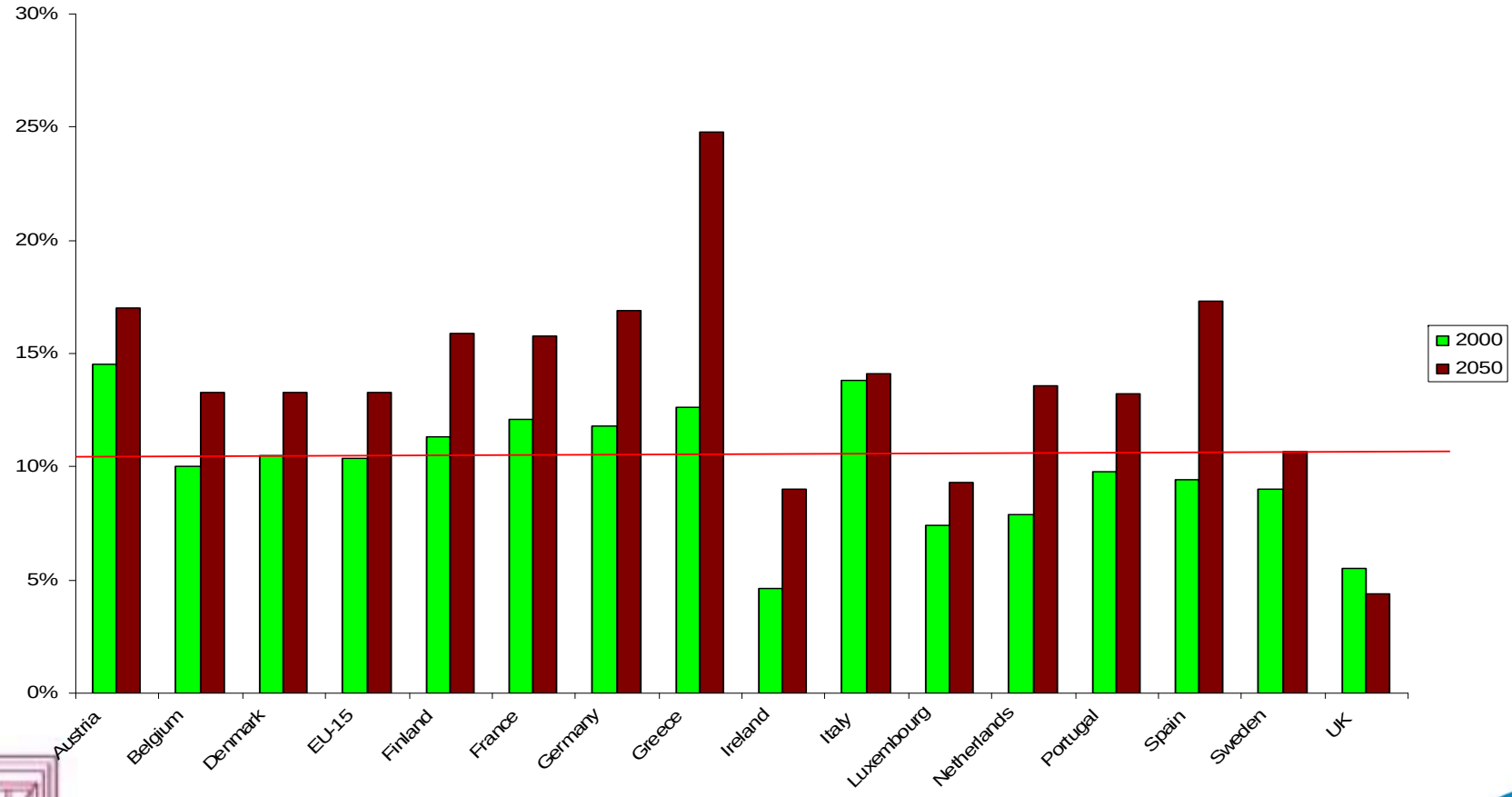
Breakdown of Income of Retired Couples in Ireland, Year 2000



Source: Hughes & Watson (2005)

Outlook for State Pension

Expenditure on Public Pension System in Europe, Year 2000 and forecast Year 2050 as a % of GDP



Economic Policy Committee (2001), see Table 3.1 (p. 61) in Pensions Commission (2004)