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The population is ageing – will health spending really increase?

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Health Economics Day in Helsinki 5th Feb 2016

The population is ageing – implications on resources?

Introduction (1)

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Finnland: Health Expenditures rise as share of GDP

Source: National Health Accounts, 1995-2013

1. Introduction (2)

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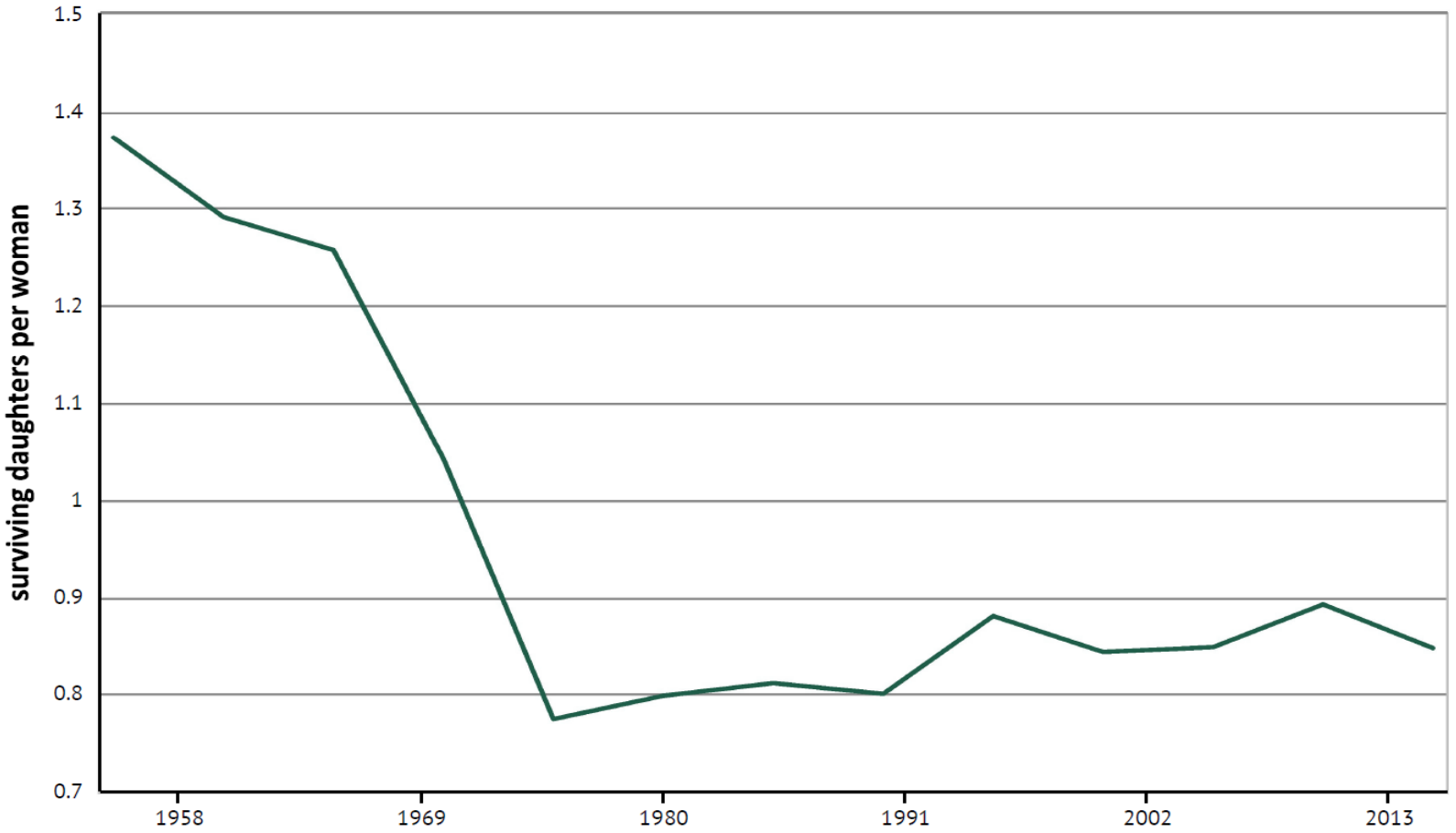
The Finnish population is ageing: below-replacement fertility



Quelle: World Population Prospects: The 2015 Revision

1. Introduction (3)

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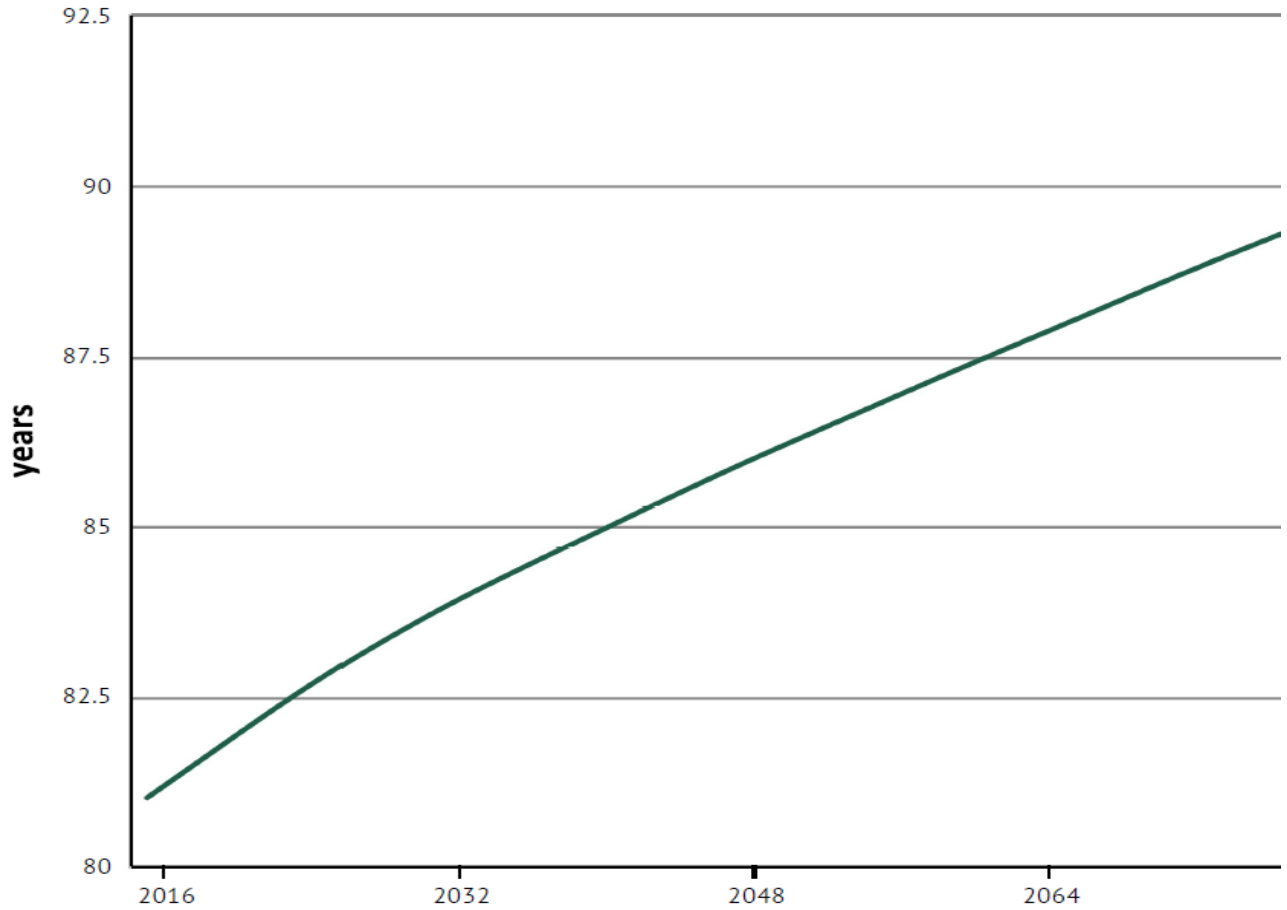
The Finnish population is ageing: rising life expectancy



Source: World Population Prospects: The 2015 Revision

1. Introduction (4)

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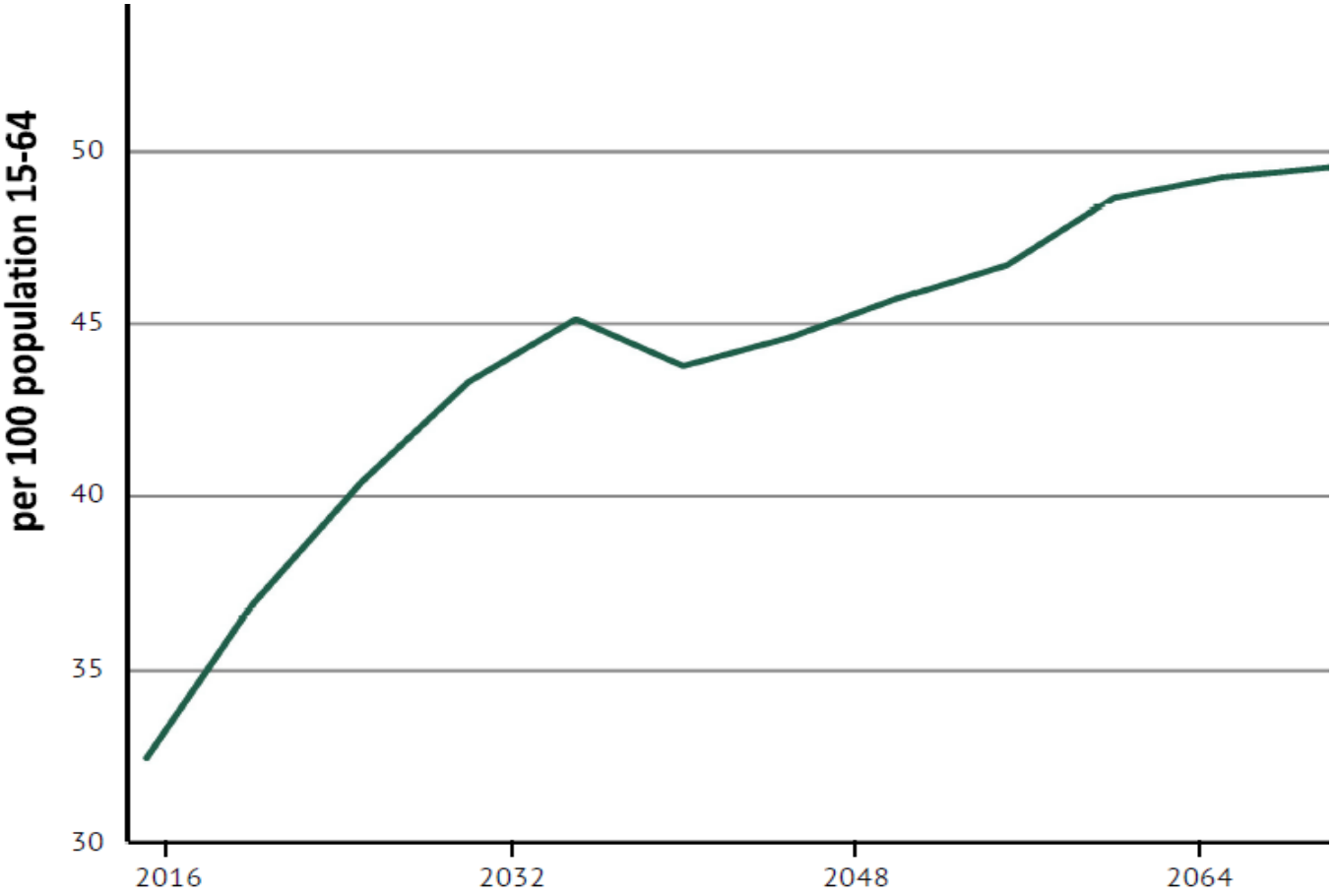
The Finnish population is ageing: rising age dependency ratio



Source: World Population Prospects: The 2015

1. Introduction (5)

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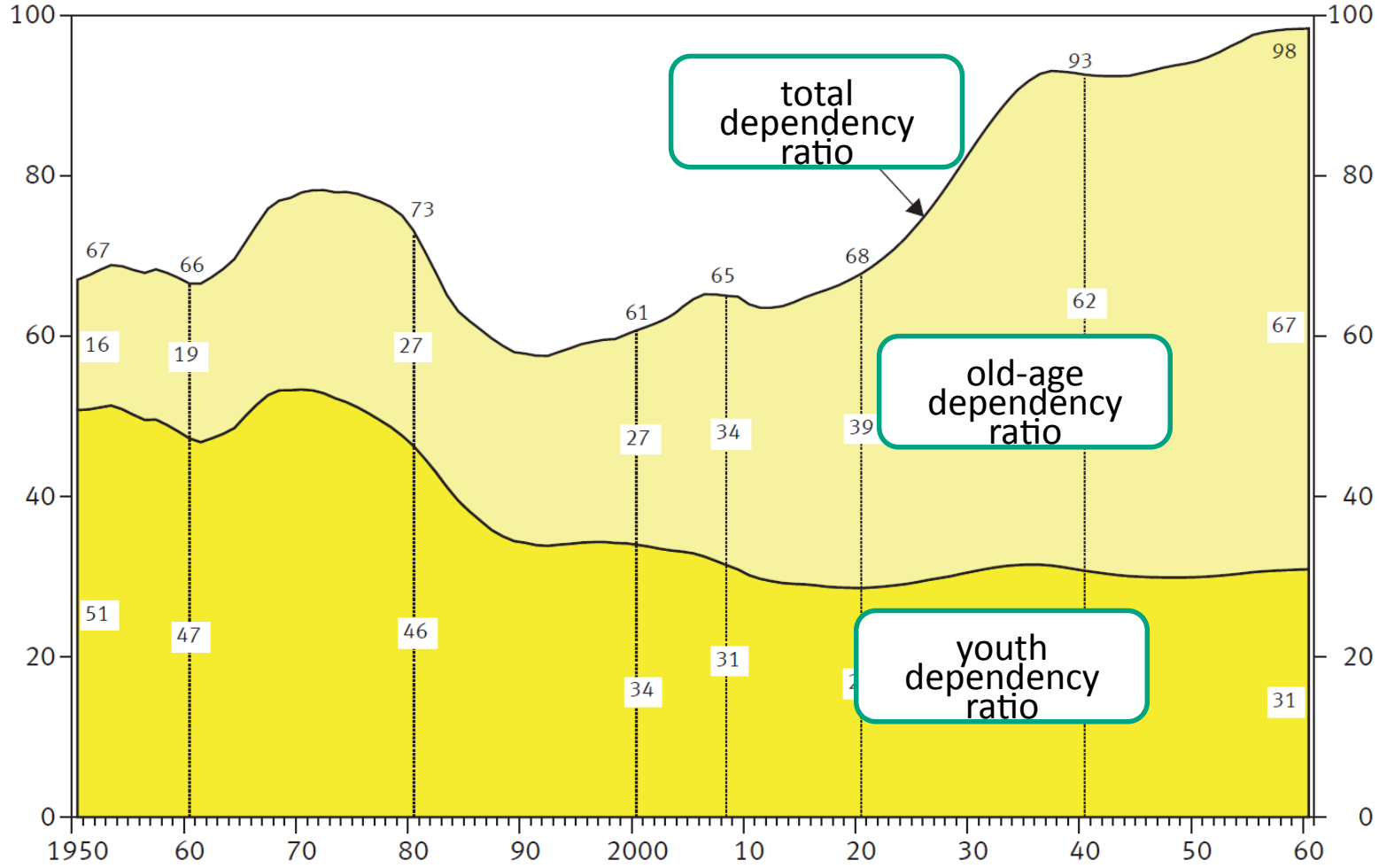
For comparison: the value for Germany



1. Introduction (6)

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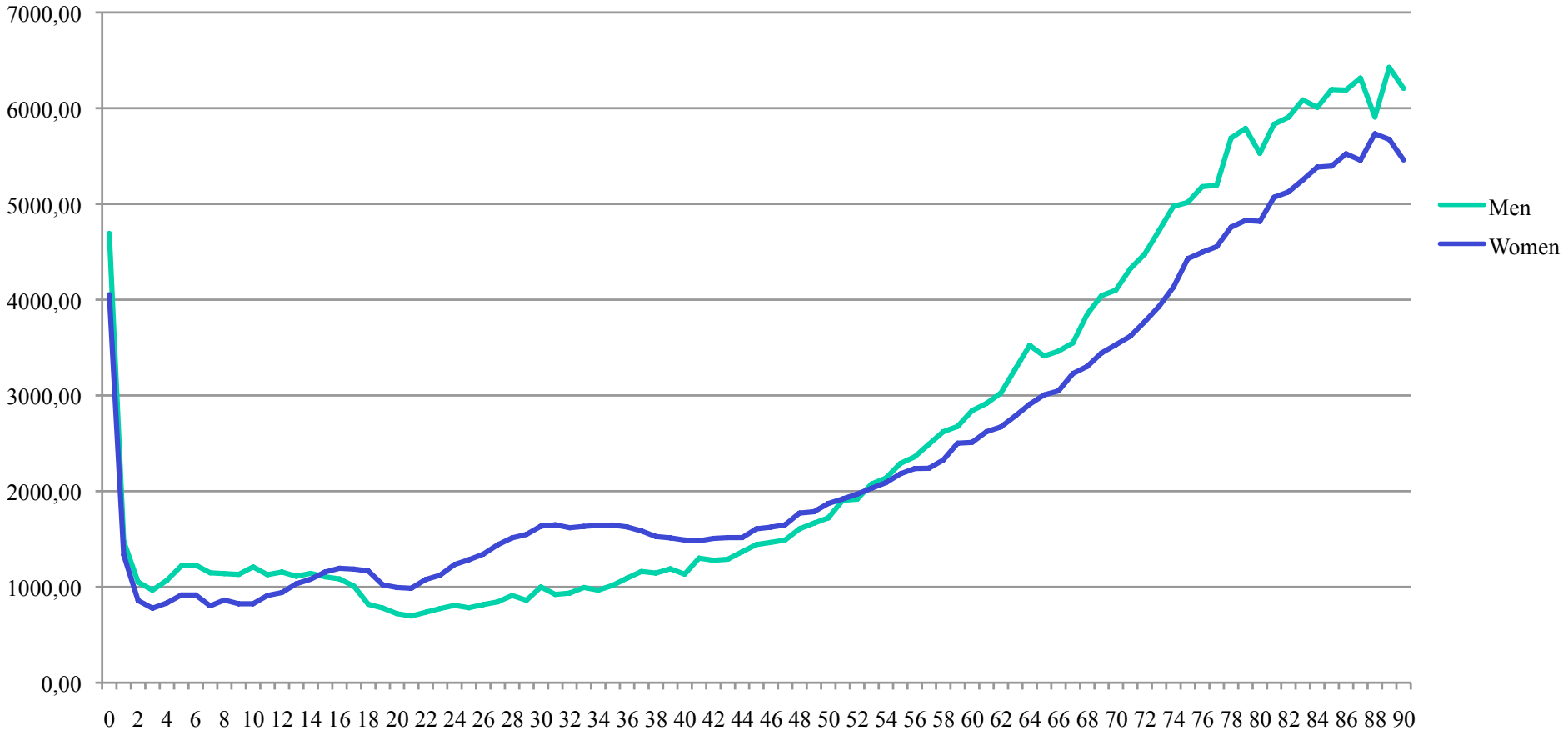
What are the implications for total health care spending?
In a cross-section, health care expenditures rise with age.
These are age-expenditure profiles for Germany (2009)



2.1 Theory: Overview

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Competing hypotheses on the effect of ageing on HCE:

1) “expansion of morbidity”: survival with chronic diseases is extended, age-specific health care costs stay constant (or increase due to medical progress), total expenditures rise due to longer lives (Olshansky et al. 1991)

2) “compression of morbidity” or “time-to-death” (TTD): cost increase in old age is due to proximity to death (Victor Fuchs 1984), and we only die once

Age-expenditure profiles are shifted to the right and total expenditures (per capita) decrease!

3) Expenditures in the last year of life are decreasing in the age of death (due to age-rationing?). Another reason why ageing could *lower* health care expenditures

2.2 Empirics: “Red Herring” (1)

Zweifel, Felder, Meier (*Health Economics* 1999) claim:
The positive association between ageing and rising health care expenditures is a “red herring” (a false clue) laid by health care providers and politicians to suggest that rising expenditures „natural“ and not the consequence of inefficiencies in the system because they want to prevent reforms of the system.

Empirical evidence:

-Data from Swiss insurance companies show that in the 1980s expenditures in the last 8 quarters of life increase with proximity to death but do not depend on age

Criticism: evidence is not entirely convincing because 80 per cent of all expenditures do not occur in the last (4) life years

2.2 Empirics: “Red Herring” (2)

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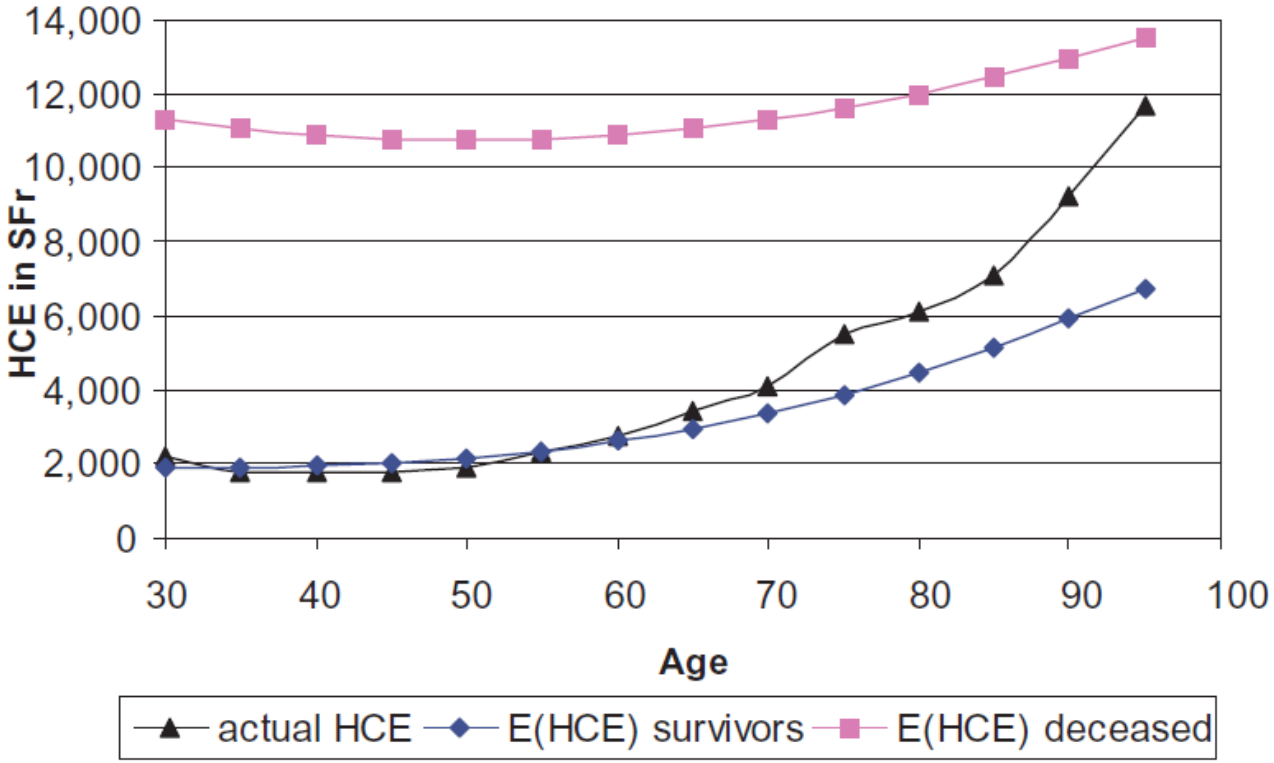
Zweifel et al. (2004) show that the increase of expenditures with age becomes flatter as soon as you distinguish between survivors and decedents.



2.2 Empirics: “Red Herring” (3)

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Large literature on the „red herring“ effect:

- Seshamani & Gray (2004) for hospital care in Britain,
- Atella & Conti (2013) for ambulatory care in Italy,
- Gregersen (2014) for hospital care in Norway,
- De Meijer et al. for long-term care in the Netherlands,
- Karlsson & Klohn for long-term care in Sweden.

Consensus:

Both proximity to death and age have a positive impact on health care expenditures. Thus the strong version of the „red herring“ is not valid.

2.3 Empirics: Forecasts

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Implication for HCE forecasts: several studies show overestimation through neglect of the TTD effect:

- Stearns & Norton (2004): “Time to include time-to-death” and Miller (2001) for the U.S.: 15 per cent,
- Polder et al. (2006) for the Netherlands: 10 per cent,
- Björner & Arnberg (2012) for Denmark: 50 per cent,
- Colombier & Weber for Switzerland: 0 per cent,
- Breyer & Felder (2006) for Germany: 10 per cent

Implications:

1)Neglecting the TTD effect leads to an overestimation of future HCE

2)There is still a positive demographic effect on HCE

3)The demographic effect on HCE is smaller than the effect of medical progress

3.1 Our New Theory: “Eubie Blake Effekt”

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F. Breyer, N. Lorenz and T. Niebel (2015), Health Care Expenditures and Longevity: Is there a Eubie Blake Effect?, *European Journal of Health Economics* 16, 95-112.

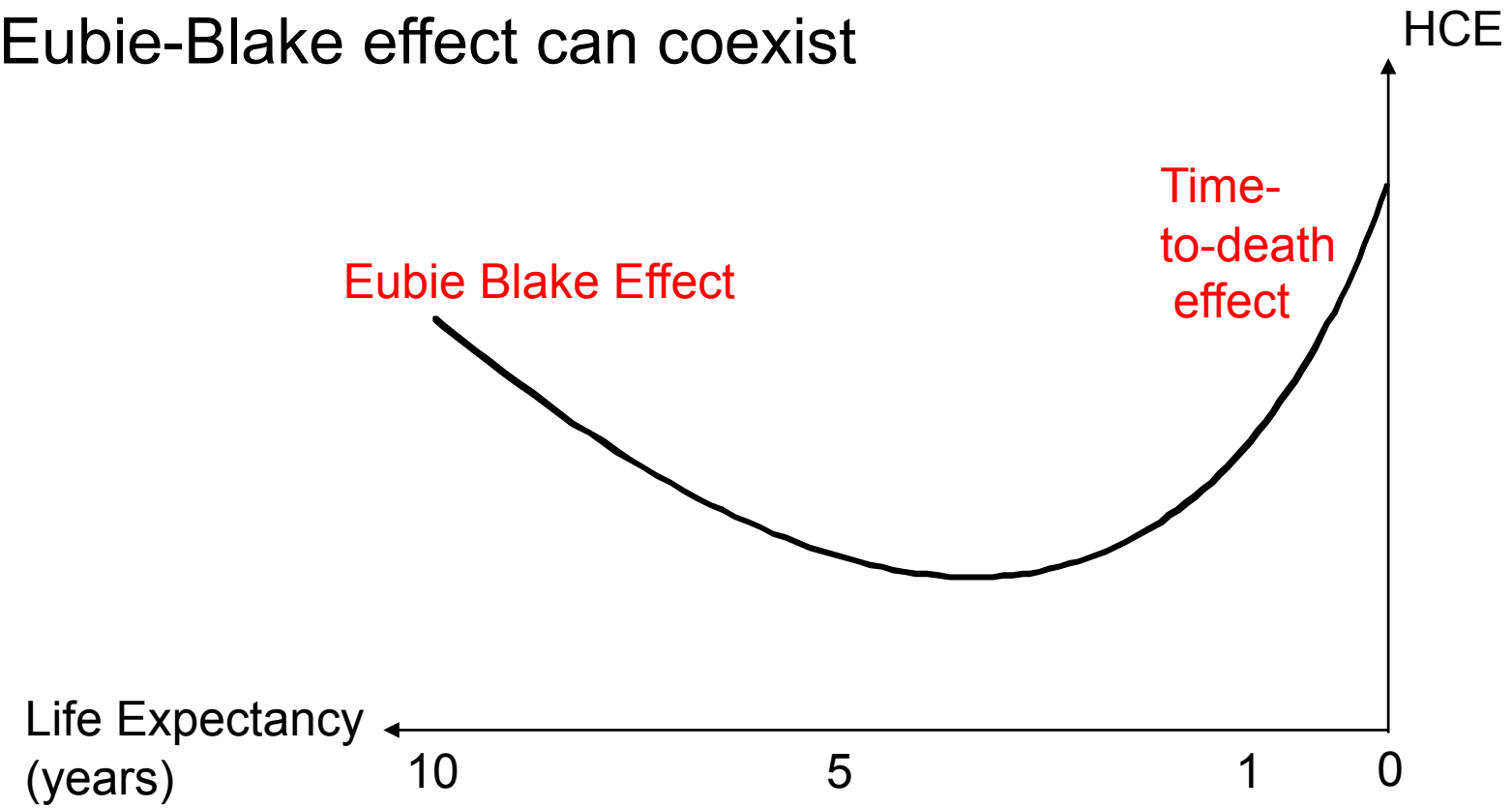
- Problem: most of these authors draw inferences from cross-sections on developments over time.
- Crucial question: what will be the effect of rising life expectancy (LE) in the course of time?
- Our hypothesis “Eubie-Blake Effekt”:
  If life expectancy rises, additional treatments become worth-while in the eyes of physicians. This is especially true for very old patients. So an 80-year old tomorrow will be treated like a 75-year old today.
- Examples: organ transplants, hip replacement, stents for coronary heart disease

Eubie Blake, a jazz pianist, said at the celebration of his (alleged)100th birthday:*
„If I had known I was going to live this long,
I would have taken better care of myself“

* He was really only 96, but died 6 days later.

Life Expectancy and Health Expenditures

The TTD effect and the
Eubie-Blake effect can coexist



3.2 Empirical test: Hypotheses

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(calendar) age: competing hypotheses:

a) HCE are falling until age 20, remain constant between 20 and 60, and are rising beyond age 60 („naïve hypothesis“)
b) no increase beyond age 60, when mortality is controlled for („red herring hypothesis“)

mortality:

HCE are increasing in the death rate

life expectancy (measured by the 5-year survival rate):

the higher the survival rate, the higher are HCE because doctors find additional treatments worth-while (as did Eubie Blake).

time: HCE are rising oder time (due to medical progress)

Why 5-year survival rates?

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Table 2: 5-year survival rates: Level in 1997 (per cent) and increase Δ from 1997 to 2009 (percentage points)

	Men		**Women**	
	$SR5$		$SR5$	
Age	1997	Δ	1997	Δ
60	91.1	2.4	95.9	0.8
65	86.1	4.3	93.2	1.9
70	79.1	5.9	88.3	3.4
75	67.9	6.9	79.5	4.6
80	51.2	9.0	64.6	5.6
85	31.6	8.6	43.6	4.7
90	14.0	4.0	22.1	1.1

3.3 Data Sources

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a) German Federal Insurance Office: Risk Adjustment Data
   - Daily per-capita expenditures for sickness fund members
   - by age and sex, 1997-2009

b) MPI Rostock: Human Mortality Database
   - age and sex specific death rates

c) German Federal Statistical Office: 12th coordinated population projection 2009 - 2060,
   - population by age group,
   - age specific death rates

3.4 The estimation equation

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Specification:

- Estimation separately for men and women
- Age dummies (each year),
- Time as year dummies
- cohorts accounted for through fixed-effects estimation
- Population death rates
- 5-year survival rates (SR-5) calculated from death rates
- Estimation in levels and 1st and 2nd differences (due to trend in data)

Problem:

- age, cohort and year are perfectly correlated
- Solved through Intrinsic Estimator (Yang et al., 2008)

3.5 Results

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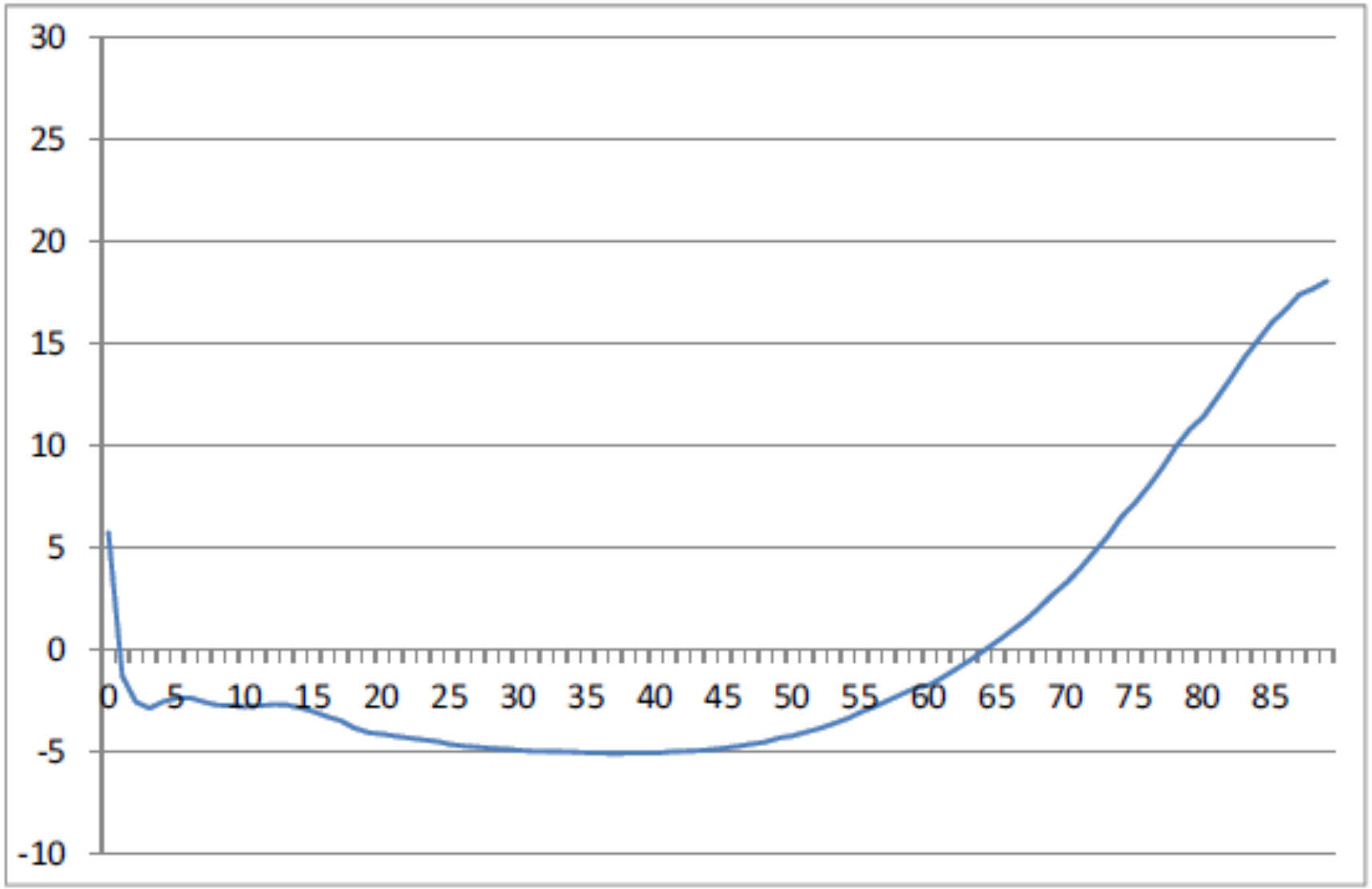
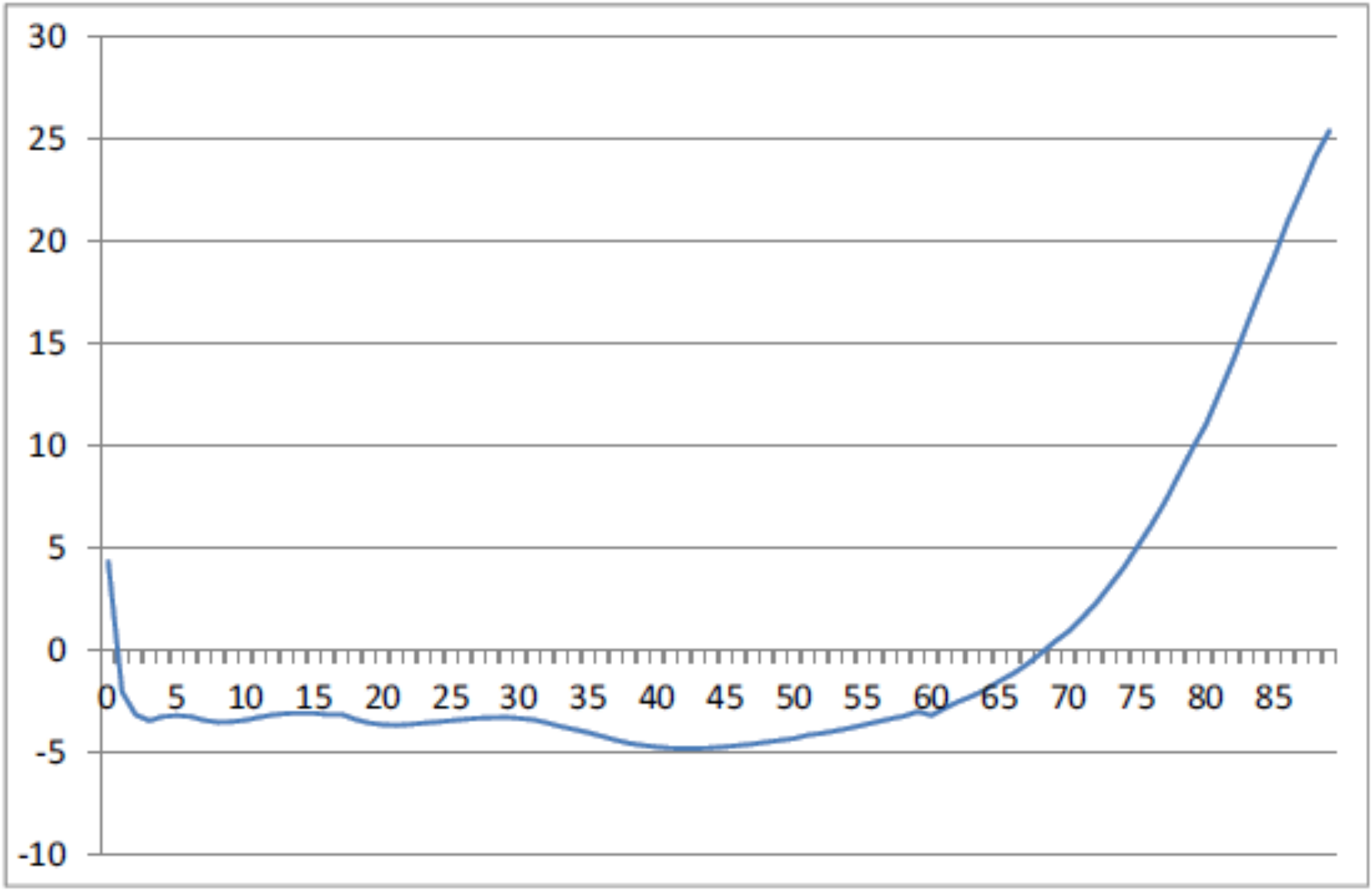
1) Graphs for age, time and cohort effects

2) Death rates and survival rates: table

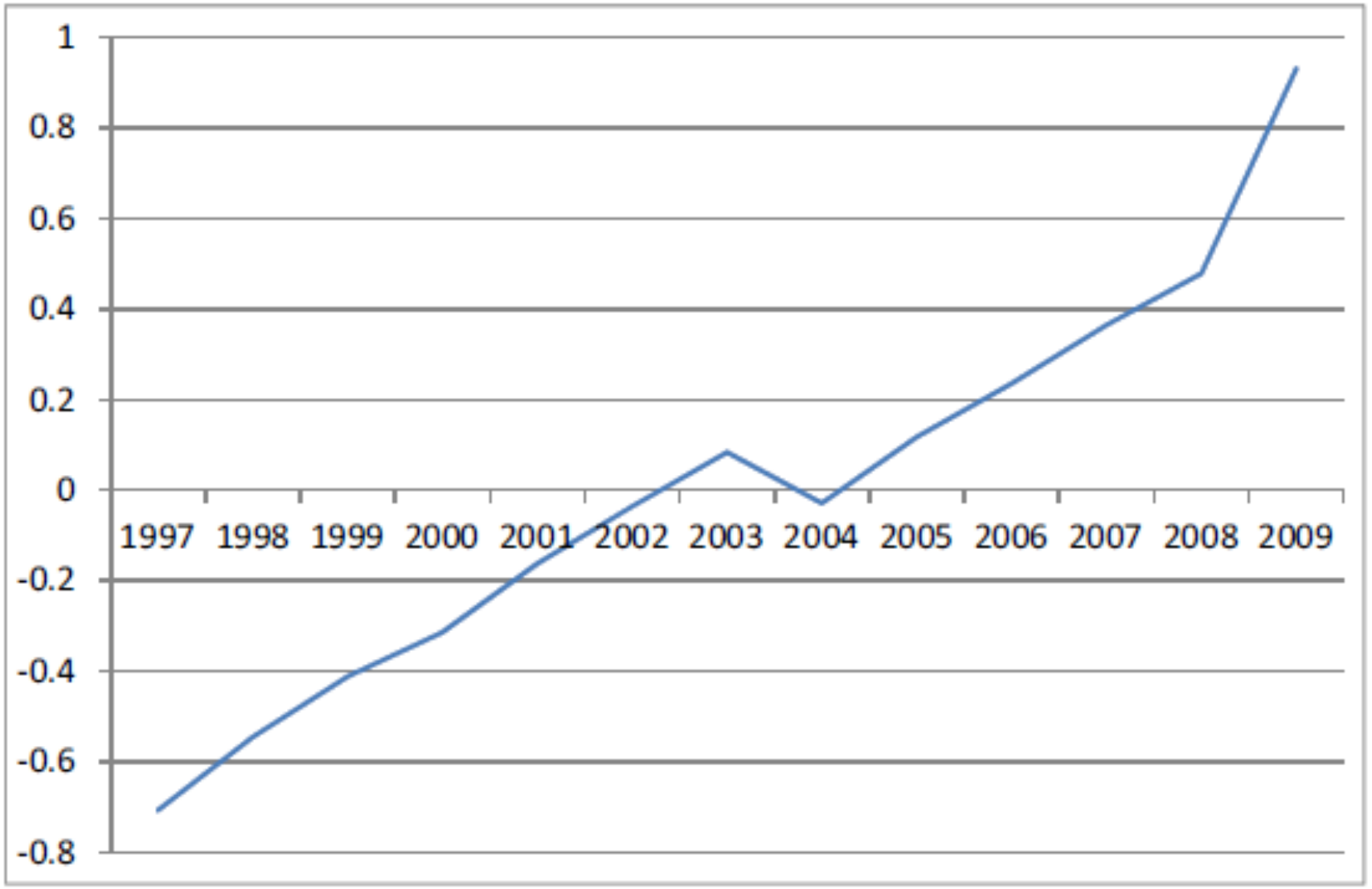
Age coefficients, men



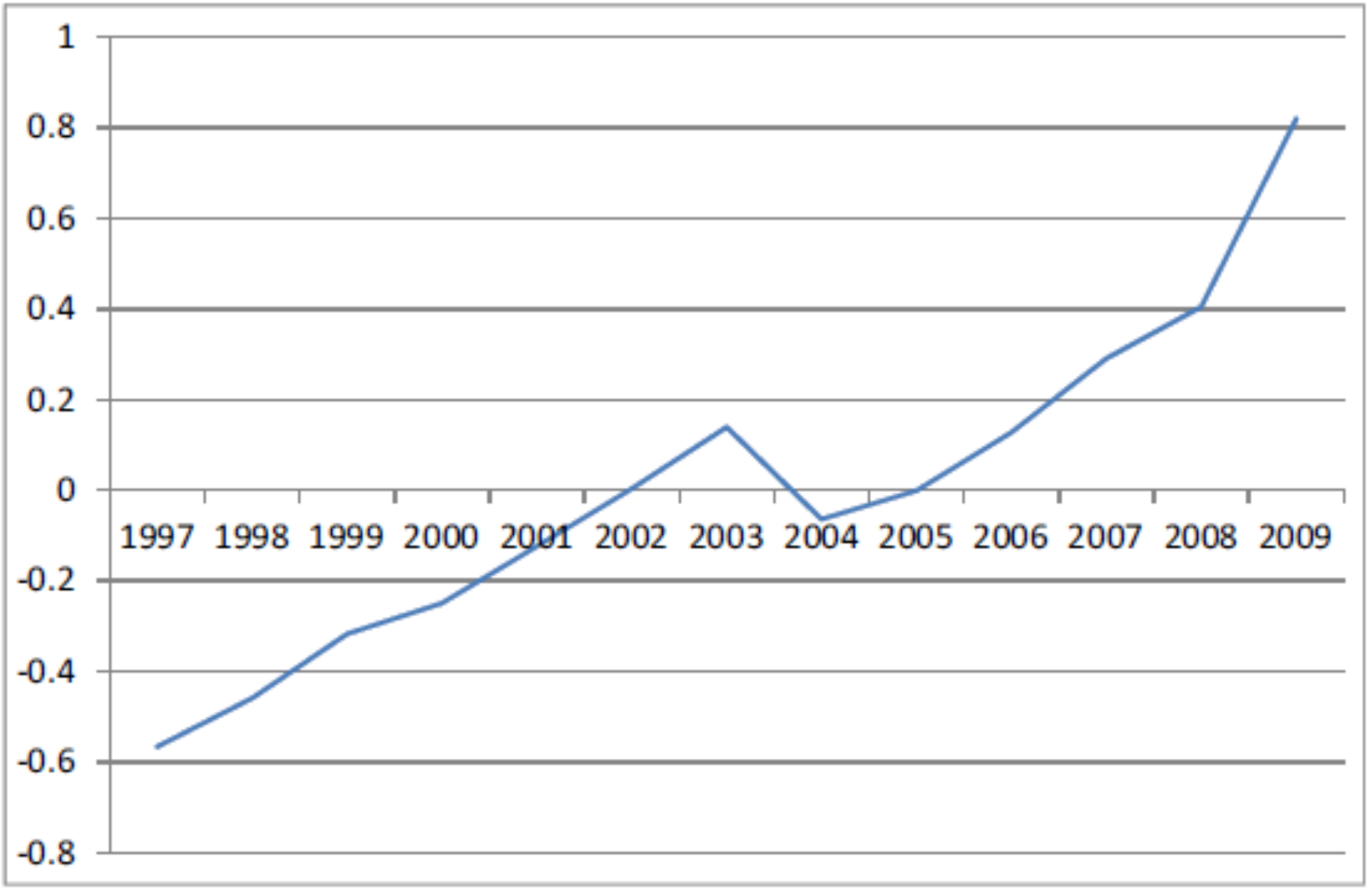
Age coefficients, women



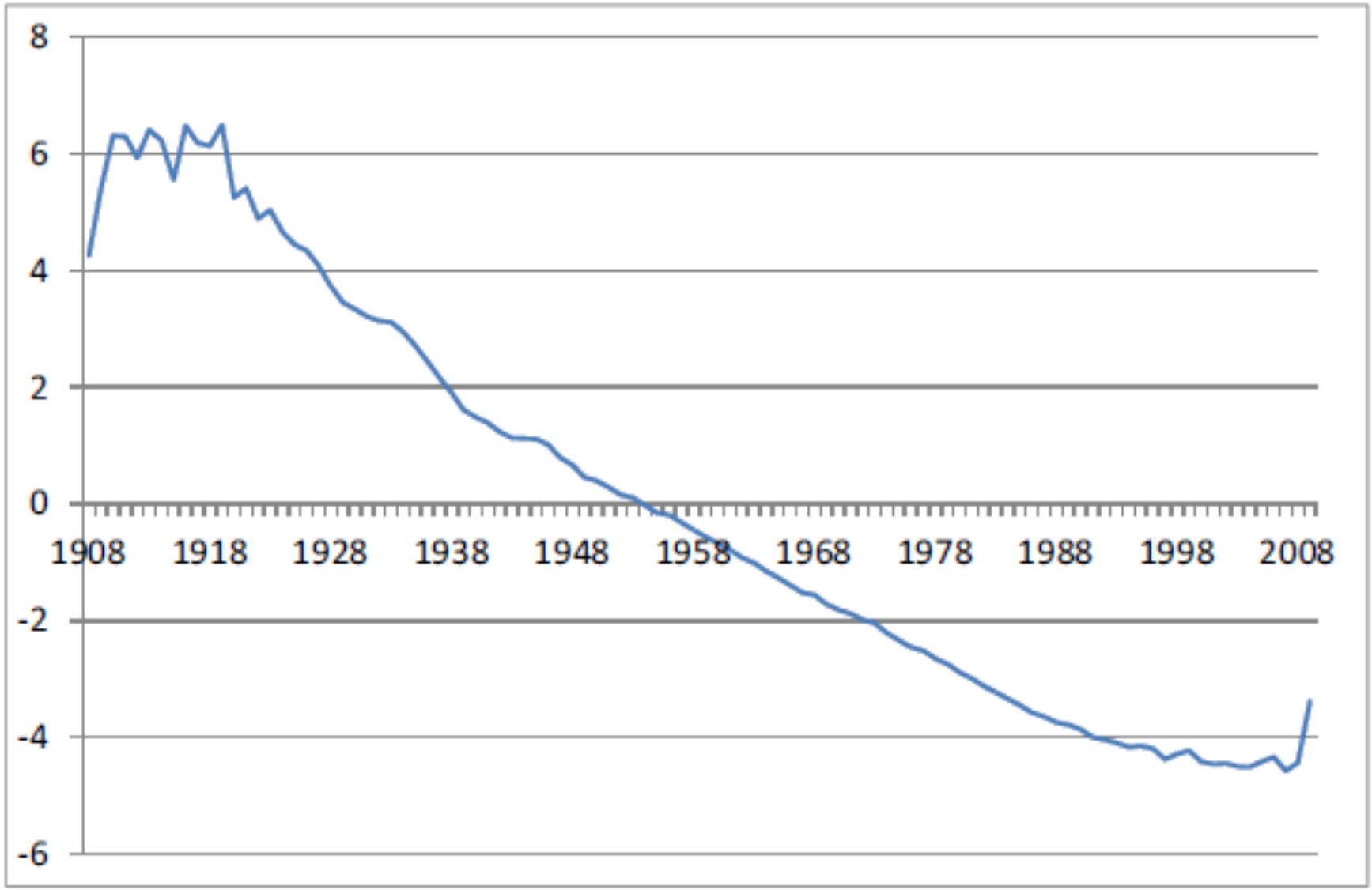
Year coefficients, men



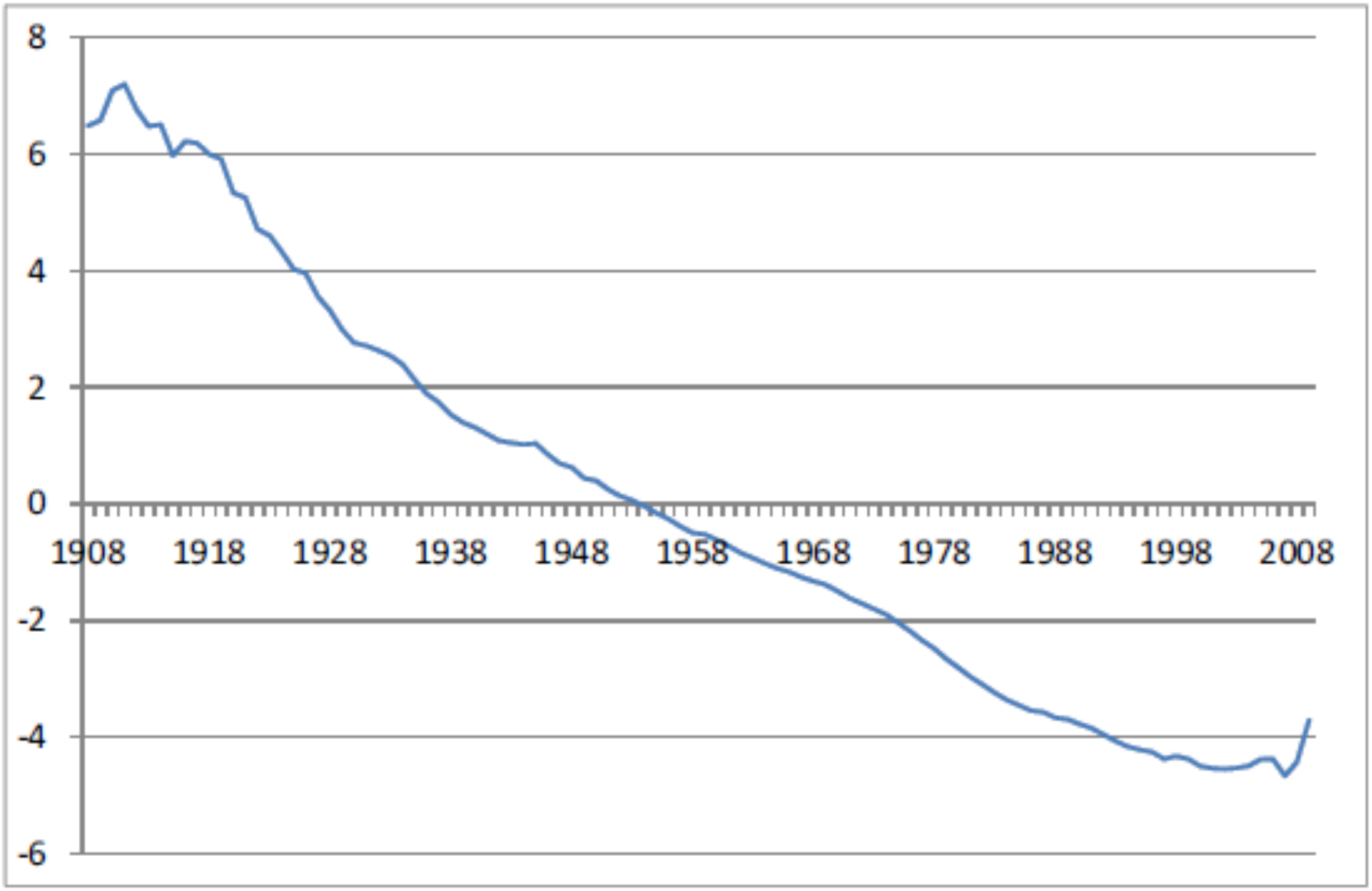
Year coefficients, women



Cohort coefficients, men



Cohort coefficients, women



Summary of Graphs

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- Increasing time trend with a kink in 2004 (major health care reform in Germany),
  annual growth rate for men: 2 – 2.3%,
  for women 1 – 1.6%
- Age effect consistent with “naïve” hypothesis
  (death rates are controlled for!)
- Younger cohorts seem to be „healthier“ than older ones, except for the last ones

Mortality and 5-year survival rates

	Men			**Women**		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
MORT	68.26*** (11.88)		58.30*** (11.23)	27.22* (14.19)		26.24*** (7.87)
SR5		41.72*** (8.47)	36.45*** (7.31)		42.79*** (4.11)	42.69*** (3.90)
Dependent variable: daily HCE. Standard errors clustered at the cohort level						
Standard errors in parentheses; *** (**, *): significant at $\alpha = 0.01\ (0.05, 0.1)$						

Mortality and 5-year survival rates

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- Mortality: coefficient is positive and highly significant for men (HCE in the last year of life 5-14 times higher), for women smaller effect
- 5-year survival rate is always highly significant, Interpretation: HCE increase by 10-30%, when SR-5 rises by 5 percentage points (as it did for men over 70 in the period 1997-2009)
- theoretical hypotheses largely confirmed: Health care expenditures are increasing
  - with time,
  - with age (over 60),
  - with the death rate
  - and with life expectancy!

4. Simulation Results for Germany 2060

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Step 1: inserting the death rate of 2060:

lowers HCE for men by 7%, for women by 3%.

Step 2: inserting the death rate and the 5-year SR of 2060:

raises HCE for men by 1-12%, for women by 5-17%

Step 3: inserting the age structure of 2060:

raises HCE for men and women by 50-55%, i.e. 0.9% annually

Step 4: adding the time trend:

leads to an annual increase of HCE for men by 2.9-3.2%, for women by 2 - 2.5%

- Total increase in HCE amounts to 150% in 50 years
- Due to shrinking population, GDP rises only by 45%
- Contribution rate to SHI rises from 15.5% now to 27% in 2060

5. Summary

- Per-capita health care expenditures in German Social Health Insurance are significantly affected by the age structure, the death rates and life expectancy of the insured.
- The last effect has a plausible interpretation. We propose to call it the “Eubie Blake effect” of physician behaviour.
- In total, ageing raises HCE at a rate of 0.5-1 per cent p.a.
- In addition there is a time trend of 1.5-2 per cent p.a. (and a weak GDP growth).
- Caveats:
  - no individual data, no distinction between survivors and decedents
  - relatively short time series (13 years)

6. Policy Conclusions

- Ageing populations and in particular rapid medical progress will raise health care expenditures significantly over the coming decades.
- This will make it necessary for all countries including Finland to choose, which health services shall be collectively financed (through taxes or mandatory SHI contributions). This is the essence of “explicit rationing”.
- Politicians in many countries refuse to debate this issue openly.
- However, the benefit package of a NHS or SHI should be determined democratically after an open societal debate.