

The logo for the Mannheim Research Institute for the Economics of Aging (MEIA) is displayed in a bold, italicized, blue font. The letters 'm', 'e', and 'a' are lowercase and connected, with the 'i' being a stylized dot.

www.meia.uni-mannheim.de

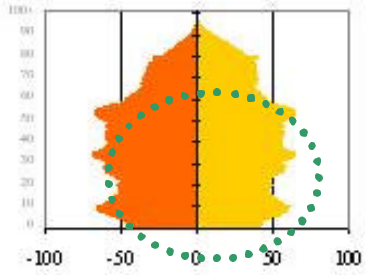
Aging and Asset Prices

Axel Börsch-Supan

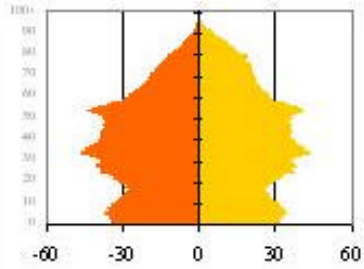
*Mannheim Research Institute for the Economics of
Aging (MEIA)*

University of Mannheim, Germany

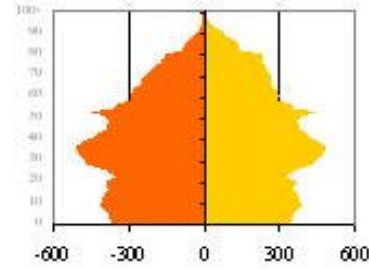
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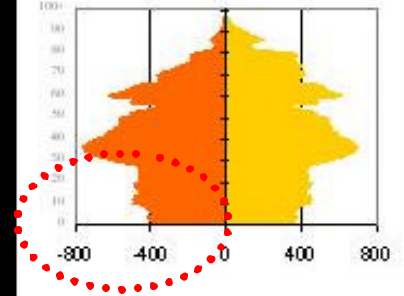
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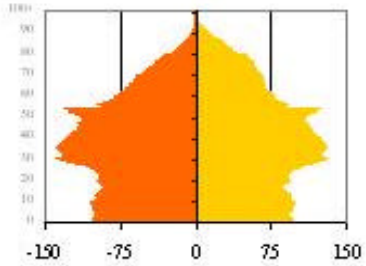
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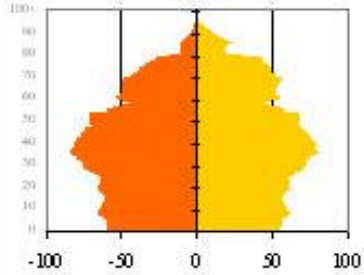
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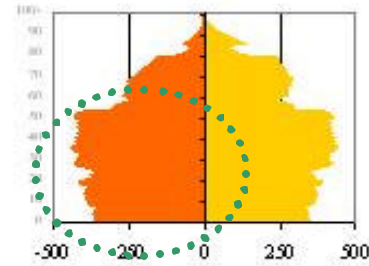
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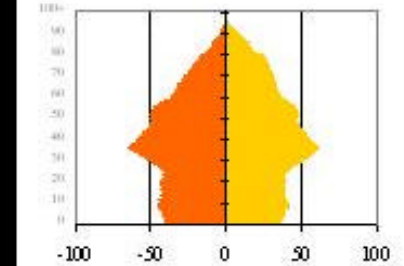
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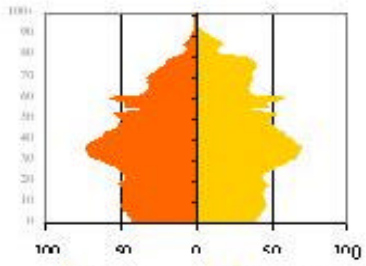
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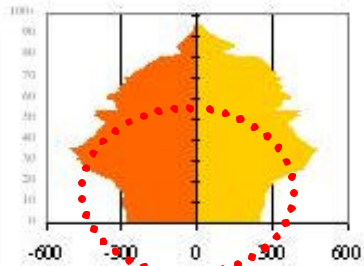
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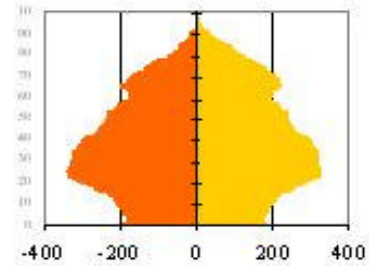
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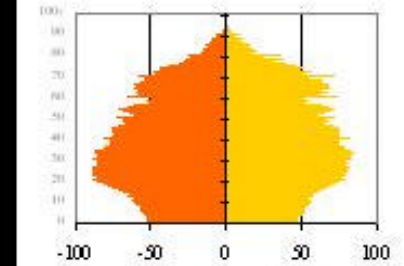
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ES



GR



Males Females

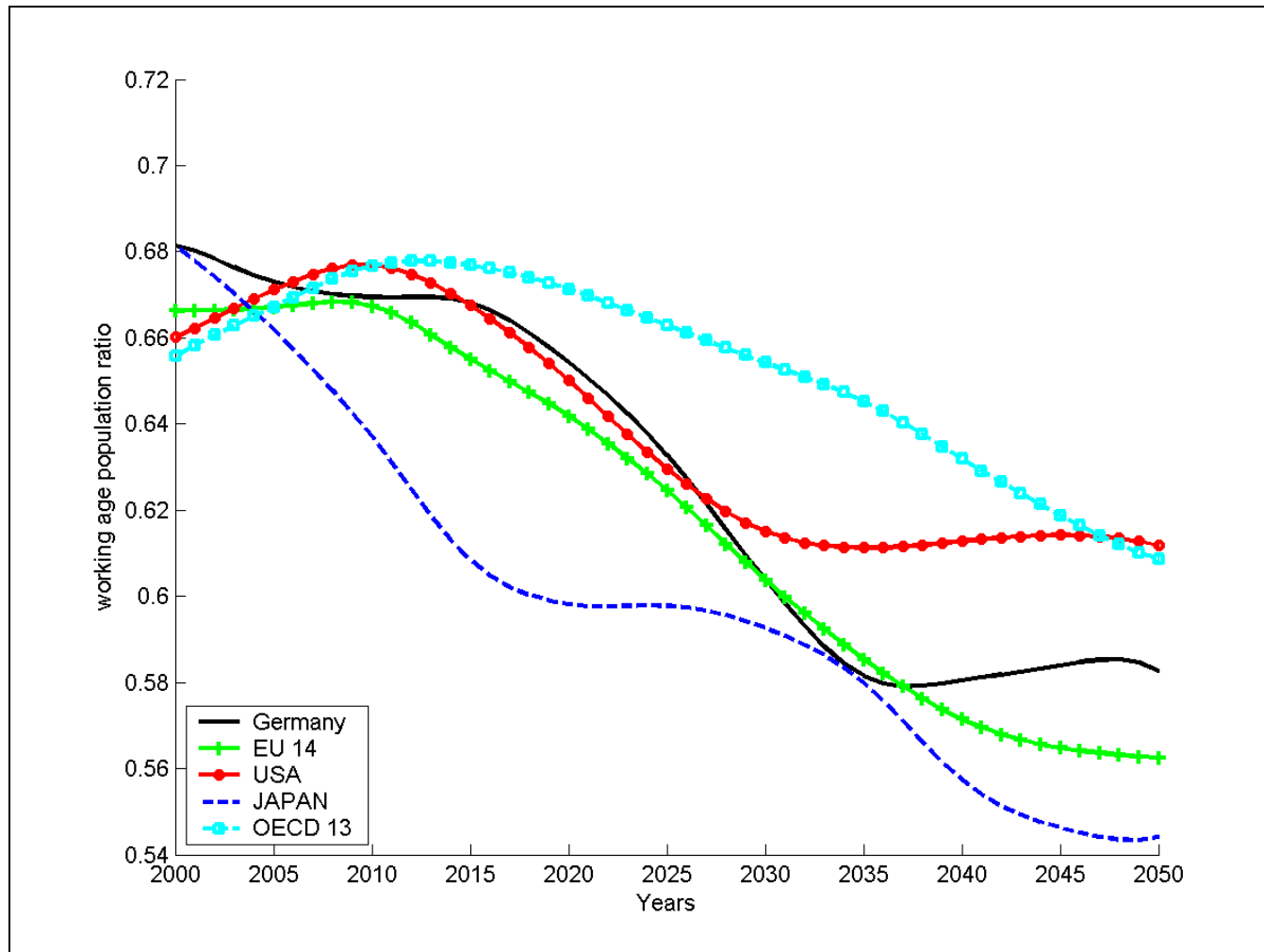
Thousand

Basics: Demography



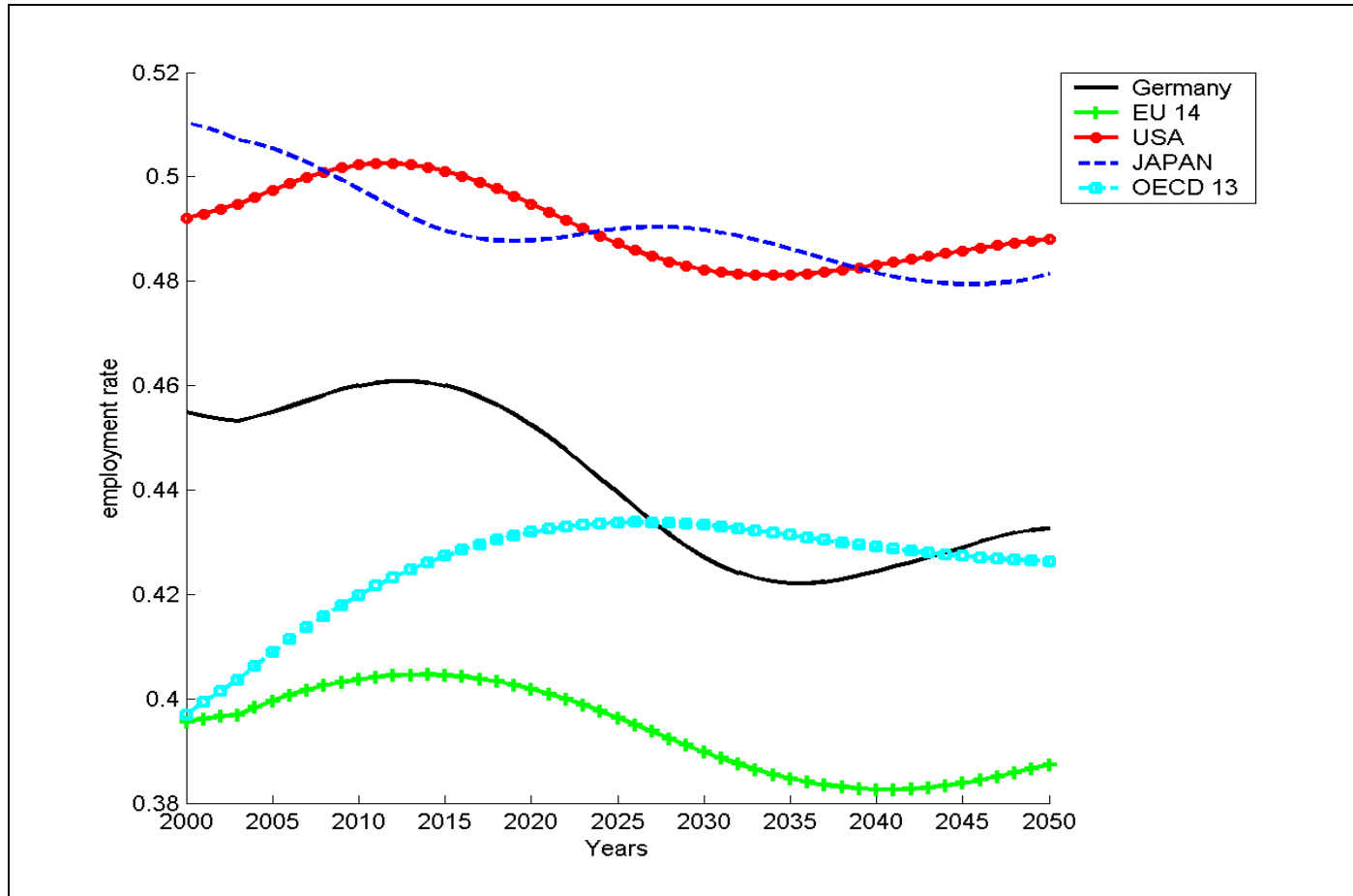
Quelle: Eurostat

Figure 1: Demographic support ratio
(proportion of persons in the total population of working age)



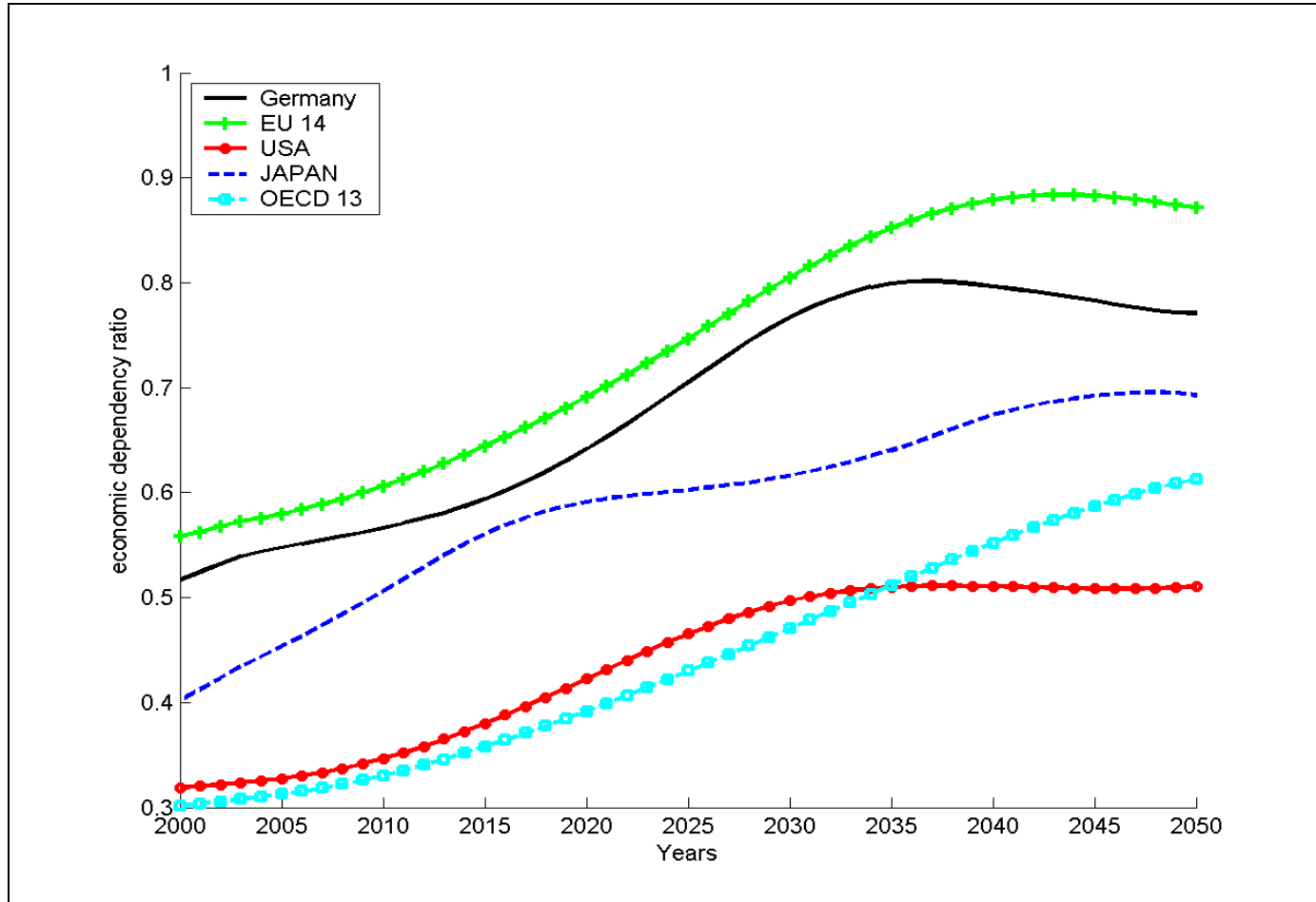
Source: Börsch-Supan, Ludwig and Winter (2003), based on the UN's demographic projections (2000).
"Working age" covers all persons between the ages of 15 and 65.

Figure 2: Economic support ratio
(Proportion of economically active persons in the total population)



Source: Börsch-Supan, Ludwig and Winter (2003), based on the UN's demographic projections (2000) and the OECD's age and gender-specific employment rates (2002).

Figure 3: Economic age burden ratio or old-age dependency ratio
(Number of pensioners divided by the number of employed persons)



Source: Börsch-Supan, Ludwig and Winter (2003), based on the UN's demographic projections (2000) and the OECD's age and gender-specific employment rates (2002).

Figure 4: Old-age dependency ratio associated with various population forecasts for Germany

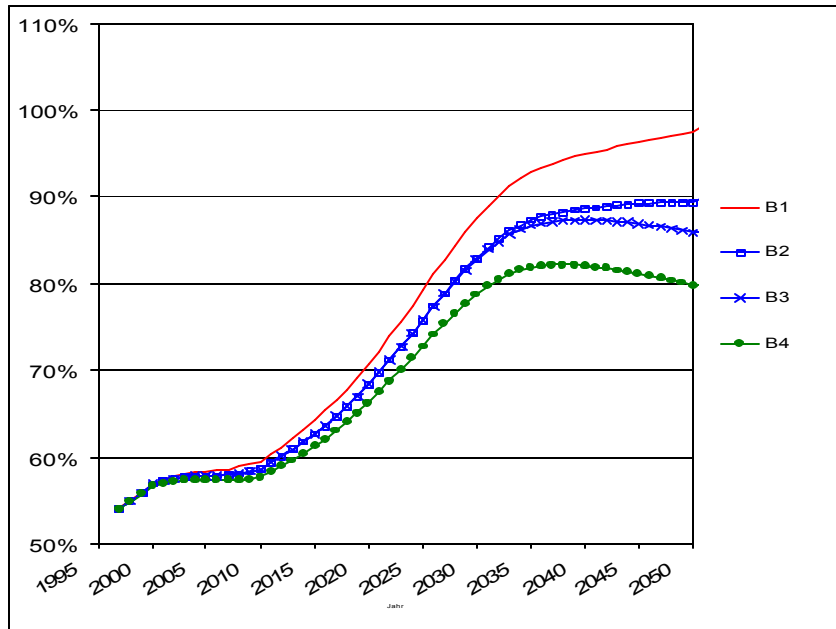
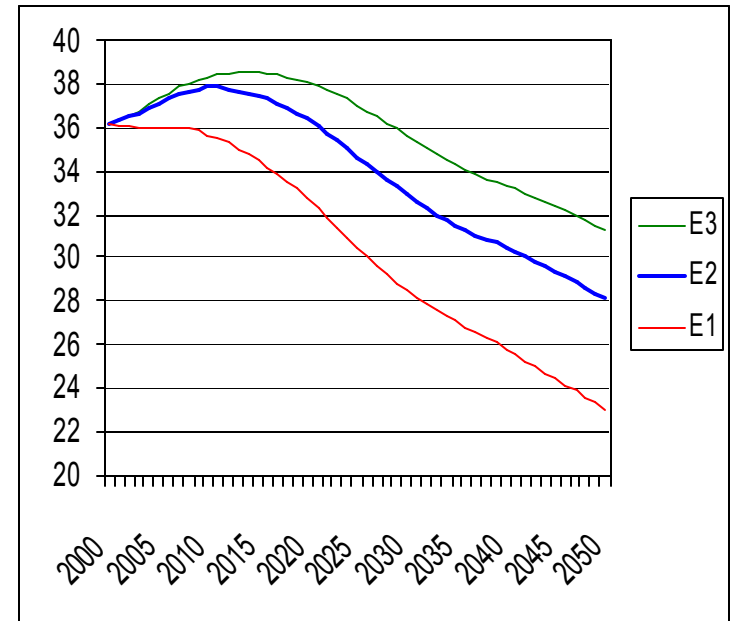


Figure 5: Labor force in Germany, 2000-2050 [in millions]



Source: Börsch-Supan (2000b). Note: Scenarios E1 - E3 correspond to the employment forecast variants explained in the text.

Source: Combination of Figure 3 for Germany with variants from Birg/Börsch-Supan (1999).
 Notes: B1: strong aging, constant fertility; B2: modest aging, constant fertility; B3: modest aging, increasing fertility; B4: weak aging, increasing fertility. *Constant and increasing fertility* respectively signifies a constant birth rate at 1.35 and an increasing birth rate at 1.64 by 2050; *modest, weak and strong aging* signifies an increase in life expectancy by 2050 of 6 years (4.5 years and 7.5 years, respectively) with annual net immigration of 120,000 persons (20,000 and 220,000 persons respectively). *Employment*: Scenario E2, cf. section 2.5.

Strategic role of capital markets in the course of global aging:

- Substitution of scarce and costly labor
- Intertemporal resource shifting
- International diversification

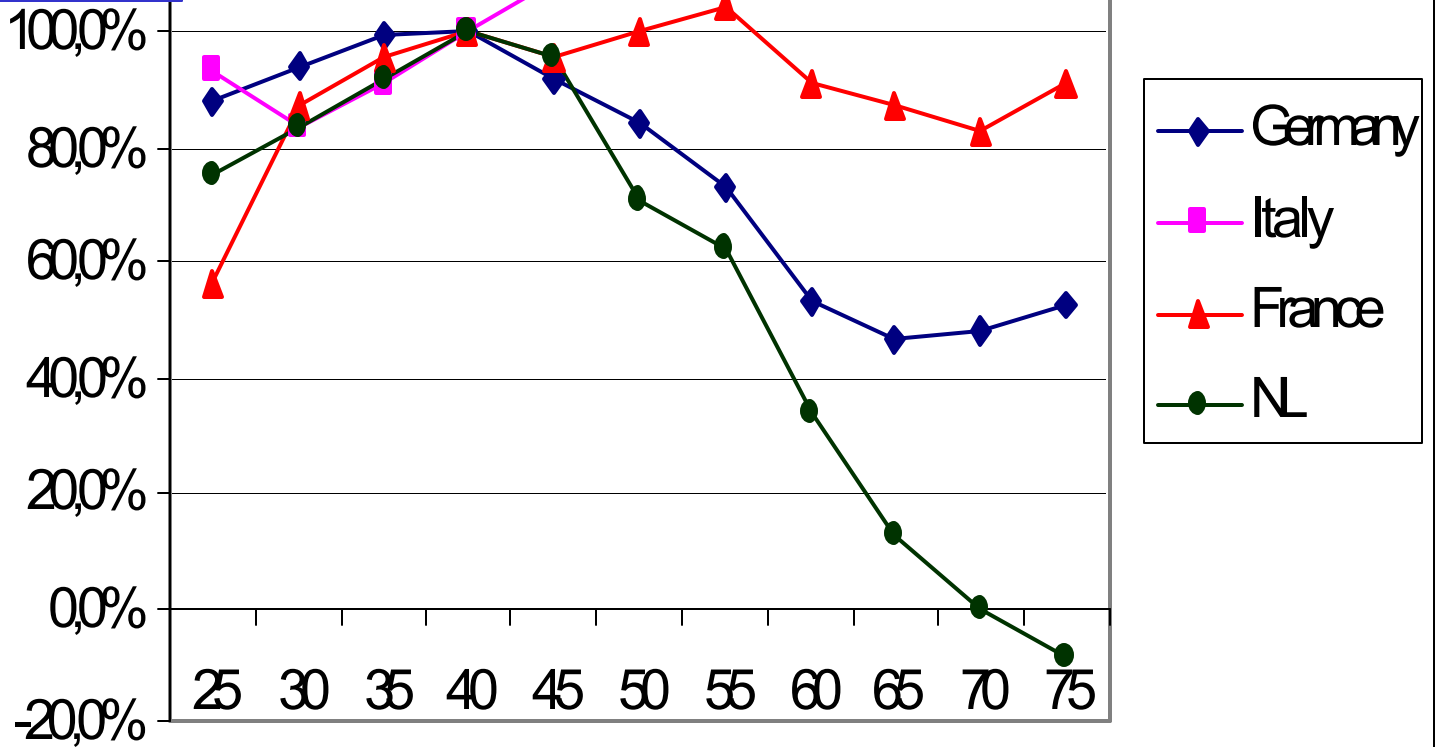
But:

Asset meltdown?

Why no asset meltdown?

1. Savings remains high at old ages (but may change)
2. Aging countries need more (not less!) *productive* capital (but: real estate)
3. Baby boom retirement neither sudden nor unexpected: very gradual impact
4. Private and occupational pension schemes still not mature
5. Global capital flows diversify risks (but home bias, frictions)

Saving rates by age and cohort (relative to age 40)



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Calibrated general equilibrium (OLG) model of long-run capital accumulation and pricing

Quite sophisticated

- Long-term consumption-savings decision
- Labor supply
- Multipillar Pension system
- Global capital market scenarios

but still to be done:

- Risk (life span, earnings, returns)
- Portfolio effects
- Capital market frictions (home bias, FDI)

Workhorse Multi-Country OLG-Model:

- **OLG-Structure:**

Time $t=2000\dots2075$; Age $a=20\dots95$; Country $i=1\dots L$

- **Production, Investment, Labor Demand:**

$$Y_{t,i} = F(K_{t,i}, A_{t,i}L_{t,i}) = \left(\alpha K_{t,i}^{1-1/\beta} + (1-\alpha)(A_{t,i}L_{t,i})^{1-1/\beta} \right)^{\frac{1}{1-1/\beta}},$$

- **Saving and Consumption:**

$$U_{t,i}^a = \frac{1}{1-\sigma} \sum_{j=a}^{LE_{k,i}} \frac{1}{(1+\rho)^{j-a}} \left(C_{t+j-a,i}^j \right)^{1-\sigma},$$

*Budget constraint
includes PAYG
System, PF passive*

Equilibrium:

- **Production** $\Rightarrow w_{t,i}$ and r_t
- **Consumption** $\Rightarrow C_{t,i}$ and $W_{t,i}$
- **Foreign Assets:** $B_{t,i} = W_{t,i} - K_{t,i}$
- **Current Account:** $CA_{t,i} = B_{t+1,i} - (1-\delta)B_{t,i} = S_{t,i} - I_{t,i}$
- **Equilibrium** $\Leftarrow \sum_{i=1}^R B_{t,i} = 0$

Pension System/Pension Reform:

- **PAYG Pillar:**

$$\tau_{t,i} w_{t,i} L_{t,i} = R_{t,i} w_{t,i} (1 - \tau_{t,i}) Z_{t,i}$$

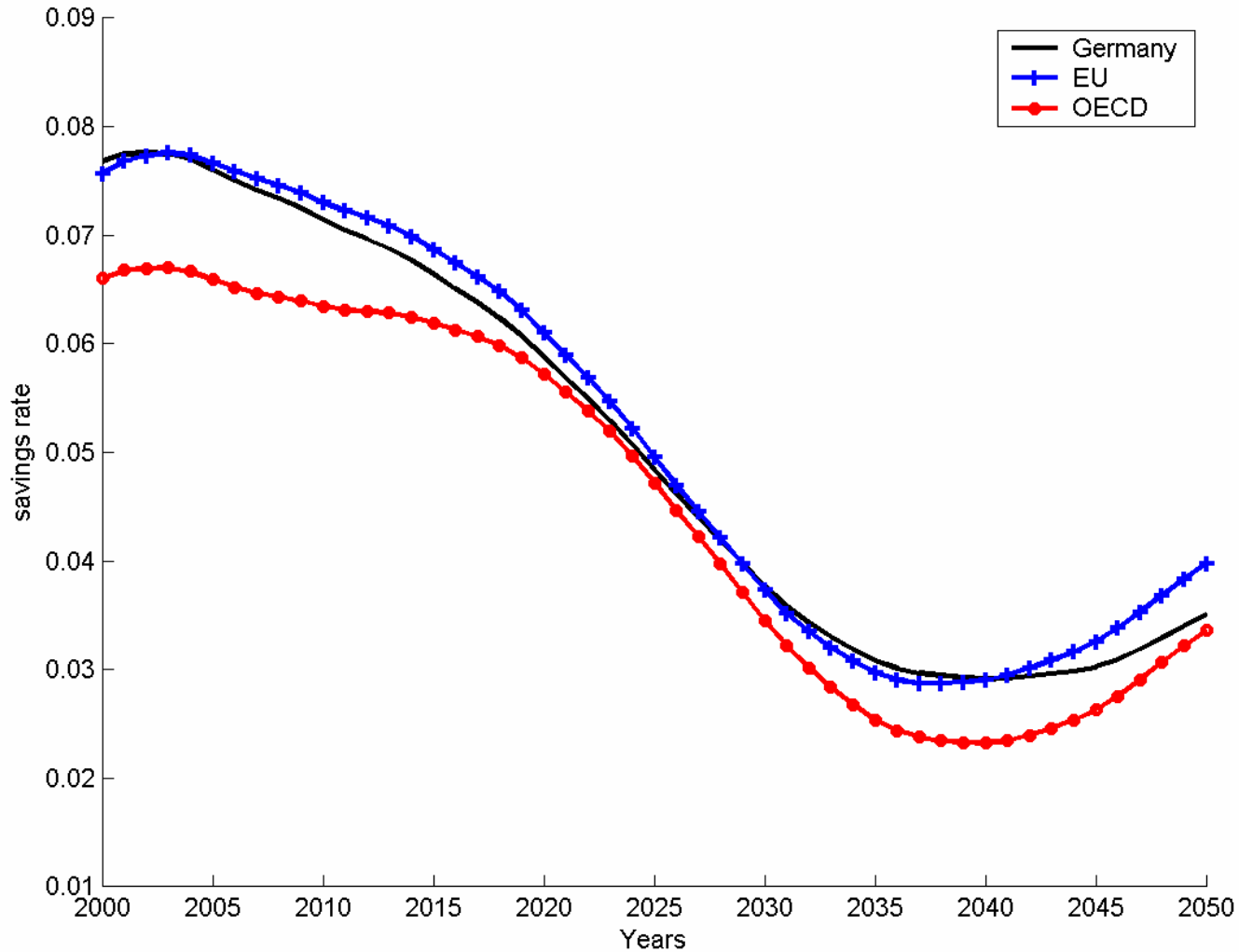
- **Funded Pillar:**

passively determined by optimal $S_{i,t}$

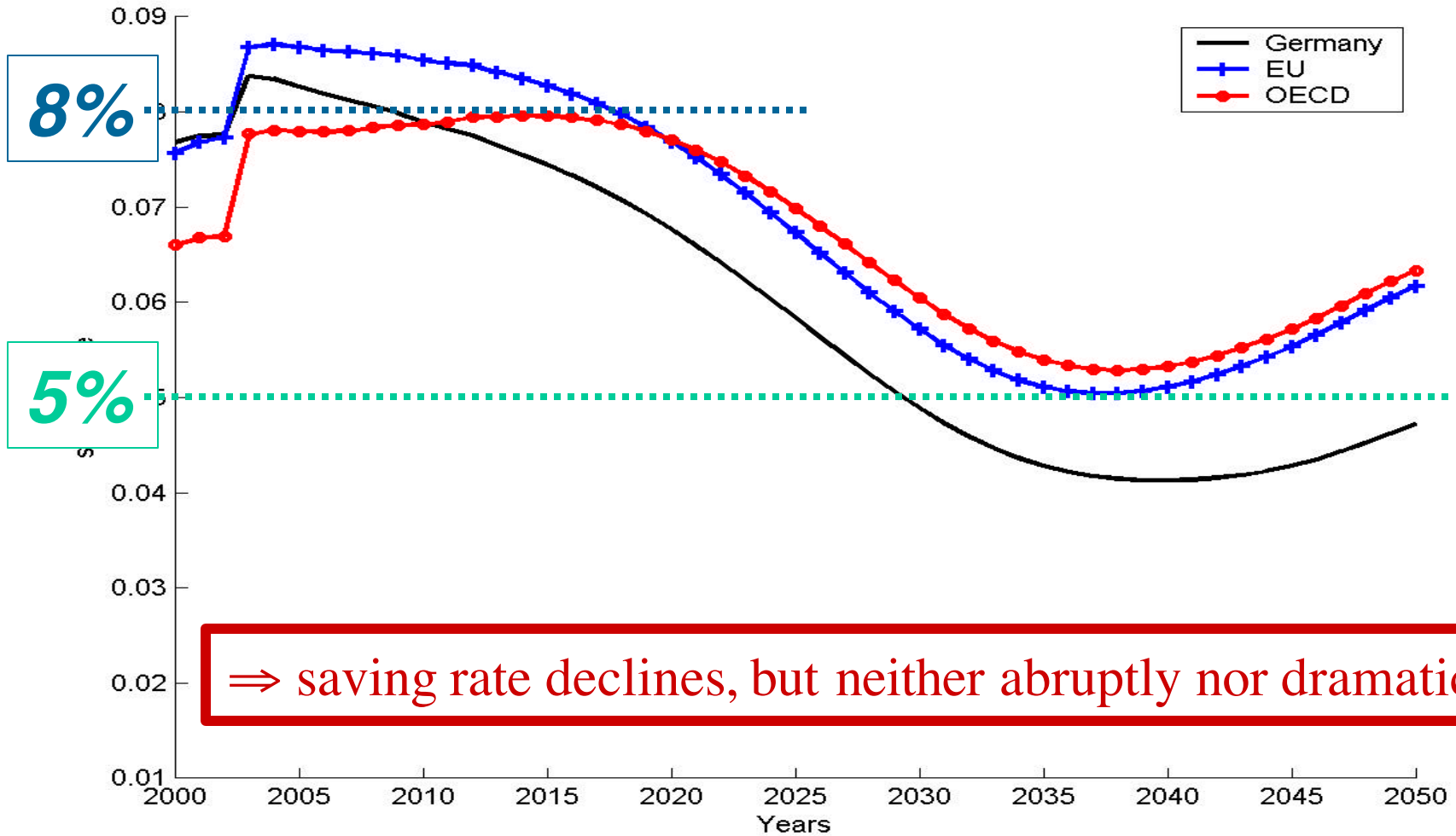
- **Pension Reform:**

„Freezing Model“

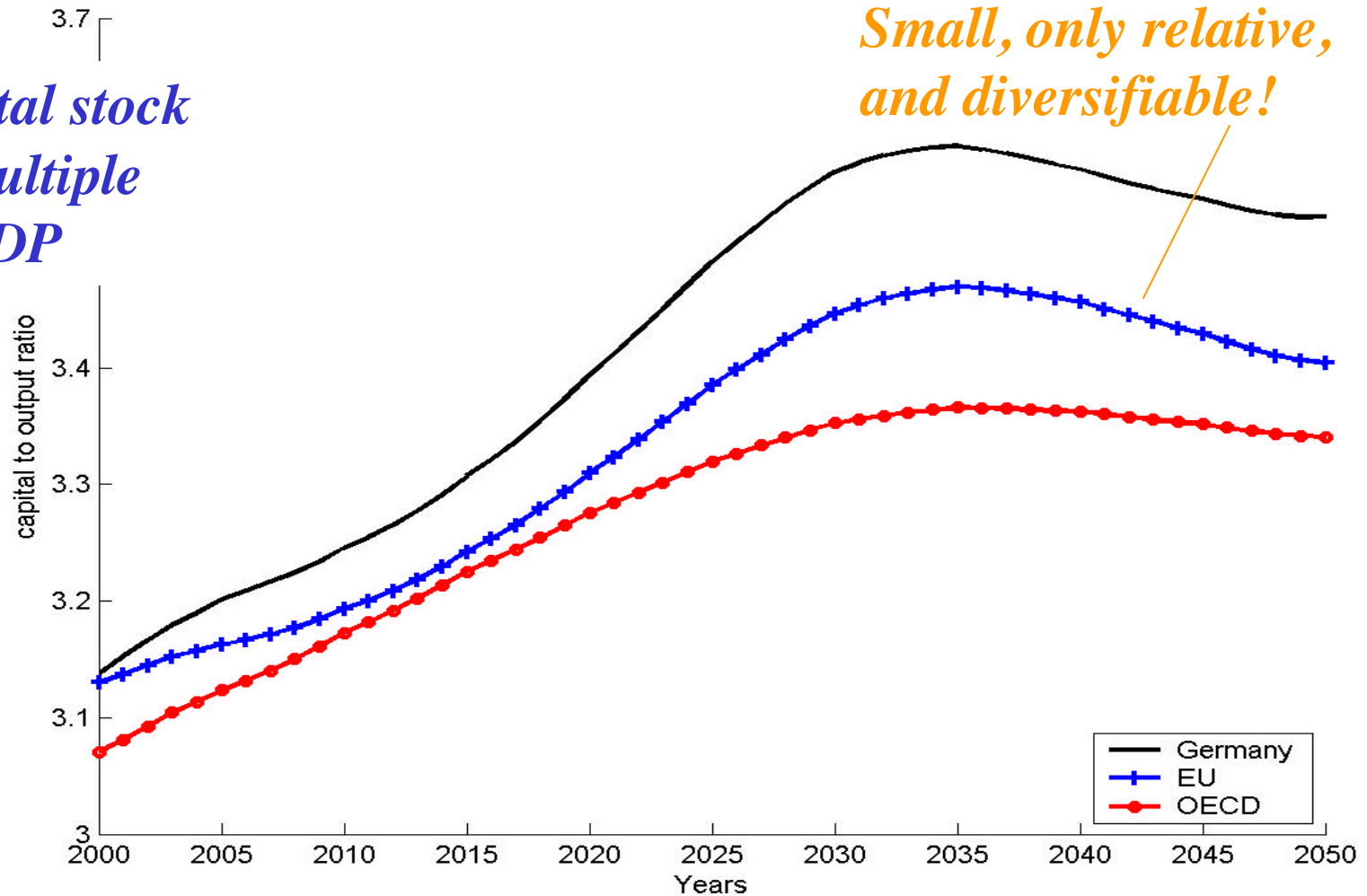
Saving rate (PAYG scenario)

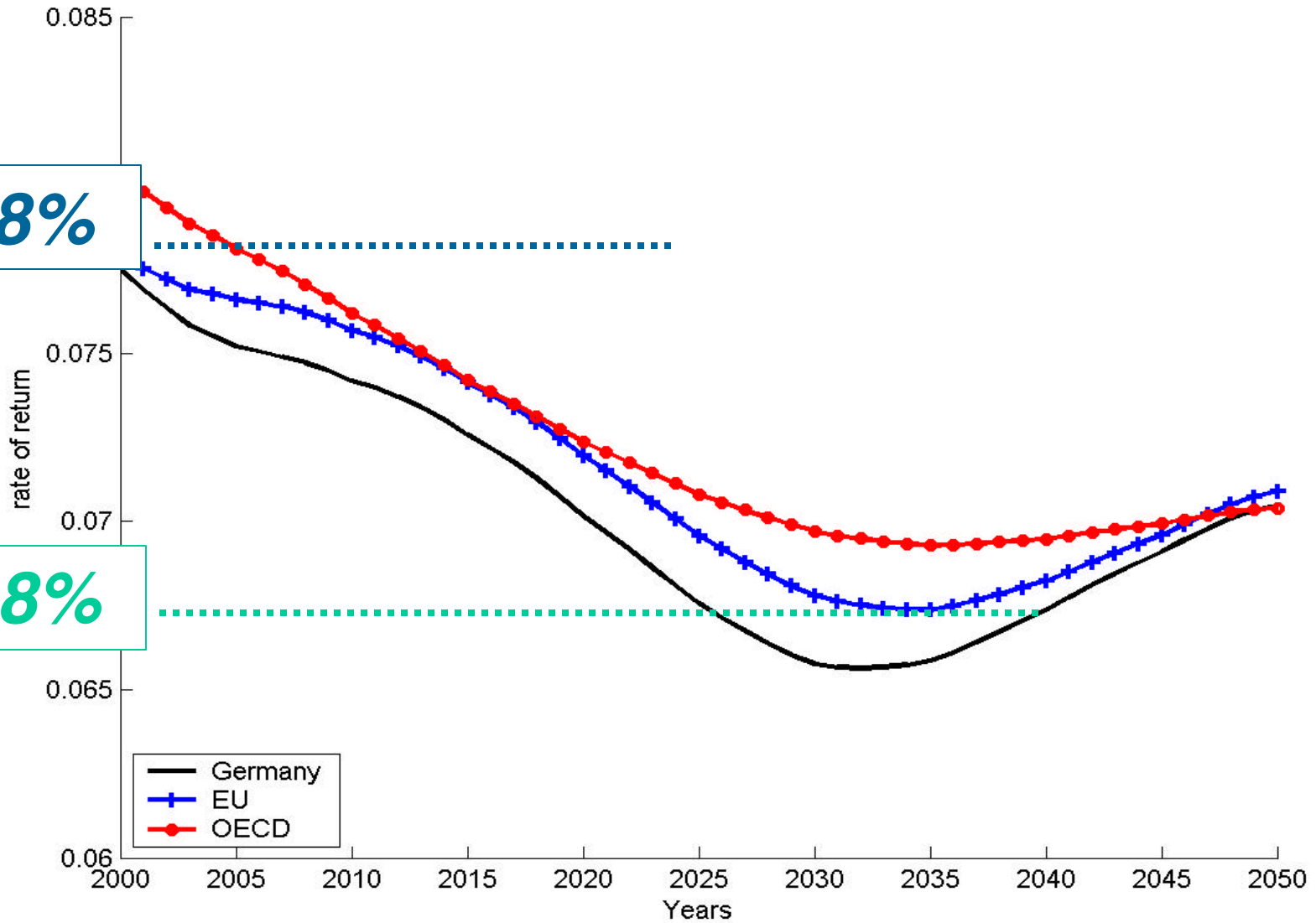


Saving rate (pension reform)



*Capital stock
as multiple
of GDP*





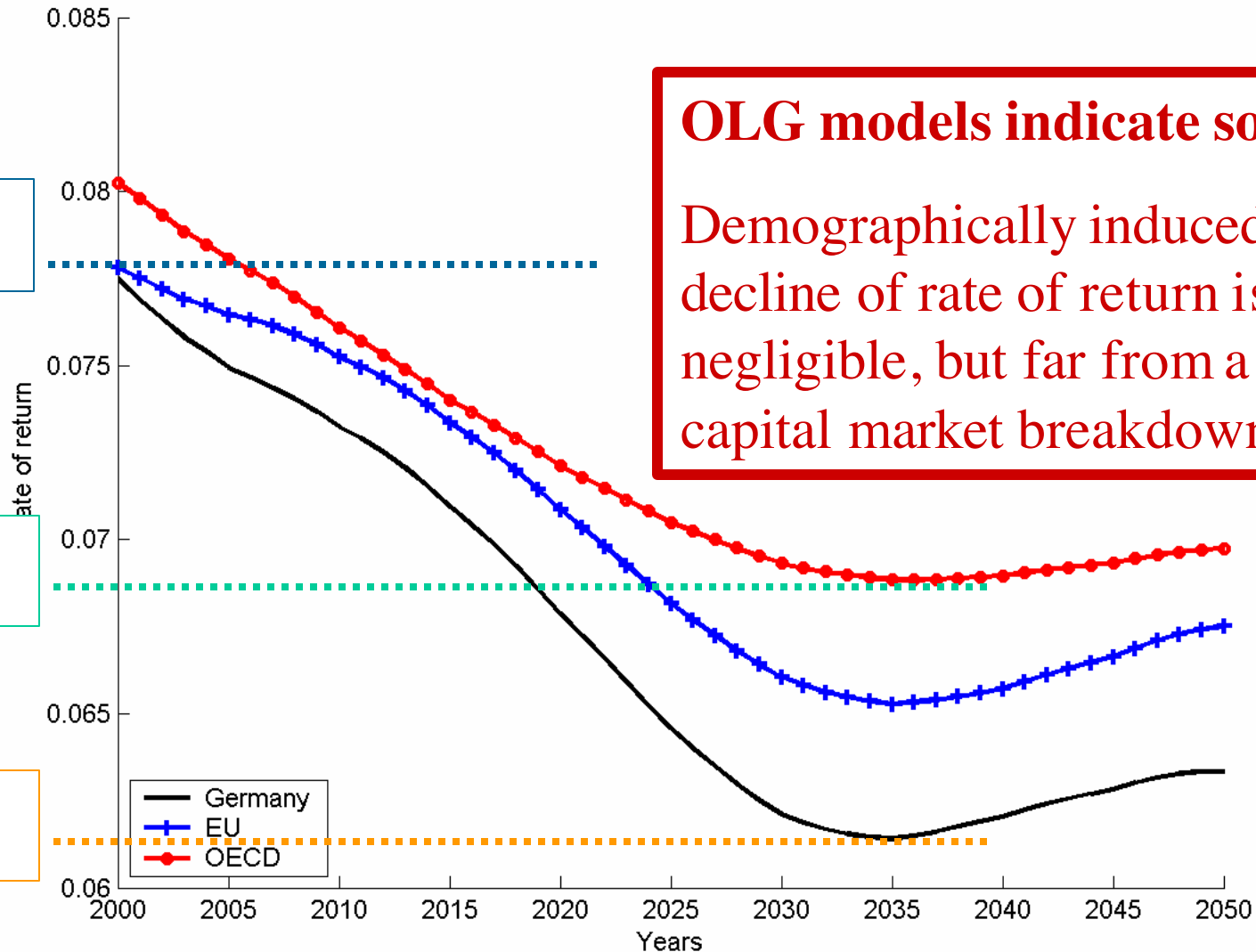
7,8%

6,8%

7,8%

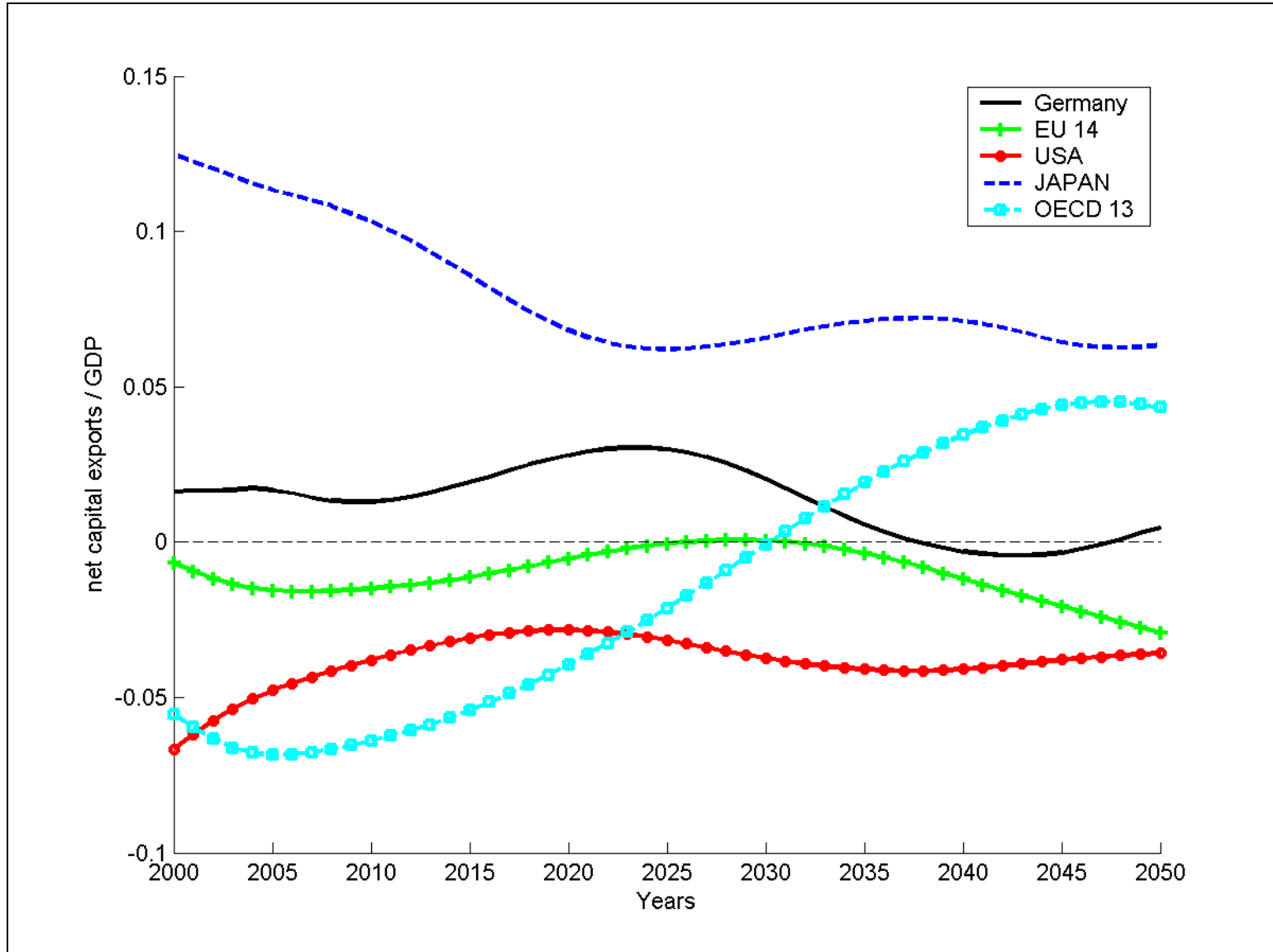
6,9%

6,1%



OLG models indicate so far:
Demographically induced decline of rate of return is non-negligible, but far from a capital market breakdown

Induced international capital flows



- Decline of rates of return to productive capital (less than 100 bpts)...
- ... but no catastrophic asset meltdown
- Qualifications: model may overestimate role of capital flows; pension reform may not happen in some countries; other behavioral responses
- Differentiate:
 - productive capital vs. real estate
 - risky vs. riskless assets

- Money, Bonds, Stocks
- Housing

What will happen?

Demand for „safe“ assets increases with age

- returns for money and bonds decrease
- risk premium for stocks („equity premium“) increases

Productive capital \neq real estate \neq housing

- population decline? Number of households!
- medium-term stable, long-term decline

Projected rates of return (EU)

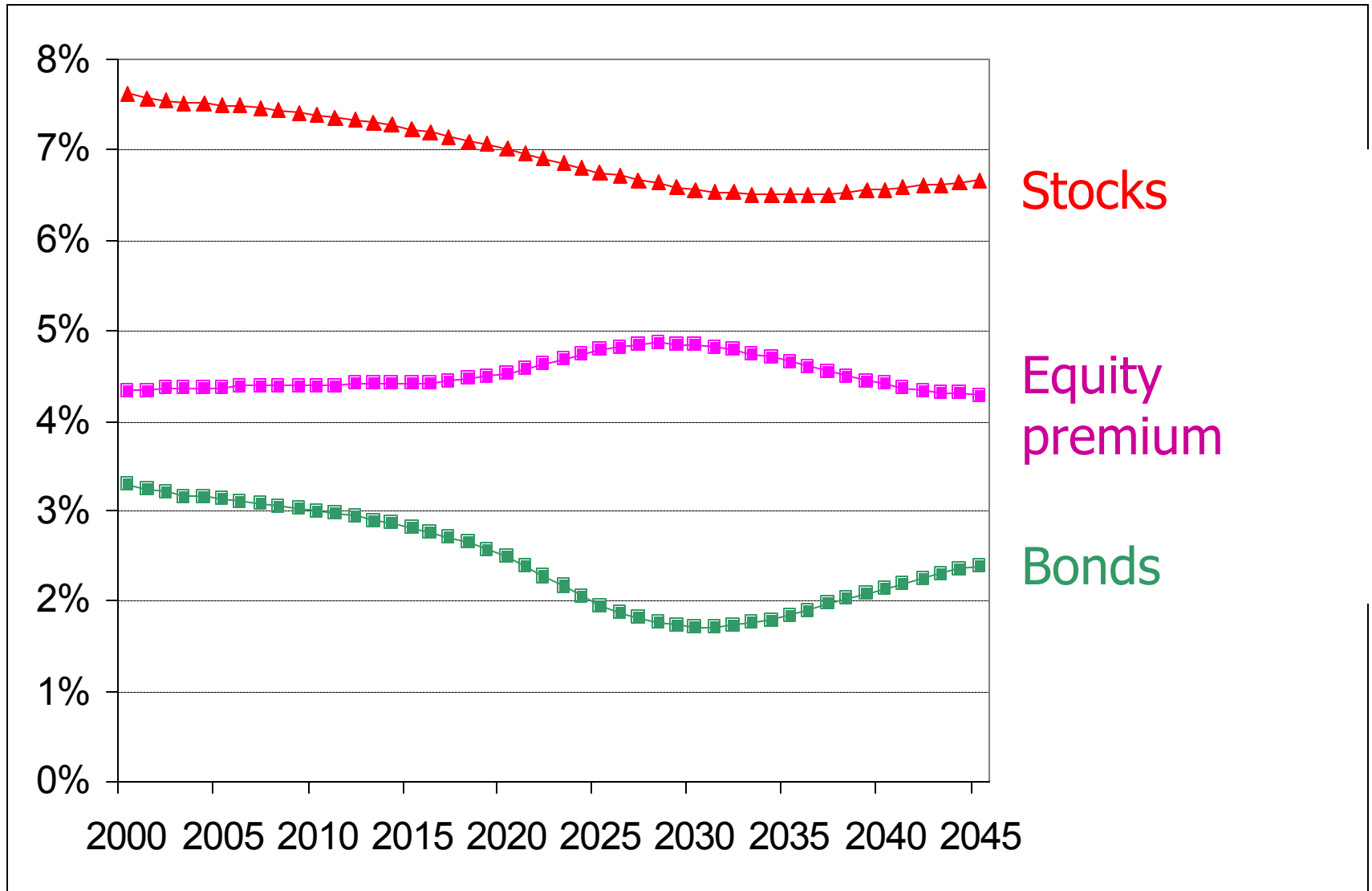


Figure 15: How does the forecast trend in returns change if the development of employment is more positive/negative than in the basic scenario?

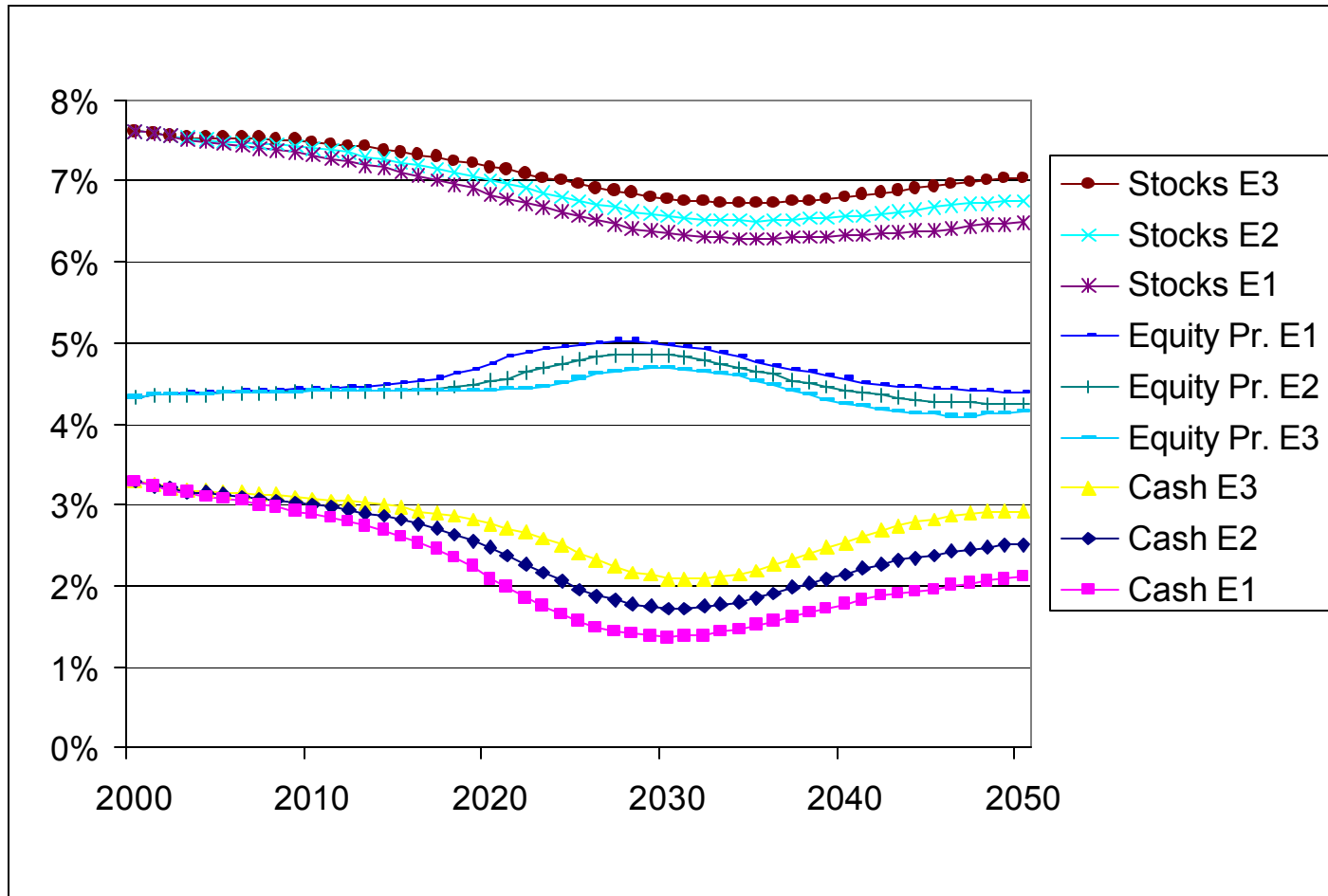
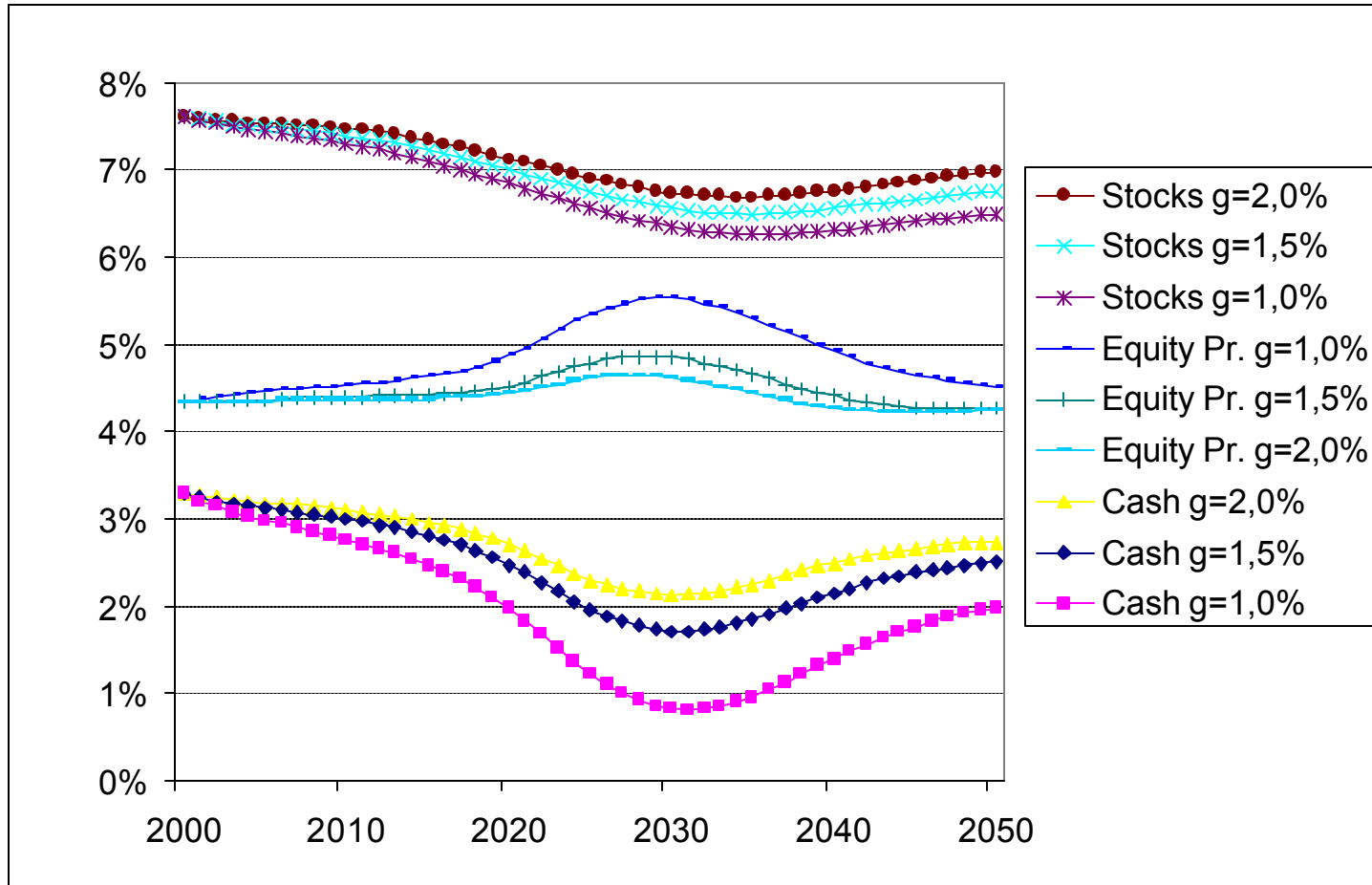
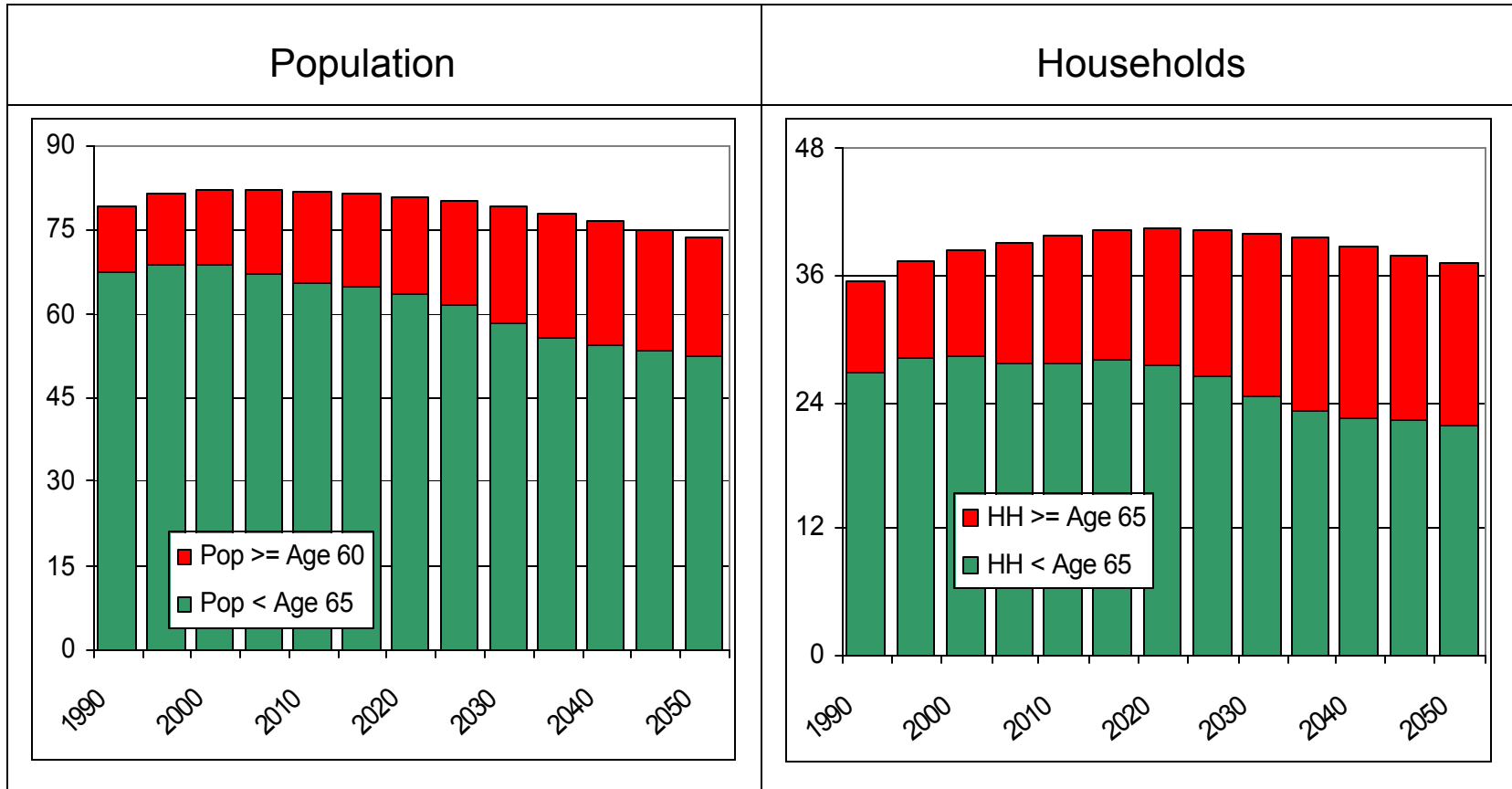


Figure 16: How does the forecast trend in returns change if the growth rate in the economy as a whole is higher/lower than in the basic scenario?



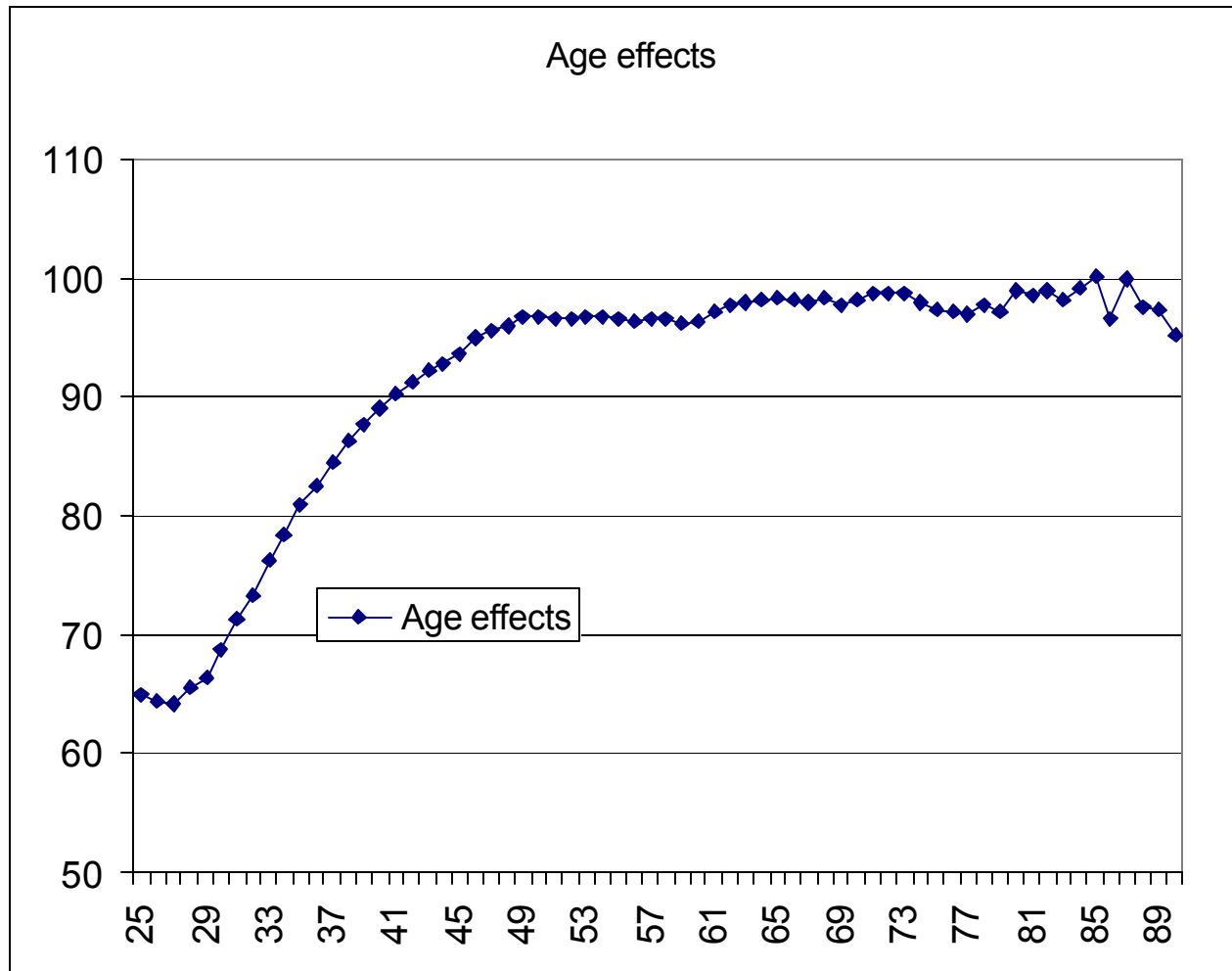
- Where it all began: Mankiw-Weil: housing prices decline by 47% until 2010
- Ingredients:
 - Population and household forecasts
 - Microeconomic age effect
 - Other concurrent demand effects (income)
 - Supply effects?

Figure 18: Trends in population and households



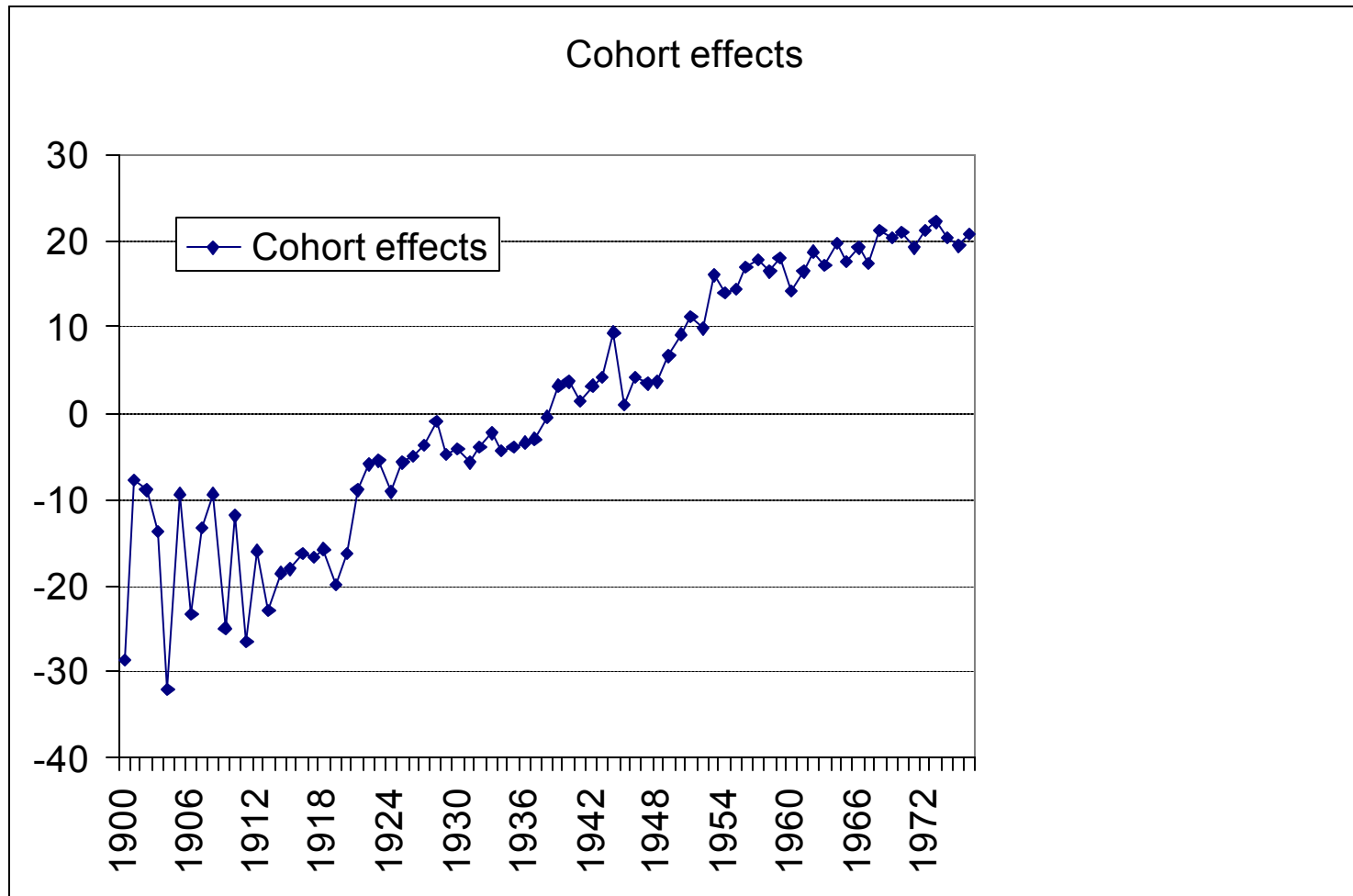
Source: *Population projection* in accordance with UN (2000), cf. section 2. *Household projection* according to age of reference persons, own calculations based on age-specific household ratios in the 2001 micro census.

Figure 19: Corrected age effects in the demand for housing

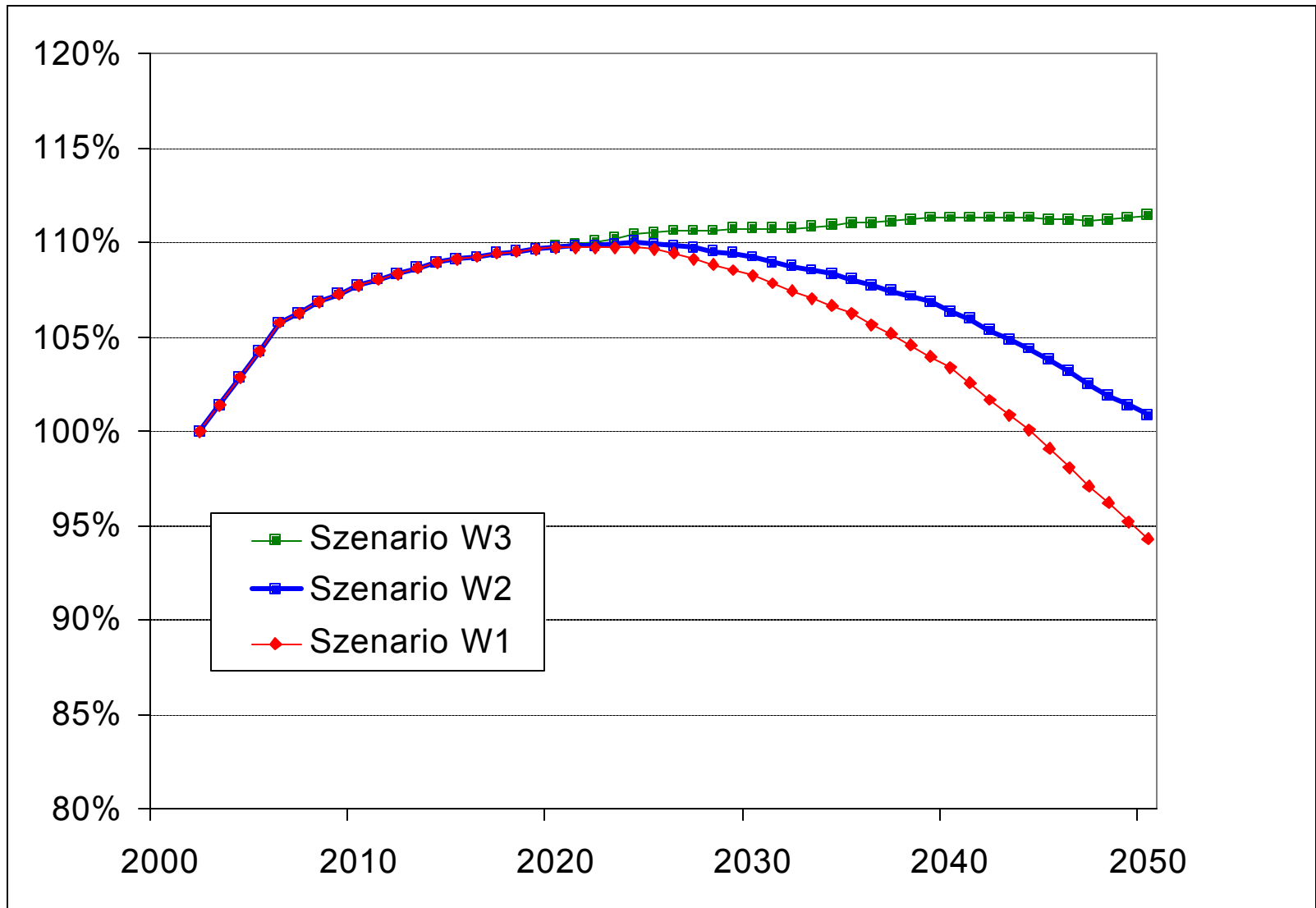


Source: Own calculations based on SOEP, 1984-2001.

Figure 20: Cohort effects in demand for housing



Source: Own calculations based on SOEP, 1984-2001.



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mea

1. Asset Meltdown?

Some reduction of the rate of return to productive capital, but no catastrophic asset meltdown

2. Differentiate!

The safer the asset, the larger the decline

3. Housing

medium run: no decline, longer run: more likely