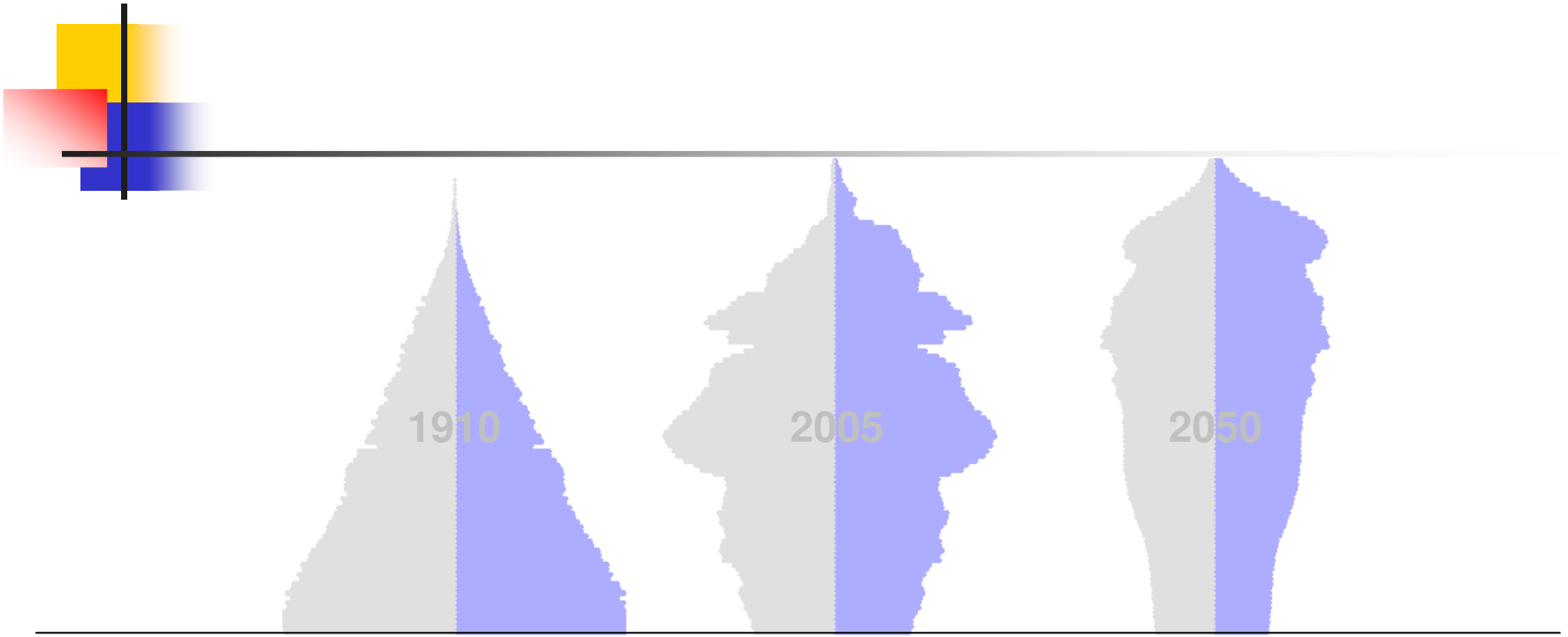
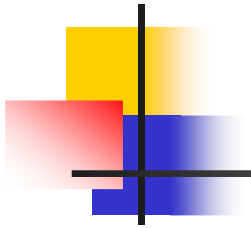
Care Need Projections for Germany

(with Eckart Bomsdorf)





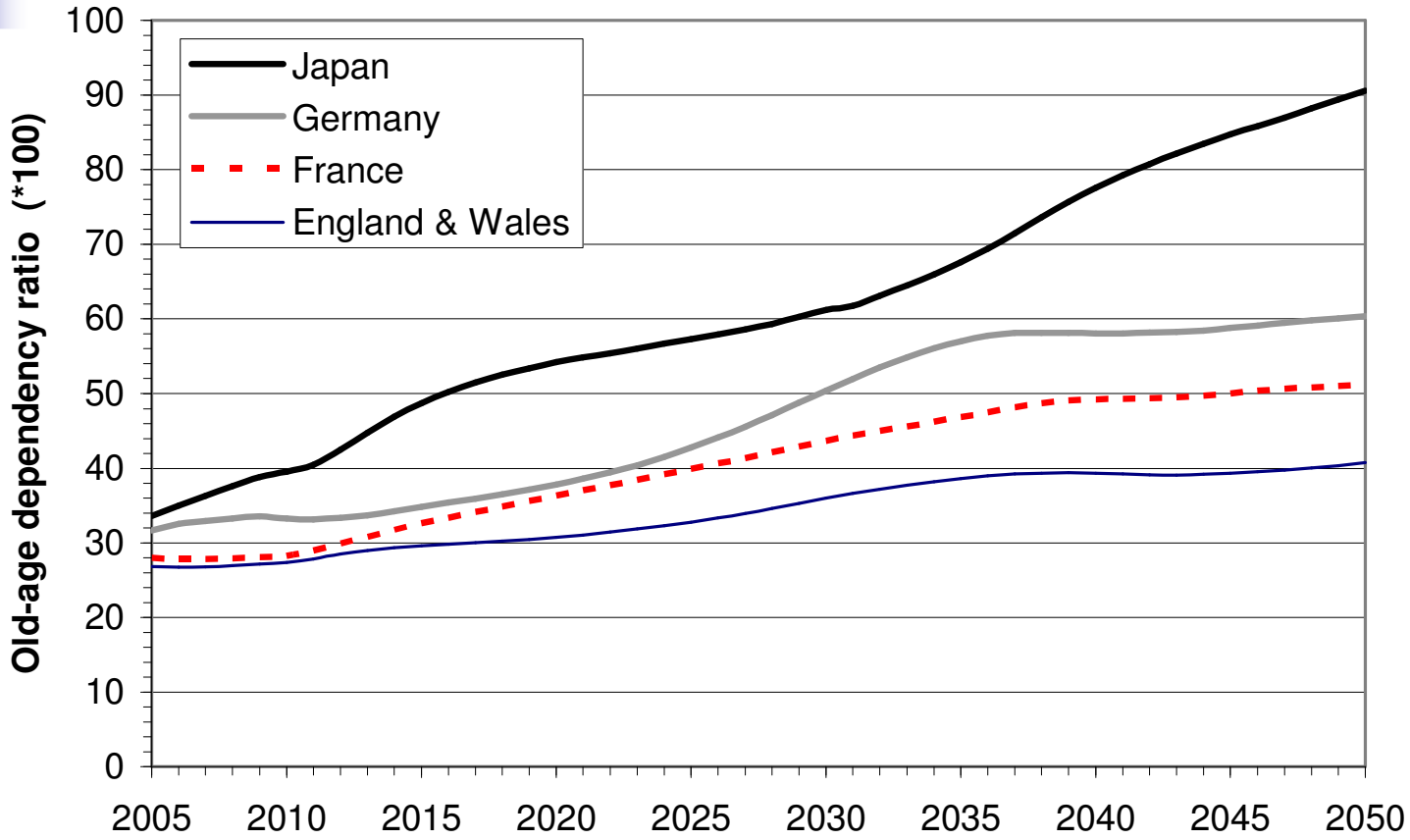
Structure

1) Introduction

2) Deterministic Projection

3) Multiple Regression

1. Introduction



Ratio of age group 65 and older to 20 to under 65 in England & Wales, France, Germany, Japan (medium variant) 2005-2050.

1. Introduction

- High developed countries are aging.
- This development may have significant consequences for social security systems, health care, etc.
- In the following, focus on German population development.
- Consequences of different population scenarios for German Long Term Care Insurance.

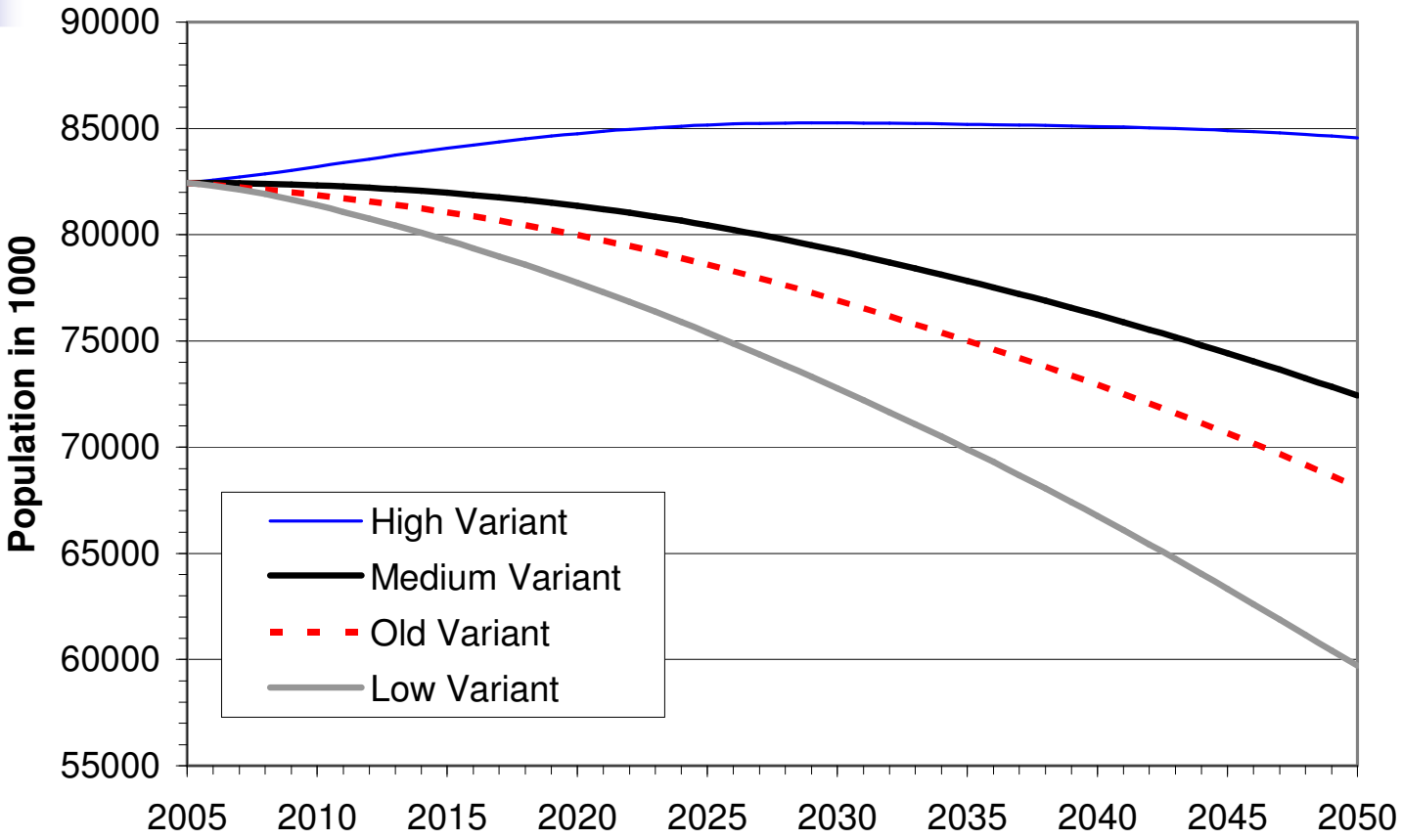
2. Deterministic Projection

- Deterministic: different assumptions, different scenarios (e.g. low, medium, high).
- Care need projections require assumptions concerning future population as well as the development of the risk of care need.
- For population: different assumptions for fertility, mortality and migration.
- For the risk of care need: age and sex-specific ratios of persons in need of care to population (data from German Federal Statistical Office).

Assumptions

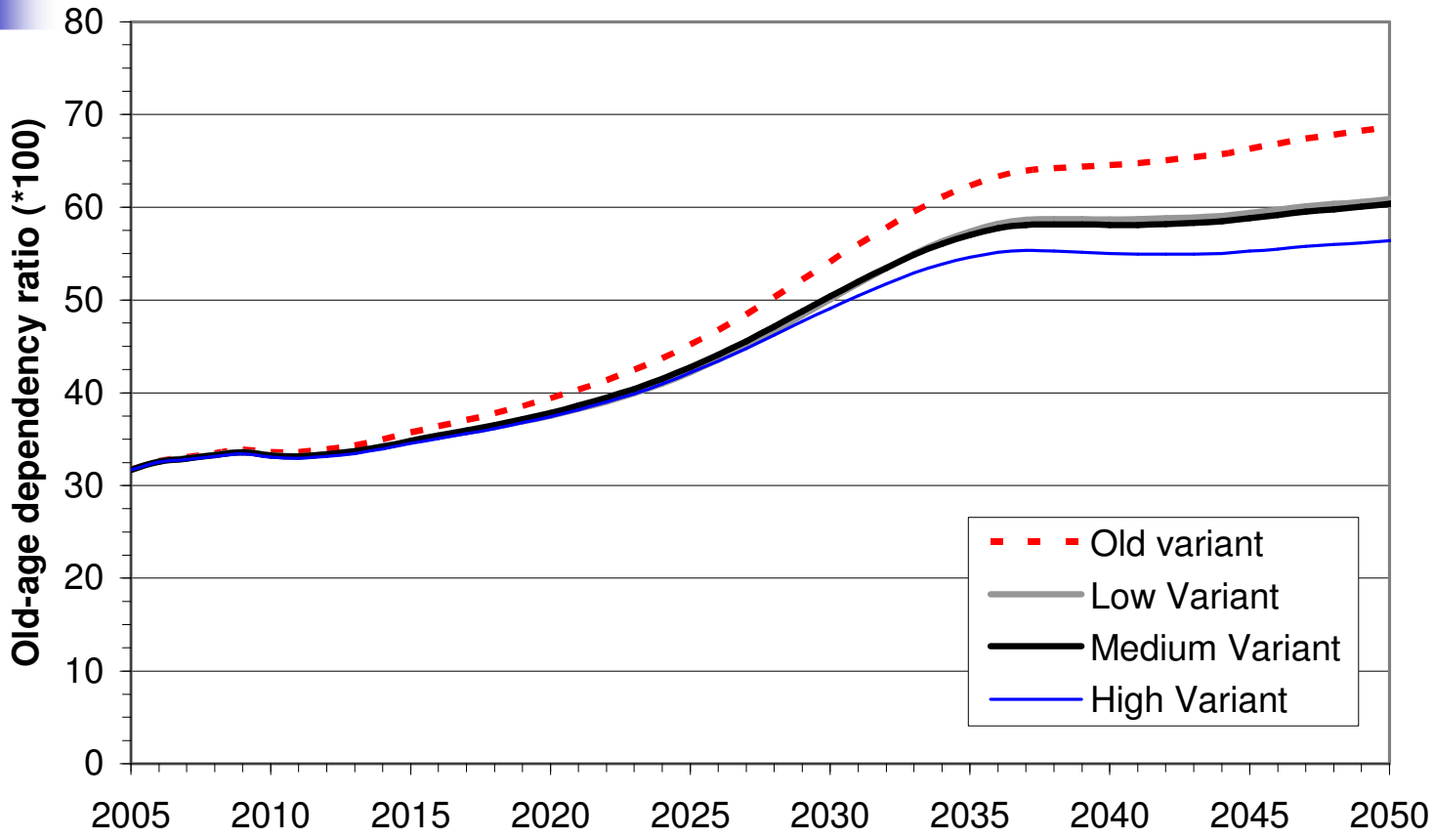
- Four scenarios for population:
  - Low, medium, high
  - Old (medium fertility, high life expectancy, low migration)
- For the risk of care need two variants:
  - A: Status quo
  - B: a slight decrease in the ratios (see also Ziegler/Doblhammer 2008 for SOEP data)

Population size



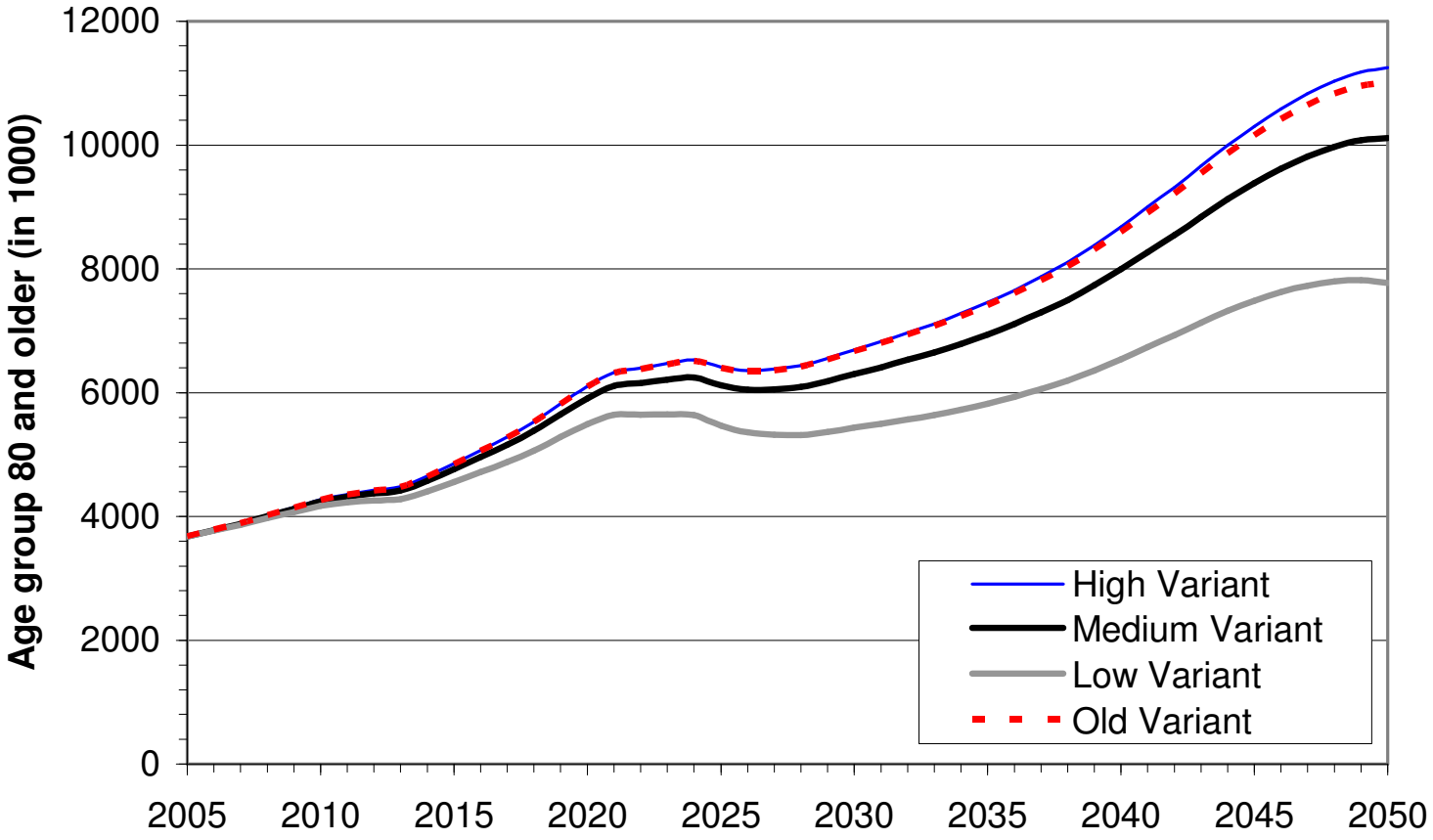
Population in Germany 2005 to 2050.

Old-age dependency ratio



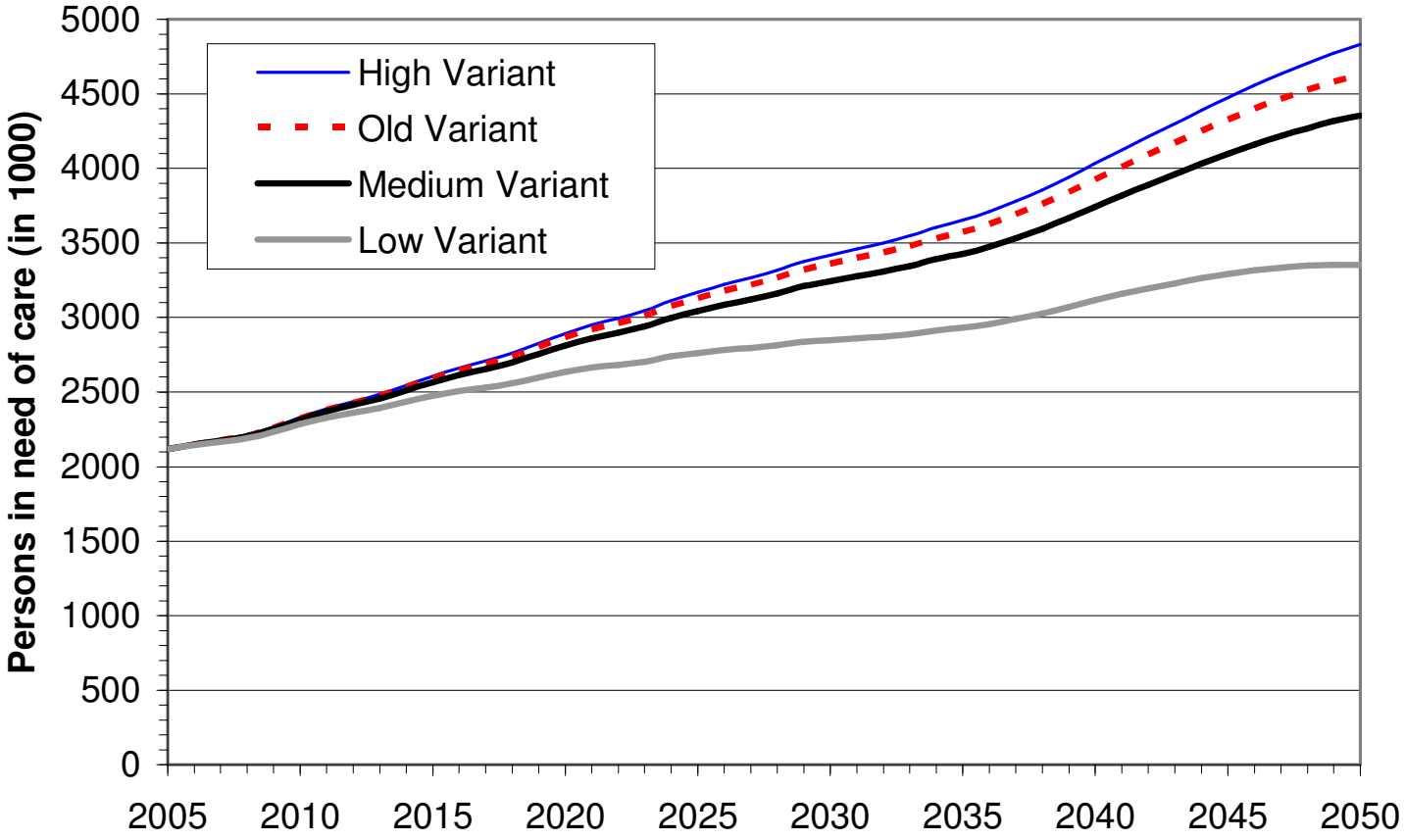
Ratio of age group 65 and older to 20 to under 65.

Age group 80+



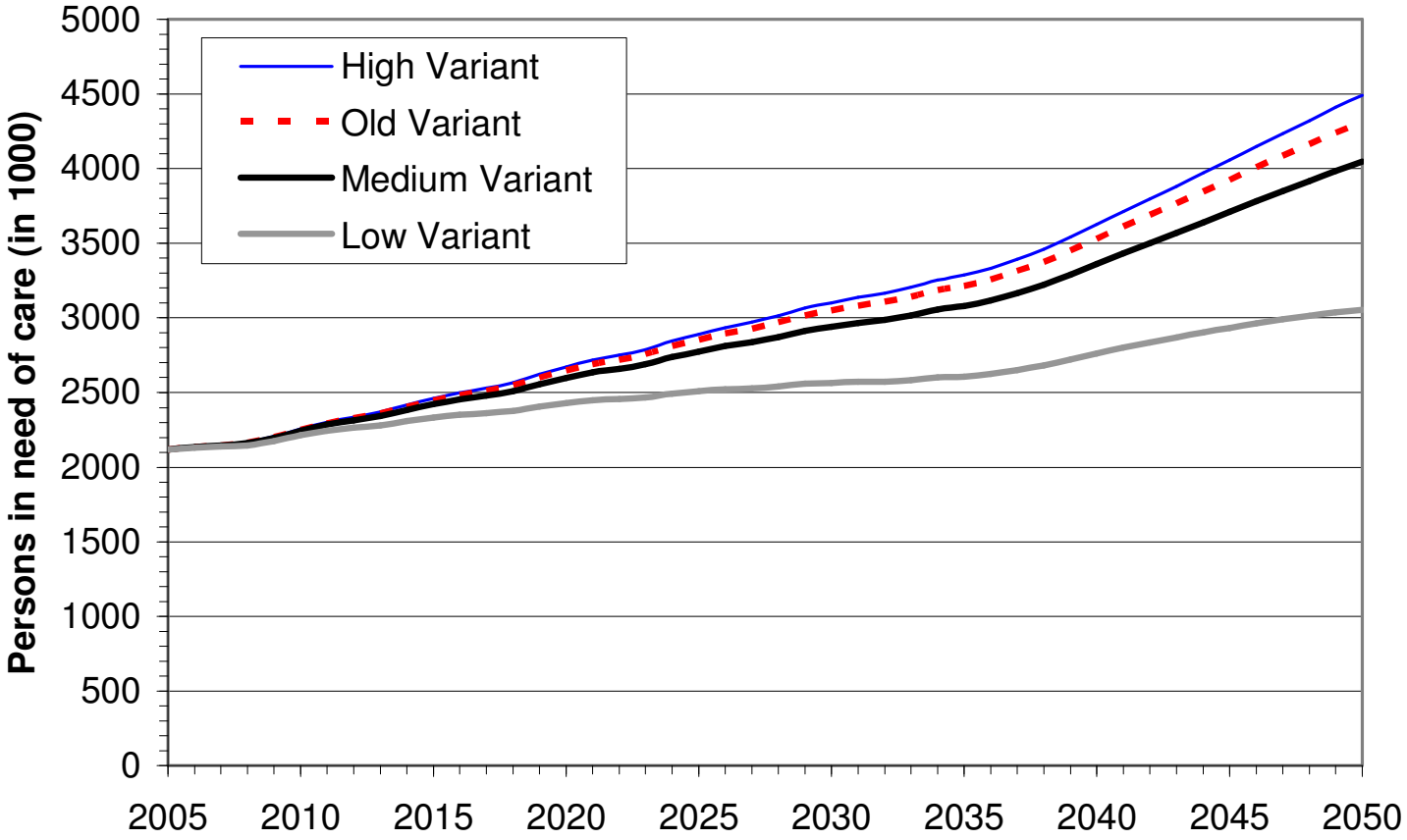
Age group 80 years and older.

Persons in need of care (A)



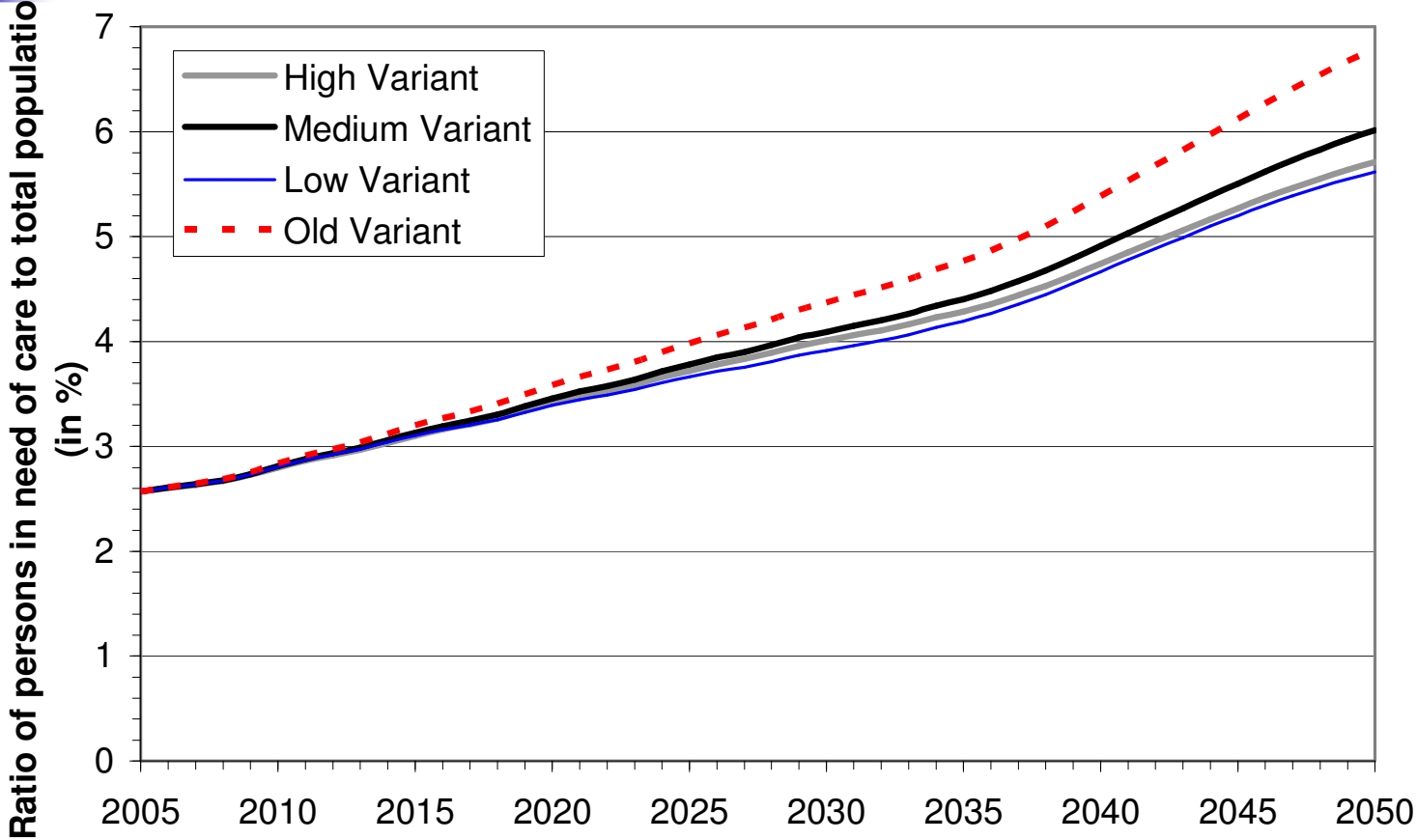
Variant A: no change in ratios.

Persons in need of care (B)



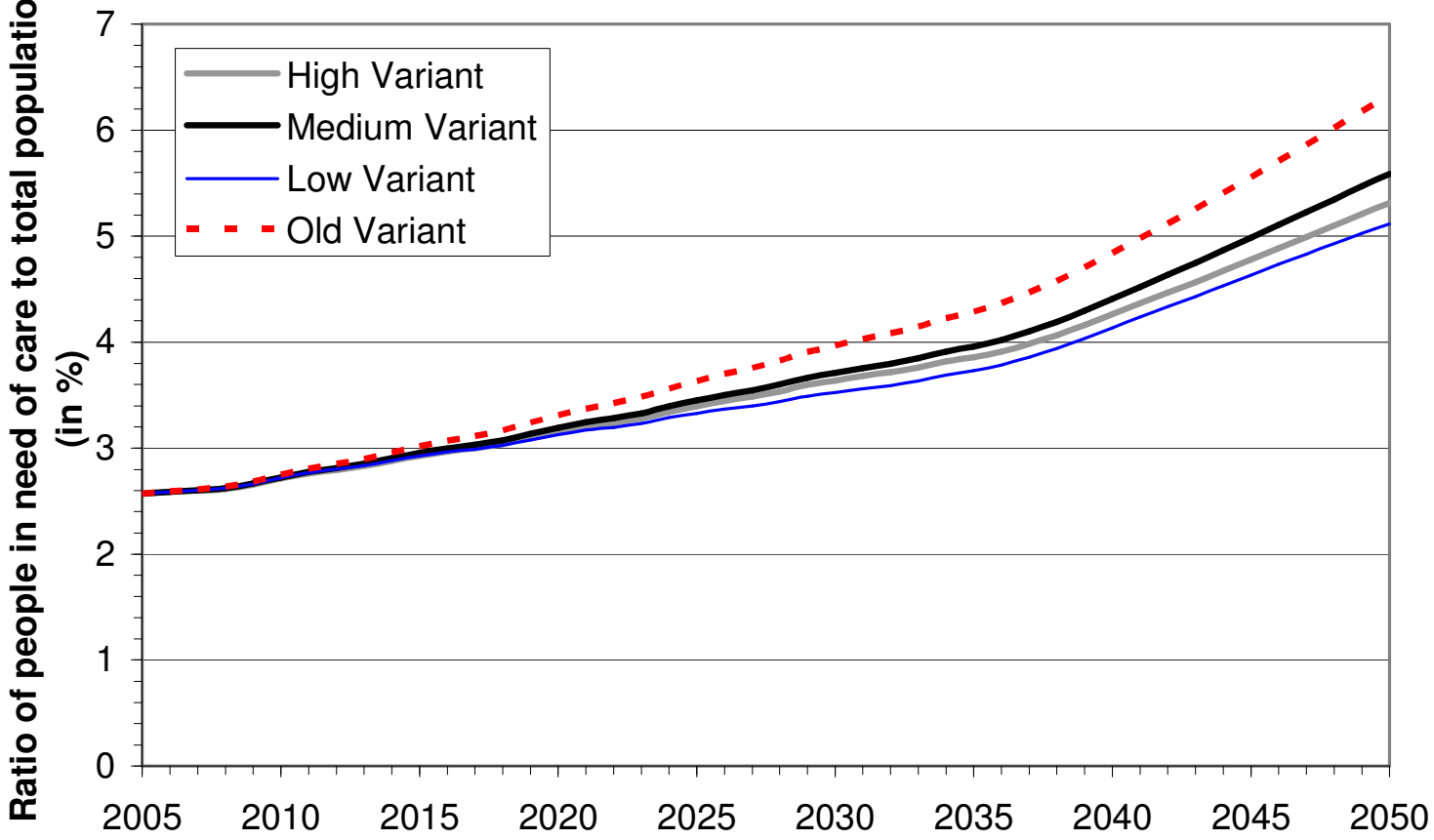
Variant B: change in ratios (slight improvement).

Ratio of persons in need of care (A)



Variant A: no change in ratios.

Ratio of persons in need of care (B)



Variant B: change in ratios (slight improvement).

Deterministic projection

Open questions:

- What happens between the considered scenarios?
- How do changes in fertility, mortality and migration affect the results?
- (no probability is given for a specific range, e.g. high-low)

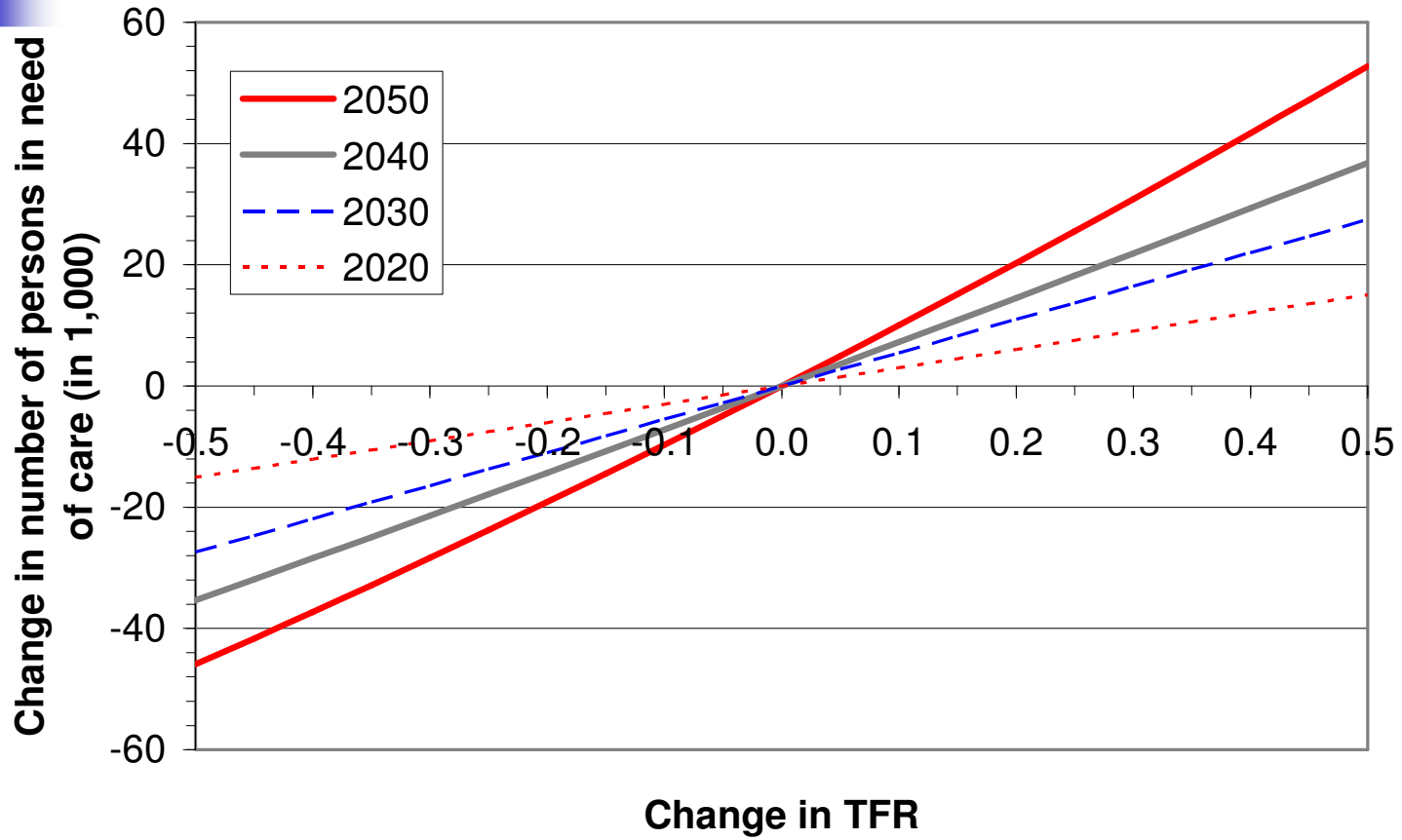
3. Multiple Regression

- Methodology developed for population (see e.g. Bomsdorf/Babel 2007).
- Examining the effect of changes in fertility, mortality and migration on number of persons in need of care and ratio to total population.
- First step: Graphical analysis of changes in fertility or mortality or migration.
- The basis of the calculations is the medium scenario for population and Variant B (slight improvement in risk of care).

Medium scenario

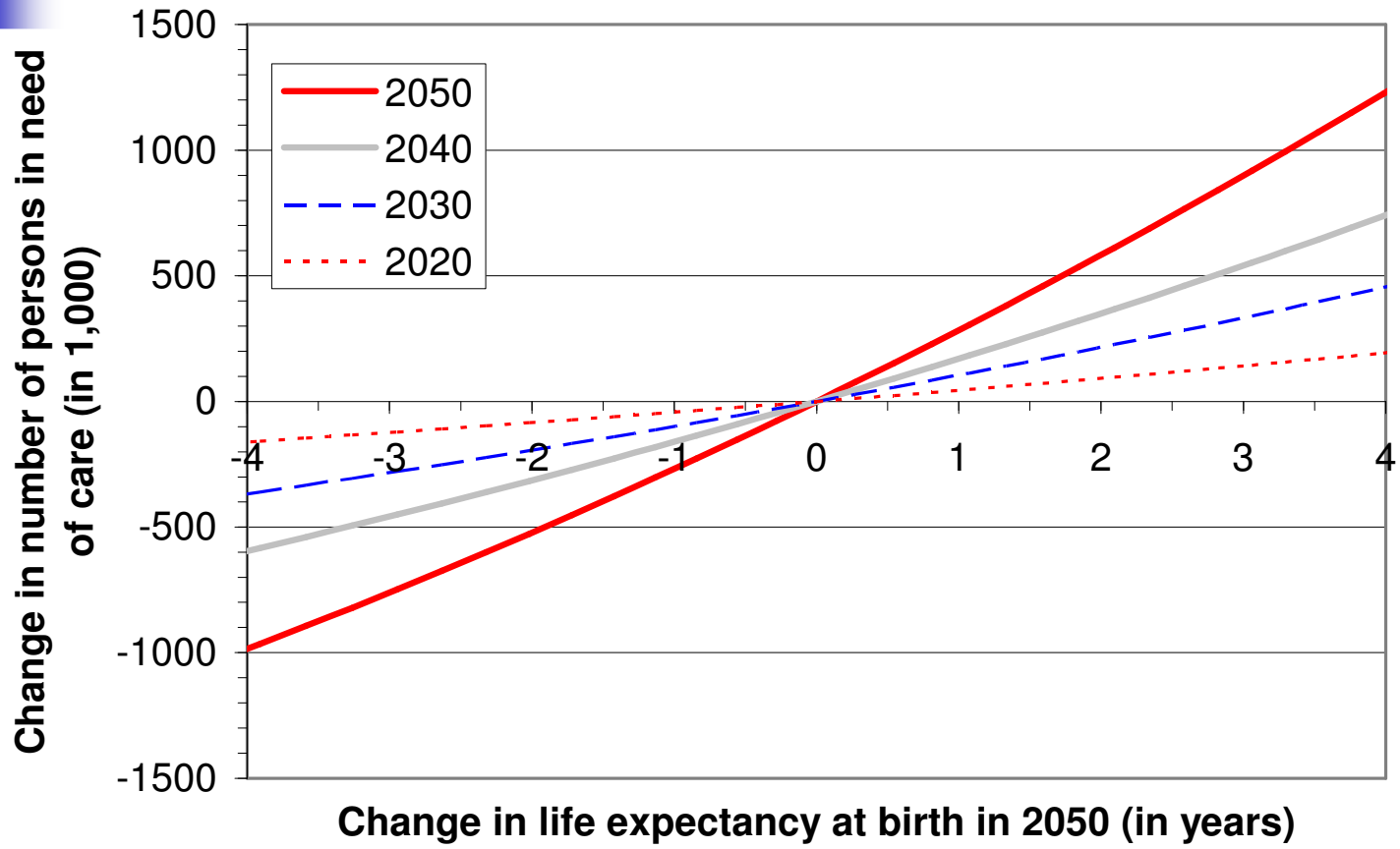
Resulting population in 2050	72.4 million
Number of persons in need of care in 2050	4.04 million
Ratio of number of persons in need of care to population in 2050	5.59%

Changes in fertility



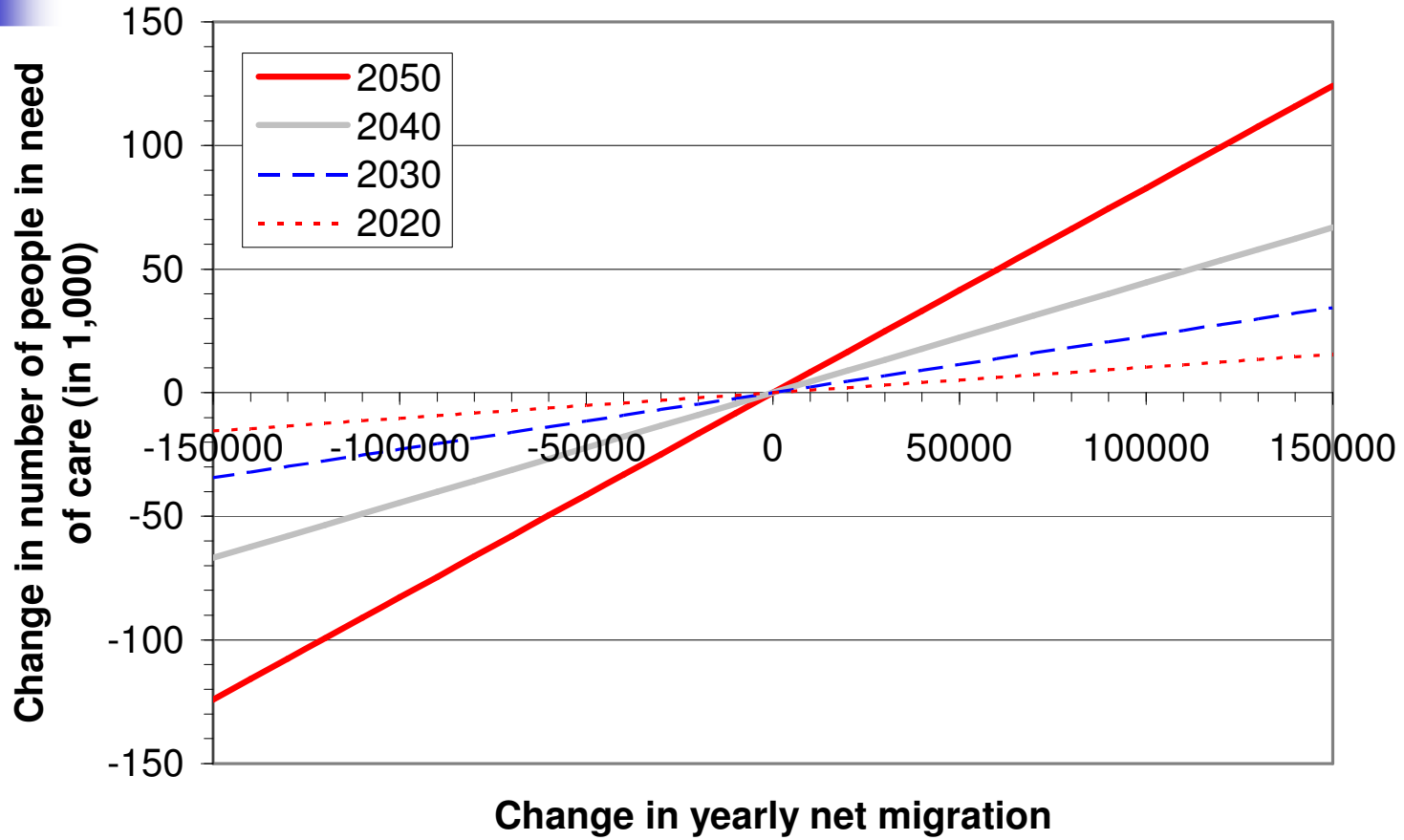
Changes in number of persons in need of care dependent on changes in TFR (reference 1.35)

Changes in mortality



Changes in number of persons in need of care dependent on changes in life expectany at birth in 2050 (reference 85.5 years)

Changes in migration



Changes in number of persons in need of care dependent on changes in yearly net migration (reference 150,000)

Multiple analysis

- Next step: Multiple analysis of isolated or simultaneous changes.
- Graphical analysis shows a nearly linear dependence between changes in need of care and changes in fertility, mortality and migration.
- Sampling 5,000 scenarios with (in specified intervals) random assumptions for fertility, mortality and migration.
- Estimating a multiple linear regression model.

Multiple regression model I

$$\Delta PNC_{2050} = 0.01 \cdot \Delta F + 0.26 \cdot \Delta L + 0.04 \cdot \Delta N$$

$$PNC_{2050} = 4.04 + 0.01 \cdot \Delta F + 0.26 \cdot \Delta L + 0.04 \cdot \Delta N$$

with

- PNC_{2050} : Number of persons in need of care in 2050
- ΔPNC_{2050} : Change in comparison to reference scenario (4.05 million)

Multiple regression model I

$$\Delta PNC_{2050} = 0.01 \cdot \Delta F + 0.26 \cdot \Delta L + 0.04 \cdot \Delta N$$

$$PNC_{2050} = 4.04 + 0.01 \cdot \Delta F + 0.26 \cdot \Delta L + 0.04 \cdot \Delta N$$

with

- ΔF: Change in Total Fertility Rate in comparison to reference assumption (1.35), unit: 0.1
- An increase in the TFR of 0.1 leads to an increase in PNC in 2050 of 0.01 million.

Multiple regression model I

$$\Delta PNC_{2050} = 0.01 \cdot \Delta F + 0.26 \cdot \Delta L + 0.04 \cdot \Delta N$$

$$PNC_{2050} = 4.04 + 0.01 \cdot \Delta F + 0.26 \cdot \Delta L + 0.04 \cdot \Delta N$$

with

- ΔL: Change in life expectancy at birth in 2050 in comparison to reference assumption (85.5), unit: 1 year
- An increase in l.e.a.b. in 2050 of 1 year leads to an increase in PNC in 2050 of 0.26 million.

Multiple regression model I

$$\Delta PNC_{2050} = 0.01 \cdot \Delta F + 0.26 \cdot \Delta L + 0.04 \cdot \Delta N$$

$$PNC_{2050} = 4.04 + 0.01 \cdot \Delta F + 0.26 \cdot \Delta L + 0.04 \cdot \Delta N$$

with

- ΔN: Change in yearly net migration in comparison to reference assumption (150,000), unit: 50,000
- An increase in the yearly net migration of 50,000 people leads to an increase in PNC in 2050 of 0.04 millions.

Multiple regression model II

$$\Delta RPNC_{2050} = -0.16 \cdot \Delta F + 0.29 \cdot \Delta L - 0.15 \cdot \Delta N$$

$$RPNC_{2050} = 5.59 - 0.16 \cdot \Delta F + 0.29 \cdot \Delta L - 0.15 \cdot \Delta N$$

with

- $RPNC_{2050}$: Ratio to total population in 2050
- $\Delta RPNC_{2050}$: Change in comparison to reference scenario (5.59%)

Effects of the components

	PNC	RPNC
TFR	o	-
Life Expectancy	+	+
Migration	(+)	-

PNC : Number of people in need of care

RPNC: Ratio of number of people in need of care to population

Conclusion

- Deterministic projections indicate an increase in the number of persons in need of care (minimum of about 1 Mio.). Ratio increases at least by 96% from 2.6% in 2005 to 5.1% in 2050.
- Multiple linear regression analysis allows the modeling of various scenarios and illustrates the effect of changes in the demographic components in a simple and clear way.
- Incorporating variations concerning the risk of care need in the regression approach.

References

- Bomsdorf, E., Babel, B. (2007): Annahmenflexible Bevölkerungsvorausberechnungen und die 11. koordinierte Bevölkerungsvorausberechnung des Statistischen Bundesamtes. Wirtschaft und Statistik 9/2007:905-912.

- Bomsdorf, E., Babel, B., Schmidt, R. (2008): Zur Entwicklung der Bevölkerung, der Anzahl der Schüler, Studienanfänger und der Pflegebedürftigen, Stochastische Modellrechnungen für Deutschland bis 2050. To appear in German Review of Social Policy.

- Ziegler, U., Doblhammer, G. (2008): Cohort Changes in the Incidence of Care Need in West Germany between 1986 and 2005. To appear in European Journal of Population.

Assumptions

Assumptions for fertility, mortality and migration

	Low	Medium	High	Old
TFR	1.15	1.35	1.55	1.35
Life expectancy at birth in 2050 (m/f)	79.8/ 85.7	82.6/ 88.3	84.8/ 89.0	84.8/ 89.0
Net Migration	50,000	150,000	250,000	50,000