Selection Behavior in the Market for Private Complementary Long-Term Care Insurance in Germany*

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About the speaker

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Long-term care insurance in Germany

- **Health insurance** in Germany
  - 88% of the population is covered by Statutory Health Insurance (SHI) and
  - 12% has substitutive Private Health Insurance (PHI)

- Since 1995, all citizens are obliged to be insured in the statutory **long-term care insurance** (LTCI)
  - Social LTCI for SHI members and mandatory private LTCI for PHI enrollees
  - Type and scope of benefits of the mandatory private LTCI are equivalent to those in the social LTCI

  → However: Only partial coverage by statutory LTCI

Private complementary LTCI

- Private **complementary LTCI** (CompLTCI) for coverage gaps
  - Most policies provide daily cash benefits in case of LTC
  - Total amount of about 3.3m CompLTCI policies in 2015
  - Still limited size of the market for CompLTCI despite increasing demand
- **CompLTCI policies**:
  - Risk-based premiums depending on only few characteristics (i.e., age and until 2012 gender) at the date of contract signing
  - Guaranteed renewability (Pauly et al., 1995) involving front-loading

Research focus

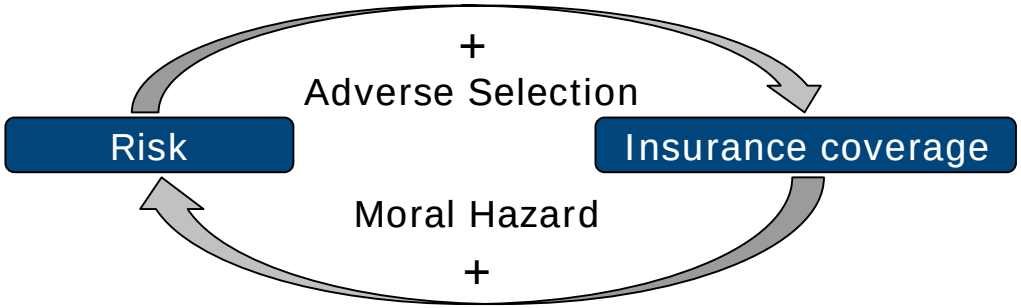
- Imperfections and related selection effects in the German CompLTCI market

Static framework	Dynamic framework
I. Do individuals have private information leading to selection effects in the German market for CompLTCI? II. What are the drivers for selection effects in this market?	III. What characterizes the in- and outflow of the insured collective over time?
→ Differentiating between the decision to buy CompLTCI and to choose the amount of CompLTCI coverage	→ Examining the uptake and lapse behavior

Adverse selection

- One-dimensional private information about the risk type

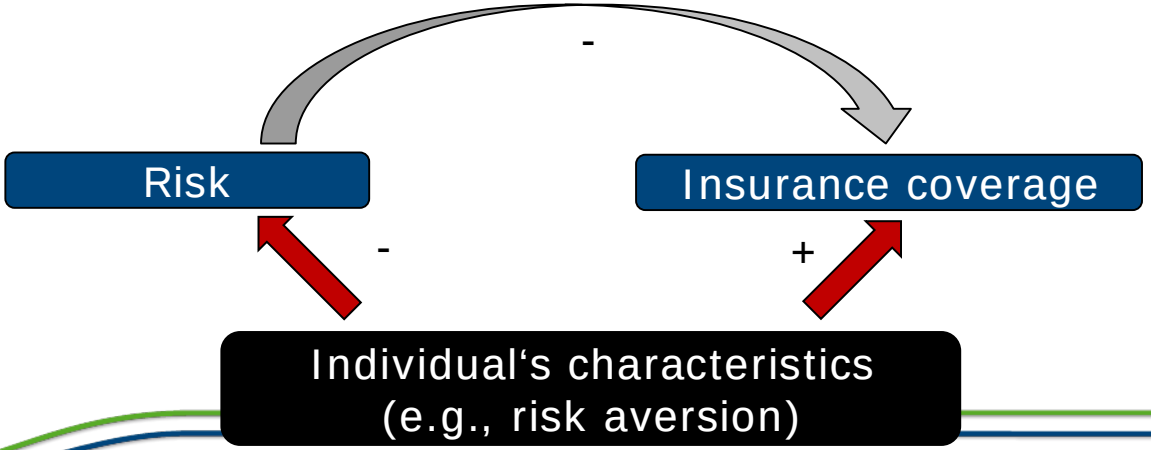
  → Prediction: Positive coverage-risk correlation (Rothschild & Stiglitz, 1976)



  → Reversed causality due to moral hazard is also possible!

Advantageous selection

- Negative coverage-risk correlation due to multidimensional private information about risk type and other individual characteristics (e.g., risk preferences, de Meza & Webb, 2001)



Background and related literature

- Evidence of both adverse and advantageous selection (e.g., Browne & Zhou-Richter, 2014; Finkelstein & McGarry, 2006) in markets for private LTCI

  → Drivers may be preference for insurance (e.g., Browne & Zhou-Richter, 2014) and socioeconomic characteristics (e.g., Fang et al., 2008)

- **"Unused observables"** may also lead to selection effects.

  → U.K. annuity market: residential location (Finkelstein & Poterba, 2014)

Background and related literature

- **Long-term contracts** and **one-sided commitment** (Hendel & Lizzeri, 2003)
- Insured may learn about their risk over time

  → Ex-post risk-based selection when front-loading is insufficient

  → Prediction: Low-risk types are more likely to drop insurance coverage.

- Evidence of ex-post risk-based selection mainly based on survey data (e.g., Finkelstein et al., 2005; Hofmann & Browne, 2013; Lange et al., 2017)

  → Important role of wealth in lapse behavior (Konetzka & Luo, 2011)

Main data source

- Contract data from a large German private health insurance company
- Health insurance and LTCI policies…
  - from enrollees of the **private health insurance**
  - **concluded** between 1960 and 2014
  - with **claims data** from 2006 to 2014
  - with information about the **lapse** of CompLTCI policies from 2008 to 2014
- Focus on individuals at the **age of at least 40 years** in 2006 and exclusion of civil servants

  → Sample size: 98,305 individuals

Descriptive statistics (I)

	Total					CompLTCI (mean)	
Variable	N	Mean	SD	Min	Max	No	Yes
			Individual data				
LTCprob	98,305	0.009	0.096	0	1	0.009	0.009
lnLTCcost	98,305	0.089	0.919	0	12.262	0.089	0.086
HCprob	98,305	0.758	0.428	0	1	0.740	0.836
lnHCcost	98,305	6.687	4.028	0	14.641	6.493	7.498
CompLTCI	98,305	0.192	0.394	0	1	0	1
lnCompLTCIp	98,305	0.571	1.213	0	5.495	0	2.967
dsick_ins	98,305	0.490	0.500	0	1	0.464	0.600
dhosp_ins	98,305	0.247	0.432	0	1	0.211	0.400
male	98,305	0.737	0.440	0	1	0.724	0.791
age	98,305	58.430	8.075	48	98	58.056	60.002
ISEI-08	71,471	55.819	21.457	11.560	88.960	55.620	56.786

Descriptive statistics (II)

	Total					CompLTCI (mean)	
Variable	N	Mean	SD	Min	Max	No	Yes
Aggregated data							
educ_sec	98,085	32.977	12.353	16.554	71.000	32.679	34.229
employ	98,085	77.122	3.267	61.400	82.704	76.971	77.757
gdp per capita	98,085	33,813.10	14,926.28	14,922.50	86,837.50	33,452.02	35,329.70
dependency ratio	98,085	58.325	4.867	47.000	68.944	58.351	58.217
single	98,085	27.398	5.328	21.000	42.800	27.428	27.271

Asymmetric information

$$R_i = \alpha_1 + \alpha_2 * X_i + \varepsilon_i \qquad (1)$$

$$C_i = \beta_1 + \beta_2 * X_i + \vartheta_i \qquad (2)$$

- R_i: Individual's i risk to receive **benefits** from the compulsory (basic) LTCI
- C_i: CompLTCI **coverage**
- X_i : **Observable characteristics** of individuals used for determining the premium for CompLTCI (age, gender for the full sample; additionally the year of signing the insurance contract for the sample of CompLTCI policyholders)

  → Identifying $\rho(\varepsilon_i, \vartheta_i) \neq 0$ indicates that R_i and C_i are correlated.

CompLTCI coverage – Risk correlation

	(1)	(2) Full Sample	(3)	(4) CompLTCI holders
	Biprobit *LTCprob - CompLTCI*	Probit *LTCprob – CompLTCI*	LPM *LTCprob – CompLTCI*	OLS *lnLTCcost - lnCompLTCIp*
Correlation coefficient of residuals $\rho\ (\varepsilon_i, \vartheta_i)$	-0.0624***	-0.0063**	-0.0155***	-0.0325***
Observations	98,305	98,305	98,305	18,908

Notes: The residuals are derived from equations (1) and (2). In column (1), the correlation coefficient is based on a bivariate probit model. The coefficient in column (2) represents the correlation between predicted Pearson residuals. *p<0.1, **p<0.05, ***p<0.01.

→ Low-risk individuals are more likely to purchase CompLTCI.

→ Among CompLTCI policyholders, low-risk individuals choose higher CompLTCI coverage than high-risk individuals.

→ Advantageous selection as dominating selection effect

Sources of selection (I)

$$R_i = \delta_1 + \delta_2 * U_i + \delta_3 * X_i + \varphi_i \qquad (3)$$

$$C_i = \theta_1 + \theta_2 * U_i + \theta_3 * X_i + \omega_i \qquad (4)$$

- R_i: Individual's i risk to receive benefits from the compulsory (basic) LTCI
- C_i: CompLTCI coverage
- X_i : Characteristics used for determining the premium for CompLTCI
- **U_i: Unused observables**

$\rightarrow \delta_2 > 0$ & $\theta_2 > 0$: source of adverse selection

$\rightarrow \delta_2 < 0$ & $\theta_2 > 0$: source of advantageous selection

Sources of selection (II)

	Full sample			Sample of CompLTCI policyholders		
	Dependent Variable		Driver for…	Dependent Variable		Driver for…
Independent Variable	LTCprob	CompLTCI		LTCprob	lnCompLTCIp	
			Socioeconomic characteristics			
ISEI-08	-0.0023***	0.0012***	Advantageous	0.0000	0.0007**	N/S
	(0.001)	(0.000)		(0.000)	(0.000)	
educ_sec	-0.0083**	0.0039**	Advantageous	-0.0001	0.0013	N/S
	(0.004)	(0.002)		(0.000)	(0.001)	
employ	-0.0146***	0.0284***	Advantageous	-0.0000	0.0030*	N/S
			Preference for insurance			
dsick_ins	-0.0648	0.3919***	N/S	-0.0019	0.0257**	N/S
	(0.040)	(0.013)		(0.001)	(0.012)	
dhosp_ins	0.1042**	0.4380***	Adverse	0.0025*	0.0295***	Adverse
	(0.045)	(0.014)		(0.001)	(0.011)	

Notes: N/S means that the characteristic is not significantly correlated to at least one of the dependent variables (i.e. a proxy for insurance coverage and risk). *p<0.1, **p<0.05, ***p<0.01

→ Heterogeneous effects of characteristics on insurance coverage and the risk

Regression lapse / uptake of CompLTCI

Dependent variable	LTCI_lapse	
	(1)	(2)
Independent variables	Adding covariates separately	Adding covariates simultaneously
lnHCcost	-0.0060***	-0.0022***
	(0.001)	(0.001)
ISEI-08	-0.0006***	-0.0003***
	(0.000)	(0.000)
single	-0.0001	0.0006
	(0.000)	(0.001)
dsick_ins	-0.0103**	-0.0075
	(0.004)	(0.005)
dhosp_ins	-0.0013	-0.0019
	(0.003)	(0.004)
tariff_non-payer	0.8709***	0.8521***
	(0.022)	(0.024)
Pricing Characteristics	Yes	Yes
Constant		-0.0597
		(0.217)
Observations		8,321

Notes: The number of observations slightly differs due to missing values. Robust standard errors for each coefficient in parentheses. When aggregated characteristics are included into the model, standard errors are clustered at a district level. *p<.10, **p<.05, ***p<.01.

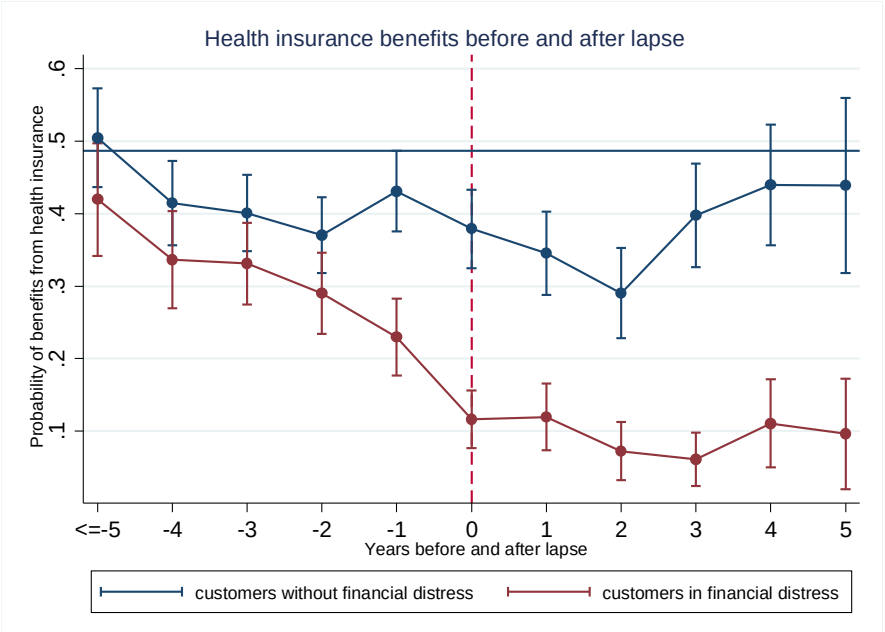
Lapse behavior in a dynamic setting (I)

$$H_{it} = \beta' X_{it} + \sum_{j=-5}^{5} \gamma_j L_{j,it} + u_t + \varepsilon_{it}, \quad j = -5, -4, \ldots, 4, 5 \quad (5)$$

- H_{it}: **Health insurance benefits** of individual i at time t
- X_{it}: **Characteristics** used for determining the premium for CompLTCI
- $L_{j,it}$: **Dummies** for the years before and after the **lapse** in year 0
- u_t: year fixed effects

→Restriction on individuals, who held CompLTCI in 2008

Lapse behavior in a dynamic setting (II)



Note: The horizontal line represents the outcome variable of the reference group, i.e., people who did not cancel their CompLTCI contracts. The vertical bars on each point refer to the 95% confidence interval.

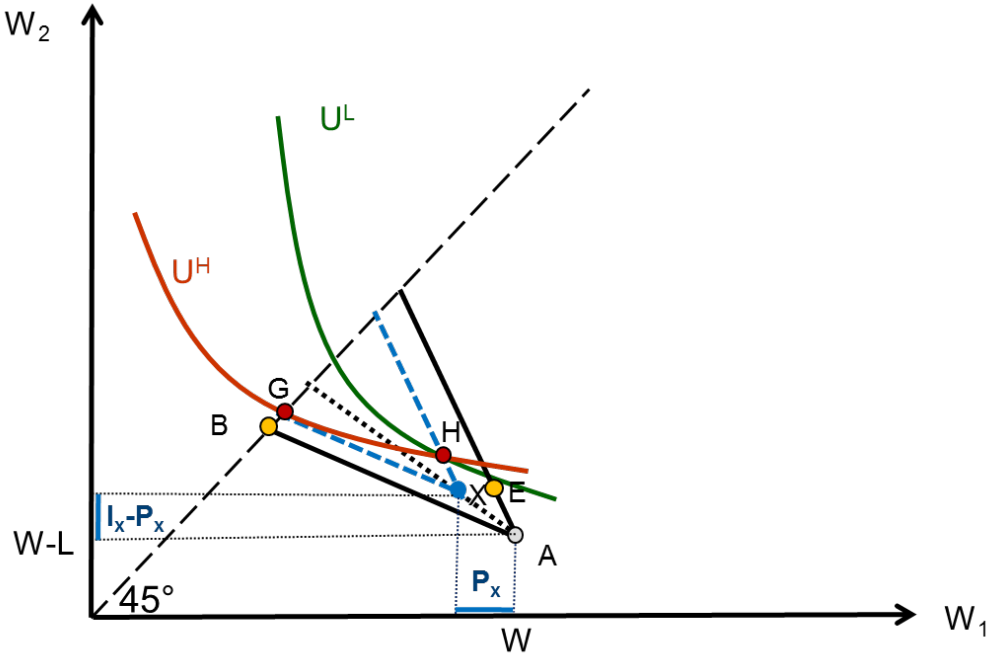
Conclusion

- We find **evidence of advantageous selection** as a dominating selection effect.
- Unused observables: Occupational status, residential location and preference for insurance
  - → Better socioeconomic status contributes to advantageous selection.
  - → Mixed results for the holding of supplementary health insurance policies
  - → Selection effects might be used for a more targeted distribution of products.
- Decision to drop CompLTCI coverage is affected by a change in health insurance payouts.
  - → Ex-post selection of low-risk types out of the risk pool cannot be excluded.
  - → However: Financial problems are seemingly a main driver for CompLTCI policy lapses.

Thank you for your attention!

Back-up

Modified Model of Rothschild & Stiglitz (1976)



Source: Own illustration on the basis of Breyer et al. (2013)

Specification of variables (I)

Variable	Explanation	Data Source
Risk		
LTCprob	1 = one or more insurance claims in the mandatory LTCI, 0 = otherwise	Insurance company
lnLTCcost	Natural log of the insurance payouts in the mandatory LTCI + 1	Insurance company
HCprob	1 = one or more insurance claims in health insurance above the highest possible deductible, 0 = otherwise	Insurance company
lnHCcost	Natural log of the insurance payouts in health insurance above the highest possible deductible + 1	Insurance company
Coverage		
CompLTCI	1 = holding of a CompLTCI, 0 = otherwise	Insurance company
lnCompLTCIp	Natural log of the monthly premiums for CompLTCI tariffs + 1 (without rate module for increasing the benefits over time)	Insurance company
Pricing characteristics		
male	1 = man, 0 = woman	Insurance company
age	Age in years	Insurance company
year	Year of signing the insurance contract	Insurance company

Specification of variables (II)

Variable	Explanation	Data Source
Unused observables		
dsick_ins	1 = holding of a daily sickness benefits insurance, 0 = otherwise	Insurance Company
dhosp_ins	1 = holding of a hospital daily benefits insurance, 0 = otherwise	Insurance Company
ISEI-08	Socio-economic status score based on the International Socio-Economic Index of Occupational Status (ISEI-08)	Assignment based on Ganzeboom and Treiman (2010)
educ_sec	Proportion of individuals (aged 15 years and older) with the general / subject-restricted higher education entrance qualification per district (in %)	German Census
employ	Employment rate (of individuals aged 15-64 years) per district in %	German Census
gdp per capita	Average gross domestic product (GDP) per inhabitant by district between 2006 and 2013 (in EUR)	Eurostat
dependency ratio	Dependency ratio, i.e. the ratio of individuals aged under 18 years or 65 years and older to individuals aged 18-64 years per district (in %)	German Census
single	Proportion of single adults (19 years and over) per district (in %)	German Census
Further information of the insurance company		
LTCI_lapse	1 = lapse of CompLTCI policies, 0 = otherwise	Insurance company
distribution_dens	Proportion of distributors of CompLTCI policies per 10,000 inhabitants	Insurance company
tariff_non-payer	1 = holding of a "emergency treatments only" tariff for non-paying customers in financial distress, 0 = otherwise	Insurance company

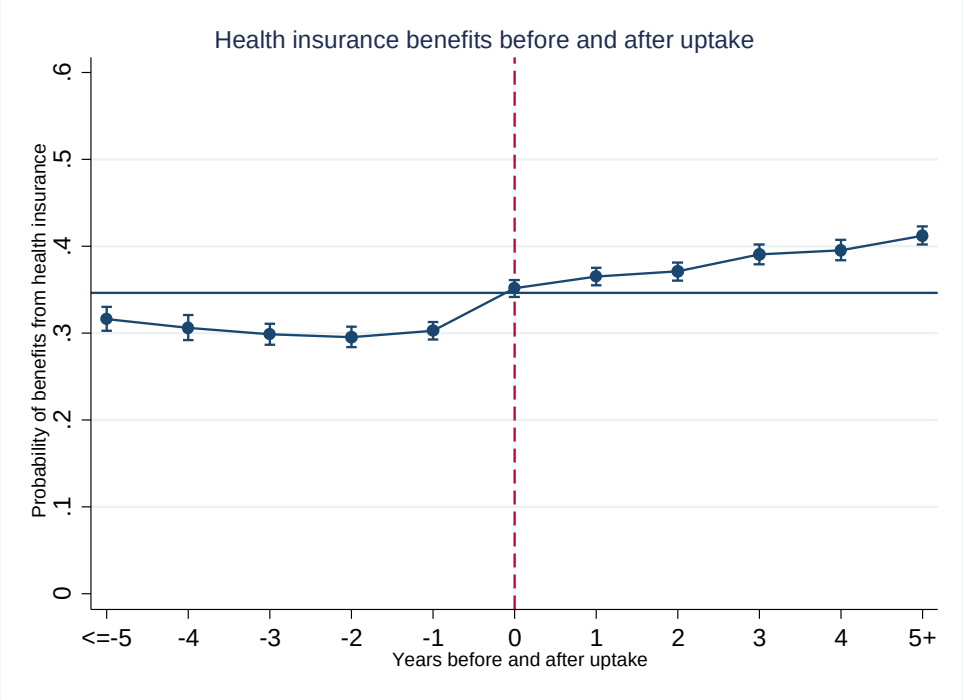
Heterogeneous effects on risk and CompLTCI coverage

Independent Variable	(1) LTCprob	(2) CompLTCI
ISEI-08		
Second Quintile	-0.0031	0.2411***
	(0.057)	(0.018)
Third Quintile	-0.0761	0.3126***
	(0.061)	(0.018)
Fourth Quintile	-0.0649	0.2584***
	(0.060)	(0.018)
Fifth Quintile	-0.1562***	0.0686***
	(0.059)	(0.018)
gdp per 10000		
Second Quintile	-0.0484	0.1682***
	(0.043)	(0.043)
Third Quintile	-0.0046	0.0932**
	(0.043)	(0.045)
Fourth Quintile	0.0084	0.2201***
	(0.040)	(0.043)
Fifth Quintile	-0.0899**	0.1995***
	(0.041)	(0.042)

Notes: The number of observations slightly differs due to missing values. Robust standard errors for each coefficient in parentheses. When aggregated characteristics are included into the model, standard errors are clustered at a district level. Omitted reference categories: First quintiles of the independent variables. *p<.10, **p<.05, ***p<.01.

Back

Uptake behavior in a dynamic setting



Thank you very much for your attention!

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