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The Dynamics of Hospital Use among Older People

Evidence for Europe using SHARE data

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Introduction

1. **Ageing Europe's strategy for health expenditures**
   - LTC expenditures vs. Budget cuts (+ crisis)
   - Reducing *preventable hospital admissions* for older people

2. **What are the drivers of HC use?**
   - Kon & Liu (2013) dynamic panel models for Hospital stays
   - Focus on health alone is not enough to reduce future use
   - Need to take into account:
     - Past HC use (unmet needs, induced demand)
     - Unobserved heterogeneity

Our contribution

1. Focus on frail people

- Frailty is a progressive & pre-clinical condition
- Frail people have higher risks of hospitalization

2. Focus the different types of care organisation

- Several European countries Hospital care is a EU concern
- # 1: SP in ambulatory care or hospital | countries
- # 2: Countries differ by their *Referral system*
  - More integrated care should reduce the odds of hospitalization

3. Decomposition between <u>stocks</u> & <u>flows</u> of HC use

- Pseudo FE (Mundlak RE): dynamics of HC use
- Unobserved heterogeneity is netted out
- Still RE allows for decomposition of the individual FE
  - By country referral system
  - By observable individual characteristics (sex, life history, etc.)

Data

1. Source

SHARE
Survey of Health, Ageing and Retirement in Europe
50+ in Europe

- 50+ in Europe; Individual panel data every two years
- Information on Health/Economic/Social
- 3 Regular panel waves: 2004-05, 2006-07, 2010-11
- 1 Retrospective wave 2009 (SHARELIFE)

2. Sample

Dynamic panel data requirements:

- 3 observations minimum (2 panel + 1 lag)
- 1 retrospective obs. for initial conditions

→ 10 countries at all waves.

Data

Table 1: Sample

Country	Total obs. at waves 1, 2, 3, or 4	Obs. for indiv. surveyed 4 times	Non-missing data		
			Total Obs. (balanced)	Obs. regular waves	Individuals
Austria	9,096	1,900	1,320	990	330
Germany	8,832	3,356	2,756	2,067	689
Sweden	9,518	3,896	3,360	2,520	840
Netherlands	10,271	4,028	3,428	2,571	857
Spain	10,044	3,308	2,176	1,632	544
Italy	11,322	4,840	3,780	2,835	945
France	13,849	4,536	3,252	2,439	813
Denmark	8,295	2,976	2,600	1,950	650
Switzerland	7,188	1,840	1,548	1,161	387
Belgium	14,568	7,096	6,028	4,521	1,507
Total	102,983	37,776	30,248	22,686	7,562

Note: All respondents aged 50+ at start of survey.

SHARE questionnaire

HC002_ SEEN OR TALKED TO MEDICAL DOCTOR

Now we have some questions about your health care. Please think about your care during the last twelve months.

During the last twelve months, about how many times in total have you seen or talked to a medical doctor about your health?

Please exclude dentist visits and hospital stays, but include emergency room or outpatient clinic visits.

(0_98)

HC003_ CONTACTS WITH GENERAL PRACTITIONER

How many of these contacts were with a general practitioner or with a doctor at your health care center?

(0_98)

HC004_ CONTACTS WITH SPECIALISTS

Please look at card 15.During the last twelve months, have you consulted any of the specialists mentioned on card 15?

(Yes/No)

HC012_ IN HOSPITAL LAST 12 MONTHS

During the last twelve months, have you been in a hospital overnight?

Please consider stays in medical, surgical, psychiatric or in any other specialized wards.

(Yes/No)

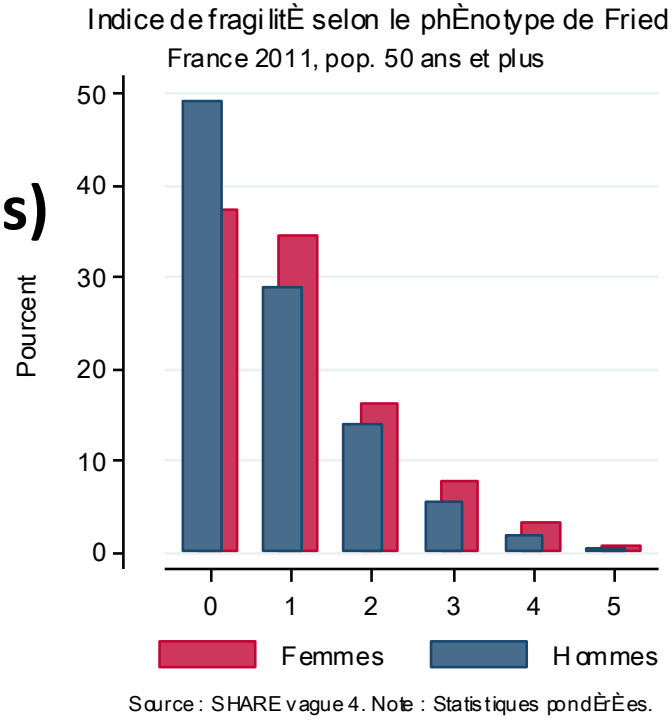
The main variables

1. Health care (last 12 months)

- ❑ Hospital overnight stay ? Yes/No (Dependant variable)
- ❑ Seen GP? Yes/No
- ❑ Seen SP? Yes/No

2. Health | Need for care (last 12 months)

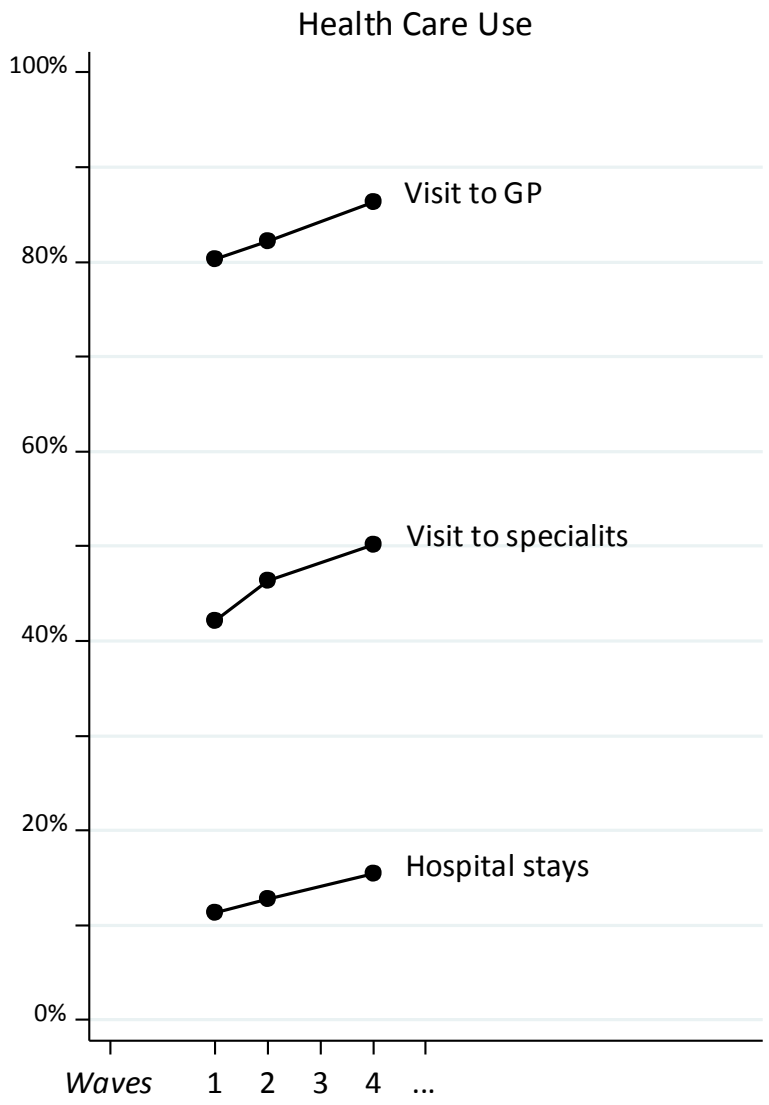
- ❑ Contemporaneous health
  - 1. Various indexes (detail hereafter)
  - 2. Fried's frailty index
  - 3. Rockwood-like frailty index (MCA)

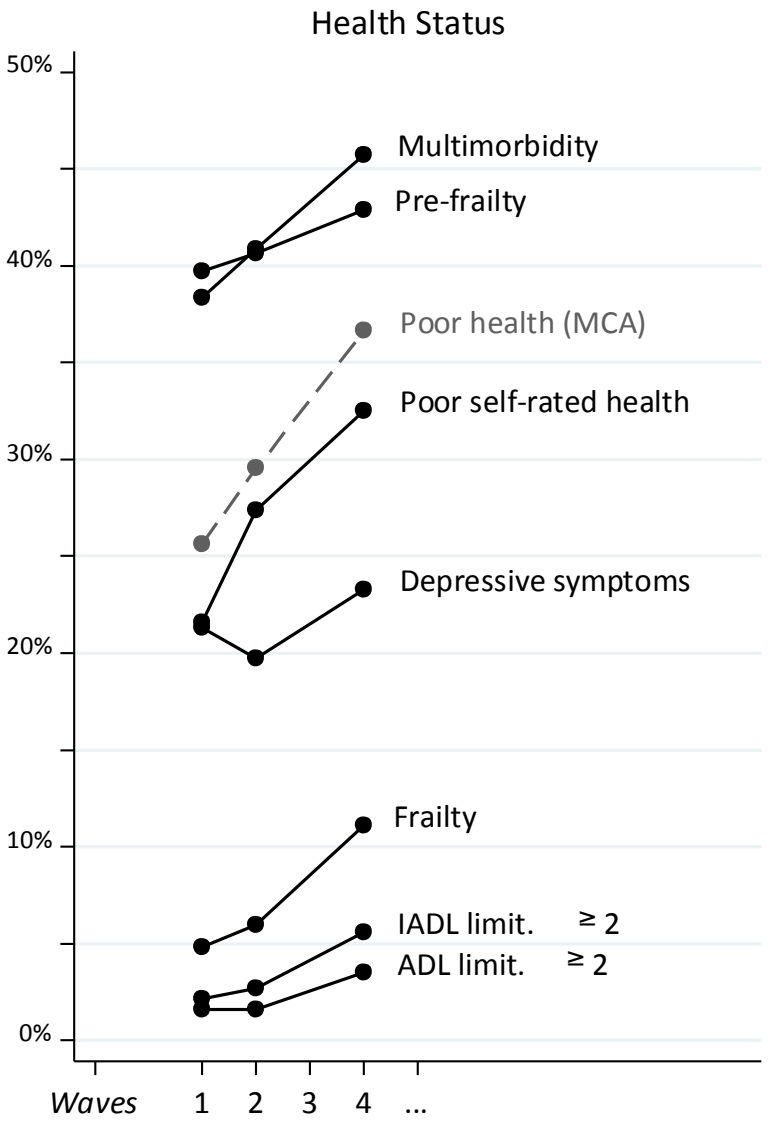


3. Economic resources (last 12 months)

- ❑ Able to make-ends-meet (inter-temporal comparability)

Descriptive statistics





Method

1. Standard panel model for binary outcomes (Probit)

- FE biased by incidental parameters
- RE assumption too strong: no corr. btw X_{it} and c_i
- RE with *some* corr. btw X_{it} and c_i

$$y_{it}^{*} = X_{it}\beta + c_i + \varepsilon_{it}$$

$$\rightarrow \quad c_i = \psi + \bar{X}_i\xi + a_i$$

- Mundlak-Chamberlain device (extension of Frisch-Waugh)
- β = unbiased within estimates (just like if FE was possible)

… under two main assumptions

1. No omitted variable: c_i controls for all non-time-varying effects
2. Strict exogeneity: X_{it} is independent from ε_{it} *for each t*

Note: unbalanced panel estimates are feasible (no attrition yet)

Method

2. Dynamic panel model for binary outcomes (Probit)

- Kohn & Liu (2013) HC_{t-1} is a significant predictor of HC_t
- "State-dependence" → Lags of y_{it} in regressors
- Dynamic RE is sensitive to initial conditions (Heckman, 1981)

$$y_{it}^{*} = \rho y_{it-1} + X_{it}\beta + c_i + \varepsilon_{it}$$

$$\rightarrow \quad c_i = \psi + \bar{X}_i\xi + \xi_0 y_{i0} + a_i$$

- Mundlak-Chamberlain device (extension of Frisch-Waugh)
- β = unbiased within estimates (just like if FE was possible)

… under three main assumptions

1. No omitted variable: c_i *idem* idem, but no IV (3 obs.) → can't be tested
2. Sequantial exogeneity: X_{it} is independent from ε_{it} *for each t* → no test
3. Sample attrition is exogenous → some tests, results = OK!

Model estimates

Dep var: Hospital stays (t)	Static model		Dynamic models			
Model specification	M1		M2		M3	
Explanatory variables	APE	S.E.	APE	S.E.	APE	S.E.
Past health care use						
Hospital stays (t-1)			0.049***	0.007	0.052***	0.007
Visit to GP (t-1)					-0.002	0.013
Visit to SP (t-1)					-0.024***	0.009
Contemporaneous altern. care						
Visit to GP	0.065***	0.009	0.077***	0.012	0.075***	0.014
Visit to SP	0.118***	0.006	0.133***	0.007	0.121***	0.009
Contemporaneous need for care						
Frailty index [0;5]	0.021***	0.004	0.025***	0.005	0.025***	0.005
Poor SRH	0.049***	0.007	0.077***	0.009	0.077***	0.009
Chronic 2+	0.031***	0.007	0.025***	0.009	0.025***	0.009
Limit. w/ IADL 2+	0.029*	0.015	0.036*	0.019	0.036*	0.019
Limit. w/ ADL 2+	0.011	0.017	0.027	0.022	0.027	0.022
Depressive sympt.	0.016**	0.008	0.021**	0.010	0.021**	0.010
Contemporaneous resources						
Make-ends-meet	-0.006	0.004	-0.009	0.005	-0.009	0.005
Initial conditions						
Health problems in adult life			0.020***	0.006	0.020***	0.006
Time fixed effects						
Wave 1	ref.	ref.				
Wave 2	-0.004	0.005	ref.	ref.	ref.	ref.
Wave 4	0.006	0.005	0.007	0.006	0.009	0.006
(+ *Mundlak device*)						
Tests on APEs (Chi^2, p-value)						
Pseudo-Hausmann test	21.1	0.012	36.3	0.000	35.9	0.000
H0: βGPt = βSPt	476.3	0.000	367.5	0.000	238.2	0.000
H0: δGPt-1 =δSPt-1					7.4	0.024
Obs.	22686		15124		15124	

Legend: * p<0.1, ** p<0.05, *** p<0.01

Model estimates

Dep var: Hospital stays (t)	All countries		Partial referral systems (PRS)		Full referral system (FRS)	
Model specification	M4		M5		M6	
Explanatory variables	APE	S.E.	APE	S.E.	APE	S.E.
Referral system						
Dummy for FRS (ref.)	-0.012**	0.006				
Past health care use						
Hospital stays (t-1)	0.052***	0.007	0.049***	0.010	0.054***	0.012
Visit to GP (t-1)	-0.002	0.013	-0.004	0.018	0.001	0.017
Visit to SP (t-1)	-0.024***	0.009	-0.017	0.011	-0.036***	0.014
Contemporaneous altern. care						
Visit to GP	0.076***	0.014	0.069***	0.019	0.083***	0.019
Visit to SP	0.121***	0.009	0.133***	0.011	0.102***	0.013
Contemporaneous need for care						
Frailty index [0;5]	0.025***	0.005	0.023***	0.006	0.027***	0.007
Poor SRH	0.077***	0.009	0.080***	0.012	0.070***	0.014
Chronic 2+	0.025***	0.009	0.019	0.011	0.034**	0.013
Limit. w/ IADL 2+	0.035*	0.019	0.014	0.024	0.077**	0.030
Limit. w/ ADL 2+	0.027	0.022	0.020	0.027	0.053	0.039
Depressive sympt.	0.020**	0.010	0.036***	0.013	-0.007	0.015
Contemporaneous resources						
Make-ends-meet	-0.008	0.005	-0.012*	0.007	-0.001	0.009
Initial conditions						
Health problems in adult life	0.020***	0.006	0.024***	0.008	0.013	0.009
Time fixed effects						
Wave 2	ref.	ref.	ref.	ref.	ref.	ref.
Wave 4	0.009	0.006	0.016**	0.007	-0.003	0.009
(+ *Mundlak device*)						
Tests on APEs (Chi^2, p-value)						
Pseudo-Hausmann test	35.9	0.000	29.8	0.000	19.7	0.020
H0: $\beta GPt = \beta SPt$	238.2	0.000	155.0	0.000	85.2	0.000
H0: $\delta GPt-1 = \delta SPt-1$	7.4	0.024	2.3	0.314	6.9	0.032
Obs.	15124		9446		5678	

Legend: * p<0.1, ** p<0.05, *** p<0.01

Model estimates

Fixed effects decomposition	M9		M9
Time invariant		**Country dummies**	
Female	-0.025***	France	ref.
Birth cohort 1950	ref.	Austria	0.075***
Birth cohort 1940	0.014*	Germany	0.021*
Birth cohort 1930	0.037***	Switzerland	0.032**
Birth cohort 1920	0.062***	Sweden	0.017
Migrant	0.004	Netherlands	-0.013
Education		Denmark	0.027**
None or primary	ref.	Belgium	0.016
Secondary	-0.004	Spain	-0.050***
Superior	-0.013*	Italy	-0.021*
Missing	0.017		
Life-history events			
Poor SRH when before age 10	0.017		
Severe illness before age 10	-0.003		
Financial difficulties in adult life	-0.005		

Conclusion

1. **Increase in Frailty means higher risks of hospitalization**
   - The need for care is a strong predictor of HC use
   - No effect of (changes in) economic resources
   - ➔ Public health policy to reduce incidence of poor health

2. **"State dependence" in hospital stays**
   - Similar to Kohn & Liu (2013) on UK data
   - ➔ Hospital care follow-up is crucial: care pathways to be improved

3. **Reducing the <u>level</u> of hospital rates through a referral system**
   - Is the effect due to a better coordination of care
   - or some restriction of care supply?

Thank you!

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