Functional capacity, health and income as determinants for institutional care

A literature review of LTC economics and new empirical Finnish results.

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Research questions

- A) Controlling for health status, functional ability, technology and place of residence what is the impact of socio-economic factors:

- *-> Do lower income and less educated people use institutional LTC care more than more better off ones in Finland ?*

- *But, Are these due to morbidity and functional capacity differences*?

- But, Are these due to place of residence or other factors ?

- B) More specifically, what do we need to *control for* and how at the individual level in order to answer question A) ? What *methods* should be used?

- C) Can *HrQoL (15D, EQ5D, HUI etc.) and other self-reported health instruments (MMSE, GHQ-12)* be used to predict institutional care demand ?

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1. Outline of the paper

- The paper consists of two parts:

- *1. a <u>general literature review</u> of (the economics) of long term care – LTC.*

- * motives & incentives for care decisions,

- * family decision making process.

- *2. <u>Econometric study</u> with Finnish Health2000 linked register and survey data.*

- * logit & cox-regression,

- * admittance to institutional care Y,

- * health and socio-economic X's,

- …And…

- *3. a <u>discussion</u> of results*.

HEALTH CARE LTC

SOCIAL CARE LTC

INSTITUTIONAL FRAMEWORK - LTC SERVICES FINLAND 2011.

ACUTE
IN-PATIENT CARE

LONG-TERM
IN-PATIENT
CARE

*INTERMEDIATE
SERVICES*

OUT-PATIENT
SERVICES

HOME CARE

-listing

SPECIALIZED

HOSPITAL CARE

- somatic.
- psychiatric.

PRIMARY HEALTH CARE

- long-term wards.

DAY HOSPITALS
- day and night care etc.

**HEALTH CARE
SERVICES**

SPECIALIZED CARE
– out-patient visits.

*PRIMARY CARE
-out-patient visits*

1. Home medical services.

NURSING HOMES

24H SHELTERED HOUSING

*REGULAR SHELTERED
HOUSING*

SOCIAL WORK AND SERVICES

DAY CENTRES / DAY CARE

1. Home help services.
2. Support services
   - meals on wheels,
   - transport services
3. Informal care

   subsidies

INSTITUTIONAL
SERVICES

*INTERMEDIATE
SERVICES*

OUT-CLIENT
SERVICES

HOME CARE

-listing

**Source: modified
from A.Noro, 2004,
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RE, FINLAND

Pictur:e
Kari Nuutinen

2. Literature review – some key results.

- *Utility maximizing decisions on health and consumption determines demand for: a)* long term care, b) formal and informal care (Norton et.al., 2008, 2004, 2000; Engers & Stern, 2000).

- *Income and wealth* are determinants of care demand (Sarma et.al. 2007,2009; Golda et.al., 2011).

- The background assumption is that family members are rational (aware of their decision, solutions are made by children if not), BUT altruistic utility maximizers.

- In the absence of altruism at the family level there exist bequest and ex-ante gift motives for care.

- The child(ren) maximizes U(c,l,a,h(a)) where a is amount & quality of informal care and h(a) is parental health, c is child consumption and l child leisure.

- Usually the child(ren)'s utility function is assumed to be additively separable for own consumption and parental utility (adjusted by 0<beta<1). Parent's usually maximize only their own utility !

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Informal care and home care – decision making.

- Theoretical literature, (Van Houtven & Norton, 2004, 2008; Stern, 1994, 2000; Zweifel et.al., 1996,1998)

- Family strategic care decisions:

- - A) principal-agent -theorem

- - principal is the parent

- - child(ren) act as agents.

- - both get utility and benefit from parental health, spending time together or monetary transfers.

- - Or B) Nash bargaining –solution

- * agreeing on care duties for each child by bargaining or bargaining on primary caregiver (others finance her / him).

- * includes monetary motives side-payments, bequest, ex-ante gifts.

- * Optimal solution either pareto –efficient or not.

3. Literature review – empirical findings

- A. Empirical results for health from the literature:

- Limitations in functional ability (measured by ADL - instruments) is the key determinant of care needs and the risk of admittance to institutional care (Norton, 2000, Stern & Engers, 2000).

- Diagnoses based on medical records explain LTC demand (Einio, 2010; Martikainen et.al., 2009; Hakkinen et.al., 2008).

- HrQoL and self-reported health outcomes (as measured by 15D or HUI) also have predictive power (Sarma et.al., 2007, 2009).

- Health habits (tobacco and alcohol) consumption may also influence demand (Gerdtham & Jonsson, 1998).

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3. Literature review – empirical findings.

- *B. Empirical results for socio-economic variables:*

- High individual and household income reduce the risk of admittance to institutional care when controlling for functional ability: Higher use and purchase of home care services (Goda et.al., 2011; Norton, 2000; Headen et.al., 1993; Börsch-Supan et.al., 1992). [Evidence of effects of education are much less decisive (McCall, 1998; Kenkel, 1990)].

- Wealth may give a strategic bequest motive for informal care: empirical results are mixed (Lassila et.al., 2002, Gale & Slemrod, 2001).

- Informal and formal care can be substitutes or complements depending on service type (hospital days, nurse visits, home care). (Van Houtven & Norton, 2004, 2008; Bolin et.al., 2008)

- Immigrants and minority groups receive more informal care (Stern et.al., 1995, 2002).

- Age increases medical care and LTC demand, but time to death is more important (Zweifel et.al., 2004; Häkkinen et.al. (2008)

- Gender matters: Men receive more informal care at home, women have a much higher risk of admittance to institutions (often as widows) (Norton, 2000; Einiö, 2010; Martikainen et.al., 2009).

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4. Econometric study for Finland

- <u>Aim of study:</u> Analyze the effects of income and socio-economic variables on the probability of admittance to institutions when controlling for health and functional ability.

- <u>Data:</u> Panel data 2000-2007, Health 2000 survey, age 53+ (N=4616 > regression n)

- Link with Hilmo care register, KELA medical register and tax registers.

- *<u>Descriptive statistics:</u>*

- Mean age 69 (std. 10 years), of institutional entry: 83 (std. 8).

- Institutional population shares: 69% women, 35% widows.

- Admittance to institutional care: 8,9 % of sample population.

- Average duration of stay: 548 days (std. 522 days).

- Household mean size: 2 persons (std. 0,7). OECD-income (mean): 13 500 euros per year (std. 52 000).

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4. Econometric study for Finland (cont.)

- <u>Empirical strategy:</u>
  - Four models:
    - Model (1.): Only socio-economic variables
    - Model (2.): Add to (1.) ADLs (activities of daily living) as a measure of functioning
    - Model (3.): Add to (1.) primary medical diagnosis (ICD-class)
    - <u>Full Model (4.): Add to (1.) both (2.) ADLs and (3.) diagnosis.</u>
  - Two different statistical methods:
    - Short run (Logit model) 3 years, and <u>long run (Cox model) 8 years.</u>
  - Socioeconomic indicators: age, gender, martial status, change in martial status (death of spouse previous year(s)), education, income.
  - Health and functional ability indicators: IADLs, BADLs diagnoses on 6 major ICD-groups.
  - Results are reported as odds ratios or relative hazards.
  - The reference category has a risk of equal (OR, RH) = 1.000.

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Table 2 . Logit-model of LTC admittance on a 3 year follow up from baseline. Proportional hazards, their statistical significance and robust standard errors. Dummy variables regressions.

EXPLANATORY VARIABLE (X'S)	Model 1	Model 2	Model 3	Model 4
Lowest income quintile	1,000	1,000	1,000	1,000
2.lowest quintile	0,842	0,834	0,867	0,875
medium income quintile	1,010	1,024	0,954	0,983
2.highest quintile	0,708	0,745	0,603	0,676
Highest quintile	0,699	0,947	0,596	0,682
Primary school	1,000	1,000	1,000	1,000
Secondary education	0,715	0,681	0,763	0,816
Tertiary education	1,078	1,086	1,218	1,444
Non-pensioner	1,000	1,000	1,000	1,000
Pensioner	7,648**	6,836**	4,993*	4,676*
Married/couples	1,000	1,000	1,000	1,000
Divorced	2,074**	1,868*	1,877	1,661
Widowed	2,126***	1,713**	2,257***	1,847*
Single	2,384***	2,180***	1,973*	1,715
Change in marital status -(1)	13,662***	15,389***	18,526***	17,184***
54-59 -year olds	1,000	1,000	1,000	1,000
60-69 -year olds	0,795	0,838	0,949	0,992
70-79 -year olds	1,986	1,631	1,546	1,528
80-89 -year olds	4,409**	2,372	5,142**	3,281*
90+ -year olds	7,422***	3,353*	14,268***	6,917**
Man	1,000	1,000	1,000	1,000
Woman	0,764	0,770	0,957	0,933
BADL Problems in (un)dressing oneself-(2)		0,281***		0,448
IADL Problems in house cleaning chores-(2)		2,103**		2,304**
IADL Problems in carrying objects-(2)		1,587		1,565
IADL Problems in taking care of one's daily business-(2,3)		1,854**		1,893*
Diagnosis - Respiratory disease(s) (4)			0,666	0,557
Diagnosis - Psychiatric disease(s) (5)			3,034***	2,639***
Diagnosis - Somatic disease(s) (6)			1,242	1,060
Diagnosis - musculoskeletal disease(s) (7)			0,719	0,686
Diagnosis - Circulatory disease(s) (8)			1,116	0,943
equation constant	0,003***	0,003***	0,003***	0,003***
log likelihood	-555.97348	-494.61292	-318.70654	-297.89666
Number of observations - N	3223	3066	2592	2574
Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.				

Variables in the Equation

logit(PROB(LTC)>0))		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1a	MMSE_TEST_SCORE	-,183	,041	20,188	1	,000	,833	,769	,902
	AGE2*GENDER	,000	,000	,003	1	,955	1,000	,999	1,001
	AGE*GENDER	,007	,035	,037	1	,848	1,007	,939	1,079
	AGE2	,002	,001	2,783	1	,095	1,002	1,000	1,005
	AGE	-,270	,216	1,565	1	,211	,764	,500	1,165
	LN_OECD_INCOME	-,497	,222	5,013	1	,025	,608	,394	,940
	15D_TEST_SCORE	-5,433	1,195	20,676	1	,000	,004	,000	,045
	KYS1_K04	,040	,393	,010	1	,919	1,041	,482	2,248
	Constant	14,355	8,361	2,948	1	,086	1715565,840		
	MARITAL STATUS	REF.	MARRIED	11,127	4	,025			
	NON-MARRIED	-16,047	3998,286	,000	1	,997	,000	,000	.
	DIVORCED	1,231	,488	6,367	1	,012	3,425	1,316	8,912
	WIDOWED	1,049	,374	7,856	1	,005	2,854	1,371	5,942
	SINGLE	1,175	,488	5,804	1	,016	3,237	1,245	8,418
	UNIVERSITY DISTRICT	REF.	HELSINKI	9,518	4	,049			
	TURKU	-,877	,472	3,453	1	,063	,416	,165	1,049
	TAMPERE	-1,221	,427	8,164	1	,004	,295	,128	,682
	KUOPIO	-,757	,406	3,481	1	,062	,469	,212	1,039
	OULU	-,657	,460	2,041	1	,153	,518	,210	1,277
	MUNICIPALITY TYPE	REF.	CITY	4,381	4	,357			
	SMALL CITY	-1,717	1,195	2,065	1	,151	,180	,017	1,868
	SUBURBAN AREA	-,180	,363	,246	1	,620	,835	,410	1,701
	RURAL AREA	-,559	,441	1,604	1	,205	,572	,241	1,358
	PERIPHERAL AREA	-,678	,541	1,574	1	,210	,507	,176	1,464

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Table 3 . Cox-model of institutional LTC admittance on a 7 year follow up from baseline. Proportional hazards, their statistical significance and robust standard errors. Dummy variables regression.

EXPLANATORY VARIABLE (X'S)	Model 1	Model 2	Model 3	Model 4
Lowest income quintile	1,000	1,000	1,000	1,000
2.lowest quintile	0,894	0,839	0,893	0,888
medium income quintile	0,828	0,813	0,767	0,748
2.highest quintile	0,587**	0,572**	0,528**	0,552*
Highest quintile	0,489**	0,552*	0,411*	0,415*
Primary school	1,000	1,000	1,000	1,000
Secondary education	1,057	1,079	1,077	1,111
Tertiary education	1,347	1,295	1,131	1,352
Non-pensioner	1,000	1,000	1,000	1,000
Pensioner	3,870**	3,490**	2,696	2,598
Married/couples	1,000	1,000	1,000	1,000
Divorced	2,018**	1,788*	2,214**	2,157**
Widow	2,596***	2,364***	2,778***	2,507***
Single	2,288***	2,144***	2,130**	1,918**
Change in marital status -(1)	10,923***	10,812***	14,406***	13,809***
54-59 -year olds	1,000	1,000	1,000	1,000
60-69 -year olds	0,976	1,014	0,913	0,938
70-79 -year olds	2,252	1,896	1,754	1,666
80-89 -year olds	4,104***	2,563*	4,186**	2,811*
90+ -year olds	5,849***	3,224**	8,912***	4,496**
Man	1,000	1,000	1,000	1,000
Woman	0,856	0,837	0,997	0,905
Problems in dressing oneself-(2)		0,217***		0,386*
Problems in house cleaning chores-(2)	-	1,624**		1,621*
Problems in carrying objects-(2)	-	1,472		1,731*
Problems in taking care of one's daily business-(2,3)	-	1,638***		1,706*
Diagnosis - Respiratory diseases (4)			0,600*	0,496**
Diagnosis - Psychiatric diseases (5)			2,209***	1,925***
Diagnosis - Somatic diseases (6)			0,994	0,903
Diagnosis - musculoskeletal diseases (7)			0,818	0,806
Diagnosis - Circulatory diseases (8)			1,231	1,076
log likelihood	-1839.4801	-1671.5011	-1004.2101	-965.73261
Number of observations - N	3213	3056	2588	2570

Statistical significance: *** p<0.01, ** p<0.05, * p<0.1

Main results – socio-economic factors.

- <u>Income</u> was statistically significant in all cox –models (1.-4.) in the long run, <u>decreasing the probability of LTC-care</u> for two richest groups.

- For a continuos income variable there is a (stat.) significant <u>negative marginal effect</u> (and 2nd order effects as well).

- But…, there was no significant effect for education status.

- Belonging to a higher age group increases demand for institutional care (IC).

- Being <u>single living</u> increases demand for IC.

- Having <u>lost a spouse</u> increases demand for IC.

- Being on <u>pension</u> increases demand for IC.

- However…, after controlling for all other factors no significant gender difference.

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Side results – health and HrQoL

- Problems in ADLs' of "taking care of daily business outside home" and "cleaning the house" were increasing factors for demand of institutional care (of total 21 ADLs).

- For Diagnoses: psychiatric conditions, such as dementia, depression etc., had an increasing effect on LTC institutional care demand.

- 15D and MMSE are (stat.) significant predictors of care. Better HrQoL (new result) and mental ability lower the demand and admittance to institutional care.

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Discussion

- According to the results socio-economic factors influence significantly demand for institutional care after controlling for health and functional status.

- -> There is scope for <u>vertical inequity</u>, service structure and regional effects in institutional care (IC).

- Income level is a predictor of care use. <u>More research on incentives</u> needed as they play a role.

- <u>Informal care should be investigated</u> because single living demand more IC. Spousal/child support and help probably important.

- Psychiatric conditions (dementia etc.) and loss of IADL-performance indicate care needs at an early stage (8 year follow up).

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Future of research

- 1) Investigate change in place of residence more closely.

- 2) Look at spousal, children and family ties and home care.

- 3) Think about incentive structures…

- -> Other ideas ? Any suggestions ? Missing something ?

- Comments welcome !

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