

The future of the European elderly population health status. An investigation using a dynamic microsimulation model.

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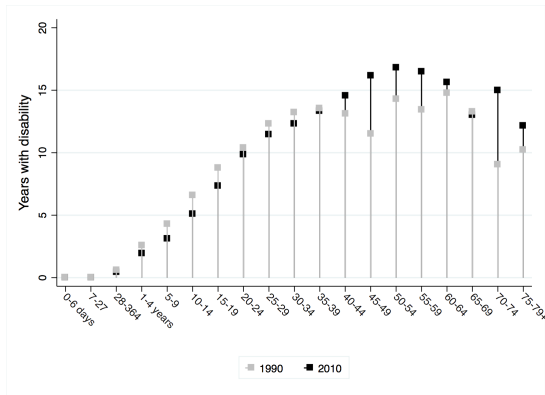
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- 1 Background and motivation
- 2 The Model
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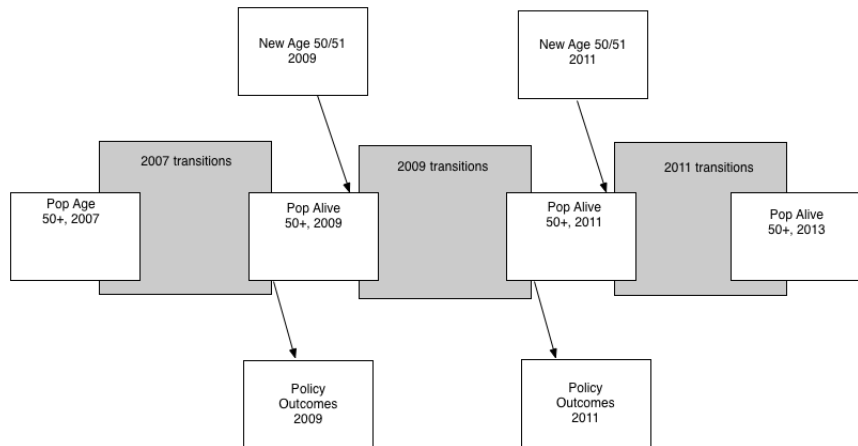
- Ageing of the population represents a serious concern in Europe.
- Latest evidence reveals that the age structure of the European population will be subject to a significant change in the upcoming decades, with an increasing share of the elderly (European Commission, 2015).
- LE at birth has been steadily increasing in all Member States since 1960. A growing trend is also likely to characterise the next decades.

- Whether gains in LE are always accompanied by an increase in healthy years is still under debate.
- Descriptive evidence and most recent studies seem to confirm, if any, the hypothesis of morbidity expansion due to chronic diseases (Badley et al., 2015; Chatterji et al., 2015, Fontana and Klein, 2007; Fontana, 2009; WHO, 2005).



Source: Infometrics, 2016

- 90% of the EU population dies of a chronic diseases, which is responsible for about 70% of health expenditure.
- This demographic dynamics will dramatically impact the performances of EU welfare systems.
- Reliable tools for quantitative analysis are key to measure the impacts of demographic changes and health status, and to support policy makers.
- We answer these questions by developing the EU-FEM, a European version of the well-known Future Elderly Microsimulation Model.
 - We provide forecasts at 2050 for major chronic conditions' prevalence, LE, disability free LE and quality adjusted life years in a set of 10 EU countries (Austria, Germany, Sweden, Netherlands, Spain, Italy, France, Denmark, Switzerland and Belgium).



- 1 Harmonized SHARE dataset (Waves 1-5) , Version C (May 2016) developed by the Gateway to Global Aging Data of the Schaeffer Center. → base data;
- 2 ECHP → historical trends for obesity and smoking status;
- 3 Eurostat → Population projections;
- 4 Human Mortality Database (HMD) → mortality data;
- 5 HS-SiSSI Database → Direct primary care costs and chronic disease trends;
- 6 Hospital discharge data → Direct inpatients costs;

- Unbalanced panel for age-50+ population (pooled waves 1-2-4-5)
- We have four types of outcomes: binary, ordered, censored and continuous.
 - Binary and ordered non-absorbing (e.g. disabilities) outcomes are modeled using probit and ordered probit models allowing for state-dependence by including the lagged outcome on the right-hand side.
 - Binary absorbing (e.g. chronic diseases) outcomes are modelled using first-order Markovian probit models.
 - Censored outcomes, earnings and financial wealth are modelled through two part models (e.g., earnings are only observed when individuals work).
- We control for several socioeconomic and health variables.

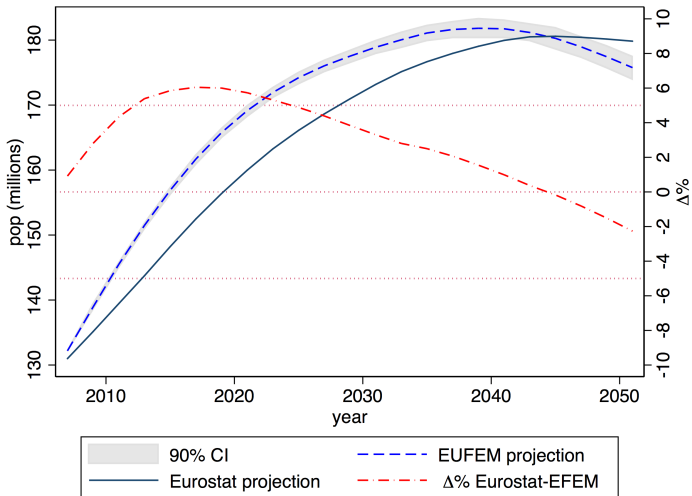
Table: Estimated outcomes

Variable	Type of variable	Type of model	Transition timing
Mortality	binary	probit	absorbing
Chronic Diseases			
Cancer	binary	probit	absorbing
Diabetes	binary	probit	absorbing
Heart disease	binary	probit	absorbing
Hypertension	binary	probit	absorbing
Lung disease	binary	probit	absorbing
Stroke	binary	probit	absorbing
Functional limitations			
Number of difficulties with ADLs	ordered	Ordered probit	Every wave
Number of difficulties with IADLs	ordered	Ordered probit	Every wave
Smoking status	ordered	Ordered probit	Absorbing (not smoking)
BMI, log transformation	continuous	OLS	Every wave
Economic characteristics			
Working for pay	binary	probit	Every wave until age 80+
Annual earnings	continuous	GHREG	Every wave if working for pay
Non-zero wealth	binary	probit	Every wave
Household wealth	continuous	GHREG	Every wave
Claiming public old age or early retirement pension	binary	probit	Absorbing

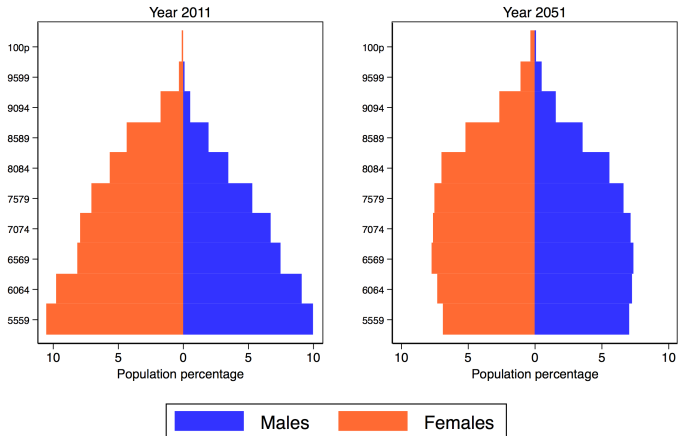
- Trends are extrapolated from historical data.
- Estimation of covariance (correlation) matrix between outcomes of interest using a multi-equation mixed-process model based on a sample of 50-55 aged individuals from SHARE data.
- New cohorts 50-51 aged individuals are generated up to 2150 by applying trends and imposing estimated correlations between outcomes.

Estimated covariance matrix (estimated on the 50-55 years sample, SHARE wave 2)

	Hypertension	Hearth	Diabetes	Cancer	Stroke	Lunge	Health status	BMI	Smoking	ADL	IADL	Work	Earnings
Hypertension	1.000												
Hearth	0.280	1.000											
Diabetes	0.329	0.301	1.000										
Cancer	0.039	0.183	0.119	1.000									
Stroke	0.235	0.343	0.171	0.203	1.000								
Lunge	0.100	0.163	0.151	0.235	0.153	1.000							
Health status	0.268	0.472	0.410	0.444	0.511	0.452	1.000						
BMI	0.316	0.125	0.361	0.038	0.028	0.037	0.158	1.000					
Smoking	-0.031	0.053	-0.011	-0.016	0.106	0.195	0.090	-0.074	1.000				
ADL	0.224	0.291	0.192	0.240	0.516	0.271	0.565	0.088	0.073	1.000			
IADL	0.160	0.218	0.213	0.280	0.490	0.301	0.541	0.047	0.160	0.662	1.000		
Work	-0.117	-0.317	-0.250	-0.292	-0.406	-0.289	-0.452	-0.053	-0.006	-0.392	-0.580	1.000	
Earnings	-0.055	-0.276	0.041	-0.287	0.271	-0.101	-0.497	-0.103	-0.087	-0.337	0.210	0.323	12.423

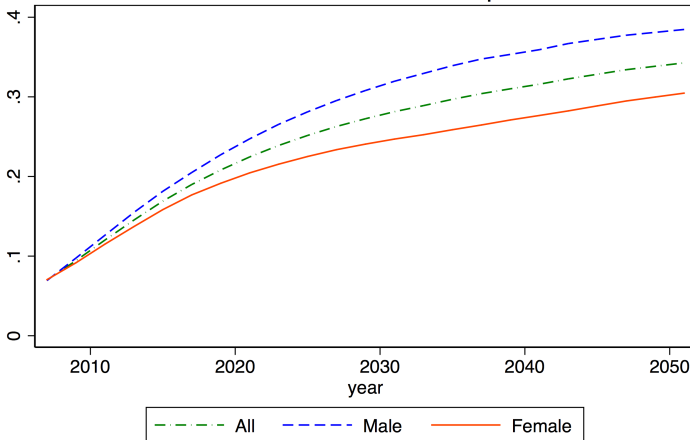


EU population pyramid



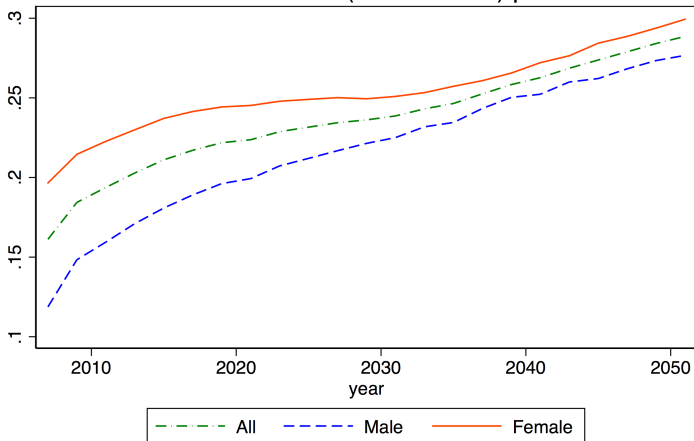
Source: Our prediction using EUFEM

More than two chronic diseases prevalence

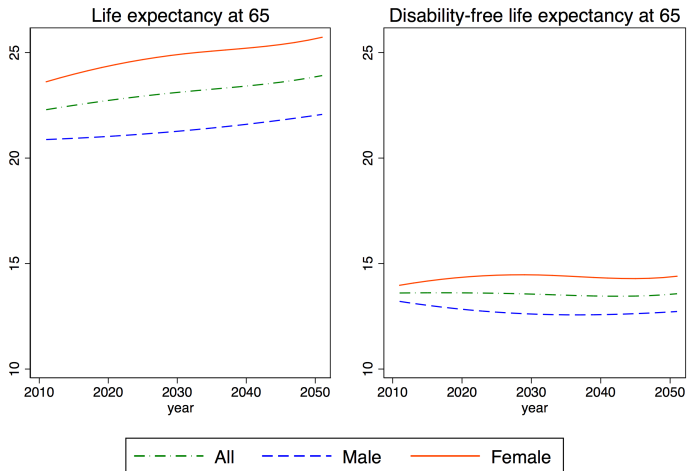


Source: Our prediction using EUFEM

At least one limitation (ADL or IADL) prevalence



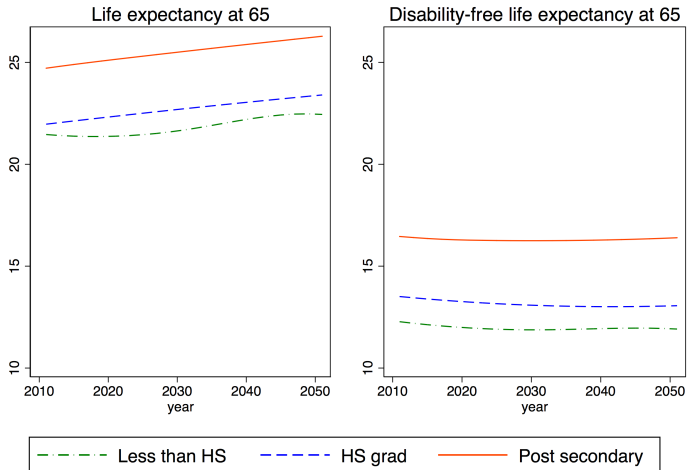
Source: Our prediction using EUFEM



Source: Our prediction using EUFEM

Results

Healthier years to come?



Source: Our prediction using EUFEM

Thank you