WIFO AUSTRIAN INSTITUTE OF ECONOMIC RESEARCH

Can we predict the need for long-term care?

A case study of the Austrian cash-for-care system using administrative data

Ulrike Famira-Mühlberger
Austrian Institute of Economic Research
Klaus Nowotny
University of Salzburg & Austrian Institute of Economic Research

ILPN Conference 2022
September, 10th 2022

Goals of the study (for the Austrian Social Insurance Institution)

- Analysis of the correlation between the health history of people aged 60+ and:
  - entry into the LTC allowance scheme (Part 1)
    - Can we predict the first-time receipt of LTC allowance with health data?
    - What are the most important determinants for receiving LTC allowance for the first time?
  - change of LTC allowance level (Part 2)
    - What are the most important determinants for being transferred to a higher LTC allowance level?
  - transfer to residential care (Part 3)
    - What are the most important determinants for being transferred to residential care?
- ... on the basis of pseudonymized
  - Health service data (2015-2018)
  - LTC allowance data (2016-2018)

Some background: LTC allowance system in Austria

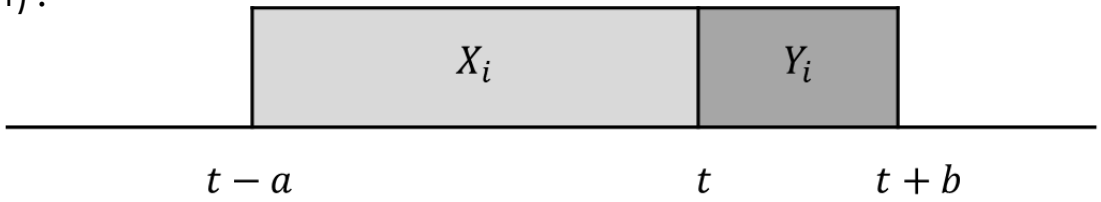
- In 1993, Austria introduced a uniform, needs- but not means-tested LTC allowance system ("Pflegegeld")
- 7 levels, depending on the intensity of care needed (from € 162.50 p. m. at level 1 to € 1,745.10 p. m. at level 7.
- 50% of those receiving LTC allowance are assigned to levels 1 and 2.
- In 2021, 5.2% of the Austrian population received LTC allowance.
  - Among those who are 65+ approx. 22% received LTC allowance
  - Among those who are 80+ approx. 53% received LTC allowance
- The LTC allowance is financed by the general federal tax revenue (national budget)

Data

- Pseudonymized individual data of all 550,960 recipients of LTC allowance aged 60+ between 2016 and 2018
- Case-control group of 435,300 persons between 60 and 85 without LTC allowance between 2016 and 2018 (Part 1)
- Data on age, gender, NUTS-3 region and
  - Number of contacts with GPs, (specialist) physicians or other contractual partners
  - Dispensed remedies and prescribed drugs
  - Main diagnoses according to ICD-10 and individual medical services provided (only for hospital stays)
  - In sum: 3,614 potential variables

Methods (Part 1)

- How likely is an event Y_i in the event period [t, t + b) given the personal characteristics of a person i and the health services X_i consumed in the observation period [t - a, t)?



- Exploratory data analysis with machine learning methods
- Logit regression using different methods to reduce overfitting problems (cross-validated LASSO, ridge regression and elastic net models, random forest)
- 75% of the dataset is used to "train" the data to optimize the statistical method
- Assessment of model quality based on test data (25% of the dataset)
- No causal interpretation, but statistical correlations!

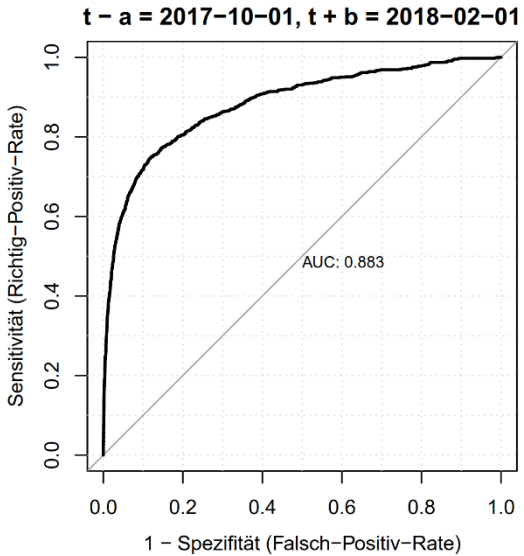
Part 1: Health care services and first-time receipt of LTC allowance

- Can we predict the first-time receipt of LTC allowance with health data?
  - Yes, fairly well, especially if the event period is relatively short and the length of event and observation period have roughly the same length

Eventzeiträume

Beobachtungszeiträume *[t − a, t) / [t, t + b)*	[01/2018, 02/2018)	[01/2018, 04/2018)	[01/2018, 07/2018)	[01/2018, 01/2019)
[10/2017, 01/2018)	0,883	0,830	0,799	0,772
[07/2017, 01/2018)	0,877	0,829	0,800	0,775
[01/2017, 01/2018)	0,862	0,822	0,797	0,776
[01/2016, 01/2018)	0,847	0,812	0,791	0,776

Beobachtungszeiträume *[t − a, t) / [t, t + b)*	[01/2018, 02/2018)	[01/2018, 04/2018)	[01/2018, 07/2018)	[01/2018, 01/2019)
[10/2017, 12/2017)	0,818	0,787	0,773	0,754
[07/2017, 12/2017)	0,817	0,791	0,777	0,760
[01/2017, 12/2017)	0,806	0,787	0,777	0,763
[01/2016, 12/2017)	0,797	0,782	0,774	0,765

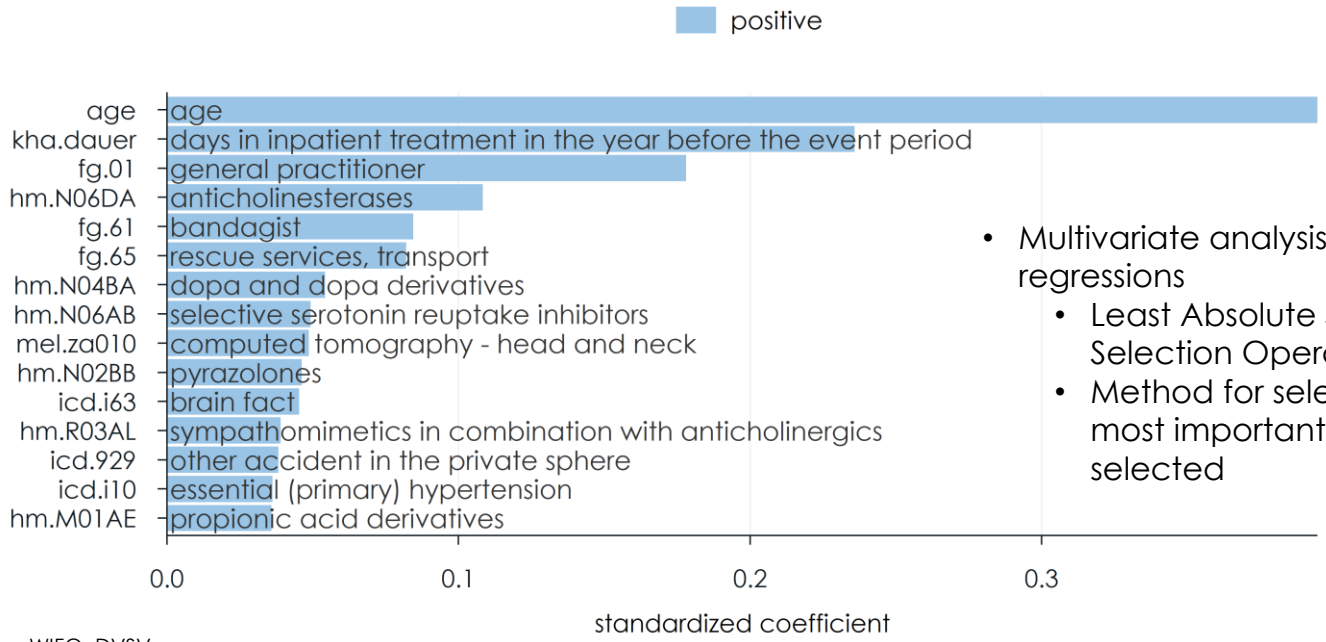


Part 1: Health care services and first-time receipt of LTC allowance

- First-time receipt of LTC allowance can be predicted well from the individual health data, especially in the short term
- Model quality deteriorates if the month before the first receipt of LTC allowance is omitted
- A higher level of detail in the measurement of health care services leads only to a slight increase in forecast quality
- A high absolute number of potential false-positive classifications limits the possibility of using it as a leading indicator ("early warning system")

Part 1: Receiving LTC allowance for the first time
The most important determinants

Characteristics that correlate most strongly with first-time receipt LTC allowance



- Multivariate analysis based on LASSO regressions
  - Least Absolute Shrinkage and Selection Operator (LASSO)
  - Method for selection of variables – most important variables are selected

Source: WIFO, DVSV.

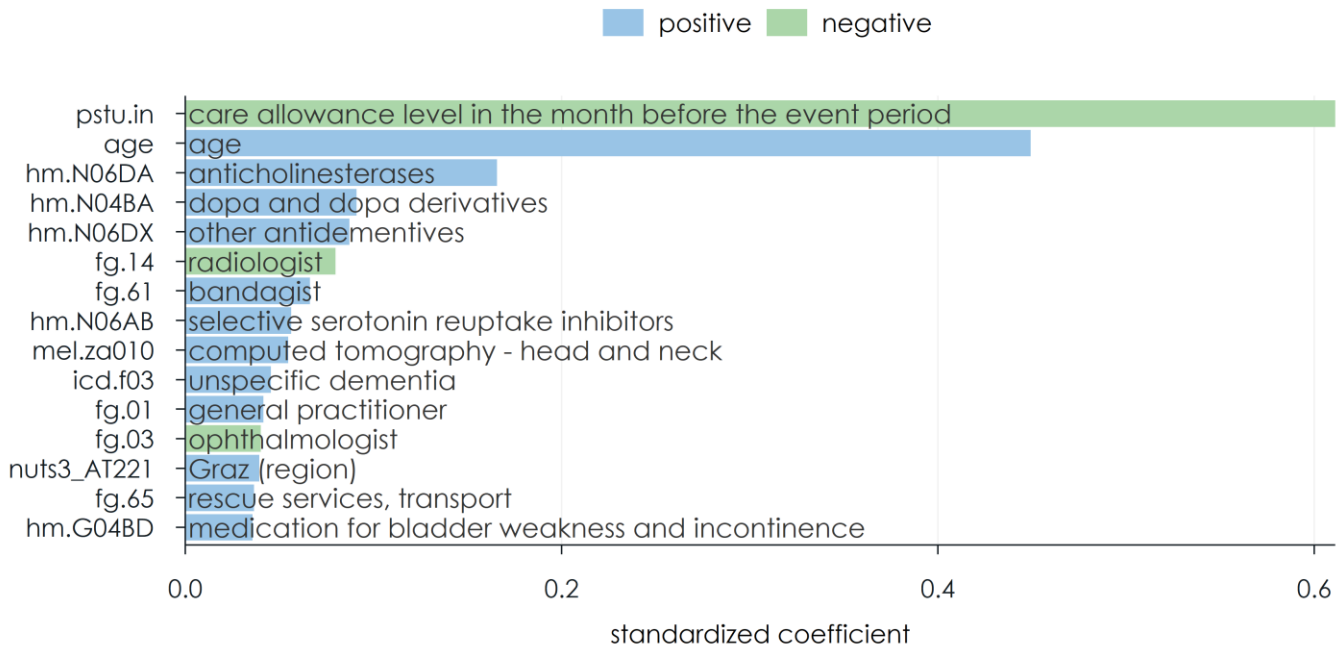
WIFO

Part 2: Transitions to higher levels of LTC allowance
Goal – Data – Method

- Aim: analyzing the most important determinants for the transition to a higher level of LTC allowance on the basis of health service data (diagnoses, prescribed drugs, individual medical services), taking into account personal characteristics
- Data: Pseudonymized individual data of all 550,960 recipients of LTC allowance aged 60+ between 2016 and 2018
- Event period: [01/2017, 01/2018] - 18% of LTC allowance recipients transfer to a higher level of LTC allowance within this period
- Observation period: [01/2016, 01/2017]
- Multivariate analysis based on LASSO regressions
  - Least Absolute Shrinkage and Selection Operator (LASSO)
  - Method for selection of variables – most important variables are selected

Part 2: Transitions to higher levels of LTC allowance
The most important determinants

The 15 most important features when moving to a higher level of LTC allowance



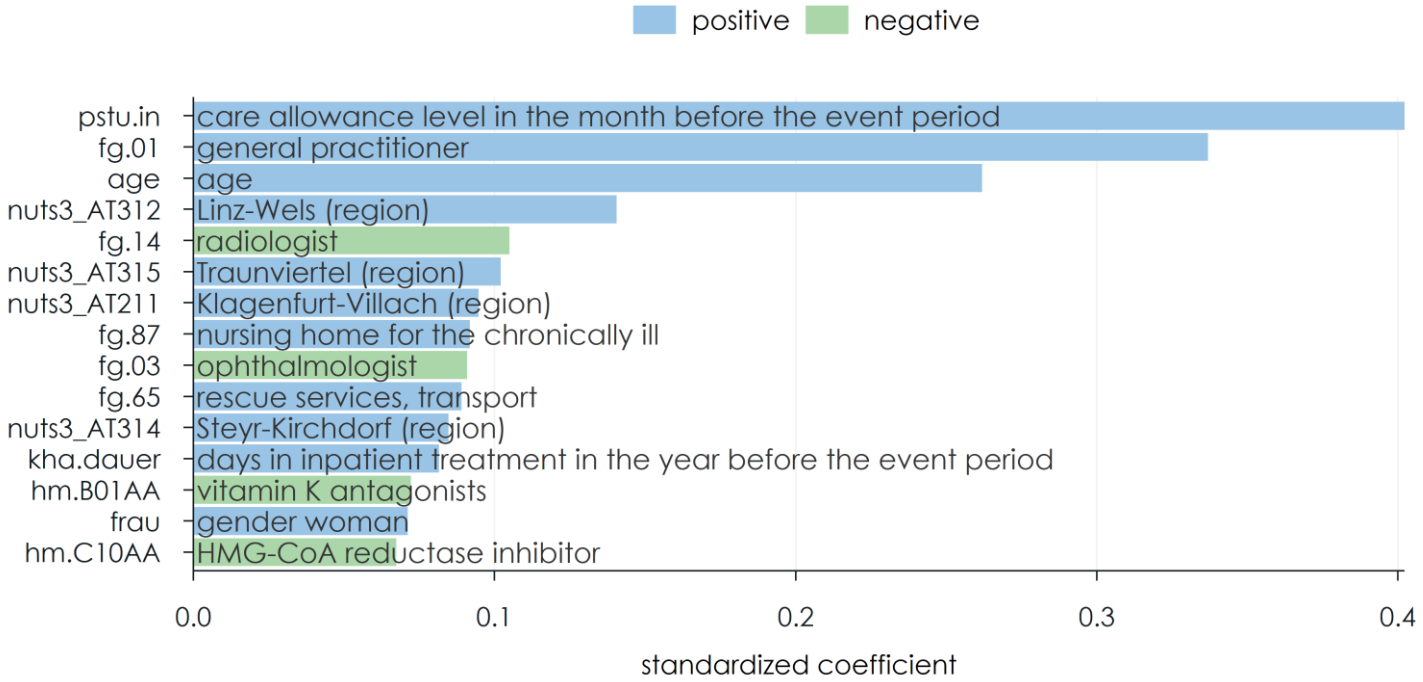
Source: WIFO, DVSV.

Part 3: Entering residential care
Goal – Data – Method

- Aim: analyzing the most important determinants before entering residential care on the basis of health service data (diagnoses, prescribed drugs, individual medical services), taking into account personal characteristics
- Data: Pseudonymized individual data of all 550,960 recipients of LTC allowance aged 60+ between 2016 and 2018
- Event period: [01/2017, 01/2018] - 8% of recipients of LTC allowance enter residential care
- Observation period: [01/2016, 01/2017]
- Multivariate analysis based on LASSO regressions
  - Least Absolute Shrinkage and Selection Operator (LASSO)
  - Method for selection of variables – most important variables are selected

Part 3: Entering residential care
The most important determinants

The 15 most important characteristics that have an effect on transfers to residential care



Q: WIFO, DVSV.

WIFO

Main conclusions

- First-time receipt of LTC allowance can be predicted well from the individual health data, especially in the short term – but no "early warning system"
- Relevance of age: too much importance in granting LTC allowance?
- Importance of dementia: prevention
- Regional consideration: higher incidence in some regions (ceteris paribus) – more research needed!

WIFO AUSTRIAN INSTITUTE OF ECONOMIC RESEARCH

Thank you for your interest!

Ulrike.Famira-Mühlberger@wifo.ac.at
Klaus.Nowotny@plus.ac.at