Income, poverty and longevity: evidence from Europe.

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Motivation

Poverty and inequality have an impact on multiple aspects of life, including *health* and *longevity* (Marmot, 2015).

Research efforts recently focused on quantifying such impact.

Modern survey data can be exploited to estimate *life expectancy*.

This can serve as intuitive *summarising measure* of well-being and inequality.

This work develops a novel approach for the estimation of life expectancy gradients, using data on the European Union.

It proposes to exploit longevity differences as *multidimensional measure of poverty and inequality*.

Literature

Income
Preston (1975), Frijters et al. (2005), Marmot (2015), Chetty et al. (2016), Case and Deaton (2021)

Education
Cutler et al. (2006), Murtin et al. (2017), Galama et al. (2018), Lutz and Kebede (2018)

Health habits
Grossman (1972), McKeown (1976), Cutler et al. (2006), OECD (2018)

Place of residence and social relationships
Kelly et al. (2017), Izenberg et al. (2018), Victor and Pikhartova (2020), Holt-Lunstad (2018)

Data

Data are from the **European Survey of Income and Living Conditions** (EU-SILC).

This include information on European Union countries and UK, from 2003.

EU-SILC collects comparable information on income, poverty, social exclusion and living conditions.

It also contains information on *individual health status*.

Scientific-use files register *causes of exit* from the sample, including death, together with year and month of exit.

Outline

1. Health gradients
2. Life expectancy gradients
3. Determinants of dying probability
4. Conclusions

Health gradients

Economic status

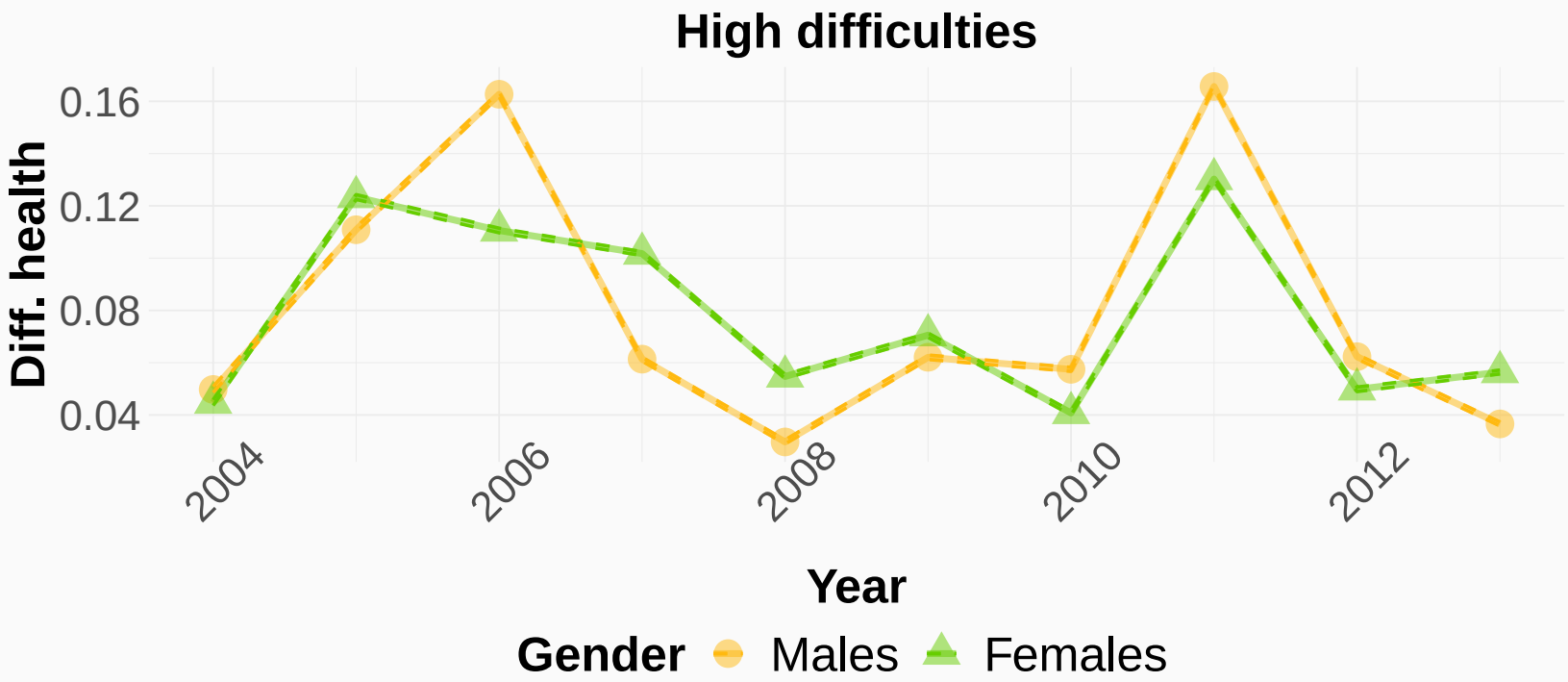

Figure 1: Health differences by economic status.

Notes: Mean health of individuals living in households with none to medium difficulties minus high difficulties to make ends meet. Dotted lines indicate 95% normal confidence interval. *Source: own elaboration of Eurostat EU-SILC PUF.*

Alternative measures

Economic status and education

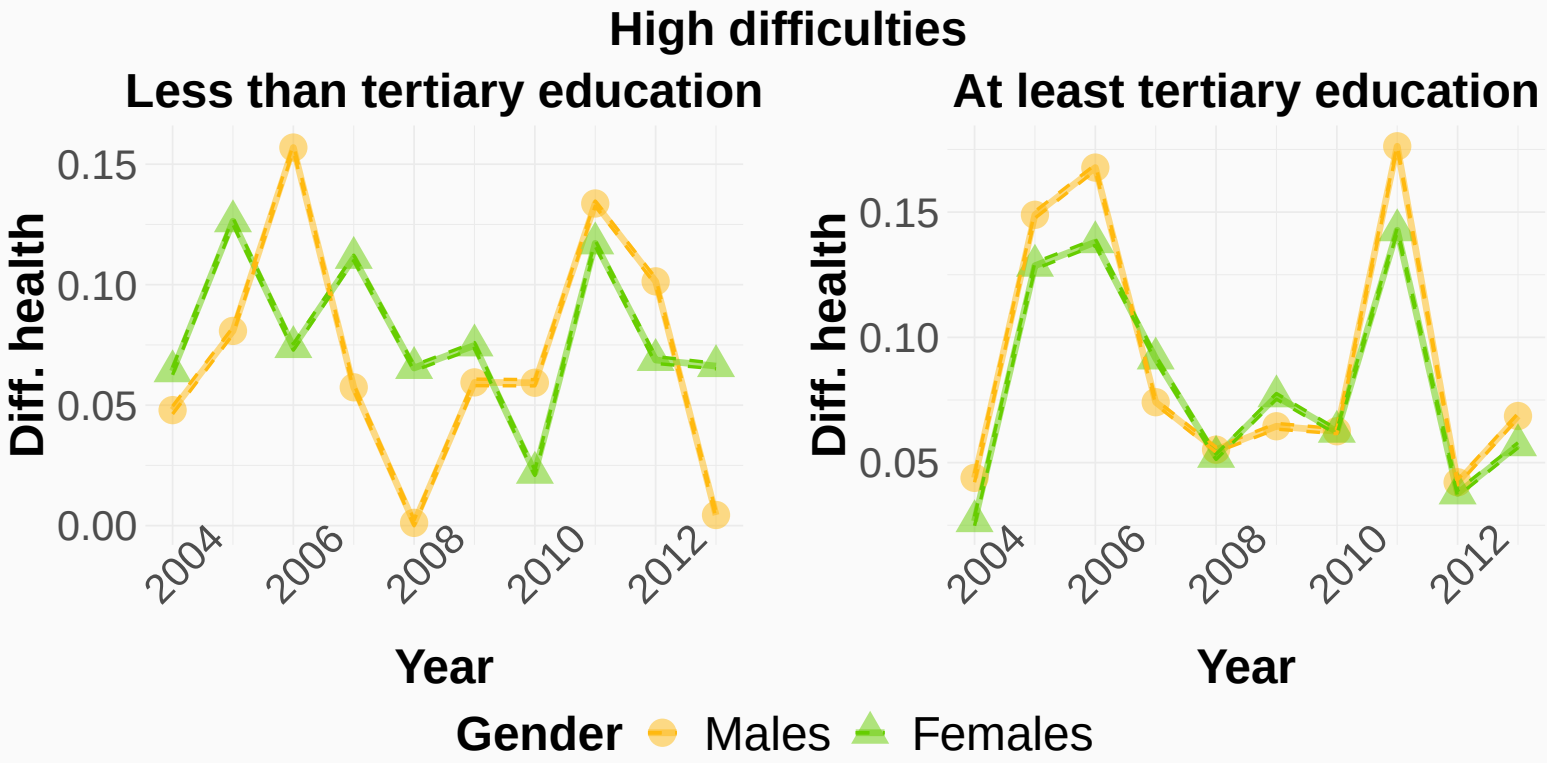

Figure 2: Health differences by economic status and education.

Notes: Mean health of individuals living in households with none to medium difficulties minus high difficulties to make ends meet, conditional on education achievements. Dotted lines indicate 95% normal confidence interval. *Source: own elaboration of Eurostat EU-SILC PUF.*

Detailed economic status

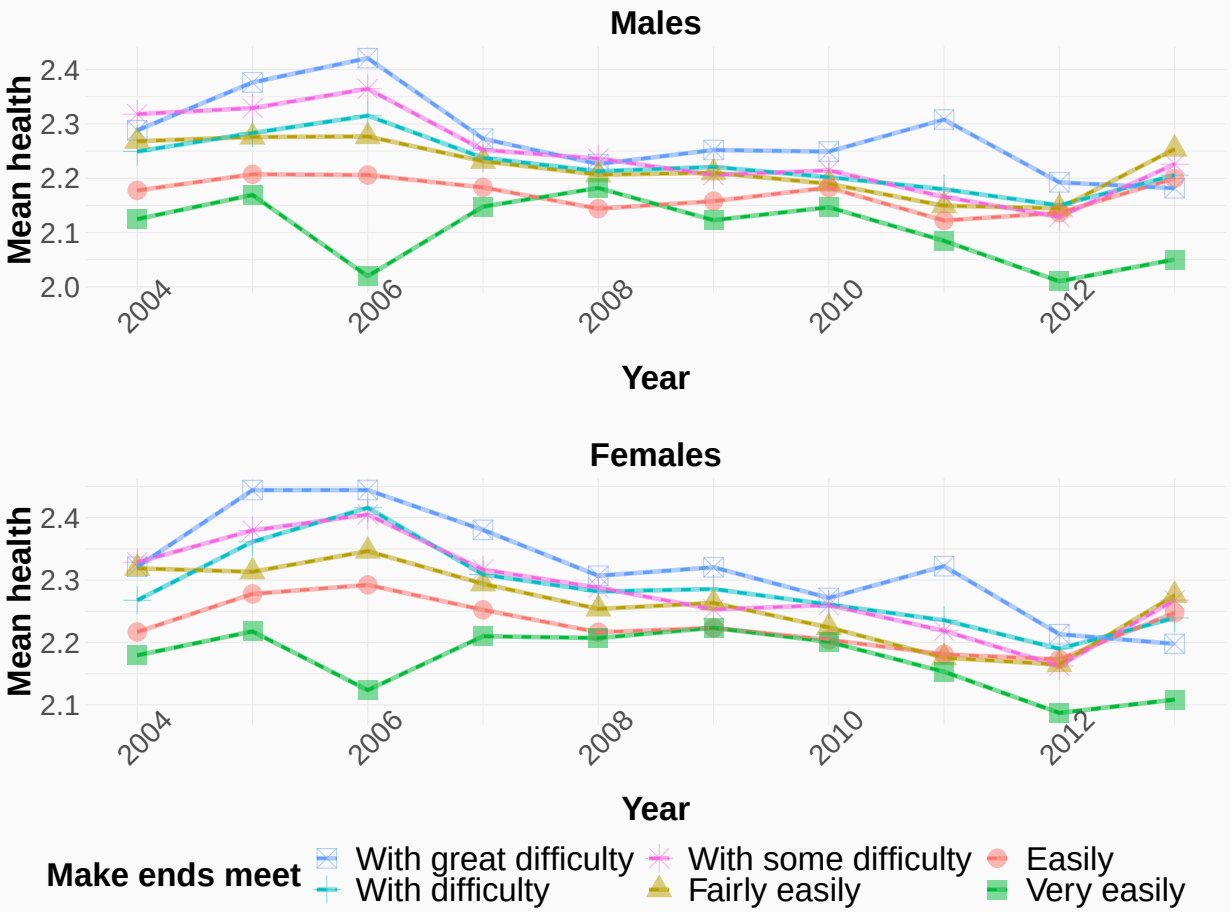

Figure 3: Mean health by five economic status categories.

Notes: Mean health of individuals by economic status of their household. Dotted lines indicate 95% normal confidence interval. *Source: own elaboration of Eurostat EU-SILC PUF.*

Life expectancy gradients

Life expectancy estimation: methodology

Sample is divided into groups conditional on demographic or socio-economic characteristics.

Within each group p, life expectancy of a cohort of age τ at time t estimated as (Collett, 2015):

$$LE_{p,t}(\tau) = \sum_{j=\tau}^{\tau^m} \prod_{q=1}^{\tau^m - \tau} (1 - \pi_{p,t}(q)) \tag{1}$$

where:

- $\hookrightarrow$ $\pi_{p,t}$ is the estimated dying probability at t for cohort of age τ;
- $\hookrightarrow$ τ^m is maximum reachable age.

Dying prob.

Determinants of dying probability

Cox hazard model

The mortality rate at age τ is estimated through a Cox proportional hazard model (Cox, 1972):

$$\pi(\tau) = \pi_0(\tau) exp(\boldsymbol{X}\beta) \tag{2}$$

where:

- $\hookrightarrow$ $\pi_0(\tau)$ indicates the baseline hazard;
- $\hookrightarrow$ $\boldsymbol{X}$ includes demographic and socioeconomic variables, space and time controls.

Long-term impact of income can be isolated using a permanent income measure.

Potential endogeneity can be further tackled through control function approach.

Construction of inequality indicator

Through regression coefficients, life expectancy (LE) of representative individuals can be estimated.

Consider the following three individuals:

Variable	Individual A	Individual B	Individual C
Income	10,000€/year	15,000€/year	30,000€/year
Education	High-school	High-school	Tertiary
Marital status	Not married	Not married	Married
Gender	Male	Male	Male
Region	Lazio	Lazio	Toscana
Year	2010	2010	2010

LE differences between A and B measure the impact of an yearly income difference of 5,000€.

LE differences between A and C summarise the combined impact of income, education, social relationships and geographical factors.

Conclusions

Conclusions

Poverty and inequality are complex phenomena that impact different dimensions of individual life.

EU-SILC data can be used to provide reliable estimates of individual life expectancy, given their demographic and socioeconomic characteristics.

Life expectancy differences can be used to produce a summarising measure of inequality.

This measure fully considers the multidimensional impact of economic and non-economic distress.

Further, it is easy to interpret and communicate to non-professionals.

Thank you for the attention!

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Backup slides

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Economic stauts: alternative measures

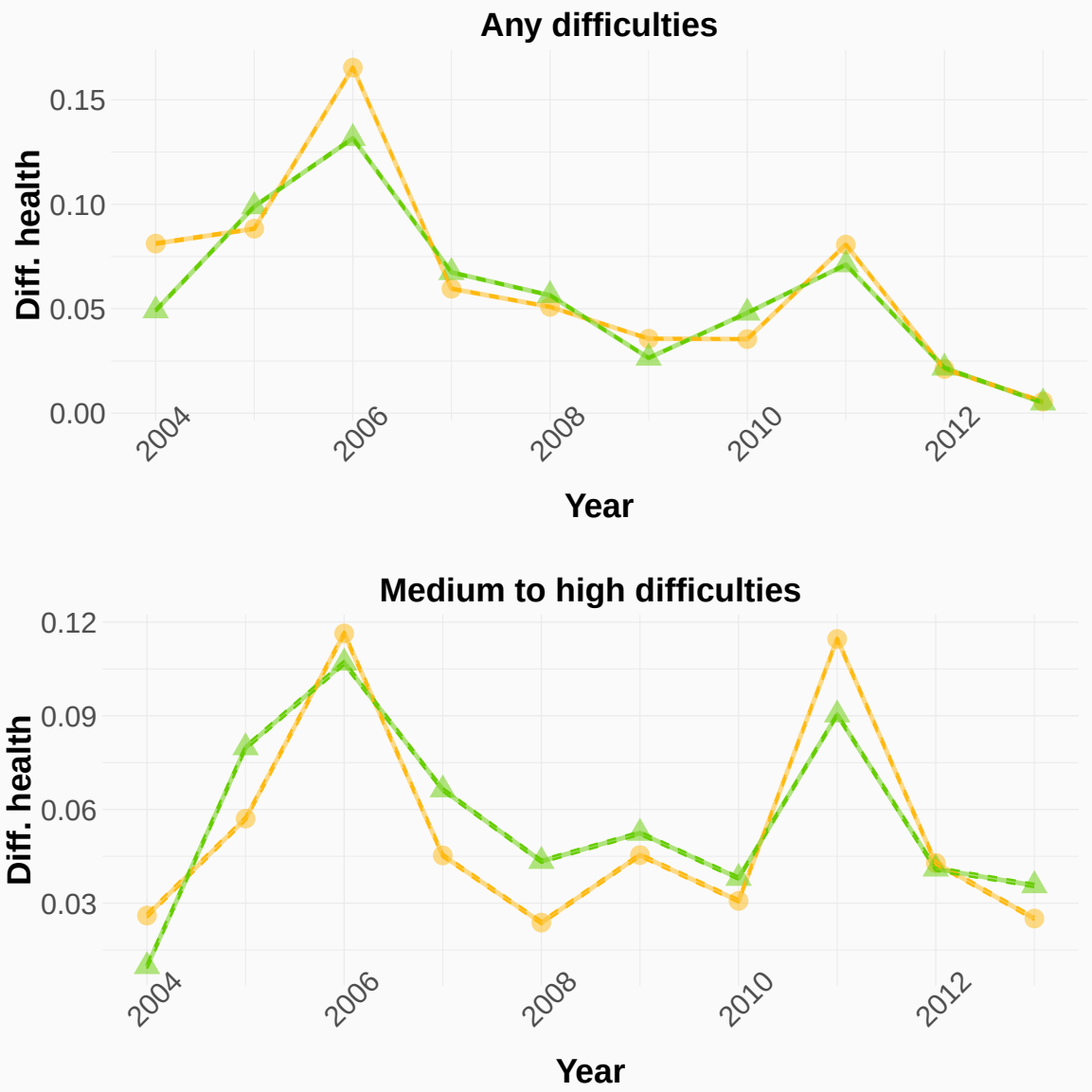

Figure 4: Health differences by economic status.

Back

Economic status and education: alternative measures

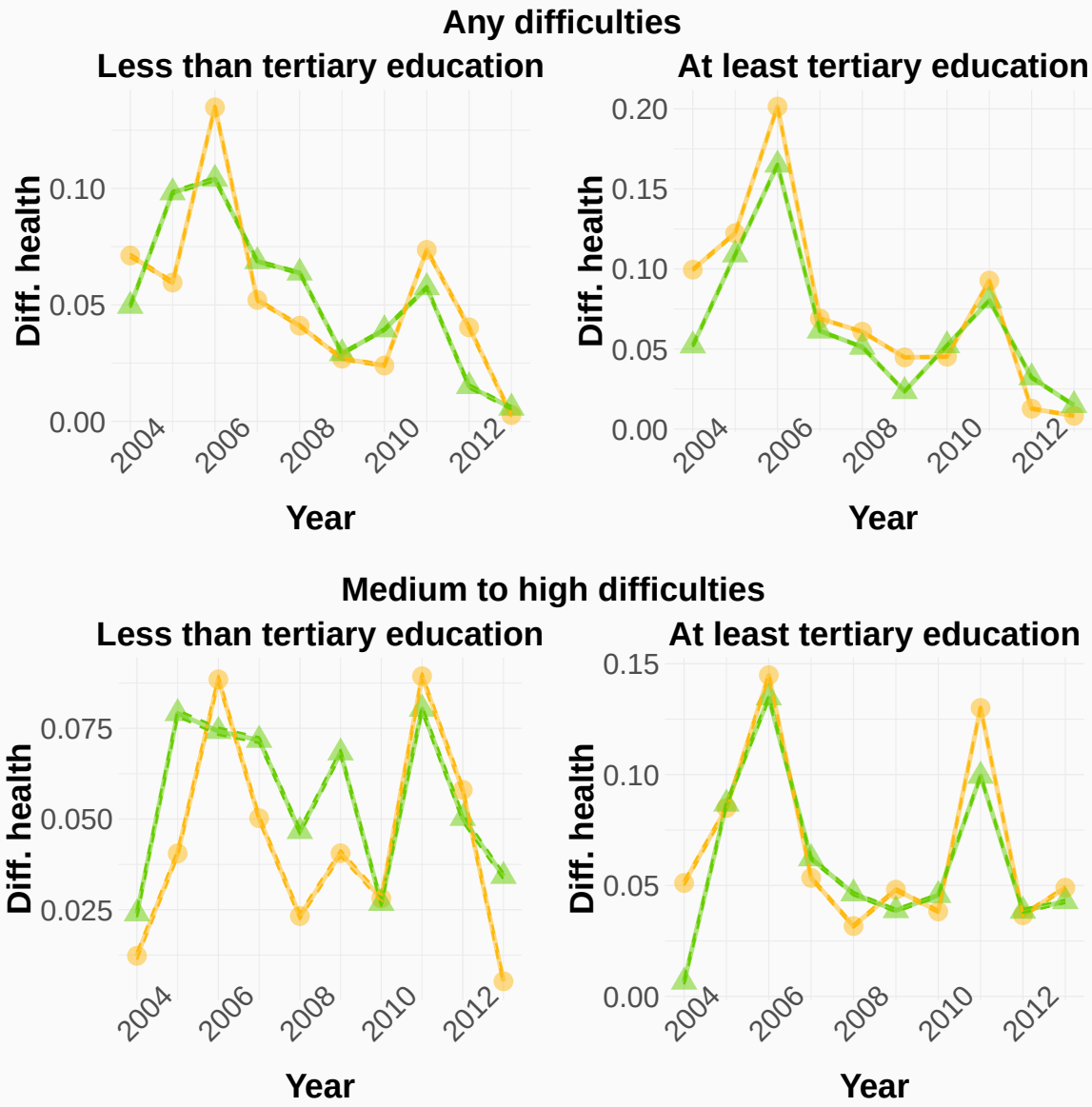

Figure 5: Health differences by economic status and education.

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Dying probability

The dying probability $\pi_{p,t}(\tau)$ for the cohort of age τ at time t is estimated as:

$$\pi_{p,t}(\tau) = \frac{m_{p,t}(\tau)}{1 + (1 - a_x) \cdot m_{p,t}(\tau)} \tag{3}$$

where:

- $\hookrightarrow$ a_x is the portion of year t that dead individuals lived;
- $\hookrightarrow$ $m_{p,t}(\tau)$ is the specific death rate for class age in year t.

Then, $m_{p,t}(\tau)$ is the ratio of the number of deaths in cohort of age τ at t to the average living population of cohort of age τ between t and $t + 1$.

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End of the presentation.