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Modelling work place decisions in mobility biographies

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Outline

- Project and basic information

- Study design and questionnaire

- Response burden

- Descriptive analyses

- Recurrent Event Survival Analysis: approach, estimation, results

- Outlook

Background information
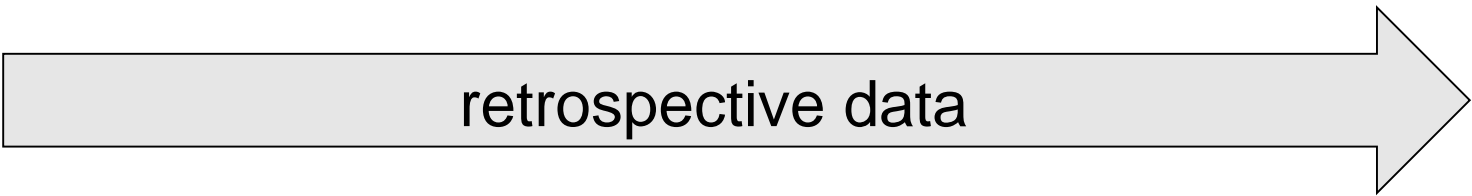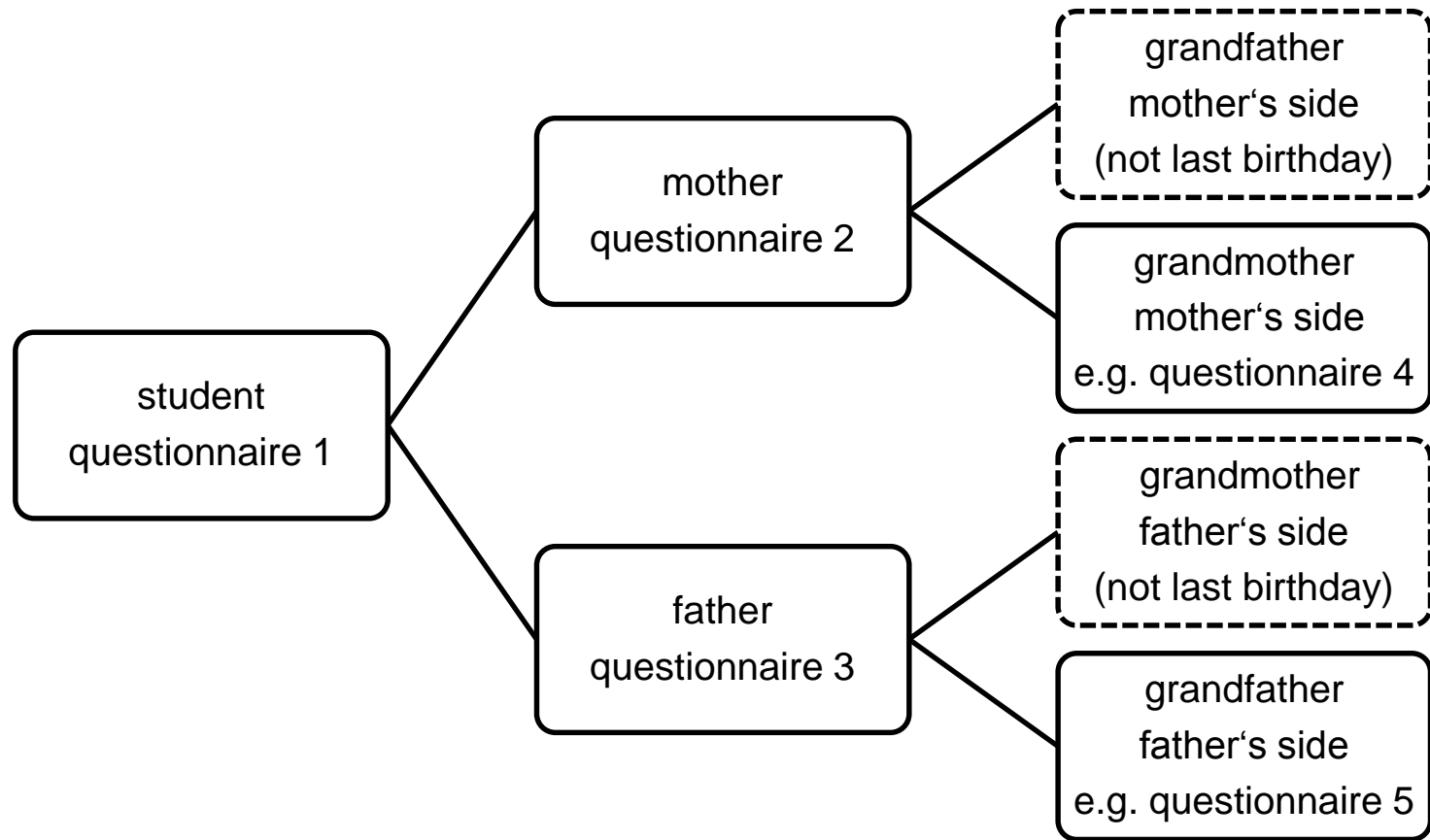
Project   Mobility Biographies: A Life-Course
                            Approach to Travel Behaviour and
                            Residential Choice

Funding: DFG/SNF

Realization: IVT ETH Zurich
                            TU Dortmund
                            Goethe University Frankfurt

Duration: (2007) April 2012 – exp. late 2015

Aim: Analysis of the variation and stability of
                            mobility behaviour in the life course

Sample size: 3972 (this analysis) / 4620 + (total)

Basics

- Changes in mobility behavior are usually determined with static cross sectional surveys but these often don´t account for the **dynamics of long term decision** (Lanzendorf 2003)

- Mobility biographies are the development **of travel demand in the life course** (Scheiner 2010)

- The mobility biography approach tries to capture and explain **travel behavior and mobility tool ownership during lifetime** (Scheiner 2006)

- **Key events** such as childbirth or starting the working career have an important influence on the individual mobility biography (Van der Waerden et al. 2003, Lanzendorf 2010, Klöckner 2003)

- **Theoretical framework** Axhausen (2002, 2007), Lanzendorf (2003), Scheiner (2003,2006), Van der Waerden et al. (2003)…

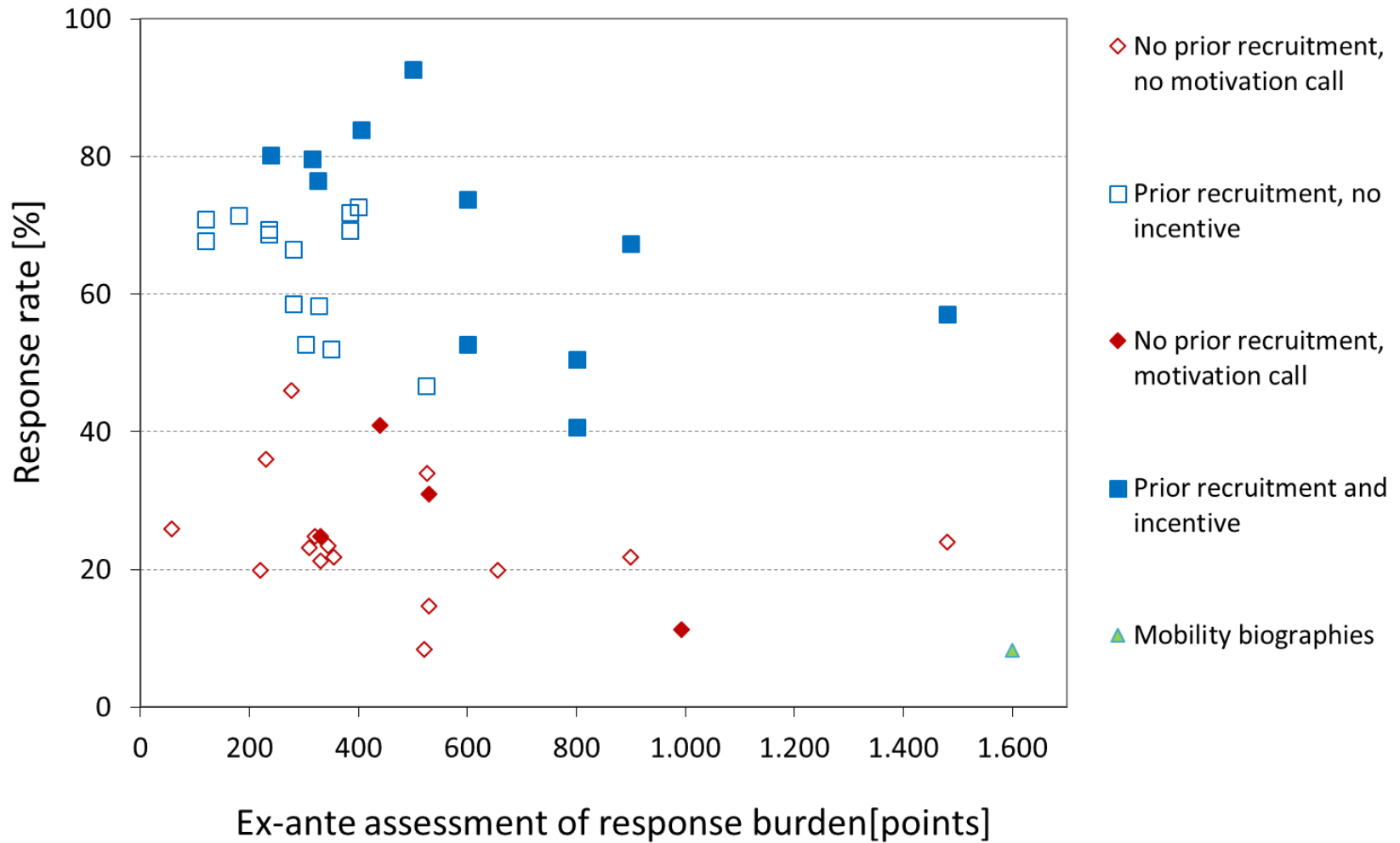- **Empirical studies** Axhausen et al (2006), Frändberg (2006), Beige (2008) …

Study design - process

student
questionnaire 1

mother
questionnaire 2

father
questionnaire 3

grandfather
mother's side
(not last birthday)

grandmother
mother's side
e.g. questionnaire 4

grandmother
father's side
(not last birthday)

grandfather
father's side
e.g. questionnaire 5

retrospective data
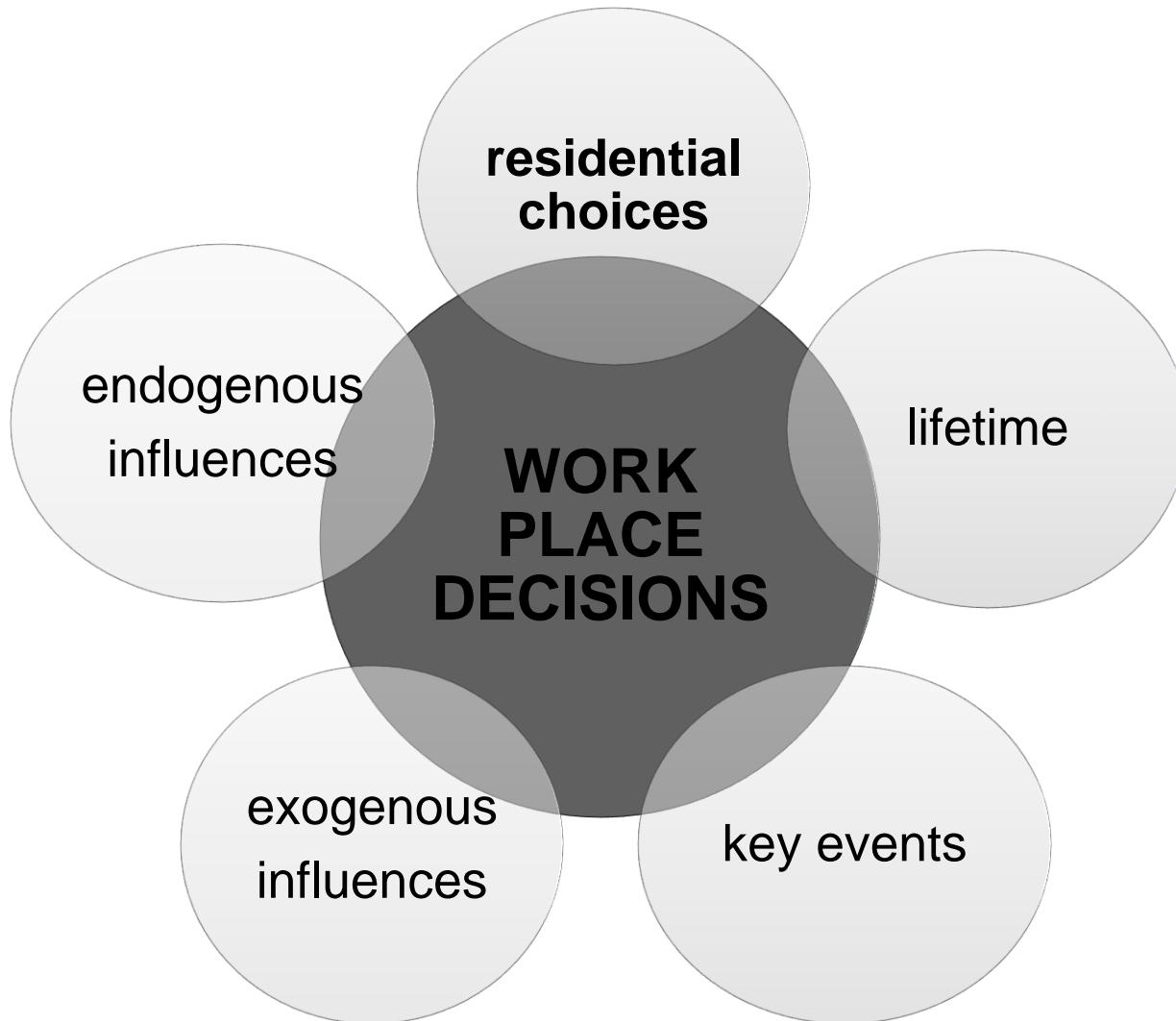
Study design – questionnaire

- Content:

  - Part A: residential relocation
  - Part B: everyday travel incl. employment biography
  - Part C: holiday travel
  - Part D: attitudinal questions
  - Part E: socio-demographic questions incl. mobility tools

  → almost 50 questions per person
  → 5 questionnaires per family

Response burden

Ex-ante assessment of response burden[points]

Legend:
- ◇ No prior recruitment, no motivation call
- □ Prior recruitment, no incentive
- ◆ No prior recruitment, motivation call
- ■ Prior recruitment and incentive
- ▲ Mobility biographies

Axhausen and Weis (2010)

Focus on work place decisions

Study design – employment biography

3. Wie sind Sie jeweils zur wichtigsten Arbeitsstelle gekommen ? Wenn sich die **Länge des Arbeitswegs oder das genutzte Verkehrsmittel geändert haben,** z.B. wegen eines Umzugs bitte eine neue Zeile ausfüllen.

Von (Jahr)	Bis (Jahr)	Stellen-prozente	Weg (ca. in km)	Haupt-verkehrs-mittel	Grund für die Änderung des Weges

...

☐ Ich war nie erwerbstätig

Kodierung für das Hauptverkehrsmittel
1 = Zu Fuß
2 = Velo/Fahrrad
3 = ÖPNV
4 = Auto
5 = Mofa/Roller
6 = Motorrad
7 = Anders

- beginning and ending of employment (in years)
- fulltime/part time (choice)
- distance to workplace (in km)
- main mode of transport (categories1-7)
- reason for changing way to work (open)

Reasons for changing way to work

- workplace change
- start of working career
- higher income
- self employment
- retirement
- improve working conditions
- start/end high school/school/apprenticeship
- back to work after break
- relocation of employment
- promotion
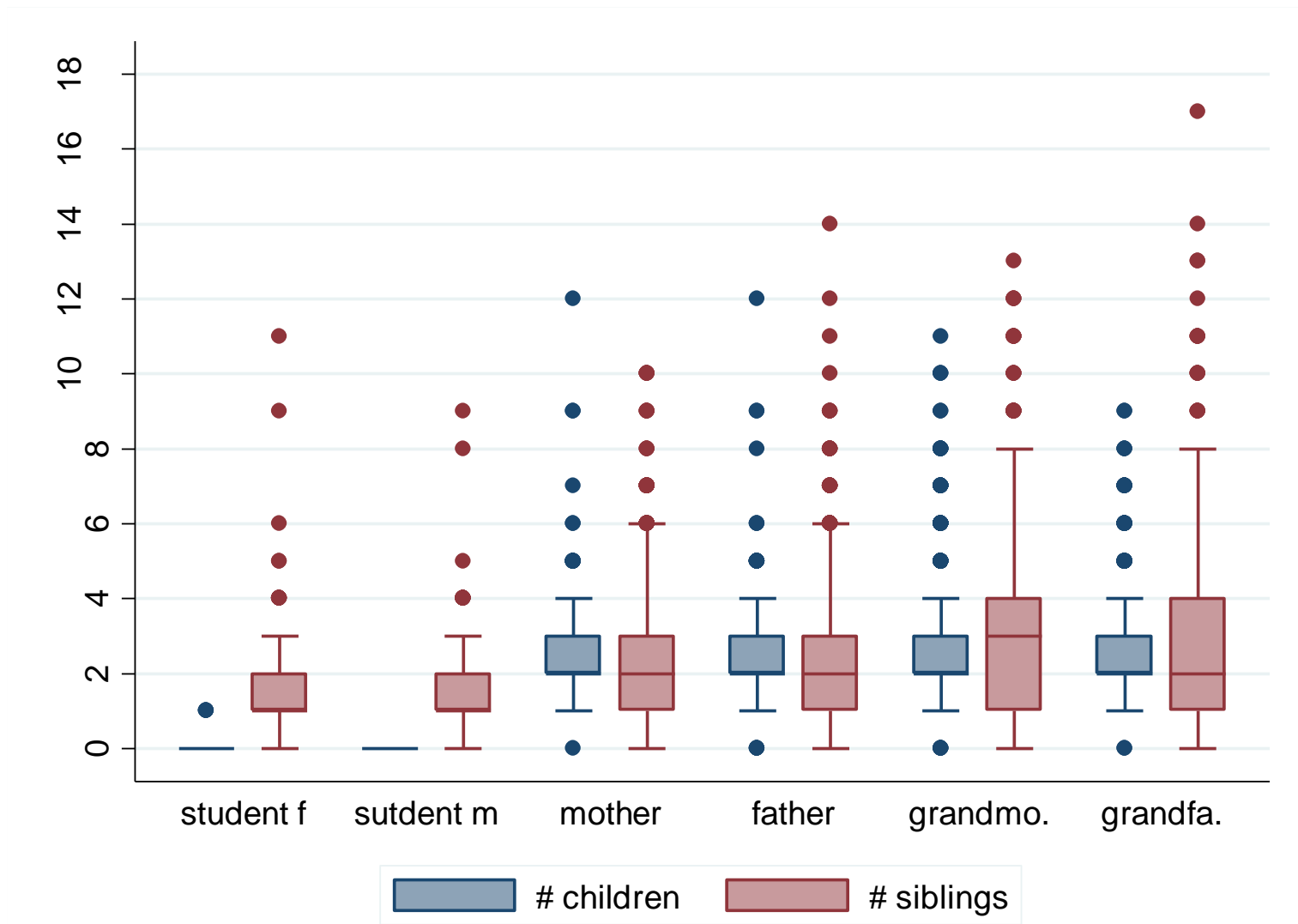- army / civilian service / voluntary work etc.
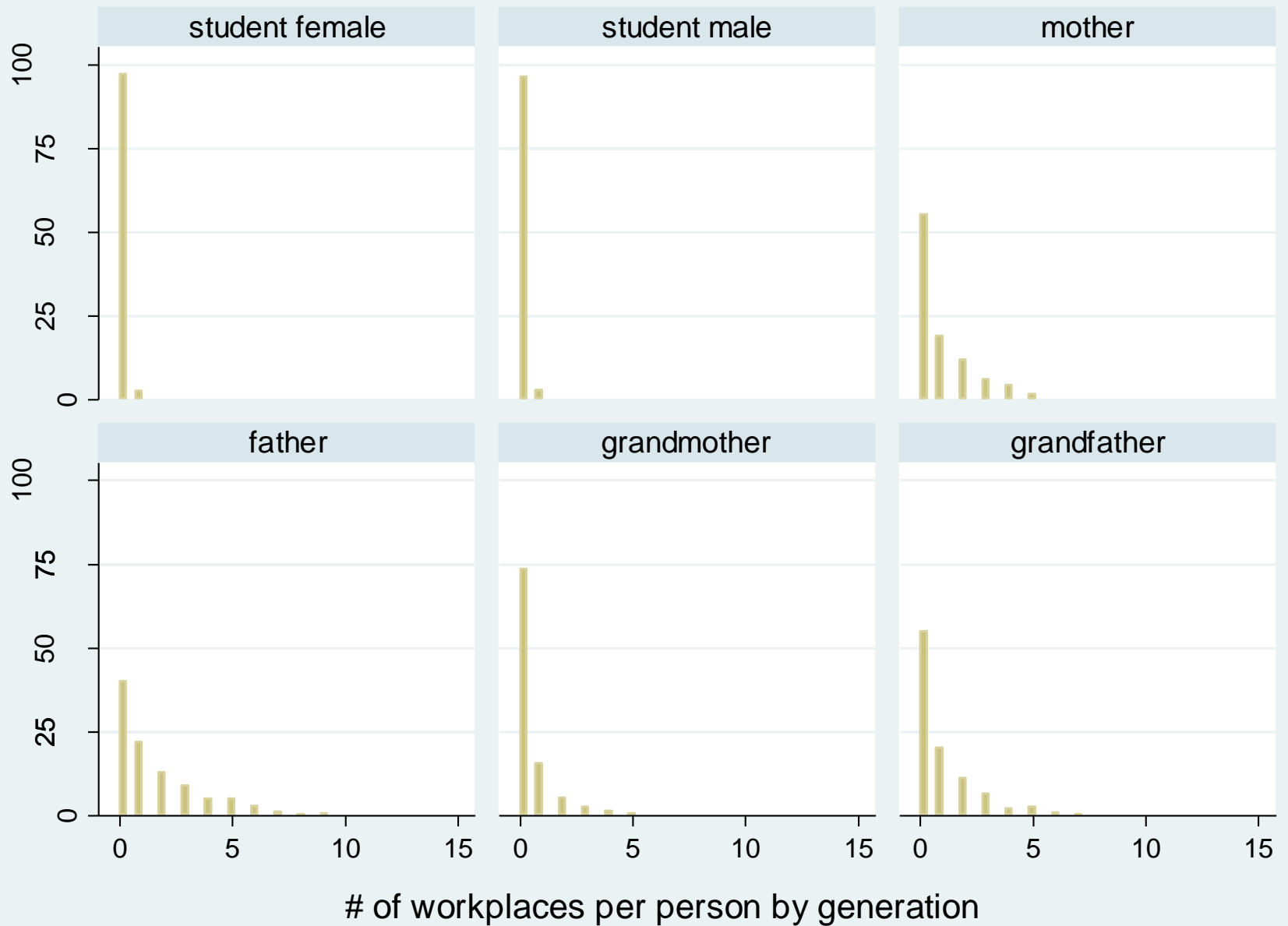
Descriptive
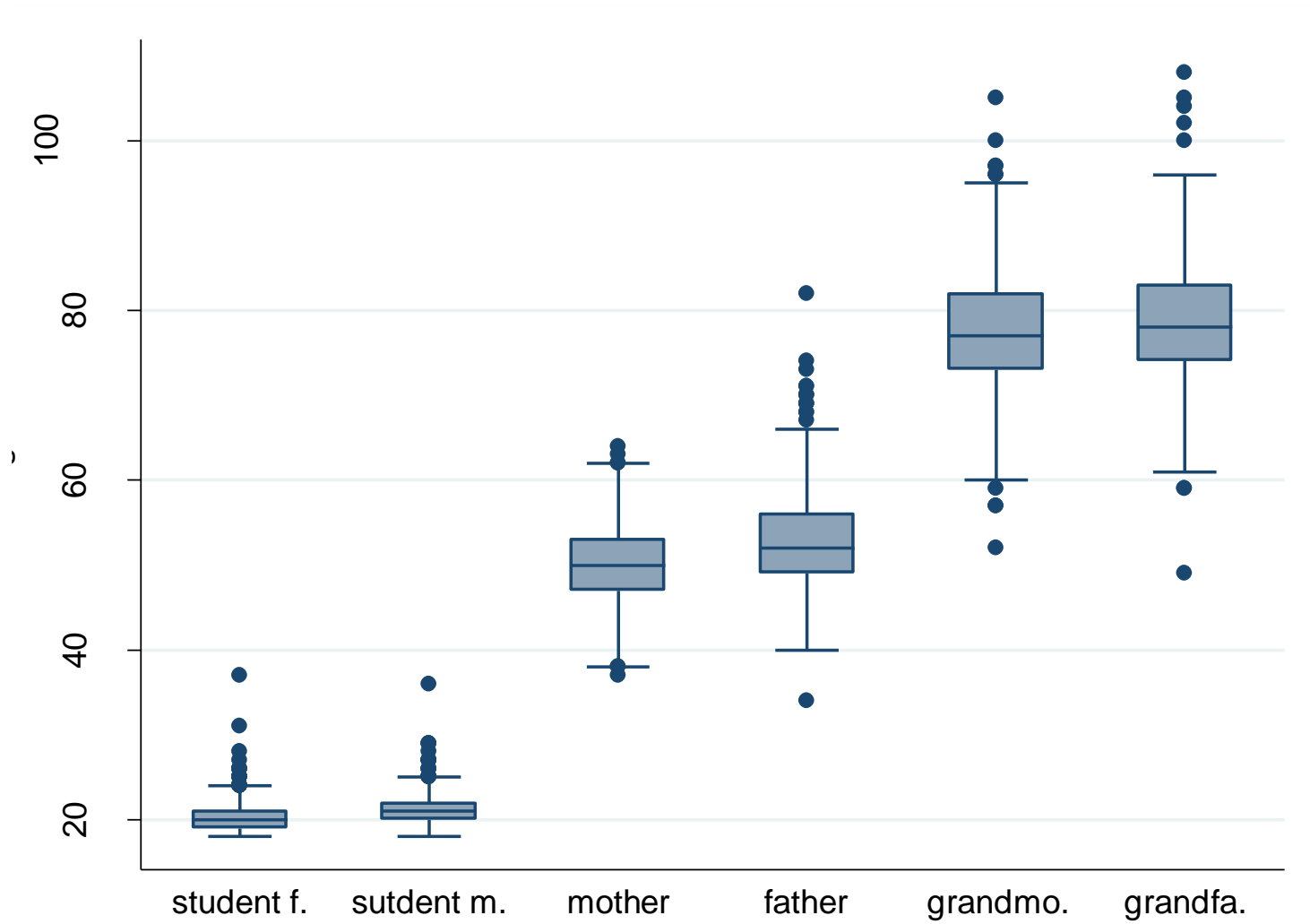
Descriptive

Attribute	Category	N	%	Attribute	Cat.	N	%
Gen-eration	Student female	493	12%	University	Yes	693	17%
	Student male	425	11%		No	3,225	81%
	Mother	919	23%	Gender	Fem.	2,217	56%
	Father	852	21%		Male	1,755	44%
	Grandmother	805	20%	Married	Yes	2,990	75%
	Grandfather	478	12%		No	966	24%
	Total	3,972	100%	Divorced	Yes	493	12%
Edu-cation	None	121	3%		No	3,455	87%
	GER Volksschule	790	20%	Drivers license	Yes	3,370	85%
	GER Hauptschule	364	9%		No	595	15%
	GER Realschule	678	17%	Car ownership	Yes	2,706	79%
	GER FH	334	8%		No	659	21%
	GER Abitur	1,669	42%	Annual/monthly PUT (>18)	Yes	1,997	50%
Appren-ticeship	Yes	2,334	59%		No	1,943	49%
	No	1,574	40%	Bahncard (>18)	Yes	654	16%
					No	3,298	83%

Descriptive

Descriptive

# of workplaces per person by generation

Modelling approach

- Recurrent Event Survival Analysis
  - events can occur more than once in a certain time interval at a certain time
  - censored by survey design
  - start time, stop time, status
  - $S(t) = \Pr(T > t)$

- Cox Proportional Hazard Model for counting process
  (Andersen et al.,1993)
  $\rightarrow$ influence of predictors on the survival/failure time
  $\rightarrow$ hazard ratio constant over time
  $\rightarrow$ robust variance estimates because correlation among
  recurrent events

$$h\,(t, \boldsymbol{X}) = h_0(t) e^{\sum_{i=1}^{p} \beta_i X_i}$$

Kaplan-Meier failure time plot 1st event
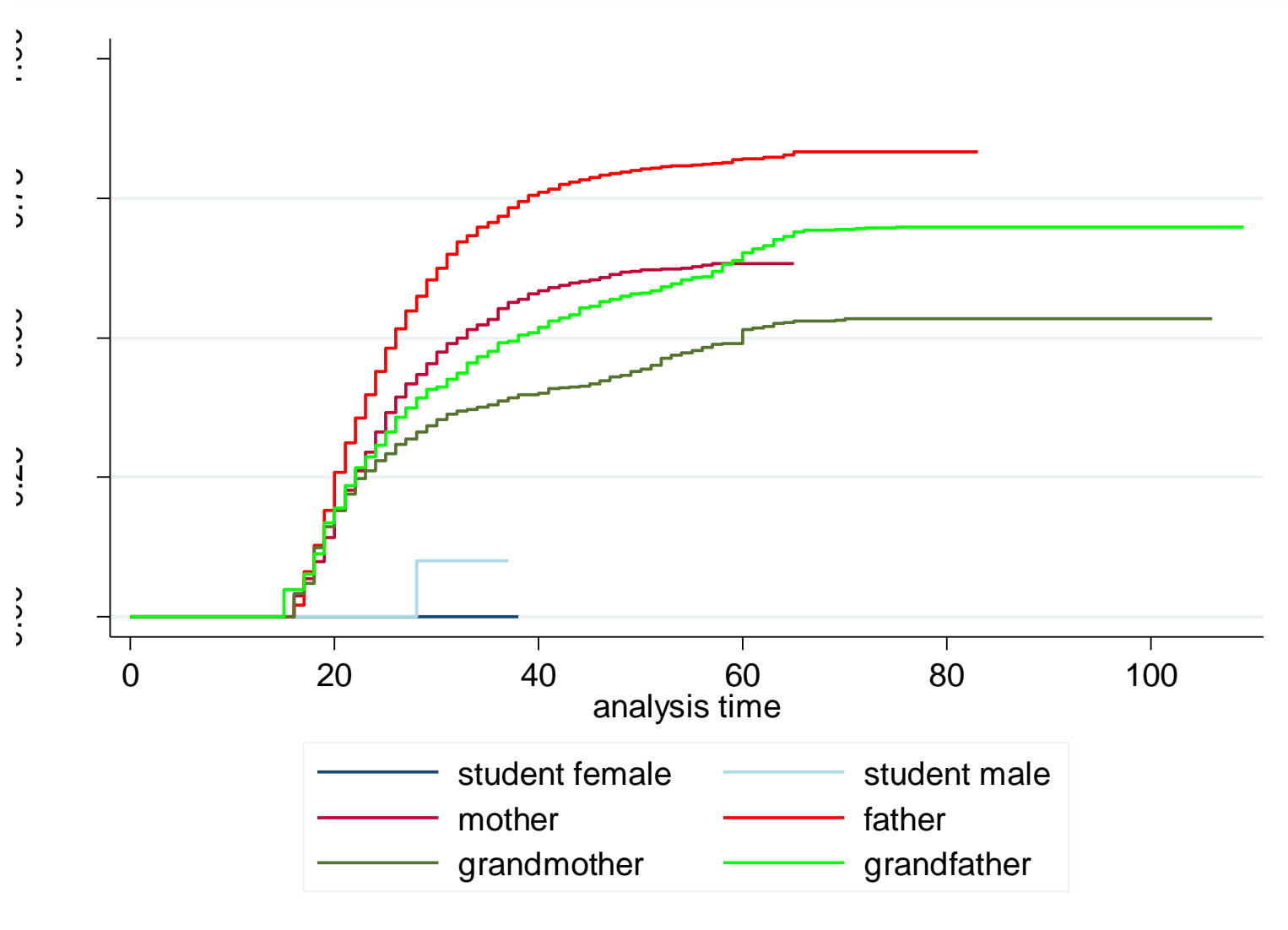
Estimation results Cox Regression

No. of observation	34973		Log pseudolikelihood	-14384.64			
No. of subjects	3232		Wald chi2(9)	301.38			
No. Of failures	1964		Prob > chi2	0			
Time at risk	94814						

_t		Coef.	Robust Std. Err.	z	P>|z|	95% Interval	
Age		-0.01	0	-2.21	0.03	-0.01	0
University degree							
	No	0 (base)					
	Yes	0.51	0.08	6.65	0	0.36	0.67
Apprenticeship							
No	No	0 (base)					
Yes	Yes	0.25	0.09	2.67	0.01	0.07	0.44
Married							
No	No	0 (base)					
Yes	Yes	2.1	0.41	5.1	0	1.29	2.91
Divorced							
No	No	0 (base)					
Yes	Yes	0.28	0.08	3.44	0	0.12	0.43
Car Ownership							
No	No	0 (base)					
Yes	Yes	0.4	0.18	2.23	0.03	0.05	0.75
Gender							
	female	0 (base)					
	male	0.48	0.07	6.89	0	0.35	0.62

Outlook – Modelling next steps

- Integrate time trajectory of mobility tools and distance

- Analyze interdependences and influences between cohorts (mobility socialization)

- Analyze interdependences between employment and residential biography

- Include Frankfurt and Zurich data

- Look for other suitable modelling approaches

Thank you very much! Questions?

Literature

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