Heterogeneous migration responses to individual life events and associated demographic change in Denmark

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Migration along Live Events

Introduction

- Analyse **interregional migration flows** in response to changes in regions' socio-economic conditions as central issue in academia and policy making
  - *Example:* Policy makers need precise estimates of role played by labor market signals driving migrations flows and thus demographic change when designing **labor market policies**
- Empirical literature mainly focusses on analysis of overall migration flows neglecting the potential heterogeneity in migration responses associated with **life events**
- We use (aggregated) **register data** counting all migratory moves of Danish residence to form distinct **event groups**

Migration along Live Events

Research Approach

- We create **non-overlapping** event groups at household level allow to identify/isolate output effects of **regional socio-economic context variables**…
- … on **interregional migration flows** across 98x4 Danish (sub-)municipalities (<NUTS-4) in period 2007-2012
- … based on **count data regression models** for Gravity-type models (linked to neoclassical migration theory)
- … test if and how regional factors influence migration choices heterogeneously across different life-events → **policy implications (scenario analysis)**

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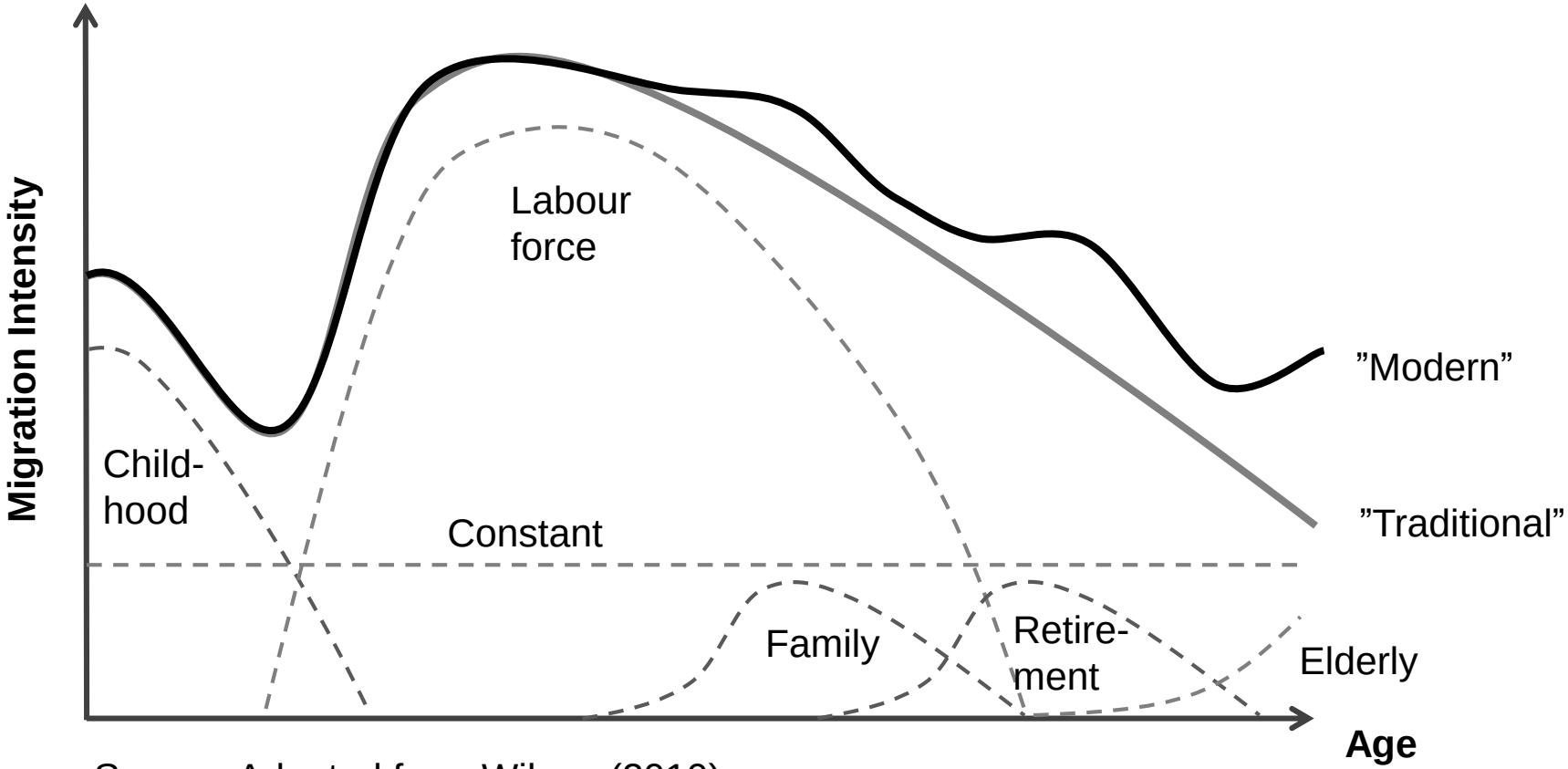
Related Literature

Figure 1: ”Traditional” & ”Modern” Age Profiles of Migration



Source: Adapted from Wilson (2010).

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Data

- Data covers **total Danish population** and thereby avoids any possible selection bias from sampling in a population
- Individuals are **grouped into households** → Create eight mutually exclusive event groups as

1. Starting education	5. Divorce
2. Graduation	6. Last children leaving home
3. Couple/marriage	7. Widowhood
4. Having children	8. Retirement from labor market
[No event]	[Multiple events]

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Data

Event Group	Persons	(% of total population)	Migrants	(% of total event group)
Starting education	210,348	4.1	141,625	67.3
Graduation	213,524	4.2	119,184	55.8
Couple/Marriage	234,152	4.6	89,473	38.2
Having children	177,572	3.5	132,690	74.7
Divorce	195,319	3.8	130,573	66.9
Last child leaving home	411,455	8.1	92,496	22.5
Widowhood	67,773	1.3	18,232	26.9
Retirement	161,763	3.2	22,217	13.7
Multiple events	413,127	8.1	279,924	67.8
No event	3,023,744	59.2	757,981	25.1
Total	5,108,777	100.0	1,784,395	34.9

Migration along Live Events

Data

- Individual data is **aggregated** to level of (sub-)municipalities
- Administrative level: Denmark has 98 municipalities (NUTS-4)
- Each municipality can be decomposed in sub-municipalities
  1. metropolitan area and cities with over 100,000 inhabitants
  2. cities with between 100,000 to 10,000 inhabitants
  3. cities with between 10,000 to 1,000 inhabitants
  4. rural areas with under 1,000 inhabitants
- Some sub-municipal areas do not exist in all municipalities, total dataset consists of 67,860 location pairs

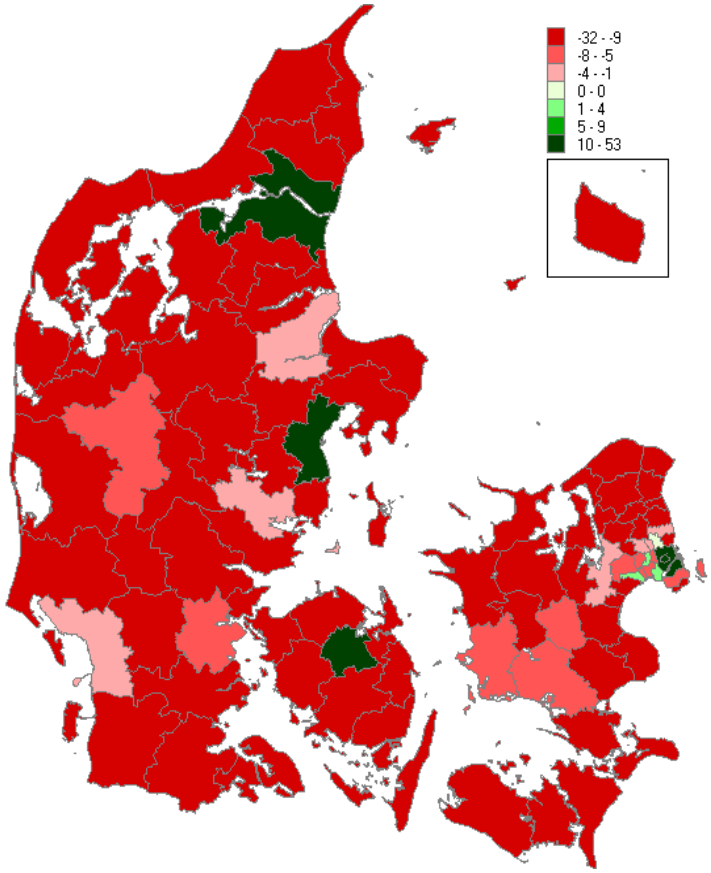
Move to estimation

Migration along Live Events

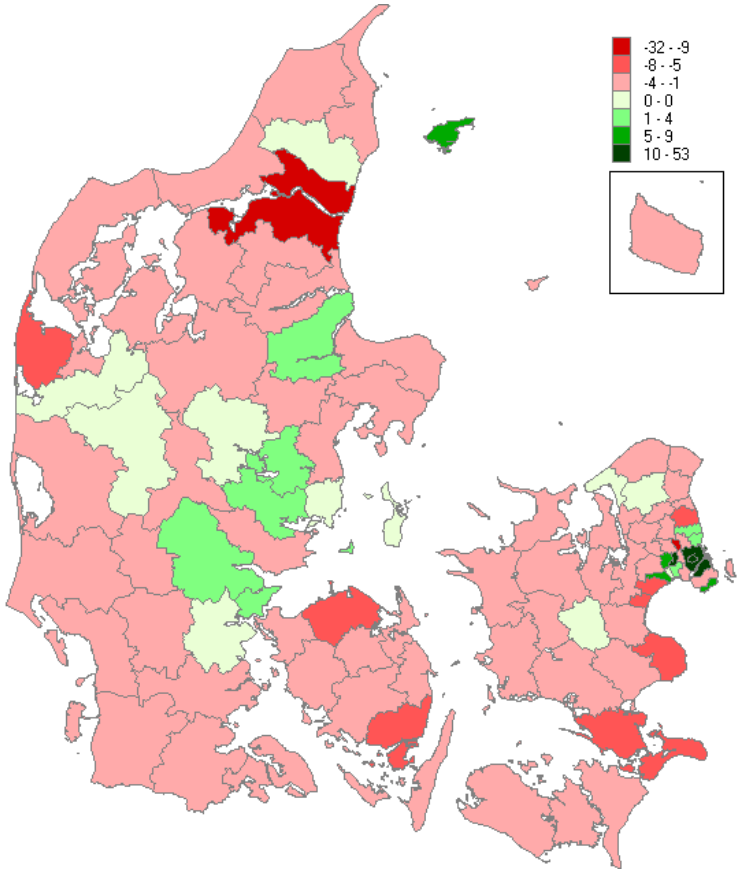
Data

Figure 1: Population development for event groups 2007-12 (per 1,000 pop.)

Starting education



Graduation

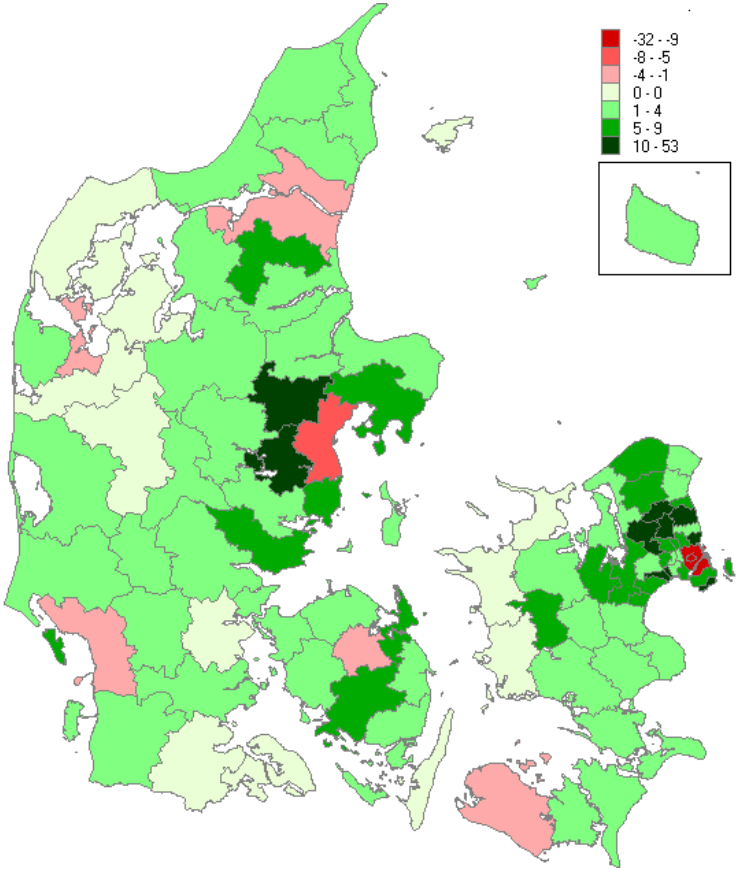


Migration along Live Events

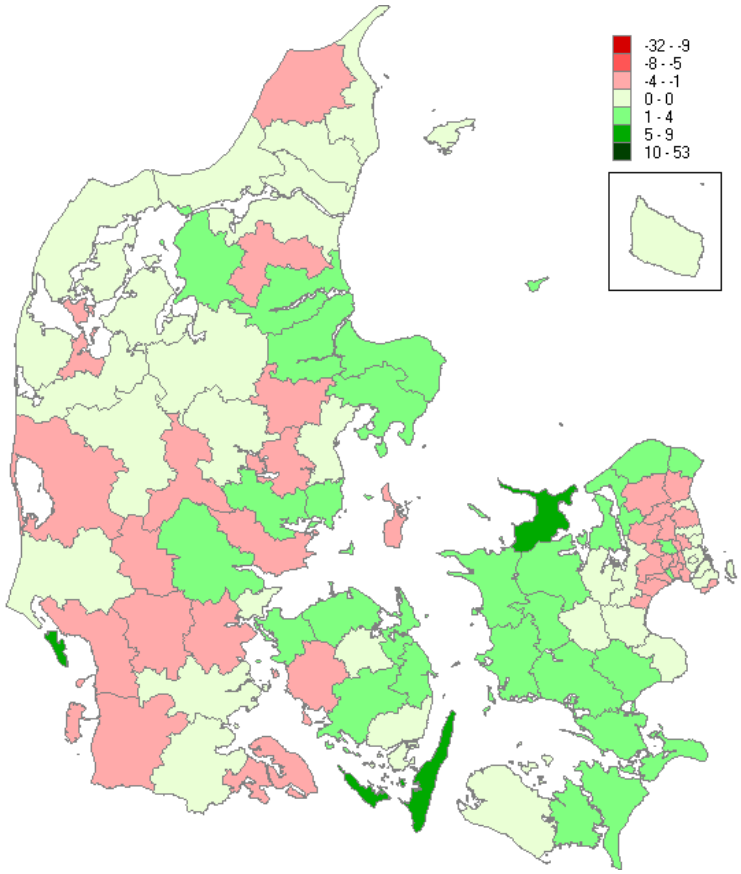
Data

Figure 1: Population development for event groups 2007-12 (per 1,000 pop.)

Having children



Retirement



Migration along Live Events

Estimation

- Gravity model for (zero-inflated) **count data estimators** as

$$migr_{s,ij,2007-12} = \exp[\beta_{0,s} + \beta_{1,s} \ln(\boldsymbol{A}_i) + \beta_{2,s} \ln(\boldsymbol{A}_j) - \beta_{3,s}(D_{ij}) + \varepsilon_{s,ij}]$$

  - $migr_{s,ij,2007-12}$ counts gross migration flows for life-event *s* from (sub-)municipality *i* to *j* in period 2007 to 2012
  - $\mathbf{A}_{i(j)}$ capture region-specific controls **in 2007** (≈30 factors: demography, socio-economic conditions, human capital and education etc.)
  - D_{ij} measures geographical distance between *i* and *j*

- **Binary choice part** (with π as probability that $migr$ has excessive zero entries)

$$\text{logit}(\pi_{s,ij,2007-12}) = \gamma_{0,s} + \gamma_{1,s} \ln(\boldsymbol{A}_i) + \cdots + u_{s,ij}$$

Migration along Live Events

Empirical Results

Gravity factors

Model	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)
Group	Total	Education	Graduation	Couple/ Marriage	Having children	Divorce	Last child leaving	Retirement
(log) Population Origin	1.069*** (0.00597)	1.133*** (0.0120)	1.251*** (0.0129)	1.003*** (0.00956)	1.156*** (0.0178)	0.931*** (0.0120)	0.885*** (0.0231)	0.898*** (0.0120)
(log) Population Destination	1.109*** (0.00596)	1.528*** (0.0127)	1.245*** (0.0131)	0.952*** (0.00971)	1.034*** (0.0176)	0.922*** (0.0116)	0.820*** (0.0228)	0.866*** (0.0118)
(log) Distance	-1.409*** (0.00638)	-1.275*** (0.0115)	-1.414*** (0.0122)	-1.477*** (0.00956)	-1.581*** (0.0173)	-1.535*** (0.0119)	-1.613*** (0.0238)	-1.314*** (0.0121)
Poisson vs. NB	6.7e+05***	6.3e+04***	5.1e+04***	2.9e+04***	3.3e+04***	4.1e+04***	6493.69***	3.1e+04***
ZINB vs. NB	9.59***	7.50***	9.29***	9.23***	34.64***	11.56***	21.77***	12.49***

- Lowest distance ”sensitivity” for migrants starting education or retiring from labor market (long-distance migration)

Migration along Live Events

Empirical Results

Gravity factors

***P*-values log(Distance)**	Total	Education	Graduation	Couple/ Marriage	Having children	Divorce	Last child leaving	Retirement
Total	—							
Education	<0.01	—						
Graduation	<0.01	<0.01	—					
Couple/Marriage	0.79	<0.01	<0.01	—				
Having children	<0.01	<0.01	<0.01	<0.01	—			
Divorce	0.19	<0.01	<0.01	0.20	<0.01	—		
Last child leaving	<0.01	<0.01	<0.01	<0.01	0.48	<0.01	—	
Retirement	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	—

- Wald-type $\chi^2(1)$ tests on equal coefficients across groups as, for instance: H_0: $\beta_{1,Total} = \beta_{1,Eductation}$

Migration along Live Events

Empirical Results

Regional economic conditions

Model	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)
Group	Total	Education	Graduation	Couple/ Marriage	Having children	Divorce	Last child leaving	Retirement
(log) Disposible Income Diff.	0.129***	0.0568	0.369***	-0.0373	-0.101	0.00473	0.176	0.0391
	(0.0519)	(0.0951)	(0.103)	(0.0791)	(0.142)	(0.0997)	(0.195)	(0.101)
(log) Unemploy-ment Rate Diff.	-0.0148	0.0815***	-0.0705***	-0.00740	-0.133***	0.00114	0.181***	0.105***
	(0.0149)	(0.0286)	(0.0312)	(0.0248)	(0.0450)	(0.0311)	(0.0652)	(0.0308)

- In line with neoclassical migration theory, graduate migration is sign. correlated with income levels (+) unemployment (–)
- Mixed pattern for role of unemployment rate differences (pos. correlation for edu: metropolitan areas; retirement: islands)

Migration along Live Events

Empirical Results

Housing market

Model	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)
Group	Total	Education	Graduation	Couple/ Marriage	Having children	Divorce	Last child leaving	Retirement
(log) house price p. square meter	0.119*** (0.0278)	0.571*** (0.0540)	0.513*** (0.0591)	0.0807* (0.0467)	-0.240*** (0.0849)	0.150*** (0.0583)	0.00816 (0.125)	-0.102* (0.0570)
(log) share of rental housing	-0.0664*** (0.00955)	0.0548*** (0.0177)	-0.0429*** (0.0190)	-0.0560*** (0.0145)	-0.107*** (0.0264)	0.0181 (0.0183)	-0.144*** (0.0357)	-0.0984*** (0.0186)
(log) share of summer cottages	0.00151 (0.00265)	0.0128*** (0.00482)	-0.0116*** (0.00517)	-0.0170*** (0.00400)	-0.0241*** (0.00722)	0.0118*** (0.00505)	0.0425*** (0.0101)	0.0244*** (0.00512)

- Migrants having children as event choose destination regions with rel. low average house price in residential neighborhood
- Senior migration directed by geographical amenities (tourism)

Migration along Live Events

Empirical Results

Human capital and education

Model	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)
Group	Total	Education	Graduation	Couple/ Marriage	Having children	Divorce	Last child leaving	Retirement
(log) (post-) secondary edu	-0.172*** (0.0452)	-1.124*** (0.0903)	-0.371*** (0.0966)	0.645*** (0.0743)	1.073*** (0.135)	-0.364*** (0.0923)	-0.278 (0.185)	-0.111 (0.0912)
(log) tertiary education	0.0765*** (0.0291)	0.599*** (0.0586)	0.172*** (0.0637)	-0.132*** (0.0490)	0.190*** (0.0896)	0.129*** (0.0602)	0.0247 (0.122)	-0.0468 (0.0596)
(log) students in vocational edu	0.115*** (0.0306)	0.815*** (0.0595)	0.313*** (0.0649)	-0.160*** (0.0511)	-0.200*** (0.0931)	0.120* (0.0641)	0.158 (0.131)	0.0686 (0.0628)
(log) students in university edu	0.0336*** (0.0108)	0.214*** (0.0200)	-0.149*** (0.0217)	0.0151 (0.0173)	-0.0541* (0.0307)	-0.0642*** (0.0217)	-0.0402 (0.0447)	0.0207 (0.0217)

- Stock-flow relations matter, e.g. migrants starting education

Migration along Live Events

Scenario Analysis

- Results show that **regional context variables** drive inter-regional migration flows (heterogeneously) across age groups
- "No causal effects" - but can be used for event-group specific scenario analysis (e.g. relocation of student education)

	Copenhagen	Nordsjælland	Østsjælland	Vestsjælland	Nordjylland
Starting Education	-322	73	17	15	48
Graduation	132	-37	-7	-5	-15
…					
Total	-204	19	9	8	41

Note: Scenario relocates 1,000 students from DTU in Kongens Lyngby municipality to AAU in Aalborg municipality; Table shows (net) migration across event groups using SAM-K/LINE®.

- *Next steps:* Forecast (error) comparison between total, age group- and event group-specific migration model estimates (?)