

# The Geography of Life: Evidence from Copenhagen

Gabriel M. Ahlfeldt<sup>1</sup>   Ismir Mulalic<sup>2</sup>   Caterina Soto Vieira<sup>3</sup>   Daniel M. Sturm<sup>3</sup>

<sup>1</sup>Humboldt University Berlin

<sup>2</sup>Copenhagen Business School

<sup>3</sup>London School of Economics

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# Motivation

- As we progress in life, we age and family circumstances change
  - Large literatures in economics on age, life events, and economic decisions
  - Franco Modigliani's pioneering work age, consumption, and savings.
  - Gary Becker's work on marriage, children and labour supply
- Circumstances of life seem like an important determinant of location choice
  - Vibrant neighbourhoods where the young and cool live
  - Scenic neighbourhoods where posh seniors live
  - Peaceful neighbourhoods where parents with young children live
- We know little about how age and life events shape location choices
  - Literature on spatial sorting focuses on income
  - We are also interested in age and family circumstances
  - Important policy implications given ongoing demographic change

## This Paper

- We use new employer-employee-property-family panel data for Copenhagen from 1986 to 2019 to document spatial sorting and look at its causes
- We document a substantial life cycle in location choices within cities
- We use the panel dimension to disentangle the effects of age and life event from correlated unobservables
- We then develop a quantitative spatial model to examine mechanisms that can explain the striking sorting in the city.
- Finally, we use model counterfactuals to explore how demographic trends such as population aging and fertility changes will shape the geography of cities.

## Preview of Results

- Mobility: We document mobility across residences and workplaces within cities that is nearly an order of magnitude larger than mobility across cities.
- Life cycle: We estimate a substantial life cycle in location choices within cities using individual fixed effects, ruling out cohort effects as confounders.
- Life Events: We show that observable life events contribute a substantial part to the overall life cycle in location choices.
- Mechanisms: We use a QSM to examine the mechanisms behind the location choices over the life cycle and find a key role for urban amenities.
- Demographic Change: Model counterfactuals show that different demographic changes (aging, lower fertility, single households) can have large effects but may partially neutralize each other.

## Related Literature

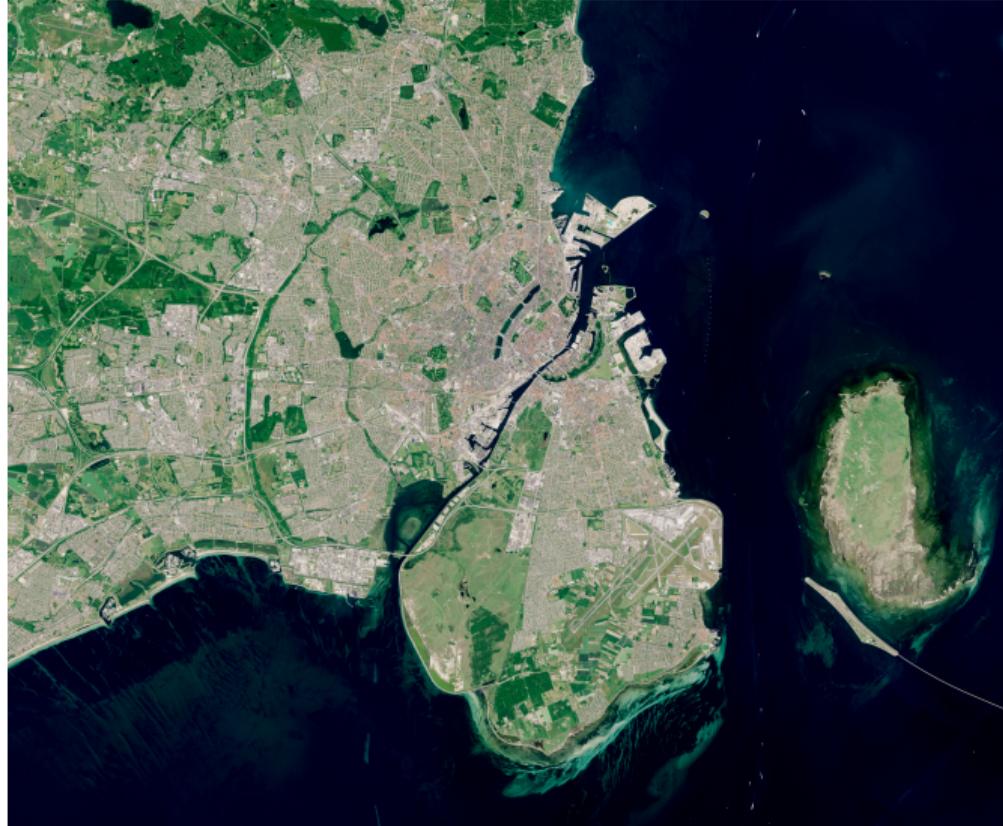
- **Effect of age on wages, income and savings:** Modigliani (1966), Mincer (1974), Meghir and Pistaferri (2011)
- **Effect of marriage and children on labor supply and consumption:** Becker (1973, 1974), Eckstein and Wolpin (1989), Blundell et al. (1994), Van Der Klaauw (1996), Adda et al. (2017), Kleven et al. (2018)
- **Quantitative urban models:** Ahlfeldt et al. (2015), Allen et al. (2015), Monte et al. (2018), Hebligh et al. (2020), Tsivanidis (2023), Miyauchi et al. (2022)
- **Retirement, Fertility and Location Choices:** Komissarova (2022), Moreno-Maldonado and Santamaría (2024), Coeurdacier et al. (2023), Albuoy and Faberman (2025), Badilla Maroto et al. (2024)

# Overview of the Presentation

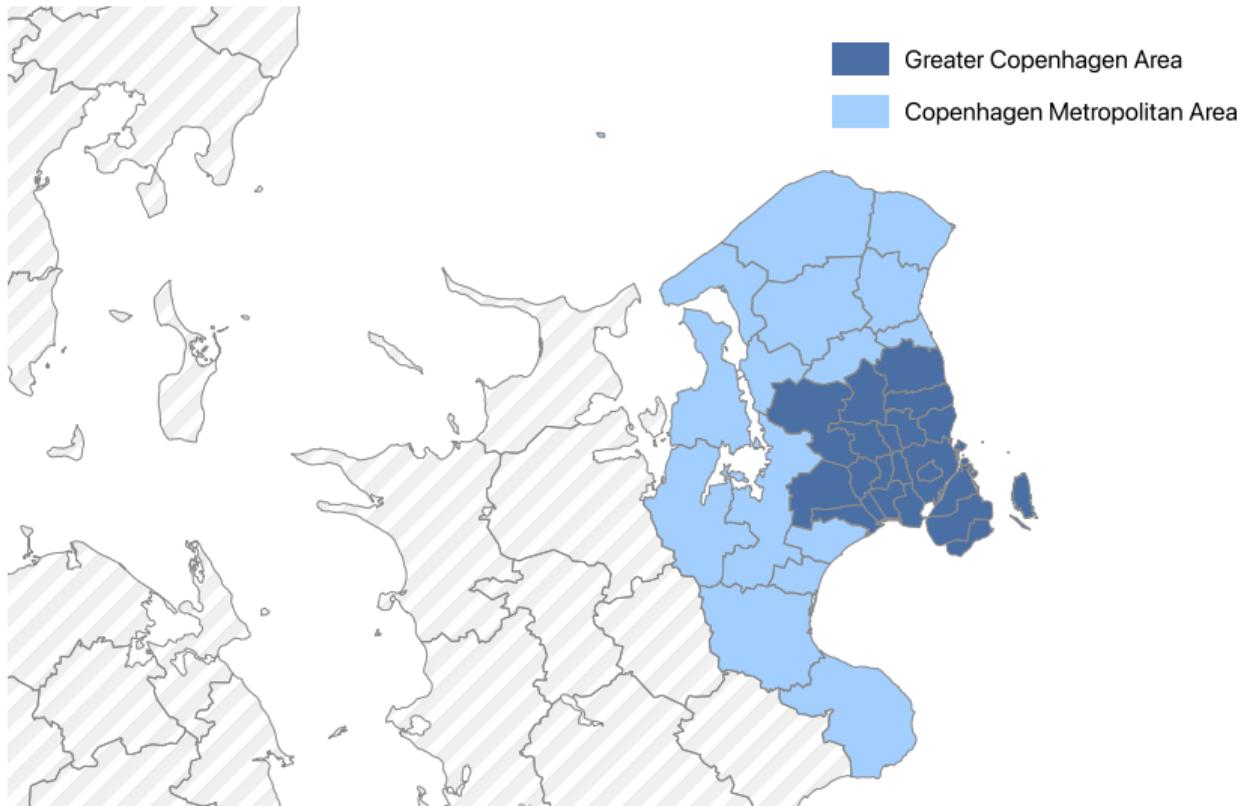
- Empirical Setting and Data
- Stylized Facts
- Theoretical Model
- Quantification
- Counterfactuals
- Conclusion

## Empirical Setting

# A View from Space



# Copenhagen Metro Area (CMA)



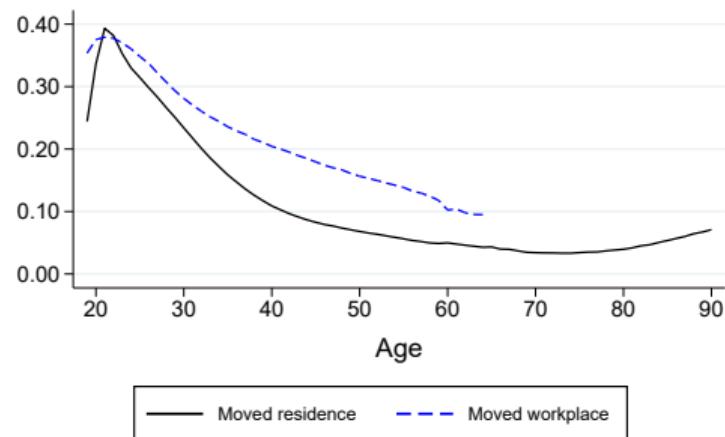
## Data

- We use an employer-employee-property-family panel of both workers and the non-working population in the Copenhagen Metro Area from 1986 to 2019.
- For each person we observe in each year the following information:
  - Residence and workplace (if working) location in 100 x 100m grid cells.
  - Wage and non-wage income, education, and sector of employment (if working).
  - Size and type of residence including estimates of the square meter price.
  - Family status, including number and age of children and marital status.
- We have the same data also for other parts of Denmark and see when people move away from or into Copenhagen.
- We combine this data with detailed information on the geography of Copenhagen including travel times by several different modes.

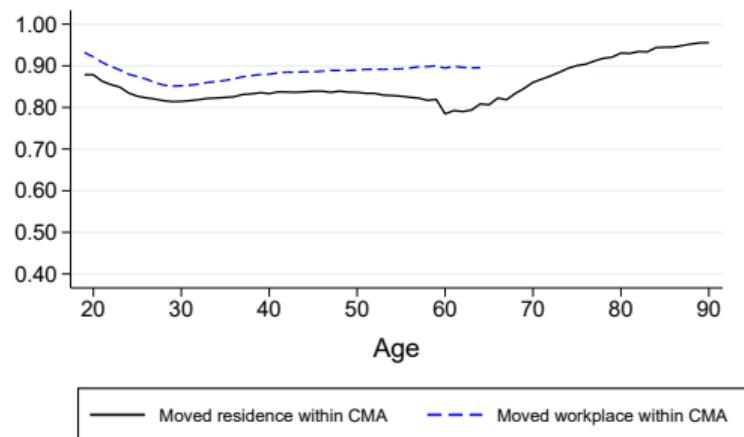
## Stylized Facts: Mobility

# Mobility Over the Life Cycle

(a) Probability of moving residence or workplace

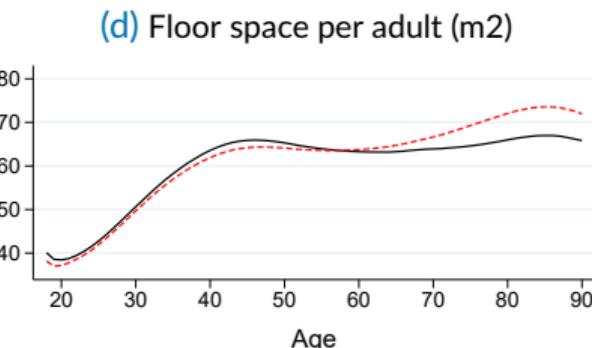
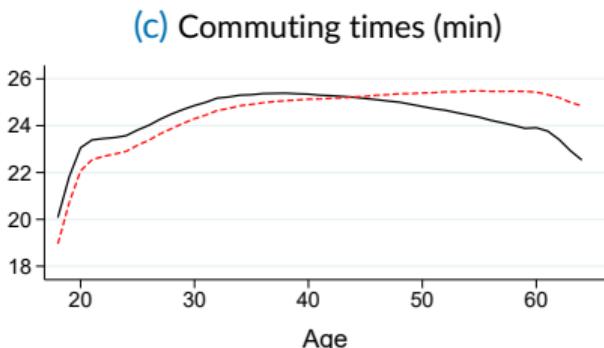
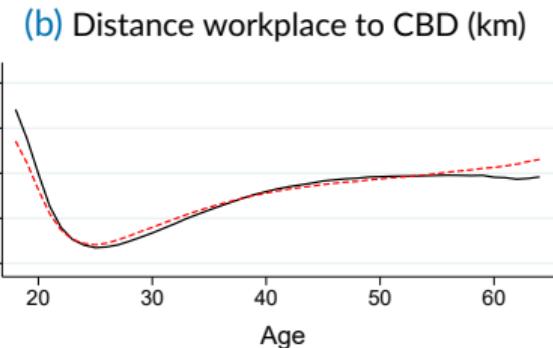
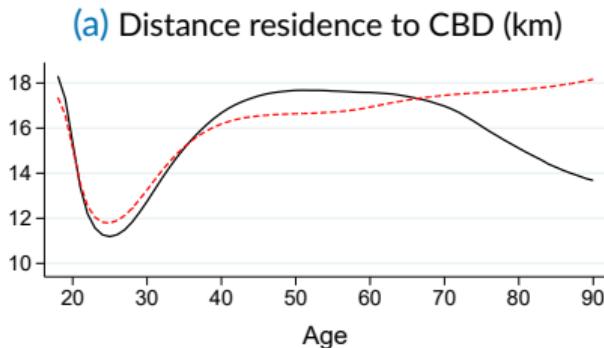


(b) Conditional probability of moving within CMA



## Stylized Facts: Age

# The Life Cycle in the City



— Unconditional mean    - - - Conditional on individual FE

► Gender Gaps

► Smaller Definition of Copenhagen

► Back to Decomposition

## Stylized Facts: Life Events

## Life Events

- An obvious question is whether observable life events can explain the pronounced life cycle in location choices.
- To explore this question, we estimate event-study regressions for a large number of life events that we observe in our data.
- We consider the following life events: cohabitation, children, separation, empty nesting, retirement, and death of the spouse (which can all repeat).
- The regressions include 11 life events that happen to at least 2.5% of the people in our data.
- We run separate regressions for early and late life events (median age of event occurrence below or above 40).  
[▶ Early Life Table](#)   [▶ Late Life Table](#)
- The timing and sequence of life events varies substantially.  
[▶ Graph Early](#)   [▶ Graph Late](#)

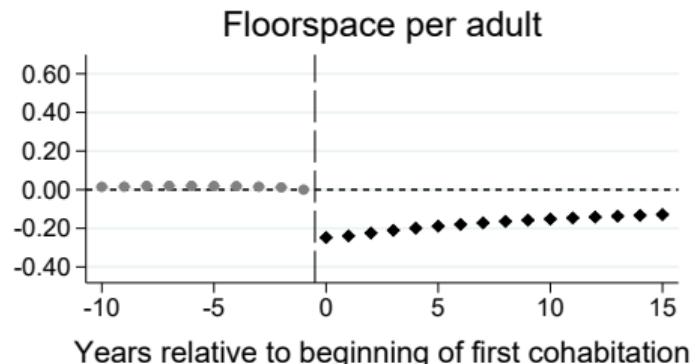
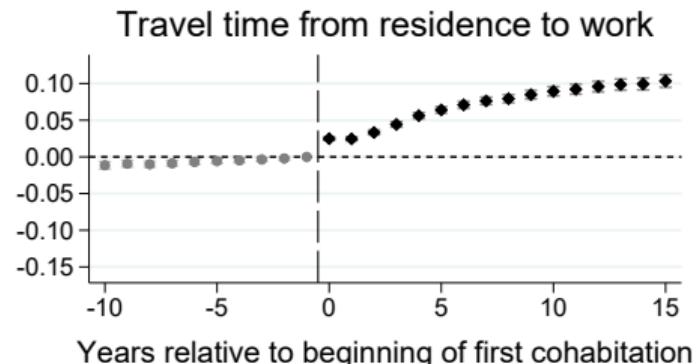
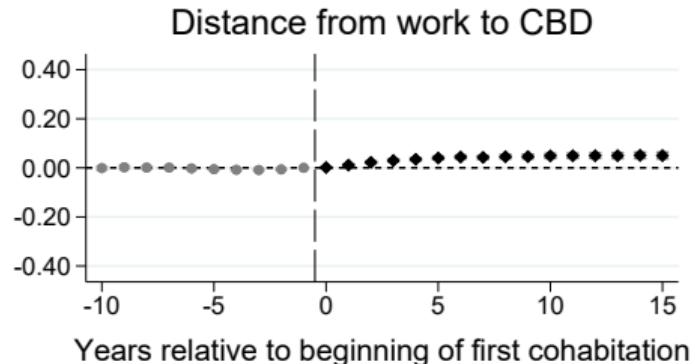
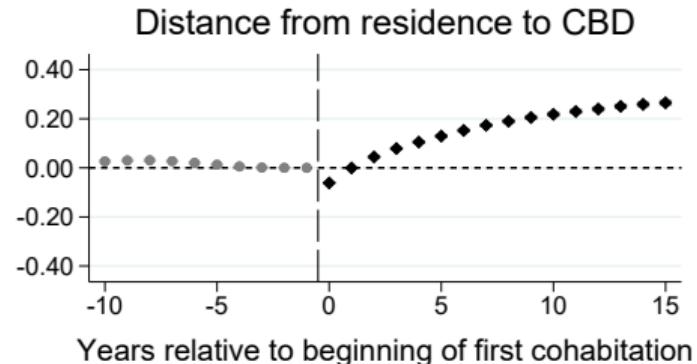
## Regression Specification

- We estimate the following event-study regressions for outcome  $y_{it}$  of person  $i$  in year  $t$  using a variant of the imputation method (Borusyak et al. 2024):

$$\ln(y_{it}) = \hat{\theta}_i + \hat{\eta}_a + \sum_{e \in \mathbb{E}} \sum_{\substack{h=-m \\ h \neq -1}}^n \beta_h^e \mathbb{1}[K_{it}^e = h] + \varepsilon_{i,t}$$

- $\hat{\theta}_i$  and  $\hat{\eta}_a$  are imputed individual and age fixed effects.
- $K_{it}^e = t - E_i^e$  is the difference between the current year ( $t$ ) and the year in which individual  $i$  experiences event  $e$  ( $E_i^e$ ), and  $\mathbb{1}[K_{it}^e = h]$  is a dummy for difference  $h$ .
- $\beta_h^e$ : are the treatment effects of either the early or late life events.
- The regressions contain all leads and lags but the graphs show -10 to +15.
- Leads and lags are jointly estimated to avoid artificial jumps under pre-trends
- Standard errors are clustered on each person

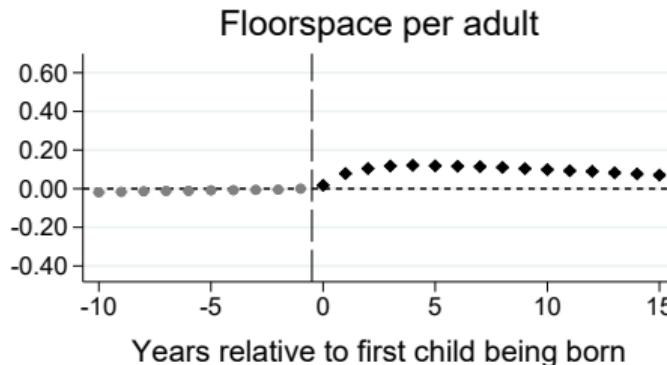
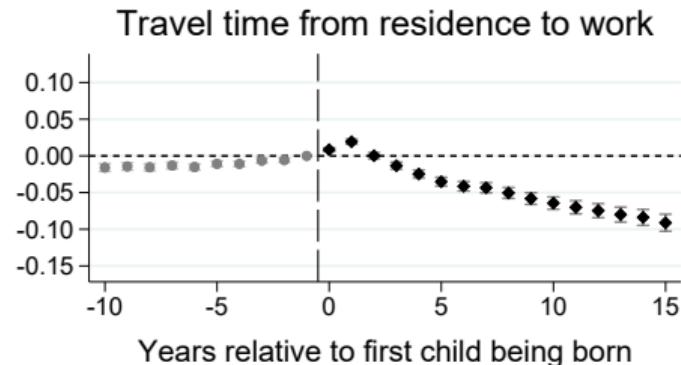
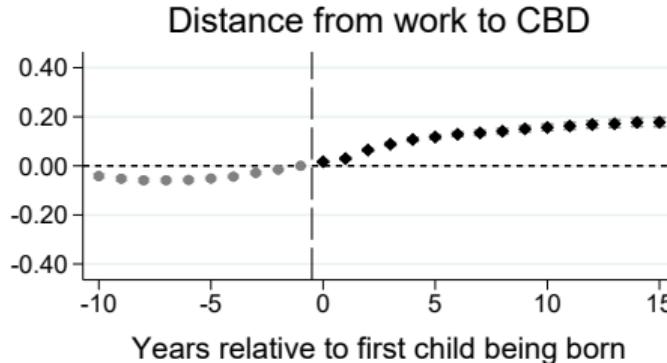
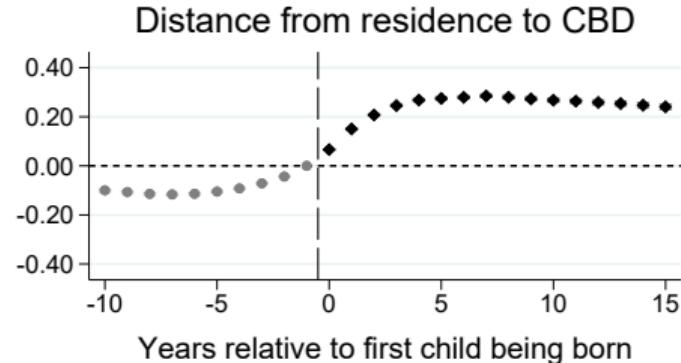
# First Cohabitation



▶ By Gender

▶ OLS Robustness

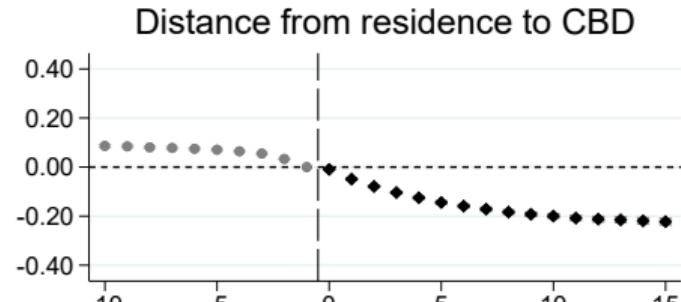
# First Child



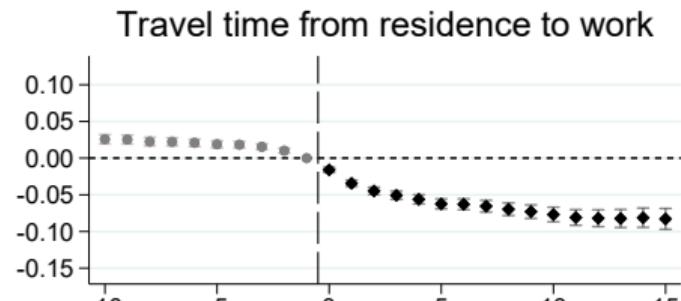
► By Gender

► Second Child

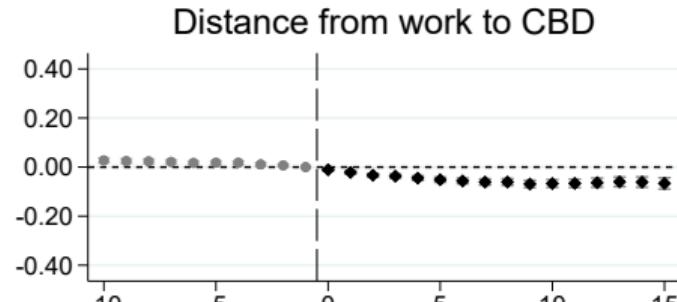
# First Separation



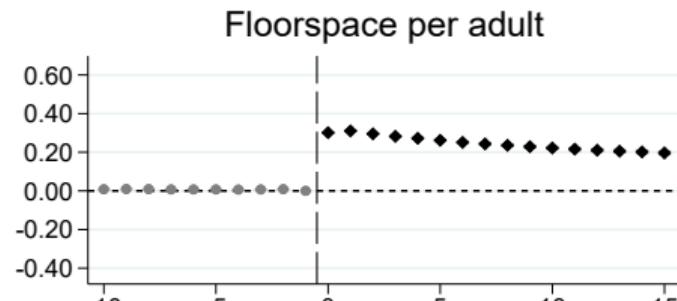
Years relative to the end of first cohabitation



Years relative to the end of first cohabitation

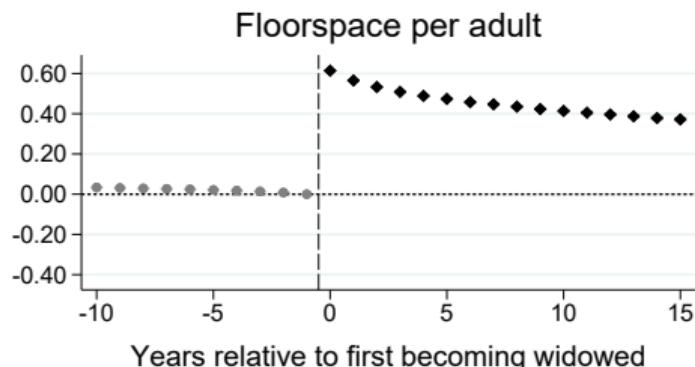
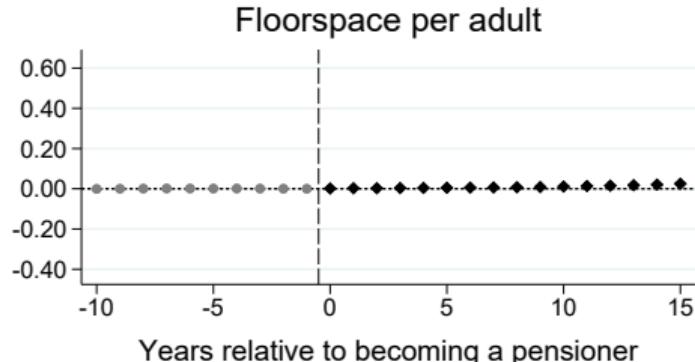
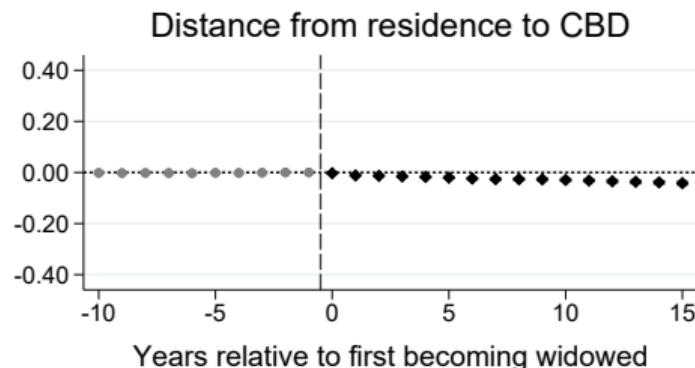
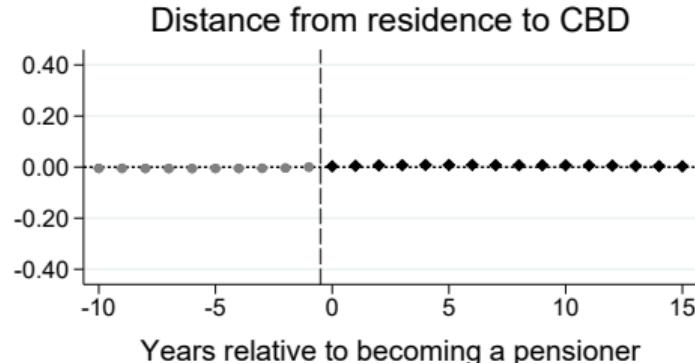


Years relative to the end of first cohabitation



Years relative to the end of first cohabitation

# Retirement and Death of Spouse



## Life Events versus Aging

## Decomposing the Life Cycle

- How much of life cycle in location choices can be explained by observable life events and how much is just explained by people getting older?
- The life cycle outcome at age  $s$  (conditional on person fixed effects) is:

$$\bar{y}_s = \mathbb{E}(y_{it} - \alpha_i \mid \text{Age}_{it} = s)$$

- We use our event study estimates to predict the treatment effects of all leads and lags of life events that person  $i$  experiences:

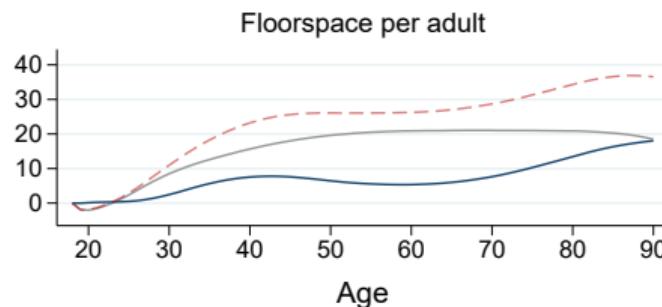
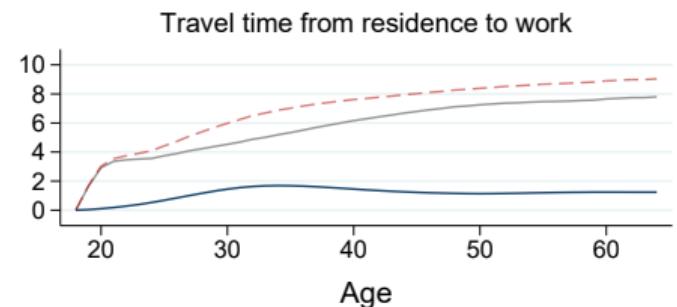
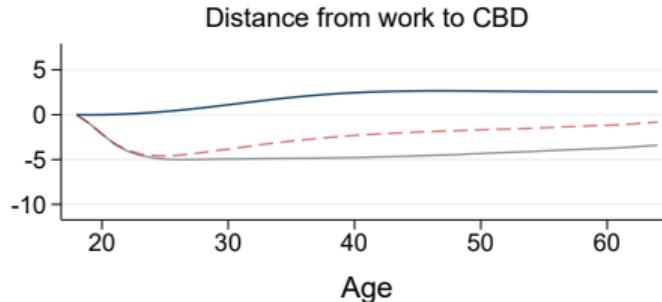
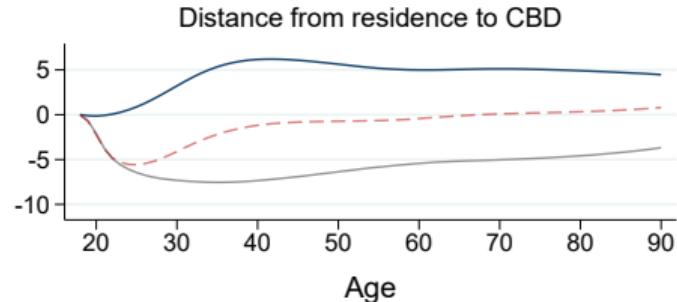
$$\hat{\mathcal{L}}_{it} = \sum_e \sum_{h=-a}^b \hat{\beta}_h^e \mathbb{1}[K_{it}^e = h]$$

- We average the treatment effect of life events for each age bin

$$\bar{\mathcal{L}}_s = \mathbb{E}(\hat{\mathcal{L}}_{it} \mid \text{Age}_{it} = s)$$

- Compute effect of aging ( $\bar{A}_s$ ) as:  $\bar{A}_s = \bar{y}_s - \bar{\mathcal{L}}_s$  (normalized to 0 at age 18)

# Life Events versus Aging



— Aging — Life Events - - - Lifecycle

Life events suburbanize households during the first half of adult life

## Key Take Aways from Reduced Form Evidence

1. There is substantial within city mobility and distance of residence and workplace to the center follow a U-shaped pattern.
2. Most life events lead to a decentralization of residence and workplace location, but separation reverses the (spatial) effects of cohabitation.
3. Residential floor space consumption is affected by children, but cohabitation has an even larger effect than the first child.
4. There is no evidence of “downsizing” residential space consumption at older ages and empty nesting and retirement have little effect on location choices.
5. Both life events and aging are quantitatively important in explaining location choices over the life cycle.

## Theoretical Framework

# Model Overview

- We develop a quantitative urban model in the tradition of Ahlfeldt et al. (2015) which differs from the existing literature in three main ways:
  - Several different worker types (“occupations”): low/high skilled and young/old.
  - Workers can have different family types (married, children etc.), which affect commuting costs, housing expenditure and preferences over amenities.
  - Non-working population: pensioners and students.
- We use the model for two purposes:
  - We use the model to shed light on the mechanisms that drive the strikingly different location choices at different ages.
  - We use model counterfactuals to examine the effect of demographic changes, such population aging or lower birth rates, on the geography of cities.

## Preferences and Production

- Indirect utility of worker  $\omega$  living in location  $n$ , working in location  $i$ , of occupation  $o$  and family type  $f$  is:

$$U_{ni}^{of}(\omega) = \frac{B_{ni}^{of} w_i^o z_{ni}^{of}(\omega)}{\kappa_{ni}^{of}(P_n)^{\alpha^{of}}(Q_n)^{1-\alpha^{of}}} \quad 0 < \alpha^{of} < 1. \quad (1)$$

- Output ( $Y_i$ ) in  $i$  is produced using all types of labor ( $L_{Fi}^o$ ) and floor space ( $H_{Fi}$ ):

$$Y_i = A_i \prod_{o \in \mathbb{O}} \left( \frac{L_{Fi}^o}{\beta_i^o} \right)^{\beta_i^o} \left( \frac{H_{Fi}}{\beta^H} \right)^{\beta^H}, \quad 0 < \beta_i^o, \beta^H < 1, \quad \sum_{o \in \mathbb{O}} \beta_i^o + \beta^H = 1, \quad (2)$$

Group-specific amenity shifter  $B_i^{of} = B_{ni}^{of} / B_n^{of}$  shifts utility akin to TFP  $A_i$

# Quantification

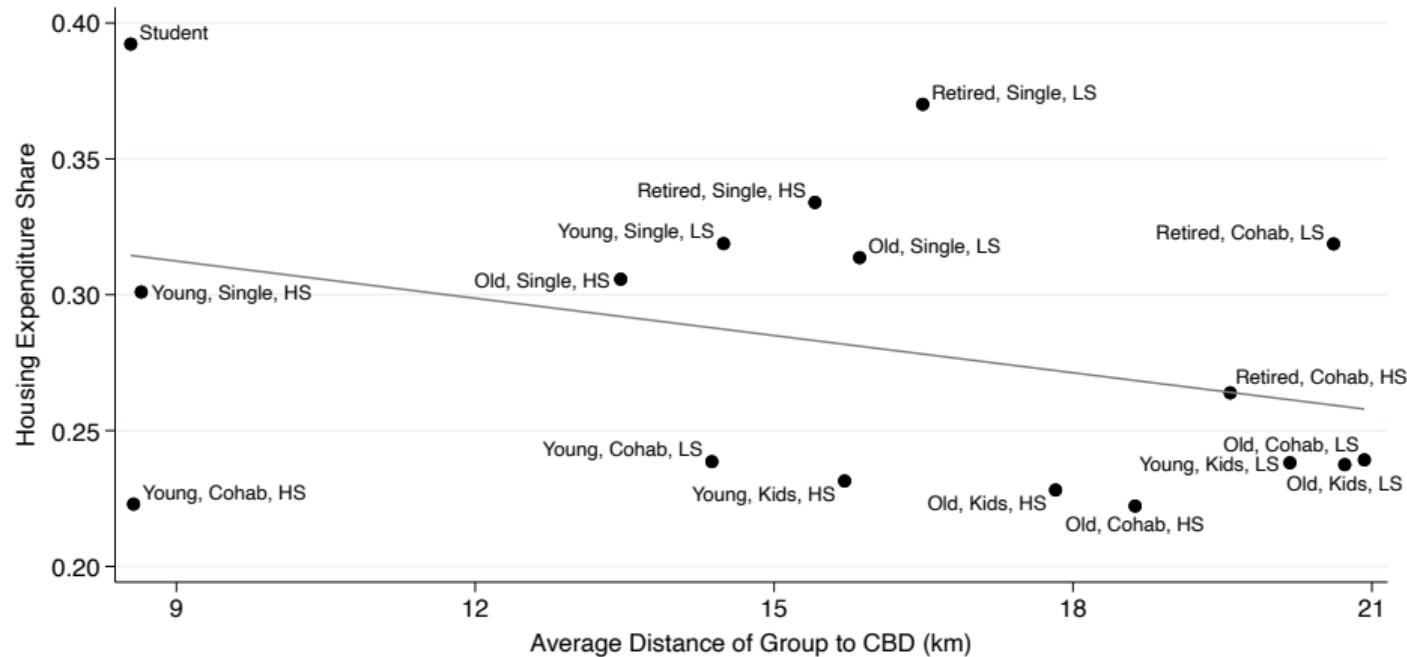
## Overview Estimation of Key Model Parameters

- Housing expenditure shares ( $\alpha^{of}$  and  $\alpha^r$ ):
  - are estimated using observed income and rents imputed from house prices
- Gravity commuting:
  - uses data on commuting flows across parishes for each type of worker
  - makes use of weighted average travel times across different modes
  - uses PPML with straight-line distance as an instrument for travel times
- Fréchet shape parameters ( $\epsilon^{of}$  and  $\epsilon^r$ ):
  - for workers are estimated using the variance of observed wages across parishes as the empirical moment
  - for the non-working  $\epsilon^r$  is set to the value of the closest worker group
- Production function parameters ( $\beta_i^o$  and  $\beta^H$ ):
  - for labor ( $\beta_i^o$ ) are calibrated to match (model) wage bill shares in each location
  - for the share of floor space in costs ( $\beta^H$ ) is set to 0.15

## What Explains the Striking Sorting?

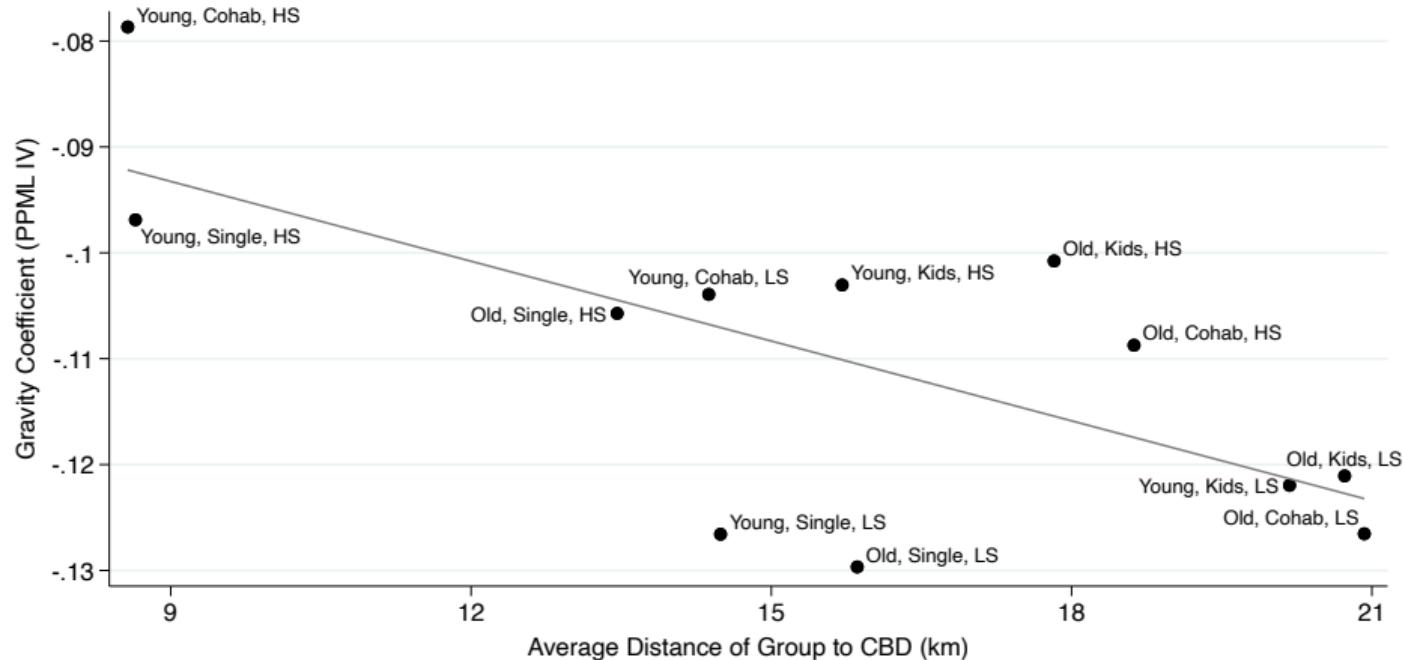
- In the model a number of mechanisms can explain the striking sorting of different groups in the city including:
  - Groups with high housing expenditure shares should (all else equal) prefer locations with lower house prices
  - Groups with higher commuting costs should favour central locations with better commuter market access.
  - Different groups attach different amenity values to a location
- To disentangle these mechanisms, we
  - inspect how groups' primitives relate to residential choices
  - 'flatten' model primitives across groups and solve for the counterfactual

# Role of Housing Expenditure Shares



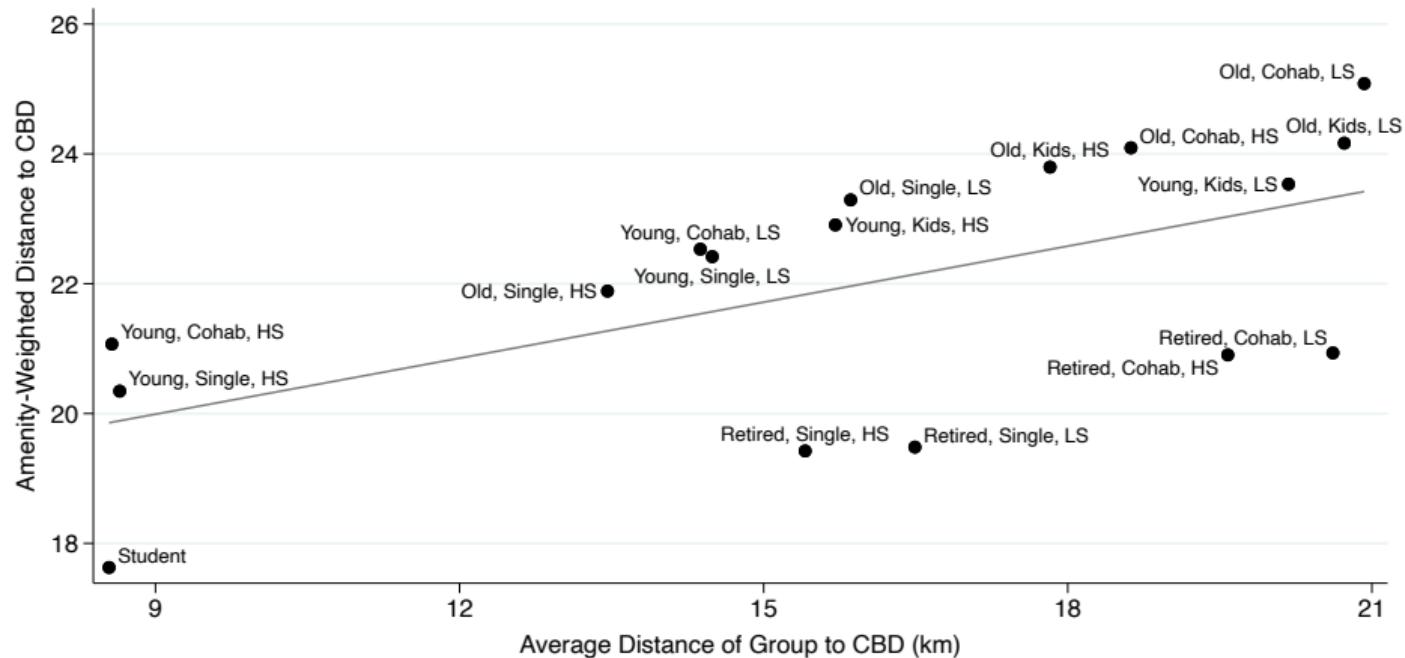
Groups with the greatest housing demand do not live in the suburbs!

# Role of Commuting Costs



Groups with the lowest commuting aversion do not live in the suburbs!

# Role of Amenity Differences



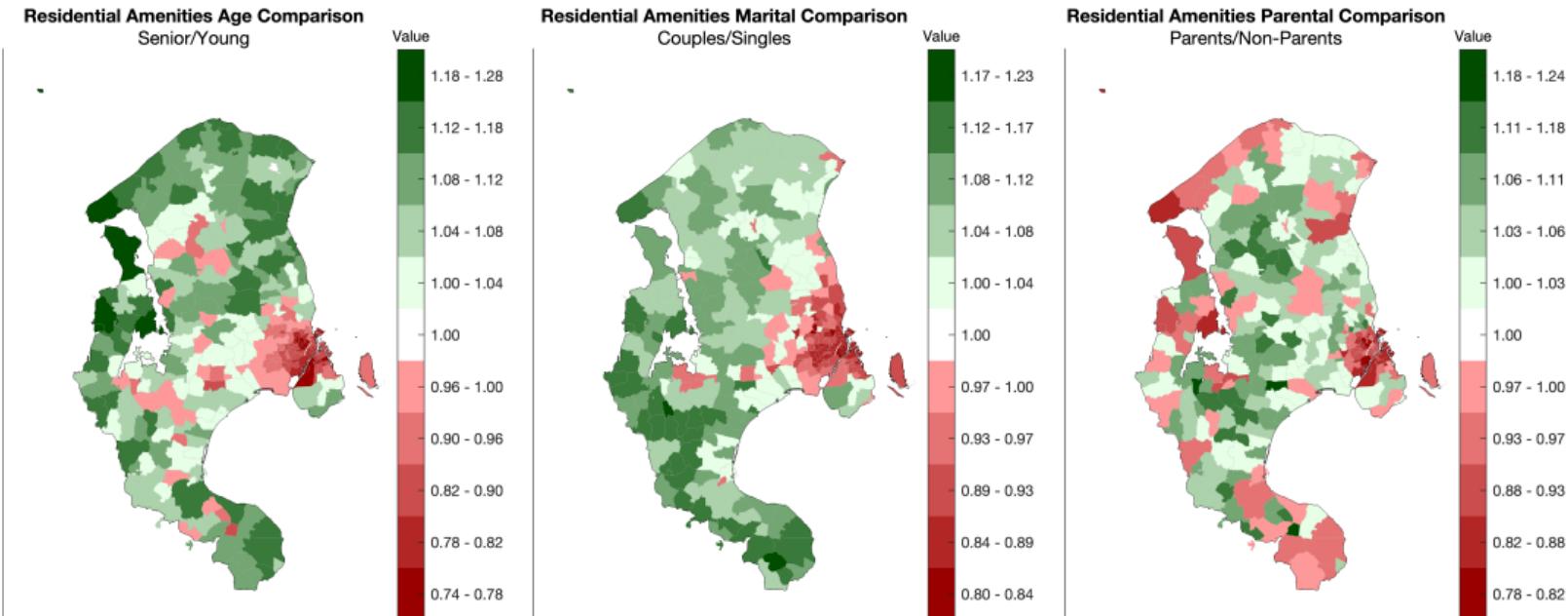
Groups valuing suburban amenities do live in the suburbs!

## Group Relative Amenities vs. Observed Features

	Senior	Couple	Children	High-skill
Interaction effect				
Consumption amenities	-0.0213*** (0.0014)	-0.0293*** (0.0017)	-0.0133*** (0.0017)	0.0183*** (0.0014)
Natural amenities	0.0332*** (0.0026)	0.0124*** (0.0031)	0.0100*** (0.0031)	-0.0099*** (0.0026)
School quality	0.0018** (0.0008)	0.0013 (0.0010)	0.0023** (0.0010)	0.0009 (0.0008)
Observations	3,421			
Group FE	Yes			
Location FE	Yes			
R-squared	0.7658			

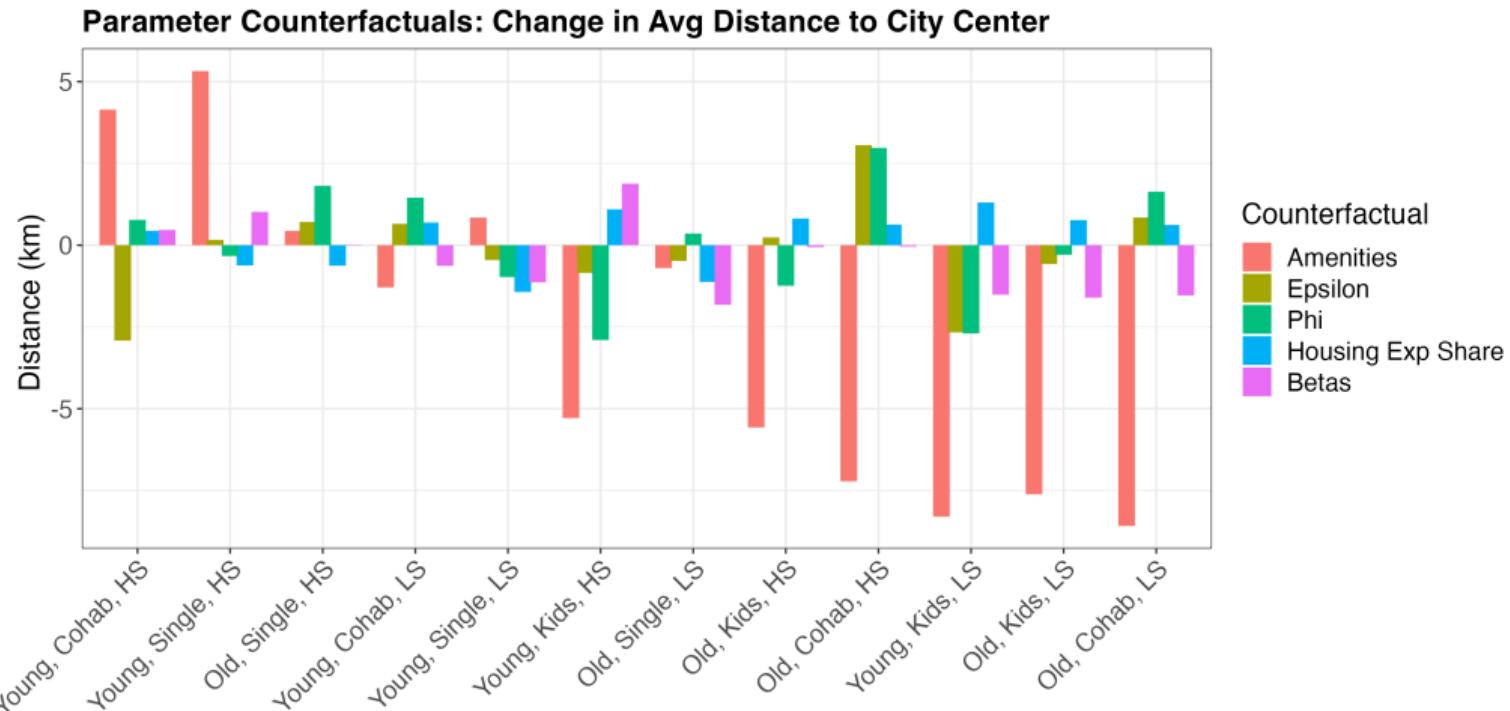
**Table:** Underlying regression is ln model amenity by region-group against ln amenity index interacted with group, controlling for group and location fixed effects. Standard errors in parentheses.

# Maps with Relative Amenities by Group



Seniors, couples, parents appreciate amenities in suburbs relatively more

# Removing Sorting Mechanisms One at a Time



"Flattening" amenities across space most consequential for spatial sorting

# Model Counterfactuals

# The Effect of Demographic Change on Cities

- How will demographic change reshape cities?
  - Falling fertility
  - Population aging
  - Lower marriage rates
- We explore these questions with model counterfactuals that change the size of different groups and use (in future) changes in Tokyo as our benchmark.

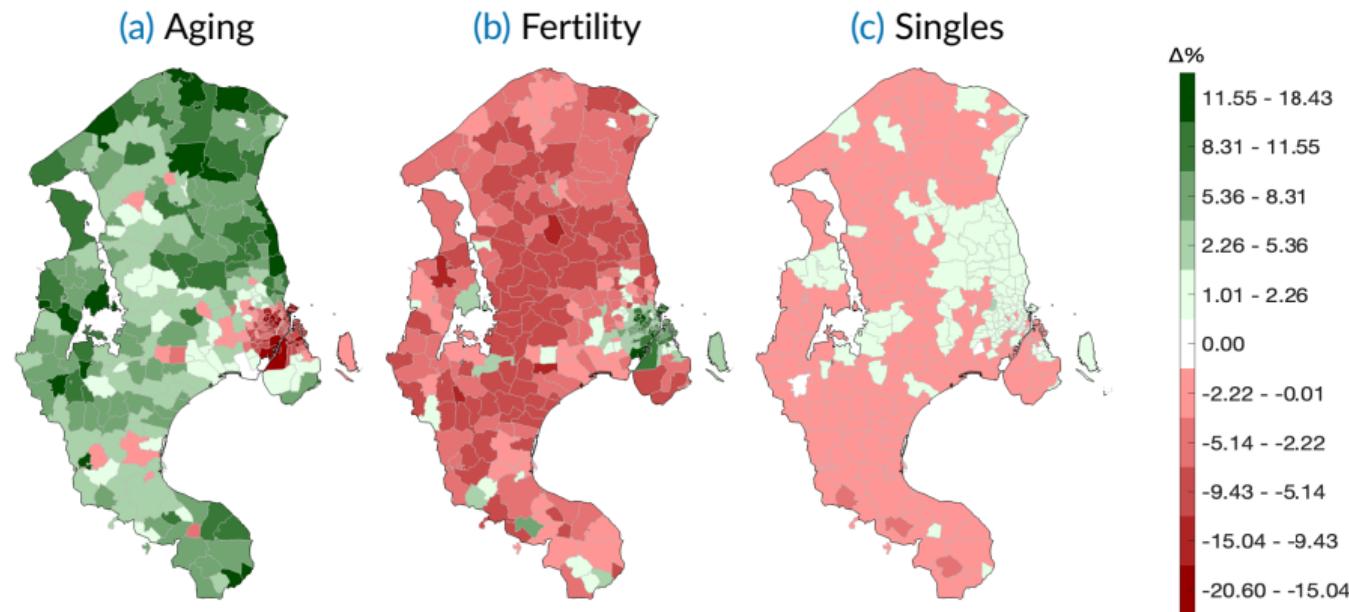
**Table:** Demographic Shares of the 18+ Population in the Greater Tokyo Area

Year	Age			Couples		Parents	
	18-44	45-64	65+	Single	Couple	Parents	Non-Parents
1980	62%	28%	10%	32%	68%	43%	57%
2020	37%	32%	30%	40%	60%	19%	81%

Notes: The table shows percentage shares of different types of population in the total adult population (18+) of either the 1980 or 2020 Japanese census for the Greater Tokyo Area.

# Counterfactual Changes in the Residential Population

Figure: Counterfactual Changes in the Residential Population



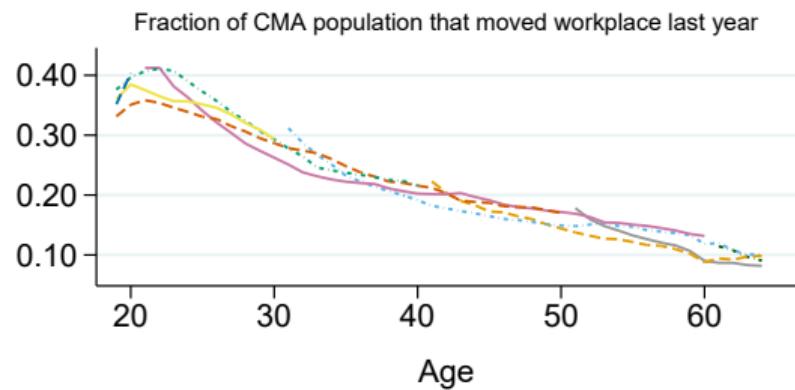
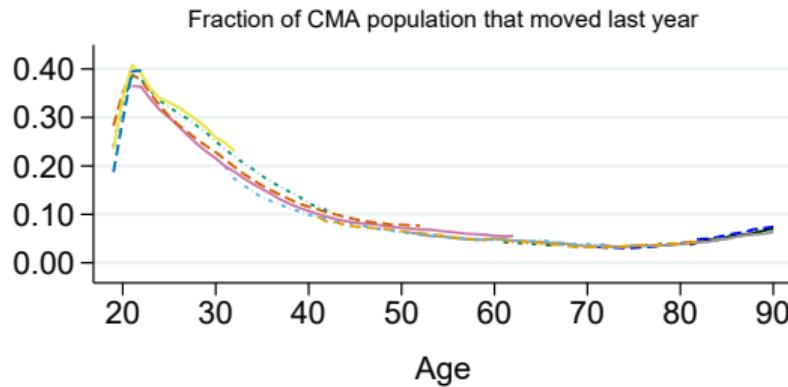
Spatial impacts of demographic mega trends point in opposite directions

# Conclusion

- Circumstances of life matter for location choices
  - Age matters on its own right
  - Family status matters, too
  - Important to model these dimension in QUM to capture sorting
- Our model points to the central role of residential amenities preferences
  - Group-specific heterogeneity for local amenities shapes geography of life
  - Housing & labour demand, commuting preferences not the main drivers
- The spatial structure of cities will likely prove resiliant to demographic change
  - Each of these trends on its own has substantial effects
  - The combination of these trends will in part neutralise each other.

# Appendix

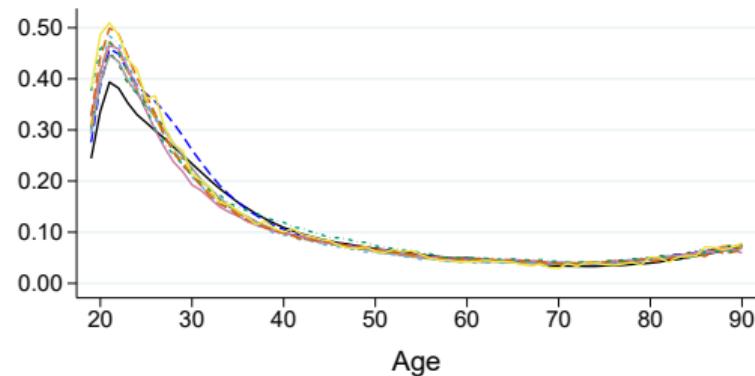
# Mobility Over the Life Cycle by Cohort



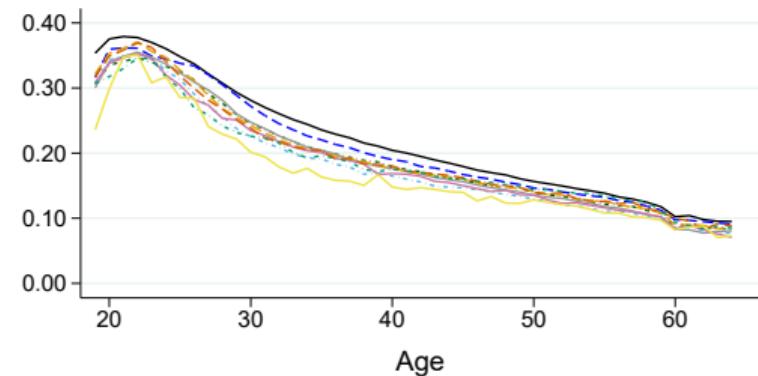
— 1896 - 1905	- - - 1906 - 1915	.... 1916 - 1925	— 1926 - 1935	- - - 1936 - 1945	- - . 1946 - 1955
— 1956 - 1965	- - - 1966 - 1975	.... 1976 - 1985	— 1986 - 1995	- - - 1996 - 2001	- - .

# Mobility Over the Life Cycle by Commuting Zone

(a) Probability of moving residence by commuting zone

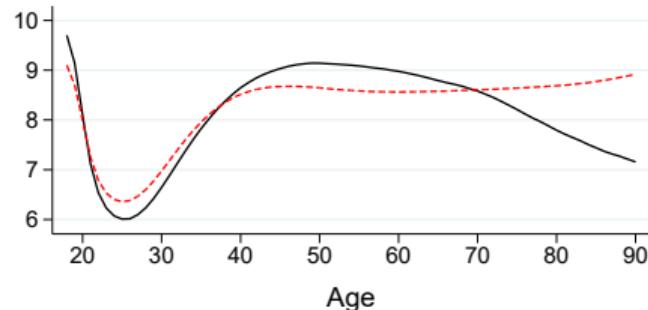


(b) Probability of moving workplace by commuting zone

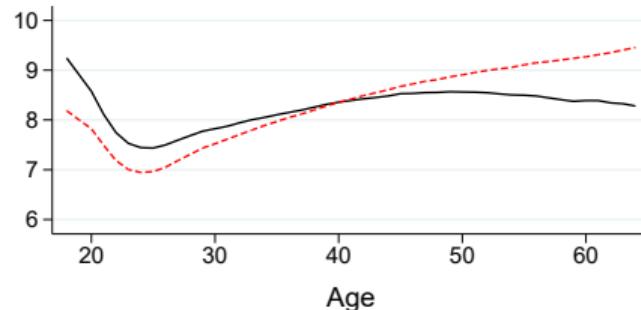


# Suburbanization in the GCA

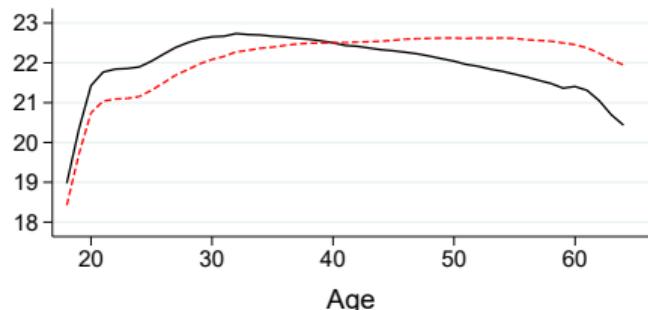
(a) Distance from residence to CBD (km)



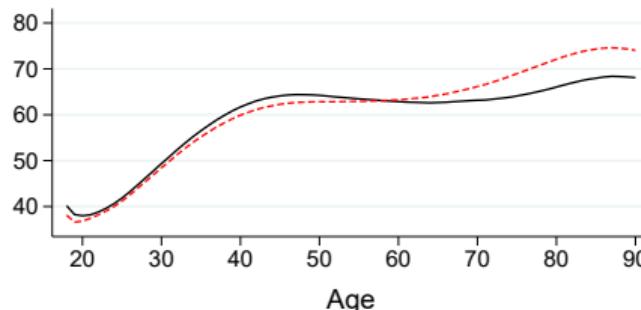
(b) Distance from workplace to CBD (km)



(c) Travel time from residence to workplace (min)

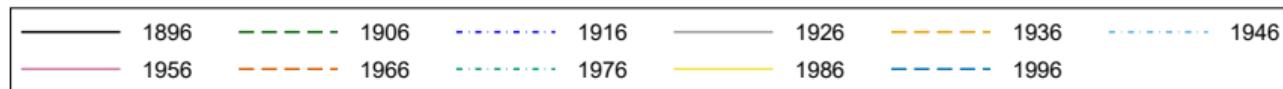
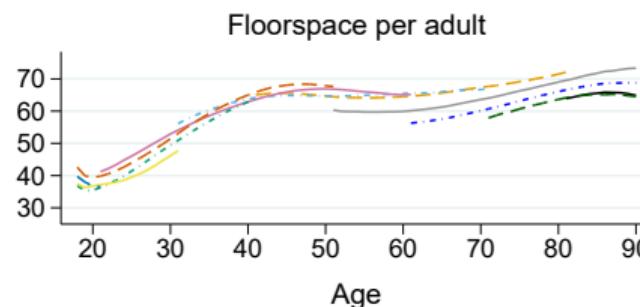
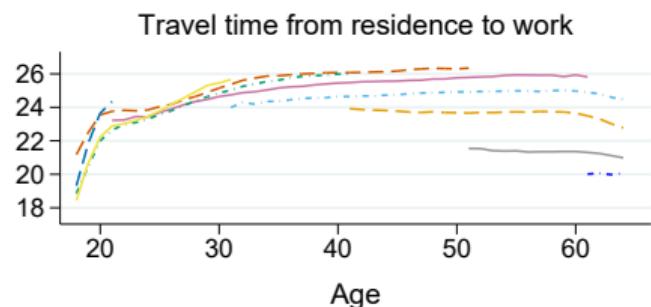
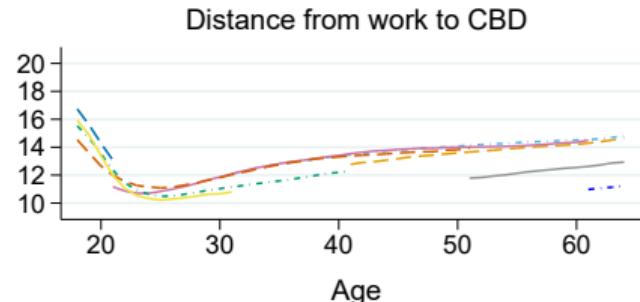
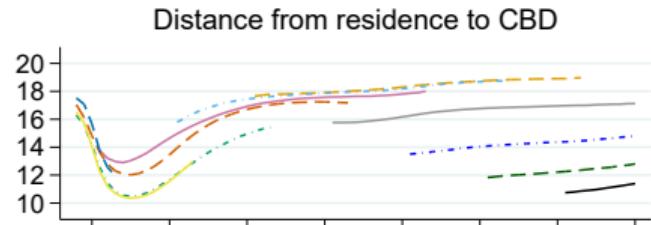


(d) Floor space per adult (m<sup>2</sup>)

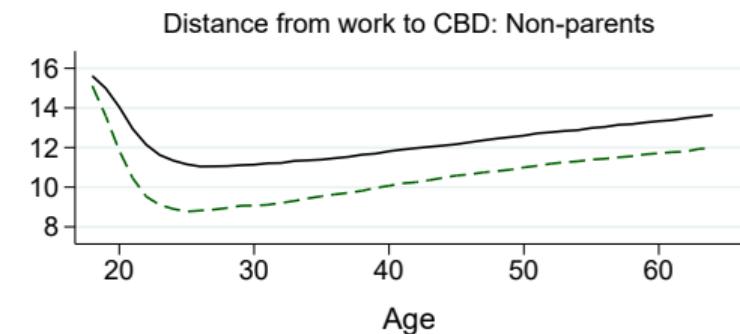
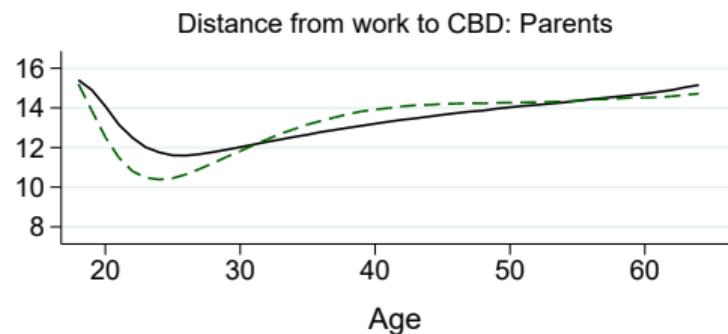
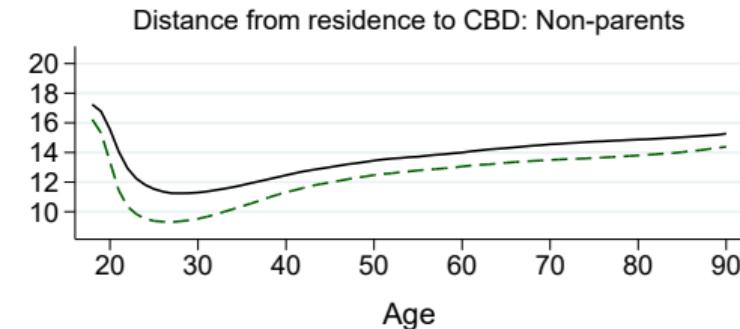
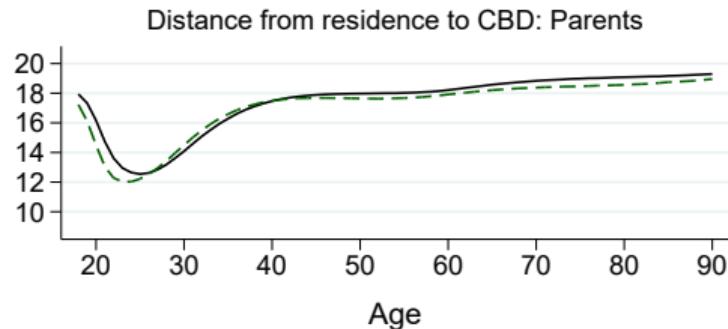


► Extended metro area

# Life Cycle by Cohort



# Parents Versus Non-Parents and Gender Gaps



— Male    - - Female

# Early Life Events

Table: Age Distribution of Early Life Events

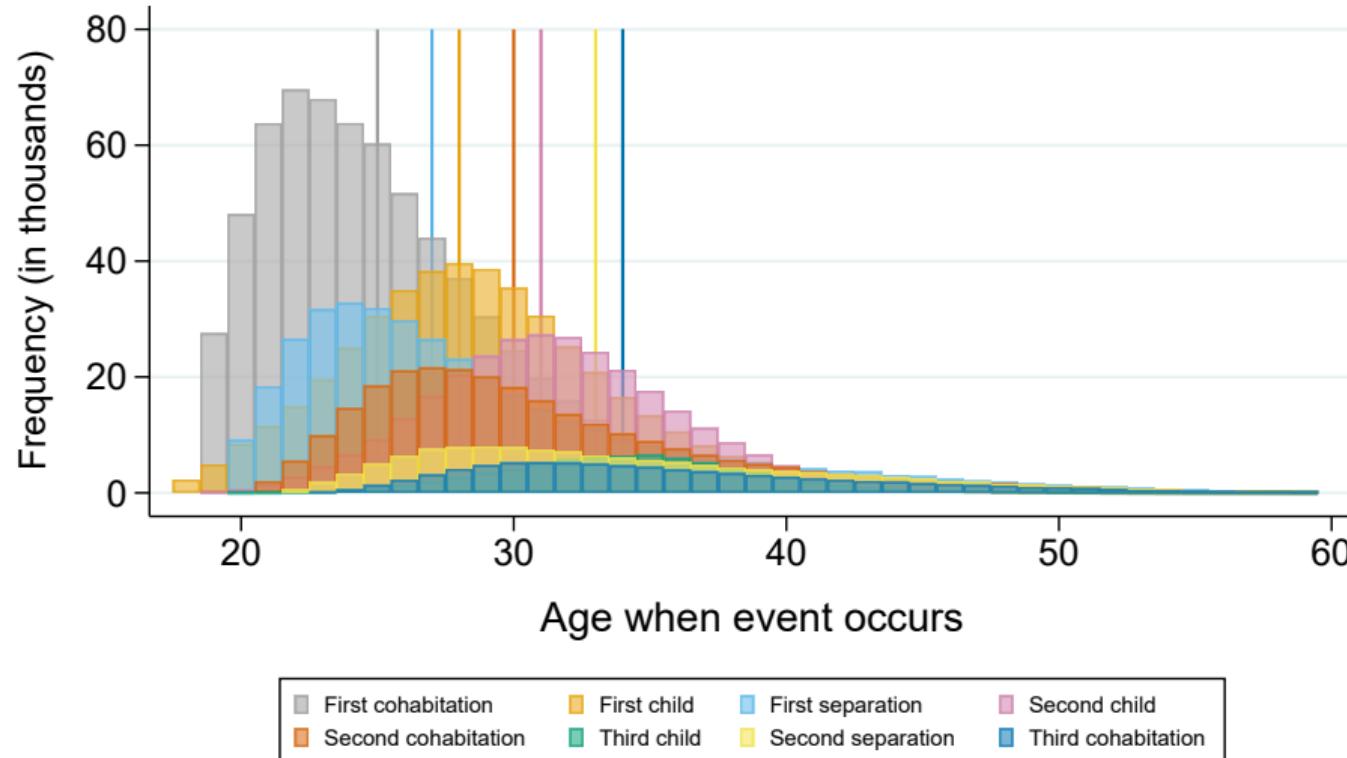
Event	p10	p50	p90	Treated Individuals	Share of sample (%)
First Child	23	28	35	465,880	35.20
Second Child	26	31	38	302,950	22.89
Third Child	28	34	40	74,859	5.66
First Cohabitation	20	25	33	700,479	52.93
Second Cohabitation	24	30	41	271,156	20.49
Third Cohabitation	28	34	47	83,531	6.31
First Separation	22	27	40	386,092	29.17
Second Separation	26	33	46	131,732	9.95

## Late Life Events

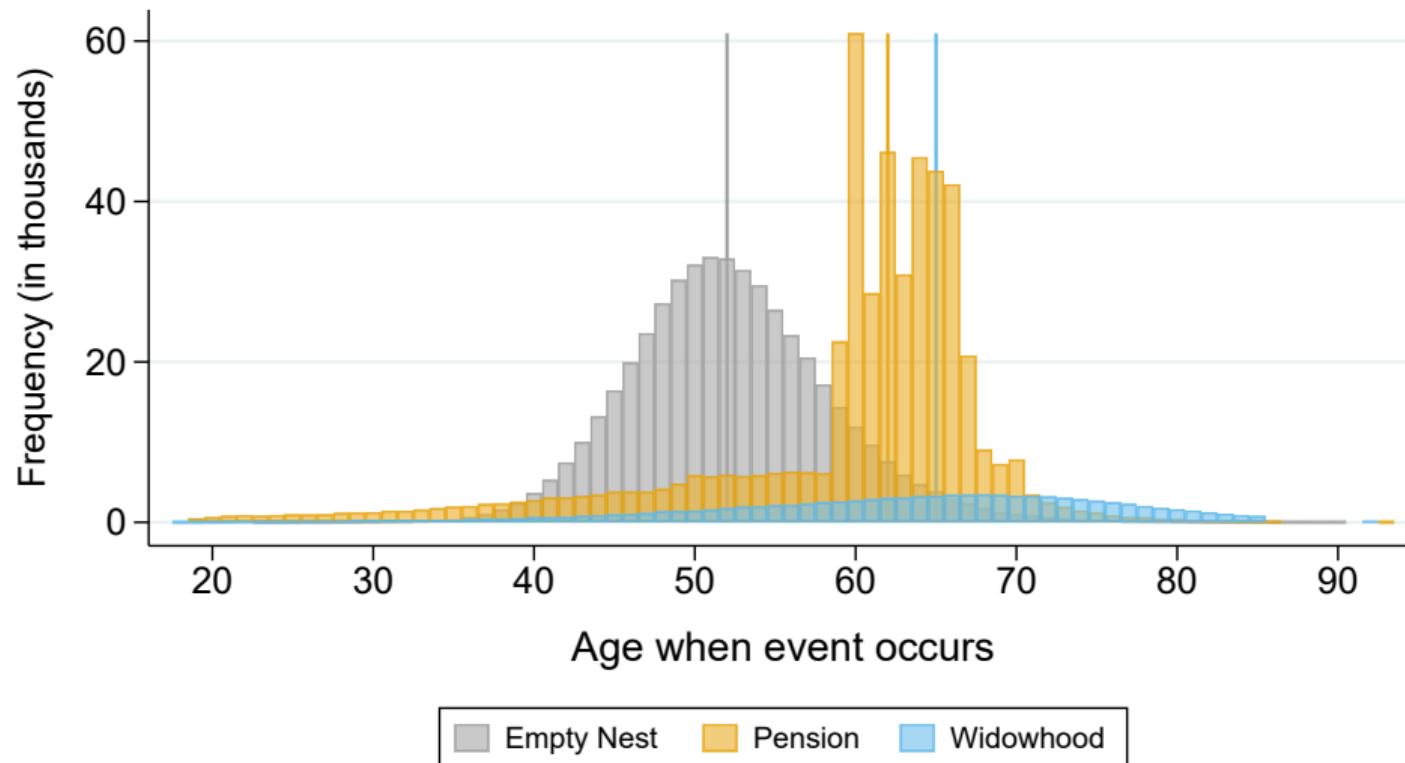
Table: Age Distribution of Late Life Events

Event	p10	p50	p90	Treated Individuals	Share of sample (%)
Empty Nesting	45	52	60	481,211	20.10
Pension	47	62	67	499,055	20.84
First Widowhood	56	65	79	103,446	4.32

# Frequency of Early Life Events by Age

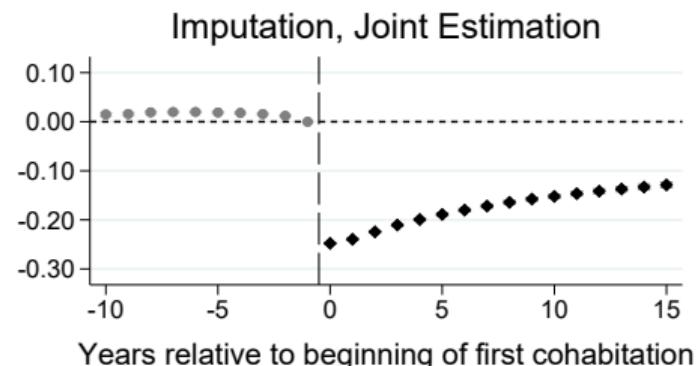
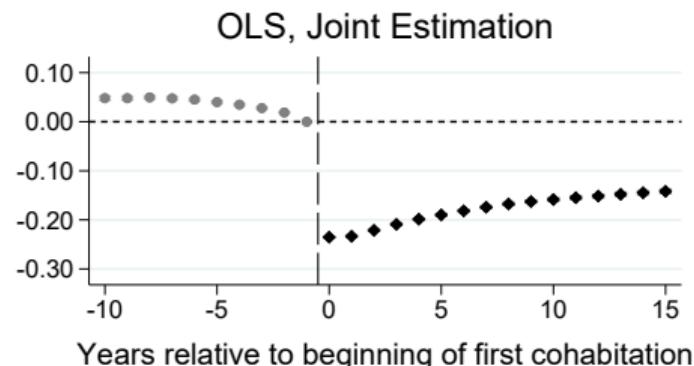
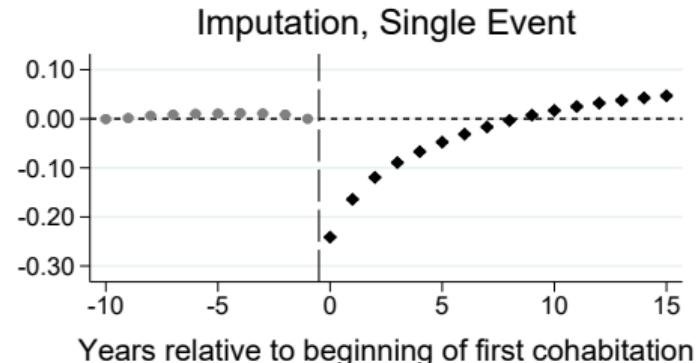
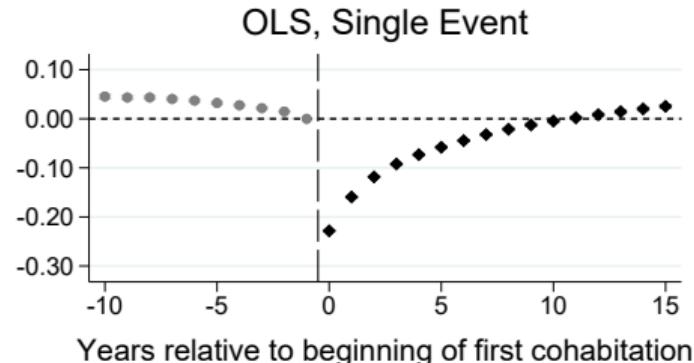


# Frequency of Late Life Events by Age

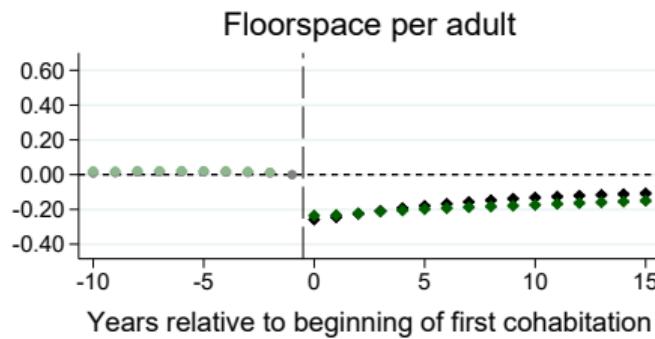
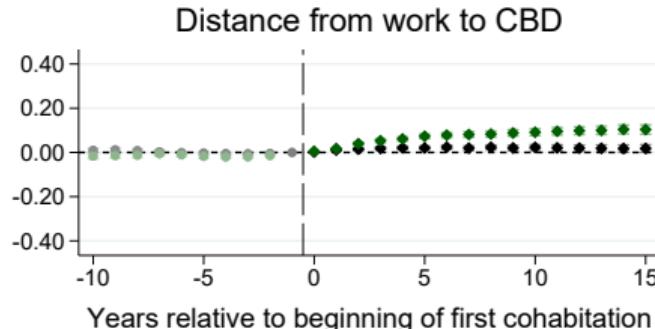
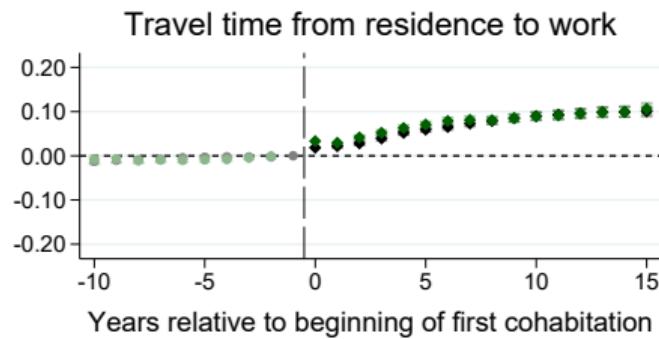
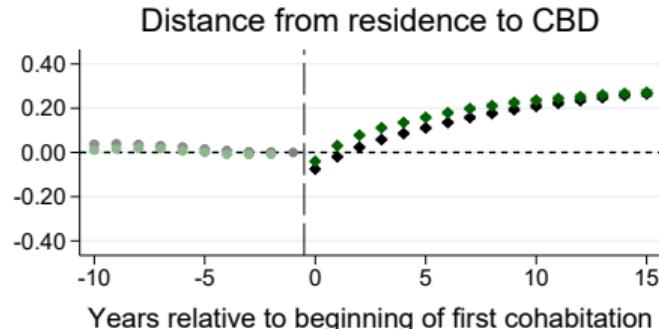


▶ Back

# Impact on Floor Space per Adult: Imputation versus OLS



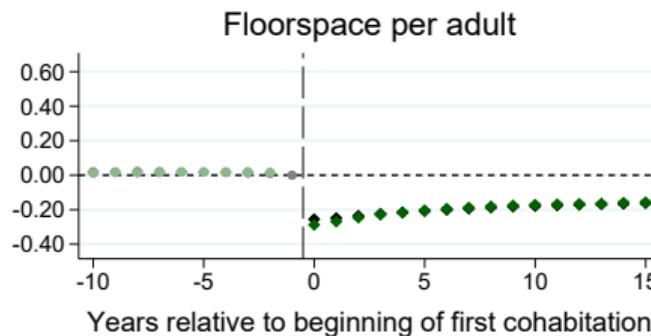
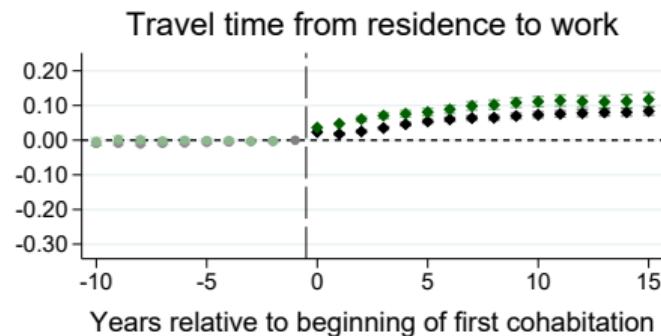
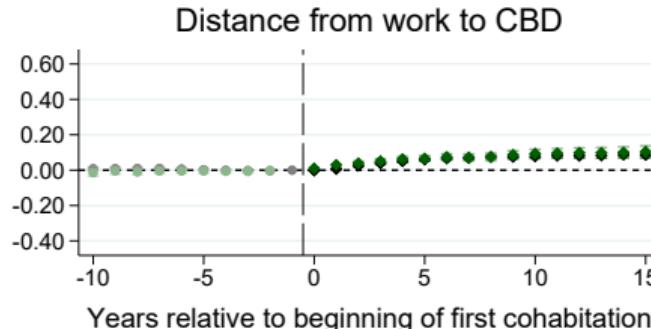
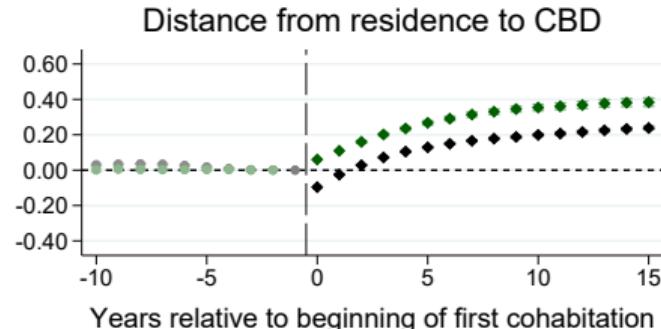
# First Cohabitation by Gender



Male      Female

Back

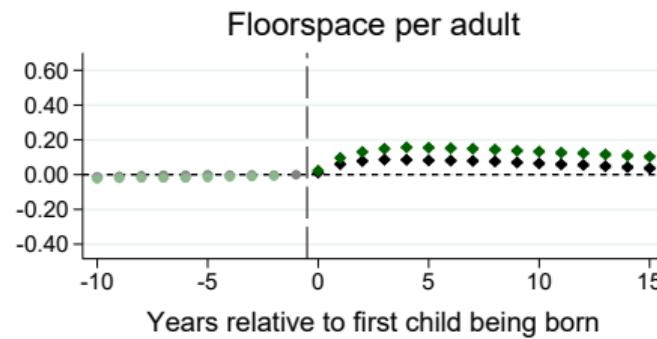
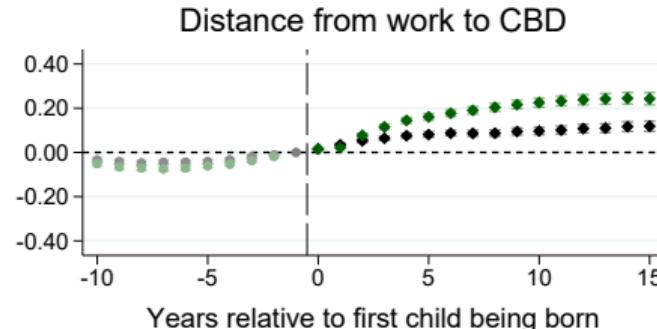
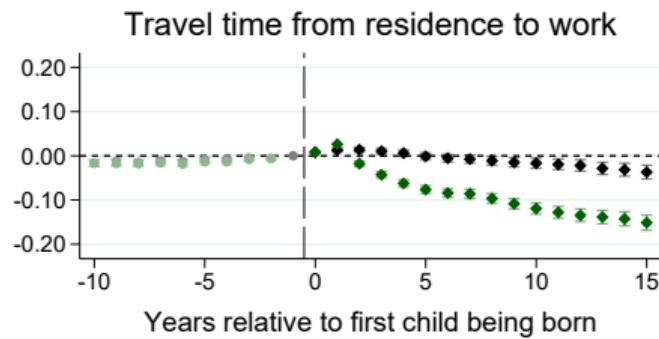
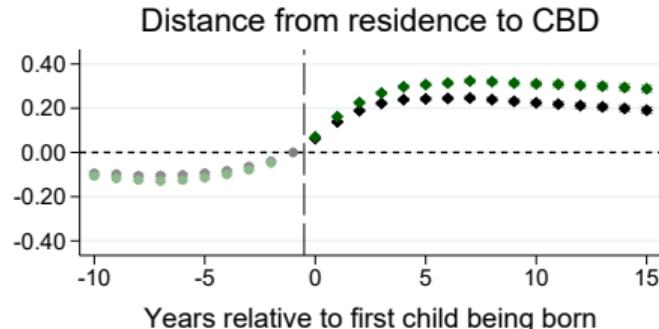
# First Cohabitation by Skill



Low-skill      High-skill

Back

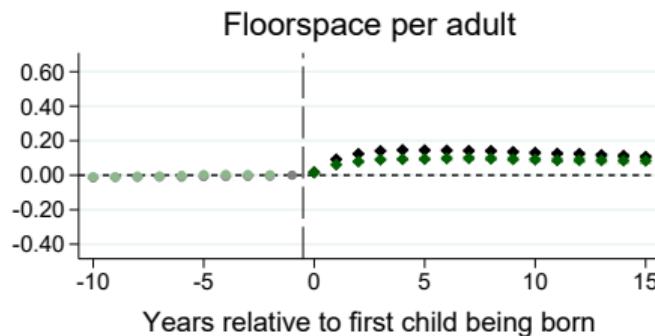
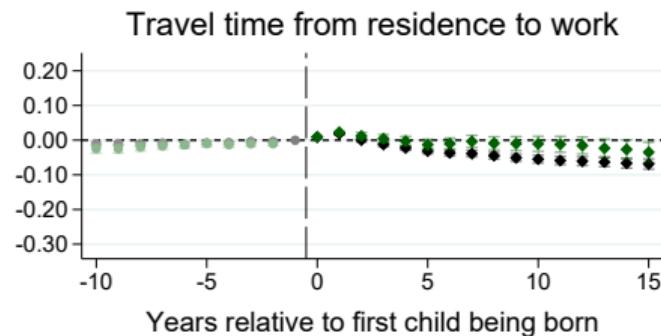
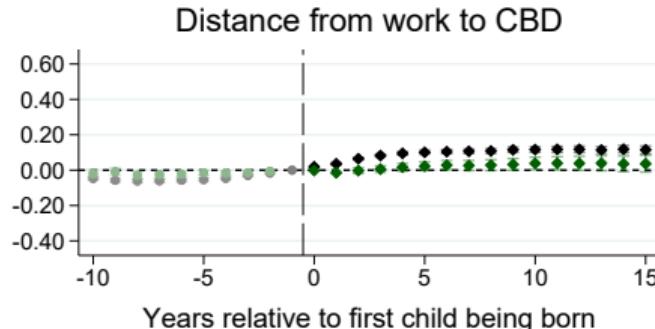
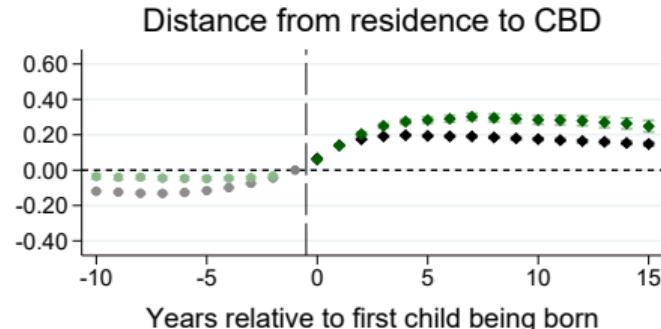
# First Child by Gender



Male      Female

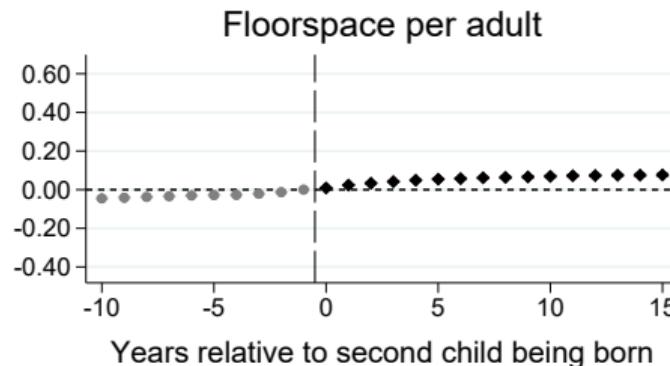
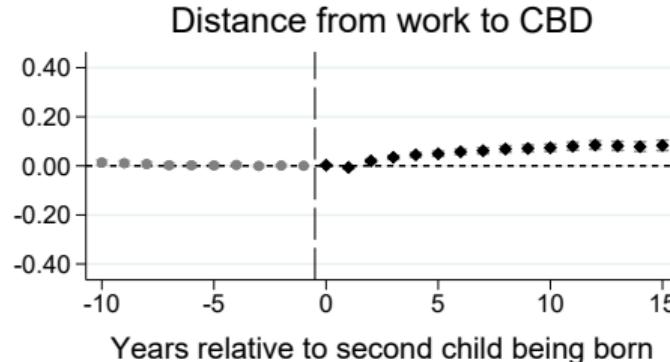
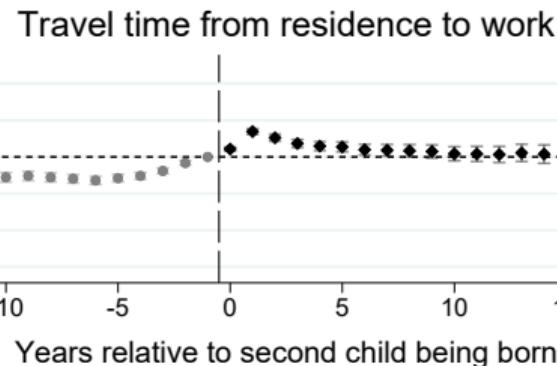
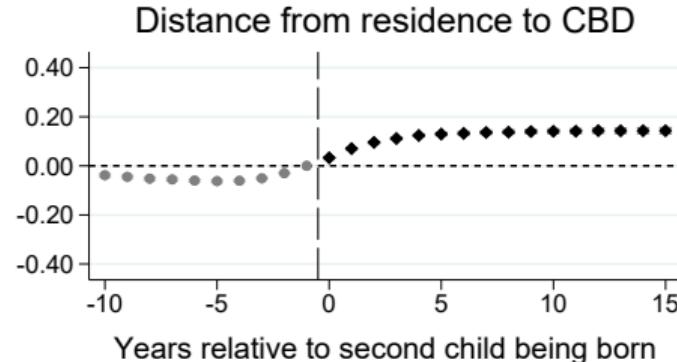
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# First Child by Skill

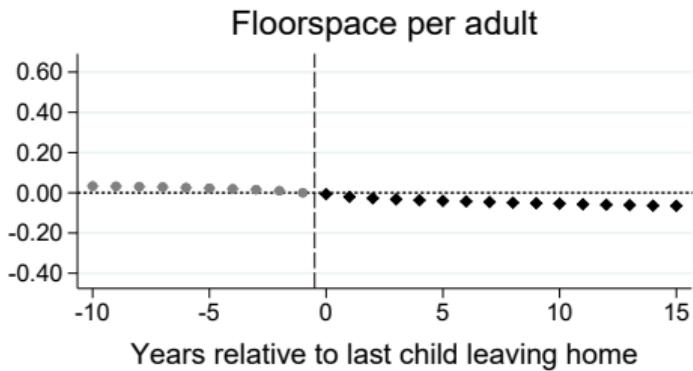
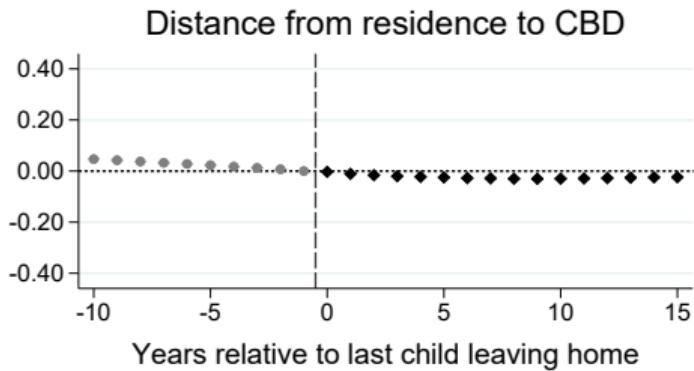


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# Second Child



# Empty Nest



# Model Groups

Table: Overview of Model Groups

	Age	Skill	Family type
Non-workers	Students	-	Single
	Pensioners	LS, HS	Single, Cohabiting
Workers	Young worker	LS, HS	Single, Cohabiting, Cohabiting with Children
	Senior worker	LS, HS	Single, Cohabiting, Cohabiting with Children

## Residential sorting

- The residential choice probability of workers in group  $of$  is given by:

$$\lambda_{Rn}^{of} = \frac{L_{Rn}^{of}}{L^{of}} = \frac{\sum_{\ell \in \mathbb{N}} (B_{n\ell}^{of} w_{\ell}^o)^{\varepsilon^{of}} \left( \kappa_{n\ell}^{of} (Q_n)^{1-\alpha^{of}} \right)^{-\varepsilon^{of}}}{\sum_{k \in \mathbb{N}} \sum_{\ell \in \mathbb{N}} (B_{k\ell}^{of} w_{\ell}^o)^{\varepsilon^{of}} \left( \kappa_{k\ell}^{of} (Q_k)^{1-\alpha^{of}} \right)^{-\varepsilon^{of}}} = \frac{\Phi_n^{of}}{\Phi^{of}} \quad (3)$$

- With  $B_n^{of} = \mathcal{B}_n^{of} \mathcal{B}_i^{of}$  and  $w_i^{of} = \mathcal{B}_i^{of} w_i^o$ , and  $\kappa_{ni}^{of} = t_{ni}^{\phi^{of}}$ , we obtain:

$$\frac{L_{Rn}^{of}}{L^{of}} = \frac{(\mathcal{B}_n^{of} / Q_n^{1-\alpha^{of}})^{\varepsilon^{of}} \sum_{\ell \in \mathbb{N}} (w_{\ell}^o / t_{n\ell}^{\phi^{of}})^{\varepsilon^{of}}}{\Phi^{of}} \quad (4)$$

- The residential choice probability of non-workers in group  $r$  is given by:

$$\lambda_n^r = \frac{L_{Rn}^r}{L^r} = \frac{(B_n^r / Q_n^{1-\alpha^r})^{-\varepsilon^r}}{\sum_{k \in \mathbb{N}} (B_k^r)^{\varepsilon^r} (Q_k^{1-\alpha^r})^{-\varepsilon^r}} \quad (5)$$

# Equilibrium

- Given model parameters  $\{\phi^{of}, \alpha^{of}, \alpha^r, \beta^H, \beta^o, \varepsilon^{of}, \varepsilon^r\}$ , group sizes  $\{L^{of}, L^r\}$ , and exogenous location characteristics (fundamentals)  $\{A_i, B_{ni}^{of}, B_n^r, H_{Fi}, H_{Ri}\}$ , the general equilibrium of the model is referenced by the vector of six variables  $\{L_{Ri}^{of}, L_{Ri}^r, w_i^o, L_{Fi}^{of}, Q_i, q_i\}$
- We solve for these six variables using these equations:
  1. Residential choice probabilities for workers ( $\lambda_{Rn}^{of}$ )
  2. Non-worker residential choice probabilities ( $\lambda_n^r$ )
  3. Zero profit condition ( $w_i^o$ )
  4. Worker workplace choice probabilities ( $\lambda_{Fi}^{of}$ )
  5. Residential floor space market clearing ( $Q_i$ )
  6. Commercial floor space market clearing ( $q_i$ )

# Equilibrium equations

$$1. \lambda_{Rn}^{of} = \frac{L_{Rn}^{of}}{L^{of}} = \frac{\sum_{\ell \in \mathbb{N}} (B_{n\ell}^{of} w_{\ell}^o)^{\varepsilon^{of}} \left( \kappa_{n\ell}^{of} (Q_n)^{1-\alpha^{of}} \right)^{-\varepsilon^{of}}}{\sum_{k \in \mathbb{N}} \sum_{\ell \in \mathbb{N}} (B_{k\ell}^{of} w_{\ell}^o)^{\varepsilon^{of}} \left( \kappa_{k\ell}^{of} (Q_k)^{1-\alpha^{of}} \right)^{-\varepsilon^{of}}}$$

$$2. \lambda_{Fi}^{of} = \frac{L_{Fi}^{of}}{L^{of}} = \frac{\sum_{n \in \mathbb{N}} (B_{ni}^{of} w_i^o)^{\varepsilon^{of}} \left( \kappa_{ni}^{of} (Q_n)^{1-\alpha^{of}} \right)^{-\varepsilon^{of}}}{\sum_{k \in \mathbb{N}} \sum_{\ell \in \mathbb{N}} (B_{k\ell}^{of} w_{\ell}^o)^{\varepsilon^{of}} \left( \kappa_{k\ell}^{of} (Q_k)^{1-\alpha^{of}} \right)^{-\varepsilon^{of}}}$$

$$3. \lambda_n^r = \frac{L_{Ri}^r}{L^r} = \frac{(B_n^r \bar{w}^r)^{\varepsilon^r} \left( (Q_n)^{1-\alpha^r} \right)^{-\varepsilon^r}}{\sum_{k \in \mathbb{N}} (B_k^r \bar{w}^r)^{\varepsilon^r} \left( Q_k^{1-\alpha^r} \right)^{-\varepsilon^r}}$$

$$4. A_i \prod_{o \in \mathbb{O}} \left( \frac{1}{w_i^o} \right)^{\beta_i^o} \left( \frac{1}{q_i} \right)^{\beta^H} = 1$$

## Equilibrium equations (cont.)

$$5. H_{Ri} = \sum_{o \in \mathbb{O}} \sum_{f \in \mathbb{F}} (1 - \alpha^{of}) \frac{v_i^{of} L_{Ri}^{of}}{Q_i} + \sum_{r \in \mathbb{R}} (1 - \alpha^r) \frac{\bar{w}^r L_{Ri}^r}{Q_i}$$

$$6. H_{Fi} = \beta_H \left( \frac{A_i}{q_i} \right)^{\frac{1}{1-\beta_H}} \prod_{o \in \mathbb{O}} \left( \frac{L_{Fi}^o}{\beta_i^o} \right)^{\frac{\beta_i^o}{1-\beta_H}}$$

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# Housing Expenditure Shares

Table: Estimated Housing Expenditure Shares by Group ( $\alpha_g$ )

Group	$\alpha_g$	Quantity (index)	Price (index)	Net Income (index)
<b>Population</b>	30.0 %	100.0	100.0	100.0
Student	39.4 %	79.7	113.9	64.2
Young, single, low-skill	34.8 %	91.9	100.2	73.9
Young, single, high-skill	33.1 %	102.9	124.6	108.3
Young, cohabiting, low-skill	27.3 %	82.9	94.0	83.6
Young, cohabiting, high-skill	26.3 %	91.6	118.2	120.0
Young, cohabiting with children, low-skill	25.7 %	95.4	84.9	93.4
Young, cohabiting with children, high-skill	25.8 %	108.6	107.2	137.4
Senior, single, low-skill	33.1 %	101.2	100.2	84.5
Senior, single, high-skill	32.8 %	120.9	117.0	129.7
Senior, cohabiting, low-skill	24.8 %	86.6	94.0	101.3
Senior, cohabiting, high-skill	23.7 %	101.3	110.7	149.6
Senior, cohabiting with children, low-skill	24.9 %	93.8	87.8	103.2
Senior, cohabiting with children, high-skill	24.0 %	113.8	108.0	174.3
Pensioner, single, low-skill	35.9 %	118.4	98.3	92.1
Pensioner, single, high-skill	32.4 %	135.4	113.6	147.8
Pensioner, cohabiting, low-skill	31.7 %	89.1	88.8	81.0
Pensioner, cohabiting, high-skill	26.3 %	109.5	107.2	154.3

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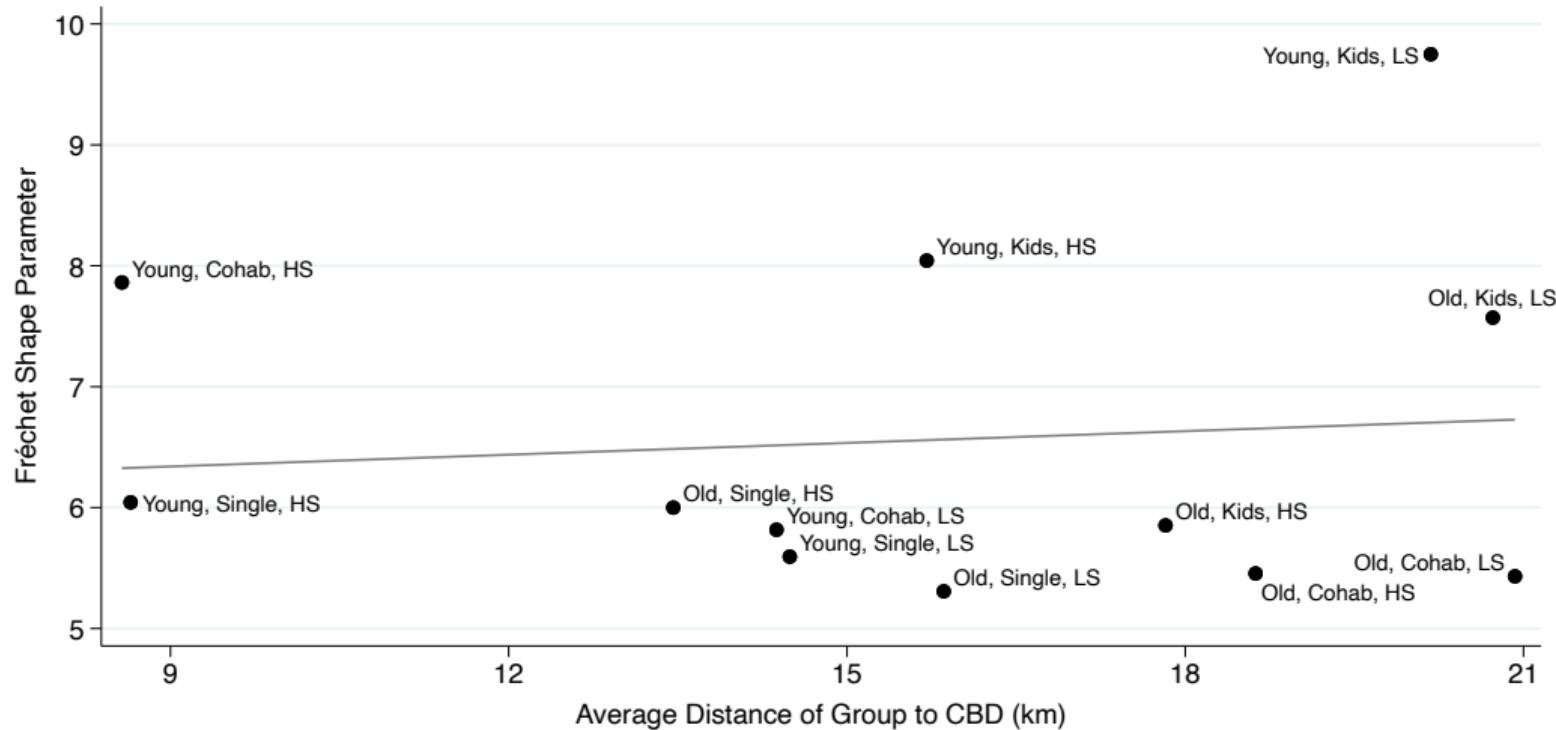
# Gravity Equations Estimates

Table: Estimated Model Parameters by Group

Group	Zero Flows	PPML	PPML IV	$\varepsilon$	$\phi$
Young, single, low-skill	75.03%	-0.080	-0.127	5.594	-0.023
Young, single, high-skill	83.38%	-0.056	-0.097	6.043	-0.016
Young, cohabiting, low-skill	84.49%	-0.064	-0.104	5.817	-0.018
Young, cohabiting, high-skill	86.82%	-0.043	-0.079	7.862	-0.010
Young, cohabiting with children, low-skill	73.80%	-0.077	-0.122	9.749	-0.013
Young, cohabiting with children, high-skill	72.47%	-0.060	-0.103	8.042	-0.013
Senior, single, low-skill	80.99%	-0.081	-0.130	5.308	-0.024
Senior, single, high-skill	84.77%	-0.064	-0.106	6.000	-0.018
Senior, cohabiting, low-skill	74.21%	-0.079	-0.127	5.431	-0.023
Senior, cohabiting, high-skill	79.47%	-0.066	-0.109	5.455	-0.020
Senior, cohabiting with children, low-skill	83.27%	-0.076	-0.121	7.571	-0.016
Senior, cohabiting with children, high-skill	83.18%	-0.062	-0.101	5.853	-0.017

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# The Role of the Fréchet Shape Parameter



# The Role of the Commuting Cost Elasticity

