Parental Rural-Urban Migration and Child Education

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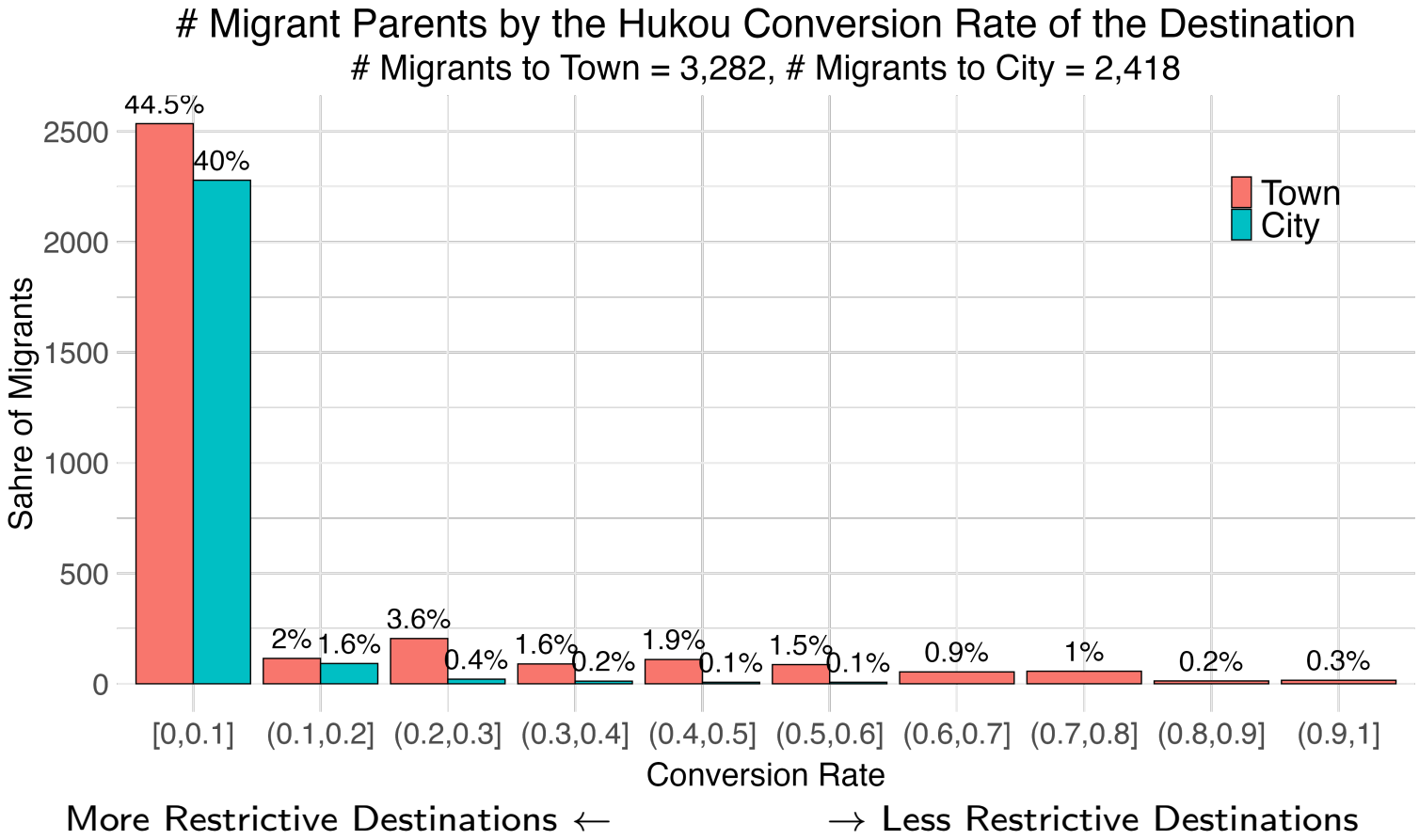
November 04, 2024

Introduction

Migration Restrictions in Developing Countries

- Rural-urban migration:
  - (+) overall productivity effects; Bryan et al. (2019), Lagakos et al. (2023)
  - (−) urban congestion; (−) pollution. Akbar et al. (2023), Chen et al. (2022)
- Governments in less developed regions were much more likely (78%) than those in more developed regions (51%) to have adopted policies to reduce rural-urban migration. United Nations (2015)

The Concentration of Migrants in Big and Restrictive Cities



- *Hukou* conversion: rural-urban migrants' acquisition of urban citizenship

The Concentration of Migrants in Big and Restrictive Cities

- Nearly half (49.2%) of rural-urban migrants without urban citizenship in China choose to leave their children behind in rural areas as of 2005. Gao et al. (2023)
- Children left behind are much more likely to be cared for by grandparents (71%) than their counterparts living with their parents (20%). Zhong (2024)

Parental Migration and Child Education

- **What is the impact of parental rural-urban migration on children's educational outcomes?**
  - Are the mobility restrictions effective in controlling migration flows?
  - How are parents' work locations and children's school locations jointly decided by the household?
  - How do mobility restrictions affect these decisions?
  - How are children's educational outcomes affected?
  - What policies would be most effective in improving the welfare of rural-urban migrants and their children?
- A nested model of parental migration decisions and children's educational decisions.
  - the lower nest: child's school location choice
  - the upper nest: parent's work location choice

Literature

- Models of migration that examine the role of migration policies
  - Existing literature has mainly focused on individual decisions rather than family considerations. Bryan et al. (2019), Tombe et al. (2019), Lagakos et al. (2023), Adamopoulos et al. (2024)
  - Recent literature has discussed household migration decisions and related welfare effects. Gao et al. (2023), Imbert et al. (2024), Zhong (2024)
  - The effects of migration policies on children's educational outcomes and other intra-household channels of migration that are previously unobservable in less complex settings.
- Parental decisions and child outcomes
  - Previous work has mainly focused on the impacting channel of the balance between parental earning capacity and financial transfers ...Antman (2012), Ambler et al. (2015), Bai et al. (2018), Albert et al. (2022)
  - ... and parental time and attention Constant et al. (2013), Marchetta et al. (2021), Yang et al. (2020)
  - Recent literature also includes the role of other extended families in child development Gao et al. (2023), Zhong (2024)
  - I further consider children's school location and treating it as an important input in the child development process, as the quality of schools varies significantly across different types of locations.

Mobility Restrictions: the Population Capacity of a City

The opening of China's state-owned industries to privatization in the 1990s

→Increased demand for labor in urban manufacturing sectors

→Substantial rural-to-urban migration flows driven by employment opportunities

→Potential decline in agricultural productivity

→*Hukou* stringency to control migration

- A significant positive correlation between the planned migration population in each city (before 1999) and the per capita annual food production in previous year. Cai et al. (2001)
- *Hukou* Stringency before 2000[1] reflects a prefecture's population capacity, which is determined by the local food supply. Zhang et al. (2019), Zhang et al. (2020)

[1]The year when the *Hukou* migration quota is abolished and the food supply is separated from the *Hukou* registration.

The Household Registration (*Hukou*) System

- Access to local welfare services is linked to the location of household registration.
- How to obtain a local *Hukou*:
  - By birth (born into the household, no *jus soli*), marriage, or certain formal sector jobs
  - By application (for restrictive cities requirements are set for social insurance participation, education level, investment and real estate purchase, and employment conditions, etc., vary by prefecture)
- Compulsory education (6 years of primary school and 3 years of middle school) completion rate 47.5% for all rural adults, 58% for all rural parents in the sample, both ages 18-50.

Data

Data

- Longitudinal survey: China Family Panel Studies (CFPS), by Peking University, China
- The CFPS baseline (2010) sample covers 25 provincial-level administrative regions (31 in total), representing 95% of China's population.

CFPS Sample sizes

	Number of sampled individuals aged			
Wave	[0,5]	[6,14]	[15,18]	[19,50]
2010	3,615	4,984	1,982	19,148
2012	3,551	4,640	2,099	21,461
2014	3,595	4,575	1,949	21,331
2016	2,988	4,566	2,295	20,408
2018	2,240	4,821	1,602	18,276
2020	859	3,981	1,251	13,928

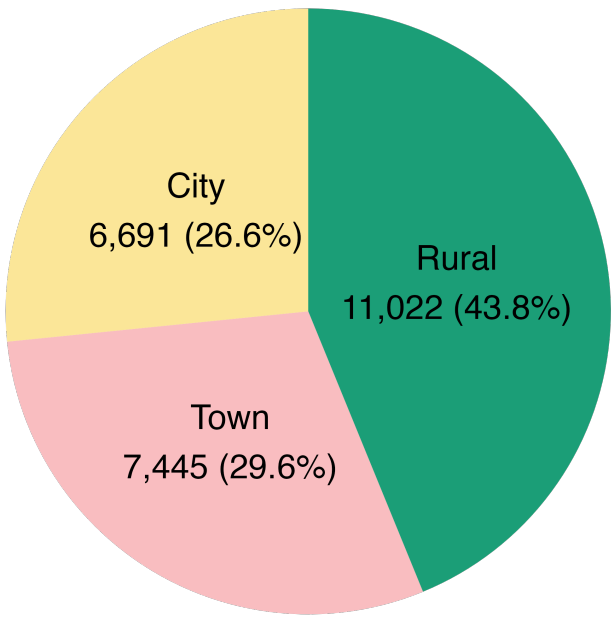
Rural-Urban Migration

- *Migrant*: a rural *Hukou* holder who lives in an urban place and has moved across counties (beyond commuting distance).
- Rural-Urban Division
  - Urban areas are divided into two types: *town* (refers to rural county seat, township, and suburb) and *city*.
  - County-level data is used (a 6-digit postal code identifies a county, digits 1-2 identify the province, digits 1-4 identify the prefecture).
  - Rural/Town/City: a county of type Rural/Town/City (this "type" is reported by the survey, based on the classification of National Bureau of Statistics of China).

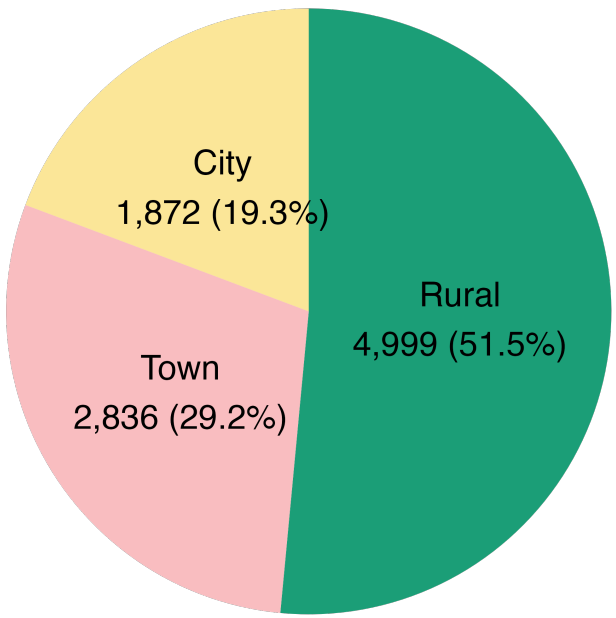
Internal Migration

- Parent's migration (across counties) destinations:
  1. Cities; 2. Township/County seat/Suburb; 3. Rural villages

Migrant Adults, ages 19-50



Migrant Parents of Children ages 6 to 18



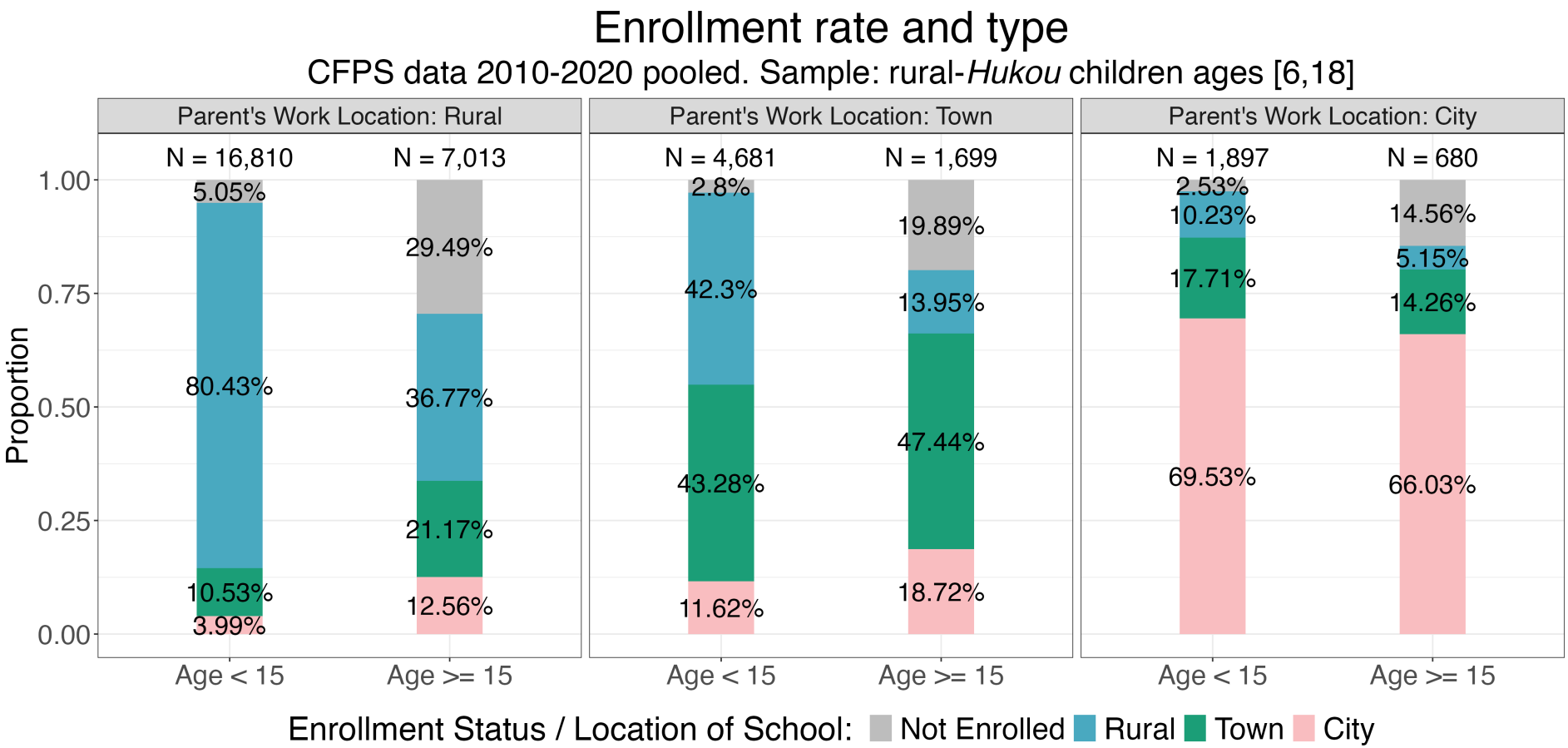
Quality of Schools in Different Locations

OLS Regressions on Test Scores, Rural Children

	Dependent Variable: Test Score (t)			
	Word Score, z-score (t)		Math Score, z-score (t)	
	Ages [10,14]	Ages [15,18]	Ages [10,14]	Ages [15,18]
Word Score, z-score (t-2)	0.552***	0.670***		
	(0.059)	(0.039)		
Math Score, z-score (t-2)			0.664***	0.556***
			(0.084)	(0.033)
Edu. Expenses (t)	0.479**	0.696***	0.270	0.459***
	(0.156)	(0.077)	(0.170)	(0.071)
School Location (t), base = Not Enrolled				
. Rural School	0.111	−0.054	0.396***	0.244***
	(0.115)	(0.072)	(0.120)	(0.068)
. Town School	0.017	0.073***	0.037*	0.050*
	(0.020)	(0.017)	(0.018)	(0.020)
. City School	1.818**	0.468***	1.419**	0.991***
	(0.599)	(0.121)	(0.508)	(0.118)
Completes 9-yr. Edu. (Parent)	2.231***	0.937***	2.263***	1.777***
	(0.602)	(0.115)	(0.515)	(0.112)
Income (t, Parent)	2.155***	0.746***	2.082***	1.505***
	(0.607)	(0.118)	(0.518)	(0.119)
Constant	5.498***	6.176***	3.734***	5.198***
	(0.592)	(0.101)	(0.507)	(0.102)
Observations	880	3,471	883	3,222
R^2	0.184	0.170	0.195	0.241

*p<0.05; **p<0.01; ***p<0.001. Cluster-robust standard errors in parentheses. Clustering is at the individual level.
Sample: children ages [10,18]. Time variable: two-year waves. Data 2010 to 2020 pooled.
Test scores are the z-scores, adjusted for age and gender, of the scores from tests conducted by CFPS.
Income and expenses are in real terms, the unit is 10k CNY in 2010.

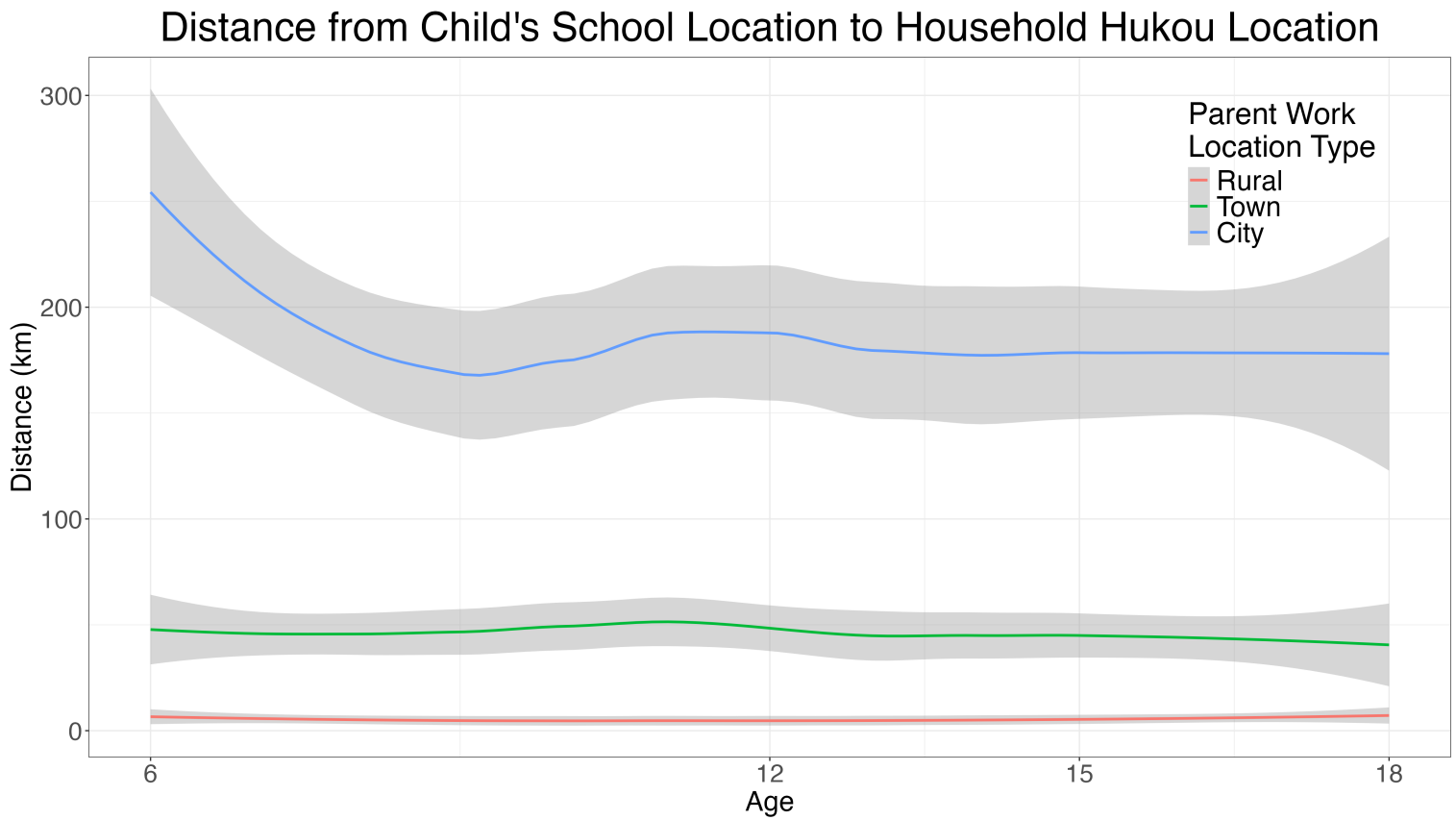
Where do children attend school?



Note: ***1***. Rural or urban refer to the child's *Hukou* type at birth or, if missing, at baseline (2010). ***2***. Compulsory education in China: 6 years of primary school and 3 years of junior secondary school, usually beginning at age 6 and ending at age 15. ***3***. The completion rate of nine-year compulsory education in China was 94% as of 2014 (National Bureau of Statistics of China, 2015).

- 7 out of 166 counties have no primary school; 77 have no secondary school.
- In all counties, there are fewer secondary school seats than primary school seats.

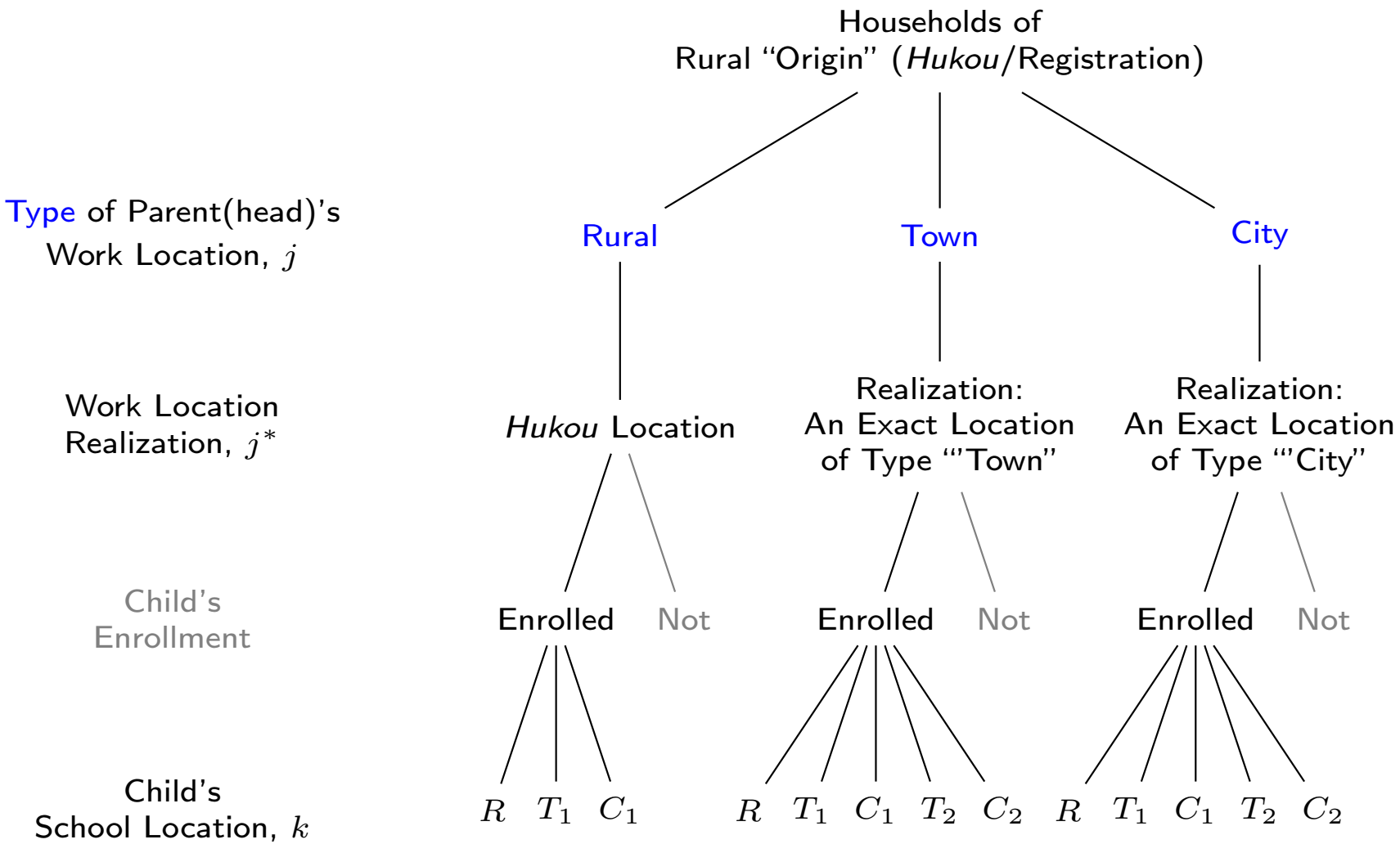
How far away are the parents from the origin?



Model

Household's Decision

The Nested Logit Structure



- R: the *Hukou* Location;
- T_1 or C_1: Location closest to ***Hukou*** with type of "Town" or "City";
- T_2 or C_2: Location closest to **parent(head)'s work location** with type of "Town" or "City".

Household's Decision

The Upper Nest: Work Location

- Decision on the **type of parent(head)'s work location**

$$d_1 = j,\ j \in \{\textit{Rural},\ \textit{Town},\ \textit{City}\}$$

- Given type j, **one exact location (county) j^* is realized**:
  - the *Hukou* location if $j = \textit{Rural}$;
  - a random draw if $j = \textit{Town}$ or *City* from the distribution $f_i(j^*|j) = \frac{M_{O_i,j^*}}{M_{O_i,j}}$, O_i: *Hukou* location of household i, M: baseline migration stock.
- The indirect utility:

$$U_j^{(1)} = \gamma_j \cdot x^{(1)} + \sum_{j^*} p_{j^*|j} \cdot (\beta_1 \cdot y_{j^*} + \beta_2 \cdot h_{j^*} + \rho_j \cdot V_{j^*}) + \varepsilon_j^{(1)}$$

where

- $x^{(1)}$: demographics of household (head);
- y_{j^*}: predicted labor income and housing price; institutional costs.

Household's Decision

The Lower Nest: School Location

- Decision on **child school location**

$$d_2 = k,\ k \in \{\text{Rural (R, } \textit{Hukou} \text{ Location)},\ \text{Town } (T_1) \text{ or City } (C_1) \text{ Closest to } \textit{Hukou} \text{ Location},\ \text{Town } (T_2) \text{ or City } (C_2) \text{ Closest to Work Location } j^*\}$$

- The indirect utility:

$$U^{(2)}_{j^*k} = \alpha_j \cdot z_{j^*k} + \mu_{jk} \cdot x^{(2)} + \varepsilon_{j^*k} + \varepsilon^{(2)}_j$$

where

- $x^{(2)}$: demographics of child and household;
- z_{j^*k}: gains from and costs of child edu.

Estimation

Two-stage LIML Estimation

School location stage:

- $\frac{\hat{\alpha}}{\rho_j}$ and $\frac{\hat{\mu}}{\rho_j}$ from maximizing the log-likelihood of a conditional Logit model

$$\ln L_2 = \sum_i \sum_j \sum_{j^*} \sum_k d_{ij^*k} \ln p_{ik|j^*}$$

where

- k: school location, $k \in \{R, T_1, T_2, C_1, C_2\}$,

$$p_{k|j^*} = \frac{\exp\left[\left(\alpha_j \cdot z_{j^*k} + \mu_{jk} \cdot x^{(2)}\right)/\rho_j\right]}{\sum_{l=1}^{K_j^*} \exp\left[\left(\alpha_j \cdot z_{j^*l} + \mu_{jl} \cdot x^{(2)}\right)/\rho_j\right]}$$

Two-stage LIML Estimation

Work location stage:

- $\hat{\beta}$, $\hat{\gamma}_j$, and $\hat{\rho}_j$ from maximizing the log-likelihood of a conditional Logit model

$$\ln L_1 = \sum_i \sum_j d_{ij} \ln p_{ij}$$

where

- j: type of work location, $j \in \{R, T, C\}$;

$$p_j = \frac{\exp\left[\gamma_j \cdot x^{(1)} + \sum_{j^*} p_{j^*|j} \cdot (\beta \cdot y_{j^*} + \rho_j \cdot V_{j^*})\right]}{\sum_{m=1}^{J} \exp\left[\gamma_m \cdot x^{(1)} + \sum_{m^*} p_{m^*|m} \cdot (\beta \cdot y_{m^*} + \rho_m \cdot V_{m^*})\right]}$$

$$V_{j^*} = \ln\left\{\sum_{l=1}^{K_j^*} \exp\left[\left(\alpha_j \cdot z_{j^*l} + \mu_{jl} \cdot x^{(2)}\right)\Big/\rho_j\right]\right\}$$

- j^*: a specific county in type j realized with probability:

$$p_{j^*|j} = \frac{M(O, j^*)}{\sum_{\{\tilde{j}:\, \text{type}(\tilde{j})=j\}} M(O, \tilde{j})}$$

O: *Hukou* location of the household; M: baseline migration stock

Household's Decision

The Upper Nest: Work Location

- The labor income of the household head, in real terms (k CNY, 2010), is predicted from regression:

$$\ln w_{j^*t} = \sum_a \theta^y_{1,a} \cdot age^p_{at} + \theta^y_{2,j} \cdot edu^p_i + \delta^y_{1,j^*} + \delta^y_{2,t} + \varepsilon^y_{j^*t}$$

where ^{p} denotes parent (household head). Similarly, the housing price is predicted from:

$$\ln h_{j^*t} = \sum_a \theta^h_{,a} \cdot age_{at} + \sum_a \theta^h_{2,a} \cdot age^p_{at} + \delta^h_{1,j^*} + \delta^h_{2,t} + \varepsilon^h_{j^*t}$$

Migration Costs

Hukou Stringency Index derived from Zhang et al. (2019)

- An index that **measures how difficult it is to obtain a _Hukou_ of the destination location**.
- Equals zero for all towns.

Hukou Conversion Rate Imbert et al. (2024)

- The share of migrants who had converted their *Hukou* registration place to the local prefecture by the last wave of the survey:

$$C_{l,\overline{edu}} = \frac{\sum_i \mathbb{1}\{\mathtt{d}_i = l, edu_i = \overline{edu}\} \cdot \mathbb{1}\{\mathtt{hk}_{i,a_0} \neq l\} \cdot \mathbb{1}\{\mathtt{hk}_{i,T} = l\}}{\sum_i \mathbb{1}\{\mathtt{d}_i = l, edu_i = \overline{edu}\} \cdot \mathbb{1}\{\mathtt{hk}_{i,a_0} \neq l\}}$$

  `d`: living location; `hk`: *Hukou* location
  a_0: year of birth, T: year of the last observation in the survey
- Has variation for towns;

Level of Grain Reserves at 2000 Zhang et al. (2020)