Labor Market Integration, Firm Sorting, and Regional Inequality

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Motivation

China has seen a large increase in internal migration in the last two decades.

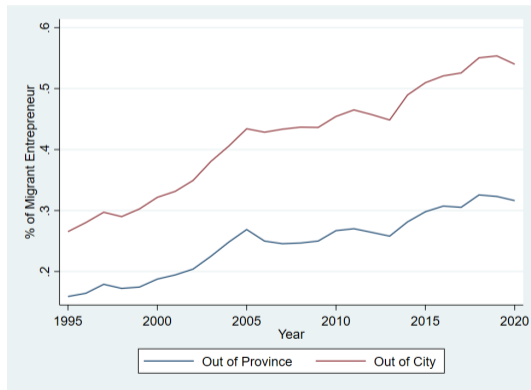- The migrant population grew from 21 mio in 1990 to 253 mio in 2015.

Entrepreneurial activity also exhibits great regional variation.

- More than 50% of entrepreneurs enter the market outside their hometown cities, and more than 30% are outside their hometown provinces.

At the same time, we observe rising regional inequality over time.

Introduction
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Background
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Entrepreneurship
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Migration Flow
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Firm Performance
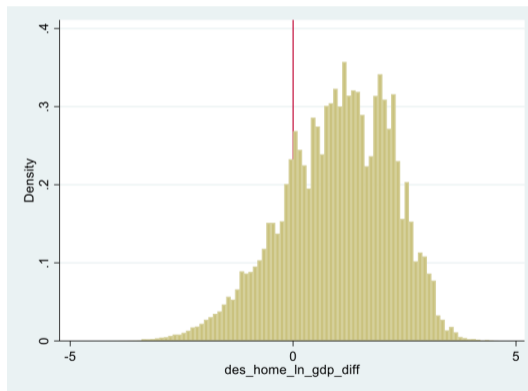○○○○○○○

Model
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Conclusion
○

Motivation

The rise of the migrant entrepreneurs in China

Motivation

Entrepreneurs are sorting to larger cities.

Heterogeneous Hukou Policies

Research Question

How does the reduction in institutional migration barriers reshape the landscape of human capital flow and entrepreneurship in China?

- Heterogeneity in the relaxation of Hukou policy
- The distributional effects of an increase in labor mobility

Exploring the channels— The human capital foundation of entrepreneurship

- Labor market integration
- Entrepreneur/skill movement

Preview of Results

We are the first to provide a full picture of the dynamics of Hukou policy in the past three decades and document its *distributional* effect on entrepreneurial activity.

- Skill-biased Hukou policy attracts migrant entrepreneurs, but crowds out local entrepreneurs.

- Non-restrictive Hukou policy spurs overall entrepreneurship.

- We examine labor mobility and firm performance to investigate the channel.
  - Low-skill labor only responds to non-restrictive Hukou policies, and high-skill labor respond to both.
  - Low-skill firms are hurt by skill-biased Hukou policies, and benefit from non-restrictive Hukou policies.
  - High-skill firms benefit more.

- The unequal relaxation of Hukou policy may contribute to greater regional inequality.
  - Younger entrepreneurs from poorer regions are more responsive to the relaxation of Hukou policy in richer regions.
  - In another related project, we document the long-term reversal of the trend— better entrepreneurs are more likely to return to their hometowns.

Literature

Labor Sorting

- Beerli et al. (2021); Bryan and Morten (2019) (the first one to focus on region-to-region migration)

Entrepreneurship & Firm Location Choice

- Amornsiripanitch et al. (2021); Liang et al. (2018); Bai et al. (2022); Gaubert (2018)

Our contribution: We link the two strands of literature and study simultaneous labor and firm sorting.

Hukou system

- Imbert et al. (2022); An et al. (2021);

Our contribution: We are the first to distinguish skill-biased Hukou policy and study its distributional effect on entrepreneurial activities

Reforming the Hukou

- After 1990, successive Hukou reforms, largely controlled at the prefecture / city level ($\approx$ 350)
- The reforms are highly heterogenous across cities, and **discriminate by group and origin** of migrants (example)
- We collect data on ALL migration-related policy reforms on a number of policy platforms, gazettes, websites and news portals for each city.
- For each policy, we ask…
  - When?
  - For whom?
  - From where?
  - By how much?

  did this policy change immigration restrictions into that city.

An Example of Policy Discrimination back

- Foshan, a manufacturing-agglomeration city in Guangdong (*"Decision on Reform of Household Registration System"* June 1, 2004)
- Approval of local household registration (Hukou) if one of the following criteria is met:
  1. Public sector employees: family all in.
  2. With above college education (male<50; female<45): one in.
  3. Parents/Children/Couples (at least one is local resident)
  4. Entrepreneur with investment here and paying tax > 10,000 RMB: family all in
  5. Running business or be employed continuously for 7 years: one in
  6. Owner of a firm with registered capital of more than 200,000 RMB: family all in
  7. Commercial housing purchase activities: family all in
  8. ...

Hukou Policy over the Past Decades
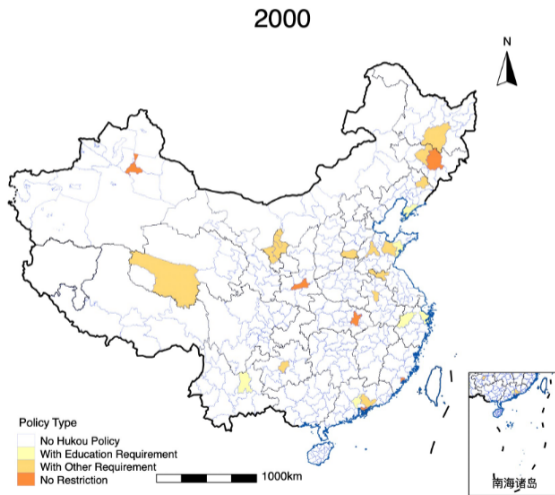
Hukou Policy over the Past Decades
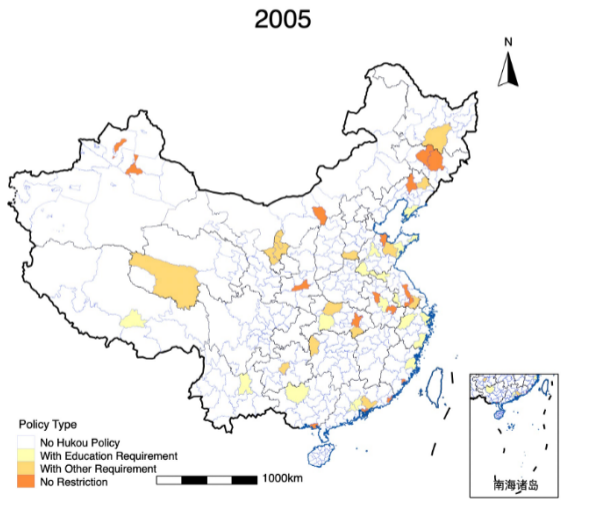
Hukou Policy over the Past Decades
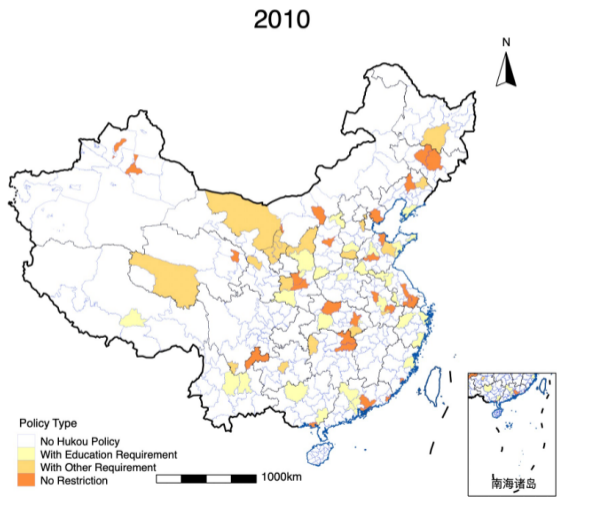
Hukou Policy over the Past Decades
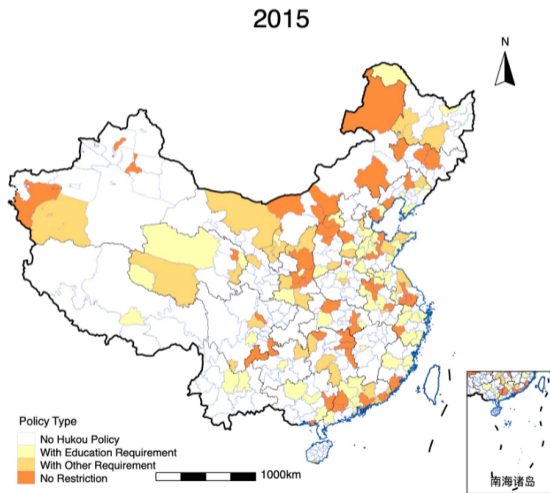
2015

Migration Flow Data

- **Migration flows 1996-2015**: China Population Census 2000, 2005 (mini), 2010, 2015 (mini)
  - We observe the year an individual left their original place of Hukou since the previous census.
  - For example, our migrant flows in 1996 are based only on people who migrated in 1996 and resided at their destination for at least 4 years where we observe them in the 2000 census, while flows for 1999 are based on anyone staying at least 2 years.
- Complimentary data: 90 million college students' CVs which capture their migration history (location choice) for job search.

Entrepreneur and Firm Registration Data

A comprehensive data set covering 90 million firms registered till 2020.

- Firm registration: Detailed firms' registration information, including the establishment date, exit date (if any), industry, registration place, registered capital, shareholders, etc.
- Firm inspection data: Detailed firms' yearly reports
- Entrepreneur: the firms' shareholder and legal person's identity, birth place, birth year, investment history, etc.

Firm Performance Data

Tax survey: A comprehensive data set with stratified sampling of 1 million firms from 2008 to 2016.

- Detailed information on the firms' income, expenditure, tax, etc.
- Representative sample, no selection problem
- We use this data set to measure firms' performance: TFP, Profitability, R&D expenditure, etc.

City level characteristics

- Basic control variables are from China city statistical yearbook 1990-2020

Empirical Strategy

We employ a simple diff-in-diff strategy, with various policy measures as the treatment.

City level:

$$Y_{ct} = \beta_0 + \beta_1 Policy_{ct} + \gamma_c + \delta_t + \epsilon_{ct}$$

where

- Y_{ct}: Number of new entrepreneurs/new firms
- $Policy_{ct}$: measured with different types of Hukou policy
    - General
    - Biased: education/skill/investment/employment
    - Non-restrictive

Baseline

Table 1: Mixed Evidence When Pooling All Types of Hukou Policies and Entrepreneurs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Hukou	0.0154						
	(0.0160)						
Hukou_education		-0.0135					
		(0.0178)					
Hukou_skill			-0.00240				
			(0.0219)				
Hukou_investment				-0.0439**			
				(0.0187)			
Hukou_job					-0.0397**		
					(0.0198)		
Hukou_biased						-0.0212	
						(0.0170)	
Hukou_no restriction							0.0616**
							(0.0255)
log(Population)	0.0456**	0.0460**	0.0457**	0.0463**	0.0463**	0.0463**	0.0459**
	(0.0215)	(0.0215)	(0.0215)	(0.0215)	(0.0215)	(0.0215)	(0.0214)
log(GDP)	0.102***	0.103***	0.102***	0.102***	0.103***	0.103***	0.102***
	(0.0139)	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)
City, Year FE, City Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,816	6,816	6,816	6,816	6,816	6,816	6,816
R-squared	0.981	0.981	0.981	0.981	0.981	0.981	0.981

Table 2: Restrictive Hukou Policy and Firm Growth

	log(Migrant firm)	log(Local firm)	log(Return entre.)	log(Migrant entre.)	log(Local entrepre.)
Hukou_biased	0.0480**	-0.0459**	0.107***	0.0162	-0.0448**
	(0.0197)	(0.0183)	(0.0281)	(0.0178)	(0.0188)
log(Population)	-0.00974	0.0352	0.0188	0.0222	0.0317
	(0.0249)	(0.0231)	(0.0355)	(0.0225)	(0.0238)
log(GDP)	0.0997***	0.105***	0.118***	0.0974***	0.107***
	(0.0161)	(0.0149)	(0.0229)	(0.0145)	(0.0153)
Constant	4.194***	5.339***	1.452***	4.586***	5.206***
	(0.169)	(0.157)	(0.241)	(0.153)	(0.161)
City, Year FE, City Trend	Yes	Yes	Yes	Yes	Yes
Observations	6,816	6,816	6,816	6,816	6,816
R-squared	0.977	0.983	0.948	0.981	0.981

Table 3: Nonrestrictive Hukou Policy and Firm Growth

	log(Migrant firm)	log(Local firm)	log(Return entre.)	log(Migrant entre.)	log(Local entrepre.)
Hukou_no restriction	0.123***	0.0521*	0.115***	0.0981***	0.0532*
	(0.0296)	(0.0275)	(0.0423)	(0.0268)	(0.0283)
log(Population)	-0.00818	0.0342	0.0218	0.0228	0.0308
	(0.0249)	(0.0231)	(0.0355)	(0.0225)	(0.0238)
log(GDP)	0.0991***	0.103***	0.119***	0.0966***	0.106***
	(0.0160)	(0.0149)	(0.0229)	(0.0145)	(0.0153)
Constant	4.188***	5.339***	1.443***	4.582***	5.206***
	(0.168)	(0.157)	(0.241)	(0.152)	(0.161)
City, Year FE, City Trend	Yes	Yes	Yes	Yes	Yes
Observations	6,816	6,816	6,816	6,816	6,816
R-squared	0.977	0.983	0.949	0.981	0.981

Who Are Responding to Hukou Policies?

We further ask the question: What is the *distributional effect* of a higher-mobility labor market? How does the flow of entrepreneurs affect regional inequality?

- if better entrepreneurs are more likely to move
- if entrepreneurs from poorer regions are more likely to respond to policy change
- if entrepreneurs are more likely to respond to policy change in large cities

… We may expect that the more integrated labor market and the flow of entrepreneurs may increase regional inequality –> sorting

Who Are Responding to Hukou Policies?

Firm level regressions:

$$Mig_{ijct} = \beta_0 + \beta_1 Policy_{ct} + \beta_2 X_{it} + \gamma_j + \delta_t + \epsilon_{ijct}$$

and to explore the heterogeneous response by entrepreneur type

$$Mig_{ijct} = \beta_0 + \beta_1 Policy_{ct} + \beta_2 Policy_{ct} D_{jt} + \beta_3 X_{it} + \gamma_j + \delta_t + \epsilon_{ijct}$$

where

- Mig_{ijct}: 1 if firm i is established by a migrant entrepreneur j in city c in year t
- D_{jt}: entrepreneur j's characteristic
  - Previous firm location
  - Hometown
  - Age
  - Previous performance

Who Are Responding to Hukou Policies?

Table 4: Destination GDP and Destination Firm Created by Migrant Entrepreneur

	(1)	(2)	(3)	(4)
Hukou	-0.581***	-0.555***	-0.350***	-0.140***
	(0.00183)	(0.00224)	(0.00235)	(0.00281)
Hukou*log(GDP)	0.0819***	0.0776***	0.0532***	0.0228***
	(0.000253)	(0.000302)	(0.000318)	(0.000375)
Hukou_no restriction		0.0174***		-0.204***
		(0.00270)		(0.00313)
Hukou_no restriction*log(GDP)		0.00168***		0.0356***
		(0.000331)		(0.000378)
ln_GDP	-0.0332***	-0.0355***	0.0208***	0.0121***
	(0.000639)	(0.000641)	(0.000326)	(0.000327)
Constant	0.642***	0.655***	0.246***	0.307***
	(0.00500)	(0.00502)	(0.00236)	(0.00237)
City, Year FE	Yes	Yes	Yes	Yes
Person FE	No	No	Yes	Yes
Observations	27,456,853	27,456,853	11,326,829	11,326,829
R-squared	0.259	0.259	0.819	0.820

Who Are Responding to Hukou Policies?

Table 5: Last Establishment Location and New Firm Creation

	(1)	(2)	(3)	(4)
Hukou	0.199***	-0.0269***	0.130***	0.0788***
	(0.00301)	(0.00356)	(0.00375)	(0.00434)
Hukou*log(Pre.GDP)	-0.0303***	-0.00361***	-0.0107***	-0.0111***
	(0.000385)	(0.000451)	(0.000469)	(0.000542)
Hukou_no restriction		0.486***		0.230***
		(0.00376)		(0.00449)
Hukou_no restriction*log(Pre.GDP)		-0.0535***		-0.0132***
		(0.000443)		(0.000532)
ln_GDP	0.0726***	0.0746***	6.36e-05	0.00832***
	(0.000339)	(0.000339)	(0.000438)	(0.000439)
Constant	-0.0593***	-0.0837***	0.494***	0.419***
	(0.00266)	(0.00269)	(0.00352)	(0.00353)
City, Year FE	Yes	Yes	Yes	Yes
Person FE	No	No	Yes	Yes
Observations	7,132,888	7,132,888	3,814,290	3,814,290
R-squared	0.213	0.215	0.789	0.792

Who Are Responding to Hukou Policies?

Table 6: Home GDP and Destination Firm Created by Migrant Entrepreneur

	(1)	(2)	(3)	(4)
Hukou	1.119***	0.922***	0.741***	0.616***
	(0.00141)	(0.00167)	(0.00227)	(0.00261)
Hukou*log(home GDP)	-0.155***	-0.131***	-0.0907***	-0.0820***
	(0.000192)	(0.000226)	(0.000306)	(0.000349)
Hukou_no restriction		0.465***		0.424***
		(0.00169)		(0.00280)
Hukou_no restriction*log(home GDP)		-0.0514***		-0.0372***
		(0.000218)		(0.000360)
ln_GDP	-0.0485***	-0.0422***	0.0341***	0.0359***
	(0.000178)	(0.000179)	(0.000840)	(0.000833)
Constant	0.860***	0.796***	0.194***	0.171***
	(0.00129)	(0.00131)	(0.00635)	(0.00629)
City, Year FE	Yes	Yes	Yes	Yes
Person FE	No	No	Yes	Yes
Observations	27,226,186	27,226,186	11,230,443	11,230,443
R-squared	0.331	0.333	0.815	0.819

Who Are Responding to Hukou Policies?

Table 7: Age and Destination Firm Created by Migrant Entrepreneur

	(1)	(2)	(3)	(4)
Hukou	0.125***	0.0910***	0.215***	0.122***
	(0.000763)	(0.000866)	(0.00135)	(0.00151)
Hukou*log(age)	-0.00308***	-0.00245***	-0.00344***	-0.00242***
	(1.72e-05)	(2.00e-05)	(3.30e-05)	(3.69e-05)
Hukou_no restriction		0.104***		0.253***
		(0.000885)		(0.00158)
Hukou_no restriction*log(age)		-0.00128***		-0.00315***
		(2.02e-05)		(3.80e-05)
ln_GDP	-0.00193***	-0.00191***		
	(1.39e-05)	(1.39e-05)		
Constant	0.521***	0.507***	0.427***	0.415***
	(0.000603)	(0.000611)	(0.000257)	(0.000258)
City, Year FE	Yes	Yes	Yes	Yes
Person FE	No	No	Yes	Yes
Observations	27,616,743	27,616,743	11,520,576	11,520,576
R-squared	0.264	0.264	0.814	0.817

The Performance

Table 8: Migrant Firm's Performance

	log(Revenue)	log(Employment)	log(Profit)	TFP	log(R&D)	log(Wage)
Migrant	0.100***	0.00645***	0.0204***	0.0916***	0.0619***	-0.0128***
	(0.00495)	(0.00159)	(0.00402)	(0.00221)	(0.00312)	(0.00114)
Constant	7.037***	3.064***	4.993***	-0.0827***	0.426***	-2.970***
	(0.00249)	(0.000871)	(0.00218)	(0.00114)	(0.00166)	(0.000620)
C, I, Y, H FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,144,462	2,858,838	1,549,195	1,452,648	1,528,346	2,693,550
R-squared	0.242	0.393	0.329	0.134	0.184	0.237

Takeaway: Migrant Firms are much more skilled!

Mechanism

Why entrepreneurs respond to different policies differently?

- Local Labor Market Skill Composition
  - Skill-biased policy may attract more high-skill labor, non-restrictive policies attract low-skill labor, who supply labor and lower labor cost, and generate market demand, and both are very essential for the success of an entrepreneur
  - This is particularly important for the low-skill-labor intensive industries
- Firms in different industries may respond differently
  - Low skill firms may be hurt by skill-biased policy facing more fierce competition from migrant entrepreneurs
  - High skill firms benefit from the skill-biased policy with cheaper high-skill labor
  - Low skill firms may benefit from non-restrictive policy with abundant low-skill worker
  - High-skill firms benefit even more from non-restrictive policy with demand spillover

Labor Market Integration Channel

$$Y_{ict} = \beta_0 + \beta_1 Policy_{ct} + \gamma_c + \delta_t + \epsilon_{ct}$$

- Y_{ict}: Share of migrants of type i (by education level), in city c in year t
- We again consider general policy vs. skill-biased policy vs. non-restrictive policy

Migrant Labor in Response to Hukou Policy

Table 9: Different Type of Hukou Policies

	(1)	(2)	(3)	(4)	(5)	(6)
Hukou	0.123***					
	(0.0303)					
Hukou_education		0.0585*				
		(0.0321)				
Hukou_skill			0.0997***			
			(0.0367)			
Hukou_investment				0.116***		
				(0.0325)		
Hukou_job					0.0892***	
					(0.0332)	
Hukou_biased						0.0983***
						(0.0306)
Constant	2.973***	2.992***	2.991***	2.985***	2.989***	2.984***
	(0.00994)	(0.00869)	(0.00809)	(0.00850)	(0.00842)	(0.00898)
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
City Trend	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,292	6,292	6,292	6,292	6,292	6,292
R-squared	0.863	0.862	0.862	0.863	0.862	0.863

Heterogeneous Response in Internal Migration

	All		Below College		College and Above	
	(1)	(2)	(3)	(4)	(5)	(6)
Hukou	0.0908***		0.0542*		0.217***	
	(0.0324)		(0.0314)		(0.0416)	
Hukou_No restriction	0.134***	0.150***	0.192***	0.205***	0.0905	0.0915
	(0.0482)	(0.0484)	(0.0468)	(0.0469)	(0.0619)	(0.0620)
Hukou_biased		0.0613*		0.0281		0.214***
		(0.0328)		(0.0318)		(0.0421)
Constant	2.971***	2.979***	2.740***	2.746***	1.405***	1.417***
	(0.00998)	(0.00910)	(0.00968)	(0.00882)	(0.0128)	(0.0117)
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
City Trend	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,292	6,292	6,292	6,292	6,292	6,292
R-squared	0.863	0.863	0.863	0.863	0.767	0.767

Firm Performance

To better understand the effect of different types of Hukou policy on firm performance, we use the Tax record data to examine:

- the effect of variuos types of policy
- firms in different industry with different skill intensity
- Outcomes:
    - Employment: employment, wage
    - Production: revenue, profit
    - R&D
- The result should be understood as the effect on the intensive margin...

Firm Performance

	Log(Employment)				Log(Wage)			
Hukou	0.0235***			0.0143***	-0.00821***			-0.0139***
	(0.00225)			(0.00230)	(0.00304)			(0.00313)
Hukou_biased		0.0144***				-0.0204***		
		(0.00214)				(0.00287)		
Hukou_no restriction			0.0331***	0.0263***			0.00186	0.00178
			(0.00247)	(0.00251)			(0.00330)	(0.00338)
log(Asset)	0.177***	0.179***	0.177***	0.179***	-0.107***	-0.109***	-0.108***	-0.110***
	(0.000441)	(0.000461)	(0.000441)	(0.000493)	(0.000658)	(0.000690)	(0.000658)	(0.000740)
Constant	1.879***	1.872***	1.885***	1.856***	-2.123***	-2.118***	-2.129***	-2.118***
	(0.00453)	(0.00468)	(0.00437)	(0.00519)	(0.00674)	(0.00700)	(0.00653)	(0.00772)
Firm, Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,640,700	3,382,582	3,640,700	3,003,272	3,413,090	3,173,428	3,413,090	2,821,212
R-squared	0.926	0.926	0.926	0.927	0.642	0.644	0.642	0.645

Firm Performance

	log(Profit)				log(Revenue)			
Hukou	0.0599***			0.0648***	0.0463***			0.0427***
	(0.00665)			(0.00668)	(0.00355)			(0.00357)
Hukou_biased		0.123***				0.0387***		
		(0.00616)				(0.00335)		
Hukou_no restriction			0.0326***	0.0322***			0.0396***	0.0341***
			(0.00716)	(0.00718)			(0.00389)	(0.00391)
log(Asset)	0.394***	0.401***	0.394***	0.400***	0.403***	0.403***	0.403***	0.403***
	(0.00165)	(0.00171)	(0.00165)	(0.00179)	(0.000702)	(0.000702)	(0.000702)	(0.000702)
Constant	2.251***	2.185***	2.280***	2.196***	5.675***	5.683***	5.693***	5.668***
	(0.0174)	(0.0179)	(0.0170)	(0.0192)	(0.00720)	(0.00708)	(0.00694)	(0.00725)
Firm, Year FE								
Observations	1,888,038	1,770,622	1,888,038	1,603,752	3,611,719	3,611,719	3,611,719	3,611,719
R-squared	0.906	0.905	0.906	0.908	0.911	0.911	0.911	0.911

Firm Performance

	log(Value-added)				TFP			
Hukou	0.0626***			0.0403***	0.0537***			0.0448***
	(0.0102)			(0.0103)	(0.00400)			(0.00406)
Hukou_biased		0.142***				0.0564***		
		(0.00970)				(0.00373)		
Hukou_no restriction			0.152***	0.137***			0.0183***	0.00683
			(0.0128)	(0.0129)			(0.00512)	(0.00517)
log(Asset)	0.453***	0.455***	0.453***	0.453***	0.131***	0.133***	0.131***	0.138***
	(0.00325)	(0.00335)	(0.00325)	(0.00362)	(0.00126)	(0.00131)	(0.00126)	(0.00141)
Constant	3.373***	3.326***	3.370***	3.370***	-1.304***	-1.315***	-1.276***	-1.345***
	(0.0339)	(0.0349)	(0.0336)	(0.0383)	(0.0129)	(0.0133)	(0.0127)	(0.0145)
Firm, Year FE								
Observations	1,349,744	1,270,997	1,349,744	1,108,954	1,713,071	1,602,045	1,713,071	1,422,719
R-squared	0.754	0.754	0.754	0.755	0.753	0.754	0.753	0.759

Firm Performance

	1(R&D>0)				log(R&D)			
Hukou	0.00518***			0.00483***	-0.0512			-0.0951**
	(0.000750)			(0.000783)	(0.0413)			(0.0414)
Hukou_biased		0.00708***				-0.0140		
		(0.000719)				(0.0393)		
Hukou_no restriction			0.00837***	0.00828***			0.525***	0.535***
			(0.000821)	(0.000854)			(0.0456)	(0.0457)
log(Asset)	0.00486***	0.00504***	0.00486***	0.00527***	0.699***	0.699***	0.697***	0.697***
	(0.000147)	(0.000155)	(0.000147)	(0.000168)	(0.0124)	(0.0124)	(0.0124)	(0.0124)
Constant	0.00347**	0.00234	0.00436***	-0.000228	-3.644***	-3.670***	-3.847***	-3.785***
	(0.00151)	(0.00157)	(0.00145)	(0.00176)	(0.143)	(0.143)	(0.141)	(0.144)
Firm, Year FE								
Observations	3,642,733	3,384,503	3,642,733	3,005,029	315,080	315,080	315,080	315,080
R-squared	0.588	0.590	0.588	0.594	0.553	0.553	0.553	0.553

Skill Heterogeneity

We measure the firms' skill intensity at industry level following Belo et al. (2017)

- Skill intensity is defined as the percentage of college graduates in the industries' total employment
- Belo et al. (2017) is for US industries
- We use the industry correspondence to map to Chinese data

The specification is

$$Y_{ict} = \beta_0 + \beta_1 Policy_{ct} * Skill_{it} + \beta_2 X_{it} + \gamma_i + \delta_t + \epsilon_{ijct}$$

Firm Performance by Skill Heterogeneity

	log(Profit)	log(Value-added)	log(Revenue)	TFP
Hukou_biased	0.00695	-0.0126	-0.0103*	0.0240***
	(0.0118)	(0.0178)	(0.00626)	(0.00691)
Hukou_biased*Skill	0.102***	0.129***	0.107***	0.0618***
	(0.0187)	(0.0285)	(0.00992)	(0.0114)
Hukou_no restriction	0.0289**	0.101***	0.0139**	-0.0223**
	(0.0129)	(0.0230)	(0.00697)	(0.00898)
Hukou_no restriction*Skill	-0.00573	0.0799**	0.0411***	0.0714***
	(0.0202)	(0.0358)	(0.0111)	(0.0145)
log(Asset)	0.394***	0.453***	0.406***	0.131***
	(0.00168)	(0.00329)	(0.000724)	(0.00127)
Constant	2.230***	3.330***	5.627***	-1.313***
	(0.0177)	(0.0344)	(0.00746)	(0.0131)
Firm, Year FE	Yes	Yes	Yes	Yes
Observations	1,832,381	1,318,942	3,503,124	1,678,137
R-squared	0.906	0.754	0.909	0.753

Model Setup

We build a standard spatial equilibrium model for estimation purpose and use the simplified version to illustrate our key mechanism: labor sort in response to the reduction in mobility cost, and firms sort with labor.

- A closed economy with N cities indexed by o or d
- A mass of H-type workers and a mass of L-type workers, each normalized to be of measure one
- Workers are born in a particular origin indexed by o, receive idiosyncratic preference shocks for each destination city d, and sort across destinations according to wages, amenities, and migration costs.
- Migration costs are relative to the birth location, and is modeled as an iceberg cost τ_{od}^s for workers of type $s = H, L$ migrating from o to d

Model Setup

- Firms are owned by mobile entrepreneurs.
- Firms use H-type labor and L-type labor to produce output.
- There is a fixed mass of h-type firms producing H-type worker-intensive products, and a fixed mass of l-type firms producing L-type worker-intensive products, each also normalized to be of measure one, sort across cities.
- Goods are freely traded in the baseline model.

Household

Households choose their city d, employer ω, consumption of h-type product Q_{dh} and l-type product Q_{dl} to maximize

$$U_{ods\omega} = b_{d\omega} a_d (1 - \tau_{od}^s)(Q_h)^{\beta}(Q_l)^{(1-\beta)}, \ Q_v = \Big[\int_{w \in \Omega_v} (q_v(w))^{\frac{\sigma-1}{\sigma}} \, dw \Big]^{\frac{\sigma}{\sigma-1}}$$

- $b_{d\omega}$ is an household-specific idiosyncratic preference shock for city d and employer ω;
- $\beta \in (0,1)$ is the expenditure share on h-type product;
- Q_v aggregates all product varieties w available in sector v, using a constant elasticity of substitution $\sigma > 1$;
- Households draw the set of idiosyncratic shocks $b_{d\omega}$ from a nested Fréchet distribution, which guides their sorting decisions across space and across employers.

Household Location Choice

Each location is endowed with a fixed mass of labor with skill level s. Households locate to maximize their indirect utility which is a function of wage and mobility cost.

$$\frac{L_{ods}}{\bar{L}_{os}} = \Big(\frac{(1-\tau_{od}^s)W_{ds}}{\tilde{W}_{os}}\Big)^\xi$$

The implied regional labor supply, given by the probability that an agent of type s from origin d chooses city d, equals to:

$$L_{ds} = \sum_o L_{ods} = \sum_o \bar{L}_{os}\Big(\frac{(1-\tau_{od}^s)W_{ds}}{\tilde{W}_{os}}\Big)^\xi$$

- L_{ds} is the measure of households of type s that choose city d
- W_{ds} is the regional skill-specific ideal wage index, aggregating the employer-specific wages $w_{ds}(\omega)$.
- $\tilde{W}_{os} = \Big(\sum_d \big((1-\tau_{od}^s)W_{ds}\big)^\xi\Big)^{\frac{1}{\xi}}$

h-Type Firms

There exists a fixed mass of firms which must decide in which city to locate. Assuming that these firms heterogeneous in terms of their productivity across locations, which are mainly affected by two factors: labor cost and agglomeration effect.

- Cobb-Douglas technology:

$$q_{dh}(\omega) = \varphi_{dh}(\omega) l_{dhH}^{\alpha} l_{dhL}^{1-\alpha}$$

  where $\varphi_{dh}(\omega) = M_{dh}^{\rho} z_{dh}(\omega)$ is firm-specific productivity.

- Conditional on the firms' location choice, they solve the maximization problem:

$$\max_{l_{dH}, l_{dL}} P_h Q_h^{\frac{1}{\sigma}} \left(\varphi_{dh}(\omega) l_{dhH}^{\alpha} l_{dhL}^{1-\alpha} \right)^{\frac{\sigma-1}{\sigma}} - \sum_{s=L,H} W_{ds} L_{ds}^{-\frac{1}{\epsilon}} l_{dhs}^{1+\frac{1}{\epsilon}}$$

Note: $P_h Q_h^{\frac{1}{\sigma}}$ $W_{ds} L_{ds}^{-\frac{1}{\epsilon}}$ and captures the market power of the firm in output and labor market.

l-Type Firms

For simplicity, assume that firms in the l-sector only employ low-skill worker. The production function of firms in the l-sector is given by

$$q_{dl}(w) = \varphi_{dl}(w) l_{dl}$$

Then firm's maximization problem is.

$$\max_{l_s} P_l Q_l^{\frac{1}{\sigma}} (\varphi_{dl} l_{dl})^{1-\frac{1}{\sigma}} - W_{dl} L_{dl}^{-\frac{1}{\epsilon}} l_{dl}^{1+\frac{1}{\epsilon}}$$

Firm Location Choice

A fixed mass of firms in each sector decide in which city to locate to maximize the profit.

h-sector: The fraction of firms located in city d is thus

$$\frac{M_{dh}}{M_h} = \left(\frac{\gamma_{dh}}{\gamma_h}\right)^{\frac{\varepsilon}{\frac{1}{\psi}}\frac{\sigma-1}{\sigma}}$$

where

$$\gamma_{dh} = C_{dh}^{-\frac{1-\psi}{\psi}} M_{dh}^{\frac{\rho}{\psi}\frac{\sigma-1}{\sigma}}, \quad \gamma_h = \left(\sum_{d=1}^{N} \gamma_{dh}^{\frac{\varepsilon}{\frac{1}{\psi}}\frac{\sigma-1}{\sigma}}\right)^{\frac{\frac{1}{\psi}\frac{\sigma-1}{\sigma}}{\varepsilon}}$$

l-sector:

$$\frac{M_{dl}}{M_l} = \frac{(C_{dl})^{\frac{(1-\psi)\varepsilon\sigma}{1-\sigma}}}{\sum_i (C_{il})^{\frac{(1-\psi)\varepsilon\sigma}{1-\sigma}}}$$

Equilibrium

A general equilibrium of this economy consists of distributions of workers and firms $\{L_{ods}, M_{dv}, s = H/L, v = h/l\}_{o,d=1}^{N}$, aggregate quantities $\{Q_h, Q_l\}$, wages $\{W_{ds}, s = H/L\}_{o,d=1}^{N}$, and final good prices $\{Q_h, Q_l\}$ such that:

- i) firms optimize on their location choice and labor demand;
- ii) workers make consumption and location decisions optimally;
- iii) final good markets clears in every sector;
- iv) the labor market clears in every city and skill type.

Calibration - Parameters

Parameter	Detail	Value
ξ	Workers' mobility elasticity on wage	1.4 (estimated from 2010 census)
τ	Worker's type- and destination- specific mobility cost	See fig-tau for estimates
ϵ	Workers' employer preference dispersion	Set to be 5 from (Fajgelbaum et al., 2019)
ε	Firms' mobility elasticity on cost	0.5 (estimated from firm registration data)
α	Firms' production technology parameter	See fig-alpha for estimates
σ	Firms' market power	Set to be 5 from (Fajgelbaum et al., 2019)
ρ	Agglomeration effect	Set to be 0.2 from (Gaubert, 2018)

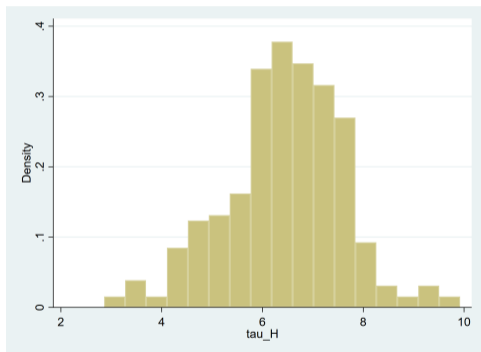# Calibrated Skill-Specific Wage Distribution
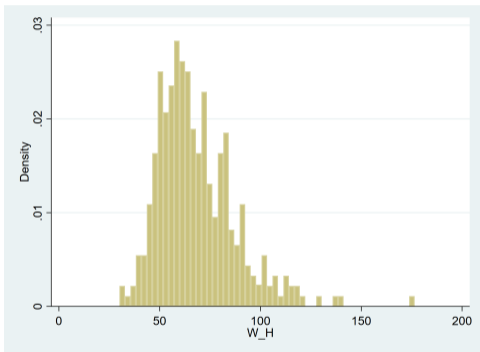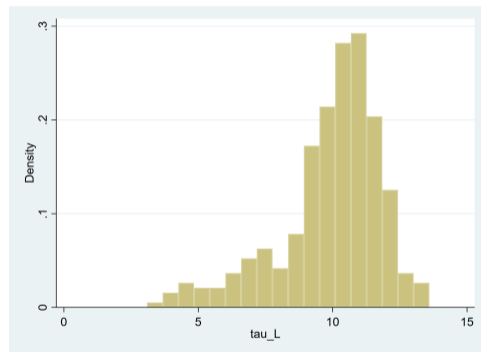

(a) High Skill
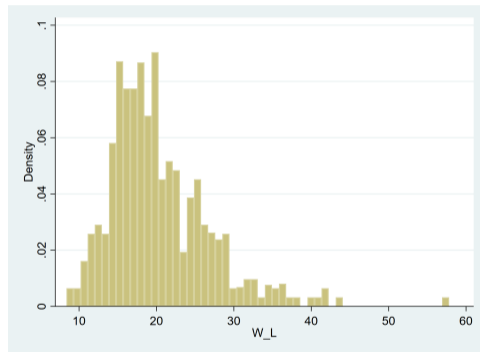
(b) Low Skill

Calibrated Skill-Specific Migration Cost Distribution 2010

(a) High Skill

(b) Low Skill

Migration Cost

Table 10: Estimated Migration Cost Reduction

	log(Migration cost_Low skill)	log(Migration cost_High skill)
Nonrestrictive Hukou	-0.212**	0.0448
	(0.107)	(0.301)
Skilled-biased Hukou Policy	0.0589	-0.190**
	(0.116)	(0.083)
Constant	3.064***	2.112***
	(0.0204)	(0.0338)
City FE		
Year FE		
City trend		
Observations	1,419	1,167
R-squared	0.705	0.682

Counterfactual - Random 20 Cities

	Biased			Unrestrictive		
	Overall	Relaxed	Unrelaxed	Overall	Relaxed	Unrelaxed
Total Welfare	1.50%	14.64%	-0.75%	10.17%	100.96%	-1.50%
Welfare (High Skill)	15.09%	95.24%	-0.98%	16.17%	104.47%	-1.52%
Welfare (Low Skill)	-0.40%	2.33%	-0.73%	9.58%	100.42%	-1.50%
Wage (High Skill)	0.91%	-4.86%	1.27%	0.91%	-1.87%	1.08%
Wage (Low Skill)	-0.47%	2.93%	-0.69%	-0.36%	-2.40%	0.23%
Labor (High Skill)	-	2.61%	-2.22%	-	4.18%	-2.57%
Labor (Low Skill)	-	0.58%	-0.04%	-	2.67%	-1.73%
Firm (High Skill)	-	2.70%	-2.37%	-	3.99%	-1.25%
Firm (Low Skill)	-	-2.13%	1.82%	-	2.08%	-0.88%

Counterfactual - Largest 20 Cities

	Biased			Unrestrictive		
	Overall	Relaxed	Unrelaxed	Overall	Relaxed	Unrelaxed
Total Welfare	2.56%	17.06%	-2.52%	19.30%	108.88%	-4.27%
Welfare (High Skill)	29.02%	98.23%	-3.06%	31.61%	109.79%	-4.61%
Welfare (Low Skill)	-1.17%	4.12%	-2.47%	18.07%	108.73%	-4.24%
Wage (High Skill)	1.04%	-7.02%	4.56%	3.66%	-3.73%	4.12%
Wage (Low Skill)	-1.89%	3.89%	-2.25%	-0.77%	-0.84%	-0.77%
Labor (High Skill)	-	6.60%	-4.29%	-	8.96%	-8.38%
Labor (Low Skill)	-	0.22%	-0.13%	-	5.25%	-3.50%
Firm (High Skill)	-	6.65%	-5.53%	-	6.98%	-5.30%
Firm (Low Skill)	-	-5.21%	4.30%	-	6.17%	-5.09%

Counterfactual - Smallest 20 Cities

	Biased			Unrestrictive		
	Overall	Relaxed	Unrelaxed	Overall	Relaxed	Unrelaxed
Total Welfare	0.10%	17.50%	-0.08%	0.24%	108.48%	-0.28%
Welfare (High Skill)	0.33%	110.10%	-0.19%	0.30%	123.91%	-0.29%
Welfare (Low Skill)	-0.20%	8.44%	-0.06%	0.23%	106.97%	-0.28%
Wage (High Skill)	-0.77%	-12.13%	-0.06%	-0.57%	-7.41%	-0.14%
Wage (Low Skill)	0.47%	9.09%	-0.07%	-0.30%	-2.82%	-0.14%
Labor (High Skill)	-	19.55%	-0.13%	-	20.91%	-0.15%
Labor (Low Skill)	-	-0.60%	0.01%	-	6.49%	-0.14%
Firm (High Skill)	-	18.76%	-0.15%	-	19.58%	-0.16%
Firm (Low Skill)	-	-15.03%	0.02%	-	13.24%	-0.13%

Conclusion

- We are the first to provide a full picture of the dynamics of Hukou policy in the past three decades and document its *distributional* effect on entrepreneurial activity.

- We build a standard spatial equilibrium model following Bryan and Morten (2019) and Fajgelbaum et al. (2019) for estimation purpose and use the simplified version to illustrate our key mechanism: labor sort in response to the reduction in mobility cost, and firms sort with labor.

- We provide rich empirical results to document the heterogeneous response to the relaxation of Hukou policies in labor mobility and firm performance.

- The unequal relaxation of Hukou policy may contribute to greater regional inequality, but improves overall efficiency and welfare.

- In another related project, we document the long-term reversal of the trend— better entrepreneurs are more likely to return to their hometowns.