

DECENTRALIZATION, DESTINATION CHOICES, AND GOVERNANCE: EXPLORING  
CHINA'S HUKOU SYSTEM AND INTERNAL MIGRATION

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## ABSTRACT

As migration is considered closely connected with differentials in regional development, which is a bi-directional process, the idea of managing migration to maximize the benefits of migration has attracted both scholars and policymakers. Therefore, internal migration in China constitutes an intriguing case: the unprecedented surge in internal migration comes at a time when China's economic structure is transitioning from socialist to market-oriented while the hukou system, relic of the planned economy era from 1949 to 1978, has retained its power for the state to manage population. However, the effectiveness of a high or low hukou acquisition threshold in discouraging or encouraging immigration remains a contentious issue.

This thesis aims to elucidate the link between the hukou system and population redistribution. Using macro-aggregated and micro-behavioral data, it employs gravity models, nested logit models, and logistic regression models to analyze the effects of the hukou system on migration from three perspectives: macro, micro, and institutional. Three methods are employed to integrate the localized hukou system into the empirical framework: a proxy variable, the hukou status of migrants, and a hukou difficulty index.

The quantitative analysis indicates that internal migrants in China show a strong inclination towards upward mobility, despite higher difficulty of obtaining local hukou. Additionally, it reveals that the effects of the hukou system vary greatly across time, regions, and populations.

## BIOGRAPHICAL SKETCH

Yu Wang is an MSc student in regional science at Cornell University. She received her bachelor's degree in urban-rural planning from Wuhan University in 2021. She will start her doctoral study at the Edward J. Bloustein School in the fall of 2023.

To my family

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## CHAPTER 1

### INTRODUCTION

#### *China's Internal Migration*

Migration has been attractive to social scientists for centuries. Ever since Ravenstein (1885, 1889) pioneered systematic empirical studies on migration, based on U.K. census data from 1871 to 1881 and later on data from Europe, the United States and Canada, scholars from a diverse range of fields have sought to understand people's migratory behavior. As migration is considered closely connected with differentials in regional development, which is a bi-directional process, the idea of managing migration to maximize the benefits of migration has attracted both scholars and policymakers. In this sense, China has been a natural experimental field for understanding the institutional power in intervening the population redistribution process.

The contribution of "floating population"<sup>1</sup> to China's stunning economic takeoff and radical urban changes in the past four decades cannot be overstated. Fang and Dewen (2008) estimated that rural-urban migration accounted for nearly 70% of urban growth in the 1980s and over 80% in the 1990s. The latest population census data show that the number of "floating population" in China reached 375.82 million in 2020, increasing by 69.73 percent compared with 2010<sup>2</sup>. In addition to well researched connections between migration and economic development, "floating population" plays a significant role in providing cheap labor for China's economic success as the

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<sup>1</sup> Population movements that do not involve a change in hukou are classified as "temporary migrants" or "floating population" (*liudong renkou*) in Chinese legal conceptualization of migration. By contrast, migrants whose hukou has been formally transferred to the new location are classified as "permanent migrants". See Chan and Zhang (1999), Fan (2002), and Goodkind and West (2002). Unless otherwise states, "migrants" in this thesis refers to temporary migrants.

<sup>2</sup> See National Bureau of Statistics (2021), [http://www.stats.gov.cn/english/PressRelease/202105/t20210510\\_1817185.html](http://www.stats.gov.cn/english/PressRelease/202105/t20210510_1817185.html), for main data of the Seventh National Population Census.

unique household registration (*hukou*) system separates people's spatial mobility from local citizenship (Chan, 2009; Fan, 2002).

Originally incepted to monitor internal migration in the early 1950s, the hukou system was designed to block rural-urban migration and to speed up industrialization in the 1960s. In the 1980s, the economic reform in coastal regions such as Shanghai and Shenzhen triggered sharply increased demands for cheap labor. Simultaneously, the rural de-collectivization boosted productivity and led to a large surplus of rural labor. The hukou system has since then undergone a series of “deep” reform to “free” peasant labor. However, far from returning Chinese citizens the rights of free migration and residence, the reformation of the hukou system has served to facilitate the exploitation of low-cost “rural migrant labor” (Chan, 2009). In this process, the management of the hukou system has been gradually devolved to local-level administrative units. Therefore, the local governments were empowered to decide the criteria upon which local hukou would be granted to immigrants, which are also called “hukou entry conditions” (*zhunru tiaojian*). In most cases, while absence of a local hukou does not continue to pose direct restrictions on immigration, the system selectively excludes immigrants from state-provided public services and therefore, is of determining import for immigrants' long-term wellbeing. In other words, non-local hukou migrants are not *de jure* residents even though they are *de facto* residents. Hence, by mobilizing population and simultaneously excluding immigrants from local benefits, the hukou system has enabled an infinite supply of manual labor at extremely low cost for China's industrialization and urbanization (Chan, 2009; Friedman, 2018).

Hence, from a theoretical standpoint, internal migration in China constitutes an intriguing case: the unprecedented surge in internal migration comes at a time when China's economic structure is transitioning from socialist to market-oriented while the hukou system, relic of the planned

economy era from 1949 to 1978, has remained one of the most critical tools for the state to manage population.

Against this backdrop, this thesis has the following objectives:

**Objective 1:** Explain the measures of the localized hukou system to filter for desirable immigrants.

**Objective 2:** Uncover factors influencing the destination choices of Chinese migrants in China's configuration of socioeconomic and political forces.

### ***What Is Migration?***

Operational definitions of migration can be traced back to the United Nations manual, *Methods of Measuring Internal Migration* (1970), which proposed that:

Migration is a move from one migration-defining area to another (or a move of some specified minimum distance) that was made during a given migration interval and that involved a change of residence (United Nations, 1970, p.2)

Apart from changes in usual place of residence, the hukou system adds another layer of operational definition of internal migration in China. That is, Chinese Census defines “floating population” or migrants as individuals who do not hold permanent local hukou at their places of residence but have resided there for at least six months<sup>3</sup>.

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<sup>3</sup> See National Bureau of Statistics (2002), <http://www.stats.gov.cn/enGLiSH/ClassificationsMethods/Definitions/>, for more detailed definitions.

While operational definition of migration is generally clear, there is no overarching conceptualization of migration, but rather a diverse range of perspectives emerging from multiple disciplines, including geography, economics, sociology, political science, and public policy (Brown & Bean, 2016; Greenwood & Hunt, 2003). Ravenstein's scholarship (1885, 1889) encompasses a conceptual model that views the migration process as a response to spatial differentials in economic opportunities. Ravenstein's "laws of migration" states that most migration moves in a short distance and in universal directions to "the great centers of commerce and industry which absorb the migrants". In addition, population sizes of the origin and destination are critical to explain migration flows. Over half a century later, Thomas (1938) complements Ravenstein's (1885, 1889) focus on the geographical aspects that condition the migration response to spatial utility differentials through attention to the demographic structure (Greenwood & Hunt, 2003). Her incorporation of migration differentials in age, sex, family status, health, education, occupation, and motivation revealed a rich understanding of migration as "a process of selections" (p.4).

These early explorations in the field of migration study have heavily influenced later conceptualizations of mobility. One of the most classical migration theories should be "push and pull" theory. According to Ravenstein (1885, 1889), migration can be understood as a response to push and pull effects exerted by unfavorable and favorable economic conditions. The search for potential "push and pull" factors has since become a feature of migration studies (O'Reilly, 2022); the most discussed ones can include economic opportunities, quality of life, climate, and urban amenities. In addition to real spatial utility differentials, "expected" differential is also well explored (Todaro, 1969). Piore's (1979) dual labor market theory challenged this common idea that migration is a response to "push and pull" factors, stating that it is the dualistic nature of

labor markets in modern industrial societies that create a chronic and unavoidable demand for temporary labor.

Overall, previous wisdom has offered a diverse range of perspectives to understand migration. However, despite the differences, a common underpinning logic to aforementioned and much other migration scholarship is that “we know and can measure why people choose to migrate” (Collins, 2018, p.965), which can serve as basis for migration management.

### ***Migration Management***

The separation of the two aspects of migration, namely, movement and citizenship, is not uncommon in the context of international migration (Chan, 2009). In wealthy countries, immigration, in particular of low-skilled workers and asylum seekers, is often viewed as a problem in need of management and control (de Haas et al., 2019). For instance, Canada has utilized a point system since the early 1990s to assess individuals’ potential contribution to and success in the Canadian economy, so as to decide whether or not the applicants are admissible (Green & Green, 1995).

While international migration policy discourses and practices have been evolving in accordance with economic, social, and political situations around the world (Appleyard, 2001), at the core of these institutional instruments is an attempt to turn migration into a more orderly, predictable and manageable process, and to make it benefit all parties involved (Geiger & Pécoud, 2010, p.2). From the perspective of receiving regions, this intrinsic objective of migration policies – to maximize the positive impacts of immigration – advocates a “regulated openness” to economically needed migration and restrictions regarding unwanted migration (Geiger & Pécoud, 2010, p.3). A holistic regime of rules is, therefore, needed to define who can be a

member of the citizenry and who cannot, and to determine how such membership can be acquired (de Haas et al., 2019). In the international context of migration, this led to the emergence of modern passport and visa systems (Neumayer, 2006).

Therefore, when researchers emphasize migration as a function of the state's ability to determine who qualifies for membership, international migration is typically viewed as differing fundamentally from internal migration (Zolberg, 1981), and this is what makes China's internal migration a unique case. The deep reform of the hukou system since the 1990s does not change its crucial role in China's institutional framework to regulate and restrict internal migration (Wang, 2004). Adaptation and reforms have led to the decentralization of the operation of the hukou system. The localized hukou system has enabled large cities, especially the most attractive ones, to minimize the negative impacts believed to be related to surplus populations. For example, denying temporary migrants equal citizenship allows local governments to avoid the costs of providing basic services, including education, health care, and social welfare, to immigrants (Friedman, 2018). On the other hand, through a series of entry conditions ("*zhunru tiaojian*"), China's major urban centers have sought to filter for desirable immigrants based on skill, wealth, or family background (Chan & Buckingham, 2008; Johnson, 2017). In this sense, the ends and means of the hukou system are no different from that of commonly used international migration policies (de Haas et al., 2019).

Hence, on the one hand, in a context with a unique configuration of social, economic, and political forces, migratory activities in China cannot be easily explained by Western analytical frameworks of internal migration. On the other hand, China makes a natural experimental field for understanding the institutional power in intervening the population redistribution process.

## *Research Design*

The central government has been encouraging the development of small cities in underdeveloped regions since the late 1990s, to rectify the severe spatial inequality across China and resolve the urban problems in megacities. Almost all policies related to population management and urbanization have underscored the importance of restricting immigration to large cities. The New Urbanization Plan (2014-2020) is an example of a large pile of relevant policies. Nevertheless, whether or not a high (low) hukou acquisition threshold has managed to discourage (encourage) immigration remains a question. In this context, despite a general agreement on the importance of the hukou system for understanding China's internal migration, only a few studies have quantitatively estimated the effects of the hukou system and opinions vary on the effectiveness of the localized hukou system on directing internal migration (Bao et al., 2011; Colas & Ge, 2019).

Therefore, my thesis aims to unravel the connection between the hukou system and the process of population redistribution, and this main question can be further broken down into the following sub-questions:

1. What have been the internal migration trends in China in the past decades? What factors have shaped the spatial pattern? In this process, what are the effects of the hukou system?

These questions seek to test the effectiveness of the hukou system in directing migration at a macro level. To answer this question, it is essential to simultaneously assess the weight of all migration-relevant factors, including institutional and economic factors.

Referring to Bao et al. (2011), I use the percentage of local hukou holders to all population in each province to measure the hukou threshold. Based on 2000, 2010, and 2020 Chinese census data, I use gravity models to estimate the impacts of the hukou system on the

aggregated volume of migration flows. I postulate that the effects of the hukou system vary in the past three decades. More specifically, the hukou system plays a more important role in the 1990s but its importance is diminishing in the later two decades. Moreover, the difficulty of obtaining local hukou is negatively associated with the aggregated volume of migration flows.

2. How does the hukou system influence migrants' destination choice behavior in China's context? How does this effect vary across educational attainment?

This set of questions aims to estimate the effects of the hukou system at a micro level.

Considering the fact that the localized hukou system is designed to filter for desirable immigrants, especially those with high educational attainment, I also takes into account the heterogeneity of the effects exerted by the hukou system.

To estimate the effects of the hukou system from a micro-behavioral perspective, I incorporate individuals' hukou types (rural hukou or urban hukou) and residential locations (where their hukou is registered) into the logit models. I posit that migrants who hold a rural hukou and whose hukou is in areas at lower administrative levels are constrained by the hukou system. Such negative effects are more pronounced for less educated migrants.

3. How do the local governments manipulate the hukou system to filter for desirable immigrants? How should we measure the stringency of the various hukou entry conditions set by different cities? How effective is the hukou system in affecting China's internal migration?

The former two sub-questions seek to understand the effects of the hukou system on China's internal migration from macro and micro perspectives. However, they are not sufficient to answer the question concerning the effectiveness of the hukou system. To reveal the policy

effectiveness, it is crucial to link the objectives of the localized hukou policies to China's actual internal intercity migration.

This thesis contributes to this research gap by combing through the decentralization of the hukou system, reviewing the rules set by the local governments to define which groups of immigrants deserve access to citizenship, and providing a refined way of measuring the stringency of hukou entry conditions. Moreover, it incorporates the hukou difficulty index into a simple migration destination choice model to estimate the effectiveness of the hukou system in managing migration. I postulate that the effectiveness of the hukou system varies across different cities.

This thesis is structured as follows:

Chapter 2 presents an extensive spatial analysis of inter-provincial migration in China during 1990-2020. Based on the 2000, 2010, and 2020 Chinese census data, it employs a series of gravity models to estimate socioeconomic, institutional, and amenity factors that shape the volume and geographical orientation of China's internal migration.

Chapter 3 provides a micro-scale analysis of the destination selection behavior of migrants with different educational attainments. Based on the 2017 China Migrants Dynamic Survey data, it uses the Nested Logit model to estimate the connections between individuals' migratory behavior and their hukou status (including hukou type and residential location). Other individual-specific characteristics and place-specific attributes associated with migrants' destination choices are included as control variables. Note that this Chapter incorporates the heterogeneity of formal education into the analytical framework.

Chapter 4 conceptualizes migration governance in China and constructs a hukou difficulty index (HDI). It starts from a revisiting of the most significant hukou policy documents and literature to trace the decentralization of the hukou system. After reviewing the ways of determining qualifications for local *de jure* citizenship in 39 large cities, I utilize regularized exploratory factor analysis (REFA) to construct a hukou difficulty index to measure the stringency of local hukou entry conditions. The most important channels, including talent program, investment, house purchase, and stable employment and residence, are incorporated into the index. Furthermore, I construct a series of logit models to test the effectiveness of the hukou system.

Chapter 5 provides a review of the key findings in this thesis, final thoughts, and directions for future studies.

## CHAPTER 2

### A GRAVITY MODEL: FACTORS SHAPING MIGRATION PATTERNS

#### *Chapter Overview*

This Chapter presents an extensive geospatial analysis of inter-provincial migration in China during 1990-2020. It examines the hukou system and other socioeconomic factors that shape the internal migration patterns between the 31 provincial administrative units. Since the 1980s, the economic structure in China has undergone tremendous reforms, and the institutional controls on its internal migration have been loosened, contributing to a migration surge. How has inter-provincial migration in China been transformed accordingly in scale or direction? Is there any change in the driving factors of migration among provinces? To answer these questions, this research develops a holistic portrait of inter-provincial migration in China over the past three decades using migration data from 2000, 2010, and 2020 censuses data.

First, this Chapter depicts the migration flows via spatial statistical analysis in the three periods. Second, I utilize modified gravity models to carry out the panel and cross-sectional estimations to investigate the driving factors. The sensitivity of migration to the household registration (hukou) system is of particular interest. In this section, I use the percentage of the registered population in each province to proxy the perceived hukou acquisition probability (Bao et al., 2011), so as to incorporate the hukou system into the theoretical and empirical framework.

#### *Spatial Pattern of China's Internal Migration, 2000-2020*

The interprovincial migration data were collected from the Chinese 2000, 2010, and 2020 population censuses, which are considered the best data sources for identifying migrants in

China. The datasets contain the volume of migration flows among the 31 provincial-level administrative units.

Table 2.2 illustrates sizes of in-migration and net migration of the 31 provincial units. An indicator of migration efficiency (ME) is included to specify the gainers and losers of human capital in the population redistribution process at the provincial level. It is calculated as the ratio of net migration to total in- and out- migration (Plane, 1984). The ranking is based on the migration efficiency in each period. Overall, the migration flows move generally from less economically developed inland areas to more developed coastal areas, confirming the significant impacts of regional economic disparity revealed in previous research (Fan, 2005b; Shen, 2012, 2017; Liu & Shen, 2017; Zhang et al., 2020). Provinces in Eastern region, except for Hebei and Shandong, have generally enjoyed a net gain over the past three decades. Among them, Shanghai, Beijing and Guangdong consistently remain in the top three in attracting human capital from elsewhere in the three periods. On the other hand, the Central, Western and Northeastern provinces have all suffered from population loss to varying degrees, with Central provinces like Anhui and Henan being particularly severely depopulated. For one thing, thanks to the China Western Development Strategy, some provincial units in Western regions have achieved net gains. It is especially noteworthy that Xinjiang has been among the leading provinces concerning migration efficiency, ranking 4th, 6th and 5th respectively in three periods, following a few Eastern provincial units. For another, the Central provinces are geographically closer to national economic growth poles such as Beijing, Shanghai and Guangdong, facilitating the migration for more employment opportunities and better quality of life. Figure 2.2 presents interprovincial migration flows in China in the three periods 1990-2000, 2000-2010, and 2010-2020. The lines are normalized as a percentage of aggregate population movements, capturing

the ratio of migration in a specific direction to all flows. Table 2.3 reports the most ten prominent migration flows in each period. Table 2.3 also displays the probability of migrants from the origins to choose the specific province as destination. The evidence suggests that the size of migration stream is strongly connected with populations at origins and destinations, distance, and regional economic disparities. First, the leading provinces that contribute and attract most migrants are mainly located in populated Central (e.g., Jiangxi, Anhui, and Hunan) and Eastern regions (e.g., Guangdong, Jiangsu, and Shanghai). Second, migration flows between two adjacent provinces (e.g., from Hunan and Guangxi to Guangdong) are typically more voluminous. Third, as the most economically developed regions in China, Guangdong, Shanghai and Zhejiang have exerted strong pull on migrants. By contrast, dominant contributors of migrants such as Guangxi, Sichuan and Guizhou have been mostly entangled with relatively slow economic growth in recent years.

Figure 2.2 and Tables 2.2-2.3 also indicate interesting changes in interprovincial migration patterns over time. First, from Table 2.2, note that although the variances of net migration volumes have been increasing sharply, that of migration efficiency fell. The spread between the minimum and maximum migration efficiency calculated from 2000 census data was 184.34% but declined to 181.72% in 2010 and 178.28% in 2020, indicating that accompanied by increasingly massive population movements, the differences among the provincial units in attracting or losing populations have been falling. This finding is consistent with Figure 2 in revealing the increasingly dynamic population mobility brought by the reformation of the hukou system, as the most prominent migration flows are shifting from unidirectional to multi-directional. For instance, 32.74% of the migrants from Henan would choose Guangdong during 1990-2000, but this probability has been declining in the latter two decades, and the migration

flow from Henan to Zhejiang has become prominent in recent decade. Second, there are also important changes in the ranking in migration efficiency. It is interesting to notice that from Table 2.1, the migration efficiency in Zhejiang and Jiangsu was ranked middle with large out-migration in 1990-2000, but they changed to the fourth and ninth respectively in latter two decades. By contrast, Yunnan's case was just the opposite. It was ranked seventh with a relatively higher migration efficiency of 54.44% in 1990-2000 but dropped to a middle province ranked 17th in 2010-2020, suffering from population loss through migration. This interesting phenomenon implies a transition in the determinant factors of migration from political guidance to market opportunities since Yunnan is one of the targeted provinces in the China Western Development Strategy while Zhejiang and Jiangsu, located in the Yangtze River Delta, are booming coastal provinces abundant with economic opportunities after the reform and opening-up.

Overall, during 1990-2020, the most prominent migration flows have continued to converge from central to eastern China, shaping two outstanding centers of population inflow - Guangdong Province and the Yangtze River Delta. However, triggered by the relaxation of internal population movement regulation, the spread of interprovincial migration over the past three decades is also noticeable. The spatial patterns clearly reveal the connection between interprovincial migration in China and distance and socioeconomic factors like economic opportunities. In the next section, the migration model is estimated to examine the main drivers of migration in the three periods.

**Table 2.1 Interprovincial migration in China in three periods**

Region	1990-2000				2000-2010				2010-2020			
	In	Net	ME (%)		In	Net	ME (%)		In	Net	ME (%)	
<b>Eastern</b>	<b>32,114</b>	<b>24,915</b>	<b>63.38</b>		<b>68,136</b>	<b>53,008</b>	<b>63.66</b>		<b>91,812</b>	<b>68,982</b>	<b>60.17</b>	
Beijing	2,463	2,372	92.82	2	7,045	6,770	92.5	2	8,418	7,948	89.42	2
Tianjin	735	653	79.82	5	2,992	2,718	83.27	4	3,535	2,736	63.14	6
Hebei	930	-289	-13.42	18	1,405	-2,094	-42.7	19	3,155	-2,325	-26.92	19
Shanghai	3,135	2,992	91.29	3	8,977	8,727	94.57	1	10,480	10,096	92.94	1
Jiangsu	2,537	821	19.31	14	7,379	4,320	41.39	9	10,309	5,957	40.63	9
Zhejiang	3,689	2,206	42.67	11	11,824	9,970	72.89	5	16,186	13,824	74.53	4
Fujian	2,145	1,335	45.15	10	4,314	2,646	44.25	8	4,890	2,276	30.33	10
Shandong	1,033	-71	-3.34	17	2,116	-980	-18.81	17	4,129	-130	-1.55	13
Guangdong	15,065	14,634	94.44	1	21,498	20,617	92.13	3	29,622	27,935	89.22	3
Hainan	382	262	52.35	8	588	313	36.18	10	1,088	665	44.04	8
<b>Central</b>	<b>2,585</b>	<b>-15,908</b>	<b>-75.47</b>		<b>4,580</b>	<b>-33,658</b>	<b>-78.61</b>		<b>9,551</b>	<b>-40,423</b>	<b>-67.91</b>	
Shanxi	667	362	37.24	12	932	-152	-7.53	15	1,621	-365	-10.12	16
Anhui	230	-4,096	-89.9	31	717	-8,905	-86.12	30	1,551	-9,970	-76.28	30
Jiangxi	253	-3,427	-87.13	30	600	-5,187	-81.21	28	1,279	-5,061	-66.42	26
Henan	476	-2,594	-73.14	27	592	-8,034	-87.15	31	1,274	-14,827	-85.34	31
Hubei	610	-2,195	-64.29	25	1,014	-4,876	-70.63	26	2,250	-3,736	-45.37	22
Hunan	349	-3,958	-85.01	28	725	-6,504	-81.77	29	1,578	-6,464	-67.2	27
<b>Western</b>	<b>5,978</b>	<b>-8,603</b>	<b>-41.84</b>		<b>10,411</b>	<b>-17,159</b>	<b>-45.18</b>		<b>18,796</b>	<b>-25,017</b>	<b>-39.96</b>	
Inner Mongolia	548	43	4.12	16	1,444	377	14.99	13	1,686	-91	-2.64	15
Guangxi	428	-2,014	-70.16	26	842	-3,343	-66.5	23	1,359	-6,750	-71.29	28
Chongqing	403	-603	-42.77	21	945	-2,562	-57.54	22	2,194	-1,983	-31.13	20
Sichuan	536	-6,402	-85.65	29	1,129	-7,777	-77.5	27	2,590	-7,768	-59.99	23
Guizhou	409	-1,188	-59.25	24	763	-3,285	-68.27	25	1,147	-7,308	-76.12	29
Yunnan	1,164	821	54.44	7	1,237	-246	-9.04	16	2,230	-731	-14.09	17
Tibet	109	89	69.11	6	165	110	49.97	7	407	270	49.47	7

Shaanxi	426	-378	-30.75	19	974	-986	-33.6	18	1,934	-1,054	-21.42	18
Gansu	228	-358	-43.99	22	433	-1,160	-57.27	21	766	-2,683	-63.66	24
Qinghai	124	29	13.37	15	318	76	13.62	14	417	-14	-1.6	14
Ningxia	192	102	36.07	13	368	143	24.01	12	675	309	29.64	11
Xinjiang	1,411	1,255	80.06	4	1,792	1,494	71.54	6	3,391	2,787	69.78	5
<b>Northeast</b>	<b>1,740</b>	<b>-404</b>	<b>-10.41</b>		<b>2,749</b>	<b>-2,191</b>	<b>-28.49</b>		<b>4,678</b>	<b>-3,543</b>	<b>-27.47</b>	
Liaoning	1,045	683	48.55	9	1,787	773	27.58	11	2,847	973	20.61	12
Jilin	309	-300	-32.71	20	456	-916	-50.09	20	1,001	-1,412	-41.36	21
Heilongjiang	387	-787	-50.45	23	506	-2,047	-66.9	24	829	-3,103	-65.17	25

Notes: In-migration and Net migration are measured in thousands.

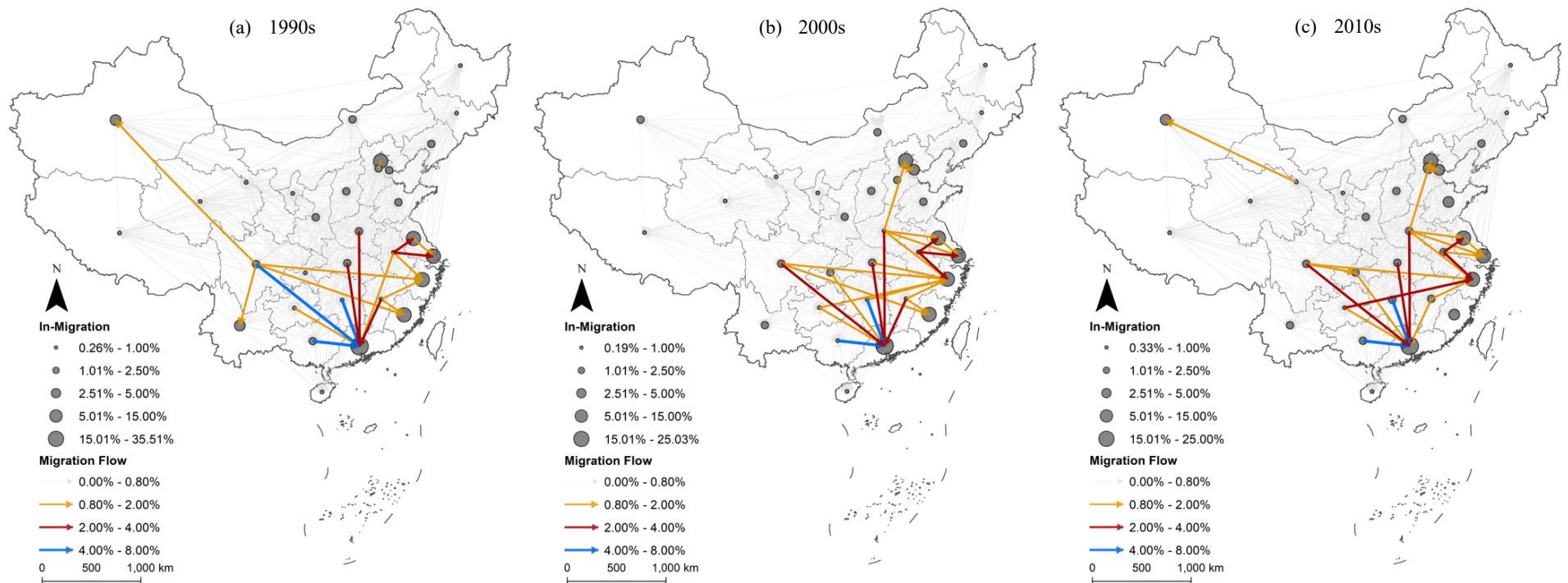


Fig. 2. Interprovincial migration patterns in China in three periods

**Table 2.2 The most prominent ten migration flows in three periods**

1990-2000				2000-2010				2010-2020			
O	D	Prob (%)	% of Aggregate Migration	O	D	Prob (%)	% of Aggregate Migration	O	D	Prob (%)	% of Aggregate Migration
Hunan	Guangdong	77.29	7.85	Hunan	Guangdong	63.66	5.36	Guangxi	Guangdong	85.46	5.55
Sichuan	Guangdong	40.99	6.70	Guangxi	Guangdong	84.96	4.14	Hunan	Guangdong	63.63	4.10
Guangxi	Guangdong	90.65	5.22	Sichuan	Guangdong	29.22	3.03	Anhui	Zhejiang	27.25	2.51
Jiangxi	Guangdong	43.78	3.80	Anhui	Shanghai	27.04	3.03	Anhui	Jiangsu	26.74	2.47
Hubei	Guangdong	52.18	3.45	Anhui	Jiangsu	26.76	3.00	Guizhou	Zhejiang	33.44	2.26
Anhui	Jiangsu	25.92	2.64	Hubei	Guangdong	39.65	2.72	Henan	Guangdong	17.23	2.22
Anhui	Shanghai	23.78	2.42	Anhui	Zhejiang	23.75	2.66	Hubei	Guangdong	44.21	2.12
Henan	Guangdong	32.74	2.37	Jiangxi	Guangdong	32.33	2.18	Sichuan	Guangdong	25.32	2.10
Jiangxi	Zhejiang	22.84	1.98	Henan	Guangdong	20.43	2.05	Henan	Zhejiang	15.32	1.98
Anhui	Zhejiang	18.07	1.84	Hebei	Beijing	44.57	1.82	Anhui	Shanghai	21.06	1.94

### ***Data and Model Specification***

Gravity model is one of the most classic methods to estimate interregional migration. This paper will build gravity models for interprovincial migration in China globally during 1990-2020 and separately in three periods.

The gravity model can be estimated using least squares estimation (LSE) in a log-linear form as follows:

$$\ln(M_{ij}) = \ln(G) + \beta_1 \ln(P_i) + \beta_2 \ln(P_j) - \beta_3 \ln(D_{ij}) + \varepsilon_{ij} \quad (2.1)$$

where  $M_{ij}$  refers to the total or gross migration flow between origin  $i$  and destination  $j$ ;  $P_i$  ( $P_j$ ) refers to the populations of origin  $i$  (destination  $j$ ) usually measured at the beginning of the period over which migration is measured;  $D_{ij}$  is the distance between  $i$  and  $j$ ;  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  are the parameters to be estimated and  $G$  is a proportionality constant; the error term  $\varepsilon_{ij}$  is assumed to be a normal distributed. Population and distance represent the standard gravity variables.

Population size of both origins and destinations is expected to have a positive influence on the migration while distance should deter migration.

While Equation 2.1 is descriptive of migratory interaction, it fails to capture the directional flows of migration (Lowry, 1966; Zipf, 1946). Building on Somermeijer's formulation which partitioned gross migration into directional flows with the help of indices of attractiveness ( $F$ ), (Lowry, 1966) employed a model that takes a more convenient multiplicative form and can be generalized as:

$$M_{i \rightarrow j} = k \left[ \frac{P_i^{\beta_1} P_j^{\beta_2}}{D_{ij}^{\beta_3}} \cdot \left( \prod_{q=1}^n \frac{F_{qj}^{\gamma_{qj}}}{F_{qi}^{\gamma_{qi}}} \right) \right] \quad (2.2)$$

$$\ln(M_{i \rightarrow j}) = \ln(k) + \beta_1 \ln(P_i) + \beta_2 \ln(P_j) - \beta_3 \ln(D_{ij}) + \sum_{q=1}^n \ln \left( \frac{F_{qj}^{\gamma_{qj}}}{F_{qi}^{\gamma_{qi}}} \right) \quad (2.3)$$

Equations 2.2 and 2.3 specify the directional migration flows, and simultaneously, have an accessible causal interpretation. The incorporation of indices of attractiveness ( $F$ ) allows later studies to incorporate all the possible exogenous variables other than gravity variables into the model, thus enabling researchers to quantify the processes that drive migration. Lowry's indices of attractiveness included unemployment rate and wage. In addition to gravity variables, economic opportunities, and amenities, the influence of institutional control on internal migration is of particular interest for this paper; therefore, the probability of securing a local hukou in the destination province  $j$  will be incorporated into the model. Considering that obtaining a hukou may be more difficult in practice than in theory (Liu & Shi, 2020), I refer to Bao et al. (2011) and employ the percentage of registered populations in each province to

measure the historical relative frequency of persons with local hukou, which can reflect the practical easiness of hukou conversion in each province. For the 2000 (2010, 2020) period, I use the mean annual percentages of populations with local hukou to the total populations during 1990-1994 (2000-2004, 2010-2014, respectively). However, the measurement of perceived hukou acquisition probability is likely to violate the exogeneity assumption as the migration outflows and inflows will directly affect the total populations in each province. Further, the stringency of hukou policy itself is not set randomly but can relate to the regional characteristics. Therefore, the Two-Stage Least Squares (2SLS) approach is also utilized. The hukou variable is re-defined to be contemporary with the migration variable, i.e., migration flow volume between two provincial regions is hypothesized to be more closely related to current hukou acquisition probability. Hence, a 2SLS baseline equation can be stated as follows:

$$\ln(\widehat{Hukou}_{j,t_{2nd}}) = f[\ln(Hukou_{j,t_{1st}}), \ln(x_{i,j,t})] \quad (2.4)$$

$$\ln(M_{i \rightarrow j,t}) = f(\ln(\widehat{Hukou}_{j,t_{2nd}}), \ln(x_{i,j,t})) \quad (2.5)$$

where  $\ln(M_{i \rightarrow j,t})$  is the migration volume from  $i$  to  $j$  in the period  $t$ ; in this study, for the 3 periods, each migrant from the 31 provincial administrative units in China, they have 30 potential destinations, thus formulating in total 2790 observations;  $\widehat{Hukou}_{j,t_{2nd}}$  is the predicted hukou acquisition probability in province  $j$  in the second half of the period  $t$  while  $Hukou_{j,t_{1st}}$  refers to that in the first half of period  $t$ ;  $x_{i,j,t}$  is a vector of province pair-level variables describing the socioeconomic disparity between  $i$  and  $j$  at the beginning of the second half of period  $t$  as shown in Table 2.4.

Further, besides cross-section analysis, we also estimate the gravity model of inter-provincial migration in a panel data framework to capture the unobservable origin-destination-pair random effects. Because the analysis involves the 31 provincial administrative units of China, the model specification is general and designed to accommodate variation in attracting immigration globally, not to accommodate special, idiosyncratic, or parametric influences. The estimated gravity model with individual effects for each origin-destination pair is given by,

$$\ln(M_{i \rightarrow j,t}) = \ln(k) + \beta_1 \ln(P_{i,t}) + \beta_2 \ln(P_{j,t}) - \beta_3 \ln(D_{i \rightarrow j}) + \sum_{q=1}^n \ln \left( \frac{F_{qj}^{\gamma_{qj}}}{F_{qi}^{\gamma_{qi}}} \right) + \sum_{t=1}^{T-1} \lambda_t Period_t + u_{i \rightarrow j} + \varepsilon_{i \rightarrow j,t} \quad (2.6)$$

where  $Period_t$  denotes period during which migration occurred, and there are  $T$  periods;  $u_{ij}$  denotes the individual effects treated as random effects;  $\varepsilon_{i \rightarrow j,t}$  is the random error term.

### ***Identification of Explanatory Variables***

The regional factors shaping migration flows fall into three main categories: gravity variables, economic variables, and amenity variables (Greenwood, 1997). For the analysis of interprovincial migration over the past three decades, seven variables were used in the modeling. Table 2.4 describes the variable and the data source. The variables describe important demographic, geographic, socio-economic, and institutional conditions of each pair of provincial administrative units. Diagnostic factors such as the variance inflation factor show no evidence of multicollinearity in the set of independent variables.

According to the theory of spatial interaction (Haynes & Fotheringham, 2020; Norris, 1972), populations in both origin and destination provinces are hypothesized to positively affect the migration flows. The distance is measured as the hours it takes to travel by railway between capital cities of origin and destination provinces since the railroad is the predominant means of long-distance passenger travel in China and is especially relevant for migrants due to the relative affordability. However, railway distance data for the 1990s and 2000s are not available, thus there is no time variation in the distance variable. The distance between two provincial units is assumed to have a negative impact on spatial interaction since increasing distance will bring both higher transportation and psychic costs, as well as diminishing information (Schwartz, 1973). The economic conditions in destination provinces have been confirmed by substantial previous studies to be significantly related to internal migration in the Chinese context (Fan, 2005b; Gries et al., 2016; Gu & Shen, 2021; Liu & Shen, 2014, 2017; Shen, 2012). Therefore, two classical economic indicators, labor return and unemployment rates in origin and destination provinces are used to capture the influence of labor market opportunities. It is assumed to have a positive effect from destination but a negative impact from origin.

Following previous studies (Clark & Hunter, 1992; Florida, 2002; P. E. Graves, 1980; Greenwood & Hunt, 1989), while displaying inconsistent empirical results in Chinese context (Bao et al., 2011; Liu & Shen, 2014a, 2017; Su et al., 2019), natural and urban amenities are also incorporated into the framework. The natural amenity focuses on temperature severity while urban amenity is represented with public service and entertainment facilities. The places with more favorable weather (lower temperature severity) and a relative abundance of educational, health care, cultural, and entertainment options are assumed to be attract immigration. Finally, a

higher perceived hukou acquisition probability is also hypothesized stimulate more immigration since it is tightly connected with state-provide social welfare.

**Table 2.3 Variables for explaining the interprovincial migration**

Variables	Description	Data Source
Dependent Variable		
Migration	Directional inter-provincial migration volume respectively from 2000, 2010, and 2020 Chinese census data	A
Independent Variable		
Distance	Railroad distances between capital cities of origin and destination provinces (hour)	B
Population	Population of origin and destination provinces in each pair in 1995, 2005, and 2015 (10,000 people)	C
Wage	The average annual wage of origin and destination provinces in 1995, 2005, and 2015 (CNY)	C
Unemployment Rate	The unemployment rate of origin and destination provinces in 1995, 2005, and 2015 (%)	C
Temperature Severity	Ratio of average difference in temperature between January and June in origin province to mean difference in temperature between January and June in destination province in 1995, 2005, and 2015 (°C)	D
Urban Amenities	The number of employees in the industries of education, culture and art, health care, sporting, and entertainment per 10,000 inhabitants in origin and destination provinces in 1995, 2005, and 2015 (person per 10,000 inhabitants)	E
Hukou Acquisition	The average percentage of all permanent residents with a local hukou in each destination province during 1990-1994, 2000-2004, and 2010-2014 (%)	C

Sources

A: 2000, 2010, and 2020 Chinese Population Census.

B: 12306 China Railway.

C: 1996, 2006, and 2016 China Statistical Yearbook.

D: [Climateknowledgeportal.worldbank.org](http://climateknowledgeportal.worldbank.org).

E: 1996, 2006, and 2016 China Labor Statistical Yearbook.

### ***Empirical Results***

We specified six separate models – the first three that pool the three periods and are estimated in panel form and the other three that are estimated as single-period (the 1990s, 2000s, and 2010s) cross-sections – to examine the driving factors of interprovincial migration. All these models account for the origin-destination pair-specific effects (i.e., migrant size from province  $i$  to  $j$ ). Firstly, table 2.6 reports the results of panel estimation utilizing random-effects strategy, 2SLS regression analysis, and combined modeling. Secondly, to catch the change in driving factors, we

apply the 2SLS regression analysis separately to three periods, as shown in table 2.7. All standard errors are constrained to be robust. Before discussing specific results, note that each coefficient is a migration elasticity, the percentage change in the directional migration volume due to the double-log functional form.

The results of panel estimation confirm the significant influence of all variables, apart from unemployment rate, on migration flows among provinces in China at 0.01 level. Further, except for hukou acquisition probability, all the coefficients present sign consistent with hypothesis. First, consistent with spatial interaction theory, the populations in both origin and destination provinces are positively correlated with migration while the distances will exert a significantly negative influence on the migration. Second, the labor return in the origin will serve as a significant hold on migrants and deter migration while in the destination, they are the most important pull factors of interprovincial migration. Above findings resonate with previous wisdoms (Colas & Ge, 2019; Fan, 2005b; Liu & Shen, 2014b; Shen, 2012, 2017; Su et al., 2019). The insignificant coefficients of unemployment rate may relate to issues ranging from statistical

**Table 2.4 Panel estimates of gravity models**

	(1) RE	(2) 2SLS	(3) 2SLS_RE
Log(Distance)	-0.784**(0.050)	-0.722**(0.028)	-0.792**(0.050)
Log(Population_O)	0.884**(0.046)	0.824**(0.030)	0.882**(0.046)
Log(Population_D)	0.500**(0.049)	0.729**(0.032)	0.477**(0.050)
Log(Wage_O)	-0.360**(0.088)	-0.791**(0.109)	-0.376**(0.088)
Log(Wage_D)	1.012**(0.114)	1.617**(0.151)	0.951**(0.116)
Log(Unemployment Rate_O)	-0.035(0.045)	-0.058(0.073)	-0.033(0.046)
Log(Unemployment Rate_D)	-0.040(0.046)	-0.001(0.072)	-0.052(0.046)
Log(Temperature Severity Ratio)	0.304**(0.067)	0.416**(0.047)	0.296**(0.067)
Log(Urban Amenities_O)	-0.005(0.132)	-1.047**(0.133)	-0.022(0.132)
Log(Urban Amenities_D)	0.547**(0.127)	1.052**(0.150)	0.501**(0.124)
Log(Hukou Acquisition Probability_1st)	-0.598**(0.146)		
Log(Hukou Acquisition Probability_2nd)		-1.924**(0.218)	-0.711**(0.158)

Period_1	-0.065(0.265)	0.186(0.353)	-0.238(0.268)
Period_2	0.048(0.104)	0.112(0.133)	-0.010(0.105)
Constant	-5.676**(1.760)	-0.197(2.621)	-3.798(1.946)
Observations	2,790	2,790	2,790
R-squared	0.665	0.708	0.668

Robust standard errors in parentheses. \*\* significant at 1%; \* significant at 5%.

inaccuracy to transitional context as discussed above. Further, it is important to note that unemployment rate from Chinese statistics (“registered urban unemployment rate”) is calculated on documented residents, excluding “informal” migrants (members of the “floating population”). Third, as expected, the populations will leave for places with pleasant climates and entertainment options. Keep in mind that natural amenity is measured as the ratio of average difference in temperature between January and June in origin province to that in destination province; all else being equal, a 1% increase in the temperature severity ratio will induce a 0.30% to 0.42% increase in migration volume. In addition, similar to the wage increase, the enhancement of the quality of life in the origin province can also encourage people to stay, but with less stable effects. By contrast, improvements in urban amenities at destination produce a significant pull effect on migration.

Last but not least, while Table 2.6 confirms that the destinations’ hukou acquisition thresholds can have a significantly strong impact on migration, opposite from the expected positive effect revealed by Bao et al. (2011), the results show that the perceived hukou acquisition probability is negatively correlated with immigration volume, which indicates that generally speaking, a higher (lower) hukou acquisition threshold in the destination province will not significantly deter (stimulate) immigration. While counterintuitive, this finding is also reflected in the spatial patterns revealed in Section 3 where the migrants tend to choose provinces with lower percentages of local hukou holders, namely, Shanghai, Beijing, and other eastern coastal

provinces. In addition, Colas & Ge (2019) presents similar empirical results, demonstrating that cities with more stringent hukou restrictions tend to be more attractive to migrants, even after controlling for economic development, labor return, population size, and fixed asset. Hence, these findings suggest that the significant negative effects of hukou acquisition probability can have a twofold origin. On the one hand, the finding also implies the dismantling of the hukou system in directly controlling internal migration in China after several rounds of reforms. On the other hand, since the hukou system remains an indispensable instrument for the state to govern the local provision of public services (Cai, 2011; Vortherms & Liu, 2022), the difficulty of obtaining a local hukou can be positively associated with the regional disparity in other unobserved benefits. For example, the quality of social welfare is tightly linked to the hierarchical administrative rank of a city, and the availability of such programs is limited to registered populations. Moreover, the exclusion of population size in Bao et al. (2011) is inappropriate, given that the stringency of the hukou “entry conditions” is not randomly determined. Instead, guiding orderly urbanization and population redistribution continues to be a crucial objective of the system.

**Table 2.5 Cross-sectional estimation of gravity models**

	(1) 1990s	(2) 2000s	(3) 2010s
Log(Distance)	-0.815**(0.054)	-0.748**(0.045)	-0.610**(0.044)
Log(Population_O)	0.928**(0.058)	0.752**(0.050)	0.852**(0.044)
Log(Population_D)	0.875**(0.066)	0.766**(0.050)	0.696**(0.047)
Log(Wage_O)	0.061(0.241)	-0.778**(0.155)	-1.727**(0.179)
Log(Wage_D)	2.756**(0.284)	1.055**(0.315)	0.881**(0.234)
Log(Unemployment Rate_O)	0.099(0.099)	-0.271(0.202)	-0.325(0.196)
Log(Unemployment Rate_D)	0.206(0.111)	0.128(0.212)	-0.183(0.177)
Log(Temperature Severity Ratio)	0.649**(0.115)	0.568**(0.091)	0.159*(0.067)
Log(Urban Amenities_O)	-1.169**(0.239)	-1.243**(0.208)	-0.638*(0.256)
Log(Urban Amenities_D)	1.945**(0.312)	1.192**(0.273)	-0.070(0.299)
Log(Hukou Acquisition Probability_2nd)	4.756**(1.388)	-2.820**(0.775)	-2.885**(0.267)

Constant	-53.632**(8.545)	10.199(7.309)	25.891**(4.830)
Observations	930	930	930
R-squared	0.655	0.712	0.697

Robust standard errors in parentheses. \* 0.01 level; \*\* 0.05 level.

For the cross-sectional models using 2SLS regression analysis, we find remarkably similar results in terms of the directions of the coefficients with the panel estimation, except for the hukou acquisition probability during the 1990s. In other words, with the population size, labor return, and natural and urban amenities controlled, lowering the hukou threshold in the destination can significantly stimulate immigration during the 1990s but fails to have a positive effect in the latter two decades. Additionally, judging from the absolute value of the coefficients, the sensitivity of interprovincial migration to hukou fell sharply between the 1990s and 2000s but rose slightly during the latter two periods. Hence, if any, the unobserved regional differences in benefits positively related to the hukou thresholds should have emerged in the 2000s and been reinforced in the 2010s. For other variables, first, the difference in the coefficient of distance suggests that the marginal migration volume per one-point increase in the distance decreased by 0.07 percent in the 2000s and 0.14 percent in the 2010s. This may pertain to the rapid development of transportation and information infrastructure in China, which mitigates the migration costs brought by distance. Second, the pull effects of improving perceived labor return from origin provinces have strengthened while those from destination provinces have been waning. One percent additional annual average wage in the origin province is associated with a decrease in nearly a percentage point (from 0.78% to 1.73%) of out-migration volume. By contrast, the migration elasticity of annual average wage in the destination is 1.70% lower in the 2000s than in the 1990s, and 0.17% lower in the 2010s than in the 2000s. Unlike economic benefits, the effects of urban amenity, whether negative from origins or positive from destinations, have been weakening. The influence of urban amenities in destination provinces

turns insignificant in the 2010s. The above findings indicate that, for one thing, the economic opportunity appears to play a more stable and vital role in attracting immigration than urban amenities. For another, despite the increasingly active internal migration, all else being equal, Chinese people are reluctant to leave their home provinces when the labor return in origin improves.

### ***Conclusion***

The objective of this Chapter is to assess how the hukou system affects internal migration in China from a macro perspective. I conduct a comprehensive geospatial analysis of inter-provincial migration during 1990 - 2020. First, this Chapter depicts the migration flows via spatial statistical analysis in the three periods. Second, I utilize modified gravity models to carry out the panel and cross-sectional estimations to investigate the driving factors of interprovincial migration in China. Of particular interest is how migration is influenced by the household registration (hukou) system.

The results show that the eastern coastal provinces have been the most prominent recipients of migrants, while the central provinces have suffered severe population exodus throughout the three periods. However, the directions have shifted from unidirectional to multi-directional over the past three decades. More coastal provinces like Zhejiang and Jiangsu have joined Guangdong, Shanghai, and Beijing as the most attractive destinations. Further, the gravity modeling confirms the significant impacts of gravity variables, economic opportunities, hukou acquisition probability, and amenities on China's internal migration. The hukou system is crucial for understanding the dynamics of interprovincial migration in China. More importantly, this Chapter demonstrates that the hukou system has been less effective in regulating migration since

the 2000s. This is evident not only in the decreasing absolute value of the coefficient but also in the finding that the association between the probability of acquiring a hukou and migration is positive during the 1990s but turns negative in the latter two periods.

## CHAPTER 3

### A NESTED LOGIT MODEL: FACTORS SHAPING MIGRANTS' DECISION MAKING

#### *Chapter Overview*

This Chapter explores the effects of the hukou system on Chinese migrants' destination choices at a micro-behavioral level. In addition, it is worth noting that the localized hukou system is designed to filter for desirable immigrants, where a crucial criterion is migrants' educational attainment. Nevertheless, previous research has either treated migrants as a homogenous group or focused on "talents". The difference between highly educated migration and less educated migration in the Chinese context fails to receive scholarly attention until recent years. To fill this knowledge gap, this Chapter incorporates the heterogeneity of formal education into the empirical framework by constructing two separate behavioral models for highly educated and less educated migrants.

Therefore, based on the 2017 China Migrants Dynamic Survey data, this Chapter uses the Nested Logit model to estimate the connections between individuals' migratory behavior and their hukou status (including hukou type and residential location). Other individual-specific characteristics and place-specific attributes associated with migrants' destination choices are included as control variables.

#### *Hypothesis*

Four sets of explanatory variables have been identified and included in nested logit models (Table 3.1). In addition to individuals' hukou type and residential location, other demographic characteristics and migration experiences enter the story as control variables. Since migration is a

process of selection, location preferences among migrants of ages, genders, and skill levels manifest heterogeneity (Stark & Bloom, 1985). Moreover, economic opportunities and amenities are used to reflect the attractiveness of the destinations. Existing studies on internal migration have widely acknowledged the crucial importance of economic opportunities in understanding migration choices (Makower et al., 1938; Ravenstein, 1885, 1889). Amenities have also been proven indispensable in explaining internal migration (Graves, 1979; Ullman, 1954).

**Table 3.1 Description of variables for explaining the migration probability**

Variables	Description	Sources
<b>INDIVIDUAL CHARACTERISTICS</b>		
Demographic information		
GENDER	1=Male, 2=Female	A
AGEGROUP	1=18~25, 2=26~35, 3=36~45, 4=46~64	A
MARITAL	1=singe, 2=married, 3=divorced/widowed	A
OCCUPATION	1=working in farming or manufacturing, 2=working in business or service, 3=working in management or technology	A
HUKOU-TYPE	1=rural hukou, 2=non-rural hukou	A
RESIDENTIAL-LOCATION	1=rural region, 2=small town, 3=prefecture-level city, 4=provincial capital city or municipality directly under the Central Government	A
Migration experiences		
HISTORY	The number of times the respondents experienced migration in total, including the most recent one.	A
DIST	The highway distance between each pair of potential origin and destination cities (km), standardized.	A, B
<b>CITY-SPECIFIC ATTRIBUTES</b>		
Economic opportunities		
SECOND	The proportion of the second industry in 2015 (%), standardized.	C, D
THIRD	The proportion of the tertiary industry in 2015 (%), standardized.	C, D
WAGE	Average yearly wage in 2015 (CNY), standardized.	C, D
UNEMP	The urban unemployment rate in 2015 (%), standardized.	C, D
Amenities		
HPI	The ratio of housing price to income in 2015 (%), standardized.	E
UNIVSTU	The number of university students per 10,000 inhabitants in 2015, standardized.	C, D
DOCTOR	The number of qualified doctors per 10,000 inhabitants in 2015, standardized.	C, D
CULTURE	The number of museums and public libraries per 10,000 inhabitants in 2015, standardized.	D
PM2.5	The average level of PM2.5 in 2015( $\mu\text{g}/\text{m}^3$ ), standardized.	F
GREEN	The ratio of the area of green spaces to the urban built area (%), standardized.	C, D

Notes:

A, 2017 China Migrants Dynamic Survey; B, Baidu Map API; C, 2016 China City Statistical Yearbook; D, 2016 Statistical Yearbook by each province; E, China House Price Platform (creprice.cn), accessed in March,

In reference to existing studies, I propose four hypotheses with respect to the destination choice of highly educated and less educated migrants in urban China.

**Hypothesis 1.** Highly educated migrants are less constrained by their hukou types and show a more pronounced tendency to move to cities with higher administrative hierarchies than their less educated counterparts.

Previous quantitative analyses of international migration policies revealed that skill-selective policy instruments are usually more effective in affecting the skill composition, instead of stimulating skilled immigration (Czaika & Parsons, 2017; de Haas et al., 2019). In the context of China's internal migration, the hukou system is a powerful instrument for local governments to screen immigrants based on the labor and human-capital considerations (Liu & Shi, 2020).

Therefore, I postulate that less educated migrants are more affected by the restrictions imposed by the hukou system, including holding rural hukou and holding hukou from regions of lower administrative level.

**Hypothesis 2.** Highly educated migrants more likely to choose destinations according to their personal preferences; in other words, the influence of individual characteristics is more important in explaining highly educated migrants' destination choices than migrants with less formal education.

Four variables, namely gender, age, marital status, and occupation, are included in the model to test this hypothesis. For the first three variables, previous studies capture the differences

regarding age and gender in migration (Clark & Hunter, 1992; Faggian et al., 2007; P. Graves, 1979). Faggian et al. (2007) suggests that migration can be a partial compensation mechanism for gender bias in the labor market, which contributes to higher mobility of female graduates. Therefore, I posit that higher education will compensate for biases based on age and gender. Further, the latter two variables capture the influence of the migrants' social networks on their decision-making. For one thing, aversion to risk is recognized as a major cause of migration in less developed countries (Stark & Levhari, 1982). For another, individuals who have invested in tertiary education tend to anticipate higher returns in the marriage market and labor market, of which the establishment of risk-sharing relations is an important component (Bramoullé & Kranton, 2007; Chiappori et al., 2018; Fafchamps & Gubert, 2007). Hence, the marriage and occupation are assumed to be more influential in encouraging the migration of skilled respondents. Taken together, we assume the educated migrants are more capable to accumulate capital to bear the uncertain risks involved in the process of migration, which leads to our second hypotheses.

**Hypothesis 3.** In terms of migration experiences, both migration distance and migration history are expected to have a more negatively impact on the less educated migrants.

Migration distance reflects the spatial feature of population relocation. It is customarily treated as a proxy for transportation costs, increasing psychic costs, and diminishing information (Schwartz, 1973). Moreover, education is significantly powerful in diminishing the adverse effects of distance on the choice of destination (Schwartz, 1973). By contrast, the migration history variable represents the number of migrations experienced by the respondent at the time of the survey, offering an observation of temporal dynamics. Knowledge migrants are mostly hired under demand-driven schemes on a temporary basis and, therefore, can move more smoothly

(Constant, 2021; Della Puppa et al., 2021; Fratesi, 2014). On the other hand, different factors, including family changes, life course, and increasing costs, intertwine to create the difficulty of new mobility after several moves (Della Puppa et al., 2021; Ramos, 2018). Therefore, we expect the migration history will be negatively correlated with the choice of first-class and second-class cities; further, such adverse effects will be more significant for less-educated migrants.

**Hypothesis 4.** Economic opportunities would exert a stronger influence on the destination choice of less-educated migrants, while amenities will have a greater effect on that of educated migrants.

To test **hypothesis 4**, I include employment opportunities, labor returns, and industrial structure to proxy the economic development in the destination (Greenwood, 1969, 2021, p. 476; Todaro, 1969). Public services (including higher education, health care, and cultural facilities) and environmental quality (including housing affordability, air pollution, and green space) are incorporated to represent the urban and natural amenities in the destination. Considering the popularity of educated migrants in the labor market, they are expected to be less responsive to economic factors. Previous studies reveal that the deterrent to immigration of a high housing price, especially for skilled populations whose likelihood of housing ownership is significantly higher (Painter et al., 2001; Plantinga et al., 2013). Although the heterogeneity of preferences for urban amenities between migrants differing by education is not conclusive, educated migrants are more likely to afford to move to and live in amenity-rich cities, and in turn, city-level amenity-oriented policies are often targeted at skilled populations (Arntz et al., 2021; Dalmazzo & de Blasio, 2011).

### ***Data and Model Specification***

The research is based on the microdata collected through the 2017 China Migrants Dynamic Survey (CMDS) by the National Health Commission of China. The survey covers 31 provincial-level administrative units in China, excluding Hong Kong SAR, Macau SAR, and Taiwan Province. By utilizing a stratified three-stage probability proportion to size (PPS) random sampling method, the survey interviewed internal Chinese migrants aged over 15 who had resided in the host city for over one month and finally collected 169,989 samples in total<sup>4</sup>. Given that the immigration policies in China are formulated by city-level administrative units, this research focuses on inter-city migration. Until the end of 2017, there were 334 prefectural level administrative units and four direct-administrated municipalities<sup>5</sup> in China, seven of them not included in the sample area of CMDS<sup>6</sup>. Thus, this research covers 331 prefectural and upper-level cities in China.

The increasing availability of microdata has allowed researchers to delve into migration behavior more closely. Different from the aggregate migration modeling, such analyses focus on the migration decision-making process of individuals and consider it as a multinomial discrete choice. More specifically, if the utility of individual  $i$  choosing location  $j$  is represented as  $U_{ij}$ , then location  $j$  will be chosen if and only if,  $U_{ij} > U_{ik}$  for all  $j \neq k$ .  $U_{ij}$  is composed of two components, the observable and unobservable utility:

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<sup>4</sup> The survey excluded the transient inflow of temporary migrants at stations, terminals, airports, hotels, and hospitals at the time of the survey, as well as those who were “military personnel or college/university students”.

<sup>5</sup> The 334 prefecture-level administrative units include 294 prefecture-level cities, 30 autonomous prefectures, 7 prefectures, and 3 leagues. The 4 municipalities include Beijing, Tianjin, Shanghai, and Chongqing.

<sup>6</sup> The seven prefecture-level administrative units not included in the CMDS are Fushun, Tonghua, Sansha, Qamdo, Shannan, and Nagqu.

$$U_{ij} = V_{ij} + \varepsilon_{ij} \quad (1)$$

$$V_{ij} = F(X_i, E_j, A_j, Z_{ij}) \quad (2)$$

where  $V_{ij}$  denotes a function of personal and choice-specific characteristics;  $\varepsilon_{ij}$  denotes unobserved random utility;  $X_i$  is a vector of individual characteristics such as age, gender, educational attainment level;  $E_j$  and  $A_j$  is a set of economic and amenity attributes;  $Z_{ij}$  is a set of variables dependent on both origin and destination, such as the distance.

The probability of individual  $i$  choosing location  $j$  thus can be described as:

$$\begin{aligned} P_{ij} &= P(U_{ij} > U_{ik}) \\ &= P\left((V_{ij} + \varepsilon_{ij}) > (V_{ik} + \varepsilon_{ik})\right) \\ &= P\left((\varepsilon_{ik} - \varepsilon_{ij}) < (V_{ij} - V_{ik})\right), \forall i \neq j. \end{aligned} \quad (3)$$

To solve Equation (3), the researchers have imposed different density functions on  $\varepsilon_{ij}$ , which leads to a family of discrete choice models. Among them, the conditional logit model has been applied substantially to internal migration in recent years (Davies et al., 2001; Su et al., 2019). Functional as it is for computing the trade-offs of interest in migration research, the conditional logit model carries the independence from irrelevant alternatives (IIA) assumption at the disaggregated level. This assumption implies that all destinations will be reasonably treated as equally substitutable. The IIA hypothesis is too restrictive to be realistic in migration choice settings, especially when the number of alternatives in the choice set is large, as in the case of intercity migration in China, where some destinations may share common unobserved features.

Considering this problem, this study utilizes a nested logit model to examine the intercity migration in China.

The nested logit model relaxes the IIA assumption by allowing the unobserved factors,  $\varepsilon_{ij}$  to be correlated. First, a nested logit model partitions the options into different subsets (namely, nests). Based on the partition, a nested logit model allows  $\varepsilon_{ij}$  to have the same correlation within a nest but maintains independence across nests. In other words, a nested logit partially relaxes the IIA assumption by allowing for different degrees of substitution within and between the nests.

Suppose that the options can be partitioned into  $M$  subsets while the nest  $m$  contains  $J$  alternatives, then the observed utility of migrant  $i$  choosing destination  $j$  can be decomposed into two parts: (1)  $U_{im}$ , which is constant for all alternatives within the nest but varies across nests; and (2)  $U_{imj}$ , which varies among all alternatives within the nest. Therefore, Equation (1) can be expressed as:

$$U_{ij} = U_{im} + U_{imj} + \varepsilon_{ij} (m = 1, \dots, M; j \in m \text{ and } j = 1, \dots, J) \quad (4)$$

According to McFadden (1978), the cumulative joint distribution function of  $\varepsilon_{ij}$  can be expressed as:

$$F(\varepsilon_{ij}) = \exp \left[ - \sum_{j=1}^J \left( \sum_{m=1}^M e^{-\varepsilon_{ij}/\lambda_m} \right) \right] \quad (5)$$

In a two-level nested logit model, the probability for individual  $i$  to choose the destination  $j$  (de Dios Ortúzar & Willumsen, 2011; Greene, 2003) can be given by:

$$P_{ijm} = P_{ij|m} \times P_{im} = \frac{e^{V_{ij}/\lambda_m} (\sum_{j=1}^J e^{V_{ij}/\lambda_m})^{\lambda_m-1}}{\sum_{j=1}^J \sum_{m=1}^M (e^{V_{ij}/\lambda_m})^{\lambda_m}} \quad (6)$$

where the parameter  $\lambda_m$  indicates the dissimilarity between unobserved utility among alternatives in different nests. When  $\lambda_m$  falls between 0 and 1, the nesting pattern is acceptable. When  $\lambda_m$  equals one, all options across nests are statistically independent, thus, nesting becomes unnecessary. However, note that while the probability of choosing a particular destination can be decomposed into the probability of choosing a particular subset of destinations and the probability of choosing the destination within that subset, a nested logit model does not imply sequential decision-making in most instances. The purpose of nesting is simply to categorize choices. Despite the individuals' preference towards a specific nest, they still have some probability of choosing any of the alternatives.

Developing the nesting pattern is an important step for a nested logit application, which typically depends on natural consideration, causal observation, theoretical judgment, or tentative examination (Falaris, 1987; Hensher & Greene, 2002; Knapp et al., 2001). Drawing on relevant Chinese migration scholarship and policy documents, this study categorizes the 330 destination choices into three nests: (1) the first-class cities, including Beijing, Shanghai, Guangzhou, and Shenzhen; (2) the second-class cities, including 32 city-level administrative units consisting with the other municipalities, vice-provincial cities, and provincial capitals; (3) the other 295 city-level administrative units, thus formulating a two-level nesting structure. Such nesting structure is widely applied in policymaking as it mirrors the administrative hierarchy positions, economic development, and population scale of the cities. For the 8,188 educated migrants and 96,641 less-educated migrants, each will choose their destinations from 3 nests and 330 options in China, excluding their hometowns. This generates and 2,702,040 and 31,891,530 observations,

respectively. Each observation carries information about the characteristics of individuals, attributes of locations, and the respondents' final migration decisions.

### ***Empirical Results***

Firstly, before discussing specific results, note that I standardized the values of alternative-specific distance and place-specific attributes to compare the relative magnitudes of the variables. Therefore, the coefficients can be interpreted as the change in destination choice probability from a one standard deviation increase in the value of a particular variable. Secondly, I specified two sets of nested logit models to compare the influence of included factors on destination choices for highly educated migrants and less educated migrants. All the models account for the destination choice probability. For each set of the nested logit models, we include individual characteristics in Model I and add place-specific attributes in Model II to study the sensitivity and robustness of different categories of determinants. First, the one-tailed chi-squared likelihood ratios and chi-squared test statistics suggest that nesting is appropriate. Second, the parameter  $\lambda_m$  falling between 0 and 1 confirms that the nesting pattern is acceptable. In other words, there are unobserved similarities between cities in each category. The empirical results reported by Table 3.2 reveal differences and similarities in the driving factors of highly and less educated migrants in China.

Consider the Model I in both cases. Firstly, the results confirm the heterogeneous preferences for location choices among migrants of different personal characteristics. Compared with third-class cities, migrants who are female and younger are more likely to choose first-class and second-class cities. While migration typically generates risks and uncertainties, the perceived return is theoretically highest in developed regions for such groups of people (Williams & Baláž, 2012),

especially for females who can employ migration as a compensation mechanism for gender bias in the labor market (Faggian et al., 2007). Consistent previous wisdom from the perspective of life-cycle migration (Chen & Rosenthal, 2008; Graves, 1979; Kim et al., 2005), while younger migrants are inclined to move towards economically developed first-class cities, these cities are relatively unattractive to elderly migrants. By contrast, second-class cities appeal to migrants of nearly all age groups.

Furthermore, consistent with **hypothesis 1**, the negative effects brought about by the hukou system is either more significant or more important to migrants with lower educational attainments, which can be seen both from hukou status and residential location. On the one hand, there is no statistically significant connection between highly educated migrants' hukou types and their destination choice. By contrast, holding an urban hukou is positively correlated to the movement into second-class cities for migrants with less formal education. This result indicates that disparate from higher educated migrants, the destination choice of less-educated migrants is still significantly impacted by the hukou system, which is consistent with Colas and Ge (2019). Interestingly, after including city-specific attributes, Model II for less-educated migration further reveals a significantly negative correlation between urban hukou and the choice of the first-class cities, suggesting that rural hukou holders relatively display a stronger preference for first-class cities within the group of less-educated migrants. This can result from the combined effects of the demand of the megacities for rural laborers and the migrants' household strategy. In terms of the household strategy, the hukou conversion is a central consideration: first, it is difficult, if not impossible, for rural hukou holders with secondary education to obtain a local hukou in megacities (Liu & Shi, 2020; Zhang et al., 2019; Zhang & Tao, 2012); second, the rural hukou is connected with rural homesteads ownership, which can weaken hukou transfer intentions (Gu et

al., 2020). Given the low probability of acquiring a local hukou and settling in most cities, taking advantage of the temporary movement to first-class cities can bring a relative maximization of utility for less-educated migrants with rural hukou. On the other hand, looking at the effects of individuals' residential locations on their destination choice, we can find that despite the same inclination of moving from rural and underdeveloped areas to urban and developed areas, such upward migration inclinations are generally more evident for highly educated migration. It is also noteworthy that the tendency of upward migration is so strong that migrants originating from provincial capitals or municipalities are less likely to choose second-class cities as their destinations.

In addition, in line with my **hypotheses 2 and 3**, demographic characteristics play a more important role in stimulating educated migrants move to more developed cities. Overall, higher education proves useful in offsetting the adverse effects not only of holding a rural hukou, but also of being elder and being female, for which they might otherwise be discriminated against in the labor market. Similarly, migration distance and experiences show expected significant and negative effects on migration. And despite the same direction of the coefficients, the adverse effects of migration distance and experience are more significant and influential for less-educated migrants.

**Table 3.2 Nested logit models**

VARIABLES	Skilled Migration				Less-skilled Migration			
	Model I		Model II		Model I		Model II	
	First-class cities	Second-class cities	First-class cities	Second-class cities	First-class cities	Second-class cities	First-class cities	Second-class cities
GENDER (reference=male)								
Female	0.452***(0.061)	0.309***(0.058)	0.311***(0.061)	0.244***(0.058)	0.095***(-0.021)	0.083***(-0.014)	0.068**(-0.021)	0.064***(-0.014)
AGEGROUP (reference=16~25)								
26~35	0.416***(0.099)	0.452***(0.086)	0.119(0.097)	0.340***(0.087)	0.168***(-0.036)	0.416***(-0.025)	0.004(-0.036)	0.356***(-0.025)
36~45	0.922***(0.129)	0.480***(0.123)	0.668***(0.129)	0.387***(0.124)	0.026(-0.040)	0.322***(-0.028)	-0.113**(-0.040)	0.268***(-0.028)
46~64	-0.018(0.198)	0.074(0.190)	-0.299(0.201)	-0.035(0.191)	-0.074(-0.043)	0.203***(-0.029)	-0.204***(-0.043)	0.149***(-0.029)
MARITAL (reference=single)								
Married	0.379***(0.079)	0.151*(0.073)	0.301***(0.080)	0.134(0.073)	-0.001(-0.034)	0.065**(-0.024)	-0.081*(0.034)	0.028(-0.024)
Divorced/Widowed	-0.316(0.333)	0.090(0.302)	-0.337(0.344)	0.119(0.305)	-0.266**(-0.085)	0.092(-0.052)	-0.309***(-0.086)	0.058(-0.052)
OCCUPATION (reference=working in agriculture or manufacturing)								
Working in business or service industry	0.513***(0.088)	1.126***(0.079)	0.290***(0.087)	1.025***(0.079)	0.218***(-0.023)	0.706***(-0.015)	0.099***(-0.022)	0.669***(-0.015)
Working in management or technology industry	0.579***(0.079)	0.658***(0.073)	0.379***(0.077)	0.566***(0.073)	0.714***(-0.036)	0.560***(-0.029)	0.566***(-0.037)	0.520***(-0.029)
HUKOU TYPE (reference=rural hukou)								
Urban hukou	0.153(0.080)	-0.023(0.073)	0.093(0.080)	-0.040(0.074)	-0.020(-0.033)	0.108***(-0.023)	-0.141***(-0.033)	0.094***(-0.023)
RESIDENTIAL LOCATION (reference=rural regions)								
Small towns	0.552***(0.082)	0.385***(0.076)	0.511***(0.083)	0.360***(0.076)	0.381***(-0.031)	0.182***(-0.022)	0.403***(-0.031)	0.185***(-0.022)
Prefecture-level cities	1.102***(0.107)	0.450***(0.106)	1.054***(0.108)	0.433***(0.106)	0.900***(-0.062)	0.374***(-0.049)	0.846***(-0.063)	0.372***(-0.049)
Provincial capitals or municipalities	0.611***(0.114)	-0.721***(0.130)	0.734***(0.117)	-0.608***(0.130)	0.821***(-0.093)	-0.311***(-0.086)	0.958***(-0.096)	0.174*(0.087)
HISTORY	-0.071***(0.026)	0.002(0.022)	-0.112****(0.026)	-0.027(0.021)	-0.093***(-0.007)	-0.027***(-0.003)	-0.084***(-0.007)	-0.031***(-0.003)

DIST	-0.659***(0.051)		-1.751***(0.096)		-0.491***(-0.011)		-2.019***(-0.042)	
SECOND			0.059*(0.030)				0.458***(-0.014)	
THIRD			0.138***(0.029)				0.458***(-0.014)	
WAGE			0.379***(0.023)				0.478***(-0.010)	
UNEMP			-0.086***(0.013)				-0.027***(-0.004)	
HPI			-0.014(0.008)				0.011***(-0.003)	
UNIVSTU			0.180***(0.018)				0.146***(-0.005)	
DOCTOR			0.103***(0.017)				0.174***(-0.006)	
CULTURE			-0.003(0.010)				0.035***(-0.003)	
PM2.5			-0.131***(0.011)				-0.241***(-0.005)	
GREEN			-0.061***(0.009)				-0.085***(-0.003)	
	0.339***(0.027)		0.992***(0.061)		0.185***(-0.005)		0.999***(-0.030)	
	0.236***(0.019)		0.672***(0.042)		0.215***(-0.005)		0.880***(-0.020)	
	0.336***(0.023)		0.731***(0.038)		0.306***(-0.006)		0.955***(-0.019)	
Log-likelihood	-29622.473		-28373.699		-441254.51		-419187.15	
Chi <sup>2</sup>	853.87		1164.85		9180.25		13742.537	
LR test (-value)	0.000		0.000		0.000		0.000	

The reference is “choose third-class cities”; Standard errors in parentheses; \*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

The place-specific attributes generally play a significant role in either case. Cities with abundant economic opportunities, advanced industrial structures, higher quality of public services, and better air quality are attractive to all migrants. However, as for the heterogeneity of the influence of place-specific attributes, it is partially consistent with **hypothesis 4**. Firstly, the results of Model II in Tables 3.2 illustrate the strong and robust effects of economic opportunities on migrants' destination choices. Across different variables, perceived labor return is the most influential on migration probability in both cases but is still more critical for less educated migrants. By contrast, the performance of the industrial structure is relatively poor for highly educated migrants but equally sound for less educated migrants. Such differences are consistent with our hypothesis. Nevertheless, the unemployment rate turns out to exert a stronger adverse effect on the destination choice of highly educated migrants. Beyond expectation as this result is, it may relate to educated migrants' investment in higher education, which can be a motive for moving to places with available employment opportunities. Secondly, coefficients associated with amenities generally perform poorer than economic factors. Indeed, a surprisingly large proportion of the factors associated with amenities display a greater impact on the less educated migration. Among all amenities-related variables, merely the scale of higher education (UNIVSTU) has a stronger pull effect on the inflow of skilled labor. In contrast, the housing price to income ratio plays no significant role in the case of skilled migration. However, it is positive and significant for the less-educated migrants. This counterintuitive finding can be explained by the lower probability of homeownership for low-educated migrants. In the meantime, further investigation suggests that cities with higher housing prices are the economically developed cities located in the eastern coastal regions of China. Since the less-educated migrants will not be tied to housing, they are inclined to move to cities with higher

housing prices but notable urban benefits. Similarly, cities offering ample cultural facilities display no attractiveness to highly educated migrants but are appealing to less-educated labor. Nevertheless, a higher proportion of green spaces fail to have a positive impact on migration. This unexpected finding may stem from the limitations in the measurement of green spaces in China and merits further research. Wang (2009) criticized that China's urban green space system for overemphasizing the rigid indices such as green space ratio but neglecting their layout and quality.

Lastly, comparison between the effects of different factors within each set of models reveals the priority of migrants when choosing their destinations. First, the migration distance has a remarkably adverse impact on the inflow of both skilled and less-skilled labor. Specifically, a one standard deviation increase in the distance would decrease the probability of immigration by 1.75% for educated migrants and by 2.02% for less-educated migrants. Further, regardless of skill levels, the migrants' occupation is ranked second in the considered factors. Note that spatial inclinations of migrants indicate a clear and significant match in migratory behavior between specific employment and production activities of destinations. However, discrepancies emerge in the prioritization of the remaining factors. For educated migrants, individual characteristics, including their residential locations, age, and gender, are notably essential predictors of their destination choices. In sharp contrast, less-educated migrants are strongly attracted to cities with higher wages and advanced secondary and tertiary industries; their personal characteristics are secondary. Lastly, the performance of amenities variables is relatively anemic for either group.

## ***Conclusion***

This Chapter examines the effects of the hukou system on China's internal migration from a micro-behavioral perspective. Considering the role played by formal education to determine who qualifies for membership in the hukou system, I incorporate the heterogeneity of educational attainments among migrants into the empirical framework. More specifically, I sought to assess the relative contribution of individual characteristics, migration experience, economic opportunities, and amenities in predicting the destination choices of skilled and less-educated migrants.

The findings show notable differences in factors that influence skilled and less-skilled inter-city migrations. In terms of the effects of the hukou system, the less-educated migrants are more restricted by holding a rural hukou than their highly educated counterparts. In addition, the results of individuals' residential locations where their hukou is registered capture a common migration trend of moving from areas at lower hierarchies to urban areas with higher administrative hierarchies. And note that such a pattern is more evident in educated migration. As for the impacts of other control variables, the educated migrants are motivated more by personal preferences and exhibit greater capabilities for bearing the uncertainty and risks emerging from migration. By contrast, the less-educated migrants often prioritize the economic opportunities in the destination and are more affected by the friction brought by age, migration distance, and frequent movements. However, irrespective of skill levels, the amenities generally perform poorer than other variables in predicting migrants' destination choices.

## CHAPTER 4

### LOCALIZED HUKOU SYSTEM AND DESTINATION CHOICE

#### *Chapter Overview*

The importance of the hukou system for understanding China's internal migration has been well recognized. However, little is known about the exact effectiveness of the hukou system in managing population. To answer this question, it is of critical import to link the effects of the hukou system to its measures and objectives. In other words, this Chapter seeks to answer these questions: how have local governments been manipulating the hukou system to filter for desirable immigrants? How should we measure the stringency of the various hukou entry conditions set by different cities? How effective is the hukou system in affecting China's internal migration?

This Chapter estimates the effects of the localized hukou system on China's internal migration from a policy-making perspective. The first step is to measure the stringency of the localized hukou system. After reviewing ways of determining qualifications for local de jure citizenship in 39 large cities, this paper utilizes regularized exploratory factor analysis (REFA) to construct a hukou difficulty index, to reflect local hukou thresholds in 2014-2019 and 2019-2023. The most important channels, including talent programs, investment, house purchase, and stable employment and residence, are incorporated into the index. The second step is to estimate the effectiveness of the hukou system through a series of destination choice models. This Chapter uses logit models to evaluates the effects of the hukou system on migration decision, with the heterogeneity of city-specific attributes and individual-specific characteristics incorporated.

#### *Decentralization of the Hukou System*

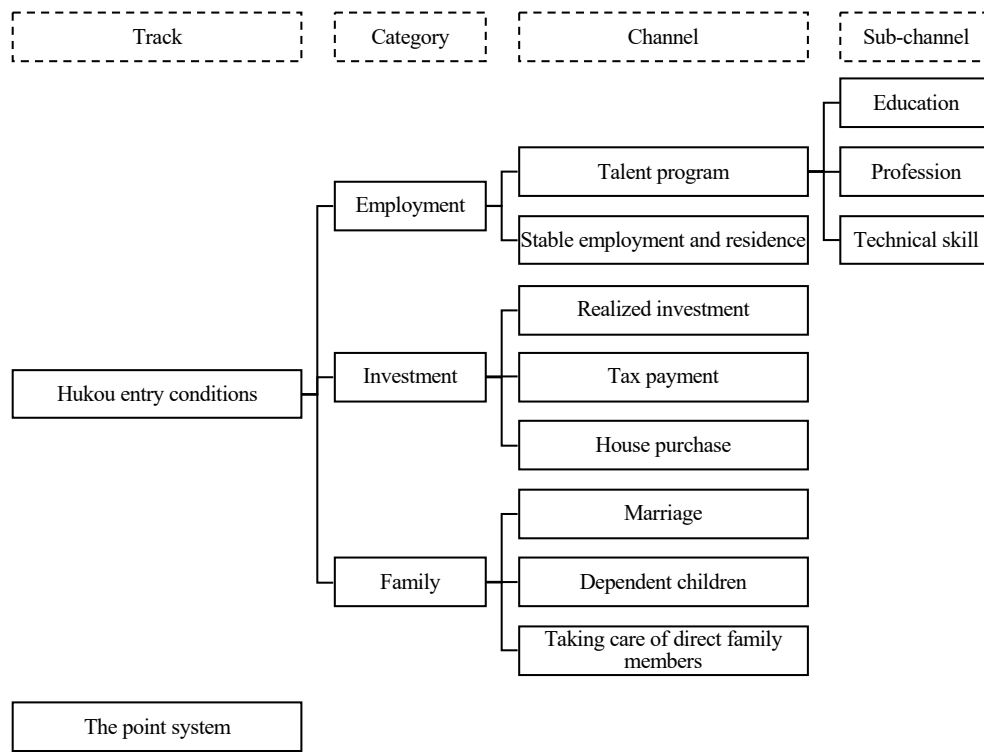
The promulgation of the *Household Registration Regulation (Hukou Dengji Tiaoli)* in January 1958 marked the formal establishment of the hukou system. Some scholars argue that the hukou system is a crucial component of a larger economic and political system that serves the state interest and priorities (Chan, 1992; Chan & Zhang, 1999; Cheng, 1991). It is an inevitable instrument for the command economy, which required meticulous planning and control of all macro and micro facets of society to pursue a Stalinist-type, Big Push industrialization strategy premised on the unequal exchange of industry and agriculture (Chan, 1992, 2009). In other words, the hukou system was designed to regulate population distribution, to ensure the compulsory procurement and monopoly of sales of farm produce (Yang & Cai, 2003). Under this system, millions of rural residents were confined to the agricultural sector, and deprived of the rights to migration to cities and to most state-provided benefits and opportunities.

Since the reform and open-up starting from 1978, many in China have openly criticized the hukou system for limiting people's mobility and creating social and spatial inequality (Wang, 2004). External factors, such as China's accession into the World Trade Organization in 2001, also called for "conformity to international standards" (Wang, 2004). Thereafter, the PRC launched several rounds of "deep" reform of the hukou system, gradually relaxing the internal migration restrictions. Coupled with the increasing demand for labor in coastal areas such as Guangzhou and Shanghai, China's internal spatial movements began to rise in the 1980s, ushering in the "Age of Migration" in the 1990s (Liang, 2001).

Beginning in the early 1980s, the central government gradually devolved fiscal and administrative powers to lower-level governments, which included changes in the management of the hukou system (Chan, 2009; Wang, 2004). Under the reformed regulations, local

governments have been granted more control in deciding the immigration to their administrative jurisdictions.

A diverse variety of localized practices to select migration has emerged, to serve cities' needs. Despite ambiguity and overlaps, the various hukou entry conditions can be roughly classified into three categories (Liu & Shi, 2020; Zhang et al., 2019; Zhang & Tao, 2012) : employment-based, investment-based, and family-based.



**Figure 4.1 Hukou acquisition channels**

Some cities have adopted a parallel model of both hukou entry conditions and point systems. And the point system is also using a combination of aforementioned indicators to grade the hukou applicants and to decide whether or not they are qualified enough for a local hukou.

***Prior Studies on the Measurement of the Local Hukou Thresholds***

There have been limited endeavors to measure the level of difficulty involved in acquiring a local hukou. Only a few quantitative studies have attempted to quantify the local hukou thresholds (Bao et al., 2011; MacroPolo, 2014; Zhang et al., 2019; Zhang & Tao, 2012). To this end, three approaches have been employed. **The first approach utilizes proxy variables**, i.e., the ratio of registered population to total population (Bao et al., 2011). However, this approach suffers from statistical inaccuracy as the registered population consists of both immigrants who have successfully acquired a local household and natives who have been assigned a local hukou at birth. Meanwhile, the total population<sup>7</sup> refers to the total number of usual residents within a given area, which is also affected by immigration and emigration. **The second approach constructs a hukou entry barrier index based on a set of indirectly relevant variables** (Zhang & Tao, 2012). They selected twenty-two variables to yield a numerical projection of the difficulty in acquiring a local hukou, which reflects the city government's capacity to provide public services, the city government's responsibility for public service provision, the degree of economic openness of the city, the living standards of the city, and the political resource of the city. However, the link between the difficulty of obtaining a local household and the variables selected remains unproven. Additionally, the utilization of a set of economic factors to construct the entry barrier index weakens the authors' conclusion that more developed cities tend to develop higher entry barriers to their hukou.

**The third approach is to code and quantify the assessment process issued by local governments** (Macropolo, 2014; Zhang et al., 2019). This approach seeks to quantify the various

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<sup>7</sup> See National Bureau of Statistics (2002), <http://www.stats.gov.cn/enGLISH/ClassificationsMethods/Definitions/>, for more detailed definitions.

requirements established by local governments, such as formal education, professional certificate, and length of local residence. The primary steps of this approach involve coding policy documents and calculating an index. For example, Zhang et al. (2019) focused on hukou qualifications regarding investment, home purchase, talent programs, and employment during the period 2000-2016. Firstly, they coded the implementation rules by documenting the core assessment indicators of each hukou acquisition channel (see Figure 4.1) and counting the number of attached requirements. Secondly, they used the Projection Pursuit Model to calculate an index measuring the difficulty of obtaining local hukou in 120 cities. The methodology used by Zhang et al. (2019) is convincing but has two flaws. Firstly, they did not take into account the specific attached requirements, such as age and length of enrollment in local social security; instead, they simply counted the number of attached requirements. Such way of coding risks losing too much detail<sup>8</sup>. Secondly, their categorization of hukou assessment components was ambiguous and inaccurate. This problem is manifested in the overlap of “academic qualification” as an assessment component between talent program and employment-based hukou acquisition (Zhang et al., 2019, p. 208-209). Additionally, apart from professional certification and educational attainment, Zhang et al. (2019) neglected a third fundamental component of talent programs that most cities implement, namely vocational skill levels<sup>9</sup>. Therefore, the method to measure the difficulty of obtaining a local hukou falls under the third approach, and the objective is to construct a more comprehensive and detailed hukou difficulty index.

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<sup>8</sup> The adjustment of hukou entry conditions in some cities, especially in first-tier ones, lies primarily in the detailed attached requirements. For example, Guangzhou’s talent program adjusted the age requirement for highly educated immigrants from under 35 in 2014 to under 40 years old in 2018, with the requirement on educational attainment unchanged.

<sup>9</sup> I reviewed hukou qualification policy documents from 39 Chinese large cities. All the 39 cities employ vocational skill levels as a method of evaluating migrants' qualification for local hukou.

## Data and Methodology

### Study Area

Considering the attractiveness to migrants, differential objectives of the localized hukou systems, and comparability of research objects, this study focuses on 39 cities from China's 337 prefecture-and-above-level cities, as shown in Table 4.1. From the perspective of political hierarchy, my selection of research objects has covered all provincial capitals, sub-provincial cities, municipalities; from the perspective of economic importance, it covers all first-tier and new first-tier cities, as well as most second-tier cities.

**Table 4.1 Cities for research**

City	Political Hierarchy <sup>1</sup>	City Tier <sup>2</sup>	Permanent Population (in thousand) <sup>3</sup>	Registered Population (in thousand) <sup>4</sup>	Urban Population (in thousand) <sup>5</sup>	Policy Objective <sup>6</sup>
Beijing	1	1	21,883	13,452	16,704	-
Shanghai	1	1	24,580	14,430	20,218	-
Tianjin	1	1.5	14,390	10,269	9,736	-
Chongqing	1	1.5	30,700	33,718	6,264	-
Guangzhou	2	1	13,501	8,542	10,641	-
Shenzhen	2	1	14,081	3,550	10,358	-
Chengdu	2	1.5	16,853	12,281	7,824	-
Hangzhou	2	1.5	9,018	7,236	5,850	-
Nanjing	2	1.5	8,973	6,534	5,828	-
Wuhan	2	1.5	10,608	8,293	7,542	-
Xi'an	2	1.5	9,880	8,157	5,596	-
Qingdao	2	1.5	9,446	7,831	4,556	+
Ningbo	2	1.5	7,825	5,866	2,583	+
Changchun	2	2		7,538	3,282	+
Dalian	2	2	6,987	5,936	3,902	+
Harbin	2	2		9,614	4,596	+
Jinan	2	2	7,132	6,257	4,120	+
Shenyang	2	2	8,517	7,304	5,718	-
Xiamen	2	2	4,540	2,111	3,119	+
Hefei	3	1.5	8,310	7,177	3,099	+
Zhengzhou	3	1.5	10,692	7,700	3,560	+
Changsha	3	1.5	8,283	6,804	3,193	+
Fuzhou	3	2	7,800	6,784	3,102	+
Lanzhou	3	2	3,979	3,219	2,439	+
Nanning	3	2	7,637	7,402	2,661	+
Guiyang	3	2	5,333	3,918	2,520	+
Shijiazhuang	3	2	10,702	10,288	3,317	+

Nanchang	3	2	5,597	5,204	2,614	+
Taiyuan	3	2	4,720	3,674	3,154	+
Kunming	3	2	6,677	5,556	3,385	+
Haikou	3	3	2,415	1,648	1,517	+
Hohhot	3	3	3,060	2,386	1,497	+
Yinchuan	3	3	2,473	1,792	1,159	+
Urumqi	3	3	3,550	2,668	2,853	+
Xining	3	4	2,311	2,012	1,227	+
Lhasa	3	4	696	530	220	+
Suzhou	4	1.5	10,616	6,670	4,084	+
Foshan	4	1.5	8,643	3,890	6,772	-
Dongguan	4	1.5	9,996	1,950	7,271	-

Note:

1. “Political hierarchy”. In the table, 1 = “provincial-level municipalities”, 2 = “sub-provincial city”, 3 = “Provincial capitals”, and 4 = “Prefecture-level city”.
2. “City tier” refers to unofficial hierarchical classification of Chinese cities published by financial magazines or investment companies, which generally reflects cities’ economic import or potential. The cities are typically classified according to consumer behavior, income level, population size, consumer sophistication, infrastructure, talent pool, and business opportunity. In the table, 1 = “first-tier cities”, 1.5 = “new first-tier cities”, 2 = “second-tier cities”, 3 = “third-tier cities”, and 4 = “fourth-tier cities”.
3. “Permanent population”, also called “usual residents”, is officially defined as people living in given administrative area over 6 months, despite their hukou status. The data in the table are permanent population in each city in 2015. Data source is CEIC China Premium Database.
4. “Registered population” is officially defined as people registered in accordance with the regulation of the People’s Republic of China on the Management of Registration Residence in public security organs in this area. In other words, it refers to the population with local hukou, regardless of their places of residence. The data in the table are registered population in each city in 2015. Data source is CEIC China Premium Database.
5. “Urban/Rural population” is officially classified according to the Regulation of Statistics Classification on Urban and Rural Population (Draft), formulated by the National Bureau of Statistics in 1999. The data in the table are urban population in each city in 2010. Data source is the 2010 Population Census of the People’s Republic of China.
6. The direction of policy objective refers to whether the localized hukou system is designed to encourage or discourage immigration, using the “5 million urban population” stipulated by the National New Urbanization Plan (2014-2020) as the cut-off.

## Data

This Chapter pieces together a variety of materials. First, the hukou difficulty index is constructed based on a systematic review of local hukou policies. I collected 327 hukou-relevant policy documents, including 287 hukou entry condition policies and 33 point system policies issued by the 39 cities, and 7 central policies; Table 4.2 shows their distribution by year of issue. The policy documents come from a diverse range of sources: 1) databases of laws and regulations

including the “Law Star (<http://law1.law-star.com/>),” “Peking University Law (<https://pkulaw.com/>)”, and “Lawyee” (<http://www.lawyee.com/>), 2) local government websites, and 3) news articles published by Xinhua News Agency and other official publications. Second, the migration decision modeling in this Chapter is based on the 2017 China Migrants Dynamic survey collected by the National Health Commission of China in 31 provincial administrative units. Using a stratified three-stage probability proportion to size (PPS) random sampling method, the survey interviewed internal Chinese migrants aged over 15 who had resided in the host city for over one month and finally collected 169,989 samples in total. The dataset contains relevant migrants’ individual characteristics and migration experiences. After filtering out intracity migrants and individuals with missing demographic information or hukou status, a total of 126,587 valid samples are used for the modeling analysis.

**Table 4.2 Distribution of policy documents**

Hukou entry condition policies			Point system policies			Central policies		
Year	Frequency	Percentage (%)	Year	Frequency	Percentage (%)	Year	Frequency	Percentage (%)
1992	1	0.35	2010	1	3.03	1997	1	14.29
1996	2	0.70	2011	2	6.06	2001	1	14.29
1999	1	0.35	2013	1	3.03	2011	1	14.29
2000	3	1.05	2014	3	9.09	2014	2	28.57
2001	6	2.09	2015	1	3.03	2016	1	14.29
2002	3	1.05	2016	3	9.09	2018	1	14.29
2003	8	2.79	2017	6	18.18			
2004	4	1.39	2018	5	15.15			
2005	4	1.39	2019	3	9.09			
2006	5	1.74	2020	2	6.06			
2007	4	1.39	2021	2	6.06			
2008	7	2.44	2022	4	12.12			
2009	7	2.44						
2010	9	3.14						
2011	7	2.44						
2012	6	2.09						
2013	10	3.48						
2014	19	6.62						
2015	21	7.32						
2016	29	10.10						
2017	33	11.50						
2018	23	8.01						
2019	18	6.27						

2020	28	9.76		
2021	13	4.53		
2022	13	4.53		
2023	3	1.05		

### **Coding Local Hukou Entry Conditions**

In 2014, China’s *New Urbanization Plan* underscored the imperative of transitioning rural migrants into urban residents. Later that same year, the central government issued *Opinions on Deepening the Reform of the Household Registration System*. In 2016, the state further issued the *Opinions on the Settlement of 100 Million Migrants*. These documents undoubtedly demonstrate the government's unwavering commitment to reforming the hukou system since 2014. On the other hand, hukou system operation documents from earlier years were typically classified as “for internal use only” (Wang, 2004) . This availability issue resulted in incomplete coverage of all 39 cities and/or all channels in the policies before 2010. Given these circumstances, this thesis constructs the hukou difficulty index by focusing on two phases: 2014-2019 and 2019-2023.

A survey of policy documents and existing studies reveal the most commonly used ways of filtering for desirable immigrants in Chinese large cities, as shown in Figure 4.1. Considering the greater uncertainty and lack of transparency in the point system<sup>10</sup>, this study focuses on the channels under the track of hukou entry conditions. Local governments have utilized a diverse array of indicators to assess migrants’ potential socioeconomic contributions, to determine their

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<sup>10</sup> This thesis excludes the point system from the construction of the hukou difficulty index due to its ambiguity of results and inconsistency of criteria. In the case of megacities such as Beijing and Tianjin, the assignment of hukou through the point system is closely linked to the quota (*zhibiao*), set by local governments each year. In other words, applicants are not automatically assigned to a local household upon reaching a certain number of points, but instead, the assignment is based on ranking. Conversely, some other large cities set benchmark points for obtaining hukou. For instance, the Nanjing municipal government stated in the *Notice on the Implementation of the Point System in Nanjing [2021-02]* that individuals who accumulate 100 points and comply with the basic requirements are eligible for local hukou. It is essential to note that either the quota or benchmark points are subject to change by the government.

eligibility for a local hukou. First, there are core requirements for each specific channel or sub-channel. Educational attainment requirements for those applying through the education sub-channel are an example of this. Second, an additional set of requirements are also used. For instance, “length of enrollment in local social security” appears in almost all seven channels. Lastly, some cities set special requirements for particular channels<sup>11</sup>. While these requirements typically apply to a small group of migrants, they are still incorporated into the index by counting the number of special requirements. Table 4.3 provides details on the coding of hukou entry conditions set by local governments.

**Table 4.3 Indicators and coding of each sub-channel**

<b>Category</b>	<b>Channel</b>	<b>Indicators and Codes</b>	
<b>Employment</b>	<b>Talent program</b>	<b>Education:</b> Educational attainment	6 = primary and below 9 = junior school 10 = secondary technical school 12 = high school 14 = junior college 16 = undergraduate 19 = master 24 = doctor
		<b>Profession:</b> Professional certificate	1 = junior 2 = intermediate 3 = advanced
		<b>Skill:</b> Occupational qualification certificate	1 = primary-level skilled worker 2 = medium-level skilled worker 3 = senior-level skilled worker 4 = technician 5 = senior technician
		<b>Additional requirements</b>	Age Length of labor contract Length of enrollment in local social security Restrictions on industry (0 = No, 1 = Yes) The number of special requirements
	<b>Stable employment and residence</b>	Length of local residence (including rental) Length of enrollment in local social security Length of holding residence permit	

<sup>11</sup> For example, in addition to the common requirements set around vocational skill level, age, and length of labor contract, Beijing stipulates in *Management Measures for the Introduction of Talents* that migrants applying for Beijing hukou through the skill channel must be ranked first in national vocational skills competitions.

		Restrictions on district (0 = No, 1 = Yes) The number of special requirements
<b>Investment</b>	<b>Realized investment</b>	Total amount of realized investment capital Length of enrollment in local social security Restrictions on industry (0 = No, 1 = Yes) The number of special requirements
	<b>Tax payment</b>	Total amount of annual tax payment Length of enrollment in local social security Restrictions on industry (0 = No, 1 = Yes) The number of special requirements
	<b>House purchase</b>	Total size or the value of the house purchased Restrictions on commercial housing (0 = No, 1 = Yes) Length of residence Length of enrollment in local social security Restrictions on district (0 = No, 1 = Yes) Restrictions on purchase time (0 = No, 1 = Yes) The number of special requirements

### **Measuring Local Hukou Thresholds**

To assess the difficulty of obtaining a local hukou through the seven channels outlined in Table 4.3, this Chapter uses regularized exploratory factor analysis (REFA). Factor analysis is a commonly used method in social science to identify patterns in a set of variables by reducing dimensionality (Child, 2006). However, issues with insufficient sample sizes can lead to unstable parameter estimates, limiting the empirical application of exploratory factor analysis in social science (Jung & Lee, 2011; MacCallum et al., 1999). To overcome this challenge, REFA has been proposed as an alternative approach that incorporates regularization methods into the factor analysis framework (Jung et al., 2020; Jung & Lee, 2011).

The process of using REFA to construct a difficulty index for each channel involves four steps (Grice, 2001): (1) constructing a correlation matrix of the indicators in Table 4.3, (2) using the regularized factoring method to extract a factor structure matrix, (3) estimating factor scores using regression-based weights, and (4) calculating the index based on factor loadings and factor

scores. Finally, a comprehensive hukou difficulty index is constructed by combining the indices of the seven channels into a single composite score using REFA.

### **Local Hukou Thresholds and Migration Decision**

In the empirical analysis, this Chapter uses a set of logit models to investigate the impact of local hukou thresholds on migrants' migration decisions. The dependent variable is coded one if sample  $i$  decides to choose city  $j$  as their destination and zero otherwise. It is assumed that the probability of sample  $i$  choosing city  $j$  is associated with individual-specific and location-specific factors, as discussed Chapter 3. Building on existing studies (Gu & Shen, 2021; He & Gober, 2003; Shen, 2017), I takes into account local hukou policies, economic attributes, amenities, and individuals' demographic and hukou characteristics. Considering heterogeneity in the effects of the localized hukou system (Chan, 2018), I incorporate interaction terms between hukou difficulty index and policy objectives, city tier, and individual characteristics.

### ***A Hukou Difficulty Index***

#### **Indices for the Seven Channels**

This study used regularized exploratory factor analysis (REFA) to analyze the variables in each employment-based and investment-based channel over two time periods: 2014-2019 and 2019-2023. Tables 4.4 and 4.5 present the rotated factor loadings obtained by REFA for the variables in each channel during the first period. Similarly, Tables 4.6 and 4.7 show the unrotated factor loadings for variables in the second period. The factor loadings reveal the relative importance of each variable in determining the hukou difficulty index, with higher factor loadings indicating stronger associations with the index. Notably, in the first period, core indicators such as

educational attainment have the highest factor loadings, while in the second period, additional requirements such as age have risen in importance and even surpassed core indicators in some cases.

**Table 4.4 Factor loadings for employment-based channels, 2014-2019**

Education			Profession			Skill			Stable employment and residence		
Variables	Factor 1	Factor 2	Variables	Factor 1	Factor 2	Variables	Factor 1	Factor 2	Variables	Factor 1	Factor 2
Educational attainment	-0.157	<b>0.560</b>	Professional certificate	-0.026	<b>0.682</b>	Vocational skill level	-0.099	<b>0.646</b>	Length of local residence (including rental)	<b>0.984</b>	0.017
Age	-0.148	<b>-0.402</b>	Age	<b>-0.505</b>	-0.223	Age	-0.355	<b>-0.425</b>	Length of enrollment in local social security	<b>0.977</b>	-0.018
Length of labor contract	<b>0.710</b>	0.128	Length of labor contract	<b>0.445</b>	0.102	Length of labor contract	<b>0.893</b>	-0.006	Length of holding residence permit	0.024	<b>0.237</b>
Length of enrollment in local social security	<b>0.668</b>	-0.150	Length of enrollment in local social security	<b>0.696</b>	-0.100	Length of enrollment in local social security	<b>0.920</b>	-0.003	Restrictions on district (0 = No, 1 = Yes)	-0.115	<b>0.529</b>
Restrictions on industry	0.219	<b>0.511</b>	Restrictions on industry	0.167	<b>0.266</b>	Restrictions on industry	0.070	<b>0.543</b>	The number of special requirements	0.153	<b>0.477</b>
The number of special requirements	<b>0.442</b>	0.060	The number of special requirements	0.066	<b>0.425</b>	The number of special requirements	<b>0.184</b>	0.158			

**Table 4.5 Factor loadings for investment-based channels, 2014-2019**

Realized investment			Tax payment			House purchase		
Variables	Factor 1	Factor 2	Variables	Factor 1	Factor 2	Variables	Factor 1	Factor 2
Total amount of realized investment capital	<b>0.698</b>	0.241	Total amount of annual tax payment	<b>0.633</b>	0.234	Total size or the value of the house purchased	<b>0.601</b>	0.135
Length of enrollment in local social security	<b>0.673</b>	-0.191	Length of enrollment in local social security	<b>0.523</b>	-0.238	Restrictions on commercial housing (0 = No, 1 = Yes)	<b>0.725</b>	-0.016
Restrictions on industry (0 = No, 1 = Yes)	0.210	<b>0.647</b>	Restrictions on industry (0 = No, 1 = Yes)	0.051	<b>0.632</b>	Length of residence	0.327	<b>-0.391</b>
The number of special requirements	0.285	<b>-0.539</b>	The number of special requirements	<b>0.417</b>	-0.260	Length of enrollment in local social security	-0.081	<b>-0.300</b>
						Restrictions on district (0 = No, 1 = Yes)	0.048	<b>0.628</b>
						Restrictions on purchase time (0 = No, 1 = Yes)	<b>0.355</b>	-0.128
						The number of special requirements	0.092	<b>0.461</b>

**Table 4.6 Factor loadings for employment-based channels, 2019-2023**

Education			Profession			Skill			Stable employment and residence		
Variables	Factor 1	Factor 2	Variables	Factor 1	Factor 2	Variables	Factor 1	Factor 2	Variables	Factor 1	Factor 2
Educational attainment	-0.072	<b>0.762</b>	Professional certificate	<b>0.706</b>	0.080	Vocational skill level	<b>0.712</b>	-0.049	Length of local residence (including rental)	<b>0.982</b>	0.033
Age	0.104	<b>0.716</b>	Age	<b>0.726</b>	-0.012	Age	<b>0.804</b>	0.174	Length of enrollment in local social security	<b>0.991</b>	-0.028
Length of labor contract	<b>0.817</b>	0.113	Length of labor contract	<b>0.762</b>	-0.030	Length of labor contract	<b>0.791</b>	0.026	Length of holding residence permit	<b>0.332</b>	-0.087
Length of enrollment in local social security	0.263	<b>0.335</b>	Length of enrollment in local social security	0.167	<b>0.672</b>	Length of enrollment in local social security	<b>0.607</b>	0.235	Restrictions on district (0 = No, 1 = Yes)	-0.036	<b>0.681</b>
Restrictions on industry	<b>0.768</b>	-0.045	Restrictions on industry	-0.106	<b>0.720</b>	Restrictions on industry	<b>0.683</b>	-0.419	The number of special requirements	0.032	<b>0.725</b>
The number of special requirements	<b>0.716</b>	-0.084	The number of special requirements	0.071	<b>0.271</b>	The number of special requirements	0.292	<b>0.580</b>			

**Table 4.7 Factor loadings for investment-based channels, 2019-2023**

Realized investment			Tax payment			House purchase		
Variables	Factor 1	Factor 2	Variables	Factor 1	Factor 2	Variables	Factor 1	Factor 2
Total amount of realized investment capital	<b>0.747</b>	0.231	Total amount of annual tax payment	0.343	<b>0.580</b>	Total size or the value of the house purchased	<b>0.633</b>	0.106
Length of enrollment in local social security	0.233	<b>0.553</b>	Length of enrollment in local social security	<b>0.657</b>	0.067	Restrictions on commercial housing (0 = No, 1 = Yes)	0.405	<b>0.434</b>
Restrictions on industry (0 = No, 1 = Yes)	<b>0.784</b>	-0.183	Restrictions on industry (0 = No, 1 = Yes)	-0.177	<b>0.671</b>	Length of residence	0.023	<b>0.577</b>
The number of special requirements	-0.174	<b>0.568</b>	The number of special requirements	<b>0.589</b>	-0.129	Length of enrollment in local social security	-0.214	<b>0.358</b>
						Restrictions on district (0 = No, 1 = Yes)	<b>0.748</b>	-0.071
						Restrictions on purchase time (0 = No, 1 = Yes)	-0.179	<b>0.395</b>
						The number of special requirements	<b>0.445</b>	-0.033

**Table 4.8 Scores for hukou thresholds via each channel, 2014-2019**

City	Education	Profession	Skill	Stable employment and residence	Realized investment	Tax payment	House purchase
Beijing	1.82	2.07	1.12	NA	2.72	1.75	NA
Changchun	-0.36	-0.43	-0.78	-0.35	-0.32	-0.27	-0.31
Changsha	-0.43	-0.26	-0.55	-0.58	-0.24	-0.39	-0.67
Chengdu	-0.39	0.04	0.07	0.21	-0.28	0.18	0.40
Chongqing	0.17	-0.62	NA	0.06	-0.33	-0.47	-0.10
Dalian	0.83	0.95	0.28	-0.41	-0.16	0.01	0.68
Dongguan	0.38	0.20	1.12	1.12	-0.43	-0.32	0.19
Foshan	0.91	0.20	0.07	0.60	NA	-0.18	-0.52
Fuzhou	-0.16	-0.26	-0.53	0.60	-0.27	NA	-0.43
Guangzhou	0.13	0.48	0.87	NA	NA	NA	NA
Guiyang	-0.12	-0.49	-0.48	-0.06	NA	NA	-0.10
Haikou	1.46	1.04	1.27	1.12	0.63	-0.20	0.29
Hangzhou	0.03	0.21	1.37	NA	0.65	0.31	1.68
Harbin	-0.63	-0.07	-0.73	NA	-0.04	NA	-0.10
Hefei	0.06	0.12	-0.15	-0.19	NA	-0.18	0.44
Hohhot	-0.61	-0.07	-0.61	-0.35	NA	-0.15	-0.10
Jinan	1.00	-0.01	0.67	-1.01	NA	-0.36	-0.14
Kunming	-0.39	-0.39	-0.48	-0.58	NA	-0.26	0.00
Lanzhou	-0.61	-0.43	-0.18	0.27	-0.25	NA	-0.80
Lhasa	-0.15	-0.23	-0.58	0.13	-0.17	-0.45	-0.67
Nanchang	-0.78	-0.33	-0.43	-0.95	NA	-0.58	-0.01
Nanjing	0.00	-0.18	-0.57	NA	-0.30	-0.27	0.36
Nanning	-0.67	-0.65	-0.84	-0.54	NA	-0.22	-0.72
Ningbo	0.17	-0.31	-0.13	1.20	NA	NA	1.02
Qingdao	-0.05	0.11	0.29	NA	NA	0.18	0.69
Shanghai	2.79	1.63	2.69	1.52	0.97	1.94	NA
Shenyang	-0.48	-0.65	-0.77	NA	-0.30	-0.25	-0.10
Shenzhen	0.26	0.69	0.46	NA	NA	0.55	NA
Shijiazhuang	-0.44	-0.54	-0.65	0.15	-0.32	-0.38	-0.76
Suzhou	0.49	0.32	0.73	NA	0.16	0.32	0.21
Taiyuan	-0.54	-0.20	-0.58	-0.89	NA	-0.25	-0.72
Tianjin	0.49	0.42	1.28	NA	NA	1.00	0.75
Urumqi	-0.05	0.19	-0.52	1.07	0.09	0.23	-0.02
Wuhan	0.00	0.01	-0.46	-0.06	NA	0.44	0.98

Xi'an	-0.05	-0.26	0.27	0.37	NA	-0.14	0.55
Xiamen	0.55	1.64	1.11	NA	NA	1.00	0.01
Xining	-0.50	-0.36	-0.58	0.13	-0.38	-0.44	-0.29
Yinchuan	-0.78	-0.62	-0.03	-1.24	NA	-0.45	-0.39
Zhengzhou	-0.78	-0.65	-0.84	-0.30	NA	-0.10	-0.10

**Table 4.9 Scores for hukou thresholds via each channel, 2019-2023**

City	Education	Profession	Skill	Stable employment and residence	Realized investment	Tax payment	House purchase
Beijing	1.81	2.53	1.25	NA	2.79	1.57	NA
Changchun	-0.37	-0.73	-0.80	-0.05	-0.33	-0.18	-0.43
Changsha	-0.37	-0.13	-0.45	-0.51	-0.22	-0.52	-0.43
Chengdu	0.01	0.76	0.70	0.64	-0.36	0.18	0.95
Chongqing	0.04	-0.48	-0.30	0.50	-0.34	-0.44	-0.17
Dalian	0.20	0.40	0.48	0.20	-0.19	0.11	0.77
Dongguan	0.12	-0.23	0.92	1.28	-0.39	-0.12	NA
Foshan	0.60	0.25	0.77	0.41	NA	0.01	NA
Fuzhou	-0.05	-0.48	-0.58	0.36	-0.30	NA	-0.56
Guangzhou	0.43	0.46	0.92	NA	NA	NA	NA
Guiyang	-0.20	-0.28	-0.38	0.23	NA	NA	0.08
Haikou	1.52	1.18	1.27	1.28	0.64	-0.18	NA
Hangzhou	0.33	0.53	0.97	NA	NA	NA	1.79
Harbin	-0.64	-0.26	-0.66	-0.97	-0.08	NA	0.08
Hefei	-0.05	0.21	0.26	-0.17	NA	0.01	0.77
Hohhot	-0.76	-0.43	-0.63	-0.39	NA	-0.05	-0.30
Jinan	-0.56	-0.73	-0.73	-0.60	NA	NA	-0.47
Kunming	-0.76	-0.73	-0.80	-0.18	NA	-0.21	0.17
Lanzhou	-0.76	-0.48	-0.58	-0.51	-0.33	NA	-0.47
Lhasa	-0.04	-0.08	-0.44	0.41	-0.10	-0.32	-0.43
Nanchang	-0.76	-0.02	-0.45	-0.75	NA	-0.52	0.06
Nanjing	0.15	-0.33	-0.52	-0.46	NA	NA	NA
Nanning	-0.76	-0.73	-0.80	-0.56	NA	NA	NA
Ningbo	-0.15	-0.48	-0.34	-0.10	-0.24	-0.29	NA
Qingdao	-0.24	-0.07	0.06	-0.92	NA	NA	0.50
Shanghai	2.85	1.99	1.95	2.05	1.02	1.99	NA
Shenyang	-0.76	-0.73	-0.80	-0.74	-0.30	-0.43	0.08
Shenzhen	-0.17	0.05	1.07	NA	NA	0.66	NA
Shijiazhuang	-0.76	-0.73	-0.52	-0.56	-0.32	-0.46	-0.47

Suzhou	0.37	0.26	0.34	NA	NA	NA	NA
Taiyuan	-0.76	-0.33	-0.66	-0.79	NA	-0.06	-0.45
Tianjin	1.14	-0.12	1.18	NA	NA	0.74	NA
Urumqi	-0.35	-0.48	-0.13	0.87	-0.12	-0.29	-0.45
Wuhan	-0.09	0.05	-0.49	0.23	NA	0.06	1.63
Xi'an	-0.31	-0.33	-0.66	-0.12	NA	-0.70	-0.43
Xiamen	0.30	2.22	0.27	NA	NA	0.74	-0.64
Xining	-0.76	-0.73	-0.80	0.41	NA	NA	-0.43
Yinchuan	-0.76	-0.48	-0.58	-0.92	NA	-0.52	-0.43
Zhengzhou	-0.76	-0.73	-0.80	-0.60	NA	0.08	0.08

**Table 4.10 Descriptive statistics of hukou thresholds via each channel**

2014-2019				2019-2023			
Channel	N	Mean	Standard Deviation	Channel	N	Mean	Standard Deviation
Education	39	0.066	0.756	Education	39	-0.052	0.786
Profession	39	0.059	0.657	Profession	39	-0.011	0.802
Skill	38	0.058	0.826	Skill	39	-0.038	0.769
Stability	28	0.036	0.724	Stability	32	-0.031	0.726
Investment	20	0.071	0.733	Investment	17	0.050	0.801
Tax payment	33	0.049	0.606	Tax payment	27	0.031	0.629
House purchase	35	0.034	0.576	House purchase	27	0.016	0.657

**Based on the factor loadings and factor scores for the variables, a hukou difficulty index for each channel in two phases was calculated, as shown in Table 4.8 and Table 4.9. These tables provide information on the relative difficulty of obtaining a hukou through each channel, with higher scores indicating greater difficulty.**

Table 4.10 presents descriptive statistics of hukou thresholds via each channel in two periods.

**Before delving into the detailed indices, it is worth noting from Table 4.9 and Table 4.10 that certain channels for obtaining a local hukou contain missing values in some cities. This mirrors the reality that the pathways to obtaining a local hukou vary from place to place and from period to period, despite similarities or continuities. For example, the house-purchase channel (“*goufang luohu*”) has undergone significant changes in recent years; there**

have been eight more missing values<sup>12</sup> in this avenue to local hukou during 2019-2023. In the early 2000s, Beijing and Shanghai abolished the assignment of local hukou to migrants who had purchased houses, while most new first-tier cities like Tianjin, Nanjing, and Foshan have followed suit in the 2010s. By contrast, second-tier cities like Kunming, Fuzhou and Nanchang have further lowered their hukou thresholds in the past five years, lifting restrictions on property size or value from the house-purchase channel. Another interesting observation from the change in the number of missing values is that the 39 cities are placing more value on the human capital carried by talented and stable immigrants and less on direct investment. Channels requiring more substantial investment, including realized investment, tax payment, and house purchase, are being abolished. On the other hand, channels based on education, profession, or skill have always been attached the most importance. Additionally, cities are increasingly interested in attracting immigrants who can contribute to the local economy in the long run, as more cities are allowing immigrants to obtain local hukou if they have worked and lived in the city for a certain number of years.

Furthermore, consider the variances in the difficulty of obtaining local hukou among different cities. Firstly, as the most economically developed and politically important cities in China, Beijing and Shanghai have set the highest thresholds for almost all channels to local hukou. This finding is not surprising, but a closer comparison of the pathways to local hukou in these two cities reveals differences in the ways in which Beijing and Shanghai set their assessment rules. Beijing always sets higher requirements on the core indicators and age to filter for younger

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<sup>12</sup> Cities that had abolished the *house-purchase* channel before 2014 are Beijing, Shanghai, Guangzhou, and Shenzhen. The eight cities that abolished the *house-purchase* channel after 2014 are Tianjin (2014), Dongguan (2014), Haikou (2015), Nanjing (2016), Nanning (2017), Ningbo (2018), Foshan (2019), and Suzhou (2020).

immigrants equipped with higher educational attainments, professional titles or vocational skills. In contrast, Shanghai prefers more stable immigrants, setting higher requirements on the length of labor contract and the length of enrollment in local social security. Shanghai's preference for stable immigrants is also demonstrated by the fact that Shanghai is the only first-tier city where immigrants can obtain local hukou provided they have held a residence permit and have worked in Shanghai for seven years<sup>13</sup>.

Secondly, it is noteworthy that the correlation between hukou thresholds and economic development in Chinese cities is not always consistent. This can be exemplified by two prominent cities in western China, namely Chongqing and Urumqi. Chongqing, one of China's most populous cities and one of the four municipalities under direct administration by the central government, has a concentrated population of over 30 million since 2015 and an urbanized area population of over 6 million. On the other hand, Urumqi, the capital of Xinjiang Uygur Autonomous Region, has a population of approximately 3 million. Despite this, except for the education channel, it is generally more arduous to obtain a local hukou in Urumqi than Chongqing. Chongqing has significantly eased its hukou restrictions since the issuance of the *Measures for the Movement of Household Registration in Chongqing* (“*Chongqing Shi Hukou Qianyi Dengji Shishi Tiaoli*”) in 2016. In contrast, it was not until 2022 that the hukou thresholds via education, profession, and investment channels set by Urumqi were lowered similar to those

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<sup>13</sup> In 2009, Shanghai municipal government issued *Measures for Shanghai Residence Permit Holders to Apply for Local Household Registration*, stipulating that immigrants who have 1) held Shanghai Residence Permit for 7 years, 2) enrolled in local social security for 7 years, 3) paid income tax in accordance with the law, 4) been appointed to an intermediate level and above professional position or held technician and above level occupational qualification certificate, and 5) had no criminal records. For people who are working in education and health positions in the suburban areas, length of holding Residence Permit and enrolling in local social security can be shortened to 5 years. In 2016, Shenzhen also stipulated in *Provisions on Shenzhen Household Registration Acquisition* that immigrants who have lived in Shenzhen and enrolled in local social security for certain years are eligible for local hukou. Nevertheless, its implementation is combined with the point system in Shenzhen.

in Chongqing. Still, Urumqi continues to maintain higher thresholds for immigrants who seek to obtain a local hukou via the skill channel compared to Chongqing.

### **A composite hukou difficulty index**

To derive a composite index for hukou difficulty, the indices for the seven distinct channels in Tables 4.8 and 4.9 were included as variables in REFA. The missing values were handled using multiple imputation with Bayesian estimation, following Graham (2009). REFA reported the factor loadings of each channel, as shown in Table 4.11. Based on the factor loadings and factor scores produced by REFA, a composite index that represents the overall difficulty of acquiring local hukou in the 39 cities was calculated, as shown in Figures Figure 4.2 and Figure 4.3.

**Table 4.11 Factor loadings for composite hukou index**

2014-2019			2019-2023		
Variables (Channels)	Factor 1	Factor 2	Variables (Channels)	Factor 1	Factor 2
Education	0.024	<b>0.887</b>	Education	-0.010	<b>0.949</b>
Profession	0.166	<b>0.758</b>	Profession	0.058	<b>0.783</b>
Skill	-0.057	<b>0.928</b>	Skill	-0.048	<b>0.938</b>
Stable employment and residence	<b>0.571</b>	0.137	Stable employment and residence	0.210	<b>0.587</b>
Realized investment	<b>1.000</b>	-0.107	Realized investment	<b>0.734</b>	0.085
Tax payment	<b>0.724</b>	0.211	Tax payment	<b>0.888</b>	0.023
House purchase	<b>0.779</b>	0.106	House purchase	<b>0.952</b>	-0.038

The hukou difficulty index provides insights into the variations in local hukou thresholds across different cities and periods. Firstly, local hukou thresholds are typically higher in more economically developed cities. As expected, Beijing and Shanghai exhibit notably higher levels of difficulty in obtaining local hukou compared to other Chinese cities. However, as discussed in previous sections, the generally positive correlation between hukou thresholds and economic development in Chinese cities is not always valid. For instance, Haikou, a third-tier city, is

ranked fourth in terms of its local hukou threshold in the two periods, which is consistent with the hukou difficulty index calculated by MacroPolo (2014).

Secondly, the hukou difficulty index also reveals changes in the relative difficulty of obtaining local hukou over time. Such changes are nuanced and require revisiting local hukou policies to make conclusions. For example, in line with the observations made by Zhang et al. (2019), the hukou difficulty index for Beijing, Shanghai, Shenzhen, Guangzhou, and some other new-first tier cities have increased in the second period. Zhang et al. (2019) concluded that these prosperous cities were tightening their migration control through hukou entry conditions.

However, for the two periods this study focuses on, I argue that this is because most cities have significantly lowered their hukou thresholds, and simultaneously, hukou entry policies in megacities including Beijing and Shanghai have largely remained unchanged in recent years.

Nevertheless, some cities did raise local hukou thresholds, which was typically closely connected with their change in economic, political, and regional importance. Hefei is an appropriate example. In 2016, Hefei was incorporated into the Yangtze River Delta area<sup>14</sup>. From 2013 to 2018, while the core assessment indicators of most channels remained unchanged, Hefei introduced additional age requirements for applicants seeking to obtain local hukou via “talent programs”.

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<sup>14</sup> See Xinhua News Agency (2016), [http://www.gov.cn/guowuyuan/2016-05/12/content\\_5072454.htm](http://www.gov.cn/guowuyuan/2016-05/12/content_5072454.htm), for a more detailed introduction to the Yangtze Reiver Delta and the incorporation of Hefei Metropolitan Area.

### Hukou Entry Thresholds in 39 Cities 2014–2019

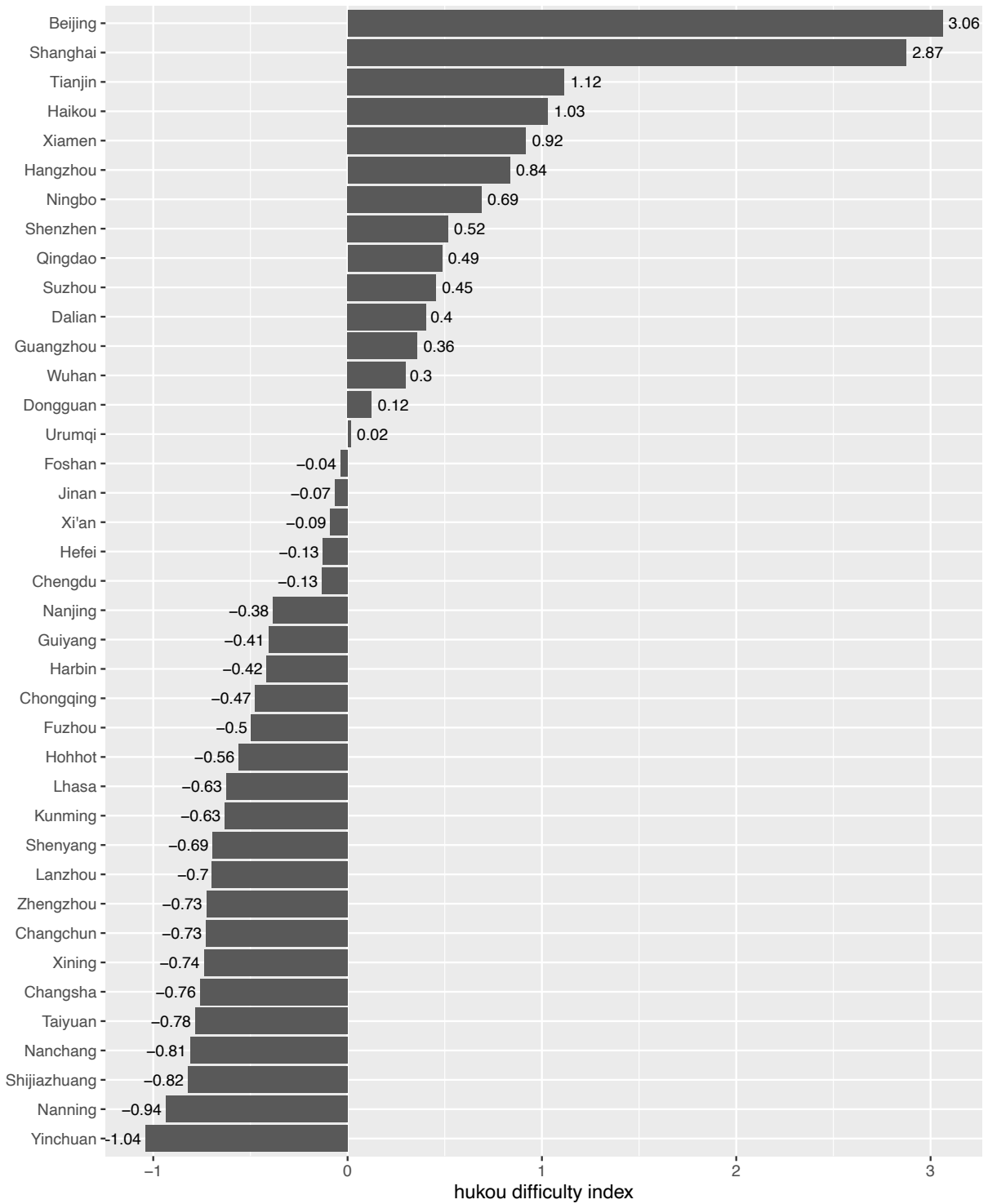


Figure 4.2 Hukou difficulty index during 2014-2019

Hukou Entry Thresholds in 39 Cities  
2019–2023

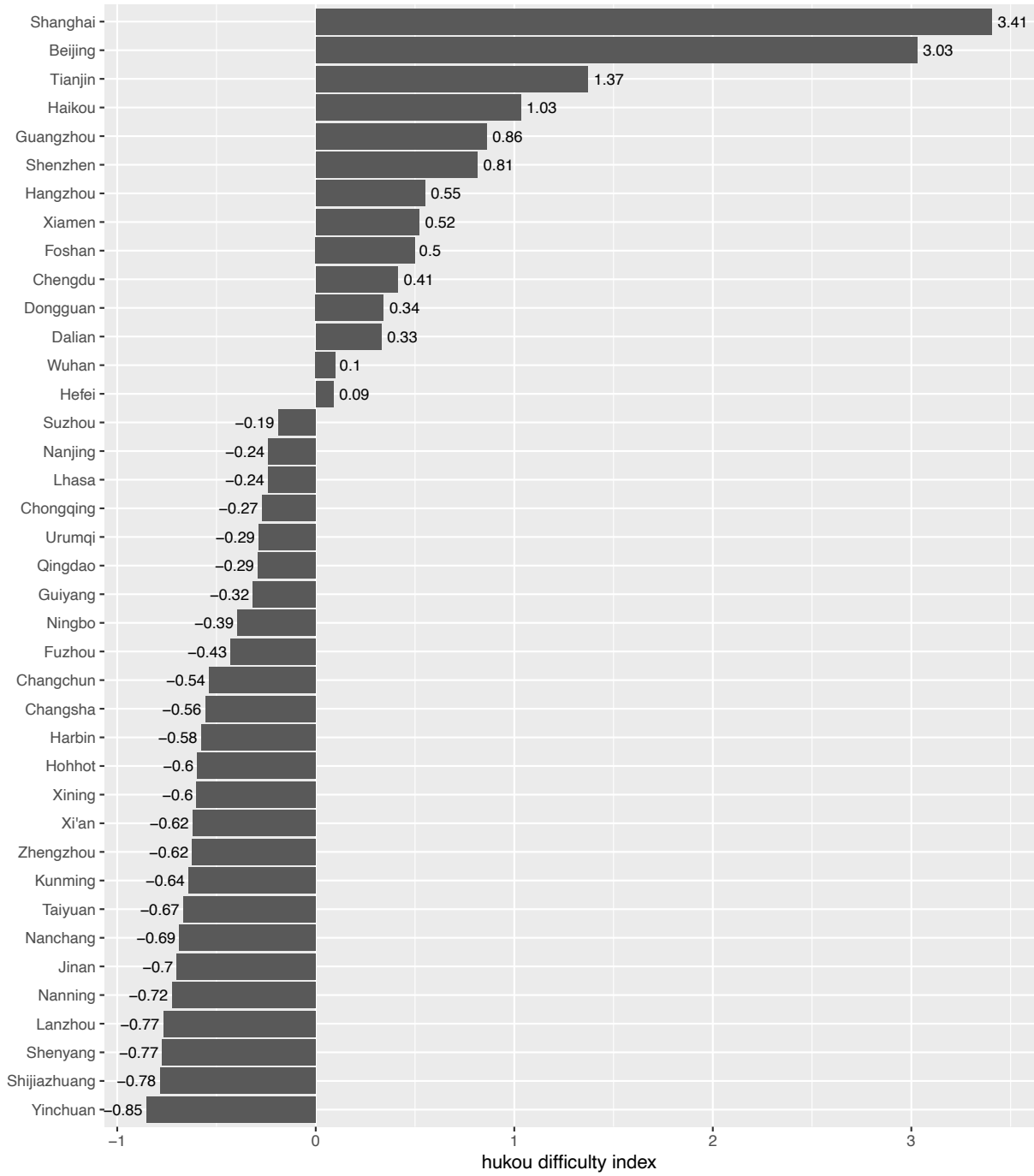


Figure 4.3 Hukou difficulty index during 2019-2023

*The Effects of the Local Hukou Thresholds on Migration*

Table 4.12 presents the empirical results of the migration decision model, which confirm the crucial role of the hukou system in understanding internal migration in China. The first model considers both the hukou difficulty index and the objective of local hukou policies. With economic opportunities and amenities controlled, the results indicate that the hukou difficulty index is positively correlated with the probability of immigration for the sample, regardless of whether the local hukou policies aim to discourage or encourage immigration. This preference is even more pronounced in cities where the local hukou system is designed to control immigration. There are two possible explanations for this counter-intuitive relationship between the local hukou thresholds and migrants' location decision. First, as discussed in Chapter 2, while the logistic regression has controlled for economic opportunities and amenities, the difficulty of obtaining local hukou is positively related to other unobserved social welfare factors. Second, the migration decision is relatively short-term, and in this scenario, the hukou system may play a less important role. According to Zhang et al. (2020), high local hukou thresholds have contributed to a widespread return migration among low-skilled migrants in China, with the number of return migrants exceeding that of migrants without local hukou. This finding, from a different perspective, also suggests that high hukou thresholds fail to discourage short-term immigration.

Models 2 and 3 demonstrate the heterogeneity of the effects of the hukou system across cities and populations, respectively. The results in Model 2 indicate that the positive relationship between the hukou difficulty index and migrants' probability of selection is the most pronounced in first-tier cities, gradually decreasing as the tier of the city drops down. In fact, the connection between the hukou difficulty index and migrants' immigration turns negative among third-or-fourth tier cities. An increase of one unit in the hukou difficulty index will lead to a decrease of 0.024% in the probability of migrants' choosing a specific third-or-fourth tier city. Furthermore,

Model 3 shows that the constraints brought about by a high local hukou threshold is most influential for migrants who are males, whose educational attainment is primary school or below, and whose originate from rural regions. Conversely, these negative effects decline for migrants who are females, who are highly educated, and whose hukou is registered in areas with higher administrative hierarchy. Chapter 3 has confirmed that formal education is useful to offset the negative effects brought about by the hukou system. Regarding the heterogeneity of the effects of the hukou system across genders, on the one hand, my finding resonates with the observation made by Faggian et al. (2007) that women are more mobile since females appear less constrained by high local hukou thresholds compared with their male counterparts. On the other hand, it is worth noting that all the samples in CMDS are migrants, people who already migrated. It is not uncommon for Chinese women to be left behind in rural areas by their husbands (Fan & Chen, 2020). Hence, it is likely that women who were able to migrate have stronger desire for an urban lifestyle, and the gender dynamics in more economically developed cities are better.

**Table 4.12 Logit regression model of migration decision**

	Model 1	Model 2	Model 3
Hukou difficulty index	0.080***(0.009)	0.521***(0.011)	-0.027*(0.012)
Policy objective (reference = encouraging)	0.028**(0.010)		0.030**(0.010)
Hukou difficulty index * Discouraging hukou policy	0.337***(0.011)		0.316***(0.011)
New first-tier city (reference = first-tier city)		0.317***(0.028)	
Second-tier city (reference = first-tier city)		0.334***(0.028)	
Third-or-Fourth-tier city (reference = first-tier city)		0.197***(0.029)	
Hukou difficulty index * New first-tier city		-0.105***(0.019)	
Hukou difficulty index * Second-tier city		-0.426***(0.020)	
Hukou difficulty index * Third and Fourth-tier city		-0.545***(0.019)	
Hukou difficulty index * Female			0.025***(0.006)
Hukou difficulty index * Junior school			0.048***(0.009)
Hukou difficulty index * Middle school			0.036***(0.010)
Hukou difficulty index * College and above			0.169***(0.011)
Hukou difficulty index * Towns			0.076***(0.009)
Hukou difficulty index * Prefectural cities			0.257***(0.015)
Hukou difficulty index * Provincial capitals and above			0.752***(0.028)
Hukou difficulty index * Non-rural hukou			0.021*(0.009)
Option-specific factors	YES	YES	YES

Individual-specific characteristics	NO	NO	YES
Constant	9.282***(0.370)	10.302***(0.440)	9.503***(0.371)
Observations	4,936,893	4,936,893	4,936,893
Pseudo R-squared	0.058	0.058	0.063
Chi-squared	72,267	70,923	70,693
Log Likelihood	-37,5261	-375,169	-373,236

Note: Robust standard errors in parentheses; \*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

## ***Conclusion***

In this Chapter, I revisit the evolution of the hukou system, with a focus on how its decentralization has enabled local governments to filter for desirable immigrants. While previous Chapters (2 and 3) estimate the effects of the hukou system on China's internal migration at macro and micro levels, they fail to take into account the localized hukou system itself into account. In addition, to assess the effectiveness of the hukou system, it requires linking the effects of the localized hukou system to its policy objectives is necessary. Therefore, this Chapter constructs a hukou difficulty index and use a series of logit models to investigate the effects of the localized hukou system on migrants' migration decisions.

The hukou difficulty index reveals the variances of local hukou thresholds across cities and periods. Firstly, it confirms prior scholarly speculations regarding the connection between hukou thresholds and the level of urban development. The results indicate that obtaining a local hukou in Beijing and Shanghai is most challenging, followed by Tianjin. Nevertheless, this relationship is not always valid, as illustrated by the high hukou threshold in Haikou and the comparison between Chongqing and Urumqi. Secondly, it documents the change in relative difficulty of obtaining local hukou in the 39 cities of research interest.

The logistic regression models in this chapter reveal a positive relationship between the difficulty of obtaining local hukou and migrants' probability of immigration, which is consistent with the results in Chapter 2. Interestingly, this positive connection is most pronounced in the first-tier cities and turns negative among third-or-fourth-tier cities. Furthermore, the effects of the hukou system vary across populations. Male migrants with primary school or below educational attainment and with hukou registered in rural regions are most constrained by high hukou thresholds.

## CHAPTER 5

### CONCLUSION

#### *Key Findings*

The intention of this thesis is to understand more about internal migration in China's unique configuration of socioeconomic and political factors. The unprecedented surge in internal migration comes at a time when China's economic structure is transitioning from socialist to market oriented. Interestingly, the hukou system, relic of the planned economy era from 1949 to 1978, has retained its power and been decentralized. As one of the most crucial instruments to "manage population", the localized hukou system allows Chinese large cities to avoid negative impacts brought about by migration. In this context, despite a general agreement on the importance of the hukou system for understanding China's internal migration, there has been limited empirical evidence on the effects of the hukou system on migration (Bao et al., 2011; Colas & Ge, 2019).

Therefore, this thesis centers on a central question – "What effects has the localized hukou system exerted on internal migration in China?" This main question is broken down into the following sub-questions, to investigate the connection between the hukou system and China's internal migration from different perspectives:

1. What have been the internal migration trends in China in the past decades? What factors have shaped the spatial pattern? In this process, what are the effects of the hukou system?
2. How does the hukou system influence migrants' choice of destination in China's context? How does this effect vary across educational attainment?

3. How do the local governments manipulate the hukou system to filter for desirable immigrants? How should we measure the stringency of the various hukou entry conditions set by different cities?

To answer these questions, Chapter 2 provides a macro-level spatial analysis, using a series of gravity models to estimate factors that shape the volume and geographical orientation of China's internal migration. The hukou system was incorporated using the percentage of local hukou holders to all population in each province to proxy the perceived hukou threshold (Bao et al., 2011). Chapter 3 provides a nested micro-behavioral analysis of the destination selection behavior of migrants with different educational attainments. The migrants' hukou status, including hukou type and residential location, is included as explanatory variables. Chapter 4 constructs a hukou difficulty index (HDI) by incorporating the most commonly used channels of filtering for desirable immigrants and tests the effectiveness of the localized hukou system with a simple migration destination choice models.

Does the hukou system affect China's internal migration? The answer to this question is obviously positive. The gravity estimations in Chapter 2, the nested logit models in Chapter 3, and the logit models in Chapter 4 all confirm the significant importance of the hukou system for understanding China's internal migration. More importantly, the results reveal the heterogeneity of the effects (and effectiveness) of the hukou system across time, regions, and populations. Firstly, the gravity modeling results demonstrate that the effectiveness of the hukou system to regulate migration has been diminishing since the 2000s. This is evident not only in the decreasing absolute value of the coefficient but also in the finding that the association between the probability of acquiring a hukou and migration is positive during the 1990s but turns negative in the latter two periods. Secondly, the findings from Nested Logit models show notable

differences in the impacts exerted by the hukou system on the destination choice of educated and less-educated migrants. The less-educated migrants are more constrained by their rural hukou and hukou from areas at lower hierarchies (such as rural areas and small towns). In other words, the hukou system has significantly more negative effects on less educated migrants' mobility. Finally, the logistic regression models in Chapter 4 overall reveal a significantly positive relationship between local hukou thresholds and immigration, which is consistent with Chapter 2. More importantly, the modeling in Chapter 4 reveals that the effects of the hukou system are various across city tiers and populations. Lowering local hukou thresholds can effectively boost migrants' immigration propensity among third-and-fourth cities, but the higher difficulty of obtaining a local hukou in first-and-new-first-tier cities does not statistically deter immigration.

### ***Project Limitations***

The objective of this thesis is to investigate the influence of the localized hukou system on China's internal migration. The key challenge faced in this study is how to integrate the hukou system into the research framework. This thesis examines three approaches: a proxy variable, the hukou status of migrants, and a hukou difficulty index. Although the hukou difficulty index discussed in Chapter 4 is more comprehensive, precise, and updated than previous studies, it is crucial to note that the complexity of acquiring local hukou in large Chinese cities goes beyond the indices and rankings. On the one hand, the hukou entry policies are more nuanced than the index suggests. For example, Haikou introduced a "talent program" in 2019, which is distinct from other channels. While obtaining Haikou hukou through the "talent program" is notably more challenging, it offers a wide range of benefits, including substantial subsidies for purchasing or renting housing. Migrants who are not eligible for the "talent program" can obtain local hukou if they have been registered in the local social security system and have stable

residency. On the other hand, even though obtaining local hukou through qualifications is more straightforward than the point system, it can still be more challenging in practice than on paper, primarily in megacities such as Beijing and Shanghai. It is not uncommon for eligible applicants to be denied due to a “lack of proof materials” or other reasons.

Furthermore, the results reported by quantitative modeling in this thesis provides interesting observations for our understanding of the connection between the hukou system and internal migration in China. However, interpretations of modeling are largely based on speculations. The most important example is how to explain the positive connection between the hukou difficulty index and migration. A crucial example is how to explain the positive correlation between the hukou difficulty index and migration. In March 2023, during my presentation of Chapter 4 at an Urban China Conference, a discussant remarked that “the hukou difficulty index is also a city attractiveness index,” highlighting the endogenous issue. Future studies could address the endogeneity problem by using panel data. Nevertheless, I doubt the capacity of statistical data and modeling to capture all aspects of the substantial spatial inequality of social welfare in China. There may always be unobserved social welfare factors positively related to the local hukou thresholds, contributing to a positive correlation between hukou thresholds and migration.

### ***Final Thoughts***

This thesis presents empirical evidence on the effects of China’s hukou system on internal migration. However, it is crucial to acknowledge the limitations of quantitative modeling and statistical data in capturing the full complexity of the hukou system and its relationship with internal migration. Therefore, it is not safe to conclude that a positive relationship between the hukou system and internal migration suggests the failure of the hukou system to manage

migration in China. The hukou system retains its power to decide people's mobility. In Chapter 2, I discovered a negative correlation between the difficulty of obtaining a local hukou and the volume of interprovincial migration flows in the 1990s, which turned positive in the last two decades. Therefore, it is likely that the seeming ineffectiveness of the hukou system in Beijing and Shanghai to discourage immigration is the result of allowing mobility. It can be helpful to compare the effects of the hukou system on short-term and long-term migration, to gain insight into its contemporary role in regulating migration in China.

The effects of the hukou system undoubtedly vary across populations. For example, both nested logit modeling in Chapter 3 and logistic regression modeling in Chapter 4 reveal that female migrants in China have a stronger preference for large cities than their male counterparts. This finding raises the question of what brings about such a gendered difference. Further ethnographic work can be conducted to explore this question.

In summary, the hukou system still plays a critical role in China after its decentralization. For the state, it has been a tool to absorb low-cost labor from underdeveloped regions and avoid costs associated with surplus population by rejecting migrants' legal citizenship. For residents, it has shaped their life chances and experiences, often creating significant disparities between those with hukou from different locations. As the reform of the hukou system deepens, with more cities providing migrants with state-provided services, it appears that the hukou system is gradually exiting from the stage. Further research is needed to fully understand the evolving role of the hukou system in shaping internal migration in China and its impact on migrant communities.

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