City Amenities and Internal Migration: Evidence from Chinese Cities

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Abstract: *This paper provides new empirical evidence of city amenities' role in China's internal migration using a unique city-level dataset. The results highlight the positive effects of city amenities such as education, public facilities, transportation, environment, and climate conditions in attracting migrant workers to cities. In our study, migrant workers are more likely to move to cities with better education, more public facilities, higher coverage of urban pensions, and a cooler climate with more precipitation. Moreover, they prefer to migrate and live in cities with larger service agglomeration and employment, higher average wages, more job opportunities, and lower house prices.*

Keywords: Amenities, Migration, Cities

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1.   Introduction

China has been experiencing a rapid urbanisation process in recent decades, with the urban population increasing from 16.2% in the 1960s to nearly 60.3% in 2019. Rapid urbanisation has spurred massive internal migration, mainly from rural areas to cities or from small cities to large cities. The number of rural migrant workers in China was 8.9 million in 1989; incredibly, it grew to nearly 288 million in 2018, accounting for more than one-third of the entire working population in China.

What attracts migrant workers to move to cities? Some studies highlight the economic incentives as the main drivers of internal migration (Zhao, 1999; Fu and Gabriel, 2012; Liu and Shen, 2014). Migrant workers tend to seek higher wages, more employment opportunities, and better economic structure in cities (Gries et al., 2016; Su et al., 2019). In fact, city amenities are also important factors in workers' migration decisions in developed countries (Gong, 2016). However, some studies highlight that city amenities were important but not the only factor in the mobility decisions of workers in China (Liu and Shen, 2013; Cui and Cho, 2020). This is because China's internal migration mobility is primarily restricted by the household registration system (Hukou system). The hukou system records a household's official residence to access local social welfare and key critical amenities in the cities such as education, pensions, housing funds, medical care, and social insurances. As migrant workers leave their official residence, they barely have access to hukou-related city amenities in their migration places. However, they still have limited access to specific city amenities such as transportation, recreation facilities, city environment, etc.

However, China has been relaxing hukou restrictions and strengthening the rights of the migrant workers in cities in the past decade. China abolished the agricultural and non-agricultural hukou in 2016 and introduced the unified household registration system for urban and rural residents. The hukou system in medium and small cities[1] with less than 3 million population was eliminated. It was also greatly relaxed in large cities with 3–5 million residents. Super cities with a population more than 5 million loosened residency restrictions for skilled migrants with college degrees or higher but still imposed restrictions on unskilled migrant workers. In general, migrant workers are eligible to settle in small and

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[1] China has five levels of cities depending on population size: megacities, super cities, large cities, medium-sized cities, and small cities. Megacities have a population of over 10 million, while super cities' populations are over 5 million. We define cities with population of 3–5 million as large cities. The cities with 1–3 million population are categorised as medium cities. Those with 1 million population or below are small cities.

medium cities, especially skilled migrant workers. Furthermore, despite the strict hukou restrictions in super and megacities, efforts are taken to relax migrants' access to public services. For example, the Chinese government implemented interim regulations on residence permits for migrant workers in 2015, ensuring they enjoy essential public services such as education, medical care, pensions, and housing support.

As a result, it is necessary to reconsider the driving factors of China's internal migration, especially the role of city amenities. In this paper, we address the effects of city amenities on migration and the mobility of workers. Using unique city-level data from China, we derive and measure city-level amenities from five dimensions: education, public services, transportation, environment, and climate. We examine the role of city amenities on the movement of migrant workers at the city level. Using the city-level panel data from the China Real Estate Information Database of the State Information Centre from 2010–17, we investigate the determinants of internal migration rates between cities. We find that specific types of city amenities tend to impact migrant flows across cities. Cities with better education, more public facilities, higher coverage of urban pension insurances, and highways tend to attract more migrant workers. Apart from city amenities, qualitative variables such as job opportunities tend to attract migrant workers to cities. We observe that migrant workers are more likely to flow in cities with a larger share of service employment in the previous year and lower unemployment rates. This study contributes to the ongoing literature on city amenities and internal migration. It highlights city amenities' crucial role in workers' mobility across cities, which adds new evidence to the literature on internal migration and city amenities.

This paper proceeds as follows. Section 2 gives some stylised facts about city amenities and migrant workers in China. Section 3 discusses the data in our analysis. Section 4 reports the empirical model and results at the city level, depicting how city amenities affect the city-level migrant inflows and outflows. Section 5 concludes with some policy implications.

2.   Urbanisation in China

This section reviews the related studies on city amenities and labour mobility. There are three branches of literature on city amenities and migration. The first branch is to derive the methodology from measuring city amenities. We summarise the index of city amenities in previous studies in Table 1.

Table 1: Index of City Amenities in Previous Studies

| Dimensions	Indicators	Representative Studies
A. Public Facilities and Services Amenities	A1. Education; A2. Medicare; A3. Dining facilities; A4. Shopping Facilities; A5. Recreation Facilities; A6. Cultural Facilities; A7. Endowment Facilities	Blomquist et al. (1988); Wang and Chen (2019); Liao and Wang (2019)
B. Environment Amenities	B1. Water Pollution; B2. Air pollution; B3. Garbage Disposal; B4. Noise Pollution	Knapp and Gravest, (1989); Wu (2006); Sun et al. (2019)
C. Climate Amenities	C1. Climatic Comfort; C2. Urban Afforestation Rate; C3. Parks; C4. City Cleanness; C5. City Landscaping	Graves (1980); Sinha and Cropper (2013); Gao and Sam (2019)
D. Transportation Amenities	D1. Road Quality; D2. Public Transportation; D3. Parking slots; D4. Transportation Connectivity	Mueser and Graves (1995); Scott (2010); Brown and Scott (2012)
E. Cultural Amenities	E1. Social Inclusiveness; E2. Citizen Education Level; E3. Scenic Spots; E4. Historical Sites; E5. Tourists Number; E6. Tourist Trips Number	Clark and Kahn (1988); Carlino and Saiz (2019); Lanzara and Minerva (2019)
F. City Safety	F1. Crime Rate; F2. Emergency Shelter; F3. Police Number; F4. Natural Disasters	Glaeser and Gottlieb (2006); Molloy, Smith, and Wozniak (2011)

Source: Authors.

The second branch explores the role of city amenities in labour mobility. Most studies highlight the importance of city amenities in both immigration and internal migration in developed countries. Hong (2016) highlighted that illegal Mexican immigrants are more responsive to the policy that reduces American amenity values than an increase in border patrol officers. Rodríguez-Pose and Ketterer (2012) also found that different types of regional amenities exert an important influence on cities' relative attractiveness across the European Union. Many studies highlight the role of city amenities in internal migration. For example, Brown and Scott (2012) found that city amenities attract college degree-holders to Canada's metropolitan areas. Although there is a positive impact on city amenities on labour mobility, China's studies are not conclusive. Zheng (2014) also finds that city amenities matter in attracting people with higher education levels in China. However, Liu and Shen (2013) highlighted that China's skilled migration is mainly driven by regional income inequality, while regional amenities play a less important role due to institutional restrictions on labour movement.

The third branch focuses on individuals' migration decisions and their subsequent settlement decisions related to migration. Several recent studies focus on the determinants of individual migration decisions (Su et al., 2018; Gao and Sam, 2019). This paper provides a city-level analysis of what determines cities' migration flows rather than individual analysis. In this paper, we summarise the determinants of internal migration in previous studies and categorise them into four types: (1) individual characteristics such as age, gender, income, and living preference; (2) city amenities in terms of public facilities, transportation, environment, climate, and cultural inclusiveness; (3) city characteristics such as unemployment rate, average wage, and access to health insurance and pensions; and (4) industrial agglomeration in terms of service sectors.

One of this paper's key contributions is to examine the service agglomeration effects on Chinese workers' migration across cities. There are two key reasons to add service agglomeration in the analysis. First, service has become a new economic growth engine of China, accounting for over 50% of gross domestic product (GDP) since 2014. As shown in Figure 1, China's service value-added increased from RMB24.485 trillion to RMB46.957 trillion between 2012 and 2018, with an annual growth rate of 7.9%, which was 0.9% higher than the GDP growth rate and up 1.3% compared with the manufacturing value-added growth rate. Meanwhile, service employment experienced dramatic growth, absorbing over 46% of workforces in 2018.

Figure 1. Share in GDP and Employment by Sectors, 1999–2018
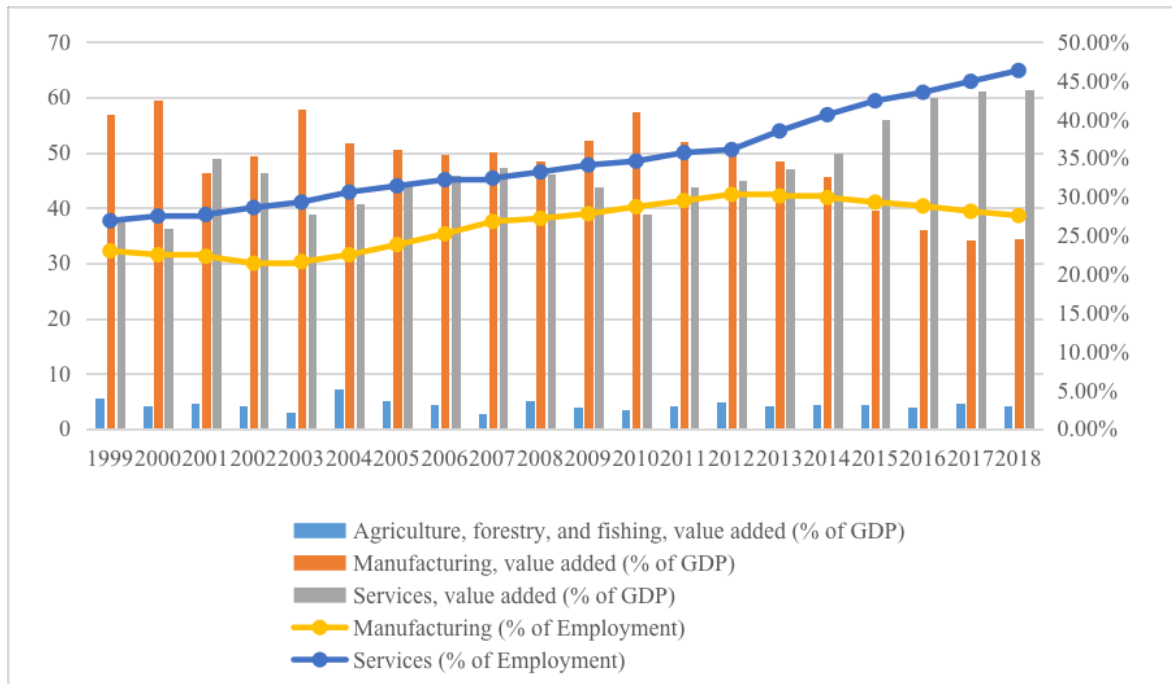
GDP= gross domestic product.
Source: China National Bureau of Statistics (NBS) (https://data.stats.gov.cn/english/).

Secondly, migrant workers play an increasingly important role in service sector development. According to the China Migrants Dynamic Survey, in 2008, 37.3% of migrant workers engaged in manufacturing jobs, while 13.8% were in building industries and 33.1% in service sectors. In 2018, the migrant workers in service sectors increased to 50.5%, while the migrant workers in the manufacturing sectors and the building industry declined to 27.9% and 18.6%, respectively. According to the China Migrants Dynamic Survey dataset, over 70% of migrant workers are in service-related occupations in 2017. Migrant workers are more likely to move to cities with service agglomeration, which provides more job opportunities. As a result, we predict that cities with more service agglomerations tend to attract more migrant workers.

3. City Amenities and Migrant Workers Mobility across Cities

3.1. City-level Data

The city-level data comes from the China Real Estate Information Database of the State Information Centre. This database provides annual statistics for all prefecture cities (around 290 cities) in China and contains more than 90 indicators, including population, employment, economic development, education, transportation, technology, public service

and facility, environment, real estate market, etc. As shown in Table 1, we use a panel data of Chinese prefecture cities from 2011 to 2017 to construct the city amenities indicators from five perspectives. First, we use the teacher/student ratio in primary schools, middle schools, and colleges and universities as proxies for education amenities in each city. Second, we evaluate the public facilities' amenities, including internet and telephone access rates, the average number of theatres, hospitals, posts, and library books per 1,000 persons. Third, we evaluate the environmental amenities using the share of landscaping in government investment, residential garbage disposal rate, and solid waste disposal rate of factories. Fourth, we measure the transportation amenities with the annual passenger volume of air, railway, and highway transportation. Finally, we also collect the climate amenities indicators, including the annual average temperature, humidity, precipitation, and insolation hour.

In this part, we study how city amenities affect migrant workers' inflows or outflows at the city level. We trace the net inflow or outflow of migrants by comparing the number of the total population with the household registration population in each city at the end of the year. We construct the migration rate, which implies the ratio of migrant workers relative to registered residents. If the migration rate is negative, the city has net labour outflows. If the migration rate is positive, the city has net labour inflows.

Following previous literature, we also control city-specific characteristics that affect migration rates, such as average wage, unemployment rate, and average house prices. More importantly, we use the share of service employment in total employment as a proxy for the service sector agglomerations and explore how it affects the migration rate. The descriptive statistics are shown in Table 2 as follows.

Table 2: Descriptive Statistics of City Amenities

		Mean	S.D.	Min	Median	Max
Dependant Var	Migration rate (%)	0.017	0.382	–0.931	–0.033	3.467
Education Amenities	College Teacher/Student Ratio	0.053	0.025	0	0.051	0.327
	Middle school Teacher/Student Ratio	2.225	25.987	0	0.078	360.13
	Primary school Teacher/Student Ratio	1.878	24.226	0	0.059	373.52
Public Service Amenities	Internet Access rate	0.051	0.108	0	0	0.889
	Mobile phone Access Rate	0	0	0	7.68E-04	0.001
	Theatre Access rate (1,000 persons)	0.002	0.003	0	3.07E-04	0.051
	Hospital Access rate (1,000 persons)	0.536	0.992	0	0.394	2
	Post Access rate (1,000 persons)	0.009	0.017	0	0	0.171
	Average Library Book	0.483	0.857	0	0.26	9.3
Environment Amenities	Landscaping Investment Share	0.121	0.152	0	0.066	0.983
	Garbage Disposal rate	0.855	0.272	0	0.98	1
	Solid waste Disposal rate	0.761	0.286	0	0.891	1
Transportation Amenities	Road and Bridge Investment share	0.426	0.294	0	0.439	1
	Water passenger volume (billions)	0.001	0.005	0	0	0.153
	Air passenger volume (billions)	0.002	0.007	0	0	0.086
	Rail passenger volume (billions)	0.004	0.011	0	0	0.143
	Highway Passenger volume (billions)	0.092	0.191	0	0.047	2.866
Climate Amenities	Average temperature	15.378	5.546	–2.2	16	30
	Average humidity	0.686	0.107	0.291	0.702	0.91
	Average precipitation (1,000 ml)	23.429	147.955	0	0.908	999
	Average insolation hour (1,000 hours)	155.218	359.941	0	2.043	3.283
City Characteristics	GDP: Agricultural Share	0.107	0.084	0	0.103	0.499
	GDP: Manufacturing Share	0.417	0.2	0	0.476	0.893
	GDP: Service share	0.324	0.163	0	0.348	0.806
	Unemployment rate	0.005	0.004	0	0.004	0.047

		Mean	S.D.	Min	Median	Max
	Average wage (RMB10,000)	4.596	1.954	0	4.734	13.499
	Average house price (RMB10,000)	85.504	552.48	0	0.427	4301.3
	Health Insurance Coverage rate	0.224	0.204	0	0.164	1.15
	Pension Coverage rate	0.182	0.156	0	0.144	1.626

GDP = gross doemstic product.
Source: China Real Estate Information Database of the State Information Centre.

4. Empirical Model

We construct the empirical model in Equation (1) to explore what determines the migrant inflows and outflows in Chinese prefecture cities at the city level.

$$M_{jt} = \beta_0 E_{Serv_{it-1}} + \beta_1 Amen_{jt} + \beta_2 X_{jt} + \sigma_j + \sigma_t + \varepsilon_{it} \qquad (1)$$

As shown in Equation (1), the dependent variable M_{jt} is the ratio of migrant workers relative to local registered residents. If the city has net outflows of migrant workers, $M_{jt} <$ 0. As indicated, we use the lagged service employment share as the proxy for service sector agglomeration. Cities with more service employment in previous periods tend to have more job opportunities and attract more migrant workers. β_0 represents how the service sector agglomeration affects the migrant worker flows across cities. $Amen_{jt}$ represents the city amenities indicators, including education, public services, transportation, environment, and climate amenities. We control other city characteristics such as average wage, unemployment rate, average house price, etc. We also include the time- and city-specific fixed effects in the model.

4.1. Results

Table 3 reports the baseline results of Equation (1). The first column presents the pooled ordinary least squares results without control year fixed effects and city fixed effects. To eliminate the impact of unobserved city characteristics, we control city fixed effects and year fixed effects in column (2). After controlling for the fixed effects, we find cities with larger service employment in the previous year tend to have higher migration rates. Different types of city amenities have different effects on labour migration. We find a negative impact of primary education on the migration rate. Cities with better access to the internet and highways tend to have higher migration rates. However, city amenities in

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terms of mobile phones, pensions, and railway tend to have a negative effect on the migration rate in the whole sample, which seems to be against intuition.

It should be noted that the sample contains migrant outflow cities as well as migrant inflow cities, in which city amenities may play different roles. Column (3) shows the impacts of city amenities on the migration rate in labour-inflow cities. First, cities with larger service employment in the previous year tend to attract more migrant worker inflows. Second, cities with better secondary education tend to have more migrant worker inflows, which are consistent with current literature. However, we do not find the quality of advanced education to have significant impact on labour inflow. We also observe that cities with better access to the internet, mobile phones, theatres, posts, and libraries tend to attract more migrant inflows, while the number of hospitals negatively affect the migrant inflows.

Urban health and pension insurances have different roles in attracting migrants. Cities with more health insurance coverage rates tend to have lower migrant inflow rates, while cities with better access to urban pensions tend to attract more migrant workers. As indicated above, most migrant workers are insured in the rural cooperative medical care system based on their hukou location, but the reimbursement is only valid in their registered place. Despite having health insurance, migrant workers still have difficulties enjoying local medical care in the migration cities as they have difficulties in reimbursing medical fees. However, pensions are paid by local employers. As long as migrant workers get jobs with pensions, they can have pension insurance in the migrant cities.

In terms of environmental amenities, the household garbage disposal rate is positively associated with migrant inflows, but solid waste disposal rates of factories and the expenditure share of landscaping are negatively correlated with migrant inflows. Transportation amenities also have different roles in attracting migrants. Migrant workers tend to favour highway transportation instead of railway or air transportation. Thus, cities with better highway capacity tend to attract more migrant workers. The climate amenities have no significant effect on the migration rate. We also observe that city house prices are negatively associated with migrant inflows, which is consistent with the findings of previous studies such as Chen et al. (2019).

Column (4) indicates how city amenities affect internal migration in labour outflow cities. We find that cities with better primary education, landscaping, pensions, and larger precipitation tend to have fewer migrant outflows. Moreover, there are more migrant

worker outflows in cities with more mobile phone users. The unemployment rate also affects migrant worker outflows, by which cities with higher unemployment rates tend to have more migrant outflows.

Table 3: Baseline Results-City Amenities

	(1) Pooled OLS	(2) FE	(3) Migrant Inflow Cities	(4) Migrant Outflow Cities
L.emp_third	–0.074	0.105*	0.237**	–0.016
	(0.313)	(0.096)	(0.013)	(0.320)
College	0.583**	–0.047	–0.012	–0.078
	(0.022)	(0.707)	(0.941)	(0.485)
Middle education	–0.296	0.175	0.606**	–0.004
	(0.505)	(0.101)	(0.016)	(0.945)
Element education	–0.362***	–0.098**	0.073	0.257**
	(0.004)	(0.015)	(0.182)	(0.047)
internet	0.126**	0.059***	0.095***	0.015
	(0.018)	(0.002)	(0.002)	(0.399)
mobile phone	49.539	–1,185.676***	435.882*	–1,136.389***
	(0.919)	(0.000)	(0.066)	(0.000)
theatre	–2.458	1.386	1.724**	0.652
	(0.425)	(0.182)	(0.010)	(0.428)
hospital	–0.288**	–0.080	–0.255***	0.005
	(0.021)	(0.123)	(0.000)	(0.662)
post	–1.100**	–0.219	0.805**	–0.261
	(0.046)	(0.161)	(0.020)	(0.103)
Library book	0.173***	0.007	0.012***	–0.005
	(0.000)	(0.446)	(0.001)	(0.172)
Health insurance	0.216***	–0.034*	–0.103**	–0.002
	(0.005)	(0.079)	(0.023)	(0.736)
Pension insurance	1.019***	0.077	0.375**	0.029*
	(0.000)	(0.195)	(0.020)	(0.081)
E_Landscaping	–0.061	0.014	–0.039*	0.018***
	(0.105)	(0.106)	(0.095)	(0.001)
Garbage disposal	–0.099*	0.003	0.027***	–0.007**
	(0.053)	(0.553)	(0.002)	(0.035)
Solid waste rate	–0.075**	0.007	–0.022**	0.001
	(0.030)	(0.354)	(0.022)	(0.833)
Air passenger	2.814	–4.916	0.208	0.320
	(0.580)	(0.191)	(0.932)	(0.815)
Rail passenger	–2.293**	–0.457**	–0.982***	–0.058
	(0.011)	(0.036)	(0.000)	(0.682)

	(1) Pooled OLS	(2) FE	(3) Migrant Inflow Cities	(4) Migrant Outflow Cities
Highway passenger	0.230***	0.081**	0.142***	0.002
	(0.007)	(0.030)	(0.000)	(0.521)
Aver_temp	0.005**	0.001	−0.003	−0.001
	(0.023)	(0.691)	(0.266)	(0.369)
Aver_humidity	−0.183***	−0.015	0.041	0.022
	(0.004)	(0.795)	(0.541)	(0.219)
precipitation	−0.000	0.000	−0.010	0.000***
	(0.622)	(0.699)	(0.357)	(0.000)
Insolation hour	0.034***	0.002	0.012	−0.002
	(0.000)	(0.814)	(0.472)	(0.354)
unemployment	−16.091***	−1.610	−1.081	−4.155***
	(0.009)	(0.255)	(0.601)	(0.001)
Aver wage	−0.015***	−0.004	0.003	−0.001
	(0.000)	(0.244)	(0.377)	(0.164)
Aver house price	−0.000***	0.000***	−0.128***	0.000
	(0.001)	(0.001)	(0.000)	(0.101)
Time FE	No	Yes	Yes	Yes
City FE	No	Yes	Yes	Yes
N	2,051	2,051	765	1,286
r2	0.557	0.363	0.368	0.650

FE = fixed effect, OLS = ordinary least squares.
Note: p-values in parentheses, * p<.1, ** p<0.05, *** p<0.01
Source: Authors.

A critical challenge in the baseline model is the endogenous issue in the model specification. Apart from climate indicators, most city amenity indicators are also affected by the migration level and may be endogenous. For example, cities with more migrant workers may have higher transportation passenger volumes, better public facilities, and more internet and mobile phone usage. Migrant workers may also affect the unemployment rate, average wage, and average house price in some cities. To deal with the endogenous problem, we introduce the lagged migration rate in the model and re-estimate using the difference-generalised method of moments (GMM) approach. The city amenities indicators are endogenous apart from climate amenities. We use the lagged five-periods of variables as instruments of endogenous variables. The results are shown in Table 4.

In Table 4, the difference-GMM results keep robust to the baseline regressions. Column (1) reports the difference-GMM results without controlling for time and city fixed

effects. Column (2) shows the difference-GMM results with fixed effects. Column (3) and Column (4) present the GMM results of labour inflow cities and labour outflow cities, respectively. The lagged service employment is positively associated with the migration rate in all columns, indicating cities with more service employment in previous years tend to attract more migrant workers. The education amenities of all the levels have significant positive coefficients in the first two columns, indicating that migrant workers tend to move to cities with better education amenities. In column (2), we also observe that cities with more theatres, posts, and library books tend to have higher migration rates. Similar to the baseline results, mobile phones' access rate is negatively associated with the migration rate. Migrant workers prefer to move to cities with better highways instead of air or railway capacity. Migrant workers are less likely to move to cities with higher unemployment rates.

Table 4: Robustness Check with GMM

	(1) Diff–GMM	(2) Diff–GMM	(3) Inflow Cities	(4) Outflow Cities
L. migrant rate	−0.033	−0.048	−0.087	−0.324***
	(0.646)	(0.504)	(0.322)	(0.003)
L.emp_third	0.388***	0.445***	0.463**	0.164**
	(0.000)	(0.000)	(0.015)	(0.015)
College	0.737**	0.880***	0.078	0.329**
	(0.011)	(0.008)	(0.872)	(0.017)
Middle education	1.456***	1.600***	3.004***	−0.128
	(0.000)	(0.000)	(0.005)	(0.369)
Primary education	0.317***	0.411***	0.488**	1.069***
	(0.001)	(0.000)	(0.017)	(0.008)
Internet	0.111***	0.027	0.205**	−0.084**
	(0.009)	(0.575)	(0.037)	(0.032)
mobile phone	−842.949***	−1,201.959***	−2,230.314***	−1,103.389***
	(0.004)	(0.004)	(0.000)	(0.000)
Theatre	4.350***	4.173***	3.244	−0.161
	(0.000)	(0.003)	(0.118)	(0.896)
Hospital	0.017	0.050	−0.039	0.010
	(0.741)	(0.318)	(0.767)	(0.318)
Post	0.021	0.537*	−0.264	−0.041
	(0.931)	(0.066)	(0.645)	(0.768)
Library book	0.010*	0.015***	0.011**	0.025**
	(0.057)	(0.009)	(0.036)	(0.040)
Health insurance	−0.011	−0.025	−0.066	−0.012
	(0.513)	(0.273)	(0.240)	(0.270)

	(1) Diff–GMM	(2) Diff–GMM	(3) Inflow Cities	(4) Outflow Cities
Pension insurance	0.017	–0.000	0.666***	0.057**
	(0.717)	(1.000)	(0.008)	(0.024)
E_landscaping	0.008	0.025	0.073	–0.002
	(0.608)	(0.156)	(0.161)	(0.875)
Garbage disposal	0.016	0.018	0.123*	–0.045***
	(0.325)	(0.327)	(0.057)	(0.001)
Solid waste rate	0.036	0.025	–0.063	0.011
	(0.391)	(0.522)	(0.282)	(0.556)
Air passenger	–7.085	–9.123*	1.842	0.926
	(0.128)	(0.063)	(0.736)	(0.679)
Rail passenger	–0.854**	–0.930**	–1.134***	0.765*
	(0.024)	(0.025)	(0.006)	(0.059)
Highwaypassenger	0.101***	0.090***	0.114**	–0.007
	(0.004)	(0.004)	(0.023)	(0.451)
Avertemp	0.005	0.004	0.044***	0.011**
	(0.414)	(0.603)	(0.004)	(0.012)
averhumidity	–0.093	–0.099	–1.766***	–0.316***
	(0.442)	(0.531)	(0.001)	(0.010)
precipitation	–0.000	–0.000	0.046	–0.000
	(0.486)	(0.556)	(0.245)	(0.791)
Insolation hour	–0.013**	–0.033	–0.033	0.019**
	(0.038)	(0.274)	(0.381)	(0.042)
unemployment	–10.115***	–8.597**	–0.958	–7.892***
	(0.001)	(0.014)	(0.798)	(0.000)
Average wage	–0.005**	–0.002	0.003	0.002
	(0.010)	(0.562)	(0.697)	(0.301)
Aver house price	0.000*	0.000	–0.216***	–0.000
	(0.083)	(0.167)	(0.001)	(0.778)
Fixed Effects	No	Yes	Yes	Yes
AR(1) p value	0.000	0.000	0.005	0.000
AR(2) p value	0.321	0.118	0.109	0.823
N	1758	1758	652	1106

GMM = generalised method of moments.
Note: p-values in parentheses, * p<.1, ** p<0.05, *** p<0.01
Source: Authors.

Column (3) highlights the positive roles of the internet access rate, libraries, pension insurance, garbage disposal rate and highway transportation in attracting migrant workers in the cities with net inflows of labour. Moreover, they address the role of climate amenities, which are insignificant in the whole sample. It seems that migrant workers tend

to move to cities with higher average temperatures and lower humidity. They are also more likely to move into cities with lower house prices. For cities with net outflows of labour, as shown in column (4), the labour outflow will be less if the city has better amenities in college and primary education. However, cities with better access to the internet and mobile phones tend to have more labour outflows. Moreover, cities with higher unemployment rates also have more migrant workers outflows.

5.   Conclusion

In this study, we found that city amenities play an increasingly important role in internal migration in China. Using the 2010–17 city-level panel data, we find that migrant workers tend to move in (or are less likely to leave) cities with a higher share of service employment in previous years. Cities with a lower unemployment rate, better education, more public facilities, higher coverage of urban pensions, more highways and lower house prices tend to attract more migrant workers. However, most of the environment and climate indicators have no significant effect on cities' migration rate.

The study highlights the importance of the service agglomeration effect at the city level. The agglomeration effect is vital for cities to create externalities and economies of scale in attracting and absorbing critical technology and human capital to create sustainable growth in the economy. The agglomerative effect is also essential to attract local and foreign skilled labour to drive creative destruction in the manufacturing and services sectors and leverage urbanisation costs with globalisation benefits at the local and regional levels.

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