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Migration across the urban hierarchy: Has China's urbanisation transitioned from the primate city stage to the secondary city stage?

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Abstract

The population density in megacities in China gives rise to challenges, such as traffic congestion and soaring housing prices. A trend of leaving primate cities can be observed as well as a population increase in secondary cities. These trends might point to an urbanisation transition from the primate city stage to the secondary city stage. Research is needed to determine at which stage of urbanisation China currently resides, and who are migrating across the different levels of cities in this stage. In order to answer these questions, the current study combines the theory of differential urbanisation and migrant selectivity, and analyses city-level migration patterns and demographic characteristics of migrants across the urban hierarchy. The findings indicate that China is currently in the intermediate primate city stage, where the upward migration across the urban hierarchy is driven by younger adults with higher education and income, and a lower likelihood of marriage or parenthood. Building upon global evidence, this research further extends the theory of differential urbanisation by incorporating migrant selectivity into the interpretation of urbanisation stages. It reveals that educated migrants tend to concentrate and move up the urban hierarchy in the primate city stage but might deconcentrate during the secondary and small city stages. This study offers practical insights for policymakers at the national and city levels to develop population growth plans, adjust targeted migration policies and respond to future urbanisation processes.

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Keywords
China, migration, primate cities, secondary cities, urban hierarchy, urbanisation

摘要
中国特大城市的人口密度带来交通拥堵、房价飙升等挑战。首位城市逐渐出现人口外流的现象，而次级城市出现人口增加的趋势。这些趋势表明城市化可能正在从首位城市阶段向次级城市阶段转变。因此，亟需相关研究来确定中国目前处于城市化的哪个阶段，以及在这一阶段是哪些人口在跨越不同等级的城市进行迁移。为了解答这些问题，本文将差异城市化理论和迁移选择性理论结合起来，分析了城市层面的人口流动变化，以及跨城市等级流动的人口的特征。研究结果表明，中国正处于首位城市中级阶段，跨城市等级向上流动的人群主要是受教育程度较高、收入较高、结婚或生育可能性较低的年轻人。本文以国际研究证据为基础，将人口迁移的选择性纳入城市化阶段的解读中，进一步扩展了差异城市化理论。研究显示，较高水平受教育程度的流动人口在首位城市阶段倾向于集中，但在次级城市或小城市阶段则可能倾向于分散。本文为国家和城市层面的政策制定者制定人口增长计划、针对性调整流动人口政策和应对未来的城市化进程提供见解参考。

关键词
中国、人口流动、首位城市、次级城市、城市等级、城市化

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Introduction

Urbanisation rates are growing worldwide as an increasing number of people migrate to cities. However, the concentration of population in megacities leads to various issues such as traffic congestion, high housing prices and a low quality of life (Henderson, 2002). Historical evidence shows that the migration to megacities has not always been a dominant trend (Lewis et al., 1991). There have also been periods of migration from megacities to smaller cities or to rural areas (Geyer and Kontuly, 1993).

This cyclical and dynamic process of urbanisation and migration[1] is explained by Geyer and Kontuly (1993) in the theory of differential urbanisation. It distinguishes three main urbanisation stages, including the primate city stage, the secondary city stage and the small city stage. In the primate city stage, population concentrates in primate cities, which are defined as the largest and leading cities of a country by Jefferson (1989). However, due to overcrowding in primate cities, the influx towards secondary cities becomes dominant. Secondary cities are cities that are secondary to primate cities in a country's urban hierarchy (ESPON, 2012). If the net migration rate of secondary cities surpasses that of primary cities, the country steps into the secondary city stage. Ultimately, during the small city stage, a growing population opts to relocate from major urban centres, seeking more favourable surroundings in smaller cities. To sum up, in the primate city stage, population concentration prevails, while the secondary city stage and the small city stage are characterised by deconcentration (Geyer and Kontuly, 1993). Some developed countries have transitioned through these stages, such as the USA (Geyer and Kontuly, 1993) and Finland (Heikkilä, 2003). However, many developing countries are still in the stage of concentration towards primate cities.

China serves as an example of a developing country in this regard. It still seems to be in the primate city stage, with primate cities like Shanghai and Beijing experiencing significant influxes of migrants (Liu et al., 2015). For instance, over the past four decades of rapid urbanisation, the population size of Shanghai has doubled according to census data. In recent years, there has been a growing trend of 'escaping from primate cities' (Jin et al., 2022; Wu et al., 2019), while secondary cities are emerging as viable alternatives to primate cities in China (Song and Zhang, 2020; Wu et al., 2019). For example, Shanghai, classified as a primate city, exhibited a growth rate of 40.3% from 2000 to 2010, followed by a notably lower growth rate of 8.0% from 2010 to 2020 according to census data. In contrast, Hangzhou, characterised as a secondary city, experienced a growth rate of 26.5% in the initial period (2000–2010), followed by a higher growth rate of 37.2% during the subsequent decade (2010–2020). These early signs suggest a potential transition from the primate city stage to the secondary city stage in China.

However, it is still uncertain whether China remains in the primate city stage or has already stepped into the secondary city stage. China's national policies have been dominated by deconcentration of population. Since the Eighth Five-Year Plan starting in 1991, policies have supported the development of small cities while controlling the expansion of primate cities (State Council of China, 1991). Gaining insights into the present stage of urbanisation enables policymakers to evaluate the efficacy of national urbanisation policies and to make informed decisions regarding future concentration or deconcentration strategies. This includes determining the appropriate timing and level of cities to implement dispersion policies.

To comprehend urbanisation stages, it is essential to gain insight into the migration patterns across different levels of cities,[2] particularly the movement of migrants between primate, secondary and small cities. This article refers to this phenomenon as migration across the urban hierarchy. Cross-level migration, involving individuals moving between cities of varying hierarchical levels as origins and destinations, plays a crucial role in shaping the urban hierarchy formed by cities of different sizes (Mu et al., 2022) and further impacts the transition from one urbanisation stage to the next.

However, the relationship between urbanisation stages and cross-level migrants' characteristics remains understudied. Migration is a selective process (Lee, 1966; Ravenstein, 1885), implying that different types of cross-level migrants can display distinct demographic characteristics. Some studies have examined the demographic characteristics of specific types of cross-level migrants, such as age, income and education among migrants moving out from primate cities (see the Literature section). Nevertheless, few studies have compared the demographic characteristics among various flows of cross-level migrants while considering the urbanisation stages.

In summary, China's stage in the urbanisation process remains uncertain, and there is limited understanding of the characteristics of cross-level migrants in this stage. To address these gaps, this study delves into two research questions: (1) what is the current stage of China's urbanisation process; and (2) do demographic characteristics vary among different types of cross-level migrants in the present stage?

This article aims to distinguish China's current urbanisation stage by examining city-level migration patterns and to explore the demographic characteristics among cross-level migrants to understand concentration and deconcentration trends. The article connects urbanisation and migration theories, and contributes to the existing literature in three perspectives. Firstly, it extends the theory of differential urbanisation by interpreting

urbanisation stages through the individual characteristics of cross-level migrants. This contributes to existing studies that predominantly used aggregate information to distinguish urbanisation stages (Kontuly and Dearden, 2003; Mookherjee and Geyer, 2011). Secondly, the article introduces a migration-orientated theoretical framework to examine the evolution of primate cities and secondary cities, offering an addition to the current spatial and functional viewpoints presented in other studies, such as ESPON (2012) and Meijers and Cardoso (2021). Thirdly, the current study enriches the theory of migrant selectivity by differentiating migrant types from an urbanisation perspective. It employs the urban hierarchy defined by urbanisation stages to classify migrants moving up and down the urban hierarchy. This complements previous research that primarily focused on distinguishing characteristics among return migrants (Wang and Fan, 2006) and onward migrants based on city size (Wang et al., 2023).

This article is structured as follows. First, it reviews the theories of urbanisation and migration. Second, it introduces research data and methods. Third, it presents the results on the urbanisation stages and characteristics of cross-level migrants. Finally, the results are discussed and interpreted at the national and global level.

Literature review

Urbanisation stages and migration across the urban hierarchy

As elaborated in the Introduction section, the rapid growth of primate cities can give rise to challenges, such as rising labour costs, severe congestion and high property prices. Consequently, migrants gradually gravitate towards smaller cities. This change in migration pattern across the urban hierarchy can be explained by the concept of 'polarisation reversal' (Richardson, 1980), which refers to the turning point when national polarisation trends disperse from the core region to other regions. The dispersion from primate cities to concentrated secondary cities marks the beginning of polarisation reversal, known as 'concentrated dispersion' (Richardson, 1980).

The shift of migration trends is closely related to the urbanisation process. Ravenstein (1885) proposed that migration takes place step by step, from rural areas to nearby towns and then towards bigger cities. This theory was gradually developed as the idea of migrating up the urban hierarchy (Plane et al., 2005), that is, moving from a lower-level city to a higher-level city. While step migration is from a perspective of individual life course, some scholars explain the relationship between migration and urbanisation from a macroscopic standpoint. Zelinsky (1971) linked the migration patterns to the social and economic stages, and established a five-phase mobility transition based on the different levels of society. Champion's (1995) cycle approach of urbanisation suggests a repeating 'lifecycle' of growth patterns, which involves alternating dominance between population growth in the core area and outer region.

However, few studies associate migration patterns with urbanisation stages considering city levels in the national urban hierarchy. Following the concept of polarisation reversal (Richardson, 1980), Geyer and Kontuly (1993) proposed the theory of differential urbanisation to explain the urbanisation stages and migration patterns across the urban hierarchy. They integrated three levels of cities to identify urbanisation stages and migration patterns.

Differential urbanisation progresses with growth in primate cities, followed by secondary cities (termed 'intermediate cities' by Geyer and Kontuly, 1993),[3] and then small cities. Figure 1 displays this sequence through the correlation of net migration rate[4] and time. For a specific level of cities, a

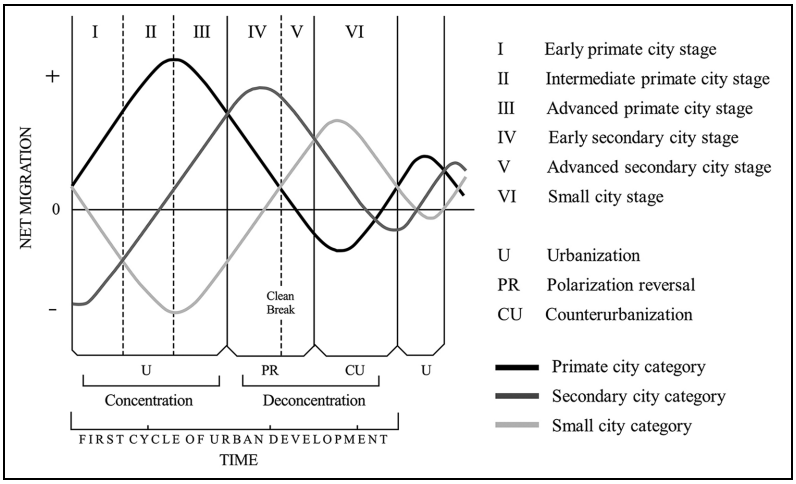

Figure 1. Temporal characterisation of differential urbanisation (adapted[5] from Geyer and Kontuly, 1993).

positive net migration rate indicates that the inflow of migrants exceeds the outflow. Urbanisation stages can be identified according to the changes and contrasts of net migration rates of the three levels of cities. The six stages can be summarised as follows (Geyer and Kontuly, 1993):

(1) Early primate city stage: migrants concentrate towards primate cities.
(2) Intermediate primate city stage: suburbanisation emerges around monocentric primate cities, and primate cities expand at a growing rate; certain secondary cities begin to benefit from net in-migration.
(3) Advanced primate city stage: primate cities become so large, and the net migration rate starts to drop due to the agglomeration diseconomies; the dominance of a monocentric urban structure is no longer sustained, leading to the formation of polycentric dominant city-regions; spatial deconcentration begins, and secondary cities grow.
(4) Early secondary city stage: polarisation reversal begins, resulting in a slowdown in the growth of primate cities, even though they continue to grow in absolute terms; secondary cities rise, especially those proximate to primate city-regions.
(5) Advanced secondary city stage: suburbanisation occurs in the rapidly developing secondary cities, while the population of primate cities decreases in absolute terms.
(6) Small city stage: counter-urbanisation phase, people move towards small cities.

After completing the six stages, the cycle repeats (Geyer and Kontuly, 1993). In these urbanisation stages, concentrating migrants, who move up the urban hierarchy, may exhibit personal characteristics other than those of deconcentrating migrants, who move downwards. The subsequent section will explore the relationship between the demographic characteristics of cross-level migrants and the stages of urbanisation.

Migrant selectivity in different urbanisation stages

Migration is recognised as a process involving self-selection (Lee, 1966; Ravenstein, 1885). Positive selection occurs when individuals choose to migrate to a host city that

offers higher skill premiums compared to their origin city (Stolz and Baten, 2012). The improved prospects and financial rewards motivate individuals to relocate, particularly educated and skilled groups with advantageous abilities to overcome obstacles during the migration process (Bernard and Bell, 2018; Wang and Fan, 2006). Fielding (1992) introduced the concept of 'escalator region' to describe those host cities that offer training and promotion opportunities for young individuals, thereby facilitating their upward social mobility. This process was coined as 'stepping on the escalator' by Fielding (1992).

Conversely, the opposite scenario leads to negative selection (Newbold, 2001). For example, returnees may encounter challenges in employment or adaptation to urban life in the host city. They tend to have lower levels of education and fewer skills, and are typically older migrants. Nevertheless, they generally possess higher levels of education and training than non-migrants (Wang and Fan, 2006). This phenomenon can be attributed to the social promotion experienced in the 'escalator region'. The out-migration of middle-aged migrants from an 'escalator region' was described as 'stepping off the escalator' by Fielding (1992).

Existing studies have examined the demographic characteristics of cross-level migrants at certain stages of urbanisation, including education, gender, income, age and the presence of children (Geyer, 2003; Heikkilä, 2003; Kok, 1999; Kontuly and Tammaru, 2006; Lewis et al., 1991). Geyer and Kontuly (1993) proposed the concept of productionism and environmentalism within the framework of differential urbanisation. It is presumed that high-income, highly educated individuals tend to prioritise environmental factors and quality of life, leading them to move down the urban hierarchy. In contrast, lower-income and less-educated individuals are inclined towards productionism and making a living, and consequently choose to move up the urban hierarchy in search of better opportunities. This concept finds empirical support in many countries. For example, during the small city stage in Great Britain,[6] a group of well-educated migrants was observed to move down the urban hierarchy in the early 1970s (Lewis et al., 1991). Similarly, in South Africa, a large high-income group (White population) left primate cities and moved down the urban hierarchy during the period of polarisation reversal (secondary city stage) in the 1980s (Geyer, 2003).

Although the concept of productionism and environmentalism has been confirmed during the secondary city stage and the small city stage in some countries, conflicting findings have been observed during the primate city stage. For instance, during the primate city stage in Estonia,[7] migrants moving up the urban hierarchy were predominantly young, highly educated and female (Kontuly and Tammaru, 2006). Moreover, in Hungary and Poland during the primate city stage,[8] not only high-income individuals moved down the urban hierarchy but also low-income individuals, who found life in the host city challenging (Kok, 1999). The literature review indicates a potential connection between the urbanisation stages and characteristics of cross-level migrants.

Data, methods and concepts

Data

This article utilised both macro and micro data. At the macro level, census data and statistical yearbooks were employed to calculate the net migration rate of cities in 2000, 2010 and 2020. At the micro level, the national China Migrants Dynamic Survey (CMDS) was employed to gather information on migrants' demographic characteristics and specific migration types with accurate origin and destination cities. As the latest available CMDS 2018 lacks the complete migration information

required, CMDS 2017 was chosen for its comprehensive data on birth city, initial migration destination, current residence, migration frequency and migration motivations.

Net migration and urban hierarchy

The first research question was addressed by analysing the change in the net migration rate of primate cities, secondary cities and small cities according to the theory of differential urbanisation. This article measures the net migrant population through the gap between resident population and hukou (household) registered population (Wu et al., 2019; Yu et al., 2019). The net migration rate was calculated as the ratio of net migration to the total population (Yu et al., 2019).

This study focuses on the period from 2000 to 2020 for two reasons. Firstly, China has established a relatively stable urban system over the past three decades. Since the extensive administrative division adjustment of municipalities in the 1983 reform (Bo and Cheng, 2021), population data at the city level has become more comparable from 1990. Secondly, migration data has remained consistent and comparable since the 2000 census. This is attributed to the change in the census data standard, transitioning from defining migrants and resident population based on a one-year migration period to a six-month period (Duan and Sun, 2006).

Cities are classified into primate cities, secondary cities and small cities based on the theory of differential urbanisation. In China, cities are often categorised by city size (e.g. Mu et al., 2022; Wang et al., 2023) or by city tiers based on economic and social indicators (e.g. Jin et al., 2022; Wu and Bian, 2018). This study adopts the tier-based classification method for two main reasons. Firstly, the role of primate and secondary cities, as outlined by Jefferson (1989) and ESPON (2012), extends beyond city size to encompass national influences and economic and social performance. Secondly, adopting the tier-based classification serves to extend urbanisation theories to practical implications for migration, as the classification based on city tiers inherently incorporates migration-related factors, such as housing prices, amenity and wage levels. Given the potential impact of different city classification methods on the stability of outcomes for the first research question, we added a further examination of results based on the standard of city size. The results show that China's current urbanisation stages can be distinguished no matter which method is applied (see details in the Supplemental Material).

According to the city-tier classification, primate cities, as the leading cities in a country, are identified using the widely accepted list of 'first-tier cities' (Jin et al., 2022). Secondary cities are identified based on the list of emerging 'new first-tier cities' (Wu and Bian, 2018), as these cities hold secondary economic and political roles at the national level. Cities that are neither primate nor secondary cities are considered as small cities in this study. The research area comprises four primate cities, 15 secondary cities and 337 small cities.

To examine the migration change of cities at different levels during 2000–2020, cities should be divided according to the same basis, that is, either a fixed basis or a dynamic basis. The current study adopts the classification of cities in 2020 as the fixed basis for the whole study period (2000–2020) for two reasons. Firstly, the classification of the urban hierarchy tends to remain effective and unchanged within such a short timeframe. Secondly, a dynamic basis is difficult to establish for the years 2000 and 2010, due to a lack of reliable information to classify cities, with the first classification report published in 2016 (New First-Tier City Research Institute, 2021).

Migrants across the urban hierarchy

To address the second research question, we extracted migration flows with specific origin

and destination cities in CMDS. For individuals who migrated once, the migration flow was determined based on the city level of the hometown and the city level of the current residence. For individuals who migrated twice, the migration flow was determined based on the city level of the first migration destination and the city level of the current residence. Individuals who migrated more than twice (accounting for 20.72% of the total sample size) were excluded due to missing previous residence data in CMDS.

To capture the accurate relationship between migration types and demographic characteristics, we selected migrants who had migrated within the past five years (Mu et al., 2022; Newbold, 2011). Additionally, CMDS defines migrants as individuals who have lived in a city different from their hukou registration place for more than one month, which differs from the six-month definition used in census data. To align definitions, we selected migrants who had resided for six months in CMDS. Besides this, there are nine types of migration based on the levels of origin cities and host cities (see Figure 2). This study concerns the six types of cross-level migration, thus excluding the three types of same-level migration. To summarise, from an initial 169,989 migrants, we selected those who moved once or twice (134,767), within five years (50,047) and over six months ago (44,905), and further focused on cross-level migrants with a final size of 13,346 samples.

The demographic characteristics of cross-level migrants include education, household income, age, gender, marital status, children and migration times. Education indicates the (probably) final educational level of individuals, as students are excluded in the dataset (National Health Commission, 2017). Household income is divided into four groups (Zhu and Chen, 2010) based on quantiles of the data to mitigate the influence of extreme values. Age groups are defined based on life stages, including young individuals (below 30 years), middle-aged individuals (30–50 years) and older individuals (above 50 years) (Mohabir et al., 2017). The variable of children is used to evaluate the influence of family structure, thus excluding children who have formed new families. This aligns with the definition in CMDS (National Health Commission, 2017). Migration times distinguish between migrants who moved once and twice. Chi-squared analysis is employed to explore the relationship between cross-level migration types and migrant characteristics. More details on data and methods are available in the Supplemental Materials.

Results

Net migration and urbanisation stage

To determine China's urbanisation stage, we employed the net migration rate as an indicator based on the differential urbanisation theory. Figure 3 illustrates the changes in net migration rates for primate cities, secondary cities and small cities in 2000, 2010 and 2020. Primate cities and secondary cities exhibit positive net migration rates, which showed an upward trend from 2000 to 2020. While the net migration rate for primate cities stabilised between 2010 and 2020, it continued to increase for secondary cities. Conversely, small cities experienced an increasing negative net migration rate from 2000 to 2020.

This pattern aligns with the characteristics of the second stage of urbanisation, as depicted in Figure 1, known as the intermediate primate city stage. During this stage, an increase in the net migration rate of primate cities is observed, gradually plateauing towards the end of the stage. Simultaneously, the net migration rate of secondary cities demonstrates an upward trend, while small cities experience a progressively negative net migration rate. The subsequent stage, referred to as the advanced

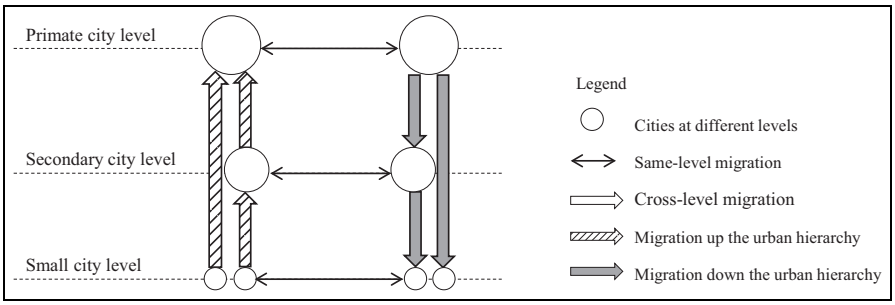

Figure 2. Nine types of migration: Same-level migration and cross-level migration.
Source: Author.

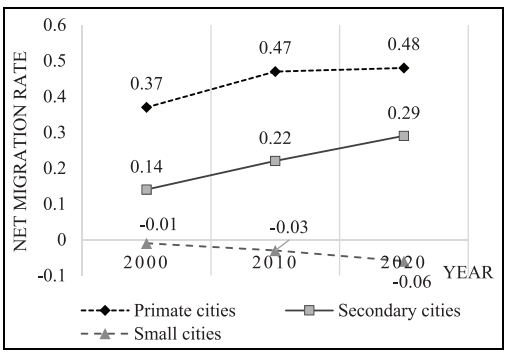

Figure 3. Average net migration rate in different levels of cities in China in 2000–2020.
Data source: Census data and statistical yearbooks.

primate city stage, is not (yet) observed in China. In this stage, the net migration rate of primate cities begins to decline while remaining positive. Summarising, our findings suggest that China is in the intermediate primate city stage.

Characteristics of cross-level migrants

The second research question investigates potential differences in the demographic characteristics of migrants across the urban hierarchy. Among the cross-level migrants in the sample, those moving from small cities to secondary cities represent the most substantial proportion (see details in Table 3 in the Supplemental Material). We compared the six types of cross-level migrants with regard to their demographic characteristics. The empirical results indicate that, except for gender, all variables exhibit statistical significance at the 0.1% level (see details in Table 4 in the Supplemental Material).

The chi-squared test shows that the six different types of migrants differ with regard to their educational level ($\chi^2_{(df=25)} = 469.22$, $p < 0.001$, $n = 13{,}346$). We examined the proportion of migrants possessing undergraduate or postgraduate degrees, which are esteemed as high educational attainments. Figure 4(a) shows that migrants who moved from a secondary city to a primate city generally possess higher education levels. Furthermore, migrants who moved from a small city to a primate city also exhibit relatively high educational attainment.

There is a distinct difference in household income between the different cross-level migrants ($\chi^2_{(df=15)} = 935.21$, $p < 0.001$, $n = 13{,}346$). Migrants living in primate cities generally have the highest income, while migrants in small cities have the lowest income. As shown in Figure 4(b), the highest income group (more than 10000 yuan/m) is most prevalent among migrants from a secondary city to a primate city (41%) and migrants from a small city to a primate city (30%). The lowest income group (less than 5000 yuan/m) accounts for the largest proportion of migrants from a secondary city to a small city (37%),

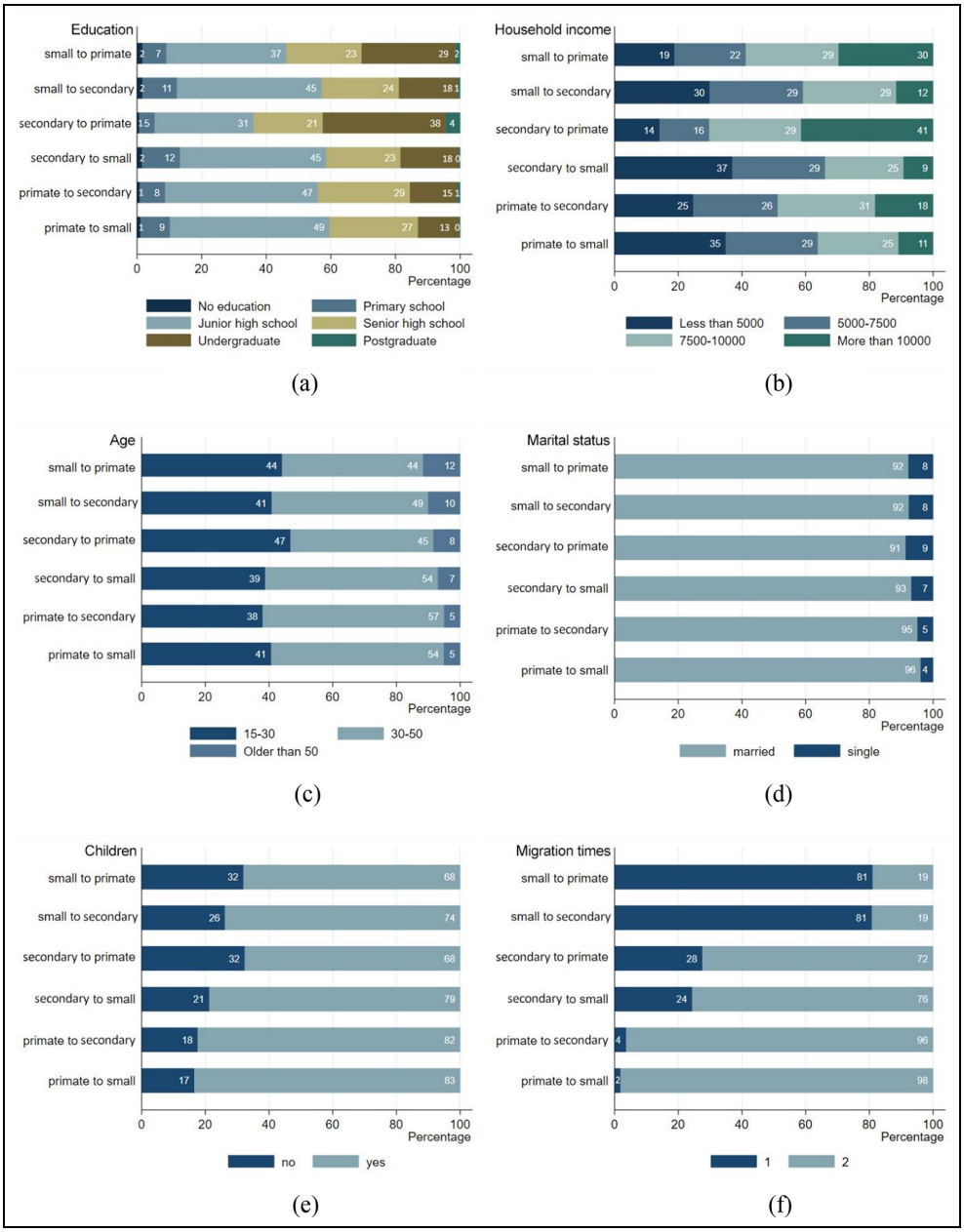

Figure 4. Demographic characteristics of the six types of cross-level migrants. (a) Education. (b) Household income. (c) Age. (d) Marital status. (e) Children. (f) Migration times.
Data source: CMDS.

followed by the migrants from a primate city to a small city (35%).

Cross-level migrants exhibit variations in terms of age ($\chi^2_{(df=10)} = 131.64$, $p < 0.001$, $n = 13{,}346$). As shown in Figure 4(c), young migrants (below 30 years) are more frequently found in the group that moved to a primate city. Moreover, a relatively high proportion of older migrants (above 50 years) moved up the urban hierarchy, such as migrants from a small city to a primate city (12%) and to a secondary city (10%).

Marital status demonstrates statistical significance among the six types of migrants ($\chi^2_{(df=5)} = 35.53$, $p < 0.001$, $n = 13{,}346$). A higher percentage of single individuals is observed among migrants who moved up the urban hierarchy, as shown in Figure 4(d). A similar pattern was also found for the variable of having children ($\chi^2_{(df=5)} = 181.20$, $p < 0.001$, $n = 13{,}346$), as illustrated in Figure 4(e). Migrants that moved up to a primate city exhibit the lowest proportion in having children, accounting for 68%, followed by the migrants that moved from a small city to a secondary city (74%).

Significant differences are observed in migration times between migrants from different levels of cities ($\chi^2_{(df=5)} = 5800$, $p < 0.001$, $n = 13{,}346$). Figure 4(f) illustrates that a substantial majority (81%) of cross-level migrants from a small city have migrated only once. In contrast, one-time migration comprises 28% and 24% of migrants from a secondary city, and merely 4% and 2% of migrants from a primate city.

We conclude with an overview of the main demographic characteristics of cross-level migrants. As depicted in the origin–destination framework in Figure 5, below the dashed line are the migrants who moved up the urban hierarchy. These individuals include both the young population and the older population. They tend to have higher levels of education and income, and a smaller proportion are married and/or have children. Notably, household income in this study refers to current income after migration, potentially influenced by migration movement. Since the educational level usually does not undergo substantial changes within a five-year period (in non-students) and is closely related to income (Ashenfelter and Ham, 1979), education can be considered as the primary indicator for illustrating the differences in economic and social status before migration. As shown in Figure 5, educational level seems largely associated with income level. Combining the two indicators, we can conclude that migrants who moved up the urban hierarchy generally demonstrate positive selectivity.

In contrast, migrants who moved down the urban hierarchy tend to be middle-aged, with lower levels of education and income, and are more frequently married or have children. Figure 4(f) indicates that over 96% of migrants who left a primate city were undergoing their second migration, implying that they were probably not local residents of the primate city. These onward or return migrants tend to exhibit comparatively lower income levels and educational attainment, as shown in Figure 4(a) and (b). This suggests negative selection among migrants leaving primate cities.

Discussion and conclusion

This study distinguishes China's current stage of urbanisation and examines the demographic characteristics of cross-level migrants. The results regarding the first research question suggest that China has entered the intermediate primate city stage but has not yet reached the secondary city stage. Our results indicate growth in both primate and secondary cities, accompanied by a consistent decline in population for small cities between 2000 and 2010. This aligns with the observed divergence in city sizes from 2000 to 2012 noted by Fang et al.

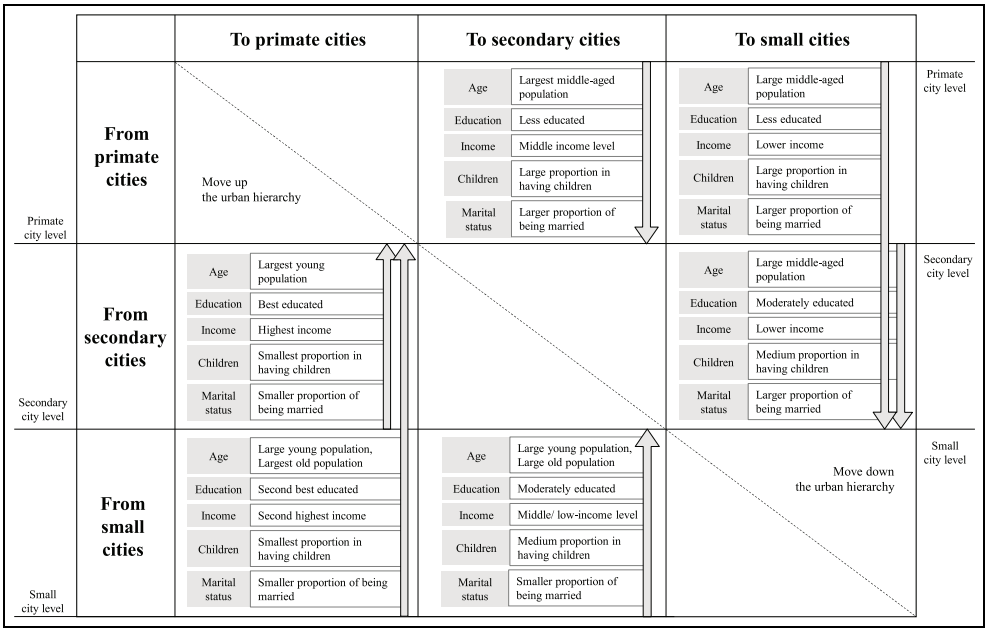

Figure 5. Difference in the demographic characteristics of migrants across the urban hierarchy.
Source: Author.

(2017). According to these authors, this pattern might be attributed to market-orientated development policies since 2001. If China's urbanisation process follows the theory of differential urbanisation, people will continue to concentrate in primate cities and secondary cities, with secondary cities growing at a more rapid rate than primate cities.

The findings of the second research question reveal that individuals who moved up the urban hierarchy tend to be younger adults with higher levels of education and income. This is consistent with the results reported by Mu et al. (2022), indicating that Chinese individuals with a bachelor's degree or higher were more likely to move up the urban hierarchy. Individuals concentrate in larger cities in search of better employment prospects and higher wages, that is, stepping on the escalator region for personal advancement (Fielding, 1992). In China's current urbanisation stage, migrants who moved up the urban hierarchy show positive selectivity.

A noteworthy finding is that a considerable proportion of older adults are moving up the urban hierarchy, challenging conventional expectations that the older population typically moves down the urban hierarchy for congenial environments in smaller cities (Champion, 1995; Newbold, 2011). This unexpected trend might be attributed to the prevailing family care culture, whereby grandparents support working couples by caring for their children (Qi, 2018). This phenomenon seems more prevalent among families moving up the urban hierarchy, with 17.7% of migrants over 50 years old citing 'taking care of children' as a motivation, compared to 9.3% who are moving down (Table 5 in the Supplemental Material).

In contrast, migrants who moved down the urban hierarchy tend to be middle-aged adults, which aligns with previous findings

(Kontuly and Tammaru, 2006; Mu et al., 2022). This is consistent with the notion that migrants step off the escalator region at a later stage of careers (Fielding, 1992). These downward migrants also have a higher probability of having children, aligning with empirical results from Finland, where individuals with children tend to relocate from large cities and move downward in all the urbanisation stages (Heikkilä, 2003).

The results indicate negative selection among migrants moving down the urban hierarchy, characterised by lower levels of education and income. A considerable proportion of migrants moving from primate cities have migrated twice. It appears that the phenomenon of 'escaping from primate cities' primarily occurs among the group of onward or return migrants with relatively low education and income. This phenomenon might partly be explained from national policies. On the one hand, national policies tend to control the limitless population concentration in primate cities. On the other hand, China as a developing country prioritises economic growth and industrial transformation to enhance its global competitiveness, especially in primate cities (Wu et al., 2019). As the tool of national policies, the hukou system in primate cities is often tailored to attracting and retaining high-skilled individuals, rather than favoring low-skilled labourers. One example is the utilisation of a point registration system, which evaluates migrants based on criteria such as education and skills (Zhang et al., 2019). These policies pose significant challenges for less-educated people to settle down in larger cities.

The observed patterns of education and income among cross-level migrants differ from the theoretical concept of productionism and environmentalism explained by Geyer and Kontuly (1993). This concept supposes that high-income, highly educated individuals tend to prioritise quality of life and move down the urban hierarchy. However, the current study as well as some other studies showed conflicting results in the primary city stage, when concentration prevails. For example, highly educated individuals were found to dominate the movement up the urban hierarchy in the primate city stage in Estonia (Kontuly and Tammaru, 2006). It appears that in the primate city stage, educated and high-income migrants tend to concentrate in larger cities, driven by economic factors. In contrast, in the secondary and small city stages, the expansion of primate cities leads to drawbacks such as poor environmental conditions, prompting some affluent and well-educated individuals to move downward. Therefore, the concept of productionism and environmentalism may be more applicable to deconcentration stages than to concentration stages.

Implications for China can be drawn at both the national and city levels. At the national level, in the subsequent urbanisation stage, referred to as the advanced primate city stage, migration towards primate cities is expected to persist with a declining net migration rate over time. Simultaneously, there will be a notable increase in individuals relocating to secondary cities. However, small cities are anticipated to continue losing population in the short term.

Effectively responding to migration flows across different city levels is crucial for addressing future urbanisation. One approach is to focus on coordination at the level of mega city-regions (Yeh and Chen, 2020), as advocated since the Twelfth Five-Year Plan from 2011. This approach aims to coordinate large, medium and small cities (State Council of China, 2011). In this urban system, secondary cities can play a vital role in absorbing the regional population, departing from the previous emphasis solely on controlling primate cities or prioritising small cities nationally (Lu et al., 2011). Secondary cities not only offer available space and settlement options for migrants from small cities (Lu et al., 2011;

Song and Zhang, 2020), but also maintain the benefits of economic agglomeration (Glaeser and Gottlieb, 2009).

At the city level, primate cities are undergoing suburbanisation (see stage 2 in the Literature section), potentially leading to the transformation of the urban structure from a monocentric to a polycentric city-region in the following stage (see stage 3 in the Literature section). This shift necessitates the consideration of transportation and housing supply at a broader scale. For secondary cities, attracting talent is crucial, as the inflow of cross-level migrants mainly comprises less-educated groups from primate cities and moderately educated groups from small cities. Conversely, small cities are confronting population decline, prompting consideration of the proactive approach of 'smart shrinkage' to adapt to future urbanisation trends.

The current study contributes to the literature by merging theories of differential urbanisation and migrant selectivity, as detailed in the Introduction section. It adopts the theory of migrant selectivity to explain urbanisation stages identified by the theory of differential urbanisation, and reveals the positive selectivity of migrants who moved up the urban hierarchy in the concentration stages of urbanisation.

There are several limitations. Firstly, migrants with more than two moves (about one-fifth of the total sample) were omitted from the analysis due to the unavailability of data on their previous places of residence, which is crucial for discerning migration types (same level, up or down). Secondly, the study applies the classification of cities in 2020 as the fixed basis for the whole study period due to the unavailability of data in 2000 and 2010. Thirdly, the study relies on cross-sectional data to explore migrants' demographic characteristics, thus offering a static view that may not fully capture the dynamics of cross-level migration. This cross-sectional design limits our ability to establish causal relationships between characteristics and urbanisation stages.

Moving forward, there are three potential directions for further research. Firstly, conducting cross-national studies with larger and more diverse datasets can validate the relationship between urbanisation stages and migrants' characteristics. This will enhance the generalisability of the findings beyond the specific context of this study. Secondly, this research framework can be extended to examine the urbanisation stages and migration patterns at the regional level, specifically within mega city-regions. Thirdly, longitudinal data analysis can be conducted to further examine the change in migrants' demographic characteristics in different urbanisation stages, providing insights into potential causal relationships.

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Supplemental material

Supplemental material for this article is available online.

Notes

1. The current article focuses on internal migration, that is, the migration within a country.
2. The city level here means the prefectural level, including urban and rural areas.
3. This article uses the term 'secondary city' with the similar definition, following Rondinelli (1983) and ESPON (2012).
4. In the diagram, Geyer and Kontuly use 'net migration' but it refers to 'net migration rate', as becomes clear from the text in the article.
5. The adapted content is that 'intermediate city' was replaced by 'secondary city'. The purpose is to follow the terms used in this study.
6. The period of 1931–1991 is proved to be the small city stage in Great Britain (Champion, 2003).
7. The period of the 1990s in Estonia is regarded as the primate city stage since urbanisation was the dominant process at the national level during this period (Kontuly and Tammaru, 2006).
8. This period of the 1980s in Hungary and Poland can be categorised as being in the primate city stage, based on the phenomenon of a consistent net influx of people towards the core regions in the countries of Eastern Europe (Cochrane and Vining, 1988).

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