A Lost Land of Opportunity? The Geography of Intergenerational Educational Mobility in China

Authors:

1. Qilyu Hong (corresponding author), Department of Sociology, London School of Economics and Political Science, q.hong1@lse.ac.uk
2. Rob Gruijters, School of Education, University of Bristol

Abstract

Despite the significant political, economic, and geographical diversity in China, there is limited research on spatial differences in intergenerational mobility in China. This research aims to fill this gap by exploring the spatial and temporal dimensions of intergenerational educational mobility in China. The data used for the analysis is the 2010-2018 China Family Panel Studies (CFPS), a nationally representative longitudinal general social survey. The analysis incorporates both relative and absolute mobility measures to provide a comprehensive description of intergenerational educational mobility. The results reveal substantial regional differences in intergenerational educational mobility across various economic zones in China, with a rising geographic inequality over time. The southwest and northeast regions stand out as the areas where the educational prospects of the young generation have become not only bleaker but dependent more on their parents. Additionally, this study presents the first education Great Gatsby Curve for China, highlighting the strong relationship between intergenerational mobility and education inequality at the regional level, particularly after China's market reform. The findings highlight the need for regionally targeted policies and levelling up agendas to promote educational opportunities in low-mobility regions.

Keywords: intergenerational mobility, education inequality, regional inequality, Great Gatsby Curve

1. Introduction

Intergenerational mobility refers to the movement of socioeconomic status between generations. It is an important indicator of the equality of opportunity in society, or more generally, the degree of equity and fairness in a society (Aydemir & Yazici, 2019). Copious

empirical evidence all over the world has shown that people's life chances are, albeit to a different extent, affected by family background[1]. Moreover, historical and comparative research has revealed considerable differences in intergenerational mobility across time and countries (e.g., Blanden, 2013), highlighting the importance of institutional features and social contexts in different countries and historical periods in shaping intergenerational mobility.

However, even within the same countries, the lived experiences, and the prospect of upward mobility for people born in certain areas may differ greatly from the national average (Buscha et al., 2021). A country is a collection of regions with widely varying local contexts and features, such as community and neighbourhood environments, school quality, labour market developments, industry composition, economic growth, and government policies. In addition to family backgrounds, these locally specific and unique environments are potentially important determinants of individuals' socio-economic opportunities (Chetty & Hendren, 2018). Therefore, a more nuanced perspective on intergenerational mobility is needed to uncover the geographical variation in intergenerational social mobility within countries.

This is particularly true in China, a vast country in terms of both population and territory. With the transition to a market-oriented economy, it has achieved unprecedented economic success. However, the rapid economic growth is simultaneously accompanied by increasing concerns about the widening regional inequality and income gap, which poses potential threats to the Chinese Communist Party's stated objective of making China a more harmonious society (Whyte & Im, 2014). There are widespread regional disparities in economic performance, labour market conditions, and education quality, particularly between coastal areas and the hinterland (Wu et al., 2019). However, there is almost no research on regional differences in intergenerational mobility in the Chinese context.

Against this background, this study aims to provide a new geographically differentiated perspective to the current mobility research in China. The primary objective is to estimate the degree and patterns of intergenerational mobility in China at a sub-national level over a relatively long period since 1949, using a suite of statistics of both relative and absolute mobility to provide a comprehensive picture of intergenerational education mobility. In

[1] For reviews of the vast literature on the topic of intergeneraional mobility, see Black & Devereux (2011) and Iversen et al. (2021).

addition to the new subnational portrait of intergenerational mobility, we further explore how this spatiotemporal pattern of intergenerational education mobility may vary by gender or household registration status. For example, will the gender premium cancel out or at least partly offset the misfortune of being born in relatively low-mobility provinces or regions? Is having a rural household registration status associated with higher opportunities for upward mobility in metropolitan Beijing, than having an urban status in the least developed province in western China? Answers to these questions will add a more nuanced understanding of social mobility in China.

Our research identifies substantial regional differences in intergenerational educational mobility across various economic zones in China, revealing a growing geographic inequality over time. Further analysis also demonstrates a significant correlation between intergenerational educational mobility and regional education inequality. This underscores the importance of regional factors in studying mobility and geographical disparities. We argue that linking regional factors with social mobility would enhance our understanding of how both social backgrounds and geographical conditions influence people's life chances, as well as how other families' demographic behaviours shape family and population processes. Therefore, our findings also speak to a broader literature on regional economic performance and inequality factors, closely intertwined with regional labour markets, neighbourhood contexts (Andersson et al., 2021), cross-region migration (Yu, 2022), as well as traditional families structure (Zhang et al., 2018) and other demographic processes (Song, 2021).

Overall, the research contributes to the extensive literature on inequality and intergenerational mobility in the following dimensions. Firstly, it presents several previously unknown facts about the geography of intergenerational education mobility in contemporary China which are of significant public and policy interest. Secondly, this is the first study that documents intergenerational education mobility differences in both physical space and social space in China by exploring the heterogeneity of regional differences by gender and household registration status. Finally, this paper expands the existing literature on the Great Gatsby Curve (GGC) and provides the first educational Gatsby curve in China.

The remainder of this paper is structured as follows. Section 2 discusses the theoretical background and reviews related literature on the geography of intergenerational mobility. Section 3 describes the methods and data used for analysis. The following section presents

empirical estimates of intergenerational education mobility in China at the regional level. Section 5 discusses the findings and provides policy implications.

2. Theoretical Background and Literature Review

Classical human capital models of intergenerational mobility (Becker & Tomes, 1979, 1986) have revealed mechanisms underlying the intergenerational process that might differ across time and space. Firstly, economic development and income levels are associated with intergenerational mobility. In countries or regions with lower average family incomes or greater income inequality, poor parents would face credit constraints and be less able to invest in their children's human capital than their richer counterparts, leading to a strong intergenerational persistence. Moreover, local labour markets also play a major role in the intergenerational transmission process. Higher returns to human capital would encourage higher-income parents to invest more in their children's human capital (Corak, 2020) and labour market regulations and policies, such as the presence of unions, the degree of employment protection, the presence of minimum wages, and the provision of unemployment benefits, may change the income distribution of both generations (Checchi et al., 2016).

Factors that operate in the educational system through the provision of high-quality public education and government education funding may also generate influences on intergenerational mobility. Compelling evidence has shown not only a strong positive association between government education spending and intergenerational income elasticity (Mayer & Lopoo, 2008) but also the causal effects of school spending on the earnings of students (Jackson et al., 2016), despite the debates about whether the expenditure targeted at early or higher education are equally important (Restuccia & Urrutia, 2004). Since areas with higher levels of economic development are probably more able to provide public education expenditure, regional economic development maps onto intergenerational mobility.

In addition to the economic investments in the human capital of children, intergenerational mobility may be associated with the social influences on these investments, such as social interactions, norms, social networks, and group membership and identity. Neighbourhoods, among many other social factors, are considered the geographic basis for social interactions that have powerful influences on local children's socio-economic outcomes (Chetty & Hendren, 2018).

Following these theoretical justifications for and interpretations of regional differences in intergenerational persistence, an important and growing literature has started to explore the geography of mobility. Research shows substantial variation in intergenerational mobility across the world and reveals a visual scenario of the negative relationship between intergenerational mobility and the level of cross-sectional inequality, known as the Great Gatsby Curve (Corak, 2013). The seminal paper of Chetty et al. (2014) explores the heterogeneity in intergenerational income mobility across small areas of the United States and offers a new framework for intergenerational mobility analysis at the sub-national level.

Several follow-up studies looked at regional variation in mobility in different Western countries (Buscha et al., 2021; Card et al., 2018; Deutscher & Mazumder, 2020). Although focusing on various contexts and aspects of mobility, these studies have convincingly shown regional differences in intergenerational mobility of income, education, occupation, and social class. The literature also reveals several possible explanations of the regional mobility patterns, particularly the levels of income inequality, degrees of educational inequality, and the heterogeneity in natural resources, among many other economic, social, and political factors, which has provided extensive empirical evidence for the GGC-like patterns[2].

Despite the literature on regional differences in intergenerational mobility in Western countries, research on finer geography about intergenerational mobility in China is limited, even though it seems to be a very promising area for research in geographic divisions in intergenerational persistence. Research has provided copious evidence on the static cross-sectional inequalities across Chinese provinces and regions in economic growth rates and human capital development. Per-capita GDP in the poorest provinces (such as Yunnan and Gansu) was less than 30% of the wealthiest places such as Beijing and Shanghai in 2017 (Felice et al., 2021). Due to the financial and administration decentralisation since the late 1980s and the increase in schooling costs[3], regional economic inequalities have been translated into inequalities in human capital investment and educational attainment across regions. Furthermore, the wide regional economic and educational inequalities have been accompanied by intensive rural-urban disparities in China, due to the unique household registration (hukou)

[2] See DiPrete (2020) for synthesis of theoretical and empirical work on GGC in the economic literature and Durlauf et al., (2022) from the sociological perspective.
[3] See Knight et al. (2011) and Xiang et al. (2020) for more Chinese policy background and educational reforms.

system in China, which essentially divides China into two separate societies (Wu, 2019; Wu & Treiman, 2004).

In the context of such large political, economic, and geographical variation, existing research on intergenerational mobility in China has, however, largely focused on estimates of mobility at the national level (e.g., Gruijters, 2021; Xie et al., 2022). Despite great contributions in terms of revealing trends of social mobility in China and nuanced heterogeneity by gender and hukou groups, these studies have not fully considered the role of the widely observed regional imbalances and different spatial characteristics in shaping the levels and mechanisms of the dynamic intergenerational process. One notable exception is the research of Fan et al. (2021), which presents the first preliminary analysis that links intergenerational mobility to province-based institutional and socioeconomic characteristics. While an insightful study, their research has some data shortcomings in that the CFPS data is not strictly representative at the provincial level, and that the sample size at the provincial level is relatively small, leading to statistically indistinguishable estimates of the provincial mobility levels. An alternative approach is provided by Geng (2021), who relies on the 1% samples of the 1982, 1990, and 2000 census data to explore intergenerational education mobility at three geographical levels: national, provincial, and prefectures. This is the most comprehensive analysis thus far, showing great spatial variation in educational mobility across China. However, census data collect information only on parents living in the same household, which is likely to generate the coresidence bias since better-educated people tend to leave the household earlier. Another major issue of the census data is that a person's place of residence is defined by their current living address, a problem that is also observed in one early attempt to discover spatial patterns of intergenerational educational mobility in China (Qin et al., 2020). Their assignment of current location when analysing regional differences in intergenerational mobility may suffer from bias, as the high mobility level in some regions may partly result from high levels of internal migration and self-selection of certain groups of people.

This paper follows these pioneering efforts to develop a comprehensive regional analysis of intergenerational mobility in China but improves on several dimensions. Firstly, by assigning individuals' regions based on their childhood location, rather than their current address, the regional differences in intergenerational mobility can be more confidently attributed to the childhood exposure effects on educational outcomes (Heidrich, 2017). Secondly, this paper extends intergenerational mobility analysis from income mobility to education mobility and

provides the first education Great Gatsby Curve in China. Thirdly, in addition to the relative mobility measures estimated by Geng (2021), this paper intends to incorporate a broader range of intergenerational mobility statistics to provide a comprehensive analysis of intergenerational education mobility in China. Finally, this research considers not only physical space, as has been done in most studies on regional differences in mobility but also the interactions between the physical space and social and institutional space by which individuals are clustered, particularly the household registration status.

3. Methodology

3.1 Measures of Intergenerational Education Mobility

Intergenerational education mobility captures the relationship between parents' and children's educational achievement. There are two types of mobility measures in answering the question of how offspring's socio-economic outcomes depend on their parental background: relative and absolute mobility[4].

Relative educational mobility captures the outcomes of children from less-advantaged families compared with their better-off counterparts. Following the standard econometric specification in the economic literature (Becker & Tomes, 1979, 1986), the canonical measure of relative mobility is the intergenerational regression coefficient, obtained from a simple bivariate linear regression of children's educational outcomes on parental educational attainment in family i:

$$Cedu_i = \alpha + \beta Pedu_i + \varepsilon_i \qquad (1)$$

where the coefficient β is the parameter of interest, providing an intuitive impression of the average predictive power of parents' education on the schooling of the next generation. Higher values of this coefficient indicate a stronger intergenerational relation of education attainment and thus lower intergenerational mobility.

[4] See Gottschalk and Spolaore (2002) for a theoretical exploration of different mobility, as well as the recent book of Iversen et al. (2021) for a more detailed discussion on different concepts and measures of intergenerational mobility.

In addition, an alternative measure of intergenerational correlation is the rank-rank specification, adopted in the seminal paper of Chetty et al. (2014). It can be obtained by replacing $Cedu_i$ and $Pedu_i$ with children's and parents' percentile ranks in their respective distribution:

$$R_{icr}^{C} = \alpha_{icr}^{R} + \beta_{icr}^{R} R_{icr}^{P} + \varepsilon_{icr} \qquad (2)$$

where R_{icr}^{C} denotes the national percentile rank of education of the child i among his/her peers in the same birth cohort c and from the same region r, and R_{icr}^{P} the similar ranks of parents.

This is a desirable measure of intergenerational mobility. Firstly, the relationship in education between parents and children may be nonlinear, while the rank-rank relation is almost perfectly linear in the analysis by Chetty et al. (2014). Moreover, in the context of sub-national analysis, when both parents and children are ranked based on their position in the national education distribution (Bell et al., 2022), even though regressions are run separately in each geographical area, the relative intergenerational persistence and educational outcomes of children can be compared on a fixed national scale.

However, relying completely on the measures of relative mobility has some pitfalls. When comparing intergenerational mobility across subgroups, such as gender or ethnicity groups, although the higher coefficient implies higher relative mobility in the country, it provides no information about the absolute levels of education they achieve given the same parental background. For example, girls may suffer a large educational disadvantage compared with their male counterparts, even when these two groups have a nearly identical level of relative mobility. Therefore, absolute mobility, as a complementary way to picture the complicated intergenerational relationship, has been of great normative and policy interest.

Alesina et al. (2021) measure intergenerational mobility as the probability of completing primary education for children with illiterate parents[5]. However, this measurement seems to be less meaningful for understanding education mobility in developing countries where rapid economic growth and education expansion have occurred (Emran et al., 2019), as primary

[5] Card et al. (2018) and Davis and Mazumder (2018) also focus on absolute transition likelihoods to measure absolute intergenerational mobility.

attainment eventually becomes universal. Since the 1990s, there has been the implementation of nine-year compulsory education, leading to an almost 100% transition rate to junior high school in China (Wu, 2010). Therefore, we focus on the probability of completing senior high school for children born to parents with up to primary education as the measure of absolute upward mobility. The major reason is that access to senior high school in China is far from universal and transition to high school is a crucial turning point that could potentially alter subsequent life course trajectories.

In conclusion, both relative and absolute mobility are relevant in revealing dimensions of the intergenerational process. The choice among them is collectively determined by the philosophical understanding of equality, the purpose of analysis, and the political imagination. This paper reports both absolute and relative mobility, aiming to provide complementary information for the analysis of intergeneration educational mobility in China.

3.2 Data

The main dataset used for analysis is the China Family Panel Studies (CFPS), a nationally representative longitudinal general social survey conducted biennially since 2010 by the Institute of Social Science Survey (ISSS) of Peking University, China. Extensive information on community, family, and individual levels has been collected through computer-assisted interviews, including family structures, economic activities, dynamics and migration, and a comprehensive history of all family members' marriage, education, and occupational status, among others (see Xie & Hu, 2014 for detailed discussions about survey design and sampling of CFPS). To maximise the sample size, we use the pooled cross-sectional data from 2010, 2012, 2014, 2016, and 2018, which constitutes a total of 74,130 individuals.

The CFPS turns out to be the most suitable for analysing the geographical differences in intergenerational mobility in China, mainly for two reasons. Firstly, unlike conventional household surveys that interview individuals living in the same households, it defines family members as both immediate relatives who are economically connected, regardless of whether they live together or not, as well as non-immediate family members who have lived in the same household for at least 3 months. Therefore, this survey overcomes the coresidence problem that could generate considerable estimation bias but is commonly found in analysis using household survey data (Fan et al., 2021). Another exceptional advantage of the CFPS is that it collects

information on individuals' province of residence during childhood, which enables the exploration of how the socioeconomic characteristics of places of residence during children's developmental stage may be associated with their intergenerational mobility (Aydemir & Yazici, 2019).

The basic unit of analysis is the parent-child educational relationship. Figure 1 shows the process of obtaining a final sample of 41,255 from a raw sample of 74,130 unique individuals surveyed from all eight waves. Firstly, the international research paradigm on intergenerational mobility considers only individuals in their mid-20s or older to reduce the chances that they may still be in school or university (e.g., Xie et al., 2022). Given that the typical age of students enrolled in higher education is between 18-22[6], we chose individuals aged 23 and above. The sample is then restricted to those who can be matched to at least one parent with education information. Finally, individuals who have missing data on the main variables of their own education and residential information are also excluded.

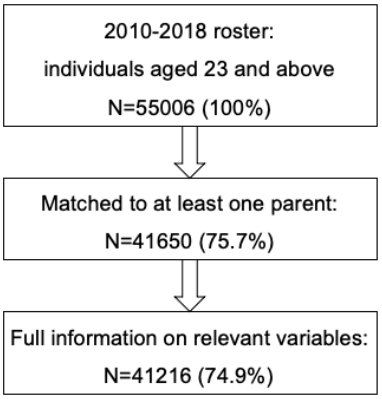

Figure 1. Selection of the analytical sample

3.3 Main variables

The estimation of intergenerational educational mobility depends on how educational attainment is measured. The CFPS collects respondents' educational information by directly asking about both the highest degree of education they obtained and their completed years of formal schooling, but we focus on years of schooling as the measure of education attainment.

[6] See Wang et al. (2022) for a summary of the education system in China.

Another key variable in the analysis is the residential place. Based on empirical evidence that early circumstances, school environment, and peer effects, together, have huge influences on the accumulation of child's human capital and their later socio-economic success (Emran & Shilpi, 2015), the focus is the place where children were raised, grew up, and received an education. Such a definition is better than the use of places of residence at the survey time because the population is geographically mobile, and their migration probabilities are based on their own and families' socioeconomic achievement (Corak, 2020). Specifically, this paper looks at comparisons among eight different regions in China, based on the classification of economic zones proposed by the Development Research Centre of the State Council[7].

Table A1 in the Appendix A presents summary statistics. There are differences in people's schooling years among regions, with Eastern coastal China, where Shanghai is located, being the most educationally advantaged region while the average number of years of education in the southwest region is about 3 years less. This highlights geography as a significant educational stratifier in China, echoing the findings of Hannum and Wang (2006). These summary statistics warrant further scrutiny of the effects of geography in status attainment research.

4. Results

4.1 Geographical differences in intergenerational education mobility

This section provides an analysis of the variation in intergenerational education mobility across different economic regions within China. It is important to bear in mind that, these intergenerational mobility measures are based on regressions that do not control for other individual characteristics. In other words, the results are summaries of all potential complex mechanisms underlying the association between parents and children, rather than the causal effects of parental education on children's education achievement. The primary aim here is to explore how these intergenerational associations differ across time and space, thereby providing a spatial-temporal depiction of intergenerational education mobility in China.

[7] These include northeast China (NEC), northern coastal China (NCC), southern coastal China (SCC), eastern coastal China (ECC), the middle reaches of the Yellow River (MRYLR), the middle reaches of the Yangtze River (MRYTR), southwest China (SWC), and northwest China (NWC). See Wu et al. (2019) for discussions about eight economic zones and provincial-scale units in China.

Figure 2 presents a heat map of relative mobility across regions in China, for the 1949-1978 cohort and 1979-1995 cohort respectively[8]. The cutoff point of 1979 denotes the beginning of Chinese economic reforms, an evolutionary transition in China that has led to dramatic multi-dimensional socio-economic changes in every part of the society including the education sector. Lighter colours represent a weaker association between parents' and children's national education ranks and therefore higher levels of intergenerational mobility.

For the first cohort, the educational rank gap between children from the most advantaged and disadvantaged families varies somewhat across China from 23.2 percentiles in northeast China to 31.4 percentiles in provinces around the middle of the Yangtze River, suggesting marginally different levels of intergenerational persistence across regions[9]. Intergenerational education mobility decreases dramatically over time in every region, as the colour within each region has become darker in the right panel. This sub-national analysis is consistent with the evidence of reducing relative education mobility at the national level [10] and shows that children's educational attainment has become increasingly dependent on their parents' education levels and this trend has been seen in all regions in China with no exception.

Furthermore, this decline pattern in intergenerational education mobility has been more significant in certain areas, leading to relative mobility being more geographically disparate after 1979. The gaps in children's education ranks between the best and worst parental background for the 1979-1995 cohort have been particularly high in the north-eastern region (around 50 percentiles) and the south-western region (around 45 percentiles)[11]. In comparison, northern coastal China, where Beijing is located, and southern coastal China have relatively low education persistence between parents' and children's educational achievement and thus the highest relative mobility. Fan et al. (2015) conclude that the regional disparity in relative income mobility may be attributed to the better economic conditions of families from those

[8] Corresponding statistics are summarised in Table A3 in the Appendix A. Figure A1 presents estimated absolute mobility across 8 economic regions in China with 95% confidential intervals.

[9] The 95% confidence interval for the northeast region is [20.5, 25.8] while that for Middle of the Yangtze River is [27.8, 35.0]. For the other regions, however, most confidence intervals overlap.

[10] Estimates at the national level is presented in Table A2 in the Appendix A.

[11] The regression analysis of the interaction effects between parental education and regions in China confirms that the educational levels of children born and growing up in southwest and northeast regions are statistically more dependent on their family background than other regions of China. Compared to northern coastal China, where Beijing is located, Northeast China has significantly higher coefficients by 0.16 and Southwest China 0.11 (p-values are 0.000 and 0.001 respectively).

provinces and thus fewer constraints when investing in the education of their children. Against the background of soaring educational costs and the decentralisation of education funding in the 1980s, children from these poor regions may face a tightened link between their educational destination and their family origins.

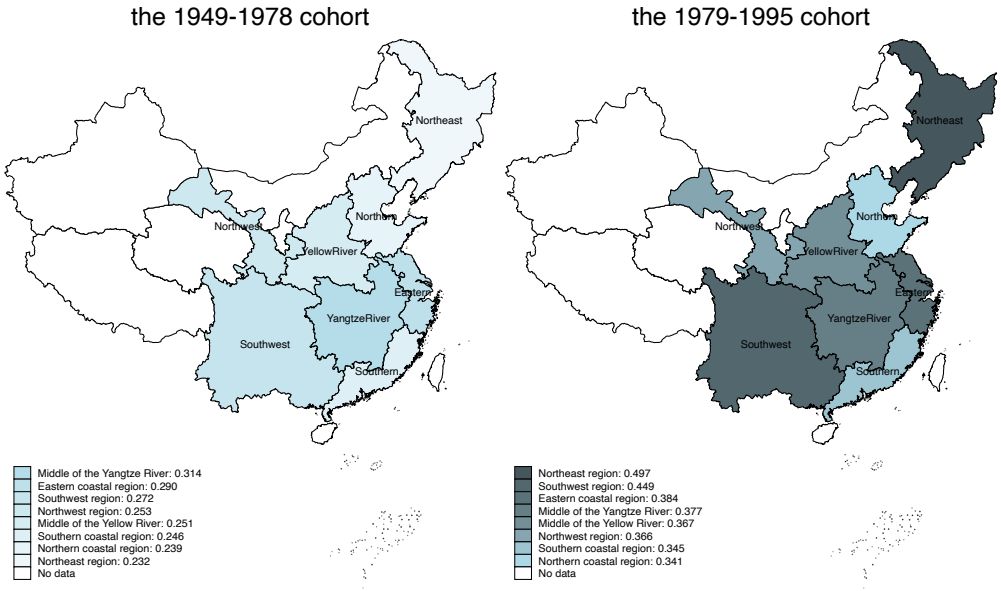

Figure 2. Geography of relative education mobility in China. The figures present heat maps of the relative measure of intergenerational education mobility by region in China, derived from within-province OLS regressions of child education ranks against parent education ranks. Individuals are assigned to provinces based on their residential location when they were 12 years old. The darker colours indicate higher intergenerational education persistence and thus lower intergenerational mobility. There is no data for Neimenggu, Hainan. Xizang, Qinghai, Ningxia, Xinjiang, Taiwan, Hongkong, and Macao.

Figure 3 presents a corresponding heat map of absolute upward educational mobility in China. Similarly, lighter colours represent higher absolute educational mobility. During the pre-reform period (1949-1978), there is a clear geographical feature of upward educational mobility[12]. The probability of completing at least high school education for children with up to primary educated parents was statistically higher in the east regions but lower in the west regions. The eastern coastal region, where Shanghai is located, stood out as being the most upwardly mobile region for this cohort. Just over one in five (21.3%) of children from the most disadvantaged family background (parents having up to primary education) could obtain at least high school

[12] Corresponding statistics are summarised in Table A3 in the appendix. Figure A2 presents estimated absolute mobility across 8 economic regions in China with 95% confidential intervals.

education. In contrast, only about 9% of similarly disadvantaged children from southwest China managed to complete high school education. The findings suggest that even under Maoism when deliberate efforts were made to create an egalitarian society (Gruijters, 2021), regional inequalities in educational opportunities were evident.

For individuals born after 1979, the probability of completing high school education has increased in all regions, probably due to the introduction of compulsory education and educational expansion in China in the late 1980s and substantial educational expansion thereafter. However, some regions have been particularly good at providing high school opportunities for disadvantaged children, leading to the enlarged geographic inequality in absolute upward mobility. Eastern areas remained more mobile than western provinces in terms of enabling children from educationally disadvantaged backgrounds to complete at least high school education. The eastern coastal region, among all, has been the best place of opportunity for the most disadvantaged children, with 50% of them being able to complete high school. In comparison, southwestern areas remained unchanged as having the lowest probability for disadvantaged children to achieve intergenerational upward mobility (the figure was 21.8%). After China's economic reform in the late 1970s, the regional disparity in absolute education mobility became so large that children born to at least primary educated parents in the eastern coastal region had almost the same probability of getting high school as their peers with better-educated parents in other places, as shown in the right panel of Figure A3.

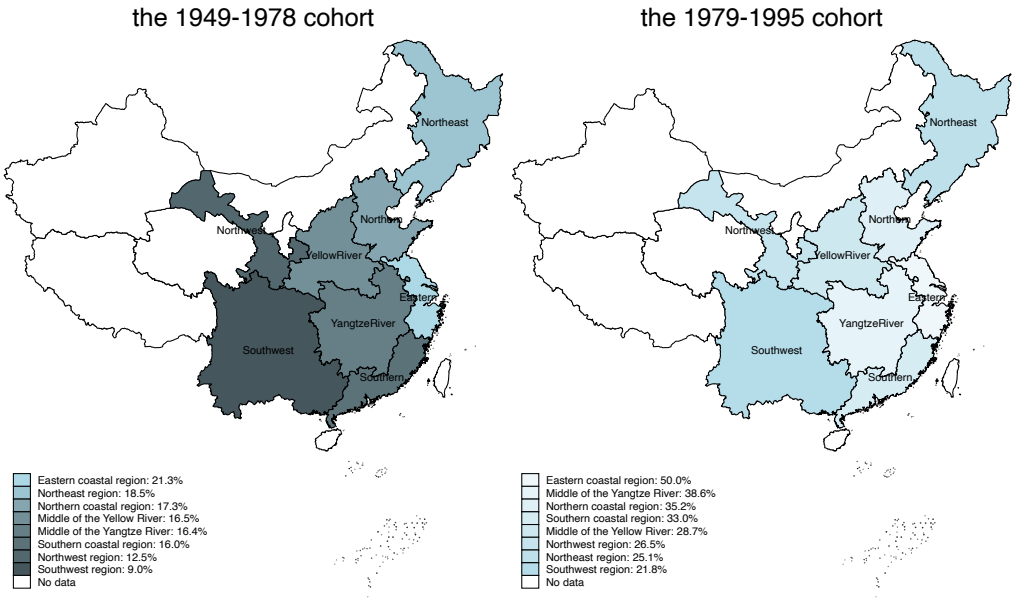

Figure 3. Geography of absolute education mobility in China. The figures present heat maps of the absolute measure of intergenerational education mobility by region in China. Individuals are assigned to provinces based on their residential location when they were 12 years old. The absolute education mobility is defined as the probability of completing middle school for children born to illiterate parents. The darker colour presents a lower probability of obtaining at least high school given that their parents have up to primary education. There is no data for Neimenggu, Hainan. Xizang, Qinghai, Ningxia, Xinjiang, Taiwan, Hongkong, and Macao.

Figure A4 in the Appendix A compares the changing pattern in both relative and absolute mobility measures and shows that while absolute mobility has increased substantially in all regions over time, relative mobility decreased. A larger proportion of children has performed much better than their parents in education, due to the elevator effect of a general increase in years of schooling caused by the considerable expansion of formal education in recent decades in China. Nevertheless, as measured by relative mobility, the parent-to-child intergenerational persistence has indeed been strengthened. Children's position on the educational ladder has been increasingly determined by their family background, pointing out a nationally wide decrease in equality of educational opportunities in China in recent decades.

We further explore the relationship between intergenerational mobility and educational inequality, measured by the education Gini coefficients[13]. As shown in Figure 4, there is a positive correlation between the relative intergenerational persistence in education and the educational Gini coefficient for the cohorts born after China's economic reform in 1978[14]. Although the positive relationship presented here is descriptive and does not imply any causal effects of educational inequality on intergenerational mobility, this finding provides new empirical evidence for the existence of the educational Great Gatsby Curve in China after its market-oriented reforms. It echoes the widely observed pattern between income inequality and income mobility both at the cross-national level in many developed countries (Corak, 2013; Jerrim & Macmillan, 2015).

[13] See Appendix B for the calculation of educational Gini coefficients in China using CFPS 2010-2018 data.
[14] There is almost no clear relationship between education Gini and intergenerational mobility for the 1949-1978 cohort.

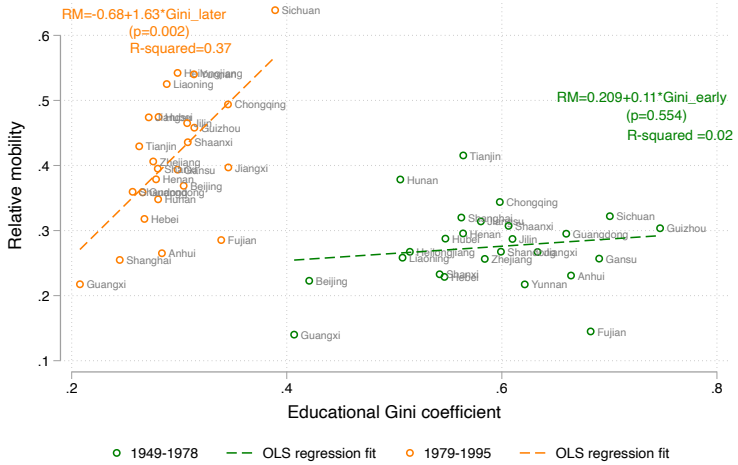

Figure 4. The educational Great Gatsby curve. The Gini coefficient is calculated by province and cohort. Relative mobility refers to the association between the educational rank of parents and that of their children.

4.2. Geography of mobility by gender and household registration status

The analysis so far has shown that geographic location is an important factor in understanding education mobility in contemporary China. This section takes a further step to explore whether the observed differences in intergenerational mobility in terms of geographical space are also related to the heterogeneity in the social space. Specifically, we look at the geographic pattern in intergenerational education mobility separately by gender and household registration status. Here we focus only on absolute intergenerational mobility to highlight the differences in upward educational mobility across regions, gender, and household registration status, under the context of compulsory education popularisation and large-scale education expansion in China.

Figure 5 presents differences in absolute upward mobility between men and women across all regions of China. There is not much difference in the regional pattern of intergenerational mobility between the two genders, with southwest and northwest regions being the least mobile places, regardless of gender. After China's economic reforms in the late 1970s, however, the geographical patterns of intergenerational education persistence differ by gender. Although the whole sample analysis shows that southwest, northeast, and northwest China are the three least mobile places, the situations for men and women in these regions have been largely different. The southwest region remained far from a land of opportunity for all children. In the northwest region, boys from educationally deprived backgrounds still had a relatively good prospect of

high school completion. This reveals that the previously observed low intergenerational mobility in northwest China is mainly driven by the low probability of upward mobility for girls, whose educational opportunities are normally more limited in the underdeveloped and poor regions of China. In comparison, girls born and educated in northeast China had more than 10 percentage points higher probabilities of high school completion than their male counterparts there. This is somewhat counterintuitive, especially under the traditional preference for sons in Chinese culture. Overall, these findings suggest that the effects of local economic and social environment on children's educational achievement may interact with local gender differences.

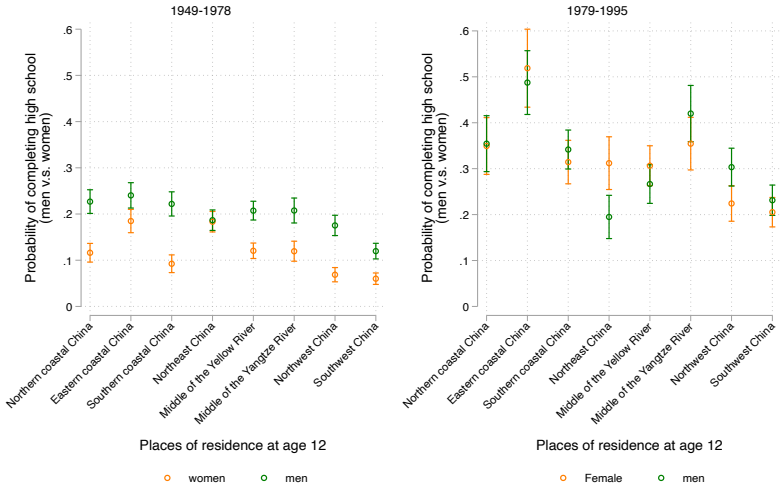

Figure 5. The geographic pattern in absolute mobility by gender

The analysis of intergenerational mobility across both geographic and social spaces (hukou) provides new nuanced information about the observed geographical pattern. For both cohorts, the whole sample analysis shows that children growing up in the southwest and northwest had a lower probability of completing senior high school, compared with other parts of China. Nevertheless, Figure 6 suggests that it is mainly the particularly low levels of upward mobility for rural children that result in the low mobility in these places. For urban residents, these two western regions ranked around the middle and even at the top of the national mobility order. Together with the finding of gender differences in the geography of education, it is reasonable to argue that in the post-reform era, rural women in western regions have increasingly faced greater disadvantages in terms of having extremely low absolute educational mobility. This is an important finding that would otherwise be ignored by merely focusing on the national-level analysis.

Liu et al. (2020) analyse the effects of hukou and places of residence on educational achievement and show that structural forces like hukou are more important than family and individual characteristics in China. Our results extend their study by exploring the interactive effects of region and hukou in determining educational achievement for disadvantaged children. The key argument is that the place of residence changes the impact of hukou on children's upward mobility probabilities, and children's education achievement is largely determined by the local economic and social environment. Eastern coastal China has become not only an area with the highest absolute upward mobility level but also a region with relatively less rural-urban inequality, at least for those from educationally disadvantaged backgrounds. Moreover, in recent decades, rural disadvantaged children with poor-educated parents in the eastern coastal region have undistinguishable educational achievement from urban children in many other regions. One possible explanation is the large-scale urbanisation of rural areas particularly in provinces such as Zhejiang and Shanghai, which has greatly improved the welfare and alleviated poverty for rural children (Wang et al., 2022), thereby increasing the educational opportunities for them.

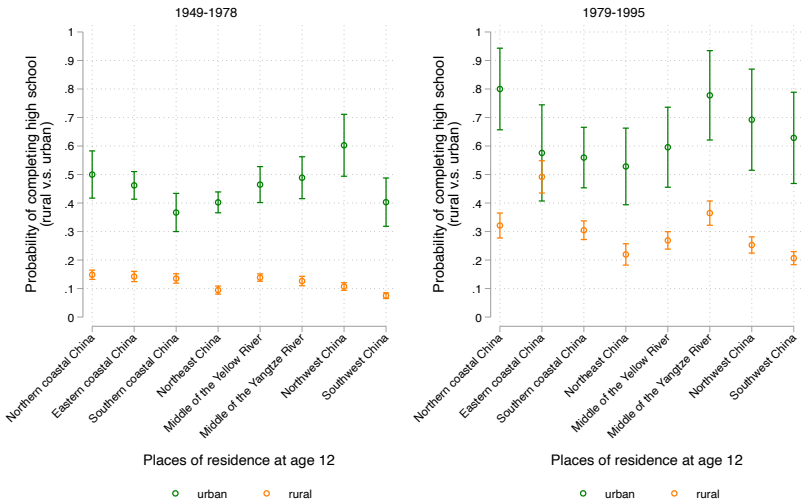

Figure 6. The geographic pattern in absolute mobility by hukou status

5. Discussion and Conclusion

Using data from the 2010-2018 China Family Panel Studies (CFPS), this paper presents a novel subnational portrait of intergenerational educational mobility in China. It reveals substantial geographic variation in education mobility for both the 1949-1978 birth cohort and the 1979-1995 cohort. The regional differences also vary over time, by gender, and by household

registration status. Four key insights have emerged from the analysis of the geographical pattern of education mobility.

Firstly, our findings show that regional variation in intergenerational educational mobility is large and increasing over time. There are highly significant and sizable differences in both relative and absolute mobility across regions in China. Western provinces stand out as the worst places where the educational fate of the young generation is not only more dependent on their parents but also greatly bleaker. This finding, in one of the world's largest developing countries, aligns with extensive research on the within-country heterogeneity in intergenerational mobility in Western contexts (e.g., Chetty, et al. 2014). In terms of policy implication, this highlights the need for regionally targeted policies and levelling up agendas to focus on certain disadvantaged areas to achieve the goal of "equality and quality education for every child", as promoted at the 19th National Congress.

Second, intergenerational mobility is inherently multi-dimensional. Relying solely on absolute or relative measures would result in inaccurate conclusions. Our joint analysis of both measures suggests that despite having seemingly high probabilities of high school completion because of educational expansion, children with poorly educated parents (parents with up to primary education) in some regions still experience strong relative intergenerational persistence which hinders their ability to progress up the educational ladder. In reality, the misunderstanding of relative and absolute mobility may explain why the "social volcano" remains dormant in China— despite the sharply increased inequality since the late 1990s, the Chinese people still exhibit fairly high levels of acceptance and optimism towards rising inequality (Whyte & Im, 2014). Chinese people believe the Confucian idea that education holds the key to upward social mobility. Over the years, the rising tide continued to lift all boats, albeit at very different speeds, leading to steady improvements in educational levels for most young people. As long as children are attaining higher absolute levels of education than their parents and are optimistic about their prospects, the increasing importance of social origins for educational attainment may be overlooked.

Third, there is a positive correlation between education inequality and intergenerational education mobility in the post-Mao era. In areas where educational equality is high (low Gini coefficients of parental education), children from low-educated families have a greater chance of completing high school education. This provides new insights into mobility and inequality

in China, the world's largest transitional economy. To the best of our knowledge, this is the first educational "Great Gatsby Curve" in China. The worrying fact is that regional educational inequality exhibits inertia, leading to some regions facing the dual burden of low education equality and low intergenerational mobility. Children in provinces with greater educational inequality are faced with fewer opportunities to climb the educational ladder and escape their lower education backgrounds, resulting in an "educational poverty trap" in China.

Finally, this study sheds light on the nuanced gender and rural-urban perspectives of the geography of intergenerational mobility. Gender inequality in intergenerational education persistence remains an issue in certain regions of China, particularly the northeast and northwest, where mobility levels are already low. The household registration system, a major structural barrier unique to China, is still at the root of the rural educational crisis in most regions (Zhang, 2022). Given that education is crucial for future earning capacity and long-term opportunities, it is essential to reform the Chinese educational system and promote balanced and coordinated development between urban and rural areas. This can be achieved through, for example, increased public investment in education, removing restrictions on accessing urban schooling, and raising rural families' ability to invest in human capital.

There are certain limitations in our research. The sample size is not quite sufficient to analyse educational mobility at the provincial level, resulting in relatively large confidence intervals when comparing mobility between provinces. Future research could use more comprehensive and representative data to examine the differences in intergenerational mobility between provinces, districts, and counties, to provide a clearer understanding of the widespread regional imbalance in China. Moreover, it should be emphasised that the analysis of the geographical pattern of intergenerational mobility in China does not provide any insight into the cause of regional differences in mobility.

However, these estimates reveal a previously unknown aspect of the regional geography of intergenerational education mobility in China over several decades. It highlights an important topic that requires further exploration, especially in developing countries. It also serves as the first step towards a closer inspection of causality, laying down a firm foundation for future discussion of causal mechanisms underlying spatial disparity. One promising direction for future research would be to explore the differences in the implementation of national-wide educational policies across China, specifically the compulsory education law, and assess the

impact of other local policy changes on social mobility. Another avenue would be to explore whether the observed regional differences in intergenerational mobility are a result of sorting or regional childhood exposure effects, as studied in other contexts (Alesina et al., 2021; Chetty & Hendren, 2018). Additionally, it is crucial to advance the identification of regional exposure effects and examine area-related factors that contribute to the spatial variation in intergenerational mobility, such as regional economic development, income inequality, and provincial public investment in education. This will provide a deeper understanding of the underlying mechanisms behind the geographic patterns of intergenerational mobility, which would be valuable in developing public policy prescriptions for low-education mobility regions.

References

Alesina, A., Hohmann, S., Michalopoulos, S., & Papaioannou, E. (2021). Intergenerational Mobility in Africa. *Econometrica*, *89*(1), 1–35. https://doi.org/10.3982/ECTA17018

Andersson, E. K., Malmberg, B., & Clark, W. A. V. (2021). Neighbourhood context and young adult mobility: A life course approach. *Population, Space and Place*, *27*(3), e2405. https://doi.org/10.1002/psp.2405

Aydemir, A. B., & Yazici, H. (2019). Intergenerational education mobility and the level of development. *European Economic Review*, *116*, 160–185. https://doi.org/10.1016/j.euroecorev.2019.04.003

Becker, G. S., & Tomes, N. (1979). An Equilibrium Theory of the Distribution of Income and Intergenerational Mobility. *Journal of Political Economy*, *87*(6), 1153–1189.

Becker, G. S., & Tomes, N. (1986). Human Capital and the Rise and Fall of Families. *Journal of Labor Economics*, *4*(3), S1–S39.

Bell, B., Blundell, J., & Machin, S. (2022). Where is the land of hope and glory? The geography of intergenerational mobility in England and Wales. *The Scandinavian Journal of Economics*, *124*(3). https://onlinelibrary.wiley.com/doi/abs/10.1111/sjoe.12511

Black, S. E., & Devereux, P. J. (2011). Recent Developments in Intergenerational Mobility. In D. Card & O. Ashenfelter (Eds.), *Handbook of Labour Economics* (Vol. 4B). Elsevier. https://doi.org/10.1016/S0169-7218(11)02414-2

Blanden, J. (2013). Cross-Country Rankings in Intergenerational Mobility: A Comparison of Approaches from Economics and Sociology. *Journal of Economic Surveys*, *27*(1), 38–73. https://doi.org/10.1111/j.1467-6419.2011.00690.x

Buscha, F., Gorman, E., & Sturgis, P. (2021). Spatial and social mobility in England and Wales: A sub-national analysis of differences and trends over time. *The British Journal of Sociology*, *72*(5), 1378–1393. https://doi.org/10.1111/1468-4446.12885

Card, D., Domnisoru, C., & Taylor, L. (2018). *The Intergenerational Transmission of Human Capital: Evidence from the Golden Age of Upward Mobility* (Working Paper No 25000; The Intergenerational Transmission of Human Capital: Evidence from the Golden Age of Upward Mobility, p. 69).

Checchi, D., Peragine, V., & Serlenga, L. (2016). Inequality of Opportunity in Europe: Is There a Role for Institutions? In L. Cappellari, S. W. Polachek, & K. Tatsiramos

(Eds.), *Inequality: Causes and Consequences* (Vol. 43, pp. 1–44). Emerald Group Publishing Limited. https://doi.org/10.1108/S0147-912120160000043008

Chetty, R., & Hendren, N. (2018). The Impacts of Neighborhoods on Intergenerational Mobility I: Childhood Exposure Effects*. *The Quarterly Journal of Economics*, *133*(3), 1107–1162. https://doi.org/10.1093/qje/qjy007

Corak, M. (2013). Income Inequality, Equality of Opportunity, and Intergenerational Mobility. *The Journal of Economic Perspectives; Nashville*, *27*(3), 79–102. http://dx.doi.org/10.1257/jep.27.3.79

Corak, M. (2020). The Canadian Geography of Intergenerational Income Mobility. *The Economic Journal*, *130*(631), 2134–2174. https://doi.org/10.1093/ej/uez019

Davis, J., & Mazumder, B. (2018). *Racial and Ethnic Differences in the Geography of Intergenerational Mobility* (SSRN Scholarly Paper 3138979). https://papers.ssrn.com/abstract=3138979

Deutscher, N., & Mazumder, B. (2020). Intergenerational mobility across Australia and the stability of regional estimates. *Labour Economics*, *66*, 101861. https://doi.org/10.1016/j.labeco.2020.101861

DiPrete, T. A. (2020). The Impact of Inequality on Intergenerational Mobility. *Annual Review of Sociology*, *46*(1), 379–398. https://doi.org/10.1146/annurev-soc-121919-054814

Durlauf, S. N., Kourtellos, A., & Tan, C. M. (2022). *The Great Gatsby Curve* (SSRN Scholarly Paper 4041275). Becker Friedman Institute for Economics. https://papers.ssrn.com/abstract=4041275

Emran, M. S., & Shilpi, F. (2015). Gender, Geography, and Generations: Intergenerational Educational Mobility in Post-Reform India. *World Development*, *72*, 362–380. https://doi.org/10.1016/j.worlddev.2015.03.009

Emran, M. S., Shilpi, F., & UNU-WIDER. (2019). *Economic approach to intergenerational mobility: Measures, methods, and challenges in developing countries* (Working Paper 2019/98; WIDER Working Paper). UNU-WIDER. https://doi.org/10.35188/UNU-WIDER/2019/734-7

Fan, Y., Yi, J., & Zhang, J. (2015). *The Great Gatsby Curve in China: Cross-Sectional Inequality and Intergenerational Mobility* [Working Paper]. Chinese University of Hong Kong.

Fan, Y., Yi, J., & Zhang, J. (2021). Rising Intergenerational Income Persistence in China. *American Economic Journal: Economic Policy*, *13*(1), 202–230. https://doi.org/10.1257/pol.20170097

Felice, E., Odoardi, I., & D'Ingiullo, D. (2021). The Chinese Inland-Coastal Inequality: The Role of Human Capital and the 2007–2008 Crisis Watershed. *Italian Economic Journal*. https://doi.org/10.1007/s40797-021-00169-w

Geng, Y. (2021). *Intergenerational Mobility in China Across Space and Time* [Working Paper]. https://drive.google.com/file/d/1-bw7kfkIl3w-F2fRd7D5KhQL1PXXHa-_/view?usp=sharing&usp=embed_facebook

Gottschalk, P., & Spolaore, E. (2002). On the Evaluation of Economic Mobility. *Review of Economic Studies*, *69*(1), 191–208. https://doi.org/10.1111/1467-937X.00203

Gruijters, R. J. (2021). Trends in educational stratification during China's Great Transformation. *Oxford Review of Education*, *48*(3), 1–21. https://doi.org/10.1080/03054985.2021.1987207

Hannum, E., & Wang, M. (2006). Geography and educational inequality in China. *China Economic Review*, *17*(3), 253–265. https://doi.org/10.1016/j.chieco.2006.04.003

Heidrich, S. (2017). Intergenerational mobility in Sweden: A regional perspective. *Journal of Population Economics*, *30*(4), 1241–1280. https://doi.org/10.1007/s00148-017-0648-x

Iversen, V., Krishna, A., & Sen, K. (Eds.). (2021). *Social Mobility in Developing Countries: Concepts, Methods, and Determinants* (1st ed.). Oxford University Press. https://doi.org/10.1093/oso/9780192896858.001.0001

Jackson, C. K., Johnson, R. C., & Persico, C. (2016). The Effects of School Spending on Educational and Economic Outcomes: Evidence from School Finance Reforms *. *The Quarterly Journal of Economics*, *131*(1), 157–218. https://doi.org/10.1093/qje/qjv036

Jerrim, J., & Macmillan, L. (2015). Income Inequality, Intergenerational Mobility, and the Great Gatsby Curve: Is Education the Key? *Social Forces*, *94*(2), 505–533. JSTOR.

Knight, J., Sicular, T., & Yue, X. (2011). *Educational inequality in China: The intergenerational dimension* (CIBC Working Paper 2011–13; p. 88). CIBC Centre for Human Capital and Productivity, The University of Western Ontario.

Liu, Y., Jiang, Q., & Chen, F. (2020). Children's gender and parental educational strategies in rural and urban China: The moderating roles of sibship size and family resources. *Chinese Sociological Review*, *52*(3), 239–268. https://doi.org/10.1080/21620555.2020.1717942

Mayer, S. E., & Lopoo, L. M. (2008). Government spending and intergenerational mobility. *Journal of Public Economics*, *92*(1), 139–158. https://doi.org/10.1016/j.jpubeco.2007.04.003

Qin, K., Luo, P., Lu, B., & Lin, Z. (2020). Analyzing Spatial Patterns of Intergenerational Education Mobility in China. In X. Ye & H. Lin (Eds.), *Spatial Synthesis: Computational Social Science and Humanities* (pp. 285–301). Springer International Publishing. https://doi.org/10.1007/978-3-030-52734-1_17

Restuccia, D., & Urrutia, C. (2004). Intergenerational Persistence of Earnings: The Role of Early and College Education. *The American Economic Review; Nashville*, *94*(5), 1354–1178.

Song, X. (2021). Multigenerational Social Mobility: A Demographic Approach. *Sociological Methodology*, *51*(1), 1–43. https://doi.org/10.1177/0081175020973054

Wang, S., Yu, X., Zhang, K., Pei, J., Rokpelnis, K., & Wang, X. (2022). How does education affect intergenerational income mobility in Chinese society? *Review of Development Economics*, *26*(2), 774–792. https://doi.org/10.1111/rode.12863

Whyte, M. K., & Im, D.-K. (2014). Is the social volcano still dormant? Trends in Chinese attitudes toward inequality. *Social Science Research*, *48*, 62–76. https://doi.org/10.1016/j.ssresearch.2014.05.008

Wu, C., Ren, F., Ye, X., Liang, X., & Du, Q. (2019). Spatiotemporal analysis of multiscale income mobility in China. *Applied Geography*, *111*, 102060. https://doi.org/10.1016/j.apgeog.2019.102060

Wu, X. (2010). Economic transition, school expansion and educational inequality in China, 1990–2000. *Research in Social Stratification and Mobility*, *28*(1), 91–108. https://doi.org/10.1016/j.rssm.2009.12.003

Wu, X. (2019). Inequality and Social Stratification in Postsocialist China. *Annual Review of Sociology*, *45*(1), 363–382. https://doi.org/10.1146/annurev-soc-073018-022516

Wu, X., & Treiman, D. J. (2004). The Household Registration System and Social Stratification in China: 1955-1996. *Demography*, *41*(2), 363–384. https://doi.org/10.1353/dem.2004.0010

Xiang, L., Stillwell, J., Burns, L., & Heppenstall, A. (2020). Measuring and Assessing Regional Education Inequalities in China under Changing Policy Regimes. *Applied Spatial Analysis and Policy*, *13*(1), 91–112. https://doi.org/10.1007/s12061-019-09293-8

Xie, Y., Dong, H., Zhou, X., & Song, X. (2022). Trends in social mobility in postrevolution China. *Proceedings of the National Academy of Sciences*, *119*(7), e2117471119. https://doi.org/10.1073/pnas.2117471119

Xie, Y., & Hu, J. (2014). An Introduction to the China Family Panel Studies (CFPS). *Chinese Sociological Review*, *47*(1), 3–29. https://doi.org/10.2753/CSA2162-0555470101

Yu, Y. (2022). Spatial and social mobility in England: The persistence of the 'Escalator' effect for the millennial generation. *Population, Space and Place*, *n/a*(n/a), e25. https://doi.org/10.1002/psp.2625

Zhang, K., Wang, J., & Ma, Y. (2018). The impact of regional economic performance on intergenerational geographical distance in China. *Population, Space and Place*, *24*(2), e2091. https://doi.org/10.1002/psp.2091

Zhang, Q. F. (2022). Invisible China: How the Urban–Rural Divide Threatens China's Rise. *The Journal of Development Studies*, *0*(0), 1–2. https://doi.org/10.1080/00220388.2022.2132709

Appendix A. Figures and Tables

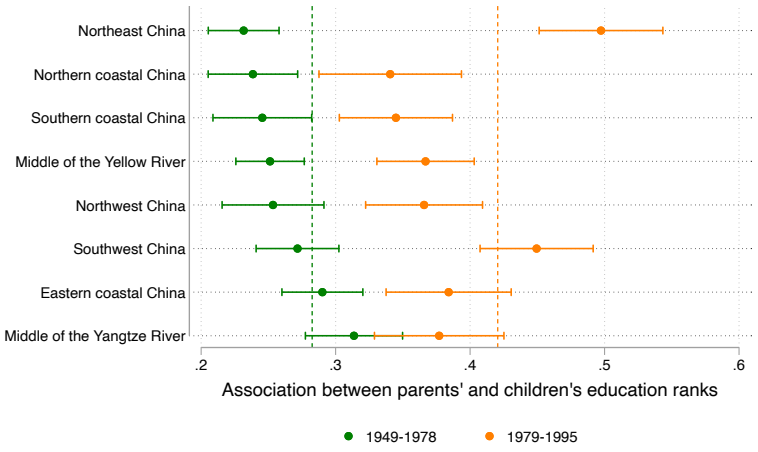

Figure A1. Relative mobility across regions with 95% confidence intervals

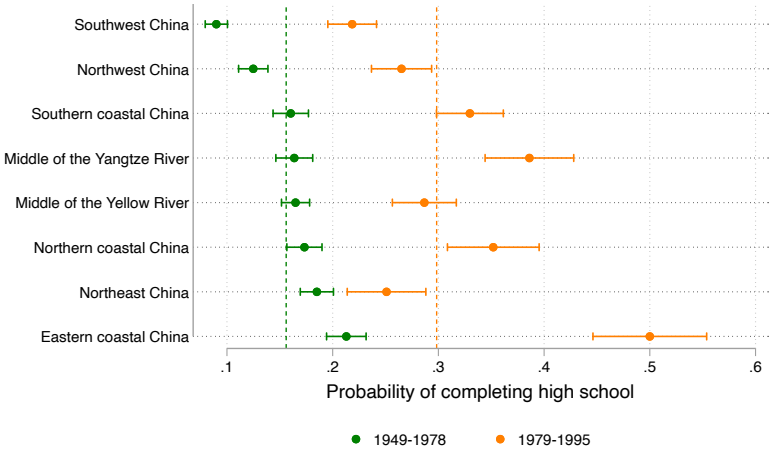

Figure A2. Absolute mobility by region with 95% CIs

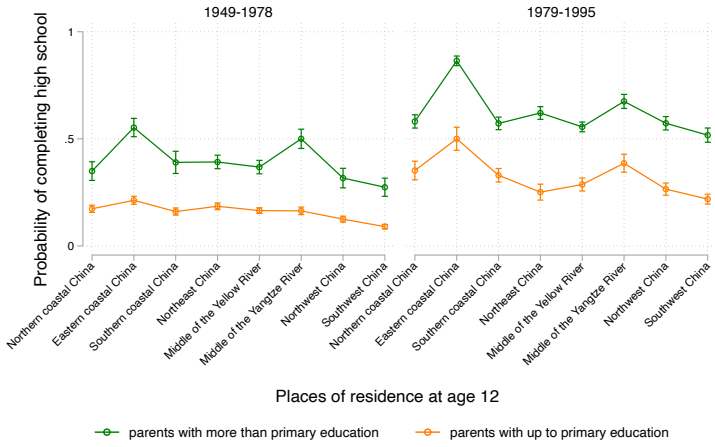

Figure A3. Probability of high school completion by parental background and region

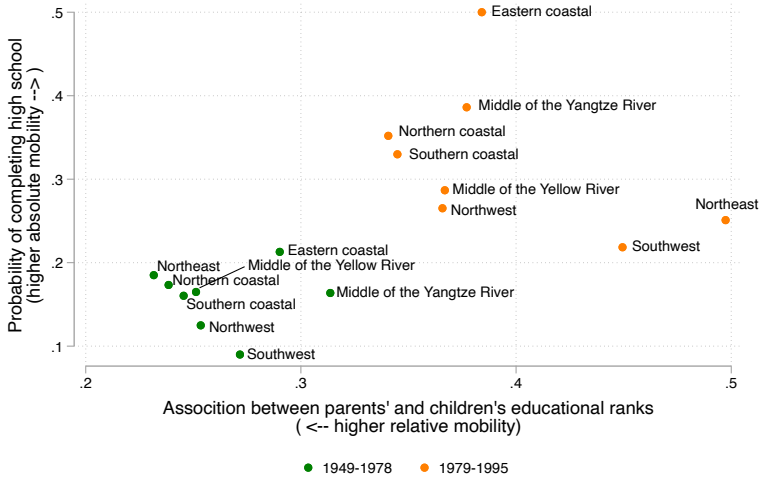

Figure A4. Absolute and relative mobility across regions and time. Absolute mobility is measured by the probability of completing high school

education for children with up to primary educated parents; Relative mobility is measured as the association between children's and parents' educational ranks in the national distribution of education by cohort.

Table A1. Summary Statistics

	Northern coastal China	Eastern coastal China	Southern coastal China	North-east China	Middle of the Yellow River	Middle of the Yangtze River	North-west China	South-west China
Sample size	4485	4357	4603	5404	7464	3914	4904	6085
Years of education								
Mean (SD)	8.03 (4.89)	9.08 (5.08)	7.92 (4.82)	8.60 (4.50)	8.15 (4.76)	8.21 (5.07)	6.60 (5.38)	6.25 (4.96)
Educational degree								
illiterate	948 (21.1%)	747 (17.1%)	964 (20.9%)	813 (15.0%)	1424 (19.1%)	802 (20.5%)	1706 (34.8%)	2021 (33.2%)
primary education	816 (18.2%)	622 (14.3%)	948 (20.6%)	1116 (20.7%)	1407 (18.9%)	717 (18.3%)	845 (17.2%)	1335 (21.9%)
lower-secondary education	1421 (31.7%)	1232 (28.3%)	1331 (28.9%)	1836 (34.0%)	2476 (33.2%)	1108 (28.3%)	1149 (23.4%)	1612 (26.5%)
higher-secondary education	731 (16.3%)	832 (19.1%)	785 (17.1%)	867 (16.0%)	1200 (16.1%)	679 (17.3%)	659 (13.4%)	634 (10.4%)
higher education	569 (12.7%)	924 (21.2%)	575 (12.5%)	772 (14.3%)	957 (12.8%)	608 (15.5%)	545 (11.1%)	483 (7.9%)
Parents' years of education								
Mean (SD)	5.10 (4.57)	5.21 (4.87)	4.73 (4.59)	5.53 (4.68)	5.33 (4.68)	5.10 (4.75)	4.24 (4.66)	3.68 (4.29)
Parents' educational degree								
illiterate	1754 (39.1%)	1769 (40.6%)	2012 (43.7%)	1924 (35.6%)	2872 (38.5%)	1588 (40.6%)	2466 (50.3%)	3266 (53.7%)
primary education	1254 (28.0%)	1075 (24.7%)	1144 (24.9%)	1486 (27.5%)	1805 (24.2%)	1046 (26.7%)	1058 (21.6%)	1488 (24.5%)
lower-secondary education	911 (20.3%)	859 (19.7%)	900 (19.6%)	1216 (22.5%)	1696 (22.7%)	723 (18.5%)	821 (16.7%)	918 (15.1%)
higher-secondary education	472 (10.5%)	464 (10.6%)	472 (10.3%)	582 (10.8%)	925 (12.4%)	416 (10.6%)	469 (9.6%)	337 (5.5%)
higher education	94 (2.1%)	190 (4.4%)	75 (1.6%)	196 (3.6%)	166 (2.2%)	141 (3.6%)	90 (1.8%)	76 (1.2%)
Age in 2018								
Mean (SD)	50.14 (16.75)	52.45 (16.96)	46.30 (16.72)	49.96 (15.54)	47.86 (16.50)	48.08 (15.54)	46.14 (15.65)	47.98 (16.16)
Gender								
Female	2182 (48.7%)	2127 (48.8%)	2122 (46.1%)	2703 (50.0%)	3612 (48.4%)	1933 (49.4%)	2342 (47.8%)	2970 (48.8%)
Male	2303 (51.3%)	2230 (51.2%)	2481 (53.9%)	2701 (50.0%)	3852 (51.6%)	1981 (50.6%)	2562 (52.2%)	3115 (51.2%)
Hukou status at age 12								
Urban	477 (10.6%)	1311 (30.1%)	637 (13.8%)	1781 (33.0%)	885 (11.9%)	648 (16.6%)	290 (5.9%)	417 (6.9%)
Rural	4008 (89.4%)	3046 (69.9%)	3966 (86.2%)	3623 (67.0%)	6579 (88.1%)	3266 (83.4%)	4614 (94.1%)	5668 (93.1%)

Table A2. Intergenerational mobility estimates at the national level

	Before 1945	1946-1955	1956-1965	1966-1975	1976-1985	1986-1995
Panel A. Relative mobility						
Regression coefficient						
	0.377***	0.299***	0.309***	0.397***	0.463***	0.420***
	(0.028)	(0.017)	(0.013)	(0.010)	(0.011)	(0.011)
Correlation coefficient						
	0.268***	0.245***	0.277***	0.399***	0.470***	0.416***
	(0.018)	(0.012)	(0.011)	(0.010)	(0.011)	(0.011)
Rank-rank correlation						
	0.284***	0.230***	0.226***	0.349***	0.453***	0.404***
	(0.018)	(0.012)	(0.009)	(0.009)	(0.010)	(0.010)
With province FE	0.250***	0.197***	0.200***	0.304***	0.398***	0.375***
	(0.018)	(0.012)	(0.009)	(0.009)	(0.011)	(0.010)
Observations	3,556	5,623	7,141	8,719	7,300	9,032
Panel B. Absolute mobility						
Probability of completing high school						
Parents up to primary edu	0.080***	0.088***	0.215***	0.128***	0.219***	0.351***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.007)	(0.008)
Parents above primary edu	0.262***	0.203***	0.429***	0.380***	0.541***	0.638***
	(0.032)	(0.018)	(0.016)	(0.010)	(0.008)	(0.006)
Gap	0.182***	0.115***	0.213***	0.253***	0.322***	0.287***
	(0.032)	(0.018)	(0.017)	(0.011)	(0.011)	(0.011)
Panel C. Heterogeneity (Rank-rank)						
Gender differences						
Men	0.261***	0.190***	0.190***	0.321***	0.417***	0.383***
	(0.023)	(0.016)	(0.012)	(0.012)	(0.014)	(0.014)
Observations	1,823	2,783	3,607	4,487	3,942	4,658
Women	0.294***	0.265***	0.258***	0.382***	0.495***	0.427***
	(0.026)	(0.017)	(0.013)	(0.013)	(0.015)	(0.015)
Observations	1,733	2,840	3,534	4,232	3,358	4,374
Household registration status						
Urban	0.235***	0.140***	0.163***	0.275***	0.349***	0.303***
	(0.038)	(0.020)	(0.017)	(0.021)	(0.024)	(0.022)
Observations	431	860	1,273	1,198	1,319	1,407
Rural	0.228***	0.159***	0.172***	0.267***	0.340***	0.324***
	(0.020)	(0.014)	(0.010)	(0.009)	(0.012)	(0.013)
Observations	3,125	4,763	5,868	7,521	5,981	7,625

Notes: Robust standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05. No additional regressors are included unless otherwise noted.

Source: The data are from the China Family Panel Studies in 2010-2018.

Table A3. Intergenerational education mobility across eight economic regions

Province	**Sample size**	**Relative mobility**		**Absolute mobility**	
		1949-1977	1978-1995	1949-1977	1978-1995

Eastern coastal China	4485	0.290	0.384	0.213	0.500
Middle of the Yangtze River	4357	0.314	0.377	0.164	0.386
Middle of the Yellow River	4603	0.251	0.367	0.165	0.287
Northeast China	5404	0.232	0.497	0.185	0.251
Northern coastal China	7464	0.239	0.341	0.173	0.352
Northwest China	3914	0.253	0.366	0.125	0.265
Southern coastal China	4904	0.246	0.345	0.160	0.330
Southwest China	6085	0.272	0.449	0.090	0.218

Notes: relative education mobility is measured as the association between national expected ranks of children's education among their peers of the same birth cohort given their parental education ranks, while absolute education mobility is measured by the probability of completing high school if having parents with up to primary education. All the intergenerational mobility measures are based on regressions that do not control for other individual characteristics. Data from CFPS 2010-2018.

Appendix B. Educational Gini Coefficients in China

Education inequality is measured by the Gini coefficient of years of schooling among the parental generation by cohort and province. Similar to the Gini coefficient of income, the most prevalent indicator of income inequality, education Gini coefficient is a consistent and robust measure of the relative distribution of education. Following Thomas et al. (2001) the education Gini index is calculated based on the following formula:

$$EduGini = \left(\frac{N}{N-1}\right) * \frac{1}{\mu} * \left[\sum_{i=2}^{n} \sum_{j=1}^{i-1} p_i |y_i - y_j| p_j\right]$$

where N is the number of individuals in the corresponding population, μ is the average years of schooling for the corresponding population, p_i and p_j are the proportions of the population with certain levels of schooling, and y_i and y_j are the years of schooling at corresponding levels of education. The Education Gini statistic ranges from 0 to 1, with larger numbers representing higher levels of inequality.

Based on the education system in China, we divide the population into six educational categories, including illiterate, primary, lower secondary, high school, college, and university levels. The corresponding years of schooling are 0, 6, 9, 12, 15, and 17 years respectively. The Gini index of parental education ranges from 0.41 to 0.75 across 25 Chinese provinces for the 1949-1978 cohort, denoting the dramatic educational inequality in China in the pre-reform era.

816 The education Gini, however, decreases dramatically to the range between 0.21 and 0.39 for
817 the 1979-1995 cohort, which perfectly lies between the range of 0.226-0.599 calculated by
818 Yang et al. (2014) using data from the 1996 China Statistical Year Book. The decrease in the
819 Gini coefficient suggests that China's economic and educational reforms in recent decades
820 have reduced educational inequality.
821
822
823