Trends in intergenerational educational mobility in China: New evidence for the 1986-95 birth cohort

Submission version for EPC 2024, theme "life course"

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Abstract

Background: Research on educational mobility for Chinese citizens born in or before the 1980s abounds. However, little is known about the educational mobility for the 1986-95 birth cohort and where it stands in the long-term trends.

Objective: We document the trends in educational attainment and educational mobility. We also explore the role played by offspring's *hukou* origin (urban or rural) and ethnicity (Han or ethnic minorities).

Method: We analysed data from the 1982, 1990, 2000, 2010, and 2020 China Censuses and 11 waves of China General Social Survey (CGSS).

Results: In the 1986-95 birth cohort, women's educational percentile ranks for secondary and tertiary levels were lower than men's in China, suggesting a higher percentage of well-educated women. From 1976-85 to 1986-95 birth cohorts, parent-child rank-rank correlation in education remained stable in all parent-child dyads. Educational persistence was constantly higher for offspring with urban *hukou* origin. Educational mobility continued to decline for men and women of urban *hukou* origin, but it increased for women of rural *hukou* origin. We did not find ethnicity differences.

Conclusion: There is some evidence of the reversal of women's disadvantage in education. Educational mobility was constantly weaker for offspring of urban *hukou* origin. Educational policies introduced around the 1990s may have contributed to greater educational mobility for women of rural *hukou* origin who were historically disadvantaged.

Contribution: Our study shows the latest trends in (a) educational attainment and (b) parent-child educational correlation by offspring's gender and *hukou* origin in China for the 1986-95 birth cohort.

1. Introduction

Intergenerational social mobility documents the association between individuals' parents' socio-economic status (education, occupation, etc.) and individuals' status. It tells if an individual climbs up or down, or remains in the same position on the social ladder (destination) compared with their parents (origin). A reasonable level of intergenerational social mobility is of vital importance in tackling inequality, fostering fairness, maintaining stability, encouraging aspirations, and promoting sustainable development (Narayan et al. 2018).

Education is a critical determinant of social stratification because it constitutes the gradient for pecuniary (e.g., income) and non-pecuniary (e.g., marriage, fertility, health, etc.) outcomes (Oreopoulos and Salvanes 2011; Psacharopoulos and Patrinos 2018). Educational mobility, a key component of social mobility, indicates to what extent an individual's educational achievement is correlated with his/her parent's education. Greater educational mobility in a population means that a child has a higher chance to attain advanced levels of education regardless of family resources. In examining the impact of family background on offspring's performance in education, hypotheses such as "maximally maintained inequality" (Raftery and Hout 1993) and "effectively maintained inequality" (Lucas 2001) have been proposed, validated, and contested. Empirical studies in the educational mobility literature revealed marked cross-national and cross-continental differences (e.g., greater mobility in Nordic countries but lower mobility in sub-Saharan Africa, Latin America, and South Asia) (Azam and Bhatt 2015; Breen, Ermisch, and Helske 2019; Causa and Johansson 2010; Hertz et al. 2008; Hu and Qian 2023; Kye 2011; Skopek and Leopold 2020; Torche 2021; Wittemann 2023). However, empirical evidence on the global trend in educational mobility is less conclusive (Engzell and Tropf 2019; Gruijters 2022; Gruijters, Chan, and Ermisch 2019; Hertz et al. 2008; Narayan et al. 2018; Torche 2021). The inconclusiveness may result from various methodological approaches with regards to data (retrospective or prospective), the measurement of education (years of schooling or categorical levels), and analytical strategy (absolute or relative mobility) (Song and Mare 2015, 2019).

In China, the topic of educational mobility continues to spark public debates and academic interests (Hannum et al. 2019). Since its founding, China has implemented various egalitarian educational policies and the tremendous social changes it underwent has profoundly affected the education sector. There was exceptionally high educational mobility for the 1950s and 1960s birth cohorts, but the educational mobility declined for the 1970s

and 1980s birth cohorts (Xie et al. 2022; Zhou and Xie 2019). In investigating this trend, ample nuanced analyses repeatedly found huge inequality in educational mobility tied with an individual's ascribed characteristics such as urban/rural *hukou* (household registration system) status (Wu 2019; Wu and Treiman 2004), place/province of birth (Hannum and Wang 2006), gender (Huo and Golley 2022), and ethnicity (There are 55 ethnic minorities in China who account for less than 10% of China's population) (Hannum 2002). China's continued market-oriented economic reforms (Hannum et al. 2019) and shifts in educational policies around the 1990s (Golley and Kong 2018) are likely to impact the latest trend in intergenerational educational mobility. However, as individuals may not have completed their advancement in the educational ladder before they turn 30, little is known about educational mobility for the 1990s birth cohort in China and where it stands in the long-term trends.

In this study, we aim to address the research gap in three ways. First, we used the 2020 China Census aggregated statistics to map the population-level distribution of education for the 1990s birth cohort by gender. Based on this and previous waves of census data, we generated educational percentile ranks that were comparable across gender and cohort (Xie et al. 2022) to chart the trends in educational attainment by gender in China from the 1950s to the 1990s birth cohort. Second, by estimating father/mother-child rank-rank correlation in education by offspring's gender and birth cohort, we chronicled the trends in educational mobility in China from the 1950s to the 1990s birth cohort. Third, we further investigated how individuals' *hukou* origin and ethnicity influenced the trends in educational mobility in China.

2. Data and methods

2.1 Data and sample

We primarily drew on data from censuses and surveys. First, we used the 1982 China Census microdata (1% of the population) from Integrated Public Use Microdata Series (IPUMS) (Minnesota Population Center 2020), as well as the 1990, 2000, 2010, and 2020 China Censuses aggregated statistics compiled by China's National Bureau of Statistics. The purpose was to capture the population-level distribution of educational attainment for men and women from various birth cohorts to generate educational percentile rank for each educational level (see section 2.2). Then, as parent-child dyads could not be identified in census data, we used data from China General Social Survey (CGSS). The nationally representative CGSS follows a repeated cross-sectional design, collecting information on

respondents' and their parents' gender, birth year, educational attainment, and other socio-demographics (Bian and Li 2012). We pooled 11 waves (2003, 2005, 2006, 2008, 2010, 2011, 2013, 2015, 2017, 2018, 2021) of the CGSS and selected respondents aged 25 or above in the interview year who fell in birth cohorts 1946-55, 1956-65, 1966-75, 1976-85, and 1986-95. The cut-off point was set at age 25 to allow respondents to have completed or be studying a college/university degree, and the classification of birth cohorts was informed by Xie et al. (2022). Our study sample included 83,569 respondents whose fathers' and mothers' birth cohorts varied from 1896-1905 to 1976-85.

2.2 Educational percentile rank

In the literature, parents' and offspring's educational level has been widely operationalised as ordinal educational categories or years of schooling. Then, educational mobility can be assessed from mobility matrices or by the coefficients from regression models. However, adopting these approaches to chart the long-term trends in intergenerational educational mobility in low- and middle-income countries (LMIC) may introduce bias due to the massive expansion of education in recent decades (Torche 2021). Given the substantial changes in the distribution of educational level across generations, a standardised metric of educational correlation that is comparable across gender and birth cohort may be less prone to bias (Emran, William, and Forhad 2018). Such a standardised metric derived from rank-based measures for education (a percentile rank) is truly margin-free (Hannum et al. 2019) and may lead to more robust estimates (Emran and Shilpi 2017).

We used the 1982, 1990, 2000, 2010, 2020 China Censuses to calculate educational percentile rank for men and women from birth cohorts 1896-1905 to 1986-95. Informed by Xie et al. (2022), wherever possible we calculated a birth cohort's educational percentile rank when they were 25-34 years old in a specific wave of census to handle survival selection by education. For example, we used the 1990 China Census data to generate educational percentile rank for the 1956-65 cohort. However, we were only able to use the 1982 China Census microdata from IPUMS to derive educational percentile rank for birth cohort 1946-55 or earlier.

In our study sample, individuals' educational attainment was divided into seven categories: (semi-)illiterate, primary school, middle school, high school, junior college, bachelor, and master/PhD. This classification was adopted in CGSS but it did not apply to a

few waves of the China Censuses (1982/1990) where bachelor was combined with master/PhD. Also, following how questions related to education were asked in censuses, we assigned a specific educational level to an individual even if he/she dropped out from or was still attending that educational level, or graduated without a diploma/certificate.

Using census data, we calculated educational percentile rank for each level of education by birth cohort and gender so that the rank would reflect the relative position of an individual's education attainment compared with his/her peers (Xie et al. 2022). For example, for a birth cohort, we assume the numbers of women completing seven educational levels are a (for (semi-)illiterate), b, c, d, e, f, and g (for master/PhD). Then the educational percentile rank for women of primary school level would be $100 \times ((a + b/2)/(a + b + ... + g))$, while the educational percentile rank for women of master/PhD level would be $100 \times (1 - g/2/(a + b + ... + g))$. The percentile rank runs from 0 (lowest) to 100 (highest). Individuals of the same gender, from the same birth cohort, and completing the same educational level would get identical ranks (i.e., the midpoint percentile for that educational level due to tied values).

2.3 Rank-rank correlation

We linked educational percentile rank calculated from census data to pooled CGSS data matching respondents' and their parents' birth cohort and gender. To allow nuanced analysis, we examined father-son, father-daughter, mother-son, and mother-daughter dyads (Hu and Qian 2023) by respondents' (i.e., offspring's) birth cohort and gender. Next, we estimated rank-rank correlations from weighted ordinary least-squares (OLS) regressions with standardised coefficients. The weights were constructed from the original sampling weight in each wave of CGSS, taking into account variation in sample size by birth cohort across multiple waves (Song et al. 2020).

3. Results

3.1 Trends in educational percentile rank

Analysing the 1982 China Census microdata from IPUMS and aggregated statistics from the 1990, 2000, 2010, and 2020 China Censuses, in Table 1 we present the trends in educational percentile rank by gender in China for ten 10-year birth cohorts from 1896-1905 to 1986-95. The educational percentile rank for each educational level showed a downward trend for both men and women over this 100-year period. For example, the educational percentile rank for

high school stood at 99 for men in the 1896-1905 birth cohort (i.e., the midpoint percentile was 99 so less than 2% of the male population completed high school because the upper bound could not exceed 100). Educational percentile rank decreased continuously to 55 for men in the 1986-95 birth cohort, while for women it dropped from almost 100 to 52 over the same period. However, there are few exceptions. The educational percentile rank of junior college and bachelor degree for men and women from the 1946-55 birth cohort increased slightly compared with their predecessors from the 1936-45 birth cohort.

Table 1 also shows that until the 1976-85 birth cohort, women's rank for each educational level had always been higher than men's rank. It reflects that the proportion of individuals in lower educational levels had been persistently higher among women until the 1976-85 birth cohort. However, the gap continued to narrow and among the 1986-95 birth cohort, for each educational level from middle school to master/PhD, women's ranks were lower than men's ranks. For example, a master/PhD degree put men at the 98.98th percentile in birth cohort 1986-95 but it only stood at the 98.73th percentile for women in the same birth cohort.

3.2 Trends in rank-rank correlation in education

Figure 1 plots the rank-rank correlation in education for father-son, father-daughter, mother-son, and mother-daughter dyads by offspring's birth cohort in China. From birth cohort 1946-55 to 1976-85, all four dyads showed an upward trend. Meanwhile, over this period, although parent-son rank-rank correlation in education increased more rapidly (e.g., from 0.23 to 0.43 for mother-son dyads versus from 0.33 to 0.47 for mother-daughter dyads), for each birth cohort parent-daughter correlation was persistently higher.

Comparing the 1980 (i.e., 1976-85) and the 1990 (i.e., 1986-95) birth cohorts, Figure 1 suggests that intergenerational educational mobility seemed to remain stable in all parent-child dyads. The slight rise in father-son rank-rank correlation (from 0.41 to 0.43) and the little dip in mother-daughter rank-rank correlation (from 0.47 to 0.45) were not significant.

3.3 Trends in rank-rank correlation in education by *hukou* origin and ethnicity

We also explored how the rank-rank correlation in education varied by offspring's *hukou* origin and ethnicity. Figure 2 plots the rank-rank correlation in education for father-son, father-daughter, mother-son, and mother-daughter dyads by offspring's birth cohort and *hukou* origin in China from birth cohort 1946-55 to 1986-95. The rank-rank correlation in

education showed an upward trend for citizens with urban *hukou* origin. In comparison, it ascended less markedly for citizens with rural *hukou* origin and decreased slightly in the 1986-95 birth cohort for parent-daughter dyads. Figure 2 also shows that the rank-rank correlation in education had been persistently higher for citizens with urban *hukou* origin in all four dyads. The gap continued to widen in recent birth cohorts, for example, standing at 0.51 (urban *hukou* origin) versus 0.27 (rural *hukou* origin) in father-daughter dyads.

Figure 3 plots the rank-rank correlation in education for father-son, father-daughter, mother-son, and mother-daughter dyads by offspring's birth cohort and ethnicity in China from birth cohort 1946-55 to 1986-95. The rank-rank correlation in education showed an upward trend for both Han Chinese and ethnic minorities. However, we did not find ethnicity differences in intergenerational educational mobility for any parent-child dyad in any birth cohort.

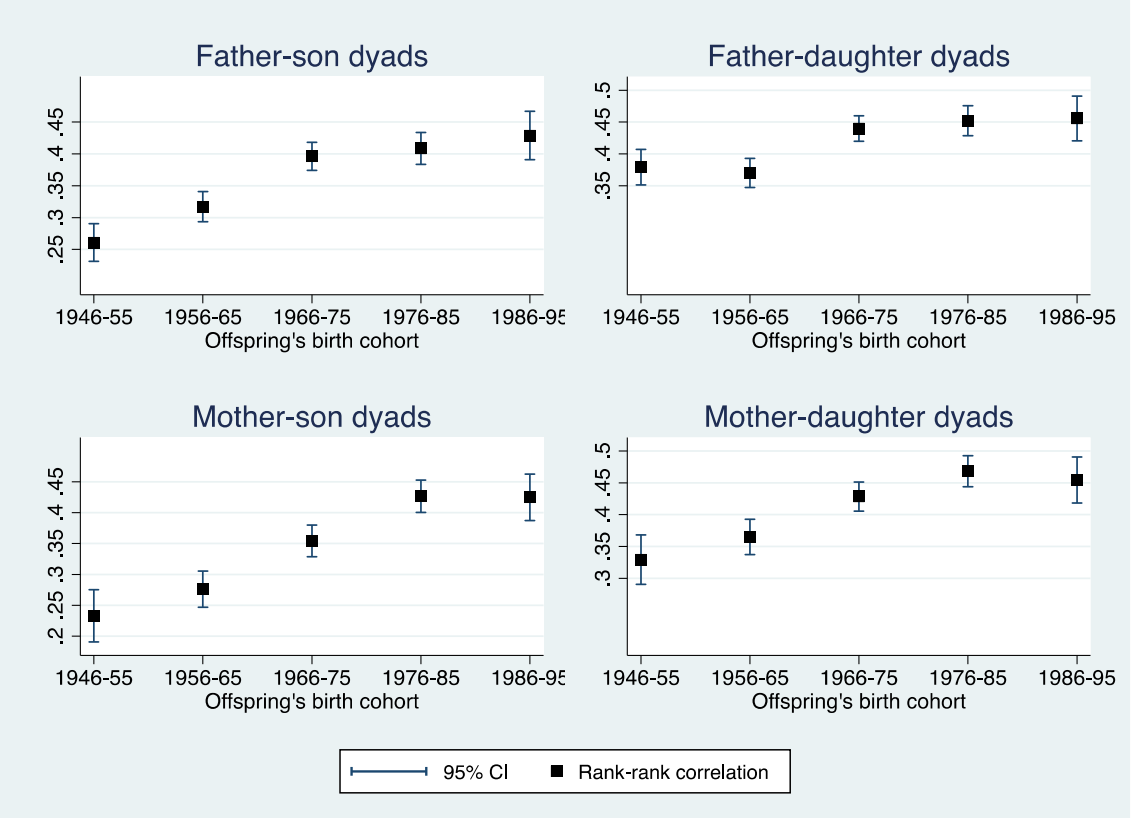

Figure 1. Rank-rank correlation in education by offspring's birth cohort in China.

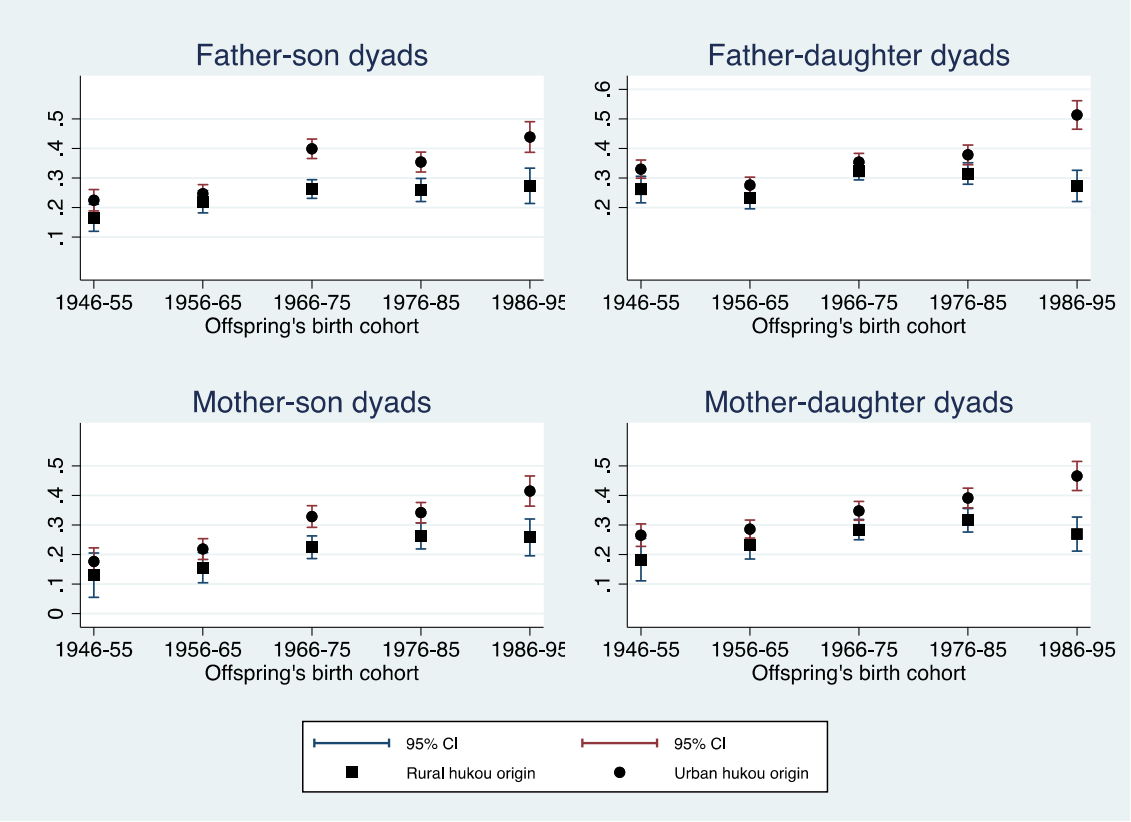

Figure 2. Rank-rank correlation in education by offspring's birth cohort and *hukou* origin in China.

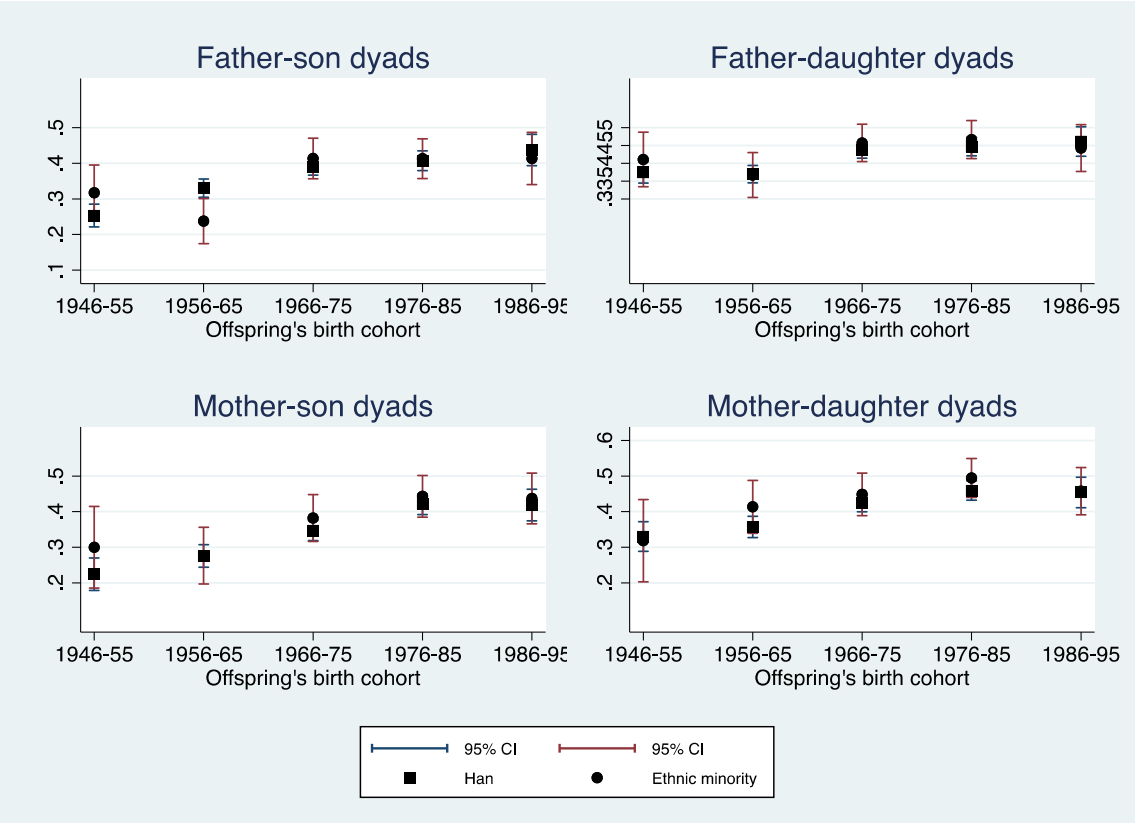

Figure 3. Rank-rank correlation in education by offspring's birth cohort and ethnicity in China.

4. Discussion and Conclusion

In this study, drawing on census data to calculate educational percentile ranks that were comparable across gender and cohort, we documented the trends in educational attainment by gender in China for birth cohorts from 1986-1905 to 1986-95. By linking the educational percentile ranks to respondents and their parents in pooled CGSS survey data, we examined the trends in intergenerational educational mobility in China for offspring in birth cohorts from 1946-55 to 1986-95 and the role played by offspring's *hukou* origin and ethnicity.

Conceptually, following the development in education system and the accumulation of human capital, the overall trend in a population would be a stable decrease in the proportion of poorly educated individuals and a corresponding increase of well-educated citizens. This was confirmed in Table 1 where the educational percentile rank for each educational level dropped constantly among men and women in China. The few exceptions found in the 1946-55 birth cohort where the educational percentile rank for junior college and bachelor degree rose slightly compared with previous cohort was caused by social turmoil. These young adults' expected admission to higher education institutes in their 20s was disrupted by China's Cultural Revolution (1966-76) during which the hiatus of tertiary education left multiple cohorts seeking a limited number of openings (Deng and Treiman 1997).

From 1896-1905 to 1976-85 birth cohorts, women's educational percentile rank for each educational level had been invariably higher than men's in China, suggesting enduring gender inequality in education. However, for the first time, there is evidence on the reversal of women's disadvantage in education observed in the 1986-95 birth cohort. In this cohort, women's educational percentile rank from high school to master/PhD was lower than men's, suggesting that the proportion of individuals in secondary and tertiary levels was higher among women. This remarkable progress follows the trend of reduced gender inequality in education in China (Treiman 2013; Wu and Zhang 2010; Zeng et al. 2014) and resembles patterns in high-income countries (DiPrete and Buchmann 2013). However, future research is needed to shed light on the gender landscape in higher education (e.g., in elite universities or fields of study) (Charles and Bradley 2009). Also, given the persistent decline in labour force participation among young urban women in China (Zheng 2020), it remains to be answered

how the reduced gender inequality in education may impact women's labour market outcomes and family life.

We found an upward long-term trend in parent-child rank-rank correlation in education from the 1946-55 to 1976-85 birth cohorts in China, implying rising educational persistence thus reduced educational mobility over this period. Together with gender differences (parent-daughter correlation was always higher than that in parent-son dyads), our results are consistent with Huo and Golley (2022) and Xie et al. (2022). However, this upward trend seemed to pause in all parent-child dyads when comparing the 1986-95 birth cohort to the 1976-85, suggesting that rising income/wealth-related inequality in China in recent decades (Piketty, Yang, and Zucman 2019) may not necessarily lead to less educational mobility. Future work is required to examine whether the trend in educational mobility in China will follow the pattern in the United States (Xie et al. 2022) by staying stable for the millennium birth cohort.

For citizens of urban *hukou* origin, the rank-rank correlations continued to climb in all parent-child dyads from the 1976-85 to 1986-95 birth cohorts. This indicates the reinforced effect of family background (i.e., reduced educational mobility) on urbanites' education regardless of gender, confirming that *hukou* is a critical ascriptive factor in social mobility in China (Li 2021). Both daughters and sons of urban *hukou* origin were beneficiaries of exclusive parental investment after the one child policy was implemented in the late 1970s (Fong 2002). Consequently, they were more likely to resemble their parents' educational achievement. In contrast, women of rural *hukou* origin in the 1986-95 birth cohort had greater educational mobility than their urban counterparts. These women, historically disadvantaged in education, may benefit noticeably from the introduction of the Compulsory Education Law in 1986 and the expansion in higher education in 1999 that offered more educational opportunities (Duan et al. 2022; Guo, Song, and Chen 2019; Liu and Wan 2019).

We did not find ethnicity differences in educational mobility in China, suggesting similar parent-child correlation in education between Han Chinese and ethnic minorities regardless of gender. Although mobility and inequality are two different dimensions of social stratification (Xie et al. 2022), our finding echoes Golley and Kong (2018) who showed the persistent minor role played by ethnicity, compared with *hukou* status at young age, in the inequality of opportunities in education. However, our findings with regards to ethnicity shall be interpreted with caution due to the limitation of small sample size (reflected in wider

confidence intervals) and the heterogeneity in socio-economic status among various ethnic minority groups in China.

Overall, we documented women's continued progress in educational attainment in China by presenting some evidence on the reversal of women's disadvantage in education in the 1986-95 birth cohort. From the 1976-85 to 1986-95 birth cohorts, parent-child rank-rank correlation in education remained stable for all dyads, implying that the long-term decline in educational mobility in China may have come to a halt for citizens born by the end of the 20th century. However, nuanced analyses present strong evidence of rising educational persistence for men and women with urban *hukou* origin and increased educational mobility for women of rural *hukou* origin. These findings call for policy-makers to take actions to tackle inequality and promote fairness between subpopulations in China stratified by gender and *hukou* status.

Table 1. Educational percentile ranks by gender for multiple 10-year birth cohorts from 1896-1905 to 1986-95 in China

	1896-1905	1906-15	1916-25	1926-35	1936-45	1946-55	1956-65	1966-75	1976-85	1986-95
Men										
(Semi-)illiterate	35.253	32.252	26.809	19.678	10.729	6.019	1.957	0.733	0.348	0.191
Primary school	82.522	78.911	71.388	60.503	44.951	34.759	15.604	12.523	5.196	2.634
Middle school	96.493	95.783	93.137	88.111	79.111	73.549	49.722	50.965	36.216	24.297
High school	99.009	98.858	98.168	96.490	93.508	94.222	84.335	85.724	72.226	54.938
Junior college	99.585	99.494	99.266	98.488	**97.347**	**98.909**	97.677	95.423	86.708	74.873
Bachelor	99.800	99.761	99.657	99.283	**98.729**	**99.496**	99.417	98.772	95.325	**90.771**
Master/PhD	-	-	-	-	-	-	-	99.899	99.476	**98.983**
Women										
(Semi-)illiterate	48.948	48.255	46.300	41.629	28.104	19.812	7.518	1.885	0.570	0.236
Primary school	98.794	97.950	95.523	89.643	70.713	58.474	31.688	19.485	7.332	2.875
Middle school	99.784	99.572	98.920	97.261	90.216	85.937	64.638	58.969	39.719	23.630
High school	99.914	99.845	99.620	99.025	97.090	96.995	89.804	88.757	74.154	52.019
Junior college	99.957	99.941	99.857	99.577	**98.999**	**99.462**	99.265	96.696	87.341	71.359
Bachelor	99.982	99.972	99.934	99.799	**99.515**	**99.742**	99.764	99.251	95.655	**89.054**
Master/PhD	-	-	-	-	-	-	-	99.943	99.512	**98.725**

Notes: Data source: IPUMS 1982 China Census data. 1990, 2000, 2010, and 2020 China Censuses aggregated statistics.

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