Social Mobility in the Long Run: An Analysis of Tongcheng, China, 1300 to 1900

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This study examines intergenerational mobility in China over 6 centuries using unique genealogical data on father-son pairs from 7 clans in Tongcheng County. Covering 18 generations and approximately 40,000 individuals, the analysis spans a broad set of social classes, from ordinary people to *jinshi* degree holders. The findings indicate that although social mobility was slow to change, mobility nonetheless underwent a sizable increase during the seventeenth century. The timing of the trends corroborates a number of key changes that affected mobility for commoners and for the highly educated elites. The results also show that intergenerational mobility and inequality are negatively correlated in the time series, a pattern previously observed in cross-sectional studies and commonly known as the Great Gatsby curve.

Intergenerational mobility—defined as the strength of the relationship between parental income and child income—is a central characteristic of any economy. Much of the recent empirical evidence from regional comparisons of contemporary economies (e.g., Solon 2004; Corak 2013; Chetty et al. 2014) suggests large differences in intergenerational mobility can arise from differences in government tax policies, neighborhood effects, community organizations, innate population characteristics, or other factors. For periods before the nineteenth century, understanding

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of mobility and the factors that contributed to its change is more limited. One challenge in studying mobility over time is that since inherited characteristics tend to change only slowly over many generations, one or two generations may not be sufficient—we need a much longer sample period stretching over many generations in order to identify temporal trends.

Historians of China have long been interested in the extent of social mobility and its explanations. Most studies, however, focus on entry and exit from the upper ranks of society. In a classic study of the Ming-Qing era (1368–1911), Ho (1962) argued that not only were the civil service examinations the most important determinant of status in late imperial China, but the examinations effectively replaced family prestige as the key determinant of social status. Kracke (1947, p. 103) asked: "did the civil service examinations introduce new blood into the Chinese civil service?" And before Kracke, Wittfogel (1938, pp. 87–88) wrote, after examining the biographies of officials in the *Dynastic Histories* from the Tang (618–907 A.D.) to the Qing (1644–1911): "Some 'fresh blood' may have been absorbed from the lower strata of society by means of the examination system; but on the whole, the ruling officialdom reproduced itself socially more or less from its own ranks." For select years, Kracke (1947) tabulated pre-Ming biographies of successful candidates for the highest degree, the *jinshi* degree, which supplied information on the careers of the father, grandfather, and great-grandfather of each candidate. Ho (1962) tabulated the *jinshi* list for the entire Ming Dynasty (1371–1643), finding that out of 22,577 top *jinshi* degree holders, only 7.1 percent came from families of registered scholar status.

Both Kracke (1947) and Ho (1962) concluded social fluidity in China was higher than expected for the highest-ranked elites. There is no general agreement, however. Research in recent decades, often using genealogical sources, has highlighted a variety of cases where elites maintained social stratification and continuity in the family line (Esherick and Rankin 1990). Ho (1962, p. 257) noted that indications of fluidity of the status system in the Ming-Qing existed mainly in the form of "non-quantifiable evidence ranging from biographies and genealogies to social novels and the comments of contemporary observers on clan and family affairs." He used the genealogical information of select clans to show how high-status families had little recourse to perpetuate their status if their descendants were incompetent. Evidently, examples of self-perpetuating elites, as well as of declining elites, can be found in the historical record.

Much less is known about the social mobility of non-elites from the Ming to the Qing. In this paper, I quantify the rich information in Chinese family genealogies to analyze mobility over time across a broad range

of status categories, from commoners to the *jinshi*. I begin by describing intergenerational mobility from approximately 1300 to 1900, tracing out mobility patterns of all individuals and families from seven clans living in Tongcheng County.[1] There is information on about 9,800 individual men in the sample and almost 9,000 father-son pairs. Around the year 1790, this sample accounts for around 2 percent of Tongcheng's total population.[2] The county spanned approximately 30 miles from north to south and 60 miles from east to west at its widest points. It was located just north of the Yangzi River, approximately 300 miles inland from the East China Sea. While this study cannot be generalized to all of China, to the extent the region was representative of the agrarian, kinship-based economy prevailing in pre-modern China, the study helps to shed light on a country wherein approximately 20 percent of the human population resided.

Genealogies are one of the classic sources of socioeconomic data in Chinese history.[3] Genealogies are less commonly compiled outside of China, but genealogical data have been recognized as being well-suited for analyzing mobility across multiple generations and have been described as "the gold standard" for linking historical samples in the United States (Bailey et al. 2020). However, since not every family has a genealogy, selection is a potential concern. To address this, I outline an approach that reduces the selection biases that may arise and describe how the current sample was constructed using a targeted approach to approximate a representative sample. In this way, the individuals in the current sample exhibit wide variations in social status, reflecting the distribution of status in society at that time. For example, there are very few *jinshi* degree holders (0.2 percent in the sample), and a majority were commoners (about 70 percent in the sample).

My results from the transition matrices of the Tongcheng sampled population indicate around 7 percent of *jinshi* fathers produced sons that were also *jinshi*, a percentage that is nearly matched to Ho's 7.1 percent tabulation. My interpretation, however, differs from Ho's. I find substantial persistence in family status among the top groups. One out of every three sons of *jinshi* stayed within the top 2 percent of the distribution.[4] In

[1] In the literature, Chinese clans are also referred to as lineages or common descent groups. This study uses these terms interchangeably.

[2] For 1790, Beattie (1979) reports 179,959 registered households. Assuming married men are heads of households, in my sample this corresponds to 3,600; 3,600/179,949 = 0.02. The 3,600 men around 1790 had about 4,200 female partners, and the data records more than 7,500 sons and 4,100 daughters, for a total of just under 20,000 persons.

[3] See Liu (1978), Shiue (2016), and Telford (1986) for surveys on Chinese genealogies.

[4] Shiue (2017) analyzes the human capital and fertility trade-off over the period.

addition, I estimate mobility patterns across near-elite as well as non-elite groups, something that is not recorded anywhere in official sources.

I estimate that any advantage that one parent has over another is roughly halved in the next generation. The average masks, however, striking temporal variation in social mobility, both in upward mobility as well as in downward mobility. Over time, both upward and downward mobility increased: fewer sons from poor families stayed poor, and fewer sons from very rich families stayed very rich. Mobility was low until the middle of the seventeenth century, before increasing significantly from the late seventeenth century onward. Overall, I find that the advantage retained by children from high-status families (over those from lower-status families) decreased, and the increase in mobility is a robust finding in various checks.

Explanations for these changes in intergenerational mobility may be found by examining how mobility was affected by the extent to which skills and education were rewarded in the economy, from both a historical and an institutional standpoint. The timing of these changes broadly correlates with the start of the policies instituted during the Qing Dynasty in the seventeenth century.

Changes in the return to human capital affect not only mobility but also inequality. Notably, this pattern has been observed to hold across regions in more recent samples as well (see Krueger (2012) on the Great Gatsby curve). I show that across the birth cohorts of my sample period, the increase in social mobility is accompanied by a decrease in inequality, demonstrating that temporal variation in mobility shares fundamental features with the existing regional analysis.

This paper contributes to our understanding of mobility for the Ming and Qing Dynasties, on which little quantitative analysis is available. For periods before high-quality, representative government-sponsored data is available, researchers have resorted to using pseudo-links that are typically based on common surnames. These approaches complement this paper, which employs family genealogies. While genealogical data may be less complete than census data, at least in certain dimensions, there are clear advantages when it comes to following intergenerational lines of descent, as these relationships are immediately available in genealogies.[5]

In addition, whereas influential mobility studies, including Ho (1962), have focused on the top 1–5 percent of elites as defined narrowly by achievements in the civil service examinations, genealogical data permits

[5] In contrast, the success rate for tracing the same individual across two U.S. censuses during the twentieth century is much lower (Abramitzky et al. 2021).

a broader understanding of status that includes people who had some evidence of wealth but did not have high levels of education. The present paper is based on a sample in which more than 70 percent of the men are non-elites, a group that includes commoners and lower social classes, and thus the results break new ground in terms of uncovering mobility patterns for a broader set of China's population.

Finally, this paper contributes to a large literature on social mobility across contemporary as well as nineteenth-century samples that use the intergenerational regression approach.[6] I show that changes in the generational coefficient—a decline from 0.7 to 0.4—is seen over several centuries. The estimate can be compared to other results in the literature. Braun and Stuhler (2018) find some differences in German mobility since the late nineteenth century. Long and Ferrie (2013) find U.S. mobility decreased since 1880. Mobility estimates range between 0.5 to 0.7 for certain parts of nineteenth-century Sweden (Lindahl et al. 2015), whereas Long and Ferrie (2018) present estimates for nineteenth-century occupational mobility in the United States and the United Kingdom of around 0.25.[7] Differences across regions are thought to explain some of the regional differences in mobility. By estimating intergenerational coefficients over time for the same region, this paper aims to contribute to an understanding of temporal changes in mobility, a margin on which generally less is known.

PREVIOUS LITERATURE

One strand of research includes Ho's (1962) seminal work on Ming-Qing social mobility, which examined the biographies of successful candidates in China's civil service examinations; the study was seen as showing higher mobility than expected among elites. Other authors have extended this work, based on high-quality source material, including Huang (2016) and Chang (2023); Jiang and Kung (2020), in particular, emphasize the importance of "cultural capital" in the sense of a high-level ancestor, versus resources for success at the highest-level examinations during the long nineteenth century (1796–1905). By focusing on high-level graduates such as *juren* and *jinshi* (provincial and national graduates, respectively), this line of research provides insights into the pattern of mobility in the top 5 percent of society.[8] While this research

[6] For contemporary surveys on mobility, see Solon (1999) and Black and Devereux (2011); see also Güell et al. (2018) and Corak (2020).

[7] See also Ferrie (1996, 2005); Aaronson and Mazumder (2008) examine the relationship between human capital returns and mobility over several generations.

[8] Recent work on the Tang Dynasty (618–907) mobility focuses on elites as well (Wen, Wang, and Hout 2024).

has produced interesting insights, the mobility patterns of China's top 5 percent are not the same as the mobility patterns of China's population overall.[9]

A second line of research has studied intergenerational processes using household registers in Northern China's Liaoning province for the period of 1749–1909 (Lee and Campbell 1997; Campbell and Lee 2003; Mare and Song 2014), while Campbell and Lee (2011) combine the data with retrospective survey data from the twentieth century. This work stresses the role of earlier generations and broader kin for mobility, as opposed to parents alone (see also Solon 2014; Braun and Stuhler 2018; Keller and Shiue 2023). The Liaoning data has the advantage that it is more complete than the typical Chinese family genealogy known today. A disadvantage is that the Liaoning data is not representative because about 75 percent of the sample men were hereditary peasants, while the occupational choice of the remainder (war captives, exiled nobles, and special-duty peasants) was even more restricted.[10] Furthermore, the Liaoning data only starts in the mid-eighteenth century, too late to pick up turning points and increases in mobility that have been traced to the erosion of occupational restrictions of the late Ming (Watson and Ebrey 1991) and the broader reach of the civil service examinations in the Ming-Qing transition (Ho 1962). In contrast, the present sample is broadly representative of China's occupational restrictions at the time and spans more than two or three centuries. Moreover, the kind of information in family genealogies is essential for studying the questions at hand.

Third, there has been rising interest in understanding how genealogies may be useful to study long-run processes involving multigenerational data, with some work shedding new light on Malthusian responses, human capital coping strategies for big shocks, environmental-induced diseases, and migration constraints (Hu 2023; Shiue and Keller 2023; Che 2023; Hess 2023). Genealogical data has recently been employed to improve automated census linking methods in the study of U.S. intergenerational mobility in the nineteenth and twentieth centuries (Price et al. 2021), and self-reported, retrospective family data has been employed to obtain improved estimates of intergenerational mobility (Jácome, Kuziemko, and Naidu 2022).

[9] Intergenerational relationships during the Ming and Qing can change drastically at the very top of the distribution, making linearity a poor assumption (Shiue and Keller 2022, figure 8).

[10] See Mare and Song (2014). The Liaoning data is related to the Eight Bannermen, an elite force of the Qing military, and the setting has been described as a tightly controlled military colony where one studies mobility under a special set of circumstances (see Lavely 1998).

Finally, the present paper documents drastic changes in social mobility over the course of several centuries while controlling for the most important groups at the time, namely, the clan. Existing research on mobility in China or elsewhere typically does not address the issue of group effects, given the shorter sample periods that are available; or it holds that mobility does not change over time based on pseudo-intergenerational links using surnames (Hao and Clark 2012; Clark 2014).[11] It is well-known, however, that social mobility between groups—for example, black and white U.S. Americans—is relatively low. A concern with the surname approach is that the relatively low estimated mobility reflects, to some extent, group-level mobility rather than individual mobility (Chetty et al. 2014). By controlling for clan effects, I effectively take out group differences, and the results show that doing so increases the mobility estimate. The results in this paper also show, however, that while clans were a force of social persistence, clan effects do not drive the mobility trends over time since mobility increased over time despite continued clan influence.

CENTRAL FEATURES OF CHINA'S ECONOMY, 1300–1900

This study covers the period from the late thirteenth to the late nineteenth centuries. Three imperial dynasties are covered in the sample period: part of the Yuan (1279–1368), all of the Ming (1368–1644), and the major part of the Qing Dynasty (1644–1911). Total population grew from very roughly 100 million in the late thirteenth century to 400 million by 1900 (Cao 2000, 2001). While the governing structure varied, especially from the Yuan to the late imperial Ming-Qing period, the effective power of government was organized around an autocratic central authority and lower administrative regions. The state taxed lightly in international comparisons with other states. Moreover, the scope of markets for allocating scarce resources was likely more limited by technology (e.g., transport technology, financial instruments) than by government regulation, in part because effective enforcement would have required more state resources than were in fact allocated.

In this structure of governance led by bureaucratic-scholar officials, education was the gateway for entry into higher-income classes. Consistent with low central taxation, the capacity of the state was limited. The provision of public goods was instead delegated to local governments and the leaders of local clans.[12] While local elites exercised paternal

[11] Other surname studies include Güell, Rodriguez Mora, and Telmer (2015) and Barone and Mocetti (2021); a direct evaluation of Clark's (2014) approach is Vosters (2018).

[12] Incentives of local dynasties and officials did not always mirror those of the imperial dynasty, however, Shiue (2004, 2005).

authority over their extended families, the participation of local elites in the political decision-making body of the state was legitimized through the state-run civil service examination system.

Throughout the Ming-Qing period, participation in the tournament-style civil service exams provided the most direct path to status and income. Passing the exam and obtaining a government office held substantial rewards and social status. These returns were so attractive that non-scholarly families who obtained wealth also invested in their sons' education.[13] On the one hand, local leadership by elites who passed the civil service exam strengthened and ensured the legitimacy of the central state. On the other hand, local elites who supported the state by participating in the civil service earned high financial rewards. There thus arose, in effect, a partnership between the central state and local elites, to mutual advantage. The result was a kind of equilibrium based on distinctively Chinese characteristics and different from, for example, European forms of social organization (Greif and Tabellini 2017). While there is little controversy that local clans were an important part of the social infrastructure, little is known at present about the economic impact of clans.[14]

Overall, the return to human capital investments in the sample period is closely aligned with the civil service examination system. In this paper, I use one of the main sources of information produced by clans, the genealogy. Genealogies allow for a more expanded definition of status as status information mirrors the ranking of exam degrees and official titles used by the state; in addition, genealogies record non-official types of wealth that clearly mattered. In the next section, I discuss this data source.

DATA

Chinese Genealogies as a Family Archive

Chinese genealogies are documents that contain information about a family's history, providing information in the form of an annotated family tree where male individuals are listed in terms of an intergenerationally linked structure along with the names and vital statistics of their spouses and children. Genealogies originated from beliefs surrounding ancestral ceremonies and Confucian teachings dating to at least the Tang Dynasty (618–907 A.D.). By the Ming and Qing, the practice had spread widely across the empire. As such, the Chinese genealogy is a well-known type

[13] "…money in Ming-Ch'ing China was not in itself an ultimate source of power. It had to be translated into official status to make its power fully felt." (Ho 1962, p. 51).

[14] A few exceptions may be found in de la Croix, Doepke, and Mokyr (2018) and Enke (2019).

of historical document that falls under the category of household documents (Faure and He 2020). Like other household documents—which include contracts, prayers for religious rituals, religious manuals, account books, tax payment records, almanacs, and textbooks—genealogies preserved information that was important to families within the social order of late imperial China. Wang (2008) catalogs approximately 50,000 publicly available genealogies, the bulk of which were produced in the Ming and Qing Dynasties. Even the 50,000 count, however, is undoubtedly an undercount of the number that exists; many genealogies are still held privately, and each passing year sees additional genealogies enter the public domain at a rate and regional distribution that may depend on the activism of libraries and local archivists, among other factors.

Because the documents are self-reported household archives, representativeness, selection bias, and accuracy need to be considered. For example, not every family had a genealogy, and some historical genealogies have survived while others have not. Also, Chinese genealogies are organized patrilineally—the family tree follows the marriages of the males of the family—implying less information on daughters than on sons. Compilation also required that at least some family members be literate, in which case the set of families for which genealogies exist might be better off than the set of families for which they do not exist (wealth bias).[15] The clan might overstate the prestige of the founding member in order to boost settlement claims or trace their ancestry to a senior official from an earlier time in order to promote itself.[16] The fact that there are small genealogies covering only a limited set of individuals, and very large multi-volume works covering several branches of a clan spread across a province, shows there were significant variations across genealogical titles.

The principle of Chinese genealogical compilation was such that all males in the patrilineal line were included for reasons of ritual. However, there were also economic and social reasons why lineages compiled information on members. Influential work in the anthropological and

[15] Research on crowdsourced genealogies provides some evidence on the potential extent of wealth bias when using all available genealogies, as relying on "all" crowdsourced genealogies may be comparable to using "all" genealogies based on primary sources. Stelter and Alburez-Gutierrez (2022) show that in the late nineteenth century, the typical lifespan in the Netherlands at age 30 was two and a half years longer according to crowdsourced genealogies compared to highly reliable life tables. It is not clear yet to what extent such results can be validly transferred to earlier periods and to China.

[16] Faure (1989) cites the case of the Zhuxi xiang lineage foundation legend and the Yao minority people, both of which may have been motivated by the lineages perceiving the need to demarcate their rights of settlement. Some lineages claim ancient ancestry with great clans of the Tang or Song Dynasties (Faure and He 2020).

sociological literature has formed the basis for an understanding of the genealogy as a way to govern the issues around resource control and defense against incursions from neighboring lineages (Freedman 1971), the corporate group and ownership of land plus property (Watson 1982), the contractual concerns of entrepreneurs (Faure 1989), or the means to organize and negotiate the tax obligations between households and the state (Szonyi 2002). Regardless of the specific lens through which one wishes to view these arrangements, they point to essential economic purposes of genealogies.

Thus, clan membership was self-professed, yet it played an important role in defining and clarifying allegiances and responsibilities, especially during times when conflict might create uncertainty regarding obligations. In this sense, the genealogy functioned as a communal archive, preserving practical, useful, and specific information about the clan. This included family rules, information on communal property, the rights of descendants to make claims to benefits on corporately owned property, fee schedules for lineage schools, and similar matters. While these family laws were not immutable and the family could adapt to new situations, the meticulous recording of genealogical details—such as membership charts, biographies, obituaries, official degrees, and appointments to office—are undertakings that reflected the lineage as a force for communal organization. The significance of the document, along with the common belief system that supported it, likely added a layer of oversight in the preservation of the family's history. Unlike the official household registers of the Ming, which linked population counts to tax levies (and which created a built-in incentive for inaccurate reporting), clan members had a vested interest in maintaining the accuracy of their genealogical documents.

Other economic functions of Chinese genealogies are related to the way China was governed during the Ming and Qing. Whether implicitly or explicitly, the state delegated much of the administration of local public goods to local clans. The management and upkeep of irrigation systems, poor relief, and grain storage for famines would often be delegated by the district magistrate to local clans. The amount that clans could contribute depended in turn on the resources at their disposal and the number of members in each clan. Lineage school fees, for example, were assessed on lineage members, with fees rising in an individual's income, providing reliable information on income differences between clan members (Chang 1955, see table A.5). Genealogies, by documenting the organization of clans, helped support the local clan's capacity for informal governance and risk-sharing.

In summary, there is a considerable amount of information in family records that were privately maintained. While it is not possible to recreate census-like population profiles with genealogical data, and certain limitations must be acknowledged due to the patrilineal focus on males, genealogical archives served essential functions that corresponded to the central role of lineages in maintaining and extending the social order. Genealogies existed and were prevalent not only because they reinforced beliefs in ancestral rituals, but also because they documented private forms of economic and political organization. Furthermore, genealogies were important household documents carefully safeguarded by lineages. Pervasive inaccuracies in genealogies would severely compromise their role in fulfilling key economic and ceremonial functions. I now turn to the data underlying the present study.

Sample Data: Coverage, Selection, and Representativeness

The data are from genealogies of clans that resided in Tongcheng County of Anhui Province (Shiue 2025). In the year 1790, Tongcheng County had about 1.3 million inhabitants (Beattie 1979). The county was relatively developed and densely settled, one of the many thriving regions located near the lower Yangzi River Basin. Tongcheng was about 150 miles away from Nanjing, the early Ming Dynasty capital; Beijing, the later Ming and Qing capital, was about 650 miles away. The region was mainly a rice-producing area where the wealthiest families were typically landowners. Over the Ming and Qing Dynasties, the region gained some fame for having produced a number of the highest officials of the empire.

Genealogies exist for numerous clans in Tongcheng, with one historical account relying on more than 60 genealogies (Beattie 1979) and another study utilizing 39 genealogies (Telford 1992). The sample I use is developed from data collection by Ted Telford in the 1980s. Although individual titles were privately sponsored during the Ming and Qing Dynasties, genealogies became not only commonplace, but the conventions of compilation became more standardized. According to genealogical principles of compilation, lineage membership is determined by patrilineal descent—that is, being an adult male—not wealth or status (Telford 1992). While not every genealogy adheres to this principle, those that do will have created a document that contains hundreds or thousands of individuals dispersed over many villages and towns that captures a cross-section of society from commoners to elites. The presence of high-status individuals in these genealogies ought to be rare.

Because employing all known genealogies from Tongcheng would lead to the oversampling of elites, a targeted approach is used to choose the genealogies included in this study, with the goal of obtaining a broadly representative sample in the raw data. Given the focus on social mobility, an important part of the approach is to target the fact that most of the population in the genealogy had no social status ("commoner") while top-status holders may have been around 2 percent, depending on the exact definition (Chang 1955; Telford 1992). For any genealogy chosen, all individuals in the data are included. These criteria led to the utilization of genealogies from seven clans—the Chen, Ma, Wang, Ye, Yin, Zhao, and Zhou—a total of about 40,000 individuals, including men, women, and children.

An important question is the representativeness of genealogical information relative to the overall population, which is affected by the completeness of genealogical records. Harrell (1987) conducted one of the earliest studies comparing genealogical figures with official data. For the early twentieth century, his study found that genealogies consistently recorded over 80 percent of the population under study in Taiwan, as benchmarked against the highly reliable Japanese household registers. For present purposes, ideally, one would obtain accurate data on Tongcheng's population, but official Chinese household registration figures, at least for some periods between 1300 and 1900, are patchy.[17]

Figure 1 plots the official registered population for Tongcheng County as a whole together with the population of the seven sample clans. Notice that between 1400 and 1825, the officially registered population is observed infrequently and unevenly, about 20 times over a stretch of 425 years. Furthermore, the official population data exhibits virtually zero population growth between the late fifteenth and the early seventeenth centuries, which is at odds with what is known about demographic processes in China's history.[18] In contrast, the information on the genealogical sample population changes relatively smoothly because observations are available at an annual frequency.[19] That official data is imperfect and only infrequently available during this period is not surprising, but it means that no benchmark population data exists that can be used to assess the representativeness of the sample underlying this study.

[17] Household registration from the Ming is not population counts but rather tax liabilities based on adult males; in the early eighteenth century, the Qing merged the adult male labor service tax with the land tax in order to arrive at a single lump sum. The quality of the official population data is uneven; falsification and underreporting of the population are pervasive (Heijdra 1998).

[18] Population growth in China was roughly half of 1 percent annually, with the exception of periods of dynastic transition or rebellion. See tabulations in Cao, Yan, and Von Glahn (2022).

[19] The dip in the seventeenth century is associated with destruction during the Ming-Qing dynastic transition.

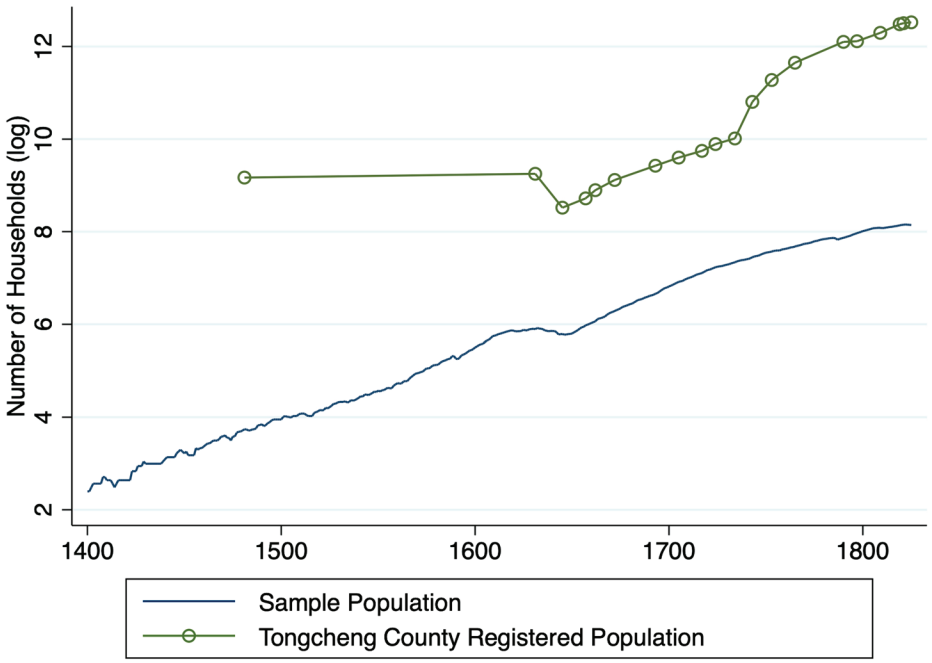

FIGURE 1
SAMPLE POPULATION AND TONGCHENG TOTAL HOUSEHOLDS, 1400–1825

Sources: Registered household population from Beattie (1979, table 3); sample population is number of head-of-household males, author's computations.

Completeness, meaning full population counts, is only one factor affecting whether genealogies give a representative sample and yield valid research results. Indeed, when the research objective is not focused on determining population totals, which is the case in the present study, then genealogies are suitable for obtaining within-sample comparisons over time (Harrell 1987). To gauge the sample's representativeness from this perspective, one can compare within-sample characteristics of the genealogical data to that obtained from other research, keeping in mind that the latter are partially estimated as well. Fei (1946), for example, holds that the leisure class accounts for the top 20 percent of the distribution. In my analysis, groups 2 to 22 in Online Appendix Table A.4, with a 20.2 percent share of the total, come quite close to Fei's estimate; these include, for example, people who might have attempted the civil service exam but failed, were village chiefs, had multiple wives and concubines, or purchased degrees.

Furthermore, I compare the within-sample share of elites in the current genealogical sample with historical accounts. Chang (1955) takes the more restricted definition that *sheng-yuan* holders and above were in the upper class and estimates that they accounted for the top 2 percent of

the total population in the later half of the Qing period. In my sample, the part of the population corresponding to Chang's (1955) definition accounts for 3.4 percent.[20] This figure falls to 1.9 percent if I include only those men who obtained an official degree through the civil service exam. These comparisons indicate that the sample is comparable to what is generally believed to be true about the share of higher-status individuals in China during this time. Furthermore, more than 70 percent of men in the sample are commoners in the sense that they do not have any signs of elevated status. Since most of the Tongcheng men during this period must have lived close to subsistence, the sample broadly captures the distribution of status at the lower end as well.

I also compare the sample status distribution with the "China Multigenerational Dataset" for Liaoning province (Campbell and Lee 2003). For this data, which starts in the mid-eighteenth century, 2 percent were "Officials," while in the present sample, about 1.4 percent had an official position.[21] The somewhat lower fraction of officials in the present sample compared to the Liaoning data may be related to the fact that men in the Liaoning data had closer ties to the Qing government than members of the typical Chinese population (see Mare and Song 2014).

Finally, the number of *jinshi* individuals (19 in the sample) lines up with official lists from the Chinese state for Tongcheng, increasing the credibility of the lineage records. Overall, given some differences in terms of samples and definitions, the sample under analysis is broadly comparable to the distribution of status in existing studies. The following section examines selection further by using cross-clan analysis.

EVIDENCE ON SELECTION FROM CROSS-CLAN ANALYSIS

The sample used for the mobility analysis consists of all male members of seven clans that reached adulthood and married at least once.[22] The largest of the clans, the Wang clan, accounts for close to half of the sample, while the smallest, the Chen clan, accounts for 3 percent. Clans are typically observed by the fourteenth century.[23]

[20] In Online Appendix Table A.4, Column (2), they are groups 13 and above.

[21] Author's computations from the China Multigenerational Dataset, Liaoning 1749–1909, http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/27063.

[22] Sample attrition due to long-distance outmigration is very limited. Mortality during childhood and inability to marry are quantitatively more important than outmigration, however, they do not account for the increase in mobility over time. For the role of fertility, health, and family resources in explaining the increase in mobility, see Figure 5.

[23] See Table A.1 in the Online Appendix for sample range, by clan. The Zhao clan is first observed around 1600, in the ninth generation. I have confirmed that this difference in generation number does not affect my main results.

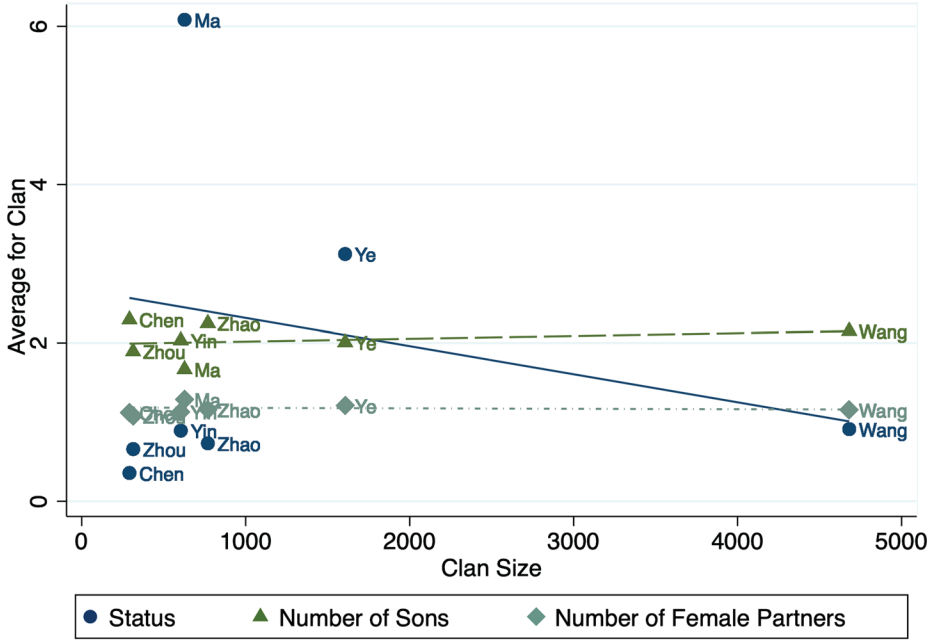

FIGURE 2
CLAN SIZE VERSUS STATUS, SONS, AND FEMALE PARTNERS

Notes: Figure shows three relationships, between average (i) number of sons, (ii) status, and (iii) number of females per man, each with the number of clan members across seven clans.
Source: Author's calculation as described in text.

First, I examine wealth bias. Much of the wealth bias may have already been eliminated because of the targeted approach of building the sample, but if there remains positive selection into the genealogical sample due to wealth bias, it would likely show up as a positive relationship between clan size and status. Figure 2 indicates that there is no such positive relationship. Thus, there is little evidence that clan size simply reflects a clan's resources or that high-status clans systematically report more members than lower-status clans.[24] Figure 2 also considers other indicators of resources. I include marriage as a measure of wealth since wealthier men could afford multiple wives and maintain larger families (Harrell 1985). The figure shows the relationship between clan size and the number of wives is essentially flat. Furthermore, the figure shows fertility as measured by the number of male children is not strongly related to clan size either.

Other concerns one might have about selection and representativeness derive from recall bias and the retrospective nature of how genealogies

[24] In the Online Appendix, I show that this result is unchanged when I focus on within-clan changes using longitudinal data (Table A.2).

FIGURE 3
EVIDENCE ON SURVIVOR BIAS

Notes: Figure shows number of clan men born in periods 1800–1825 and post-1825, both versus average clan status.
Source: Author's calculation as described in text.

are compiled. One way this bias could manifest is if, after a clan member attains a particularly high level of status, the clan reports a surge in new members. This could happen because the clan uses its resources to emphasize the significance of an individual's achievements or because, ex-post, people who were not originally part of the clan might try to establish an ancestral relationship with the high-status individual. Online Appendix Table A.3 evaluates such hypotheses of recall bias using regression analysis and finds little evidence for it.

A related concern is survivorship bias: over time, this type of bias could result in a disproportionately higher fraction of high-achieving individuals compared to low-achieving individuals. One implication is that toward the end of the sample period, the distribution becomes skewed toward relatively high-achieving clans. As Figure 3 shows, however, there is little evidence for this. For the interested reader, additional results on aspects of sample selection can be found in the Online Appendix sections A.2 and A.3. In sum, the analysis provides evidence that the level of representativeness of the sample is relatively high while the degree of selection is relatively limited.

TABLE 1
INCOME DISTRIBUTION

Group	N	Percent	Description
0	6,320	71.1	No signs of extraordinary income, wealth, and status
1	1,796	20.2	Multiple consecutive marriage; educated without passing civil exam; family wealth
2	254	2.9	Landowners and merchants; multiple contemporaneous wives; official student
3	396	4.5	Official passing district/prefectural exam; student of imperial academy
4	108	1.2	Official passing provincial exam; individual passing national exam without office
5	19	0.2	Official passing national exam with top-level position

Notes: Sample is all married males linked over three generations (son, father, and grandfather); N = 8,893.
Sources: Information is based on Chang (1955, 1962), Eberhard (1962), Ho (1962), and Telford (1986, 1992). See Online Appendix for more information.

Measurement of Status

A challenge in contemporary studies of intergenerational mobility is that income is measured with error due to life-cycle and transitory income fluctuations, and thus, biases on both parent and child income can be large and difficult to eliminate (Nybom and Stuhler 2016). Although there is no income information, one advantage of genealogical data is that it records the highest lifetime achievements in biographical sections that resemble obituaries. In the genealogies collected for this sample, there is uniformity in the types of status indicators that are mentioned across different lineages, likely due to shared social perspectives across lineages.

In line with other research that uses sectoral or occupational categories when individual-level data is not available, I employ six different classifications, as shown in Table 1. Information on official titles and degrees awarded by the state is useful because it is consistently recorded and can be ranked. The main sources include Chang (1955, 1962), Ho (1962), and Telford (1986, 1992).[25] Further details on the status classifications, as well as the relationship between status and income, are given in section A.4 of the Online Appendix.

More than 70 percent of men in the sample are in the lowest category of the distribution because they do not have anything in their biographies indicating uncommon levels of income, wealth, or status (Table 1).

[25] Compared to earlier studies of mobility with historical samples that have constructed a simple binary variable of "status" or "no status" (e.g., Campbell and Lee 2003; Mare and Song 2014), the present data is more detailed.

TABLE 2
SUMMARY STATISTICS

Panel A. Overall Sample

		N	Average	Std. Dev.
Father	Status	8,893	0.58	0.99
	Year of Birth	8,893	1732.04	70.85
Mother	Year of Birth	8,893	1735.64	71.00
Son	Status	8,893	0.45	0.87
	Year of Birth	8,893	1763.90	71.30

Panel B. Information by Clan

		Chen	Ma	Wang	Ye	Yin	Zhao	Zhou
N	Early	152	410	2,096	792	364	382	237
	Late	139	217	2,585	815	240	387	77
Status	Early	0.11	1.29	0.29	0.98	0.23	0.16	0.22
	Late	0.17	1.64	0.30	0.65	0.35	0.32	0.09

Notes: Status levels 0 to 5, as shown in Table 1. "Early" is birth year of son before 1780, "Late" is son's birth year after 1780 (which is roughly half of the sample). Panel B. shows information on sons.
Source: Author's calculation as described in text.

To account for variation in group size—see Column (3)—I convert each man's status into the percentile status rank, as in Dahl and DeLeire (2008) and Chetty et al. (2014). Each individual is coded with the midpoint of his category's status ranking. An individual belonging to the lowest category, for example, has a percentile rank of 0.356, which is equal to 71.1 percent divided by two.

Summary Statistics

Sample information on status and demographic characteristics for N = 8,893 father-son pairs are given in Table 2. Panel A provides information on fathers, mothers, and sons. With status levels ranging from 0 to 5 (Table 1), the average for fathers is 0.58, which confirms that the majority of men are in the lowest status category. The average birth year of fathers in the sample is 1732. The birth year of the first father that appears in the data set is 1298. When using genealogies to study intergenerational mobility, one sample restriction is that the sample consists of men who had married and had descendants. In this period, almost all women married, but not all men were able to marry during their lifetime; the fraction of unmarried men in this sample is similar to Telford's (1992) estimate of 22.1 percent for Tongcheng clans between 1520 and 1661.[26] Another restriction is that

[26] The focus on married men also means that life expectancy in the sample is higher than life expectancy of all men in China during the sample period.

the intergenerational analysis is confined to people who lived within the county or migrated within the county. However, only a small percentage migrated over long distances.[27]

Turning to information on the women who were the wives and mothers of the male members, the average birth year is 1736, similar to that of their husbands, as one would expect.[28] The earliest-recorded mother in the dataset was born in the year 1300, only two years later than the earliest-born father. Almost all marriages are between husbands and wives of different clans (endogamy is very rare). The average birth years of fathers and sons imply a generational interval of approximately 30 years.

Panel B shows size and status statistics separately for each of the seven clans by time period (before and after 1780). The largest clan is the Wang, followed by the Ye, while the highest average status is obtained by the Ma clan. It is also interesting to see that the Ma clan's average status increased while the number of its clan members decreased over time. The finding confirms the analysis noted previously that there is no evidence that wealth is an important reason for sample inclusion in these data.

INTERGENERATIONAL MOBILITY IN TONGCHENG, 1300–1900

Transition matrices for the six status categories reveal the nature of intergenerational mobility for the sons of elites and non-elites. In low-income families where the father was at level 0, nearly 9 out of 10 sons remained in the lowest income level; see Table 3. In contrast, sons from the elite *jinshi* families (level 5) have a 7 percent chance of retaining *jinshi* status. This relatively low percentage can be explained by the fact that educational degrees were awarded to individuals and could not be transferred from one generation to the next. Nevertheless, the rate is about 35 times the population share of *jinshi*. Even if few sons of the *jinshi* reached the same high status as their father, at least one in three sons stayed within the top 2 percent of the population, with approximately 36 percent of the sons staying in levels 4 and 5. Thus, at the top of the distribution, there is substantial intergenerational persistence.

Moreover, the probability that a son rises in status to a given level is increasing in the status of his father. For example, the chance of a son reaching status level 4 is 0.07 percent for a son of a level-0 father, and 1.17 percent, 4.05 percent, and 5.83 percent for a son of a level-1, level-2, and level-3 father, respectively.

[27] Outmigration beyond the county was about 2 percent (Telford 1990).

[28] Throughout this paper, the term "wives" includes non-married partners, that is, concubines (less than 2 percent of all female partners).

TABLE 3
INTERGENERATIONAL TRANSITIONS BETWEEN STATUS LEVELS

		Father						
		0	1	2	3	4	5	Total
	0	86.74	66.47	0	0	0	0	71.07
	1	11.39	23.95	66.33	61.43	28.12	10.71	20.20
	2	1.04	2.87	13.42	9.89	17.97	7.14	2.86
Son	3	0.75	5.16	15.70	21.88	35.16	46.63	4.45
	4	0.07	1.17	4.05	5.83	17.19	28.57	1.21
	5	0	0.37	0.51	0.97	1.56	7.14	0.21
	Total	100	100	100	100	100	100	100

Notes: Transition probabilities between six levels in percent.
Sources: Author's calculations based on status levels as defined Chang (1955, 1962), Eberhard (1962), Ho (1962), and Telford (1986, 1992).

Conversely, the chance of dropping to the bottom of the distribution is decreasing in father income. For example, the chance of falling to level 1 is about 11 percent for a son of a level-5 father, but 28 percent, 61 percent, and 66 percent for a son of a level-4, level-3, and level-2 father, respectively.

The regression approach for estimating intergenerational mobility is an OLS relationship relating son to father status:

$$R_S(i) = \alpha + \beta_c R_F(i) + \varepsilon(i). \quad (1)$$

In Equation (1), $R_S(i)$ and $R_F(i)$ are the percentile ranks of the son and the father, respectively, in pair i, i = 1,..., 8,893.[29] For all father-son pairs, I compute percentile ranks of father and son separately for their respective birth cohorts, defined as a 25-year time window. For example, percentile ranks for the fathers from 1575 to 1600 are computed by ranking the status levels of all fathers born during this period.[30] The mean-zero error term $\varepsilon(i)$ captures all other influences affecting pair i.

A coefficient β_c close to one in Equation (1) indicates low mobility because the son's rank in the income distribution is strongly determined by his father's rank, while there is relatively high mobility when β is close to zero. Table 4, Column (1) shows the estimated β_c = 0.528, suggesting that a father with a 10 percentage point rank advantage over another father can expect that his son has about a 5 percentage point rank advantage. Put differently, any advantage in the father's generation is approximately cut in half in one generation.

[29] If a father has two sons, there will be two father-son pairs.

[30] Conditioning on the income distribution in each birth cohort means that changes in average income between birth cohorts will not affect the results, reducing concerns about a possibly non-stationary distribution between fathers and sons.

TABLE 4
INTERGENERATIONAL MOBILITY FOR THE FULL SAMPLE PERIOD

	(1) Percentile Rank with 6 Levels	(2) Discrete with 6 Levels	(3) Percentile Rank with 23 Levels
β	0.528	0.552	0.570
(s.e.)	(0.009)	(0.010)	(0.008)
$E\,[R_S(i)\,\|R_F(i) = 0.25]$	0.42	n/a	0.42
$E\,[R_S(i)\,\|R_F(i) = 0.80]$	0.65	n/a	0.66

Notes: Estimation of β_c (Equation (1)) by OLS; $E[R_S(i)\,|R_F(i) = 0.25]$ is the expectation of percentile rank of sons with fathers at percentile rank <0.5; $E[R_S(i)\,|R_F(i) = 0.80]$ is the expectation of percentile rank of sons with fathers at percentile rank > 0.6; N = 8,893 in Columns (1) and (2); and N = 8,892 in Column (3).
Sources: Author's calculations based on status levels as defined Chang (1955, 1962), Eberhard (1962), Ho (1962), and Telford (1986, 1992). See Table 1 and Online Appendix Table A.4.

Table 4 also reports separate measures of upward and downward mobility. A relatively low-status father, with a percentile rank of 0.25, can expect that his son will have a rank of 0.42 in the next generation's distribution. In contrast, a high-status father, at rank 0.80, can expect that his son will be at rank 0.65. The direction of these moves confirms that there is regression to the mean, while their magnitude provides new information on the speed of intergenerational mobility.[31]

The remaining two columns in Table 4 present results for two alternative specifications. Column (2) employs six discrete categories valued at 0 to 5, yielding a β_c estimate of 0.552, similar to the baseline estimate in Column (1). Column (3) in Table 4 reports results based on percentile ranks with more disaggregated 23 status categories; the estimated β_c (= 0.570) implies somewhat more intergenerational persistence than the baseline (Column (1)), but the result is similar.[32]

Overall, these estimates fall within a relatively narrow range, with the intergenerational regression coefficient for the entire sample period estimated to be somewhat above 0.5.

CHANGES IN INTERGENERATIONAL MOBILITY

Evidence from Transition Matrices

To examine overall changes over time in intergenerational mobility based on transition matrices, I repeat the analysis for two sub-periods:

[31] Given that more than 70 percent of men are of the lowest status class, I have employed resampling techniques to confirm that the absolute mobility results do not depend on the identity of the fathers in the groups with expected ranks of 0.25 and 0.80.

[32] The status descriptions are given in Online Appendix Table A.4.

TABLE 5
TRANSITION MATRIX FOR FIRST HALF OF SAMPLE PERIOD

		Father						
		0	1	2	3	4	5	Total
Son	0	91.61	66.90	0	0	0	0	71.28
	1	6.22	22.07	62.32	60.99	28.89	0	17.87
	2	1.31	4.37	16.20	9.89	20.00	18.18	3.99
	3	0.75	5.75	16.90	24.45	37.78	36.36	5.55
	4	0.11	0.80	3.87	4.12	11.11	27.27	1.11
	5	0	0.11	0.70	0.55	2.22	18.18	0.20
	Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Notes: Transition probabilities (percent) between six status levels before the year 1780.
Sources: Author's calculations based on status levels as defined by Chang (1955, 1962), Eberhard (1962), Ho (1962), and Telford (1986, 1992).

before 1780 versus after 1780, which splits the sample in half based on the number of observations.

Table 5 shows that in the earlier period, more than 91 percent of sons from lowest-income families stayed in the bottom group of the distribution. Also, 18 percent of top-level *jinshi* families (group 5; top 0.2 percent of the distribution) stayed in that group from one generation to the next.

Table 6 shows results for the latter half of the sample. Notice that the corresponding probabilities fall to 82 percent and 0 percent, respectively. Fewer sons from poor families stay poor, and fewer sons from very rich families stay very rich—upward and downward mobility has increased. Importantly, this result is not driven by a change in the share of these groups in the population. As the last columns in Tables 5 and 6 indicate, the population shares of the poor (group 0) and the very rich (income group 5) are approximately 71 percent and 0.2 percent, similar in the earlier and later periods.

Shorrocks (1978) proposes a measure of the mobility of a transition matrix based on its trace, defined as $M = \frac{n - trace\,P}{n-1}$, where P is the square transition matrix and n is its dimension. The higher the trace, the lower the mobility. In the present case, M for the earlier period is 0.83, while M for the later period is 0.87. Thus, evidence from transition matrices indicates that mobility has increased in China over the sample period.

Relative Mobility over Time

In addition to transition matrices, it is useful to examine mobility by comparing relative mobility estimates that vary by cohort, β_c. Figure 4 shows the evolution of β_c for birth cohorts of 25 years each (such as years

TABLE 6
TRANSITION MATRIX FOR LATER HALF OF SAMPLE

		Father						
		0	1	2	3	4	5	Total
Son	0	82.22	66.11	0.00	0.00	0.00	0.00	70.85
	1	16.19	25.57	76.58	62.06	26.32	17.65	22.51
	2	0.79	1.59	6.31	9.88	13.16	0.00	1.73
	3	0.76	4.66	12.61	18.18	28.95	52.94	3.36
	4	0.03	1.49	4.50	8.30	31.58	29.41	1.32
	5	0.00	0.59	0.00	1.58	0.00	0.00	0.22
	Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Notes: Transition probabilities (percent) between six status levels in the year 1780 and after.
Sources: Author's calculations based on status levels as defined by Chang (1955, 1962), Eberhard (1962), Ho (1962), and Telford (1986, 1992).

1575 to 1600).[33] Mobility was low through the seventeenth century (high β_c), then increased in the eighteenth century, reaching values of β_c close to 0.4 by the nineteenth century.[34] Furthermore, if instead of 12 different birth cohorts, only two are allowed—namely, birth years before 1700 and birth years after—the point estimates are $\beta_{<1700} = 0.69$ and $\beta_{>1700} = 0.49$. The two estimates are significantly different (p-value 0.00). This confirms that relative mobility increased over time.

The Online Appendix provides additional estimates showing not only did relative mobility—as measured by β in Equation (1)—increase over time, but both upward and downward mobility also rose from the early to the later centuries of the sample period (see Online Appendix Figures A.6 and A.5, respectively). For example, a son whose father was at the 25th percentile rank could expect to rise by 13 percentage points around the year 1550, but by the beginning of the nineteenth century, a son with a father at the same rank could expect to rise 20 percentage points, reaching the 45th percentile rank instead of the 38th.

Robustness

This section addresses robustness with respect to the measurement of status. Next, I consider 23 instead of 6 status categories. I also recode

[33] All cohorts are included except for the first cohort, which is defined as sons born before 1575, and the last cohort, which is defined as sons born after 1825. Using equal windows of 25 years means that the number of father-son pairs in each window varies; I give each β_c equal weight when constructing the confidence intervals. Reported are results for cohort-by-cohort regressions; thus, from one cohort to the next, both mean son status (intercept) and the influence of father status (slope coefficient β_c) are allowed to vary.

[34] Similar results are obtained when observations with estimated vital data are distinguished from those observations in the genealogy for which vitals are not estimated.

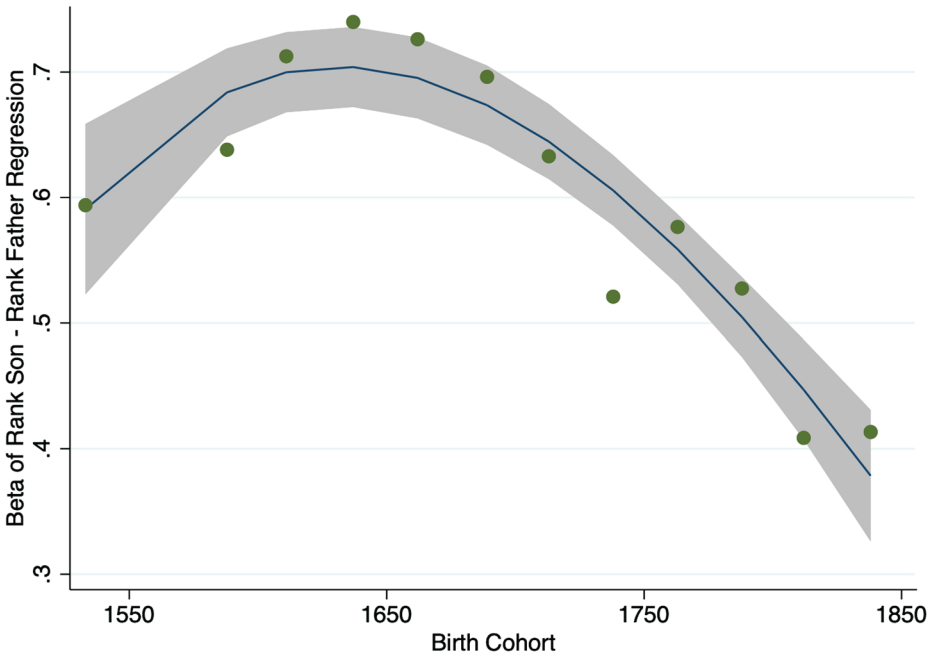

FIGURE 4
INTERGENERATIONAL MOBILITY OVER TIME

Notes: Shown are β_c coefficients from OLS regressions of percentile rank son on percentile rank father (Equation (1)). Ten 25-year birth cohorts (1575 to 1825), plus birth cohorts before 1575 and after 1825. Each cohort coefficient is given equal weight in the construction of the confidence intervals (90 percent). Median birth year of son in cohort is given on horizontal axis. Earliest son birth year in sample is 1330, latest son birth year is 1885.
Source: Author's calculation as described in text.

status categories in multiple ways to account for potential changes in their definitions over time. One change noted in the literature, for example, is that in the later period of the sample, a relatively higher number of lower-level degrees (*shengyuan*) were awarded, which could have diluted the status of *shengyuan* degree holders. A second set of results estimates mobility over time while controlling for potential misspecification through changes in fertility, longevity, and other factors that might affect mobility.

MEASUREMENT OF STATUS

Table 7 considers four alternative specifications to examine the robustness of the finding that mobility increased over time. Since the focus is on the change in mobility over time, to limit the number of reported results,

TABLE 7
CORRELATION OF BASELINE RESULTS WITH ALTERNATIVE SPECIFICATIONS

	Income Definition				
	(1) 23 Groups	(2) Moderate Family Wealth	(3) Lower Rank Officials > 1786	(4) Measurement Error	Average
Relative Mobility β	0.996	0.820	0.966	0.950	0.934

Sources: Table gives correlation between the mobility measure of the baseline specification with four alternative specifications, as described in the text; 12 birth cohorts.

I show only the correlation across birth cohorts with the baseline relative mobility finding shown in Figure 4; see Columns (1), (2), (3), and (4) of Table 7.

First, Column (1) gives estimates that come from employing 23 status categories instead of just six categories.[35] Table 7 shows the estimated regression coefficients β_c from the disaggregated approach with 23 categories correlated with the corresponding baseline β_c with 6 categories. The correlation is 0.996. This suggests the aggregation level of lifetime income does not play an important role in the result showing that mobility has increased over time.

Column (2) recodes the status of the sons and grandsons of relatively high-status men. In the baseline, these men are assigned some status, even if they did not earn any degrees or titles themselves. Within the historical context of Ming-Qing society, individuals from such families would typically have received some education and, even without formally earning a degree, would not be considered commoners. However, their exact status remains somewhat ambiguous. I explore how the results change if, instead, these individuals are placed in the lowest status level.[36] Results indicate that recoding status in this way does not greatly change the main finding of an increase in mobility over time (correlation of 0.82 with results from the baseline, Column (2) of Table 7).

Column (3) of Table 7 explores how the results would change if the status of certain categories changed over time. In particular, some accounts indicate that the status of lower-ranked officials declined in the later part of the sample period. Thus, I recode the status of men whose fathers received a lower-level degree (*sheng-yuan*) to level 0 (instead of level 1 in the benchmark) after the year 1786, and men who were

[35] These 23 status categories are shown in Online Appendix Table A.4.

[36] In particular, individuals in level 3 of Online Appendix Table A.4 are allocated to level 0 rather than level 1 in the six-level classification of Table 1.

sheng-yuan themselves are demoted to level 1 (from level 2 or 3) after 1786. We see that accounting for the potentially lower status of lower-ranked official degree holders in the later part of the sample leads to similar results on mobility over time (correlation of 0.966 with the baseline results, see Column (3), Table 7).

Also, I explore the role of measurement error in the definition of status. In particular, classical measurement error in the independent variable would lead to attenuation bias and an underestimate of the β_c coefficients (overestimating mobility). To investigate whether this type of measurement error might play a role in the finding that mobility increased over time, I introduce additional measurement error in father income. Results are shown in Column (4) of Table 7. The introduction of measurement error with mean zero and a standard deviation of 0.5 does not change the key finding that mobility was increasing over time (correlation with baseline measures of mobility over time of 0.950, see Column (4) of Table 7).

Overall, these checks suggest that the increase in mobility over time documented earlier is a robust finding.

CHANGING IMPORTANCE OF OTHER FACTORS THAT AFFECT STATUS

The analysis noted earlier showed that mobility increased over time. In this section, I examine a range of alternative explanations that could have influenced these mobility patterns. Since the variables used in this section are often associated with wealth—wealthier men tend to purchase degrees, marry multiple times, and have more sons—this section allows us to check whether alternative definitions of income, which rely less on education and official titles, produce the same trends in mobility over time.

I extend Equation (1), estimated cohort by cohort, to include a characteristic of cohort c and father-son pair i, denoted by $Z^c(i)$:

$$R_S^c(i) = \alpha + \beta_c R_F^c(i) + \theta_c Z^c(i) + \varepsilon^c(i), \forall c, i. \quad (2)$$

The estimates described earlier demonstrated that when factor $Z^c(i)$ is not included, estimates of β_c are higher in earlier cohorts than in later cohorts (i.e., mobility is increasing). It could be, however, that increases in mobility simply reflected omitted demographic factors, such as changing numbers of sons, family size, or gender ratios that could impact marriage patterns. In addition, it is possible that events such as wars or famine, which disrupted the health or longevity of parents in the later

part of the sample, played a role in changing mobility patterns over time. Also, some degrees could be purchased, especially in times when state revenues fell short, and these could have offered a new avenue for the persistence of status between fathers and sons. Further, since participation in the civil service examination was only open to males, variation in the ratio of daughters to sons could influence the fraction of children in a given cohort that earned degrees, potentially influencing mobility measures.

The first specification in this section includes the number of sons in cohort c as variable $Z^c(i)$ on the right-hand side of Equation (2) in order to proxy for fertility. If there is selection on fertility over time in a way that is correlated with mobility, the estimates of β_c will be different, depending on whether fertility appears on the right-hand side. A sufficiently strong effect could eliminate the finding that mobility increased over time.

Figure 5 on the upper left shows estimates of β_c that include fertility as variable $Z^c(i)$ in Equation (2) using " ×" as the symbol, and it also shows the trend line of these estimates over time. In addition, the panel shows hollow squares for estimates of β_c that do not include a variable $Z^c(i)$. The difference between the two sets of β_c estimates indicates whether time-varying fertility trends play an important role in the finding that mobility has increased over time.

Similarly, the remaining five subpanels of Figure 5 show results for five alternative factors $Z^c(i)$. This includes the number of wives per married man ("Multiple Women"), and an indicator that a man was the first-born male of his parents ("Son first-born"). The number of wives variable captures changes in marriage behavior and sex ratios, while differences in the shares of first-born males may be associated with changes in mobility because parental investments into first-borns tend to be higher than for other children. If the cross (×) and square symbols are closely overlapping for a given birth cohort, the factor under consideration is relatively unimportant in affecting intergenerational mobility. Results in the lower part are for the (i) prevalence of "Purchased Degrees," the (ii) "Share of Daughters" among the children, and (iii) "Lifespan" (death year minus birth year) of males.

Figure 5 shows that these six factors vary in their importance for social mobility. Most of the time-varying factors are relatively unimportant, except for purchased degrees and the number of wives per married man, where the difference between the cross and square symbols is larger. Furthermore, some factors have the same qualitative influence on mobility across all cohorts, while for others the influence is changing over time.

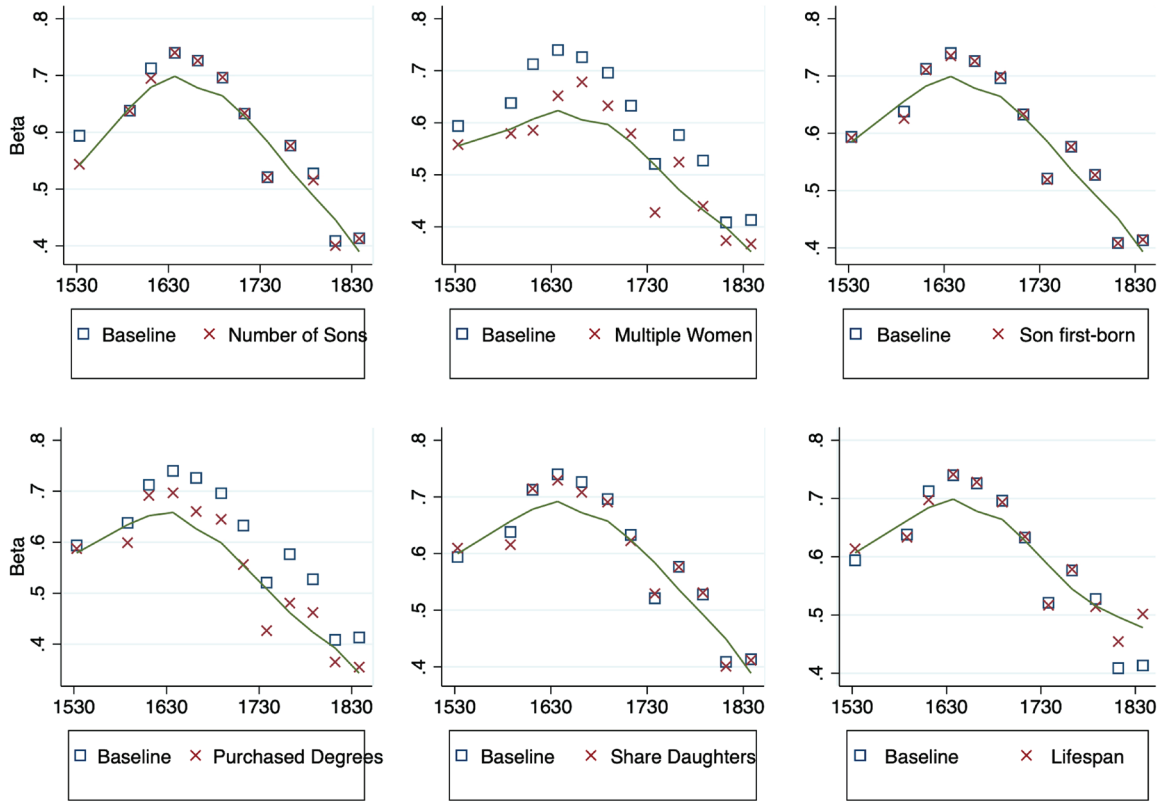

FIGURE 5
SELECTION ON OTHER TIME-VARYING FACTORS

Sources: Results from estimating Equation (1) and Equation (2), respectively; line is lowess smoother of the particular robustness check.

For example, controlling for multiple women in the household always increases mobility (lower β_c, upper center) for every temporal interval, while controlling for lifespan can both increase and decrease estimated mobility (lower right panel).[37]

While there are interesting differences among the various factors, the six panels of Figure 5 indicate that the finding of increasing mobility over time is robust. The difference between the highest estimate of β_c around the year 1630 and the lowest estimate of β_c around the year 1830 is larger than 0.2 and typically about 0.3, no matter which other time-varying factors are controlled for. Overall, Figure 5 indicates that accounting for possible selection on other time-varying factors does not alter the finding that intergenerational mobility in Tongcheng County increased over time.[38]

THE ROLE OF THE CLAN FOR THE INCREASE IN MOBILITY OVER TIME

A high-ranking descendant of the clan would presumably benefit the clan as a whole. Thus, even if the father did not have official titles or degrees, it might be that other members of the lineage did. For example, if a person had an uncle who was an official, and if we allowed the uncle to proxy for the role of the father, we might find a higher correlation across generations than if we just used fathers and sons. In the case of lineage-based societies where clan members would often act as a cooperative unit (in contrast to individual nuclear family units), it might be useful to adopt a broader conception of the notion of mobility in order to account for the contribution of the lineage to the mobility between father and son.

I examine the evolution of social mobility over time based on estimates with and without clan fixed effects, along the lines of Equation (1). Notice that the inclusion of clan fixed effects tends to reduce the estimates of the intergenerational coefficients (Figure 6). The relatively greater social mobility estimated within clans means that between-clan

[37] I have also explored whether "son status" is affected by having a concubine mother; one might assume that given the relatively low status of a concubine, her sons might receive fewer resources in the household compared to other sons. I find some evidence that given father status, the status of sons tends to be somewhat lower when the share of concubine mothers is high; however, quantitatively, the effect is small relative to the increase in mobility over time.

[38] Another concern one might have involves the timing of the final compilation of the genealogy; for example, a form of recall bias could take place if father-son status information is recorded less accurately for genealogies with a relatively late final compilation date. Exploring this issue, I find that controlling for the year of compilation does not change the result that mobility increased over time. Additionally, the status of the "expectant official" might differ from those who were actually officials, in contrast to my treatment based on Online Appendix Table A.4 (see groups 14, 15, 19, and 21). However, exploring the role of expectant officials for mobility over time, I find similar results as in Figure 4 when expectant officials are separately identified as such.

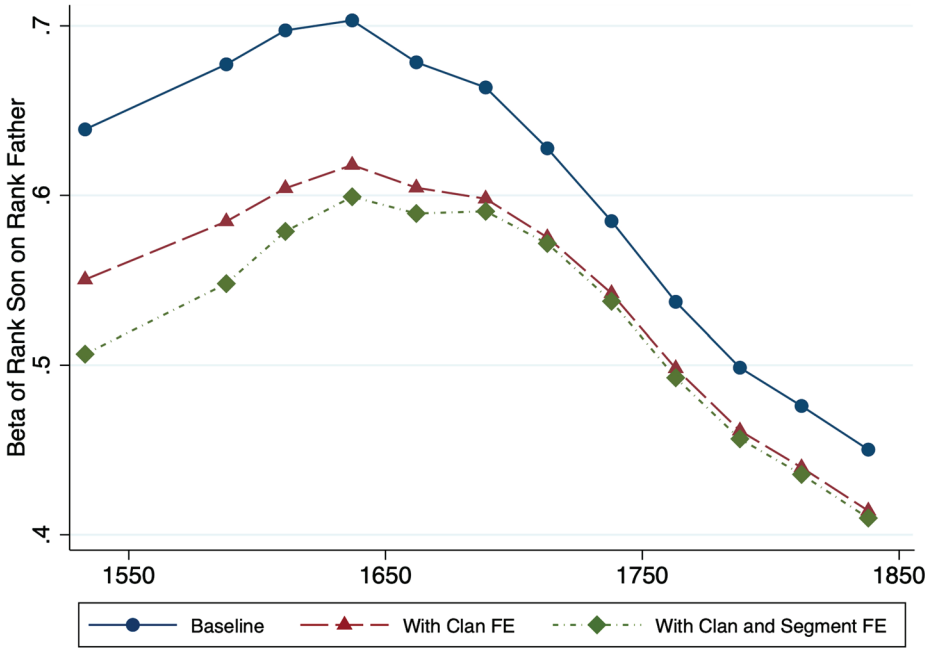

FIGURE 6
MOBILITY OVER TIME AND CLAN EFFECTS

Notes: Shown are β_c (Equation (1)) with and without clan fixed effects in the regression, as well as with clan and segment fixed effects. Smoothed β_c based on 12 birth cohorts (lowess running mean smoother). Horizontal axis shows median birth year in cohort; earliest birth year of son is 1330, latest is 1885.
Source: Author's calculation as described in text.

differences contribute to intergenerational persistence. This could be due to variation across clans in terms of resources, genetic endowments, or cultural traits. The result tends to confirm the *a priori* notion that status beyond the immediate household had an influence. At the same time, Figure 6 demonstrates that the increase in mobility between 1600 and 1850 remains robust even with clan fixed effects included in the specification. In other words, clan effects remain relatively consistent throughout the entire time period. Neither the intergenerational persistence observed in the earlier period nor the increase in mobility that emerged in the later period can be explained by changes in the impact of the clan. Furthermore, the finding of an increase in mobility over time is also obtained when (subclan) segment fixed effects are added; see the lower series in Figure 6. This indicates that potential differences in data characteristics at the subclan level do not drive the result.[39]

[39] The results underlying Figure 6 come from cohort-by-cohort regressions. As a consequence, clan and segment influences can vary arbitrarily over time.

EXPLAINING THE INCREASE IN INTERGENERATIONAL MOBILITY

This section highlights a number of important changes related to compulsory occupational registration as well as the institution of the civil service examination, which, taken together, plausibly affected mobility over time. To recap, the empirical pattern found so far shows that until the year 1700, mobility was relatively low, before increasing toward the end of the sample period (see Figure 4 and Online Appendix Figures A.5 and A.6). Furthermore, there is some evidence that mobility was lowest around the year 1650.

These empirical patterns are consistent with the timing of trends described in the historical literature. First, before the seventeenth century, there were formal barriers to occupational mobility. For example, occupational mobility was limited during the Yuan Dynasty (1279–1368) due to the way the state extracted labor services from the civilian population. To enforce these obligations, the state required households to be registered in segregated occupational groups—commoner, artisan, soldier, salt producer, miner, scholar, astrologer, and other categories. These occupational groups were hereditary and largely determined the position of an individual. The practice of compulsory occupational registration was carried over from the Yuan to the Ming (1368–1644) Dynasty. By the latter half of the Ming, however, the hereditary nature of the categories had started to break down. The biographies of exam candidates of the Ming period show that the family backgrounds of some *jinshi* degree holders included occupational status designations—soldiers, army officers, horse breeders, medical officials, and official cooks—that were not previously allowed to participate in the civil service examinations (Ho 1962; see cite to Li 1746).

Second, as argued in Naquin and Rawski (1987), fewer institutionalized and legal barriers to mobility were consistent with the increasing commercialization of the eighteenth century compared to earlier centuries. The hiring of workers for a wage had likely become a more efficient way to find workers compared to the old system of compulsory labor service. While aspects of the older practice of hereditary occupations were still present, occupational mobility increased as the Ming state could afford to be lax in enforcing labor obligations. For example, the Ming state resorted more frequently to paying wages for desired services rather than extracting labor. The Qing state discontinued the practice of family occupational registration altogether, by which time there were no effective legal barriers to mobility due to any pre-designated occupational

status of the family (Ho 1962). As Mann (1991, p. 206) remarks: "Surely the most striking development with respect to mobility in the mid-Qing era was the series of imperial edicts eradicating the final remaining hereditary class barrier in Chinese society."

Third, the pool of men eligible for the civil service examinations expanded as the national civil service examinations became more routine in nature, and over time, regional quotas for the various academic degrees became less discretionary. While sumptuary laws had previously restricted commoners from taking the civil examinations, these laws were eliminated in the later part of the Ming Dynasty (1368–1644). The effect of lifting occupational restrictions and hereditary privileges is the basis for Ho's (1962) argument that entry into higher-status groups was newly possible.

By the start of the Qing in 1644, the only types of hereditary privileges and automatic status that remained belonged to the imperial dynasty, where the throne was passed from the emperor to one of his sons, and the leading families of the Eight-Banner system. Despite the fact that some members of the elite and high-ranking officials of the state had long been selected on the basis of examinations (already in the Song Dynasty, 960 AD), candidates had been selected in a discretionary fashion, which in turn restricted access to high-level degrees. With the start of the Qing Dynasty in 1644, the state relied more heavily on the civil service examinations to test a candidate's knowledge. The shift to a more rules-based system reduced uncertainty regarding the returns to human capital investments by making them more predictable.

The empirical results in this paper demonstrate that the trend toward higher intergenerational mobility in Tongcheng starts around the year 1700, and by the 1800s, the β-coefficient has fallen by about 20 percentage points to around 0.45. Ultimately, however, since the Chinese state was the largest employer of the recipients of higher degrees, the decline in the return to higher levels of human capital was driven in part by a decline in state fiscal capacity (see Online Appendix Figure A.7). Furthermore, there was a crowding-out effect because despite the substantial increase in population, the number of high-ranking official positions did not proportionally increase. All else equal, an increase in the number of competitors in the state exam reduces the *ex-ante* return to human capital investments. With more competitors, an individual would need to invest more to keep the same expected probability of achieving a particular degree or position, thereby reducing the net return.

Although there is no systematic evidence that the nominal return from holding a certain rank or position fell over time, the change in the

officials' lifestyle and spending patterns, based on information from biographies, clan genealogies, and gazetteers, is consistent with a decline in the expected return from human capital investments. Anecdotal evidence points to how the generous allowances official students during the Ming Dynasty received in the form of food (two bushels of rice), cotton and silk cloth, embroidered silk cloth, sets of clothing, headgear, and boots, as well as travel money to go home to visit family, had fallen away by the Qing Dynasty, when students received only a minimal grain stipend and tax exemptions from the state (Ho 1962).[40] Moreover, income derived from teaching fell over time. Men who passed the lower-level exams but repeatedly failed to pass the intermediate or higher exams could not obtain an official position, with the result that many of these individuals resorted to a livelihood as schoolteachers. Toward the end of the Qing, the income from teaching was so low that in some cases teachers could not sustain themselves on teaching alone, forcing them to take up other tasks (Chang 1962; Ho 1962). Teachers' real wages were lower in the nineteenth century compared to the earlier Qing period (Rawski 1979, figure 1).

Thus, various types of descriptive evidence all point to a decline in the return that could be expected from human capital investments in the later period of the Qing. This history is consistent with the trends toward greater mobility. Next, I show that the higher level of mobility over time was accompanied by lower levels of inequality across households. This provides additional evidence that mobility increased due to a decline in the return to education.

Does the "Great Gatsby" Curve (Krueger 2012) Exist over Time?

Additional evidence on the importance of changes in mobility comes from asking if there is a relationship between mobility and inequality. Historical accounts describe such trade-offs at the clan level. For example, Brook (1990) describes elite families as essentially facing the choice between harboring the resources of the family in order to channel them toward investments for their own sons in the next generation, or alternatively, sharing those resources in the current period with their poorer fellow kin.[41] In the workhorse model of intergenerational investments

[40] For further details on this and other evidence on human capital returns in the Ming and Qing, see Shiue (2017).

[41] Conceptually, the former strategy creates less mobility (and less equality), whereas the latter strategy leads to more equality (and more mobility).

due to Becker and Tomes (1979, 1986), a decline in the return to education will, in fact, lead to a decline in inequality. This is because when human capital returns are low (high), parents have more incentives to channel resources away from (toward) child investments, which in turn results in increased (decreased) intergenerational mobility and less (more) inequality over time.

To investigate if increases in mobility occurred with decreases in inequality, consider the Theil (1967) index, a well-known measure of inequality. Lower values of the Theil indicate less inequality, or equivalently, more equality.[42] It is defined as

$$T_c = \frac{1}{N_c}\sum_{i=1}^{N_c}\frac{R_F(i)}{\mu_c} ln\left(\frac{R_F(i)}{\mu_c}\right), \tag{3}$$

where $R_F(i)$ is the percentile rank status of the father in father-son pair i belonging to cohort c, μ_c is the average percentile father rank in cohort c, and N_c is the number of fathers in cohort c, $c = 1, ..., 12$. The circles (fitted with a solid line) in Figure 7 show the intergenerational mobility of sons in the different cohorts; for each of these cohorts, the figure also shows a triangle (fitted with a dash-dot line) that gives the cross-sectional income inequality observed in the father's generation.

Figure 7 shows that times of relatively high inequality are times of high β_c (low mobility). Intergenerational coefficients of 0.6 and above before the year 1700 are found when the Theil index is equal to 0.12 and higher. By the year 1850, when β_c has fallen to 0.45, the Theil index is lower as well. The correlation between the intergenerational coefficient β_c and T_c is 0.77.

In sum, the evidence suggests that the estimated increase in social mobility is due to a decline in the return to human capital. This evidence is further strengthened by the simultaneous decline in inequality, which, in economic models of intergenerational investments, is a key implication of a lower return to human capital.

CONCLUSIONS

Understanding temporal changes in mobility can usefully reveal information about the fundamental drivers of mobility differences. The findings in this paper are based on a group of approximately 40,000

[42] The Theil index is a well-known member of the single-parameter Generalized Entropy Class indices; I chose it in part because it is additively separable. See Bourguignon (1979) and Shorrocks (1980) for overviews of inequality measures. Similar results over time are obtained with other measures of inequality, such as the Gini index.

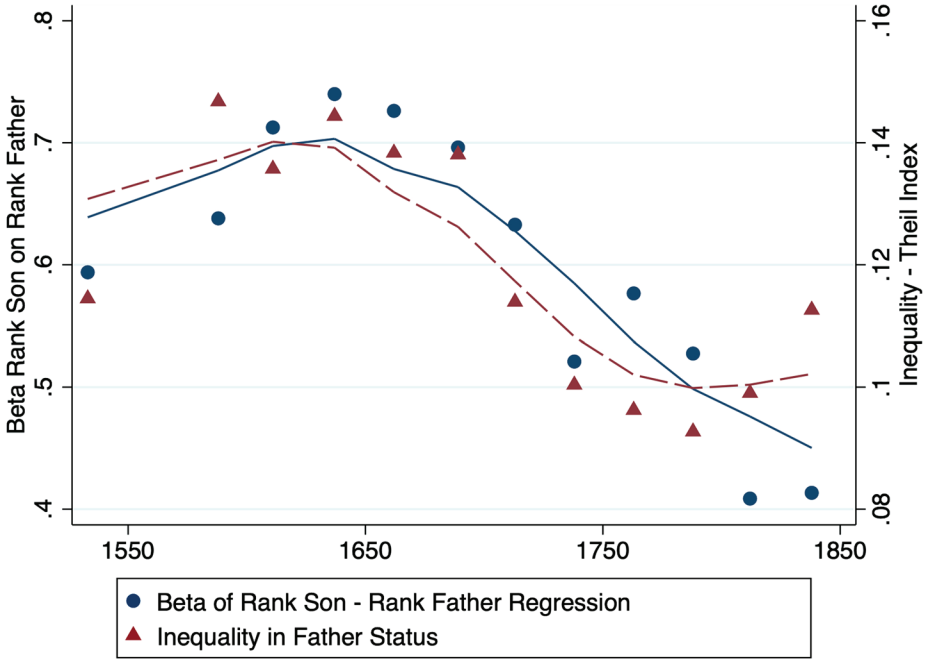

FIGURE 7
MOBILITY AND INEQUALITY: GREAT GATSBY IN THE TIME SERIES

Notes: Shown are β_c and the Theil index (Equation (3)) of status in the father generation for 12 birth cohorts. Earliest son's birth year is 1330.
Source: Author's calculation as described in text.

individuals who resided in Anhui Province between roughly the years 1300 and 1900. The population sample has been targeted to be representative of the lower Yangzi population of China of the late imperial period. By focusing on closely related families residing in the same region, we can better understand mobility changes at the individual or family level. For this sample, with a median year of observation around 1780, I estimate an intergenerational regression coefficient of about 0.5, suggesting that any parental advantage is halved in the generation of the children.

A main finding is that intergenerational mobility in Tongcheng changed markedly over time. Although mobility was relatively low before the late seventeenth century, with intergenerational coefficients estimated at around 0.7, I document an increase in mobility through the eighteenth and nineteenth centuries when intergenerational mobility coefficients dropped to below 0.4. The long time horizon in the data is critical for being able to observe these changes since mobility is slow-changing, requiring several generations to observe substantially different mobility levels.

The increases in mobility seem plausible in light of the social and institutional developments that took place over the Ming-Qing period. These include the elimination of hereditary occupations, the increase in commercialization, and the changes in the return to human capital. The argument that mobility increased is also strengthened by the finding that cross-sectional inequality and persistence are correlated, as most formal frameworks would predict.

Although the focus of this paper was not comparative, in future work it would be interesting to compare the documented level of intergenerational mobility with that of other regions of China and other countries. Unlike Germany, Sweden, and the United States, by the nineteenth century, the Chinese economy was not moving toward sustained modern economic growth. Additionally, while some European nations developed government-sponsored welfare systems, social security in China was rooted in the local community and family ties. The relationship between mobility, inequality, and economic growth would appear to be a fruitful avenue for future research.

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