Elite Strategies for Big Shocks: The Case of the Fall of the Ming*

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Abstract

This paper employs unique genealogical data to study skill acquisition decisions over seven generations as people in a Central Chinese county responded to the fall of the Ming dynasty. The setting allows us to focus on the responses of interlinked families, rather than on conditions in the places in which they live. The shock reduced China's overall population by some 16%, a scale of destruction mirrored in Central China. Exploiting variation in destruction levels across villages within Tongcheng, we show that the shock drastically lowered the status of elites–being high-ranking scholar-officials– that experienced the shock first-hand in their lifetimes. And yet, the impact on the elites reversed: from the third to the fifth generation, descendants of first-generation men who suffered the heaviest losses acquired disproportionately more elite status than descendants of those that suffered less in the first generation. We argue that trauma associated with the loss of land and property led to a stronger focus on the relatively portable skills of scholar-officials, and this change in attitudes was transmitted within families from generation to generation. Evidence comes from finding that sons benefit more strongly from the skills of their elite fathers among first-generation treated compared to control family lines. In addition, this difference exists to a greater extent after than before the shock. Migration is crucial for this reversal in skill acquisition. Comparing historically destroyed with not destroyed regions instead of treated with control

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family lines, we find fewer elites in the former, which is because families that outmigrate after the shock tend to invest disproportionately into elite skills given their relatively young age and affluence.

Keywords: Intergenerational Transmission, Persistence, Migration, Cultural Norms, Institutions

1 Introduction

Originating approximately in 600 AD and abolished only in the early 1900s, China's imperial examination system (*keju*) is among the world's most enduring institutions. Yet, little is known on why this institution lasted as long as it did. This paper studies the fall of the Ming dynasty (1368-1644) to the Qing (1644-1911) to better understand what makes institutions persist rather than change. Often, the sources of institutional persistence are shrouded in mystery because data giving a paper trail of the chain of events does not exist. Using genealogical data from Central China, this paper seeks to make progress by examining the strategies that families adopted to the fall of the Ming as they sought to protect and re-gain elite status under the Qing over more than three centuries.[1]

Through warfare, famine, and disease, the fall of the Ming cost the lives of some 36 million, or one in every seven Chinese people. This ranks high among the largest human catastrophes in world history. Our sample consists of the histories of seven clans in a single county, Tongcheng (Anhui province), exploiting village-level variation in destruction to estimate the shock's causal impact on elite attainment. Passing the exam to become scholar-official was the main path into the elite in China's primarily agricultural economy during imperial times.[2]

Four hundred-ninety sample couples witnessed the fall of the Ming in their lifetime. We define a family as exposed to the shock (treated) if during the fall of the Ming the family resided in a heavily destroyed region of Tongcheng county. Control families lived in less destroyed regions. This treatment assignment is carried forward to each family's subsequent four generations, yielding roughly 8,000 observations on husbands and wives (1,600 different family lines each observed for 5 generations). We refer to this as treatment of people. Figure A.3 illustrates this treatment of people. It allows to examine the behavior of subsequent generations who did not live through the shock, but were descendants of people who did. The response of intergenerational family lines to treatment is something on which relatively little is known.

We also consider the difference in elite attainment in historically treated versus control villages. Such place-based differences are commonly analyzed, and we refer to it as treatment of regions. Importantly, treatment of regions and treatment of people are not the same to the extent there is migration. In our

[1] Institutions are defined in this paper as constraints on human behavior and a framework for coordinating expecations (Acemoglu, Egorov, and Sonin 2021); see also North (1990).

[2] Chinese clans are also referred to as lineages or common-descent groups.

setting, we can compare treatment of people with treatment of regions because each family's residence information permits to account for migration from one generation to the next.

We find that among men living during the fall of the Ming, in the first generation, those residing in treated regions had a lower chance to attain elite status than those in control regions. This is to be expected given that wars and famines would make it difficult to acquire the skills necessary to pass the exam. Moreover, the impact is economically important: for every ten control men who enter the elite, there are only about seven treated men who did so. We also show that the shock reduced the chance that a couple's son is able to marry and thus form the next generation in the first place.

In addition, even in the fifth generation, the fall of Ming has a significant impact on entering China's elite. With about 34 years between one generation and the next, typically the fifth generation was alive 170 years after the fall of Ming, and in some family lines the fifth generation only arrives three hundred years after the shock. These results are consistent with deep historical roots for economic development.

The impact on elite attainment is not monotonic in time, rather, there is a reversal. Losses in the first generation turn into gains starting in the third generation. Moreover, cumulatively over five generations, treated men attain elite status to a greater extent than control men despite heavy losses in the first generation. Clearly, first-generation losses did not discourage these family lines to pursue scholar-official careers. Our analysis demonstrates that the long-run impact of a shock might be quite different from a faded version of the shock's short-run impact.

Key to the strong elite attainment performance of the treated are families with ancestors that were elites already under the Ming dynasty. Thus, rather than the shock producing a clean slate, elite positions under the Qing tend to be re-captured by the same families that were elites also under the Ming. At the local level, the transition from the Ming to the Qing, two dynasties that are ethnically and geographically different, is a story of elite persistence.[3]

Distinguishing treatment of people from treatment of regions is important because the fall of the Ming has qualitatively different signs on the two. Over five generations the cumulative treatment of regions impact is negative, in contrast to the cumulative impact on people which turns positive after the third generation. Central are choices of the second-generation families, the children of those experiencing the

[3]Ethnically, the Ming was Han while the Qing dynasty was Mongol. The geographic locus of power of the Qing was the North while it was the center-south for the Ming.

shock firsthand. Outmigrating from destroyed regions facilitates a scholar-official career, and families that outmigrate tend to be relatively young and affluent. In this sense, we show that selective migration reconciles the estimated difference beween treatment of people and treatment of regions. At the same time, regional destruction does not influence elite attainment beyond the second generation: starting in the third, elite attainment is primarily determined by whether a family line is treated or not, irrespective of the historical destruction of the region in which the family line currently lives.

Critical to estimating the shock's causal effect is that outcomes of families living in heavily destroyed areas, as opposed to those of families in less destroyed areas, would have followed the same trends in the absence of treatment. However, some families might have foreseen to a greater extent which areas of Tongcheng would be particularly dangerous in case the Ming falls, or they could have protected themselves better than other families. To shed light on whether differences in post-shock elite attainment might simply be the continuation of pre-shock differences between treatment and control observations, we employ information on the two generations *before* the shock, going back to the early 1500s. Consistent with quasi-random assignment of treatment, we do not find evidence for large differences in elite attainment of fathers and grandfathers in the first-generation treatment and control samples.[4]

We then turn to the mechanisms behind the Tongcheng families' strategies to attain elite status. Historical evidence is consistent with increased incentives to become scholar-official during the Qing, due to civil service exam improvements, the abolishment of tax exemptions for land owners, and because families felt that a scholar-official career would be more righteous than land-based wealth.[5] While these factors played a role, by and large they applied to all families in Tongcheng, and hence they cannot account for the estimated difference between family lines that were treated versus not treated in the first generation. An explanation that does account for this difference, in contrast, is that first-generation couples in heavily destroyed areas experienced more trauma than other couples. Destruction in Tongcheng was certainly high enough to lead to trauma, and it may have shifted preferences towards a scholar-official career relative to land-based wealth.[6] Scholar-officialdom also has the advantage of being a relatively portable form of wealth that would make any future escape easier if necessary. We hypothesize that disproportionate

[4]In addition, the fall of the Ming is an attractive natural experiment to estimate long-run effects because Tongcheng (as well as China) did not experience other big shocks until the mid-19th century. Important events include the Taiping Rebellion (1850-64).

[5]Local unrest in the Tongcheng area was triggered in part by resentment to absentee landlordism and that landlords often used their influence to avoid taxes in the early 1600s; see also section x.

[6]Section x provides more infomration on the conditions in Tongcheng during the Ming-Qing transition.

trauma for first-generation treated couples led to a stronger emphasis on becoming scholar-official that treated family lines transmitted from one generation to the next through the numerous ways in which parents shape the preferences of their children.

Given that intergenerational transmission is key to this argument, we zero in on the intergenerational father-son relation and show that it was stronger in treated compared to control family lines. Well-known models such as Becker and Tomes (1986) predict that higher parental investments towards the skills of their children–increased emphasis by the parents that the son would pass the civil service exam–would be reflected in a higher intergenerational regression coefficient. Indeed, the intergenerational regression coefficient for treated sons is found to be higher than for control sons, indicating that treated sons benefit more from elite fathers than control sons. In addition, we consider absolute mobility. Treated descendants have higher upward mobility, that is, a treated descendant with non-elite father is more likely to enter the elite than a control descendant with non-elite father. Moreover, downward mobility in treated family lines is lower than in control family lines (a treated descendant with elite father is less likely to be non-elite than a control descendant with elite father). In addition, the difference between treated and control family lines after the shock is larger than before the shock, which suggests that local elites have changed their strategies from the Ming to the Qing to re-coup and even increase their hold on power.

We consider alternative explanations for the reversal, including that the shock has driven a wedge between treated and control families in terms of other dimensions, such as those on health and material welfare. While the data does not allow to fully distinguish these (correlated) factors, evidence for health or material well-being factors is weaker than for skill acquisition. Furthermore, we examine robustness using more similar samples that sharpen the focus of the treatment-control analysis, finding broadly consistent results.

The present paper relates to a large literature on the role of historical factors for long-run economic development. In particular, our time horizon is similar to persistence studies, which present evidence on the forces of development by correlating long past and more recent regional characteristics of economies (early work includes Dell 2010, Nunn and Wantchekon 2011; Nunn 2020 and Voth 2021 are surveys). Our contribution to this literature is largely twofold. First, instead of relating a historic event to economic variables many decades or even centuries later, our analysis of seven linked generations yields coverage over centuries at the same time when on average there is another longitudinal data point every thirty-

three years (the typical length of a generation). Additional data provides useful discipline given that relationships over centuries tend to be subject to several interpretations (Cantoni and Yuchtman 2021 discuss the related issue of historical contingencies).

Second, in virtually all persistence studies the key relationships are established using cross-regional variation. It is well understood that migration poses a challenge for exploiting cross-regional variation because it leads to sample changes that will typically affect estimated relationships.[7] Using data on residence for each generation, the present analysis is among the first to isolate the role of migration by comparing treatment of regions and treatment of people. We show that the distinction can matter because in the present case the long-run treatment of people effect is substantially less negative than the long-run treatment of regions effect, and furthermore, selective migration helps to reconcile the two forms of treatment. More broadly, while the analysis of regions is well established both for positive purposes (how statistical data is collected) and for normative purposes (place-based economic policies), our findings suggest that combining regional analysis with a "peoples" perspective may lead to additional insights.[8]

Building on research on the role of institutions for economic decision-making (North 199x, Acemoglu et al. 2005), a more recent literature has examined institutional political change and how actions of the elites may lead to institutional persistence (Acemoglu and Robinson 2008, Acemoglu, Egorov, and Sonin 2021). Our analysis complements other empirical findings of elite persistence with micro data, such as that former US slaveholders had disproportionately high wealth in the early 20th century (Ager, Boustan, and Eriksson 2022), and that grandsons of elites that lived in pre-revolutionary 20th century China are disproportionately rich themselves by the late 20th century (Alesina, Seror, Yang, You, and Zeng 2022). Our analysis is distinct in that our evidence is for a longer period of time. This is crucial because documenting that former Ming elites not only recoup but even surpass their earlier hold on elite status after the third generation indicates that political change may be a time in which the grip of elites on power actually strengthens.

The importance of attitudes towards a scholar-official career is in line with work on the role of culture for individual economic behavior (Alesina and Guiliano [?] Handbook chapter, others). In particular, the present paper complements research on the interaction of culture and institutions in economic development

[7] Voigtlaender and Voth (2012) provide evidence that migration dilutes persistence estimates.

[8] A number of papers have provided evidence on the importance of "people" versus "regions". Putterman and Weil (2010), e.g., show that early development indicators that reflect the history of a population's ancestors rather than the history of the place they live today improve the indicators' ability to predict current GDP.

(Bisin and Verdier JPE 2023). At a time when macro political change is mirrored by weakening local norms in Tongcheng, elites are able to hold on to power by changing local culture: putting more emphasis on righteous careers in which high status comes from passing the exam. Thus, the dynamics between culture and institutions can shed light on the mechanisms behind persistent effects (Persson and Tabellini 2021).

Moreover, it is well-known both that attitudes can rapidly change through trauma caused by a major shock (Rice and Robone 2022) and that they are intergenerationally transmitted (Bisin and Verdier 2001). This paper relates especially to research that highlights the role of family ties in determining fundamental economic attitudes (Alesina and Guiliano 2014), and intergenerational transmission of norms within families is important in settings ranging from Central Africa's 17th century Kuba Kingdom to Poles whose ancestors were expulsed from their home after World War II (Lowes, Nunn, .. 2017 and Becker, Grosfeld, Grosjean, Voigtlaender, and Zhuravskaya 2020, respectively). Our work is distinct by presenting regression evidence using micro data for five linked generations that the shock has caused a difference in career focus between treated and control family lines. The paper also sheds new light on the role of kinship relationships in China. Most of what is known to date concerns intra-generational kinship relationships, in contrast to the present paper which concerns intergenerational relationships among Chinese families.[9]

This paper is also part of a small but growing literature employing Chinese genealogical data to study long-run aspects of Malthusian responses, environmental-induced diseases, and social mobility (Hu 2023, Che 2023, and Shiue 2024, respectively).[10] Compared to research using official data in which intergenerational links are created ex-post, such as Abramitzky, Boustan, Jacome, and Perez (2021), the main advantage of Chinese family genealogies is that the analysis can begin several centuries earlier, while the main disadvantage is that samples are smaller. Key issues will be discussed below.

[CHECK] In the remainder of the paper, the following section 2 provides background on the Ming-Qing dynastic transition in general and what happened in Tongcheng county in particular. Section 3 summarizes the data and describes our approach to estimate causal effects. The main finding of an elite reversal over five generations is presented in section 4. The following section 5 shows using intergenerational analysis that the shock has led to a higher emphasis of attaining elite status among treated families that has been transmitted from generation to generation. Additional results based on samples that sharpen identification

[9] See Tabellini (2008) who argues that kinship-based relationships may eventually allow less economic cooperation than market-based relationships (so-called limited versus general morality). Greif and Tabellini (2017) present a comparative analysis between Chinese and Western organizational forms.

[10] Using related data for the period 1300 to 1900, Shiue (2017) examines changes in the child quantity-quality trade-off.

are shown in section 6, and some concluding observations are provided in section 7. The Appendix includes further discussion of the dataset, additional robustness checks, and it shows that the shock also led to shorter family lines by reducing the probability that a son would marry.

2 The Fall of the Ming

2.1 General Developments in China

Several factors contributed to the collapse of the Ming dynasty in the mid-17th century. They include a decline in the fiscal accounts of the state that was hastened by corruption within the state and military and the increasing expenditures of the imperial court. A series of natural catastrophes in the late 1620s and 1630s increased the price of grain, leading to famine, epidemics, and crises (Brook 2010). International affairs played a role as well. Prior to the 1630s and 1640s, about half of the silver mined in Japan and the New World ended up in China, but by the end of the Ming, ongoing military campaigns and an international economic depression led to a shortage of silver in China, which, according to some analysts, was associated with increased demand for taxes and economic depression in China. These downturns were compounded as banditry increased, and as Ming and Qing armies fought to win control over the empire. Finally, climatic conditions contributed to the fall of the Ming (Lee and Zhang 2013).

Throughout China's history, dynastic transition usually entailed violence and political fighting, but even by these metrics the end of the Ming Dynasty in 1644 was an exceptionally devastating interlude. Ge (1999) estimates that during the Ming-Qing transition, population dropped from 221 million in the year 1630 to 185 million in 1680 (see also Cao 2022). In the twenty years between 1626 to 1646, China experienced a reduction of more than 11% of its population (Lee and Zhang 2013). Other sources hold that the fall of the Ming Dynasty began with the campaign of the Jin khan Nurhaci against the Ming that resulted in the capture of Fushun (Liaoning province) in 1618. Irrespective of the particular source, the fall of the Ming ranks among the largest negative shocks in world history, especially among those not caused by a pandemic.

2.2 Destruction in Tongcheng[11]

During the final decades of the Ming dynasty, Tongcheng county witnessed many local uprisings. One of them, by the former serf Chang Ju in 1634, led eventually to the attack on Tongcheng's capital town and initiated ten years of violence, bloodshed, and devastation. Moreover, Tongcheng county became a battleground as it was located directly in the path of the Qing armies of the north-west, notably that of Chang Hsien-chung (the so-called butcher of Sichuan), as they pushed agains Ming armies that sought to defend their dynasty from the South. As a consequence, there was a "succession of sieges and battles, the comings and goings of government and rebel troops [...], famines, and plagues", and during this period almost all rich families had their property burned and plundered (Beattie 1979a p.45).

One common response to the fall of the Ming turmoil, especially by the relatively wealthy, was to flee. Taking advantage of the fact that Tongcheng is located just north of the Yangzi river, as early as 1636 many of Tongcheng's residents had fled south across the river, and by 1642, more than half of Tongcheng's high-status population was gone. Another common response was to move to the capital city of Tongcheng, which was protected by a city wall since 1576. By 1642, the siege of this city by Chang Hsien-chung and his army meant that the city's wells were polluted, pestilence was spreading, and food was in such short supply that people were reduced to eating the flesh of corpses. When the situation further deteriorated, the people in the city were preparing to kill themselves if help did not arrive. Troops of the Manchu conquerors (the Qing) finally arrived in 1645, which stopped the situation from further deteriorating.

Accounts of Tongcheng in 1645, after peace returned, suggest conditions were desolate, with a huge loss of life and laying waste of land. According to some estimates, in a single year 160,000 people had been killed, and by 1643 it was said that 70-80% of the cultivated land of the county had been devastated (Tongcheng 1827).[12] While there is little question on the scale of destruction during the fall of the Ming in Tongcheng, the long-run impact of the shock on the economic fortunes of Tongcheng remains far from clear.

[11] See Beattie (1979a), pp. 43-48, as well as three editions of the local gazetteers of Tongcheng: Tongcheng (1490; 1696; 1827).

[12] The officially registered population of Tongcheng county fell by 57% between 1631 and 1645 (Beattie 1979a, page 133). Tongcheng population levels are considered to be underestimates because after the 1383 census Tongcheng population growth was undercounted, as was true elsewhere in China. However, the *change* in population between 1631-45 gives some evidence on the magnitude of the fall of Ming shock.

2.3 Loyalities, Land, and Elite Status[13]

This paper contrasts the strategies of Tongcheng families that resided during the fall of the Ming in more versus less destroyed locations (treatment versus control). Evidence will be presented that treated families exhibited a stronger focus on attaining elite status as the result of the shock. The following describes key features of the general setting in Tongcheng at this time as they applied to all families, both treated and control.

2.3.1 To Support the Ming or Support the Qing?

One factor that could influence how individuals fared during the Ming-Qing transition might be whether they welcomed the new rulers or not. In some regions not far from Tongcheng, for example in Yangzhou (Jiangsu), Manchu and defected Han Ming soldiers committed mass killings of residents both as punishment for participating in resistance efforts and to teach a lesson of what happens to those who resist to the Qing. In Jiangyin (Jiangsu), the 1645 Qing hair dress code –"either you lose your hair or lose your head" – inflamed the sentiment of local Han people so that they heroically defended the walled city against the siege of Qing troops. What about Tongcheng–are there any signs of comparable resistance?

By the late 16th century, Tongcheng county was home to a number of government officials at various levels of government, which in itself would create apparent loyalities to the Ming dynasty. At the same time, loyalities to the Ming were diminished because Ming troops tasked to defend Tongcheng depleted local grain resources, causing people to live in constant fear of famine as Ming troops pillaged scanty grain supplies. Also, the Ming government did not support local miltary defense efforts, because in Tongcheng as elsewhere in China Ming authorities were reluctant to let military power slip into the hands of local elites (Wakeman 1971).

Furthermore, no reaction to the July 1645 hair-cutting edict is recorded for Tongcheng, the new rule that is considered more than any other act as a sign of utter submission to a barbarian regime. Overall, in terms of loyalities for the Ming versus Qing, the behavior of Tongcheng's population (including its elites) was primarily characterized by shifting alliances and collaboration instead of outright resistance.[14]

[13] See Beattie (1979b) and Tongcheng (1827).

[14] While we do not information on the allegiance of specific clans in the sample, our treatment versus control definition typically cuts within clans in the sense that some members of a given clan are treated while others are part of the control sample.

2.3.2 Local Triggers of Discontent

In the prelude to the fall of the Ming, Tongcheng witnessed years of internal warfare which pitched not Ming loyalists against Qing supporters but certain factions of Tongcheng against each other. To some extent the conflict was between elites on the one and small-scale tenants and (former) serfs on the other side, or, between rich and poor. The relative welfare of the rich is a likely determinant of human capital acquisition because it is these elites who command the resources needed to consider the path to official position by participating in the civil service exam.

Local histories indicate that one reason for the internal warfare in Tongcheng before 1644 was that the social contract that existed throughout much of the Ming between more and less affluent parts of the population was increasingly broken. Large landowners and other local elites started leading an extravagant lifestyle and became absentee landowners by moving to Tongcheng capital. The rich looked increasingly after their own narrowly defined self-interest. One example is the 1581 attempt by the county magistrate to re-survey Tongcheng's cultivated land acreage, which would have led to a new and more uniform scheme of converting actual to fiscal area. Because this would have harmed disproportionately the rich, powerful landowning interests organized protests upon which the project was abandoned.

Furthermore, local elite families used their influence to extend the landholding tax privilege of their degree-holding to other members of their families. Subsequently, this tax avoidance triggered successive increases in land taxes which were borne by the remainder of the population, who were less able to escape these taxes. By the 1620s, social tensions had risen, and it has been argued that the elite's selfish and disruptive exploitation of excessive tax privileges had not only drastically eroded the foundations of the Ming fiscal system but also helped bring about social chaos at the end of the dynasty.

2.3.3 Developments After the Fall of Ming

Even though the new Qing rulers had a different ethnicity than the Ming rulers (Mongol, not Han) there was a considerable degree of continuity in the matters of state administration. For one, the civil service examination process to recruit officials at all levels of government was kept in place. In addition, the fundamental approach to local government remained the same: the Qing rulers, as had the Ming before them, sought to delegate many of the state's tasks to local elites. Because this meant that the Qing rulers depended on their cooperation, they had to placate them to some extent. Despite this general continuity,

the Qing rulers put several changes in place that reinforced each other.

First, in 1657 the Qing rulers abolished generous exemptions for officials and degree holders from the land tax. Moreover, there is evidence that these tax changes were enforced, for example in the case of the so-called Chiang-an tax case (Oxnam 1973, Atwell 1986). Because the tax burden for landless officials and degree holders would not change while that of landowning officials and degree holders went up as a consequence, this amounted to an increase in the return to being a scholar-official relative to land.[15]

Second, the approach of seeking political influence during the Ming by forming alliances with other local groups gave way during the early Qing to a more direct approach to influence through a family member or friend who would be part of the provincial or central government (Wakeman 1970).[16] Given that, the obvious path to power during the Qing was to compete for examination success and attain provincial or central government office. Indeed, it has been noted that with the transition from the Ming to the Qing Tongcheng's families increased their efforts to compete in the civil service examinations.

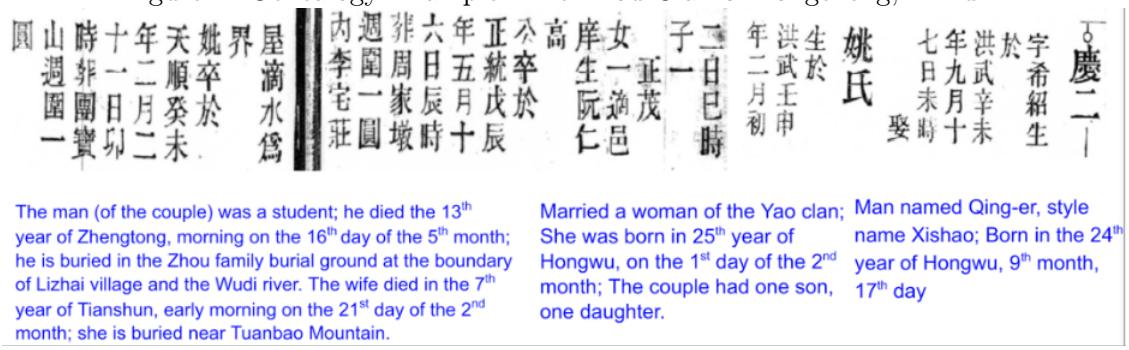
Third, the early Qing is also the time during which many clans felt the need to compile new rules of behavior. Clan rules are important instruments of social control during this time in China, and detailed rules might not have existed before, or they may have been lost during the turmoil of the Ming-Qing transition (especially handwritten rules). Comparing typical Qing clan rules in Tongcheng with earlier rules shows that clan rules became both more strict and more comprehensive, in the sense of prescribing socially respectable behavior in a broader set of areas (e.g., no tax abuse or avoidance, decent treatment of tenants); this was due in part to the 'broken social contract' leading to Tongcheng's internal warfare during the final years of the Ming dynasty. Importantly, prescribed behavior often included the pursuit of socially respectable occupations and education as the way to status and social esteem. More than during the Ming, now the families' energies and resources were channeled into competition for a scholar-official career.

These changes are consistent with an increased emphasis on attaining the scholar-official elite status throughout the Tongcheng area. In the analysis below, we will ask whether those families subject to greater destruction appear to have increased their emphasis on elite status attainment by more than other

[15] China-wide, the return to these skills also rose with the transition of the Ming to the Qing because the civil service exam was held more regularly every three years (Shiue 2017).

[16] The former approach may be termed 'horizontal' because multiple groups at the same hierarchical level work together, in contrast to a more 'vertical' approach using influence at a higher hierarchical level during the Qing.

Figure 1: Genealogy Example: The Zhou Clan of Tongcheng, Anhui



Notes: Authors' translation.

families in Tongcheng.

3 Data

3.1 Genealogies as Data Source

This study uses genealogical data for seven clans in Tongcheng county, part of Anhui province. Genealogies, essentially annotated family trees, are a classic source of socio-economic data for China. Recent estimates put the number of those currently existing into the tens of thousands (Wang 2008), and dozens have been employed in earlier research on Tongcheng (e.g., Beattie 1979a, 1979b). Because documenting intergenerational links is a key purpose, genealogies are particularly useful in the present context as they yield longitudinal family information over the long term. In addition to the record of time of birth and death, as well as achievements, marriage and children, genealogies provide information on the location of the burial site, and sometimes other information; Shiue (2016) provides a recent overview.

Figure 1 shows part of the Zhou genealogy of Tongcheng. Information in genealogies is self-reported, and there are no penalties from the state for misrepresentation–genealogies are private documents. A key reason why this study employs genealogies as opposed to official data is that for our sample period, state-provided data for Tongcheng does not compare in quality and consistency to the clan records, see Figure A.4.

3.2 Accuracy and Representativeness

One concern with genealogies is that the self-reported information might be exaggerated because the clan has an incentive to make itself "look good". This is tempered by the fact that genealogies fulfilled key economic functions that required accuracy. First of all, property rights turn on information recorded in genealogies, because they establish and sustain village settlement rights for specific clans. Second, genealogies are critical as a means of defense, including war, because by determining who is member of the clan and who is not it defines allegiances, rights, and responsibilities in times of conflict (both versus other clans and versus the government). Third, genealogies provide information on taxation and public goods provision. On the one hand, the state delegates to local clans the right to tax as well as the responsibility to fund public works such as irrigation. On the other hand, a clan's genealogy specifies assessments (essentially taxes) on their members to found and maintain common clan property. With these functions of the genealogy for the clan, one would expect the data to be accurate, especially given that they are costly to produce.

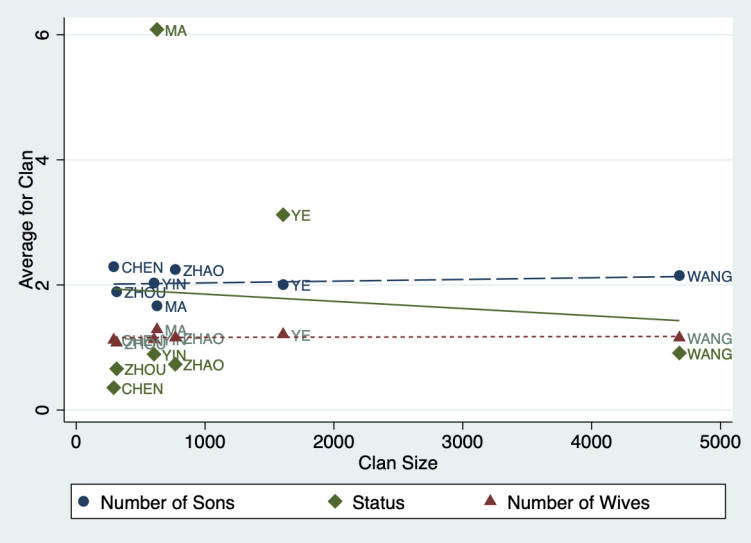
The main concern with genealogies is upward selection. While illiteracy was common during the sample period, preparing a genealogy requires literacy, at least for some clan members. Therefore, employing all extant genealogies for Tongcheng would tend to lead to positive selection.[17] The sample of this study is constructed using a targeted approach with the explicit goal of a relatively high representativeness. Three criteria are applied. First, the sample consists of a mix of heterogeneous–richer and poorer– clans so that sample moments are close to well-known estimates for China at this time. In particular, about 20% of the sample belongs to the upper class as defined by Fei (1946), and the fraction of local and provincial civil service examination graduates is comparable to 2% as reported by Chang (1955).[18] Second, conditional on including a given clan in the study, all entries of the genealogy become part of our sample. A fundamental principle of Chinese genealogies is that all males are members of the clan irrespective of their achievements, and it ensures that the sample majority are lower-class individuals, as in China overall.[19] Third, we employ genealogies with relatively complete (raw) records. It is well-known that the quality of family genealogies varies. In a survey of more than nine hundred genealogies, e.g., Telford (1986) finds that while on average

[17] Similarly, there is upward selection in studies based on recent crowdsourced genealogical information; for example, life expectancy conditional on living until age 30 in The Netherlands according to genealogies is 2.5 years longer than according to national life tables once the latter exist (late 19th century; Stelter and Alburez-Gutierrez 2022).

[18] Additional comparisons to external evidence are shown in section B.1.

[19] Exclusions from the clan of men born to a clan father are virtually non-existent. Adoptions do occur but are rare; we have dropped this handful of cases from the sample.

Figure 2: Clan Resources and Representation in the Sample



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 for seven clans.

about three quarters report vital dates for both husbands and wives, genealogies from Hunan province are more likely to have vital records than those from Shandong (93% versus 31%, respectively). In our sample, vital records exist for more than 90% of the sample, and we have confirmed that results do not depend on observations with estimated vitals.

The clans in our sample are the Chen, Ma, Wang, Ye, Yin, Zhao, and Zhou. They yield a broadly representative sample in part because the clans are quite different from each other. First, clan size differs. Wang clan members account for about half of all men, while the Zhou clan has a share of about 1%. Second, the clans differ in terms of the average level of resources. The data report several proxies for resources, including (i) each adult male's social status, (ii) the number of female partners of each male, and (iii) the number of children of each male. These are lifetime measures and will be discussed below.

Cross-clan variation in resources allows us to evaluate the extent to which the sample is selected in the sense that individuals from richer clans are more likely to be included in the sample or not. Figure 2 plots each of the three resource proxies against the number of men from each clan in the sample. If the sample would disproportionately include men from rich clans the relationships in Figure 2 would be positive. In contrast, there is hardly any relationship between the resources of a clan and the number of its members in the sample (Figure 2). In particular, there is no evidence for an overrepresentation of rich clans. Moreover, this results continues to hold when focussing on changes within clans using longitudinal

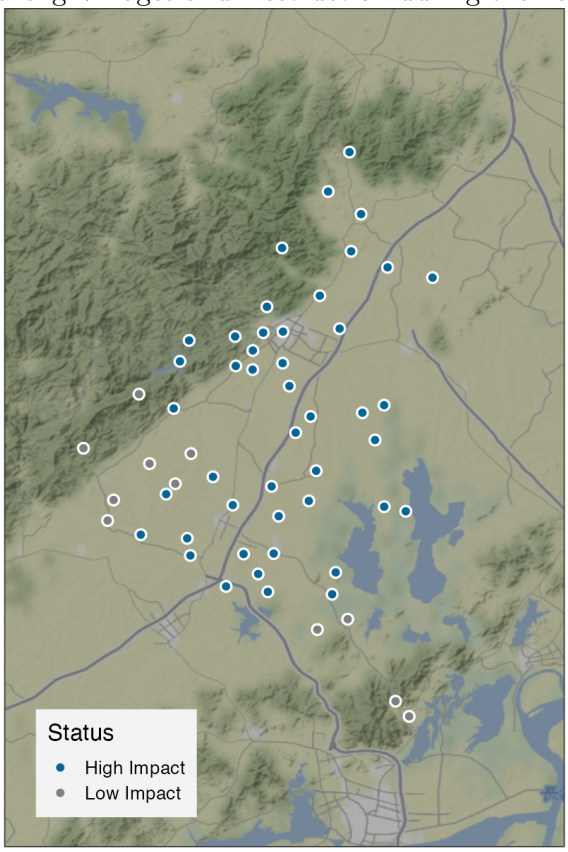
data (see Table A.1). We have examined the representativeness of the sample further, and find no evidence that various type of selection biases including recall bias, progenitor bias, and survivor bias play a major role in our sample (see section B.2).

3.3 Treatment of People versus Treatment of Regions

We begin by defining the set of people who are potentially treated by the fall of Ming shock, which has both a temporal and a spatial dimension. Temporally, we define as potentially treated those couples in which the male was born between the years 1590 and 1644. This definition implies that males 44 years old or younger at the onset of the heavy destruction in Tongcheng in the year 1634 can be treated, and by including males as young as 1 year old by the time the Ming dynasty fell (1644) we account for the fact that the turmoil was not immediately over once the Qing came to power. We show below results for changing this time window of treatment.

With this assumption, the sample has 490 couples who are potentially affected ('treated') by the fall of Ming shock. We will refer to this as the treatment generation, or first generation couples.

Figure 3: Tongcheng Villages and Destruction during the Fall of the Ming



Notes: Figure shows the villages of Tongcheng country in which the treatment generation couples lived. High Impact is defined as at least moderately destroyed (treated), while Low Impact is defined as little or not destroyed (control). One village with low impact in remote eastern area not shown. Source: Telford (1992).

Figure 3 indicates the locations in which the treatment generation couples lived in Tongcheng county. The county's capital city, Tongcheng, is located about 200 kilometers southwest of Nanjing (Jiangsu) and 60 kilometers north of Anqing, the capital of Anhui province. Tongcheng county is located just north of the Yangzi river (shown in the lower-right of Figure 3). Spanning 100 kilometers east-west and 60 kilometers north-south, in the late 18th century Tongcheng is estimated to have had about 1.5 million inhabitants (Beattie 1979a).

The different colors in Figure 3 distinguish two sets of towns and villages, those with "High Impact" versus "Low Impact", which indicate the level of destruction during the fall of Ming shock, thus defining treatment in the spatial dimension. Specifically, first-generation couples who lived in "High Impact" regions are treated, while those living in "Low Impact" regions are control observations. About three quarters

of villages were treated according to that definition, and 89% of the treatment generation couples are. The relatively high extent of treatment is in line with the high level of destruction in the county during the Ming-Qing transition (see section 2.2). This spatial definition of treatment is based on Telford's (1992) analysis of crisis mortality by region during the years 1635-1645. Because the majority of locations escaping heavy destruction are located in the less central and more mountainous areas of Tongcheng, our treatment definition is in line with evidence that rugged terrain makes it more difficult to persecute people (Nunn and Puga 2012).

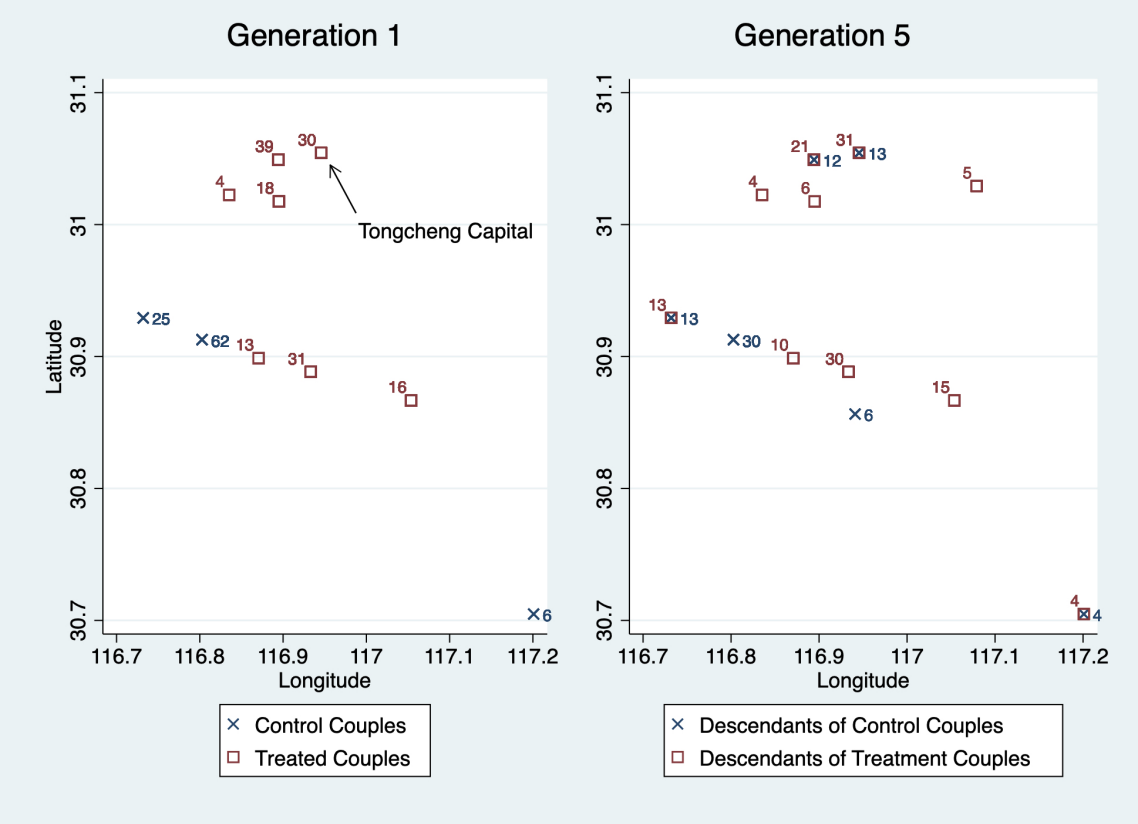
A sample of five linked generations is formed from the treatment generation couples and their next four patrilineal generations, that is, sons, grandsons, great-grandsons, and great-great-grandsons, together with their spouses and children. Treatment assignment from the first (fall of Ming) generation is extended to subsequent generations: anyone who is descendant of a couple residing in a treated location during the fall of Ming is defined to be treated, whereas anyone descendant of a first-generation control couple belongs to the control observations. This is referred to as treatment of people.

In addition to treatment of people, information on migration movements allows us to define a second form of treatment for the sample. Consider Figure 4, which depicts the location in which members of one of the clans resided in the first and in the fifth generation. Numbers in these panels report how many families of the Ma clan lived in a particular generation in each of the locations. For example, in Generation 1, 30 Ma families resided in Tongcheng Capital, the most northern location with members of the Ma clan.[20]

Figure 4 distinguishes treated couples from control couples; they are marked as squares and crosses, respectively. Treatment and control couples never live in the same location in the first generation (left panel), because the distinction of treatment versus control couples is based on each location's destruction in that generation. By the fifth generation, however, a given location can have both treated and control descendants. For example, $31 + 13 = 44$ Ma families reside in Tongcheng Capital (right panel). Of these, 31 families are descendants of Ma couples that lived in the first generation in a heavily destroyed region of Tongcheng, while 13 families are descendants of Ma couples who resided in low-destruction regions during the fall of Ming.

[20]Over the five generations, members of the seven clans resided in more than 80 different locations of Tongcheng county. Movements outside of the county can be tracked as well but they are very rare.

Figure 4: Migration Movements of the Ma Clan: Locations in the First and Fifth Generation



Notes: Left panel shows locations of the Ma couples in the first (treatment) generation, with squares (crosses) indicating those living in destroyed (undestroyed) locations. Right panel shows locations of the 5th generation descendants of those in the right panel, with squares indicating those descendants whose ancestors resided in generation 1 in destroyed locations. Numbers indicate the number of heads-of-households of a particular type in that location.

The treatment-of-persons effect for any outcome for the Ma clan in the fifth generation is the average difference between squares (treated) and crosses (control) in the right panel, no matter where they live. In contrast, the treatment-of-regions effect from the Ma clan in the fifth generation is the average difference between the outcome of those living in historically treated versus control locations in the right panel. One of these historically treated regions in Tongcheng Capital (see Figure 4, left panel). As a consequence, the 13 Ma families who live in the fifth generation in Tongcheng Capital but are descendants of couples living in low-destruction regions during the fall of Ming are treated in a sense of region but control in a sense of people.

Of these two forms of treatment effects, treatment of regions is what has been typically analyzed. One may ask whether the difference between treatment of regions and treatment of people effects is

Table 1: Elite Status and Civil Service Exam Participation

(1)	(2)	(3)	(4)	(5)
Group	Description	Elite	N	Fraction (%)
A	Non-Elite	0	6,712	83.7
B	Official Student	1	529	6.6
C	Imperial Academy Student	1	400	5.0
D	*Shengyuan*, *shengyuan* w/ office;	1	199	2.5
E	Military *juren* or *jinshi*; civil *juren*	1	98	1.2
F	Civil *jinshi*	1	83	1.0
All			8,021	100.0

Notes: Table gives information on a elite status in the main five linked generations estimation sample. Further information is given in Table A.3.

quantitatively important. Clearly, the answer depends on how persistent location choices of families are. In our sample, families move in 19% of all transitions from one generation to the next between locations (although not necessarily between the sets of treatment and control regions). Irrespective of how frequent migration movements are, treatment of people provides a new perspective on how shocks affect the welfare of inter-generationally linked families, which in turn may provide additional insights on the mechanisms that underlie long-run economic effects.

3.4 Variables and Summary Statistics

Elite status in this analysis is an indicator that a man acquired a substantial amount of skill during his lifetime. This includes all men who participated in China's civil service entrance exam at either the local, provincial, or national level. The exam was the primary standardized form of skill acquisition during the sample period. As noted in the classic work by Ho (1967), passing the civil service examination was "the ultimate source of power".[21] Table 1 provides sample information on this elite status variable.

Table 1 shows that 16 percent of the men in the five-generation estimation sample belong to the elite while 84 percent do not. A man who passes the local exam is a *shengyuan*, while a man who pased the provincial level exam is a *juren* and a graduate of the national exam is a *jinshi*. Generally, the status associated with civil positions was higher than that of military ones. One percent of the men in our five-generation linked sample belong to the highest category shown in Table 1. They would work typically

[21]Passing the examination was necessary for obtaining an official position, and passing at a higher level would typically lead to a higher-level and more lucrative official position. See sections C.1, C.2 for additional information.

in a top-level position of the Imperial bureaucracy.[22]

We also treat men who as "Students" are slated to participate in the civil exam as belonging to the elite because these men would be relased from agricultural and other duties to prepare for taking the exam. The man shown in Figure 1 from the Zhou clan, for example, was such an official "student" preparing for exams. Our main elite status variable is the indicator shown in column (3) of Table 1.

The 490 couples who witnessed the fall-of-Ming shock in their lifetime first hand are the basis for the intergenerationally-linked analysis. For two reasons, the inter-generationally linked sample is a subset of all observations in the clan genealogies. The first reason is that a particular couple does not have a male child. Given that the genealogy is organized patrilineally, a branch of the family without male heir is terminated by construction. While having a male child or not is to some extent biologically determined and random, there is scope for selection because in the absence of a male child with a given female partner, a rich man may have another female partner whereas a poorer man is less likely to be able to afford this. At the same time, there is no major difference in fertility for males with multiple female partners between treatment and control samples, which suggests that the influence of this for the long-run impact of the Ming-Qing transition is limited.[23]

The second reason why the inter-generationally linked sample is a subset of all clan observations is that even though the couple has a male child, that child may not be able to form a household himself. One reason for non-marriage is that the male child dies early on in life, which may be influenced by the fall of Ming shock but also by the health and resources of the parents. Another reason for non-marriage is that the male child lacks the resources to marry given the prevailing sex ratio. It is therefore likely that the five-generation linked sample is upward selected compared to the sample of all clan observations. We provide analysis of the fall of Ming impact on the shortening of family lines in section D. To get a sense of magnitudes, we compare the set of village locations in which members of the seven clans lived for (i) the overall sample and for (ii) the five-generation linked sample. The five-generation linked sample includes 80 percent of all of the locations in the overall sample, see Figure A.10. This suggests a moderate effect due to the five-generation linked sample constraint. Section D provides additional analysis.

[22] A one percent share of civil *jinshi* is above their share in the population; this is in part because these are results for the five-generation linked sample, see the discussion below.

[23] For first-generation males with more than one female partner, the ratio of total sons to number of sons with a given female partner is 1.77 in the control and 1.74 in the treatment sample (n = 15 and n = 81, respectively; p-value of 0.94). Below, a male who has two female partners during his lifetime would correspond to two distinct couples in the dataset.

Table 2: Summary Statistics: Five-Generation Linked Sample

	Male								Female	
Panel A. Generation	N	Birth Year	Death Year		Elite	Social Standing	Migration	Sons	First Wife	Sons
		Median	Median	Max			Mean			
1	1,667	1619	1678	1728	0.251	4.320	0.198	3.272	0.104	2.998
2	1,661	1653	1718	1759	0.224	4.320	0.276	3.667	0.092	3.517
3	1,632	1686	1743	1796	0.157	3.540	0.229	3.322	0.071	3.222
4	1,609	1716	1778	1850	0.106	2.505	0.147	3.391	0.049	3.275
5	1,515	1748	1803	1886	0.063	1.998	0.104	2.224	0.096	1.929
All	8,084				0.163	3.366	0.189	3.193	0.083	3.005

Panel B. Clan	Chen	Ma	Wang	Ye	Yin	Zhao	Zhou
N	373	903	4,527	1,175	513	531	62
(%)	(4.6)	(11.2)	(56.0)	(14.5)	(6.3)	(6.6)	(0.8)
Elite	0.063	0.417	0.124	0.290	0.018	0.008	0.032
# Wives	1.078	1.289	1.240	1.286	1.105	1.056	1.226
Total Sons	3.456	2.685	3.335	3.062	3.162	3.119	1.952

Notes: Shown are statistics for five-generation linked sample; number of observation varies to some extent by variable; value for N given in Panels A. and B. is for male birth year. Migration is equal to 1 if head of household resides in generation x in a different town or village than in generation x-1. Total Sons is number of sons of a male from all female partners; First Wife is an indicator that the female is the female to be married at the earliest date of all females that lived consecutively or sequentially in the household; # Sons (# Daughters) is the number of sons (daughters) born to that female.

Table 2 presents summary statistics for the sample of all descendants of the 490 first-generation couples that (patrilineally) can be linked forward four times. The number of observations in the five-generation linked data set is about 8,000 couples (Panel A). Linking the first generation forward four times, the couples of the fifth generation are unique, and the male in each of these couples is the great-great grandson of the treatment generation couple. Because some males in the fifth generation are brothers, the number of unique couples in the fourth generation is lower than 1,600, in the third generation even lower, and so on, until in the first generation in which there are 170 unique couples.[24] The cross-sectional unit of observation is the roughly 1,600 branches of the family tree (family lines), and with five generations we have $5 \times 1,600 = 8,000$ observations each on husbands and wives. Figure A.11 shows the number of husbands across each of the five generation as a function of calendar time.[25] The range of typical lifetimes is illustrated in Figure A.13.Panel A. of Table 2 shows statistics for men by generation. Looking at the vitals on the left, the first generation typically experienced the transition from the Ming to the Qing in 1644, while the second generation did not. Moreover, the typical lifetime of the fifth generation reached into the early 19th century, with the latest death year being 1886. The father with the earliest birth year of any of the first generation males–employed in the pre-shock analysis of Table 3 below–was born in the year 1542. This means that the range of the data over these six generations is close to 350 years.

Table 2 provides more detail on the elite status measure by presenting a breakdown of elite status by generation (Panel A, center). Over time, the chance that a man would become a scholar-official in the sample fell, as was the case for China overall.[26] Social standing is a lifetime measure of a man which is based on a range of descriptors in the genealogies. It includes whether he was a scholar-official but it is more broadly defined compared to the elite indicator. For example, wealthy farmers or merchants would have higher social standing, as would the leaders of village (mayors), but they would not be part of the elite. Most importantly, men who purchased academic degrees–which was sometimes possible in times of revenue shortage, especially during the 19th century–would not have the same elite status as those who obtained their degree through passing the civil service exam. Information provided in the genealogies allow

[24] Thus, about 35% of the 490 treatment generation couples and their descendants have at least one male child that becomes a head of household over four generations.

[25] While in principle each family line is observed in each of the five generations, in practice the number of observations falls somewhat from first to fifth generation because identifying data for birth or death year can be incomplete. Nevertheless, 91% of the first generation men are linked to the fifth generation (= 1,515/1667).

[26] Competition in the civil service examination increased as population went from 100 to 400 million during the Qing, while the number of top positions stayed roughly the same. One could account for this non-stationarity of the distribution as in Shiue (2024), however, the inclusion of birth year fixed effects together with taking the difference between treated and control observations suffices to deal with the issue.

us to account for purchased degrees, see Table A.3. The social standing variable has an ordinal range from 0 to 22. About 70% of the men belong to group with the lowest standing, and they would be commoners living close to subsistence. In the five-generation estimation sample, this figure is 55%, see Table A.3.

Information on migration comes from the place of residence of a head-of-household; the variable is equal to one if the head of household resides in a different location compared to his father, which is the case in just under 20% of all generation-to-generation transitions. We also employ information on the number of sons a male has from all his relations with females; it averages at about 3.2. Women in Chinese genealogies do not have status independent of the male, however, we have information on the timing of marriage and the role the female played in the household. Table 2 shows that about 8 percent were the first (earliest) wife of several in their husband's household, compared to 80% of all females who were the single lifetime wife of their husband, and about 2.5% concubines (unmarried females). Females in our sample had on average close to 3 sons.

The lower Panel B. provides information on each of the seven clans. The clans are different in multiple ways, which helps to obtaining a sample that is broadly representative. The two larger clans are the Wang and the Ye, while the Zhou is the smallest clan. Clans differ substantially in terms of elite status, fertility, and affluence, here measured as the average number of females per head of household. The Ma and the Ye had the highest share of their members being part of the elite, while the Zhao clan had the lowest.

3.5 Pre-Shock Analysis

A central identification condition to causal estimation is that in the absence of the shock, human capital outcomes for treatment and control observations would have been similar. A well-known approach to provide evidence on the likelihood of this is to examine treatment and control samples in the pre-shock period. By linking the treatment generation couples backwards in time, we can compare treatment and control samples in the two generations *before* the fall of Ming. Table 3 presents the results.

Panel A, section I of Table 3 reports tests of the equality of the mean of various characteristics of the treatment generation males' fathers. Elite status of fathers turn out to be not very different, at 0.24 versus 0.30 in control and treatment samples, respectively (Table 3, section A. I.). Lifespan and social status among control fathers is somewhat higher than among treatment fathers, but the difference is not

Table 3: Differences between Treatment and Control Samples Before the Shock

	Control	Treatment	Difference	p-value
	N = 54	N = 436		
A. Test of Equality of Means				
I. Generation (-1): Father				
Elite Status	0.24	0.30	-0.06	0.35
Social Standing	6.00	5.18	0.82	0.37
Birth Year	1589.16	1586.90	2.26	0.37
Lifespan	55.86	53.78	2.08	0.25
II. Generation (-1): Mother				
First Wife of Several	0.11	0.12	-0.01	0.82
III. Generation (-2): Grandfather				
Elite Status	0.41	0.30	0.11	0.10
Social Standing	5.22	5.62	-0.40	0.64
B. Tests of Equality of Distribution				
Generation (-1): Father Status				0.31

Notes: Lifespan is age in years at death. Test for equality of distribution is Kolmogorov-Smirnov.

statistically significant, and neither is their typical birthyear.[27] We can also assess pre-shock characteristics in terms of the mothers in the treatment generation. In particular, the share of mothers of treatment generation males who were the first among several married female partners in their husband's households was similar in treatment and control samples (section II of Table 3).[28]

Table 3 also presents results on the grandfathers of the treatment generation males (second pre-shock generation). Some of these men were born in the early 1500s, more than a century before the fall of the Ming dynasty. Grandfathers of the treatment generation males in the treatment and control samples turn out to belong to the elite at a rate of 0.41 among the control and 0.30 among the treated couples (see Panel A., section III.). This tends to favor control families, although the difference is not significant at standard levels. Note that while elite status is more common among control couples in the grandfather generation, the reverse is true in the father generation. Looking at elite status of either father or grandfather generation, 32% of the control sample has elite status compared to 30% of the treatment sample (p-value of 0.68). Moreover, since social standing is not an indicator variable but defined in terms

[27]Lifespan here is higher than in China overall at this time because the figures in Table 3 are conditional of surviving to adulthood and being able to marry. Section D.2 on the effect of the fall of the Ming on being able to marry shedslight on these margins.

[28]Most husbands have a single married wife during their lifetime (80%). In the remainder, the majority is husbands who have sequentially married wives because the first wife dies.

of 23 categories (see Table A.3) one can compare the entire distribution in the treatment and control samples. They turn out to be similar, as the p-value of 0.31 indicates (Table 3, section B.). Overall, this analysis does not yield evidence for major pre-shock differences between treatment and control samples, and in particular, there is no pre-shock difference in terms of elite status in favor of treated couples.

4 The Impact of the Fall of the Ming on Elite Status

4.1 Treatment of People

This section asks whether the fall of the Ming had a differential impact on those living in areas that were more heavily impacted, and if so, whether this differential impact was still present in any of the four following descendant generations. We refer to this as the treatment effect on people. The elite indicator variable is related to a treatment indicator, d_p, the level of destruction of the village or town in which the couple resided in the first generation (see Figure 3), using the following OLS specification

$$e_{ic(p)g} = \alpha + \beta_g \left[I \left[t = g \right] \times d_p \right] + \beta_f hfstat_{c0} + \eta_g + X'\gamma + \varepsilon_{ic(p)g}, \tag{1}$$

where $e_{ic(p)g}$ is elite status of man i belonging to couple c in generation g who is a descendant of pair p in the treatment generation. The term $I[t = g]$ is an indicator function equal to one if observation t belongs to generation g, and zero otherwise, while η_g are fixed effects for each of the five generations. Equation (1) also includes the status of the father of the male in the first generation couple, denoted by $hfstat_{c0}$. Conditioning on (a proxy of) father income is common in intergenerational analysis because it helps to address omitted variables concerns (Oreopoulos, Page, and Stevens 2008). We have shown above that there is no significant average difference in $hfstat_{c0}$ between treatment and control samples (Table 3).

Equation (1) includes also a vector X of additional variables. First, it includes fixed effect for each of the men's birth years. Lifetime in terms of calendar time varies substantially within a given generation (see Figure A.11), and including birth year fixed effects helps to account for secular changes and shocks. Second, we include a fixed effect for each of the seven male clans, denoted by m, $m = 1, ..., M$. They capture time-invariant differences, for example in the level of clan resources, that may affect an individual's response to the fall of the Ming. Similarly, equation (1), adds a fixed effect for each of the wives' clan-of-origin (130 different clans), denoted by f, $f = 1, ..., F$; also characteristics of the wife's clan might affect the

human capital response of the husband.[29] The error term $\varepsilon_{ic(p)g}$ is assumed to be mean-zero but possible heteroskedastic. We cluster by couple of the treatment generation (p). The shock may trigger effects that last for more than one generation, and if intergenerational adjustment strategies play a role the behavior of members of the same family line in different generations will not be independent. Conditional on the included variables, we assume that β_g gives the mean difference in $e_{ic(p)g}$ due to the fall of the Ming in generation g.

The sample consists of all men and women that are descendant couples of the treatment generation in generation two to five, plus the individuals of the treatment generation. Results are presented in Table 4.

We begin with a specification that has only fixed effects for each generation, see column (1). In the first generation, the coefficient on treatment is estimated at -0.29. This says that for every ten men in the control group that have elite status in the first generation, due to the shock only seven treated men do. It is plausible that war, famine, and disease would make it more difficult to succeed in the civil service exam. For the second generation, the treatment coefficient β_g is close to zero, whereas point estimates are positive for the following generations (column (1), Table 4). This points to a reversal of attaining elite status, which indeed is confirmed by further analysis. The father status variable $hfstat_{c0}$ enters with a positive sign, which reflects that attaining elite status is costly so that men with higher-resource fathers have an advantage.

Actual lifetimes of men in each of the five generations vary in terms of calendar time, and different shocks may be present at different calendar times. To account for that we include birth year fixed effects. They do not drastically change the point estimates although precision becomes somewhat higher (see column (2)). The following two specifications introduce male and female clan fixed effects to the specification. While the size of the negative impact in each generation varies somewhat, the overall pattern, from negative in the first to positive by the third generation, is the same as before, and in the specification with all four sets of fixed effects the shock's impact in the fifth generation is significant at standard levels (column (4)). Thus, compared to control men, the shock has initially a negative impact on elite status attainment which turns positive in later generations.

[29] We do not include the clan subscripts m and f in equation (1) to simplify the notation.

Table 4: The Impact of the Fall of the Ming

	(1)	(2)	(3)	(4)
Gen 1	−0.290*	−0.236*	−0.209*	−0.286**
	(0.120)	(0.100)	(0.103)	(0.104)
Gen 2	−0.026	−0.025	−0.009	0.051
	(0.130)	(0.115)	(0.118)	(0.105)
Gen 3	0.214**	0.184**	0.194**	0.210**
	(0.060)	(0.047)	(0.052)	(0.052)
Gen 4	0.149**	0.100*	0.110*	0.087*
	(0.053)	(0.040)	(0.043)	(0.041)
Gen 5	0.131*	0.105*	0.117*	0.126*
	(0.053)	(0.047)	(0.050)	(0.052)
Father Status	0.026**	0.021**	0.018**	0.016**
	(0.003)	(0.002)	(0.003)	(0.003)
Fixed Effects				
Generation	Y	Y	Y	Y
Birth Year	N	Y	Y	Y
Male Clan	N	N	Y	Y
Female Clan	N	N	N	Y
Mean d.p.	0.16	0.16	0.16	0.16
N	8,056	8,054	8,054	8,021

Notes: Dependent variable is elite status indicator; sample consists of all men and women in generations 2, 3, 4, and 5 that constitute couples formed by male descendants of the treatment (first) generation, as well as the treatment generation couples themselves. Estimation of equation (1) by OLS. Father Status is status of the husband's father in treatment generation. Gen stands for generation, d.p. stands for dependent variable. Robust standard errors clustered at the level of treatment generation couple; **/*/+ indicates significant at the 1%/5%/10% level.

To recap, even though the shock was detrimental to attain elite status in the treatment (first) generation, by the second generation elite status attainment of the descendants of treatment vs control couples is comparable, and from the third generation on descendants of treatment couples become elites at a higher rate than descendants of control couples. Thus, the lower rate of attaining elite status has not discouraged descendants of treatment couples, instead, the evidence is consistent with treated descendants being disproportionately encouraged to make investments to attain elite status in later generations. One explanation consistent with the historical evidence from above is that the shock has increased the incentives to become scholar-officials among treated descendants. We will evaluate this explanation below.

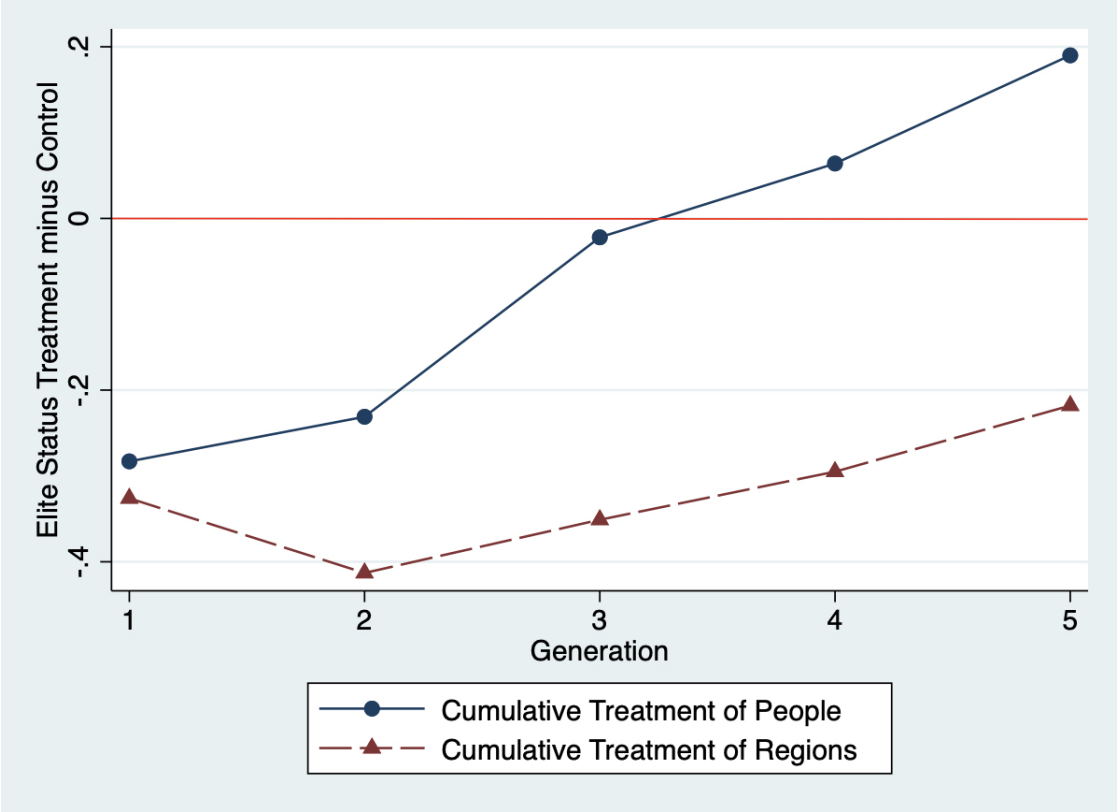
4.2 Treatment of Regions

Before explaining this reversal in elite status attainment, it is useful to compare the fall of Ming impact on 'people' (the descendants of couples living in heavily destroyed villages) with the fall of Ming impact on 'regions'. The latter compares elite attainment of those living in generations 2, 3, 4 and 5 in regions that were historically treated in generation 1 with the elite attainment of those living elsewhere, both in the treatment generation 1 as well as generations 2 to 5. Treatment of people follows descendants of treated vs control families wherever they migrate to, whereas treatment of regions is based on whoever has stayed in, or immigrated into a historically treated region. We estimate the following equation by OLS:

$$e_{icg} = \alpha + \delta_g \left[I \left[t = g \right] \times I \left[r = 1 \right] \right] + \delta_f hfstat_{c0} + \eta_g + X'\gamma + \varepsilon_{icg}, \tag{2}$$

where $I \left[r_{ig} = 1 \right]$ is an indicator function equal to one if individual i in generation g resides in a historically destroyed location, and zero otherwise. This exploits cross-sectional variation across regions, with one treatment coefficient δ_g per generation. Equation (2) is estimated on the same inter-generationally linked sample as that underlying the results of Table 4. Figure 5 shows cumulative point estimates from applying equation (2) with elite status as the dependent variable.

Figure 5: Treatment of People versus Treatment of Regions



Notes: Cumulative Treatment of Regions shows cumulative point estimates from estimating equation (2)), while Cumulative Treatment of People shows cumulative point estimates of column (4), Table 4, based on equation (1).

Figure 5 shows the cumulative impact of the fall of the Ming on regions as the lower of the two series, while the upper series is the cumulative impact of treatment of people (from Table 4, column (4)). The impact on regions tends to be more negative than the impact on people, both because there is an incremental negative impact on regions in generation 2 and because the recovery of human capital acquisition in generations 3, 4, and 5 is slower. Overall, the cumulative impact on regions by the fifth generation is -0.22, compared to 0.19 for the impact on people.[30] Thus, the reversal in elite status attainment is only obtained if we employ the treatment of people framework. Adopting the treatment of regions framework, there is no reversal, instead there is a negative effect that is largely persistent.

[30]The small difference between impact on region and the impact on people in generation 1 is due to constraining the birth year and clan fixed effects to be the same across generations to save on degrees of freedom. If one estimates generation by generation (as in Table **??**), coefficients for impact on regions and impact on people are identical in generation 1.

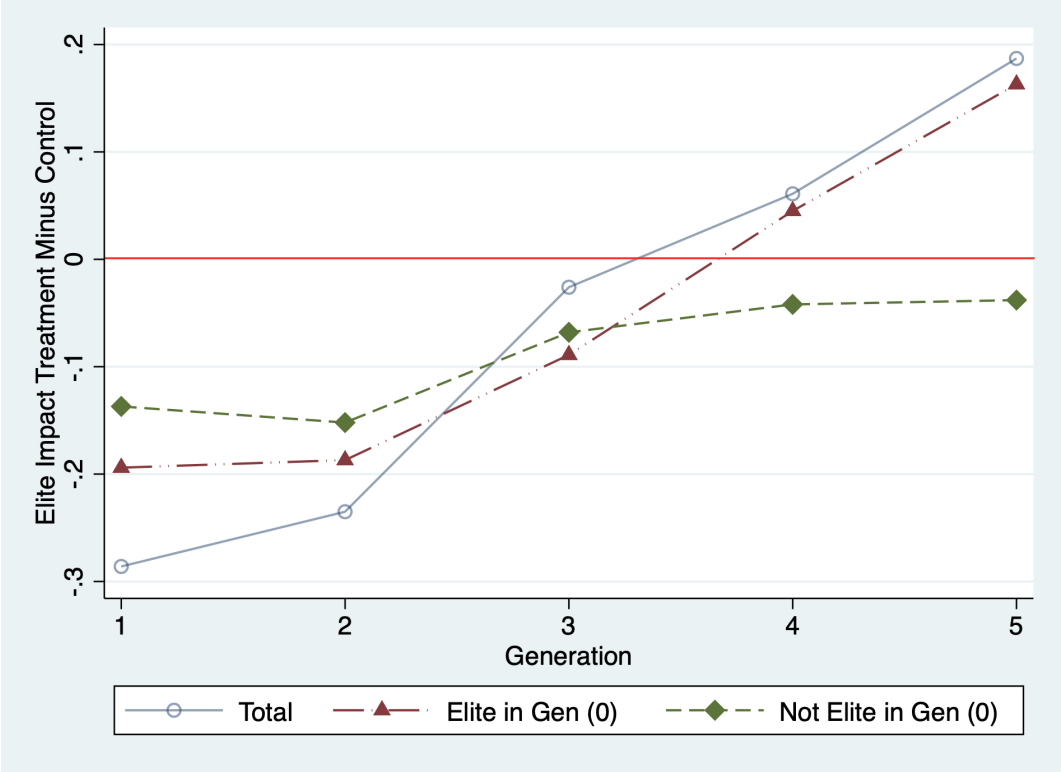
Considering the two series shown in Figure 5, the difference between how a shock affects a region compared to how it afffects the people who lived in the region at the time when the shock hit is due to migration. In the present case this can be studied using information on the location of each family line in a given generation (see Figure 4). Some families will migrate away from historically treated regions, while other families will migrate into historically treated regions. Given that the Treatment of People series lies above the Treatment of Regions series, we know that on net, treated people who migrated out of historically destroyed regions attained elite status to a greater extent than control families who on net migrated into historically destroyed regions. These results show that the long-run impact of a shock on people can be qualitatively different from the long-run impact of the same shock across regions. In the present case the long-run outlook on regions is particularly dire because families in-migrate to historically destroyed regions invest disproportionately little towards elite status. The next section examines these migration movements as part of other strategies to cope with the Fall of the Ming dynasty.

4.3 Elite Strategies

4.3.1 Reversal of Status Attainment and Ming Elites

A first question is who is responsible for the sustained increase in elite status attainment in generations 2 to 5 seen in Figure 5 – is it those families who were elites in during the Ming or is it primarily newcomer elites under the Qing dynasty? One way we can address this question is by using pre-shock information to distinguish families who had elite status in the late Ming from families that had not. In particular, we estimate equation (1) separately for those family lines in which the father of the treatment generation husband had elite status and for those family where that was not the case. Figure 6 shows the results.

Figure 6: Ming-Qing Persistence of Elites



Notes: Figure shows cumulative results from estimating equation (1); the sample for Elite in Gen (0) series is family lines in which the father of the first-generation husband had elite status (N = 2,696), and the sample for Not Elite in Gen (0) series is family lines in which the father of the first-generation husband did not have elite status (N = 5,294). Total is identical to Cumulative Treatment of Persons in Figure 5. Birth year as well as male and female clan fixed effects included.

In the first generation, the shock caused lower levels of elite status attainment both within Ming elite and within Ming non-elite families (see Figure 6). Also, the shock's impact in the first generation was somewhat higher among Ming elites. One explanation may be that due to the intergenerational transmission of skills, a son from a Ming elite family would be relatively likely to attain elite status himself in the absence of the Fall of Ming shock.

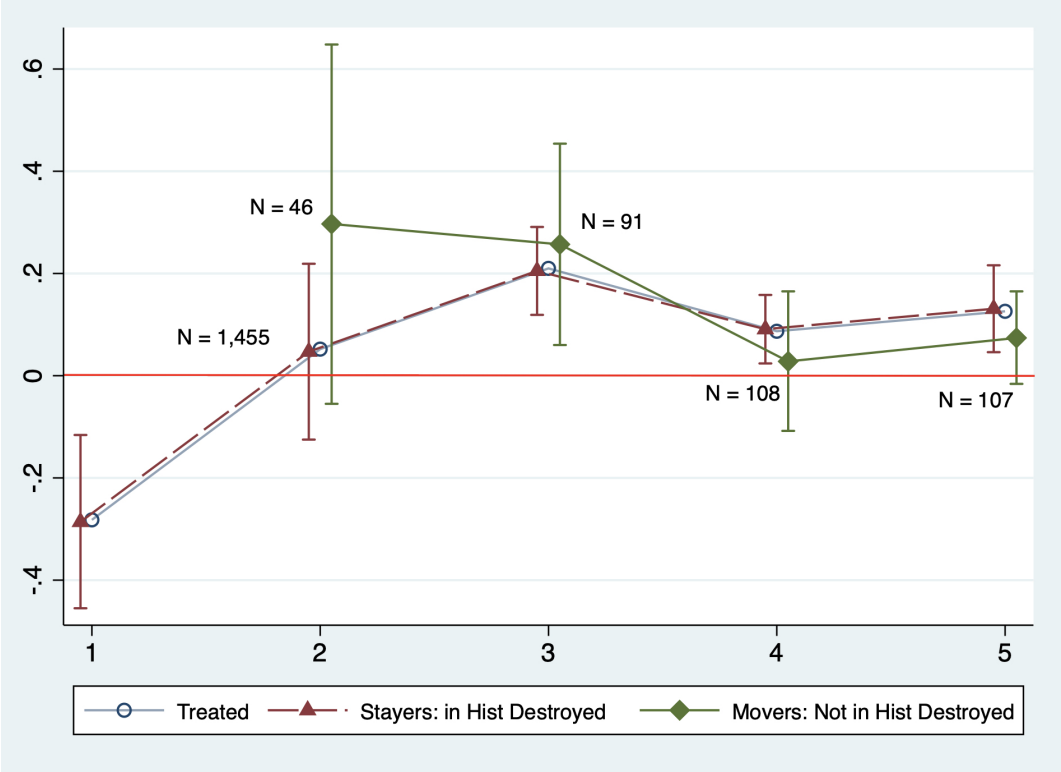
Figure 6 also indicates that elite status attainment of Ming elites and non-elites was not too different in the second and third generation. However, only treated descendants of Ming elites attain disproportionately elite status in generations four and five, whereas descendants of Ming non-elites fade away in terms of elite status attainment. As a consequence, the overall elite status reversal, "Total" in Figure 6, is driven mostly by the behavior of descendants of Ming elites. In sum, the resurgence of elite status documented above is due to elite persistence, in the sense that the families who were among the elites during the Ming tend to be also the elites during the Qing dynasty.

4.3.2 Migration

Figure 5 indicates that given the residence of people in destroyed versus not destroyed locations in generation 1, on net men who moved into one of the destroyed location attained less frequently elite status in generation 2 than those that left the destroyed locations.[31]

Figure 7 shows a generalization of the analysis of treatement of people underlying Table 4, column (4) by distinguishing treated family lines that currently live in treated regions versus treated family lines that currently live in control regions.

Figure 7: The Role of Outmigration



Notes: Figure shows elite status of two sets of treated family lines, those who reside in a particular generation in any of the historically treated locations (circle), versus those who reside in any of the historically not treated locations (triangles). Estimation analogous to equation (1) by OLS. Omitted category is human capital acquisition of control family lines residing in historically not destroyed regions (the zero line). 90 percent confidence intervals based on standard errors clustered on first-generation couple.

Of all treated family lines in generation 1, about 3% move to a historically not destroyed region in generation 2 (N = 46, see Figure 7).[32] Compared to those that remained in treated regions, husbands in

[31] Stayers–those family lines that stay for generation 2 in their generation 1 location–cannot explain the difference between treatment of regions and treatment of people in generation 2.

[32] Because residence of a family line in the first generation determines treatment of people, by construction there are no treated families residing in control regions in the first generation.

family lines that outmigrated by the second generation tend to attain more frequently elite status. Point estimates are not statistically different, but the relatively high coefficient for treated family lines in control regions provides evidence that regional destruction is detrimental to attaining elite status.

In contrast, in the third generation point estimates for the two sets of treated family lines turn out to be similar to each other. Similar elite status attainment exists for treated family lines irrespective of whether they live in historically treated or control regions suggest that the regional dimension is a factor that matters primarily in the short- but not in the medium- and long-run. The idea that family lines transmit their attitudes towards investing into elite status intergenerationally finds additional support in that the point estimates for the two sets of treated lines remain close to each other also in the fourth and fifth generation. Furthermore, in the third generation both sets of treated family lines attain elite status more frequently than control family lines residing in control areas (the zero line, as the omitted category). Net outmigration flows to historically less destroyed areas stabilize in the fourth generation at around 7 percent of all treated family lines.

Evidence on factors that determine migration decisions come from comparing treated family lines that outmigrated versus treated family lines that stayed in historically treated regions. The following analysis focuses on migration decisions in the second generation, for which differences between movers and stayers appear to be sizable, see Figure 7. Table 5 shows the results.

Table 5: Correlates of Outmigration from Treated Regions

	Stayers	Movers	Difference	p-value
	N = 1,452	N = 46		
Second Generation				
Husband Birth Year	1651.2	1661.2	10.0	<.01
Wife Birth Year	1655.4	1663.2	7.9	<.01
First Generation				
Elite Status	0.21	0.37	0.16	<.01
Social Standing	4.05	4.26	0.21	0.79
Number of Females	1.30	2.15	0.85	<.01
Number of Sons	3.25	4.70	1.44	<.01
Husband Lifespan	59.1	62.1	3.0	0.17
Wife Lifespan	62.3	49.5	12.8	<0.01

Notes: Table compares means for two sets of treated family lines, those who remain in a historically treated region in generation 2 and those who move to a historically not treated region in generation 2. Number of observations for Wife Lifespan is N = 1,439 Stayers, N = 46 Movers.

Table 5 indicates that families that outmigrate from historically destroyed areas in the second generation are younger compared to families who stay behind, as indicated by the relatively late birth year of both husband and wife. A plausible reason for this is is that migrants who are relatively young have a longer time horizon over which to recoup the costs of migration (Bowles 1970). Other results reflect that migrant families tend to be those who have the resources to cover the cost of migration. Specifically, families that move out of the historically destroyed areas in the second generation are more likely to have had elite status in the first generation. Thus, while treated first-generation couples in general are less likely to be part of the elite due to the shock compared to control couples (see Table 4, Generation 1), those that decide to leave destroyed areas are disproportionately those that attained elite status despite the negative shock. Furthermore, husbands who have many brothers are more likely to outmigrate as well (see "Number of Sons", Table 5). Signs of affluence tend to be positively correlated with the probability to move away from the historically destroyed areas.[33]

5 Mechanisms

5.1 Greater Aspirations to be Elite

Why was there a reversal in attaining elite status for those whose ancestors suffered heavily from the shock? This section examines the hypothesis that the shock might have increased the desire to be part of the elite for those affected by the Fall of Ming shock.

Elite status of descendants of first-generation treated couples to the point that they have more than made up their ancestors losses (Figure 5) is initial evidence of a greater focus on a scholar-official career for these families. The main alternative in this economy was land-based wealth. Historical accounts emphasize that the shock had a large negative impact on agriculture. Even though devastated land becomes arable again after some time, the difference in portability between land and skill-based wealth in the face of a big shock increases incentives to pursue a career as an official.

The relative vulnerability of land compared to the more portable skills suitable for a scholar-official career would have been observed both by those that experienced heavy fall of Ming destruction first-hand

[33] One exception to this is that a relatively short lifespan of the mother in the first generation is positively correlated with the outmigration decision. The reason for that is that a relatively early death of the mother releases the younger generation from potential old-age caretaking duties, and thus it enables the young family to move away.

and by those that did not. However, it is plausible that the destruction made a stronger impression on the former compared to the latter, even causing trauma. First-hand exposure may create attitudes that generate a difference between descendants of treated versus control couples because attitudes are internalized and passed down from generation to generation.

If the destruction during the fall of the Ming has led to a greater emphasis on a career as official among the descendants of treated couples, it would tend to lead to higher elite status attainment relative to the control descendants, as seen in Table 4. Moreover, to the extent that the transmission of this attitude is important, one expects that the increased emphasis on elite status among treated descendants is reflected in a stronger intergenerational relationship between father and son.[34] To assess this, we employ the well-known framework of intergenerational mobility that relates son characteristics to father characteristics using an OLS regression:

$$e_{ic(p)g} = \alpha + \omega_1 e_{ic(p)g-1} + X\psi + \epsilon_{ic(p)g}. \tag{3}$$

Here, $e_{ic(p)g}$ is the elite indicator for the son, $e_{ic(p)g-1}$ is the elite indicator for the father, and the vector X includes father social standing in generation 1 as well as generation and birth year fixed effects. The higher is ω_1, the more is the son's elite status attainment influenced by his father's elite status, so higher ω_1 means higher elite persistence (lower mobility). Equation (3) is separately estimated for the descendants of generation-1 treated couples and the descendants of generation-1 control couples, using only observations that were not themselves directly influenced by the fall of Ming shock (generations 3, 4, and 5). Results are shown in Table 6.

For the descendants of treated couples, the parameter ω_1 is estimated at 0.278 (column 1). It means that among descendants of couples that were subject to the fall of Ming shock, the son of an elite father has a 27.8% higher chance to become elite himself compared to a son of a non-elite father. In contrast, among control descendants, the point estimate is lower at about 0.20 (column (3)).

Including clan fixed effects lowers the point estimate of ω_1, see Table 6. This confirms earlier findings that group differences can be a source of persistence, for example because some resources may be shared at the level of the group (Shiue 2024). At the same time, the inclusion of clan fixed effects does not change

[34] See Becker and Tomes (1979, 1986) for workhorse models of parental investments into children in order to raise their lifetime incomes.

Table 6: Elite Persistence: Treated versus Control Descendants

	(1)	(2)	(3)	(4)
	Treated		Control	
Father Elite	0.278**	0.263**	0.201+	0.132+
	(0.033)	(0.029)	(0.107)	(0.068)
Birth Year FE	Y	Y	Y	Y
Male & Female Clan FE	N	Y	N	Y
Included Generations	3, 4, 5	3, 4, 5	3, 4, 5	3, 4, 5
N	4,272	4,272	426	411

Notes: Dependent variable is son elite status indicator. Also included are the male father's status in generation 1 as well as generation fixed effects. Robust standard errors clustered at the level of the treatment generation couple; **/*/+ indicates significant at the 1%/5%/10% level.

the finding that the ω_1 point estimate for treated descendants is higher than for control descendants. Elite status persistence among treated descendants is almost twice that among control descendants, see Table 6, columns (2) and (4), respectively. The relatively high intergenerational elite persistence among treated descendants is consistent with the idea that dynastic change has raised elite aspirations among the treated descendants.

More light on the role of intergenerational transmission for elite persistence can be shed by considering which factors would either facilitate or complicate this transmission of attitudes from one generation to the next. In this process, an elite father would impart essentially knowledge to his son about how to be(come) an elite.[35] Such knowledge transfers depend to some extent on face-to-face interactions between father and son, especially for knowledge that cannot be fully codified–written down–but is tacit (Polanyi 1966). To explore the importance of common face time, we ask whether the degree of elite persistence depends on the extent to which father and son's lifetimes overlap; with this variable, $Z_{ic(p)g}$, equation (3) is extended to the following:

$$e_{ic(p)g} = \alpha + \omega_1 e_{ic(p)g-1} + \omega_2 \left[Z_{ic(p)g} \times e_{ic(p)g-1} \right] + \omega_3 Z_{ic(p)g} + X\psi + \epsilon_{ic(p)g} \tag{4}$$

where $Z_{ic(p)g}$ is an indicator that is equal to one if the lifespans of father and son in this pair exceed 20 years, and zero otherwise.

[35] Similar arguments hold for mother, uncle, aunt, or other family members of past generations.

Table 7: Determinants of Intergenerational Transmission

	(1)	(2)	(3)	(4)
	Lifespan Overlap		Changing Residence	
Father Elite	0.274**	0.169**	0.274**	0.310**
	(0.034)	(0.054)	(0.034)	(0.054)
Father Elite x Lifespan Overlap		0.124*		
		(0.060)		
Father Elite x Changing Residence				−0.230**
				(0.085)
Lifespan Overlap		0.021		
		(0.017)		
Changing Residence				0.088*
				(0.042)
N	4,199	4,199	4,199	4,199

Notes: Dependent variable is son elite status indicator. Sample is all treated descendants of generations 3, 4, and 5. Also included are male father's status in generation 1 as well as generation and birth year fixed effects. Robust standard errors clustered at the level of the treatment generation couple; **/*/+ indicates significant at the 1%/5%/10% level.

Results are shown in Table 7. We find that a high overlap in lifespan between father and son increases the degree of elite persistence (column (2)). This is plausible because such pairs would tend to have more face-to-face interactions between them.[36]

Conversely, one can think of factors that would be a barrier to intergenerational knowledge transmission. An important one is physical seperation through a move of the son, because it would tend to make face-to-face interactions harder; this would potentially affect not only knowledge transfer between father and son but also from other family members to the son. We thus consider an alternative variable $Z_{ic(p)g}$ which is equal to one if the son resides in another village than his father, and zero otherwise. The positive coefficient on Changing Residence in column (4) is in line with earlier results that migration is associated with elite status attainment. At the same time, intergenerational elite persistence is lower if

[36]We have also explored whether more years of lifespan overlap increases elite persistence, finding that it does up to about twenty years.

the son changes residence compared to his father's location, see the estimate of -0.23 on the interaction variable (column (4)). This is consistent with the idea of a lower rate of knowledge transfer in families where a move physically separates younger and older generations.

The following compares how treated and control descendants fare in terms of absolute mobility, moving into and out of the elite after the shock (Table 8, Section I). Notice that 83% of sons of elite fathers fail to sustain elite status among the control descendants, whereas only 58% of the sons of elite fathers among the treated descendants move down in status. This is consistent with more emphasis on elite status among the treated families. Also, upward mobility among treated descendants is much more common than among control descendants (5.8%, compared to 2.3%, respectively; Table 8, Section I).

Table 8: Elite Mobility: Transition Tables

Section I: After the Shock

Panel A: Control Descendants

		Father	
		Not Elite	Elite
Son	Not Elite	97.7%	82.9%
	Elite	2.3%	17.1%
		100%	100%

Panel B: Treated Descendants

		Father	
		Not Elite	Elite
Son	Not Elite	94.2%	58.1%
	Elite	5.8%	41.9%
		100%	100%

Section II: Before the Shock

Panel A: Control Descendants

		Father	
		Not Elite	Elite
Son	Not Elite	96.9%	45.4%
	Elite	3.1%	54.6%
		100%	100%

Panel B: Treated Descendants

		Father	
		Not Elite	Elite
Son	Not Elite	83.7%	36.9%
	Elite	16.3%	63.1%
		100%	100%

Notes: Table shows transition matrix for intergenerational mobility in elite status. Section I. is for post-shock period using generations 3, 4, and 5. Section II. is for the pre-shock period, using the generations of the treatment generation's fathers and grandfathers (as in Table 3). Columns sum to 100 percent. Total number of observations N = 4,741 in Section I and N = 490 in Section II.

Section II. of Table 8 shows results on elite intergenerational transitions before the fall of the Ming dynasty. Generally, it was easier to be part of the elite around the year 1600 than in the 18th and 19th

century, in part because China's population was rising while the number of official positions was kept roughly constant.[37] At the same time, we find that treated families perform better than control families in terms of elite status attainment in this process. Specifically, while elite persistence before the shock was roughly similar for treated and descendant families–a 16% premium for (subsequently) treated families–, after the shock the elite persistence premium of treated families is with 145% considerably higher.[38] This provides further evidence that treated family lines placed disproportionate emphasis on elite status in the aftermath of the shock, and they were especially successful in holding on to elite status once a family had obtained it.

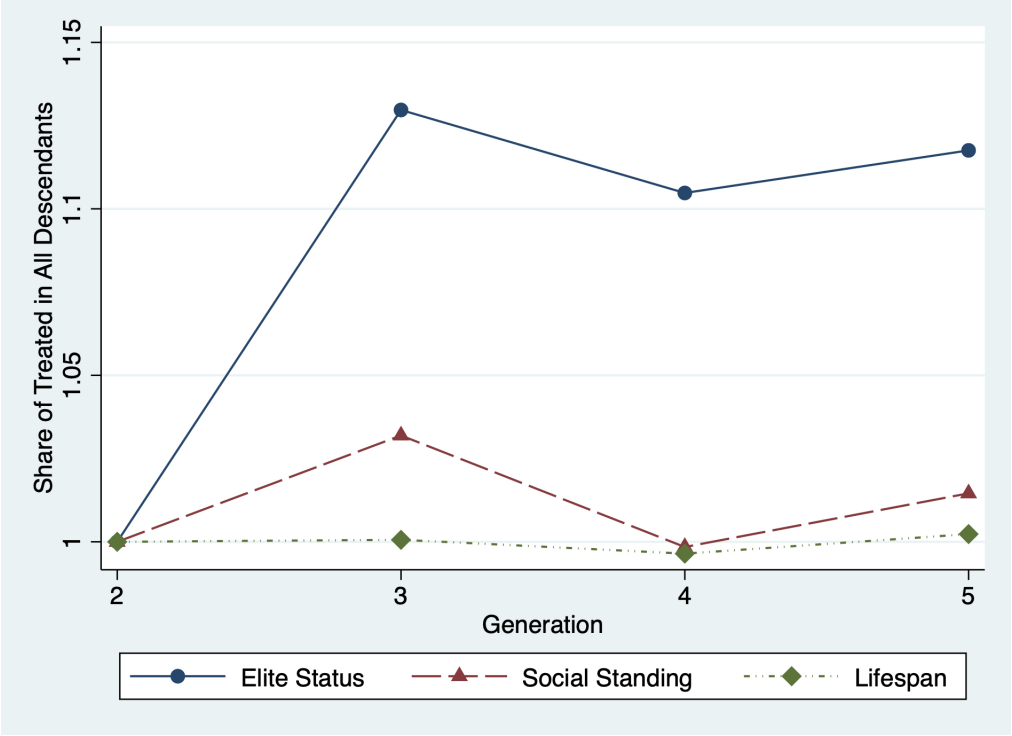
5.2 Alternative Explanations

The previous section has examined the hypothesis that elites resurged after the fall of the Ming dynasty because there is elite persistence from the Ming to the Qing. But could the patterns that have been documented be explained by other mechanisms? In particular, is there something specific about elite status, or has the shock simply incentivized descendants of the historically treated couples to perform better overall?

The following presents evidence on alternative mechanisms. First, consider sample size. For any of the five generations, the historically treated couples and their descendants account for about 90 percent of the population in the linked sample. This is by construction because the analysis is net of any break in the family lines, and given our cohort approach there is no entry in later generations. Even though the share of the treated population is approximately constant, if behavior changes as the result of the shock, the share of treated descendants in other dimensions might vary. Figure 8 presents this share for several variables.[39]

[37] See also elite status averages by generation in Table 2, Panel A.
[38] Calculated as $16\% = \frac{63.1\%}{54.6\%} - 1$, versus $145\% = \frac{41.9\%}{17.1\%} - 1$, Table 8, Sections II. and I., respectively.
[39] Generation 1 is omitted from this figure in order to focus on post-shock developments.

Figure 8: Elite Persistence and Alternative Explanations



Notes: Figure shows the share of treated descendants in terms of three different variables. Lifespan is computed as death year minus birth year. Values for Generation 2 are normalized to 1.

Relative to generation 2–the first post-shock generation–, treated descendants had an almost 13% higher elite share in generation 3, compared to a treated descendants' share of social standing that rose only by 3% from the second to the third generation, see Figure 8. This indicates that to the extent that the shock affected the career focus of these families, it was more strongly redirected towards being among the scholar-official elite compared to a broader measure of social standing. Furthermore, this difference is persistent. Relative to generation 2, treated families account for an at least 10% higher share of the elite in every subsequent generation, and a 12% higher elite share in the fifth generation. In contrast, the share of treated families in terms of social standing after the shock remains lower and is only 1.5% higher by the fifth generation. This provides evidence that families specifically directed their investment strategies towards elite status, not just towards higher income and wealth more generally.

Another hypothesis is that the shock has increased elite status attainment because treated descendants live longer, as this, e.g., gives them a better chance to obtain a high-ranking position. We examine this issue by considering the share of treated descendants in total lifespan, measured as year of death minus year of birth. Figure 8 shows that the treated descendants' share of lifespan virtually did not change

after the shock. Thus, the greater attainment of elite status of the treated descendants is not just due to longer lifetimes. Rather, these descendants reach elite status disproportionately even controlling for lifespan differences. Furthermore, lifespan, as longevity, can also be seen as a proxy for health and attitudes towards risk. From this perspective, our results indicate that the documented resurgence in elite attainment is not driven by a change towards a more healthy or less risky lifestyle of these families.

Overall, the pattern of elite status attainment in the post-shock era is different from those proxying for income, health, and attitudes towards risk. This provides additional support for the hypothesis that the shock has led to more emphasis on elite status among treated families that is transmitted from generation to generation.

6 Conclusions

Do big shocks have a permanent effect on the economic fortunes of people, or are the effects from such shocks transitory? This paper examines the fall of the Ming Dynasty (1644), a shock that cost the lives of 1/7 of China's population, and the economic responses over three centuries in a sample of men and their families in Central China. The impact of the shock is estimated by comparing the behavior of couples who were living in villages that were more heavily or less heavily destroyed by the turmoil of the fall of the Ming, a shock that is plausibly exogenous.

We find that the shock has a negative impact on the ability of men to attain the elite status of scholar-official in the first generation. Moreover, the impact is sizable. For every three men attaining elite status in the not destroyed areas, only just under two do so in the destroyed areas. However, this negative impact does not persist. Instead, by the third generation (the treatment generation's couples' grandsons), those with ancestors that lived in historically destroyed areas become members of the elite at a higher rate than those with ancestors in historically not destroyed areas. Furthermore, the recovery of elite status attainment persists to the fifth generation, which includes individuals living 250 and more years after the fall of Ming. We also show that Ming elites are key to this process–the recovery of elite status attainment reflects elite persistence from the Ming to the Qing dynasty.

As explanation we propose that the shock has led to a stronger focus on being a member of the elite for those first-hand affected by the fall of the Ming, and that these families have transmitted this change in

norms from one generation to the next. In support of this, we find that in the post-shock era, descendants of treated couples exhibit both a higher rate of elite upward mobility and a lower rate of elite downward mobility than descendants of control couples. Moreover, among descendants of treated couples elite status of the father plays a greater role for the son than among control families. In support of intergenerational transmission of attitudes, we find that the intergenerational persistence of elite status is stronger when father and son have many years during which both are alive, and persistence is also stronger when the family does not change the location of their residence. The findings are consistent with a greater emphasis on elite status that is transmitted from one generation to the next.

Migration turns out to be key to elites strategies. We find that the fall of the Ming dynasty had a more detrimental long-run impact on the regions that were historically affected than it had on the family lines whose ancestors lived in these affected regions at the time of the shock. In short, regions fared worse than people in terms of elite status attainment. This reflects that those who migrated away from historically destroyed regions performed better than people that remained in, or moved into, those regions. Migrants who are able to leave the destroyed areas in the aftermath of the shock tend to have elite status, they are relatively affluent, and they also are relatively young. Providing the means for this migration response is an important complementary strategy of how the elites maintain their status from the Ming to the Qing dynasty.

For the medium to long-term, the third to fifth post-shock generation, we find that being part of the elite depends more closely on whether a man is part of the treated family lines or not than on whether a man currently lives in a historically destroyed region or not. This provides additional evidence that the intergenerational transmission of knowledge within families is key for longer run impacts of big shocks.

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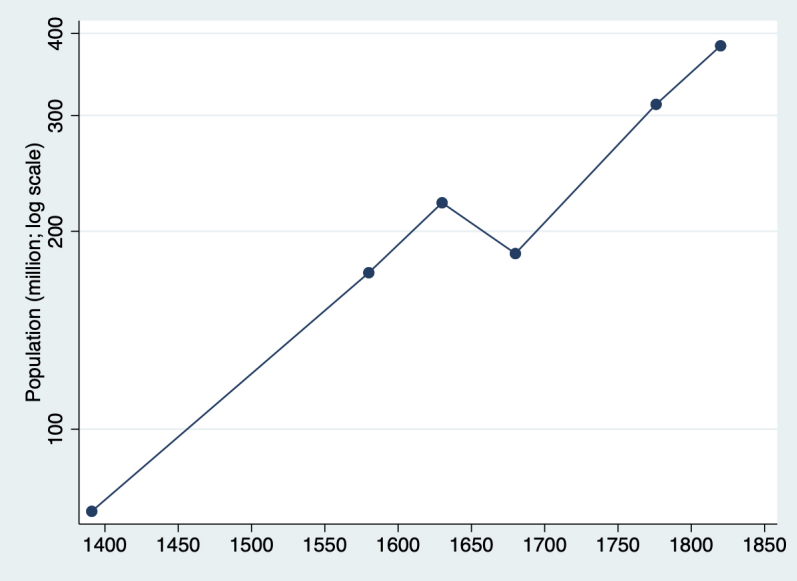
A Supplemental Information

A.1 The Fall of the Ming as a Shock

Figure A.1 shows the evolution of China's population from the late 14th to the early 19th century. In 1630, population is estimated at 221 million, compared to 185 million in the year 1680 (a 16% decline).

Figure A.1: China's Population and the Fall of the Ming

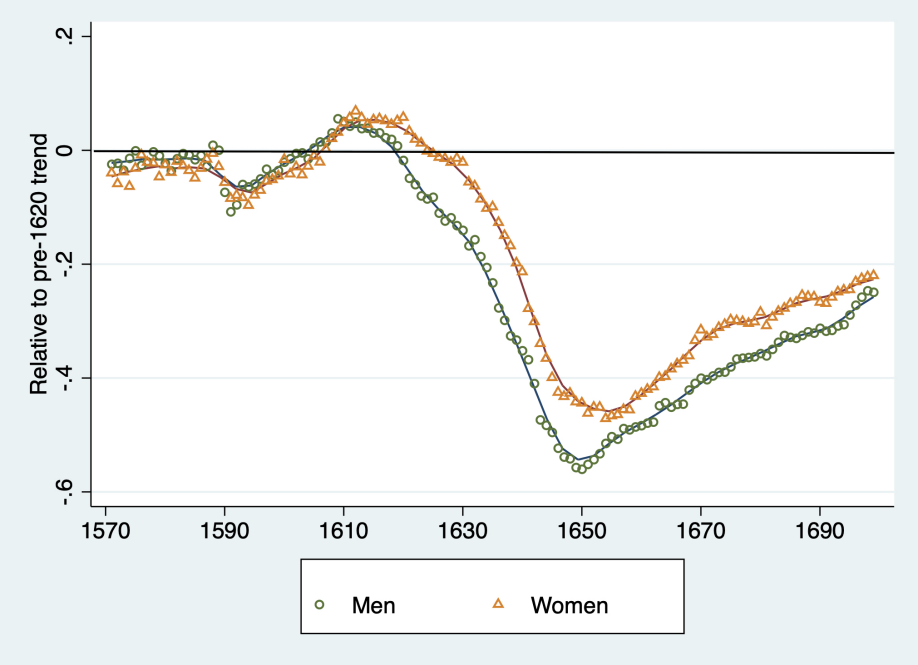


Notes: Source is Cao (2022), based on Ge Jianxiong (1999).

A.2 Sample Population by Gender

Figure A.2 shows the population developments in the sample between 1570 and 1700 relative to the pre-1620 trend for both men and women. Growth for both gender is relatively close to the pre-shock trend until the year 1620. Between 1620 and 1650, the male population falls by more than 50% relative to pre-shock trend growth, before it slowly recovers. The onset of the female population decline is somewhat later, and its trough is with around 45% somewhat above that for men. This might be due to men being more vulnerable to war activity or food crises compared to women.

Figure A.2: Sample Trend Growth and the Fall of Ming Shock by Gender



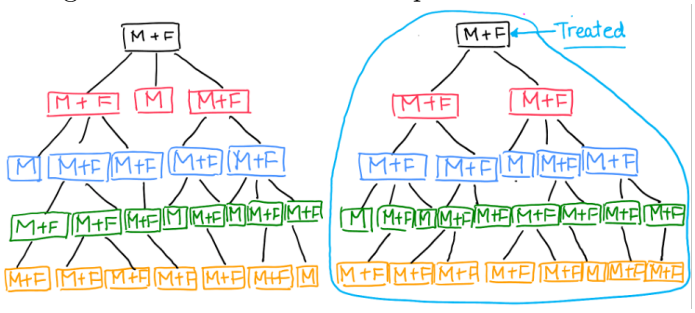
Notes: Figure shows the log difference between male (female) population and its trend fitted on pre-1620 data with circles (triangles).

Even by the end of the 17th century the number of both men and women remains more than 20% below the trend.

A.3 Treatment of People

Figure A.3 illustrates the concept of treatment of people.

Figure A.3: Treatment of People: An Illustration



Shown in the top row of the family trees are two first-generation couples. The couple on the right resided in a region of Tongcheng that was highly destroyed during the fall of the Ming, and is therefore treated,

while the first-generation couple on the left lived in a less destroyed area and belongs therefore to the control sample. This treatment assignment is carried forward to all members of the next four generations of descendants. In particular, all descendants of the first-generation treated couple are themselves treated, independent of whether the family in that particular generation still lives in a region of Tongcheng that was historically destroyed or not.

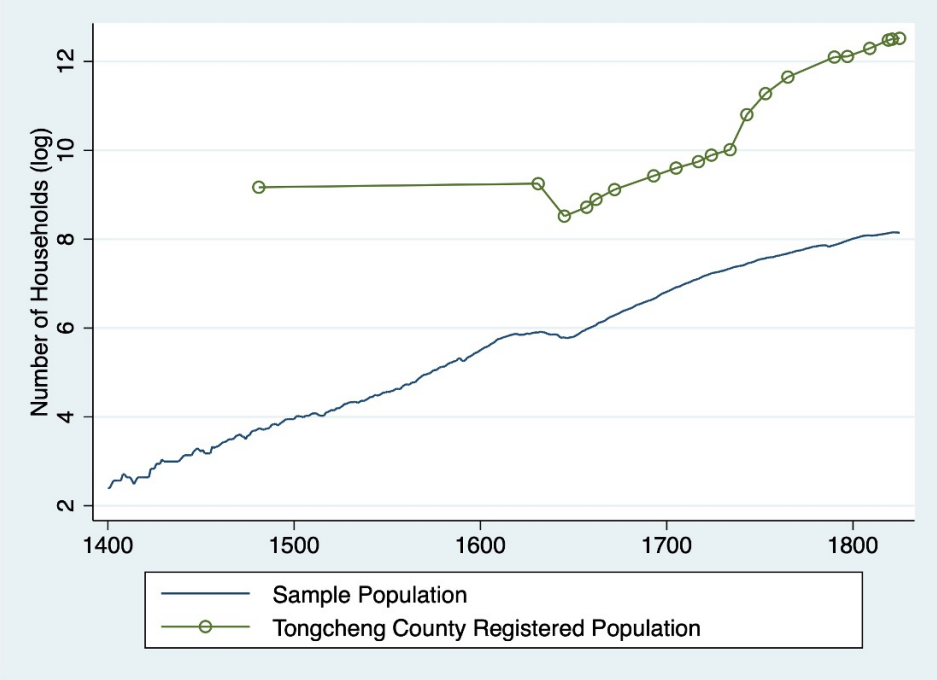
Figure A.3 also illustrates that linking across five generations affects the size of the sample. In particular, the figure shows a male in the third generation that does not have a wife. Typically, the person would have died in childhood or did not have the resources to marry. Because this family line ends in the third generation, it is not part of the main empirical analysis shown in the text (because that conditions on observing five generations). Section D.2 in the Appendix shows how such terminations of family lines affect the results.

B Representativeness

There would be no need to rely on clan records if high-quality data would be available for the economy in question. Thus, we begin by comparing the sample clan population with the available official data. Figure A.4, lower series, shows the evolution of Tongcheng population between 1400 and 1825 based on the seven clan genealogies of this study. Growth of the population is fairly steady over this period, with the exception of the years of the Ming-Qing transition in the middle of the 17th century.[40]

[40] More details on sample population developments around the fall of the Ming are presented in the Appendix, Section A.1

Figure A.4: Sample Population and Official Population



Notes: Sample Population is authors' computation of total of heads-of-households across seven clans; Tongcheng County Registered Population is the official number of households from Beattie (1979a), Table 3.

The upper series in Figure A.4 shows figures for Tongcheng's population based on official data, the tax registers. First, there are only twenty-one annual observations, less than 5% of what is available based on the clan total. Second, the official data does not record any population growth between the late 15th and the beginning of the Qing dynasty (1644). Overall, Figure A.4 suggests that Tongcheng population developments are better described by the clan figures than by official population figures.

B.1 Comparisons to External Evidence

A first check is to consider mortality rates by age group. Population figures at the regional level are typically based on gazetteers (local histories about a certain place). Three county-level gazetteers about Tongcheng cover the period under analysis; they are *Tongcheng xian zhi* (1490), *Tongcheng xian zhi* (1696), *Tongcheng xuxiu xian zhi* (1827). In addition, there are official accounts for subsets of the population, such as the Qing population registers, which are the product of the Eight Banner registration system.[41]

[41]These data are available for areas in China's northeast, in today's Liaoning and Heilongjiang Provinces; these lands were organized under the Imperial Household Agency and the Jilin Military Yamen, an office in the General Office of the Eight

Telford (1990) compares demographic patterns in the Tongcheng genealogical data and the Eight Banner populations for 1774 to 1873, when the latter starts to become available. He finds a very similar variation in the probability of dying for different age categories across the two sources (see Telford 1990, Figure 2).

To further assess representativeness we examine top individuals, in part because much of the available estimates focuses on the upper groups. Chang (1955) takes the view that *shengyuan* holders and above were in the upper class, and estimates that they were in the top 2% of the total population in the later half Qing period. In the present analysis, the part of the population corresponding to Chang's (1955) definition account for 3.3% of the sample, which is comparable.[42] Fei (1946) presents a wider estimate of the upper income groups, at 20%. In our analysis, groups 2 to 22 in Table A.3 correspond to Fei's definition of high status—and the share of these groups in the sample is 20.2%. Both these comparisons indicate that the data is fairly representative of China's population as a whole with respect to the size of top income groups as well as the relative size of higher versus commoner groups.

Given the genealogy is a written document, if literate individuals only recorded information about themselves their and immediate kin, the percentage of top income people in the genealogy should be very high. Alternatively, if genealogies recorded extended family who were not of high income—rules of ritual say that all adult male members are eligible, regardless of income—the percentage of top income should typically be low. How does the share of top status groups in the present sample compare with other evidence? In his classic study based on national lists of *jinshi*, which are extremely reliable, Ho (1967) reports that during the Qing in Anhui there were 41 *jinshi* per one million population, or, 0.0041 percent. There were regional variations, and the province of Anhui was below the provincial average in terms of *jin-shi* per capita in Qing China (Ho 1967, p. 228). In the Tongcheng data, there were a total of 14 *jinshi* during the Qing in Shiue's (2019) study, which is about 0.045 percent of the population in the data. Thus, there are about ten times more *jinshi* in the sample than in Qing Anhui overall.

At the same time, *jinshi* were rare, and some parts of Anhui province did not produce a single *jin-shi* over centuries. Furthermore, Tongcheng was not among the areas of China where top individuals were most prevalent. Some areas had more *jin-shi* by an order of magnitude compared to Tongcheng.[43] Therefore, while the number of men in the highest status group in Tongcheng was higher than in the

Banner Command. See https://www.icpsr.umich.edu/icpsrweb/ICPSR/series/265. For the imperial household dynasty, there are observations going back to the seventeenth century (Lee et al. 1993).

[42] In Table A.3, column (1), they are groups 13 and above.

[43] Specifically, Zhejiang and Jiangsu were among the provinces with high densities of *jinshi* (Ho 1967).

local surrounding area, Tongcheng was noteworthy at a local, perhaps provincial level, but it was not an unusual region in China.

Finally, the list of people who are recorded in the data to have obtained the highest status level, *jinshi* degree, can be compared against other lists of degree holders from Tongcheng County (Fang 2010; Cao 2016; Wang 2017). There were over 51,000 *jinshi* degree holders from the Yuan, Ming, and Qing dynasties. Information on top degree holders can be cross-checked for accuracy by referring to known lists of *jin-shi* degree holders from the Chinese state, which give the name, the date on which someone received his degree, and his hometown. We have verified that the information on the *jinshi* in the sample is consistent with the information of these official lists.

In summary, the information in the dataset is consistent with what we know and expect based on other sources for larger parts of China. To a significant extent this is because the dataset is based on seven genealogies that each describe rather different clans, so that combining them yields a diverse sample.

B.2 Cross-Clan Analysis

Next, we shed light on a number of possible forms of selection by exploiting differences across the seven clans in the data over the sample period. As shown in Table 2, the clan's average status varies substantially. A first concern is that genealogies begin with a particularly noteworthy man, who then becomes the progenitor of the clan. Part of his noteworthiness might come from being educated, which is one of the most important signs of status and one of the consistently reported characteristics of noteworthy persons. Alternatively, perhaps later generations were more likely to *ex-post* select a particularly noteworthy progenitor. In either case, the implication would be a trend of declining status over time.

Selection would arise if the records contain more entries of success compared to failure. We have shown in the text that average clan status is virtually unrelated to size across the seven clans (2) There is no evidence that on average, richer clans have more entries in the genealogies. Here this analysis is extended by examining the temporal correlation between status and clan size across twelve birth cohorts.[44]

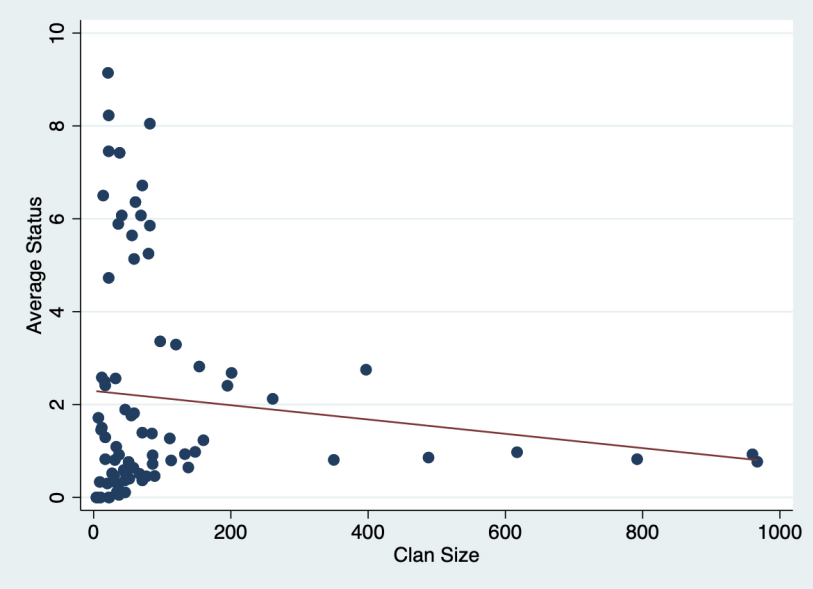
[44]The birth cohorts are 25 year periods, except (1) all years before 1575 and (2) all years after 1825; see Figure A.8.

Table A.1: Clan Size versus Status, Fertility, and Female Partners per Man

	Status			Fertility			Female Partners per Man		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Clan Size	−0.154	−0.074	−0.078	0.012	0.016	−0.019	0.005	0.001	−0.009
	(0.142)	(0.165)	(0.109)	(0.026)	(0.028)	(0.037)	(0.007)	(0.008)	(0.009)
Birth Cohort FE		Y	Y		Y	Y		Y	Y
Clan FE			Y			Y			Y
N	81	81	81	81	81	81	81	81	81

Notes: Results from OLS regressions of the variable on top of the column on the number of men born (size), both averaged by clan and by birth cohort. Clan size in 100s of men. Fertility is measured as the number of male children. FE stands for fixed effects. Standard errors in parentheses.

Figure A.5: Clan Size and Status: Birth Cohort Analysis



Notes: Shown is the size of each clan as measured by the number of men born in each of twelve birth cohorts, versus average clan status in that birth cohort; N = 81.

Figure A.5 shows that there is no strong relationship between status and clan size using information by birth cohort, and to the extent that there is a relationship it is negative. Thus, there is no simple positive selection into the sample based on status. The following extends this analysis in two ways. First, we consider the relationship between clan size and other variables. Second, the focus is placed on different parts of variation in the data by including different sets of fixed effects. See Table A.1 for the results.

Results indicate that there is no positive relationship between status and clan size, in fact there is no strong relationship of either sign. In particular, accounting for changes that are common to all clans

Table A.2: Clan Success and Recall Bias

	Clan Size		
	(1)	(2)	(3)
Clan Status (-1)	−0.098	−0.026	−0.061
	(0.096)	(0.098)	(0.157)
Birth Cohort Fixed Effects		Y	Y
Clan Fixed Effects			Y
N	74	74	74

Notes: Dependent variable is clan size, measured by the number of men born in a cohort (in units of 100s). Clan Status (-1) is average clan status lagged by one birth cohort. Estimation by OLS. Standard errors in parentheses.

by including birth cohort fixed effects does not yield a significant relationship (Table A.1, column (2)). Furthermore, there is no significant within-clan relationship between status and size either, as Table A.1, column (3) indicates.

There is a positive coefficient for fertility and clan size, however, it is not significant at standard levels (Table A.1, column (4)). Moreover, the positive point estimate turns negative (still insignificant) when we account for time-invariant differences across clan size by including clan fixed effects (column (6)). Qualitatively similar results are obtained for the relationship between clan size and the number of female partners per man, see columns (7) to (9). Overall, there is little evidence that a clan's representation in the sample in terms of size is related to key economic variables.

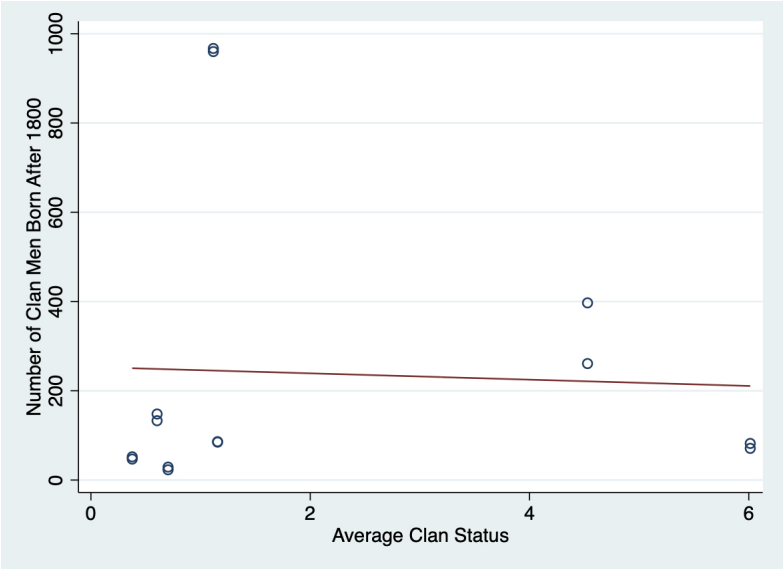
Other concerns about selection and representativeness derive from recall bias and the retrospective nature of how genealogies are compiled. One way this bias could manifest itself is that after a clan member attains a particularly high level of status, the clan reports many new members—it could be that the clan uses its resources to confirm the significance of their achievements or ex-post, people who were not previously part of the clan might try to establish an ancestry relationship to the high status individual. Table A.2 evaluates such hypotheses of recall bias using regression analysis.

With a coefficient on lagged clan status that is negative and insignificant, there is no evidence for recall bias in the sense that recent successes for the clan translate into more clan members. This result does not change with the inclusion of birth cohort and clan fixed effects, see Table A.2, columns (2) and (3).

A related concern is survivorship bias: over time, this type of bias could result in a disproportionately fraction of high-achieving (high skill) individuals compared to low-achieving (low skill) individuals. One

implication is that towards the end of the sample period the distribution becomes skewed towards relatively high-achieving clans. As Figure A.6 shows, however, there is little evidence that the distribution of the sample towards the end of the sample period is becomes skewed towards high-status clans.

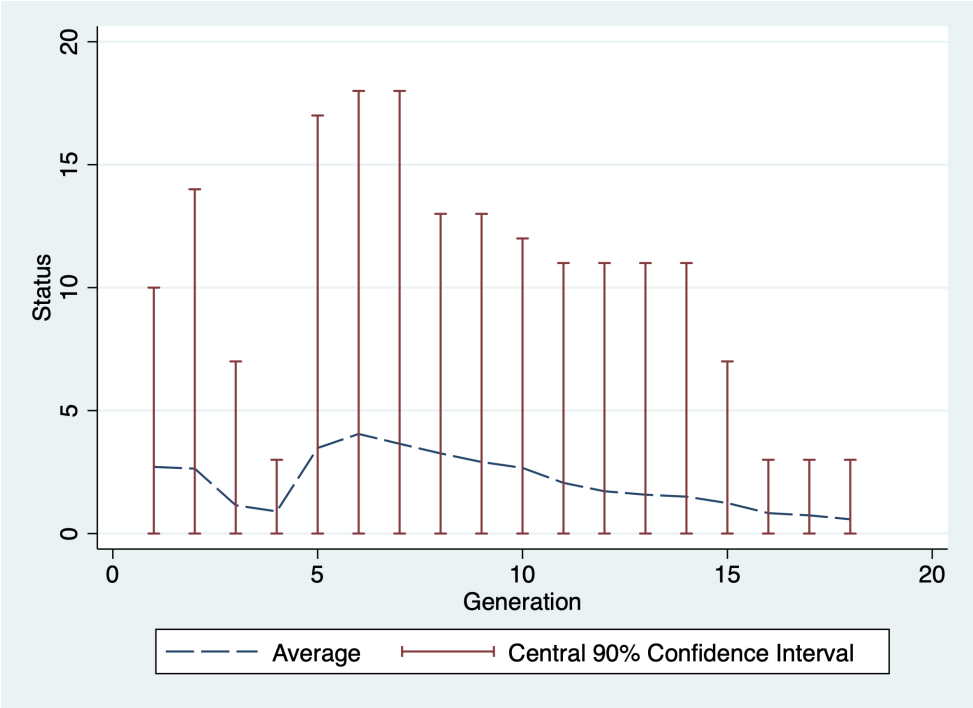
Figure A.6: Evidence on Survivor Bias



Notes: Figure shows number of clan men born in periods 1800-1825 and post-1825, both versus average clan status.

One might also ask why the genealogy of a given clan begins in a particular year. If the genealogy of a clan is established precisely because one of the clan members had achieved extraordinarily high status, this might yield a mechanical tendency of average status falling over time, and one might be concerned that this might also affect the estimate of intergenerational mobility over time. To examine this, Figure A.7 shows average clan status by generation.

Figure A.7: Clan Status by Generation

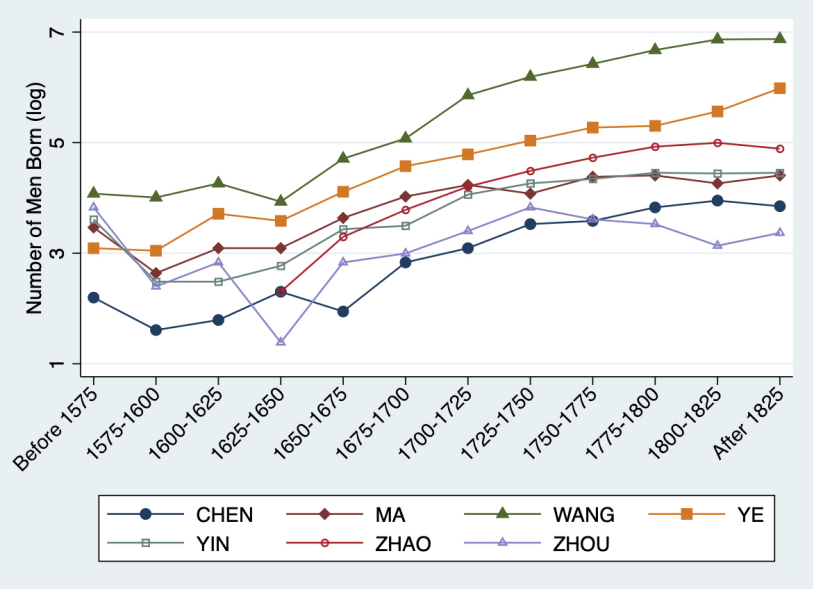


Notes: Shown are clan average status and the central 90% confidence interval of clan status for the first to eighteenth generation.

We can see that average clan status does not monotonically fall across generations. In particular, average clan status from the 5th to the 10th generation is higher than in the first generation. Thus, the dynamics of clan average status do not support the hypothesis that the sample genealogies typically begin with the life of an extraordinarily successful progenitor.

Figure A.8 shows the size of each clan in terms of the number of men born in each birth cohort. Over the sample period, all clans are present during the period from 1575 to 1825.

Figure A.8: Sample Size over Time



Notes: Shown is the size of each clan as measured by the number of men born in each of the twelve birth cohorts shown.

In general, size grows for all clans, although growth rates vary by period; for example, the growth rate is negative for three clans in the birth cohort 1625-1650, which includes the dynastic transition from the Ming to the Qing (1644). Some clans grow faster than others, however, sustained overtaking in terms of clan size is rare.

Overall, the evidence for various forms of selection bias is limited. This provides evidence that as a set, the genealogies underlying the present sample are broadly representative for Tongcheng. A different form of selection, due to intergenerational linking, is examined in section D.2 of the paper.

C Sample

C.1 Elite Status and Social Standing

This section lays out the elite classification employed in the paper, see Table A.3. The classification draws on on work by Telford (1986, 1992) ans well as Chang (1955, 1962), Eberhard (1962), and Ho (1967). The genealogies have descriptors that summarize each man's lifetime achievements in various areas. The key aspect for present purposes is whether the man ever participated in China's civil service examination. In the baseline, our elite indicator is equal to one if a man passed the civil service examination at any level

(local, provincial, and national), see column (3). Men also belong to the elite if they are official students en route to passing the next level of the civil service examinations. The most important types of students are in groups 9 and 12, see Table A.3, column (1).

That preparing and passing the civil service examination had high monetary returns is well-established. For details on the income and wealth of top-level exam graduates (*jinshi*) as well as officials, see Chang (1962). High income and wealth, however, was not enough to belong to the elite. There were also wealthy men that were not *jinshi* and top-level officials, though their number is relatively small (one percent of the sample, see group 8, column (1), of Table A.3). This is because passing the civil service exam elevated the status of a person by so much even members of the wealthiest families sought to acquire the skills to pass the civil service exam. For example, several of the Cohong merchants engaged in the lucrative bi-lateral monopoly trading relationship with Western countries in Canton (Guangzhou) in the early 1800s sought to rise to the highest government offices requiring *jinshi* degrees, without success, so they stayed at lower level positions (Chang 1955). Passing the civil service examinations was "the ultimate source of power", as noted in the seminal work by Ho (1967).

Table A.3: Elite Status and Genealogy Descriptors

(1) Social Standing	(2) Description	(3) Elite Status	(4) N	(5) Fraction (%)
0	No title, degree, and evidence of wealth	0	4,399	54.5
1	Honorary or posthumous title; village head; other honors	0	46	0.6
2	Multiple wives in consecutive marriage (two or more not living at the same time)	0	434	5.4
3	Evidence of moderate wealth of 1st degree family, incl. minor and expectant official, lower level degree *(shengyuan*, *jiansheng*), and official student	0	1,015	12.6
4	Wealthy family member 2nd degree, incl. official, *juren*, *gongsheng*, and *jinshi*	0	20	0.2
5	Wealthy family member 1st degree, incl. official, *juren*, *gongsheng*, and *jinshi*	0	20	0.2
6	Educated, scholar, no degrees or office; editor of genealogy; refused office, or prepared but did not pass exam	0	273	3.4
7	Two or more wives or concubines at the same time	0	180	2.2
8	Substantial evidence of wealth and property; set up lineage estates, large donations, philantrophy; wealthy farmer, landowner, or merchant	0	79	1.0
9	Official Student (Province)	1	529	6.6
10	Military *shengyuan*, minor military office	0	0	0.0
11	Purchased *jiansheng* and/or purchased office	0	188	2.3
12	Student of the Imperial Academy	1	400	5.0
13	Civil *shengyuan*; minor civil office	1	199	2.5
14	Expectant official; no degrees	0	36	0.4
15	Expectant official one of the lower degrees	1	5	< 0.1
16	Military *juren*, *jinshi*; major military office	1	2	< 0.1
17	Civil official with no degree, minor degree, or purchased degree	0	68	0.8
18	*juren*, *gongsheng*, with no office	1	38	0.5
19	*juren*, *gongsheng*; with expectant office	1	53	0.7
20	*jinshi*, no office	1	0	0
21	*jinshi* with official provincial post or expectant official	1	1	< 0.1
22	*jinshi* with top-level position in Imperial bureaucracy (Hanlin Academy, Grand Secretariat, Five Boards, Prime Minister)	1	83	1.0
All			8,068	100.0

Notes: Table gives information on a man's elite status in the six-generation linked sample. Based on Telford (1986, 1992), Chang (1955, 1962), Ho (1967), and Eberhard (1962).

The final two columns of Table A.3 report the size of each group in the inter-generationally linked sample. Employing the baseline definition in column (3), 16% of the men have attained elite status during their lifetimes.

Descriptors that determine a man's elite status and social standing in the genealogy are shown in column (2) of Table A.3. If there is nothing other than vital statistics in the individual's biography, and this person had no evidence of wealth, degrees, or titles, then he is coded as a member of group 0 (first line of Table A.3). These individuals would have lived close to subsistence during the sample period, and

one can think of them as commoners.

Among the civil service exam degrees, *shengyuan* was the lowest degree of the recognized categories of government education, conferred upon those who had passed the local degree threshold. The *shengyuan* who were more competent were awarded with the *gongsheng*, "imperial student" title; above them in rank were the *juren* (graduate of the provincial examinations), and above the *juren* were the *jinshi* (graduate of the national metropolitan examinations). The levels are building up on each other, that is, in order to have the *jinshi* degree one must have the *juren* and the *shengyuan*, and in order to be *juren* one must have passed the *shengyuan* examination. There were no age requirements or limitations for advancement, but since the examinations required a high level of literacy and years of study, the earliest that one could attain the *jinshi* degree would be in the low twenties, and it was not unheard of for a man in his fifties to still be a *shengyuan*. Not all *shengyuan* advanced to the next levels, and those who didn't may have given up and turned instead to working for officials in a secretarial capacity, or, helping to manage local affairs—settling disputes, organizing local public goods projects, improving welfare and security interests, or providing education in their community (Chang 1962). In that sense, acquiring human capital by preparing for the civil service examinations had returns even for those who did not pass, let alone pass at the highest levels of the examinations.

C.2 Elite Status and Income

Elite status in society translated into income and wealth differences. There is no systematic information on the income or wealth of individual men, but having passed a certain level of degree made a person eligible for a certain level of official position. For example, there were nine levels of civil positions during the late 19th century (Chang 1962, Table 1). A district magistrate would be seventh-ranked civil official, while a provincial governor would be a second-level civil official. The mapping between degree and official position was not deterministic, however, the level of office was increasing in the degree that a man had obtained. Becoming a top-level official in the imperial bureaucracy with only a *shengyuan* (local) degree was almost impossible, and conversely, most *jinshi* had better-paid positions than being a district magistrate. The level of degree is useful because they are consistently mentioned in the data.

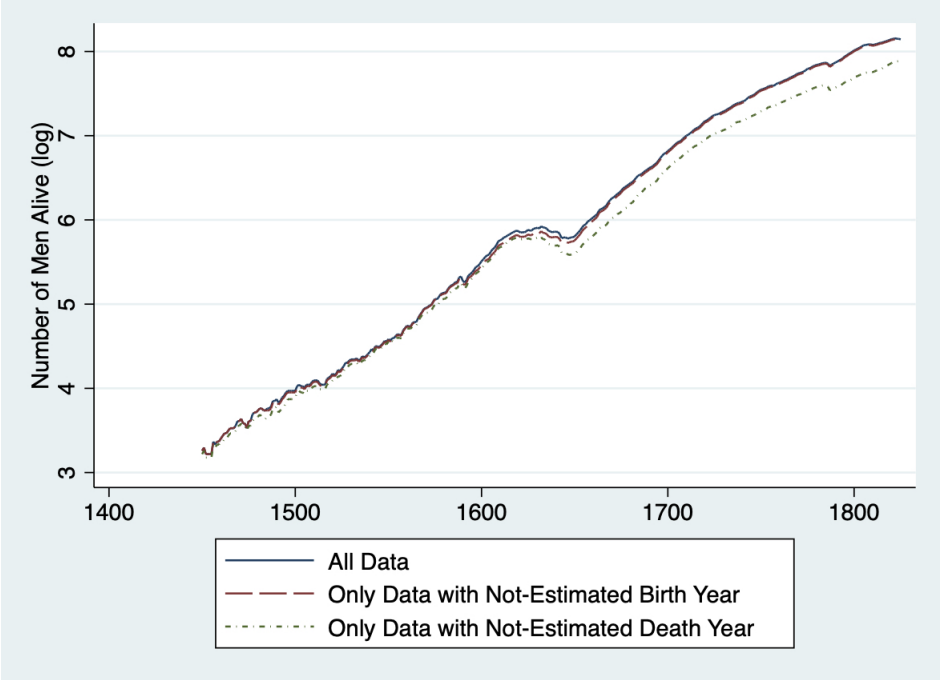
At least for certain periods, the salaries of government officials at different levels are known (see Chang 1962). However, official salaries accounted for only a small part of the total compensation of government

officials; the larger portion of their income were other contributions on which there is less systematic data. At the same time, high-level officials were also expected to contribute to local public goods to a substantial degree. Arguably the best information on status differences comes from assessment schedules of clans to their members who have reached higher positions. This can be thought of a tax on the clan member who has achieved a significant level of status, see, e.g., Chang (1962).

C.3 Estimation of Vital Statistics

Figure A.9 shows fall of Ming population shock using the full sample as well as dropping observations with estimated vital statistics.

Figure A.9: The Ming-Qing Population Shock and Estimated Vitals



Notes: Figure shows the size of the population shock in the Ming-Qing transition using all data versus two samples that drop observations with estimated vitals.

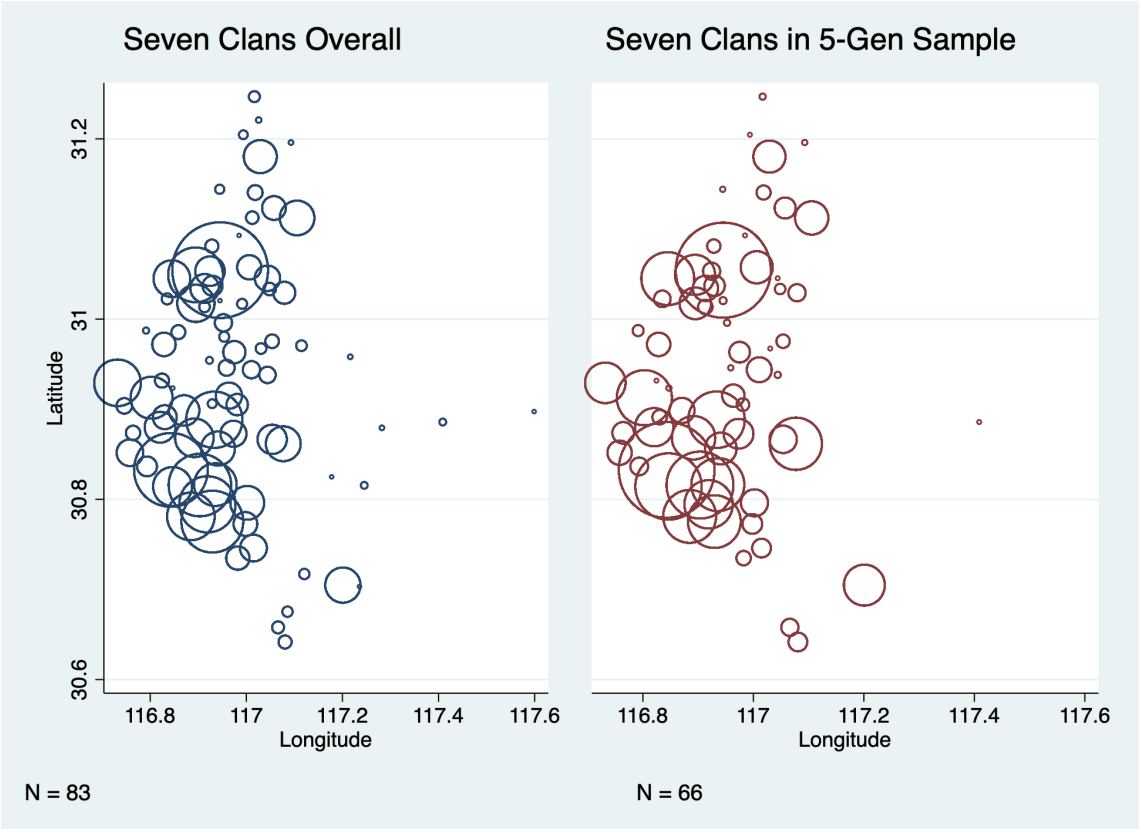
Notice that the negative Ming-Qing transition population shock is not due to the estimation of vital statistics. If anything a focus on non-estimated data would increase the size of the shock, as one would expect if the estimation introduces classical measurement error.

D The Five-Linked-Generations Subsample

D.1 Selection in Terms of the Set of Residence Locations

Figure A.10 shows the extent to which the five-generationally linked sample is a subset of the clan records overall in terms of villages that are included. Specifically, there are N = 83 locations in the sample overall, and this number shrinks to N = 66 in the sample that conditions on quintuplets of intergenerational links (son to great-great grandfather).

Figure A.10: Inter-generational Linking and Selection in Terms of Geography

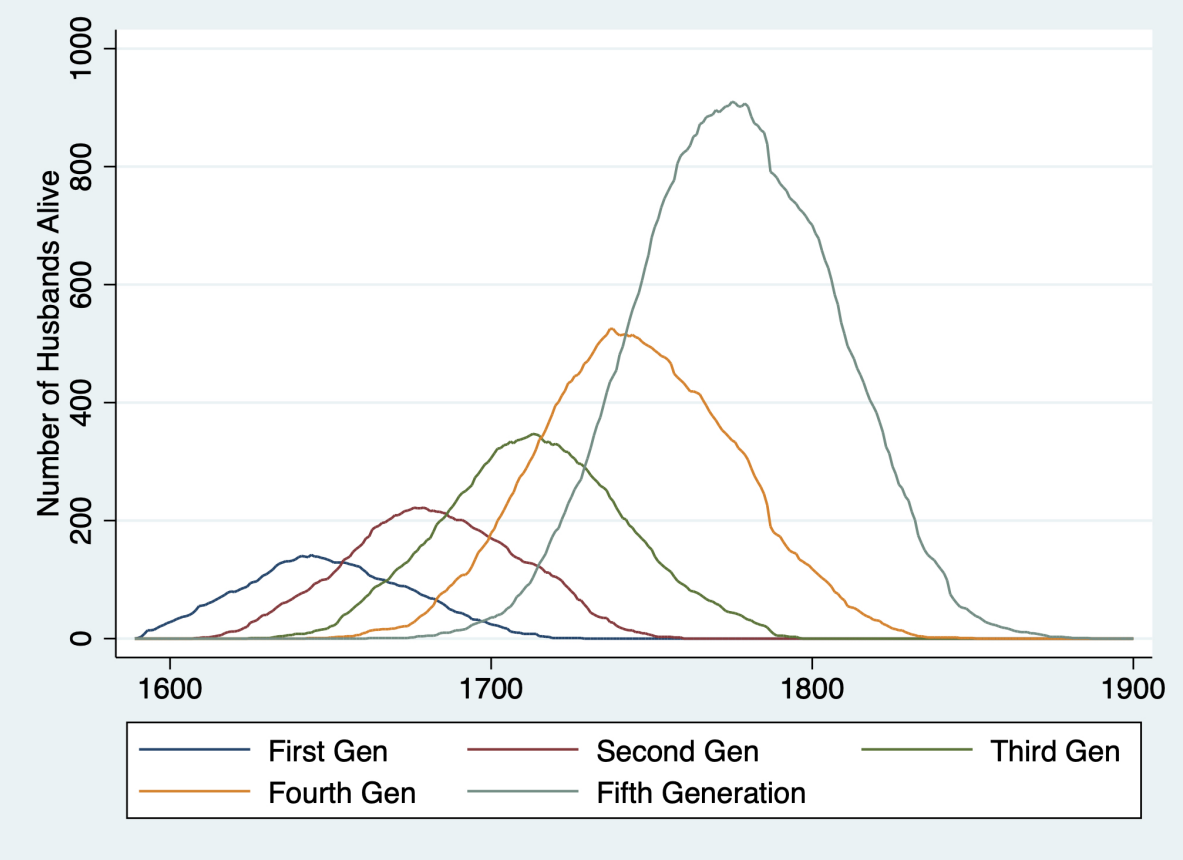


Notes: Shown are residence locations of members of the seven male clans (1) overall on the left, and for (2) couples in the five-generation linked sample on the right. Size of circle is proportional to number of heads of household.

Furthermore, we see that it is primarily locations with relatively few households that disappear through the linking.

Figure A.11 shows the number of unique husbands by generation.

Figure A.11: Number of Husbands by Generation over Time



Notes: Figure shows the number of husbands alive in each of the five generations in relation to calendar time.

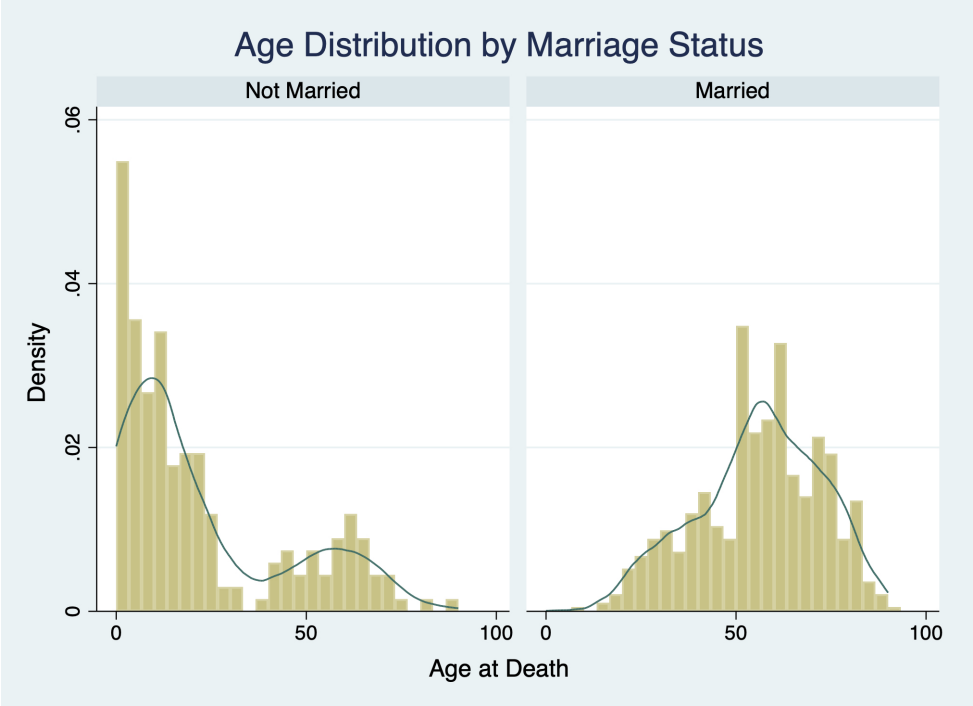
D.2 Impact on the Continuation of Family Lines

Selection is present in intergenerational analysis if being able to make intergenerational links is not orthogonal to the outcome of interest. Here, the existence of an intergenerational link depends on a male child being able to marry, which could, e.g., be influenced by parent resources. Factors such as race, ethnicity, or surname play less of a role here, because all individuals in the sample share the same race and ethnicity, and given information in the genealogies, intergenerational links are established with virtual certainty. Because there is consistent information on male children in our sample, it is possible to analyze major margins of selection by using information on male children together with that on males that we know have married.

One determinant of whether a given male would marry later in life is clearly whether he would survive

childhood to reach a marriageable age. Figure A.12 shows the distribution of the length of life time of second-generation males by marriage status. For non-married males (left panel), the distribution of age at death is bi-modal, and the highest density of males is for those that do not live beyond three years of age. The main reason for this is infant mortality. Another, local maximum of those that do not marry is around 60 years. The main reason that these males do not marry is that given the prevailing male-female sex ratio of larger than one, these men are not rich enough to marry. In comparison, the distribution of longevity for married men has a single maximum around 52 years (Figure A.12, right side).

Figure A.12: Age at Death by Marriage Status



Notes: Figure shows densities of age at death of two samples, the second-generation males that were able to marry and of the sample of second-generation males that were not able to marry, right and left panel, respectively.

Based on this we examine whether the fall of the Ming appears to have an impact on lifespan (age at death). The specification is given by

$$age_{i(p)2} = \alpha + \beta d_{i(p)} + \beta_f hfstat_{i0} + \eta_g + X\gamma + \varepsilon_{i(p)}, \tag{5}$$

where $age_{i(p)2}$ is longevity, measured as death year minus birth year, of individual i in generation 2 who is descending of pair p, the variable $hfstat_{i0}$ denotes the social status of individual i's pre-shock grandfather, and the vector X are male and female clan fixed effects. Table A.4 shows the results.

Table A.4: Impact on Longevity and Marriage Probability

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. var.	Longevity					Marriage	
Variable z_i			Human Capital	Longevity Father	Longevity Mother	Human Capital	Mother Longevity
Fall of Ming Shock	−4.514	−4.249	−9.959*	−39.896**	−37.610**	−0.061	−0.467**
	(3.114)	(3.527)	(4.315)	(13.274)	(10.538)	(0.087)	(0.176)
Ming Shock x z_i			16.524**	0.617**	0.574**	−0.031	0.006*
			(6.022)	(0.229)	(0.179)	(0.113)	(0.003)
z_i			−8.803	−0.217	−0.084	0.187+	−0.000
			(5.664)	(0.218)	(0.218)	(0.100)	(0.003)
Father Status	0.336*	0.934**	0.109	0.361*	0.336*	−0.002	0.005
	(0.169)	(0.247)	(0.219)	(0.177)	(0.162)	(0.004)	(0.004)
Birth Year FE	Y	Y	Y	Y	Y	Y	Y
Husband Clan FE	N	Y	N	N	N	N	N
Wife Clan FE	N	Y	N	N	N	N	N
N	774	761	774	774	767	801	789

Notes: Dependent variable is age at death (longevity) of male descendant of treatment generation couple in columns (1) to (5), and marriage indicator in columns (6) to (8); estimation of equation (5) by OLS. Robust standard errors clustered at the level of the treatment generation couple; **/*/+ indicates significant at the 1%/5%/10% level.

The coefficient for $d_{i(p)}$ is estimated at about -4.5 (column (1)). This indicates that on average, the shock tends to reduce age at death by more than four years (not significant). Adding fixed effects for each of the seven male clans as well as the clans of the in-marrying mothers (68 fixed effects) does not change the point estimate much (column (2)). The impact of the shock on the son's length of life might depend on family characteristics. Introducing the interaction of the shock with some variable $z_{i(p)}$, denoted by $z_{i(p)} \times d_{i(p)}$, the specification becomes

$$age_{i(p)1} = \alpha + \beta_1 d_{i(p)} + \beta_2 \left(z_{i(p)} \times d_{i(p)} \right) + \beta_3 z_{i(p)} + \beta_f hfstat_{i0} + \eta_g + \varepsilon_{i(p)}, \tag{6}$$

where $z_{i(p)}$ a characteristic of the treatment generation couple, p, is also included linearly. Results are shown in Table A.4. In the first of these specifications, variable $z_{i(p)}$ is the human capital of the father (man in first generation). Having a human capital holding father switches the shock impact on son's life time from negative to positive (-10 + 16.5 = 6.5), at the same time when sons of fathers with human capital

in this generation generally tend to have a shorter life time (coefficient on $z_{i(p)}$ is -8.8, not significant). Son lifetime is not only related to the family's resource endowment but also to its genetic endowment. In the remaining two specifications, the longevity of father and mother is employed as measures of health (genetic endowment). Results show that controlling for health, the impact of the Ming-Qing shock on son longevity is significantly negative (columns (4) and (5)).

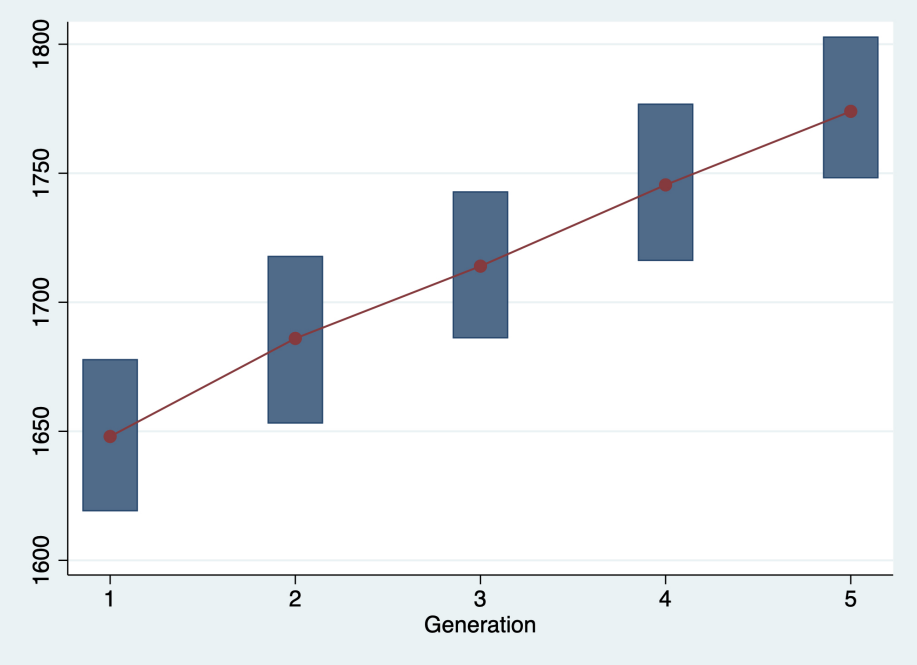
Turning to the impact of the Ming-Qing transition shock on marriage, Table A.4 shows the results on the right side. On average, sons of fathers with human capital have a roughly 19% higher chance to marry (column (6)). The fall of Ming shock tends to reduce the marriage probability by about 6 percent, and by about 9 percent if the father has human capital (not significant). Generally, the probability to marry is more closely related to the mother than to the father. Controlling for mother longevity, the shock leads to a significant reduction in the marriage probability, while for every ten years of mother longevity the probability to marry increases on average by a six percentage points ((column (7)). An analysis of the distribution of longevity by marriage status confirms that child mortality is a major channel through which the shock has cut off family lines (see Figure A.12).

This section has shown that the Ming-Qing transition shock has cut off family lines by shortening the life time of males and their ability to marry. The overall impact of the shock is composed of this shortening of family lines together with the effects on descendants that succeeded to have four generations.

D.3 Typical Lifetime of Generations

Figure A.13 shows the typical lifetime of each of the five generations.

Figure A.13: Typical Lifetimes by Generation



Notes: Bars show median birth and death year by generation, with the line giving the average life midpoint (1/2*(birth year + death year)) by generation.