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# Social mobility in the Tang Dynasty as the Imperial Examination rose and aristocratic family pedigree declined, 618–907 CE

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Data from the distant past are fertile ground for testing social science theories of education and social mobility. In this study, we construct a dataset from 3,640 tomb epitaphs of males in China's Tang Dynasty (618–907 CE), which contain granular and extensive information about the ancestral origins, family background, and career histories of the deceased elites. Our statistical analysis of the complete profiles yields evidence of the transition away from an aristocratic society in three key trends: 1) family pedigree (i.e., aristocracy) mattered less for career achievement over time, 2) passing the Imperial Examination (*Keju*) became an increasingly important predictor of one's career achievement, and 3) father's position always mattered throughout the Tang, especially for men who did not pass the *Keju*. The twilight of medieval Chinese aristocracy, according to the data, began in as early as the mid-seventh century CE.

intergenerational mobility | education | aristocracy | Chinese history | historical research

Education has been central to sociological analysis of mobility for almost one hundred years (1). Blau and Duncan (2) literally put education in the center of their 1967\* model. Implicit in much of this work, including recent work (3), is an assumption that education rose to a prominent role in social stratification in the twentieth century CE (4). As such, its centrality is an element of modernity. Treiman (5) made the connection explicit, noting that a hallmark of the industrial age was ever-greater complexity in both products and production, complexity that used and rewarded the skills acquired in secondary schools. Technological change and the expansion of financial, professional, and health services increased demand for post-secondary education (4).

Scholars often abstract three main components of the Blau–Duncan model: (a) inequality of educational opportunity, measured as the statistical association between social origins and education, (b) the “direct” effect of social origins on people's adult outcomes, and (c) the effect of education on those outcomes (6). The model implies that the total correlation between social origins and destinations ( $r_{od}$ ) is a function of these three components:  $r_{od} = ac + b$ . Blau and Duncan (2) hypothesized that constant (over time or among nations) social mobility  $r_{od}$  might hide a changing balance between  $ac$  and  $b$ . Treiman (5) hypothesized that industrialization might well increase social mobility by decreasing all three components.

Most evidence on these hypotheses comes from data collected between 1950 and 2020 (3). Seventy years is a long time but not enough time to say whether the central role of education in social mobility is a consequence of modernity or of education per se. For that, we need information from pre-modern societies. In recent years, the growing volume of historical data available to researchers has expanded the opportunity to study total mobility (7–9). Unfortunately, few of those studies include education.

To study pre-modern society, scholars need to think of family in pre-modern ways. In his agenda-setting paper, Mare (10) called for a multigenerational view that started with parents and grandparents and grew broader to include more of each person's ancestral line. Clans and even dynasties may have been relevant in antiquity, he argued.

Tomb epitaphs of Chinese elites in the Tang Dynasty (618–907) contain data of this sort. Epitaphs written in the Tang period tended to describe the individual's life in great detail (Fig. 1). They included on the deceased's career, whether he passed the imperial exam (*Keju*), his father's and grandfather's occupations, and his ancestral “branch.” Tackett (11) digitized a significant portion of this information. We extended that and constructed a dataset containing information from 3,640 excavated or otherwise documented tomb epitaphs of male Tang Dynasty elites.<sup>†</sup>

## Significance

Sociologists and economists have shown how education can both equalize mobility chances and reproduce inequalities. Most think education's dual role emerged in the twentieth century. Data from excavated tomb epitaphs of male elites in China's Tang Dynasty (618–907 CE), reveal patterns of education and mobility very much like contemporary patterns. After 650 CE, China's Imperial Examination System (*Keju*) shaped social mobility in the medieval bureaucracy much as university education shapes mobility in rich countries today. Early in the Tang Dynasty, aristocratic ancestry was a distinct advantage, but over time, exam results overtook aristocracy. The fall of family ties and rise of credentials is relevant to historians' debates on the fate of China's medieval aristocracy.

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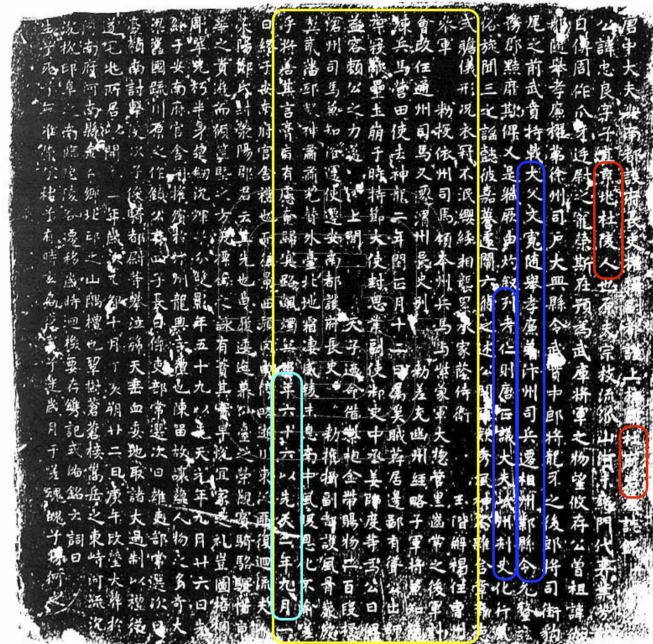
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<sup>†</sup>Our multivariate analyses are based on 2,636 records with complete information.



**Fig. 1.** The Rubbing of a Tomb Epitaph of a Deceased Elite (Du Zhongliang 杜忠良) in the Tang Dynasty. Notes: Red = surname and choronym; Blue = grandfather and father's full name and office rank; Yellow = the deceased elite's career trajectory; Green = age at death and time of death. Source: National Library of China.

We used these data to quantify a grand transformation in Chinese history—the transition away from an aristocratic society. Specifically, our statistical analysis shows that coming from a prominent ancient great house or branch mattered less for career success in the bureaucratic system after roughly 650 while passing the *Keju* came to matter more. Furthermore, passing the exam may have even equalized chances of subsequent success, as father's occupation was not a factor in the occupational rank of men who passed the *Keju*.

The Tang Dynasty is intrinsically interesting due to its antiquity, of course, but it is relevant for our agenda because it was the only long-lived Chinese dynasty where competitive exams for entrance into the bureaucracy coincided with a significant presence of aristocratic clans in politics. Prior to the Tang, the ruling class controlled entry into the imperial bureaucracy through institutionalized patronage, based on recommendation, direct nomination, or pedigree-based allocation. A limited kind of *Keju* was introduced during the Sui Dynasty (581–618). During the Tang, the *Keju* expanded to more topics, and reforms around 650 made it open to most literate men. Sometime after that, the aristocracy disappeared (12–15). Historians still debate the timing and manner in which they vanished, and whether *Keju* played any role (11), but they agree that by the end of the Tang, the aristocracy was largely gone.

The rich information extracted from the tomb epitaphs of Tang elites allows us to characterize this period in great detail. For determinants of individual success, we investigate not only father's position, the defining variable in modern social mobility studies but also ancestral branch, a crucial factor in the pre-modern era, and the *Keju*, unique to the Chinese context. Our statistical analysis reveals that between the seventh and ninth century, passing the *Keju* had become increasingly important, while the effect of ancestry on career achievement, with or without controlling for channels affected by such pedigree, gradually

declined. Social mobility undermined aristocracy through the three centuries of the Tang Dynasty.

## Historical Studies of Intergenerational Mobility

Ho Ping-ti's classic study of late imperial China highlighted *Keju* as a “ladder of success” for the ordinary literati families (16). Hymes (17) and Elman (18, 19) disputed Ho's conclusions in various ways.<sup>‡</sup> Huang (20) advanced this historical literature, which previously relied on descriptive statistics, with rigorous multivariate statistical modeling. With the Chinese Government Employees Dataset-Qing (CGED-Q), researchers can now link records of over 300,000 government officials in China's late Qing Dynasty (1830–1912) and the corresponding *Keju* records, along with other information, to further investigate questions concerning historical mobility and social stratification in the last century of imperial China (21).

In this paper, we employ quantitative social science methodology that allows for controlling for various confounders and assessing competing effects [similar to methods in Huang (20)]. Our sample, however, is not restricted only to those who had already passed a certain stage of the *Keju*, as is the case in ref. 20 and to a large extent (21). It is thus conducive to estimating the “effect” of passing the *Keju* per se on career outcomes. Our techniques and data also enable us to control for a much wider array of family background variables, including father and grandfather office ranks, aristocratic pedigree, political factions [proxied by ancestral services in pre-Tang regimes, consistent with how (22) analyzes region-based political factions in the Tang], and membership in elite marriage networks (a point emphasized in ref. 17), and assess how the various effects varied throughout an entire dynasty. Substantively, the significance of the Tang is history: the Tang data are from the seventh through ninth centuries. We therefore extend social mobility studies even to medieval times, when an aristocracy was very much in power and competitive exams still developing.

Furthermore, our estimates of the relative roles that *Keju* and various dimensions of family background played in Tang China could bridge across this interdisciplinary scholarship on social mobility and *Keju* in late imperial China, and the separate medieval Chinese aristocracy literature that dovetails with the prominent “Tang-Song Transition Thesis.” We briefly discuss the latter literature in the penultimate section.

## Hypotheses

Mare (10) articulated a socio-demographic theory of how aristocratic legacy effects could combine with more immediate effects of grandfathers and fathers and accumulate over many generations. He never got to test it, but we can combine Mare's with Treiman's (5) hypotheses to get these three to be tested with the Tang data:

*Hypothesis 1:* Throughout the Tang Dynasty, family pedigree should play a diminishing role in men's career advancement in the bureaucratic system.

*Hypothesis 2:* Throughout the Tang Dynasty, father's status should play a diminishing role in men's career advancement in the bureaucratic system.

*Hypothesis 3:* Throughout the Tang Dynasty, passing the *Keju* should become increasingly important in men's career advancement in the bureaucratic system.

<sup>‡</sup>Hymes (17) studied the Song Dynasty, but he framed it as a corrective to Ho's study of late imperial China.

Even fuller information on families, crucially fertility, survival, and careers of all sons and grandsons of a given elite, would be needed to test Mare's full theory. Treiman focused on changes under industrialism. We stray beyond that limiting condition to consider long-term change, in general, as a heuristic to guide our work with the Tang data.

## Tomb Epitaphs in Medieval China

Tomb epitaphs in medieval China are slabs of stone inscribed with the deceased's biography. They were buried underground with the deceased, and could only be seen again after excavation. According to the historian Nicolas Tackett (11), "extant epitaphs represent a roughly random sample of the elite population" within each locale (p. 32). Because they are more representative of the whole literate population than other historical sources, epitaphs have become the main materials for recent demographic research on the Tang (23, 24). A "nearly random" sample could yield biased results if either the process of making epitaphs or finding them left out successful aristocrats or men from particular places. We used estimates of the geographic distribution of Tang officials, including the claim on a contemporary bureaucrat's memorial that "approximately 8 to 9 people compete for one entry spot" (25, vol. 17) to reweight the data several ways designed to reveal those biases, if present. All of the variations, which we report in *SI Appendix, section 8*, yielded results that closely resemble the results in Table 2 and Fig. 3.

Epitaphs written between the fifth century and the eleventh century China, including during the Tang Dynasty, tended to be highly detailed descriptions of an individual's life and family background, accompanied by stylized prose and poems. A medieval Chinese epitaph usually started with a person's ancestry, including the surname and the clan choronym. Then, it introduced the key offices held by ancestors, going back as many as three generations. A prominent remote ancestor, if there was one, might also be mentioned. The main body of the epitaph described the individual's life course in great detail, including his exam success (if any) and his entire career trajectory, if applicable. The epitaph text usually closed with a long poem or prose essay, as in Fig. 1.

The contents of most tomb epitaphs remained unknown until their excavation in recent decades. Tomb epitaphs have long been used by historians as primary sources in their analysis of social and political history. They have recently garnered attention from social scientists because of their potential for quantitative analyses (15, 26).

The basis of our dataset comes from Tackett (11). We added data to that base. The Tackett database contains elites active between 618 and 907, collected from epitaphs and other sources, such as dynastic histories, with the latter contributing far more data points. This paper only uses the male epitaphs for analysis. We removed elites who died after 907 (the official ending year of the Tang). After cleaning, the resulting database we use included 3,640 males. Our statistical analyses used the 2,636 cases with complete data on all variables.

## Original Data Collection

**Office Ranks.** The Tackett database contains the title of the last office held by the deceased before he died as well as the titles of offices (almost certainly the highest ones) held by the father and grandfather of the deceased, as mentioned in the epitaph. The Tang Dynasty, as with all other imperial Chinese dynasties,

distinguished bureaucrats by the ranks of their office titles. We added the ranks to the Tackett database and gave them scores.

To assign scores, first, we extracted the treatises on office titles and ranks from historical texts written in the eleventh century and before. These include the *Comprehensive Statutes (Tongdian)*, *New Book of Tang (Xin Tang Shu)*, *Old Book of Tang (Jiu Tang Shu)*, *Book of Sui (Sui Shu)*, *Book of Zhou (Zhou Shu)*, and *Book of Wei (Wei Shu)*. Then, we created a dictionary of office titles alongside their ranks. Finally, we matched office titles in the Tackett database with their ranks using this dictionary.<sup>§</sup> The Tang Dynasty had nine ranks and numerous sub-ranks. For details on how we converted these ranks into a continuous variable, with higher values indicating higher career success, refer to *SI Appendix, section 1*.

**Examination Success.** For each person in the Tackett database, we collected information on whether he had passed *Keju*. Our data come from four sources. For 35.5% of the individuals, the Tackett database recorded some information about their career histories, which mentions exam success if applicable. We consulted two additional sources specifically designated for *Keju* information in the Tang. Ref. 27 is a compilation of Tang *Keju* records maintained and updated by generations of historians in imperial and modern China; Database of Imperial Examination Figures Across Dynasties, maintained by Zhejiang University scholars, is a commercial database aimed at exhausting the universe of exam passers in Chinese history. Last but not least, we cross-checked the data collected from the three sources aforementioned by reading the actual epitaph inscriptions, which were not preserved in the Tackett database. We are able to locate the texts of most epitaphs in the China Stone Inscription Database and archaeological reports as well as scholarly publications. Overall, our data suggest that 13.65% of male elites in the Tang had obtained *Keju* degrees.

**Operationalizing Aristocracy.** Medieval Chinese aristocrats were generally addressed by their choronym-surname (*junxing*) combinations (i.e., Du of Jingzhao, Yang of Hongnong, etc.). Such combinations offer a popular way to quantify aristocratic status (12). However, it is problematic for the Tang context because successful people from humbler background in many cases falsely claimed to descend from important choronyms (28). To further distinguish themselves, Tang aristocrats added the specific branch (*fanzhi*) name of the choronym-surname combination to their identities. We operationalize the concept of aristocracy using branches *within* individuals' choronym-surnames. Specifically, we regard an individual in our data as an aristocrat (or one with high family pedigree) if we can trace his ancestry, through reliable genealogy sources, to a prominent branch. We scrutinized the ancestry of every person in the dataset generation by generation, consulting a variety of sources. See *SI Appendix, section 1* for details of our construction and *SI Appendix, section 9* for a validity check. When discussing empirical results, we will use the words "aristocracy," "aristocrats," "prominent branch(es)," and "family pedigree" interchangeably.

This operationalization builds on the consensus among historians that family background in medieval Chinese reflected not only patronage and privilege through the achievements of one's immediate ancestors but also a component that reflected the prestige and pedigree of the ancient bloodline itself net of patronage (29, 30). Our measure of family pedigree directly

<sup>§</sup>Because the titles in tomb inscriptions sometimes used slightly different wording than the official positions in the dictionary, this process was only semi-automated.

reflects bloodline, while father office rank and other control variables capture patronage. Mare's (10) sociology of dynasty also emphasized bloodline.

## Methods

In order to test the three hypotheses proposed, we specified a multivariate regression model:

$$\begin{aligned} \text{Rank} = & \Sigma\alpha_k\mathbf{X}_k + \Sigma\beta_k\mathbf{X}_k \times T \\ & + \Sigma\gamma_k\mathbf{X}_k \times T^2 + \mu_{pt} + \xi_{it} + \epsilon, \end{aligned} \quad [1]$$

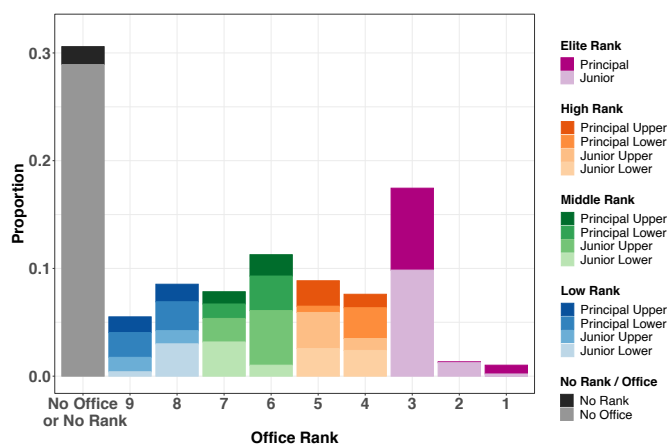
where *Rank* is our outcome of interest—a man's office rank in the bureaucratic system—measured as a continuous variable ranging from 0 (no office) to 19 (highest rank).  $\mathbf{X}$  denotes independent variables. Our key independent variables include origin in a prominent branch (yes = 1), passing the *Keju* (yes = 1), and father's office rank (0–19). In addition, we control for grandfather's office rank (0–19) and whether the person belonged to the elite marriage networks. In our analyses of continuous change across decades, we also multiplied these variables by decade of birth ( $T$ ) and its square ( $T^2$ ), to capture how these effects evolved over time. Finally, we included an indicator variable equal to one if the epitaph is preserved only in transmitted texts or zero if it was excavated. According to our hypotheses, we expect to observe a declining positive effect on occupational destination of prominent branch and father's rank throughout the Tang Dynasty and an increasingly positive effect of passing the *Keju*. Finally, we included two interactions designed to control for unobservables that might be correlated with the  $\mathbf{X}$  variables: modern-day province of excavation ( $p$ ) by decade of birth ( $T$ ) and ancestral regime prior to the Tang ( $r$ ) by decade of birth ( $T$ ). Some men died very young, but that does not account for our findings; the results were similar when we dropped men who died before turning 20 (*SI Appendix, section 4*).<sup>4</sup>

To support the decomposition of mobility into the direct and indirect effects of origins, Table 2 also includes regressions of *Keju* success on background.

## Empirical Results

We begin with descriptive statistics. Fig. 2 presents the distribution of office ranks in our sample. More than 30% men in our data had no office or rank. Among men with an office rank, status varied widely. These findings confirm that although the population with tomb epitaphs may have been an elite group, they achieved a wide range of outcomes in the bureaucratic system. The third rank was the most frequent outcome. It was the threshold of the inner circle. We suspect that most men who reached the junior third level passed through lower ranks during their career. Almost by definition the top two ranks were very small, so principal third level was a terminal rank for many men.

Table 1 reports the means of our key variables in the full sample, the pre-Empress subsample, and the post-Empress subsample. This two-period division is informed by historical research on the role of Empress Wu Zetian (the only female emperor in Chinese history) in reforming the *Keju*. Specifically, we divided the data into those who died before 690, the year Empress Wu claimed the throne, and those who died afterward. Note that Empress Wu's rise to power began in earnest in as early as 655–656, when she was made empress consort by her emperor husband and those who had opposed the marriage got purged. The changes to the *Keju* were not all uni-directional and there were multiple episodes of policy reversions (32, 33). Almost one-fourth (24.5%) of the men in our sample descended from a prominent branch. They were aristocrats in medieval



**Fig. 2.** The distribution of office rank among the Tang elites. *Notes:* From left to right, each bar represents a rank category in hierarchical order, scored from 10 (no office or no rank) to 1 (highest), with two or four levels distinguished within ranks.

China by our definition. The prevalence of aristocrats changed little over time; it increased four percentage points between the early and late periods. Father's status was similarly stable over the three centuries (the half-rank difference between the pre- and post-Empress means was not statistically significant). The *Keju*, on the other hand, became more prominent after Empress Wu Zetian's rule; in the pre-Empress period, only 6.7% men who were successful in the *Keju*, but the number increased to almost 17% in the post-Empress period.

The simple correlation of father's and son's rank in the Tang elite was 0.41. That is less than estimates for men in nineteenth century Europe (7) but not far from contemporary estimates for American men (34), despite the broader base and different measures of social standing in contemporary studies.

**Two-Period Analysis.** We now move on to interpret results from multivariate regression analysis, starting with Table 2. Recall that the higher the value of the dependent variable, the more successful the son's career is. Models 1 and 2 are regressions for the pre-Empress and post-Empress subsamples, separately. We observe reverse patterns regarding family pedigree and *Keju* before and after Empress Wu. In the earlier period of the Tang Dynasty, coming from a prominent branch could help a man climb significantly higher in the bureaucratic hierarchy. Compared to those without an aristocratic background, decedents of a prominent branch on average ranked almost two points higher on the occupational status scale. The effect size is substantial. In contrast, passing the *Keju* during early Tang had no effect on career advancement. Thus before 690, the Tang society could still be regarded as an aristocratic society. Bloodline mattered, and exam success did not.

Results obtained from Model 2 reveal how profoundly Chinese social structure changed after 690. The aristocracy no longer dominated, as prominent branch status no longer improved an individual's position in the bureaucratic system. Class advantage did not disappear altogether as each point of father's status raised his son's status by 0.27 point as before, but that one-generation advantage was no longer compounded by the legacy of many generations. As lineage mattered less, performance mattered more. Passing the competitive exams could, after 690, land a man into office at least one full rank higher than that achieved by an otherwise comparable man who had not passed the exam. In

<sup>4</sup>Tackett (31) oversampled individuals who died during three time slices (650 to 660, 720 to 730, and 800 to 810) and those whose families produced chief ministers. In *SI Appendix, sections 5 and 6*, we show that even after removing cases that were oversampled, the main findings remain highly robust.

**Table 1. Descriptive statistics on key variables for all Tang years and before and after the reign of Empress Wu Zetian**

Variables	All years (618–907 CE)	Before Empress (Before 690 CE)	During & after Empress (690–907 CE)
Origin: Prominent branch	0.245 (0.430)	0.211 (0.408)	0.251 (0.433)
Origin: Father’s office rank	7.337 (5.561)	8.094 (5.263)	7.206 (5.602)
Passed the imperial exam ( <i>Keju</i> )	0.153 (0.360)	0.067 (0.250)	0.167 (0.373)
Destination: Office rank	7.074 (5.673)	5.729 (5.470)	7.307 (5.676)
Number of observations	2,636	389	2,247

Notes: SDs are in parentheses.  
Office ranks ranged from 0 to 19.  
Cases with complete data on all variables (72% of the original 3,640 cases).

short, after the reforms to the *Keju* associated with Empress Wu and later rulers, the political advantage of the ancient great houses vanished, and the recruitment process for the Tang government relied on selection criteria the regime itself devised and promoted.

Model 3 combines all periods and is mainly of statistical interest as a baseline for Model 4.

Could a son transcend his background altogether? Sociologists have found that, in contemporary, post-industrial societies,

higher education can overcome the disadvantage of low-status birth for young people who complete university degrees (3, 35, 36).# The *Keju* was still evolving in 690, and Tang society, even high society, was far from modern. Yet the question of escaping one’s origin is worth answering. To get an answer, we add interaction terms between prominent branch and *Keju* success and between father’s office rank and *Keju* success, respectively, to Model 3 (yielding Model 4). If *Keju* equalized chances,

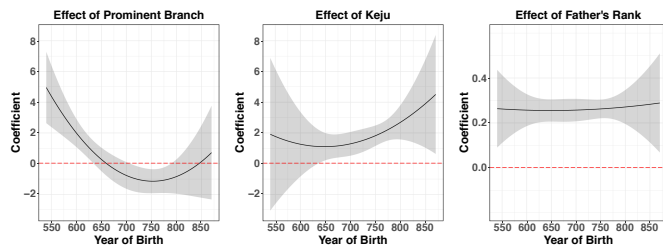
**Table 2. Regression of (A) highest rank attained and (B) exam success on family pedigree, father’s position, and, for (A), passing the imperial exam (*Keju*) for the period before Empress Wu, after Empress Wu, and all years of the Tang Dynasty**

Variables	Before Empress	During and after Empress Model 2	All years	
	Model 1		Model 3	Model 4
<b>A. Outcome: Highest rank attained</b>				
Prominent branch	2.040* (0.852)	−0.438 (0.366)	0.047 (0.365)	0.181 (0.432)
Father’s office rank	0.269** (0.064)	0.265*** (0.019)	0.261*** (0.018)	0.287*** (0.021)
Exam success	−0.208 (1.250)	1.940*** (0.312)	1.750*** (0.317)	3.650*** (0.505)
Prominent branch × exam success				−0.492 (0.594)
Father’s office rank × exam success				−0.197*** (0.038)
Observations	389	2,247	2,636	2,636
Within R <sup>2</sup>	0.119	0.146	0.132	0.136
R <sup>2</sup>	0.525	0.403	0.406	0.409
<b>B. Outcome: Exam success</b>				
Prominent branch	−0.061 (0.044)	−0.045 (0.030)	−0.045 (0.027)	−
Father’s office rank	0.001 (0.003)	0.000 (0.001)	0.000 (0.001)	−
Observations	389	2,247	2,636	
Within R <sup>2</sup>	0.011	0.061	0.057	
R <sup>2</sup>	0.465	0.243	0.252	

Notes: \*P < 0.05, \*\*P < 0.01, \*\*\* P < 0.001.  
Clustered SEs are in parentheses.

All models control for grandfather’s office rank, whether the individual belonged to the elite marriage network, whether the epitaph is preserved only in transmitted texts (not yet excavated), and fixed effects for modern province of excavation-by-decade of birth and ancestral regime prior to the Tang-by-decade of birth.

#This pattern can also be viewed as higher returns to education among lower-origin people (37, 38).



**Fig. 3.** Estimates of the effects of ancestral branch, *Keju* success, and father's rank on office rank over time (point estimates with 95% CIs).

the interaction terms will be significantly less than zero. The coefficient for the interaction between father's office rank and *Keju* was significantly less than zero. The coefficient for the interaction between prominent branch and *Keju* was not but that did not matter because the main effect of prominent branch was near zero in all models. The marginal effect of father's position was 0.28 for men who did not pass the *Keju* but a statistically insignificant 0.08 for those who passed it.

The *Keju* could have just been a novel status symbol or legitimization of already existing privilege. If so, then a statistical analysis could predict exam success accurately from data on prominent branch membership and ancestors' statuses. But it was not so. The *Lower* panel of Table 2 shows that neither prominent branch nor father's rank predicted exam success.

Statistical results in Table 2 shed light on how China shifted away from aristocracy. But they broke a continuous process into two discrete eras. We use a different statistical approach in the next subsection, to examine smoother processes.

**Continuous Change Across Decades.** Fig. 3 presents estimates of 1) coming from a prominent branch (*Left* plot), 2) passing the *Keju* (*Middle* plot), and 3) father's office rank (*Right* plot) on a men's own office rank with 95% CIs, controlling for other factors. Men from a prominent branch enjoyed substantial advantages in advancing through the bureaucracy early in the Tang, but, by our estimates, that advantage fell through the seventh century and was not significant thereafter. This empirical pattern reflects a chronic decline of the medieval Chinese aristocracy as a group. A more adequate methodology, by avoiding selection on the dependent variable, leads us to find evidence of earlier decline than simpler calculations revealed using very similar data (11, 31).

The *Middle* plot shows an opposite trend regarding the effect of *Keju*. Exam success became increasingly important for men born in the later period of the Tang Dynasty, net of confounding factors. The point estimate of the marginal effect of passing the *Keju* doubled from two points at the initial ascendancy of Empress Wu Zetian to four points by end of the dynasty, implying that Chinese rulers became more and more dependent on the *Keju* to fill their government as time went on. This empirical pattern lends strong support, again, for older historical studies on the Tang, especially (22). For educated men, participating in the exams had become crucial if they aspired to a successful career. *Keju's* independently strong role in climbing the bureaucratic ranks, growing over time, underlined a highly dynamic society from the seventh century onward. Consistent with results in the lower panel of Table 2, while exam success played an independently strong role in one's career, family background variables only moderately mattered for exam success. *SI Appendix, section 2* reports our analysis of the effects of family background variables on exam success. It seems that only membership in elite marriage

networks could potentially help one pass the exam in the ninth century, and the effect was statistically weak. This result lends some credence to (31).

The rising effect of *Keju* on occupational success and the weak effects of aristocratic origins and father's occupation on *Keju* success imply that the *Keju* developed into a channel of mobility for Chinese men by the ninth century.

The final part of the analysis plots the effect of father's office rank on son's office rank over time. Although there were signs of moving toward meritocracy, the opportunities to hold an office in the Tang society remained unequal. Just as in most other societies, a father with power and influence could help his sons in their careers. We document that even after taking into account other confounders such as family pedigree and passing the *Keju*, the effect of father's office rank remained positive throughout the entire Tang Dynasty. The model results show no hint of either rising or declining trend. This finding suggests that despite its uniqueness (or "medievalness"), the Tang society shares similarities with other cultural and historical contexts, especially more modern contexts, in terms of intergenerational mobility and status attainment process: resources while growing up mattered for adult success.

Our results are robust against reasonable alternative specifications of the regression model. For example, Tackett (11, 31) defined aristocrats as members of an elite marriage network based in Chang'an and Luoyang, Tang's twin capitals. This variable is a control in our specification. *SI Appendix, section 3* plots the effect of this variable on son's rank over time from the same specification. The pattern is similar to what we report here using our preferred definition. *SI Appendix, section 7* also shows the "total" effects of aristocracy on son's career using both this alternative definition and our preferred definition. The total effects declined in a similar manner with the "direct" effects. The aristocracy, however defined, experienced a gradual decline over the course of the Tang.

We also reweighted the data to explore the sensitivity of our results to potential sample selection biases. Such possibilities include the under-representation of elites from the "Jiangnan" (Yangtze Delta) region, the level of which could also change over time, as well as the over-representation of elites who eventually attained higher-ranked offices in the government. *SI Appendix, section 8* shows that our findings remain substantively similar under various re-weighting schemes.

## Debating the Medieval Chinese Aristocracy: Chronic Decline vs. Persistence

Our results have implications beyond the community of mobility specialists. A key case in point is the historians who have debated the end of the medieval Chinese aristocracy. Numerous works (22, 39–41) argued that the aristocracy had already been in chronic decline since the mid-seventh century. The advantages aristocrats had in placing themselves into prestigious government jobs were thought to have gradually diminished over the course of the dynasty. We refer to this line of argument as the "chronic decline" hypothesis.

Other scholars (11, 12, 14, 31, 42) contended that the career advantages of the aristocracy in the bureaucracy persisted throughout the entire Tang Dynasty. The end of Chinese aristocracy, according to this account, occurred suddenly during the Huang Chao Rebellion, at the very end of the Tang. Warfare physically eliminated the aristocrats as a group. We refer to these studies as the "persistence school."

A core aspect of the debate concerns the role of the *Keju*. The chronic decline hypothesis emphasized the equalizing effect of competitive exams (22, 40, 43). The *Keju* contributed to the diminishing aristocratic advantage in men's careers and the rise of a new elite from humbler background. The persistence school, by highlighting that many exam passers were themselves aristocrats, regarded *Keju's* role as what stratification researchers call "indirect," that is the product of an elite advantage in exams and the high leverage exams had in career success. Our results support the chronic decline hypothesis. Within the broader elite stratum, men from prominent branches were *not* more likely to pass the exam (Table 2).

More generally speaking, the sociologists' stratification model brings to historical debates a proven method designed to disentangle the competing impacts of *Keju* and the two distinct historical dimensions of medieval family background, father position, and ancestral pedigree.<sup>11</sup> We found that the *Keju* became more important over the course of the Tang, and ancestral branch was not a factor after about 650. These offsetting trends align with the expectations of the chronic decline hypothesis, and appear to us to be inconsistent with recent findings from the persistence school. These complex questions deserve a full article of their own, however.

## Conclusions and Discussion

This study constructed a unique dataset containing information from 3,640 tomb epitaphs of male elites in China's Tang Dynasty (618–907 CE). Epitaphs contain granular information about the ancestral origins, family background, and extensive career history written for these deceased individuals. Our statistical models reveal how Chinese aristocracy disappeared as a factor in men's careers while the imperial exam (*Keju*) became a major factor in elite selection. Results lend support to hypotheses based

<sup>11</sup>The persistence school, by pre-defining aristocrats and then computing proportions of holders of top government posts who were aristocrats as they pre-defined, often gets criticized for mixing up these two distinct historical dimensions through a single measure (44, 45). Our multivariate regression approach effectively resolves this problem.

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on sociological theories of intergenerational mobility (5, 10). Father's office rank was also expected to wane, but it remained important, at least for men who did not pass the *Keju*. These findings cast doubt on the persistence school in the historical literature on medieval China, and lend credence to older studies arguing that the aristocracy had been in chronic decline for some time (22, 40, 43). Our analysis supports the argument that the Tang Dynasty was indeed a transitional period in Chinese history.

Rising education and institutions shaped opportunities for advancement in Tang China without modernity, much like modern higher education has in industrial and postindustrial nations, at least since the 1960s. Specifically, men's status in the hierarchy of medieval China came to depend more on their own achievements and less on the status of their family of origin. Blau and Duncan's conclusion about the United States in 1962 applied to Tang China a millennium before: "...superior status cannot any more be directly inherited but must be legitimated by actual achievements that are socially acknowledged" (2, p. 430).

Our results extend the social science of intergenerational mobility to medieval times. They also help move the historical literature forward from a longstanding debate on how society changed in the Tang Dynasty. In the future, we plan to expand our dataset to include female members of the elite families, which will allow us to analyze assortative mating and marriage networks during the Tang Dynasty.

**Data, Materials, and Software Availability.** csv and code data have been deposited in Harvard Dataverse (46).

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