Social Mobility in Ming China: Evidence from Twelve Thousand *Chin-shih* Data*

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The civil service examination system in imperial China, theoretically based on individual merit rather than family background, has played a central role on recruiting government officials and political elites for over a thousand years. Detailed family background records of the top exam-passing literati, *Chin-shih*s, enable us to estimate the effect of family background on examination outcomes. We find that family backgrounds have a strong and positive effect on examination outcomes, and the effect is still marginally outstanding for those from really high social status. Comparing the effects on different exams also suggests that human capital accumulation may not be the only channel that leads to the result.

I. Introduction

Appropriate social mobility is vital to a society. It prevents a society from being totally controlled by some specific powers. The civil service examination system is often believed to be the major channel for ordinary commoners to improve their social status in imperial China for as long as 1300 years.[1] Even until now some still argues that the *fairness* of the civil exam system is so evident that we should mimic it and restore it, instead of choosing some other channels. However, how fair indeed were the civil exams? How strong did civil exams contributed to the mobility of the society as a whole?

Thanks to the detailed records of those who passed the final stage of the exam, including the officialdom status in the past three generations and other demographic variables, we are able to capture a local picture of how the society was mobilized under the system, trying to clarify the big puzzle.

This is also not a new question for historians investigating the system. Ho, first used the data in 1959, showed that over half of the *Chin-shih*s that passed the final stage of the exam are from ordinary families, suggesting the exam itself is a good channel for mobility. He also found that the proportion of *Chin-shih*s from ordinary families decreases overtime, indicating mobility was deteriorating (but did not provide convincing explanations). See Figure I for similar identifications as with Ho (1959). Many follow-up studies disagreed with Ho's views (but also provided little evidence).

By collecting a large sample of *Chin-shih* data in the Chinese Biographical Database and linking the officialdom records with the officialdom ranking system implemented in Ming, we found that there is a strong and positive effect of family backgrounds

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[1] Since the feudal ages, traditional Chinese society can be roughly split into four major classes, namely, from the highest to the lowest, scholars, peasants, artisans, and merchants.

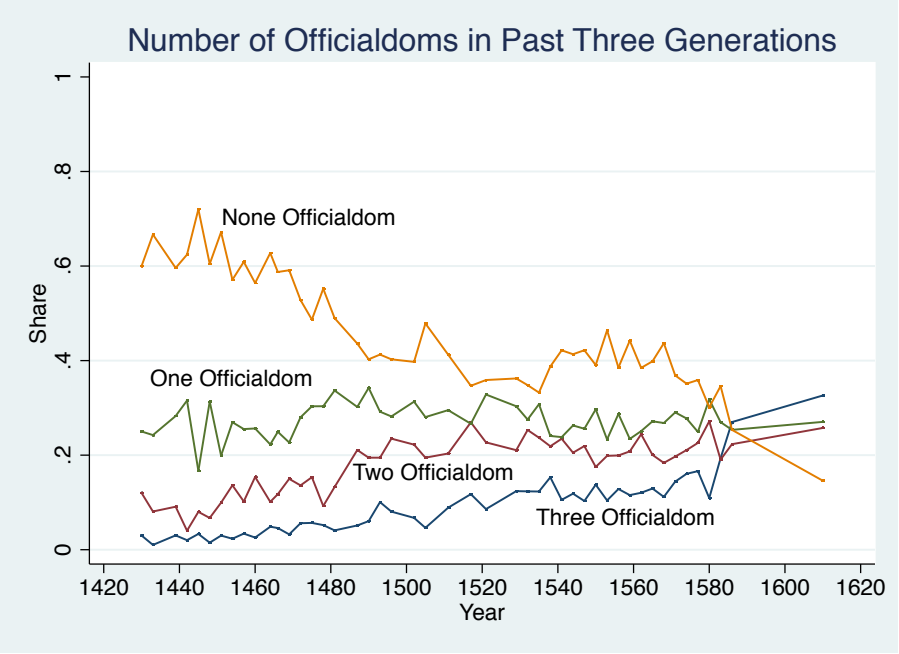

FIGURE I: SHARE OF *Chin-shih*S BY DIFFERENT NUMBERS OF OFFICIALDOM RECORDS

on examination outcomes. Not only do those from officialdom families perform better than those from ordinary families, those from high-ranking officialdom families still performs much better than those from slightly lower ranking officialdom families.

Furthermore, by constructing relative measures for performances on two other exams, we find that family background may have some different effects on different levels of exams. Our finding suggests that better human capital accumulation under better family backgrounds may not be the only channel that affects the outcome. Lastly, although the underlying channels are still puzzling, we presented the first large sample estimation of the effects of family backgrounds on examination outcomes, showing the system may be much more *unfair* than many may expect.

The paper proceeds as follows: Section II. reviews the literature. Section III. describes the data. Section IV. provides empirical results. Section V. discusses the results and concludes.

II. LITERATURE REVIEW

II.A. Historical Backgrounds of Civil Service Examinations

The civil service examination system was established in A.D. 605 and abolished in 1905. The system was initially introduced by the emperors in order to deprive the hereditary aristocracies of their political power (Kracke, 1957). Hence, no specific restrictions based on examinees' family backgrounds or occupations were implemented. During the dynasty of T'ang (618–907), successful candidates selected from the examination still cannot be appointed to the office directly; the vast majority of literary officials were also not products of the system (Elman, 2000).

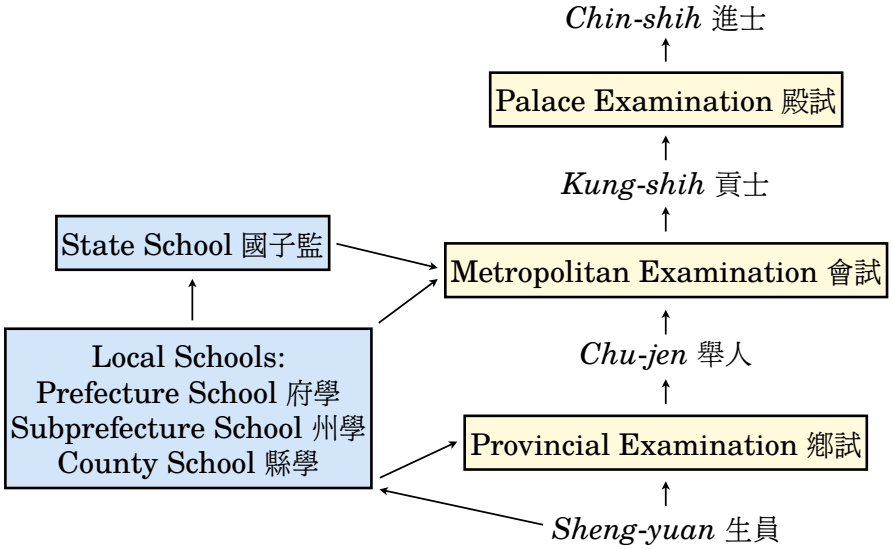

FIGURE II: FLOW CHART OF CIVIL EXAMINATIONS, DEGREES, AND SCHOOLS

Several important changes were made subsequently in Sung (960–1279) to ensure the rigor and fairness of the examination procedure. Personal recommendations were no longer legitimate; examinees' names were concealed; examination papers were rewritten to prevent the official examiners from identifying their handwritings; palace examination, the final stage of the system, were invented to be theoretically hosted by the emperor himself (Wang, 2012). Since then, the system has been the major way to join the officialdom (Chang, 1955). Some scholars found officials from non-officialdom family backgrounds in Sung outnumber officials from officialdom backgrounds, concluding the system boosts mobility (Kracke, 1947). Others observed that the Sung government may be monopolized by dozens of dynastic clans, inferring the system had little help on mobility (Hartwell, 1982).

The system was maturized in Ming (1368–1644) and Ch'ing (1644–1911). Since Ming, school supply has increased such that there were public schools in every prefectures, subprefectures, and counties; schooling system and exam system were combined together; regional quotas were implemented to balance the geographical differences in political evolvement; the infamous eight-legged essay, a standardized rigorous writing structure, were introduced to make scoring rubrics clearer; fully-developed printing techniques also enable large-scale reproductions of Confucian classics, lowering the costs for education (Ho, 1964; Elman, 2000). Figure II presents the flow chart of the system in Ming and Ch'ing dynasties. Table I summarizes key differences between several examinations and degrees.

II.B. Social Mobility under Civil Examination in Ming

Based on the family officialdom records of *Chin-shih*s in Ming, Ho (1964) first calculated that over half of *Chin-shih*s are from common, no-record, families. Furthermore, mobility seemed especially high in 15th century, but deteriorated fast in 16th century.

TABLE I: SUMMARY OF THE EXAMINATIONS AND THE DEGREES

	Provincial Examination	Metropolitan Examination	Palace Examination
Time	Every 3 years in fall	The spring after provincial exam	The month after metropolitan exam
Place	Provincial capitals	National capital	Emporor's palace
Graduates	*Chu-jen*	*Kung-shih*	*Chin-shih*
Quotas	30–140 per province; different from province to province[a]	100–350 per exam year; 60% southern people, 40% northern people[a]	No restrictions, only for ranking purpose[b]
Passing rate	4–10%[c]	8–12%[c]	100%

	Sheng-yuan	*Chu-jen*	*Chin-shih* & *Kung-shih*
Accumulated numbers in Ming	$\approx 600,000$[d]	$\approx 100,000$[c]	$24,862$[c]
Average age at time for degree	24[e]	30[e]	35[e]
Ratio to population in late Ming	$\approx 0.4\%$[d]	$\approx 0.056\%$ (14% of *sheng-yuan*)[a]	$\approx 0.0192\%$ (4.8% of *sheng-yuan*)[a]
Officialdom assigned directly	No; but have some local privileges[b]	Low level (rank below 8)[b]	Middle level (usually rank 5–7)[f]

Source: [a] Elman (2000). [b] Ho (1964). [c] Wu (2000). [d] Chen (2005). [e] Liu (2005). [f] Qian (2004).
Note: Since there are always candidates taking the exams repeatedly, so the ratios of accumulated numbers of the degrees are not the average passing rates. Examples for *Sheng-yuan*'s local privileges: need not to serve the annual labor, lighter punishment while breaking laws, and need not to kneel in front of the county magistrate.

He concluded that the examination system may facilitate mobility and stabilize the country, especially in early Ming.

Follow-up studies disagreed with Ho's opinions. Elman (2000) proposed that the system had little to do with mobility. Elman criticized that Ho (1964) had overestimated the number of *Chin-shih*s from common families. Since the data recorded only the officialdoms of father, grandfather, and great-grandfather, it could not truthfully reveal the effect from some other relatives of the candidates. Elman also argued that the system served merely as a "circulation of elites", that is, mobility lies only inside the ruling class, rather than the whole society. However, no sufficient empirical data were presented to support Elman's opinion.

Likewise, Shen (2006) suspected that high mobility in early Ming was merely an illusion rather than a contribution of the examination system. Since discriminating policies were implemented in Yuan, the previous dynasty ruled by Mongolians, little chance of becoming government officials was offered to Han. Hence, it is natural to have more no-record *Chin-shih*s in early Ming. Similarly, little evidence were presented to test this hypothesis directly.

Last but not least, all studies to date were based merely on descriptive statistics; no effects of family backgrounds on examination outcomes have ever been estimated.

III. Data Description

Every time after the result of the palace examination was announced, the Ministry of Rites was in charged to collected the data of the examination, including the name of the officials that were hosting the exam, the questions of the exam, model essays, and the family backgrounds of the *Chin-shih*s. The data were then presented to the emperor, and published in *The List of Passing Civil Exam* 《登科錄》 of that exam year. This is perhaps one of the most detailed, accurate data in imperial China.

Unfortunately, not all of the *List*s are well-preserved until today. Only 2 out of 118 *List*s are discovered for Sung dynasty (the years for *Chu Hsi* and *Wen Tien-hsiang*); similarly, only 3 out of 112 are available for Ch'ing. Luckily, 67 out of a total 89 *List*s are known for Ming today, which is far more complete than any other dynasties (Qian, 2004).

We use *Chin-shih* data from China Biographical Database (CBDB), which records the raw data from the *List*s of 52 exam years, consisting a total of 14,116 *Chin-shih*s. This is the only large-scale and digitalized *Chin-shih* data to date. We drop the data for the exam years of 1371, 1400, 1412, 1592, and 1610 for they are discontinued with the majority of our data. The data for exam year 1586 are also dropped for it does not contain the places of the provincial exam that the *Chin-shih*s attended.

Hence, we use the data consisting a total of 12,877 *Chin-shih*s that attended 45 out of 52 theoretically held palace exams between 1430–1583. Data for 7 exams during this period are not included in the database.[2] Comparing to the whole Ming dynasty (1368–1644), there were 88 exams held and 24,862 *Chin-shih*s produced (Wu, 2009). Our dataset consists about half the total *Chin-shih*s in Ming and covers 150 years that are exactly in the middle of Ming, avoiding possible effects from wars or civil conflicts.

The family background records reports the candidate's ranking in the palace exam, the metropolitan exam, and the provincial exam (with the place of provincial exam). Since the number of people passing the exams differ from year to year, ranking itself may not be a good measure, we use percentage of ranking to proxy the outcome of the examinations. Percentage ranking of palace exam is defined by palace exam ranking divided by total numbers of *Chin-shih*s produced in that year. Similarly, percentage ranking of metropolitan exam is defined by metropolitan exam ranking divided by previous quota for metropolitan exam;[3] percentage ranking for provincial exam is de-

[2] Data for the following exam years during 1430–1583 are not included in the database: 1436, 1484, 1499, 1508, 1514, 1523, 1526.

[3] The data do not report which year's metropolitan exam did the candidate pass. Here we assume all of the candidates attended the previous metropolitan exam (the one held one month before the palace exam). Although most of the candidates attended the palace exam directly after they've passed the metropolitan exam, minor cases are that the candidates may not attend the palace exam of the same year due to reasons like the death of candidate's parents, the death of candidate's teacher, the candidate got sick,

fined by provincial exam ranking divided by average quota for provincial exam in that province.[4] See Appendix for yearly details.

To proxy the variation of officialdom records, we link the officialdoms with the nine-rank system implemented in Ming. The system is detailed described in *The Code of Ming Dynasty* 《明會典》. The ranking itself not only measures the overall political power but also reveals the relative level of salary paid (in liters of rice) to the officialdoms during imperial times. We then classify the records that are not "blank" into 5 categories. Those officialdoms ranked 1–4 are classified as *high-ranking*, those ranked 5–7 are classified as *middle-ranking*, and those ranked 8–9 are classified as *low-ranking*. Firstly, this is a traditional classification adopted in Ho (1964). Secondly, this is also how *Chu-jen* and *Chin-shih* are typically assigned to their first job (See Table I). Officialdoms that are lower than 9-ranked jobs (given by "not in the ranking system" in *The Code of Ming Dynasty*) are classified as *without ranking*. Some cases are that the records contains only the education status or the exam-passing degrees rather than a specific officialdom name, we classify this kind of record into *contains only education status* since they are still different from those blank records.

The family background record also reports candidate's birthplace (including province, prefectures, and counties), registered family status, provincial exam place, schooling, and specialty classic.[5] These variables are transferred into dummies to be controlled in our estimation. Table II gives the descriptive statistics.

IV. Preliminary Results

IV.A. The Association between Palace Exam Outcome and Family with Record

We first consider the local effect of whether the family officialdom record is blank (if not, meaning the candidate is not from an ordinary-commoner family) on palace exam outcome. We primarily consider the outcome of palace exam since its ranking not only determines the first job of *Chin-shih*s, it is also the only exam that we have

or the death of candidate himself (Qian, 2004). In our dataset, 311 candidates (2.42%) have the same metropolitan exam ranking with other candidates in the same exam year, meaning that about 1.21% of the candidates did not attend the exam in the same year. 13 candidates (0.10%) will have percentage rank of metropolitan exam that are greater than 100% under this setting. We set those percentage ranking to be 100% for they may just have attended a metropolitan exam that has more attendant, not necessary meaning that they have performed worse than others.

[4] The data also do not report which year's provincial exam did the candidate pass. It was pretty common for a candidate to take two to three times of metropolitan exams after they've passed the provincial exam (Wu, 2009), hence it is hard to infer the year of provincial exam directly from the data. For simplicity, we use the average quota of that province as the denominator. Although the exact numbers of the quota change overtime, the relative distribution between provinces does not change much. 553 candidates (4.29%) will have percentage rank of provincial exam that are greater than 100% under the is setting. Similarly, we set those percentage ranking to be 100% for simplicity.

[5] Registered family status, or *hu* is classified by family ancestor's job. Ming government regulated it heavily as the criterion to collect taxes. People inherited the status, were not allowed to change the status, and were not deprived of any chances to take the exams due to different status. Specialty classic: Candidates had to choose one specialty from The Five Classics, that is, *The Poetry*, *The Documents*, *The Changes*, *The Rites*, and *The Annals*.

TABLE II: DESCRIPTIVE STATISTICS

	Min	Max	Mean	Std. Dev.
Exam-year-level				
Numbers of *Chin-shih*s	99	403	286.15	80.03
Quota for metropolitan exam	100	400	288.22	80.29
Total quota for provincial exam	545	1757	1130.98	216.85
Individual-level				
% ranking of palace exam			50.17	28.87
% ranking of metropolitan exam			50.09	28.84
% ranking of provincial exam			44.89	30.83
Age			32.86	5.54
Father's officialdom record				
% has officialdom record			38.46	48.65
% high-ranking			4.36	20.43
% middle-ranking			12.93	33.55
% low-ranking			5.02	21.83
% without ranking			11.60	32.03
% contains only education status			4.09	19.81
Grandfather's officialdom record				
% has officialdom record			31.98	46.64
% high-ranking			3.70	18.89
% middle-ranking			13.82	34.52
% low-ranking			2.83	16.57
% without ranking			9.88	29.84
% contains only education status			1.21	10.94
Great-grandfather's officialdom record				
% has officialdom record			21.67	41.20
% high-ranking			3.10	17.33
% middle-ranking			9.15	28.83
% low-ranking			1.92	13.72
% without ranking			6.24	24.20
% contains only education status			0.69	8.29
Number of generations have officialdom record:				
% three generations have record			9.15	28.83
% two generations have record			18.55	38.87
% one generation has record			27.56	44.68
% no generation has record			44.74	49.72
Highest record in past three generations:				
% high-ranking			8.08	27.25
% middle-ranking			21.74	41.25
% low-ranking			6.87	25.30
% without ranking			15.70	36.38
% contains only education status			2.28	14.94

Source: Numbers of *Chin-shih*s and individual-level data are from CBDB *Chin-shih* dataset. Quota for metropolitan exam and total quota for provincial exam are from Wu (2009) and Qian (2004). Officialdom rankings are from *The Code of Ming Dynasty*. See Appendix for yearly data.

Note: High-ranking: ranked 1–4; middle-ranking: ranked 5–7; low ranking: ranked 8–9; without ranking: lower than 9-ranked officialdoms. There are little disparities between "% has officialdom record" and the sum of "% high-ranking, % middle-ranking, % low-ranking, % without ranking, and % contains only education status" because some handwritings on the records of the original data are too messy to identify the officialdom status; hence, they are not explicitly reported in the database.

TABLE III: PALACE EXAM OUTCOME AND DUMMY FOR RECORD

	% Palace exam ranking						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Father	−0.0245***	−0.0343***	−0.0361***			−0.0175***	−0.0320***
with record	(0.00523)	(0.00557)	(0.00605)			(0.00556)	(0.00630)
Grandfather				−0.0232***		−0.0133**	−0.0102
with record				(0.00631)		(0.00619)	(0.00684)
Great-grandfather					−0.0198***	−0.0181***	−0.0118
with record					(0.00710)	(0.00669)	(0.00743)
% Metro.		0.111***	0.109***	0.109***	0.109***		0.108***
exam ranking		(0.00939)	(0.0100)	(0.0101)	(0.0101)		(0.0100)
% Prov.		0.0628***	0.0611***	0.0625***	0.0630***		0.0607***
exam ranking		(0.00868)	(0.00939)	(0.00939)	(0.00939)		(0.00939)
Birth Province		Yes					
Birth County			Yes	Yes	Yes		Yes
Controls[a]		Yes	Yes	Yes	Yes		Yes
Obs.	12,877	12,243	12,244	12,244	12,244	12,877	12,244
R^2	0.002	0.096	0.195	0.193	0.193	0.003	0.196

Robust standard errors in parentheses. Significant at *10%, **5%, ***1% level.
[a] Controls: year dummy, age, schooling, registered family status, provincial exam place, specialty classic.

all the candidates in our observations. Column (1) of Table III reveals that there is a positive correlation between palace exam outcome and father with officialdom record.[6] On average, those candidates whose father has record perform 2.45%, or about $2.45\% \times 286 \approx 7$ places on average, better than those whose father does not have record.

Column (2) adds the list of basic control variables to estimate the model

$$\%\text{PALA} = \alpha + \beta\,\text{REC} + \theta_1\,\%\text{METRO} + \theta_2\,\%\text{PROV} + X\gamma + \varepsilon \tag{1}$$

where %PALA is the percentage ranking in palace exam, REC is the dummy for father's officialdom records that are not blank, %METRO is the percentage ranking in metropolitan exam, %PROV is the percentage ranking in provincial exam (in hope of controlling for personal ability partially), and X is the set of demographic control variables including birth province (or birth county elsewhere), year dummy, age, schooling, registered family status, provincial exam place, and specialty classic. Under this specification, the association becomes even larger. If we control for birth county instead of birth province, just as in column (3), the association grows further, suggesting a 3.61% (or 10 places on average) better performance for candidates whose father has records than those who does not.

Similar specifications can be done to the records of grandfather and great-grandfather. Columns (4)–(5) report the results. It seems that despite all the coefficients are statistically significant, the effect of father's record is larger than that of grandfather's, and the effect of grandfather's record is also larger than that of great-grandfather's. It may reveal that closer generation contributes larger on one's human capital accumulation

[6] Notice that the smaller the ranking, the better the outcome of the exam.

TABLE IV: PALACE EXAM OUTCOME AND NUMBER OF RECORDS

	% Palace exam ranking		% Palace exam ranking by period				
			1430–1469	1472–1496	1502–1535	1538–1559	1562–1583
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Three generations have record	−0.0539***	−0.0577***	−0.0984*	−0.0220	−0.0743**	−0.0432	−0.0820***
	(0.00940)	(0.0111)	(0.0542)	(0.0391)	(0.0313)	(0.0271)	(0.0230)
Two generations have record	−0.0268***	−0.0332***	−0.0593**	−0.0366	−0.0312	−0.0252	−0.0552***
	(0.00702)	(0.00796)	(0.0268)	(0.0242)	(0.0219)	(0.0203)	(0.0196)
One generation has record	−0.0166***	−0.0246***	−0.0319*	−0.0273	−0.0223	−0.0295	−0.0443**
	(0.00613)	(0.00687)	(0.0193)	(0.0200)	(0.0193)	(0.0191)	(0.0181)
% Metro. exam ranking		0.108***	0.109***	0.0955***	0.127***	0.102***	0.115***
		(0.0100)	(0.0277)	(0.0296)	(0.0283)	(0.0276)	(0.0262)
% Prov. exam ranking		0.0611***	0.0522**	0.0795***	0.00124	0.0604**	0.0850***
		(0.00939)	(0.0259)	(0.0272)	(0.0258)	(0.0253)	(0.0240)
Birth County		Yes	Yes	Yes	Yes	Yes	Yes
Controls[a]		Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,877	12,244	2,339	2,313	2,387	2,491	2,714
R^2	0.003	0.195	0.405	0.403	0.379	0.378	0.367

Robust standard errors in parentheses. Significant at *10%, **5%, ***1% level.
[a] Controls: year dummy, age, schooling, registered family status, provincial exam place, specialty classic.

or cares more about one's social status. Columns (6)–(7) put dummies for three generations together. The effects become much smaller under this specification, suggesting there may be a strong correlation between the records of three generations. The effects of the earlier generations even vanish once we control for the control variables, and the effect concentrates on that of father's.

Similar specifications can also be done to the *number* of records across three generations. Columns (1)–(2) of Table IV report the result. It shows that those from a family of three records (that is, whose father, grandfather, and great-grandfather all have officialdom record) performs 5.39% (about 17 places) greater than those from a pure-ordinary family, which may not be a negligible effect. The effect is smaller for those have exact two generations with records, and even smaller for those have exact one record.

To see how the effect changes overtime, we then cut the sample into five periods of time, forming five subsamples with a relatively equal numbers of observations. This is presented in columns (3)–(7). Interestingly, the effects of family background are much more significant in the first and the last period. We can also see some effect of three generations in the middle period. The order of magnitude of the effects from three, two to one generation remain largely the same.

IV.B. The Association between Palace Exam Outcome and Officialdom Ranking

We now explore further on more extreme cases, that is, given that there is a officialdom record, whether the *ranking* of the officialdom affect palace exam outcomes. Column (1) of Table V reveals that there are strong correlations between palace exam outcome and fathers of both high and middle ranking officialdoms.

TABLE V: PALACE EXAM OUTCOME AND OFFICIALDOM RANKING

	% Palace exam ranking						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Father's officialdom							
high-ranking	−0.0899***	−0.0471***			−0.0718***	−0.0593***	−0.0422**
	(0.0169)	(0.0182)			(0.0181)	(0.0179)	(0.0193)
middle-ranking	−0.0353***	−0.00682			−0.0315**	−0.0248*	−0.00704
	(0.0133)	(0.0146)			(0.0135)	(0.0134)	(0.0148)
with ranking	0.00277	−0.0325**			0.00430	−0.00211	−0.0312**
	(0.0116)	(0.0129)			(0.0117)	(0.0116)	(0.0129)
without ranking	−0.00135	−0.0159*			8.79*e*−05	−0.00309	−0.0152
	(0.00806)	(0.00921)			(0.00815)	(0.00813)	(0.00927)
edu. only	−0.0280**	−0.0339**			−0.0223*	−0.0199	−0.0299**
	(0.0126)	(0.0142)			(0.0127)	(0.0126)	(0.0143)
Grandfather's officialdom							
high-ranking			−0.0432*		−0.0317	−0.0221	−0.00917
			(0.0222)		(0.0218)	(0.0215)	(0.0240)
middle-ranking			−0.00771		−0.0134	−0.00617	0.00929
			(0.0181)		(0.0169)	(0.0166)	(0.0186)
with ranking			−0.0122		0.00811	0.00401	−0.00550
			(0.0168)		(0.0154)	(0.0151)	(0.0170)
without ranking			−0.0148		−0.00399	−0.00380	−0.00770
			(0.00964)		(0.00878)	(0.00877)	(0.00975)
edu. only			−0.0461*		−0.0247	−0.0193	−0.0370
			(0.0261)		(0.0239)	(0.0237)	(0.0260)
Great-grandfather's officialdom							
high-ranking				−0.0676***	−0.0649**	−0.0634**	−0.0450
				(0.0262)	(0.0253)	(0.0247)	(0.0275)
middle-ranking				−0.0246	−0.0229	−0.0232	−0.0218
				(0.0225)	(0.0212)	(0.0205)	(0.0227)
with ranking				0.0114	0.0182	0.0181	0.0169
				(0.0207)	(0.0196)	(0.0188)	(0.0207)
without ranking				−0.0188	−0.0185*	−0.0172	−0.0131
				(0.0117)	(0.0107)	(0.0107)	(0.0118)
edu. only				−0.0544	−0.0287	−0.0322	−0.0493
				(0.0352)	(0.0330)	(0.0327)	(0.0352)
% Metro. exam ranking		0.108***	0.109***	0.110***		0.143***	0.108***
		(0.0100)	(0.0101)	(0.0101)		(0.00899)	(0.0100)
% Prov. exam ranking		0.0605***	0.0623***	0.0628***		0.0550***	0.0599***
		(0.00939)	(0.00940)	(0.00940)		(0.00830)	(0.00940)
Birth County		Yes	Yes	Yes			Yes
Controls[a]		Yes	Yes	Yes			Yes
Obs.	12,877	12,244	12,244	12,244	12,877	12,598	12,244
R^2	0.005	0.196	0.194	0.193	0.007	0.032	0.197

Robust standard errors in parentheses. Significant at *10%, **5%, ***1% level.

[a] Controls: year dummy, age, schooling, registered family status, provincial exam place, specialty classic.

Note: High-ranking: ranked 1–4; middle-ranking: ranked 5–7; with ranking: ranked 1–9; without ranking: lower than 9-ranked officialdoms; edu. only: contains only education status in the officialdom record.

Column (2) adds the same list of control variables as those in Equation (1) to estimate the model

$$\begin{aligned} \%\,\text{PALA} = \alpha + \beta_1\,\text{HIGH} + \beta_2\,\text{MID} + \beta_3\,\text{RNK} + \beta_4\,\text{NORNK} + \beta_5\,\text{EDU} \\ + \theta_1\,\%\,\text{METRO} + \theta_2\,\%\,\text{PROV} + X\gamma + \varepsilon \end{aligned} \tag{2}$$

where %PALA, %METRO, and %PROV are the percentage rankings in palace, metropolitan, and provincial exams respectively; HIGH, MID, RNK, NORNK, and EDU are dummies for fathers of high-ranking, middle-ranking, fathers were officialdoms with ranking (no matter high, middle, or low), officialdoms without ranking, and father's record contains only education status, respectively. Hence, β_1 estimates the difference of percentage palace exam outcomes between candidates with high-ranking fathers and candidates with low-ranking fathers; β_2 estimates the difference between candidates with middle-ranking fathers and candidates with low-ranking fathers; β_3, β_4, β_5 compares the difference of those candidates with low-ranking fathers, fathers were officialdom without ranking, father's record contains only education status to those candidates with ordinary fathers, respectively.

Column (2) shows that, compared to those fathers of low-ranking records, candidates with fathers of high-ranking records perform 4.71% (or 13 places on average). We can also roughly infer that compared to those with ordinary fathers, fathers with high-ranking performs $4.71\% + 3.25\% = 7.96\%$ (about 23 places on average) better, which is not a small effect for such a competitive examination. Interestingly, no statistical difference is found between fathers of middle-ranking and fathers of low-ranking.

However, there is a significant gap between fathers with low ranking and ordinary fathers. A similar gap is found between father's record contains only education status and ordinary fathers. This may suggest that the effect we found previously is not driven by *whether* there is a officialdom record or not solely, or driven purely by the effect of high-ranking families. The effect of family backgrounds still depends on *how* high the record is.

Similar specifications can also be done to grandfather's rankings and great-grandfather's rankings, as is shown in columns (3)–(4). The major variations in these two cases comes from the difference between high-ranking and low-ranking families. This perhaps shows only the effects from those with really high-ranking, or successful, ancestors can last over two generations.

We can also put the officialdom ranking of whole three generations together in a same regression, as in column (5), the effect of grandfather's officialdom status vanishes even without any controls. This still suggests a pretty strong correlation between grandfather's officialdom status and that of great-grandfather's, especially for those of high-rankings. The effect of great-grandfather's officialdom status also vanishes once we add in the control variables, presented in column (7). Father's officialdom status takes all of the effects, and the coefficients are similar to those in column (2).

In sum, two major gaps are shown under this specification. Candidates from those

TABLE VI: DIFFERENT EXAM OUTCOMES AND NUMBER OF RECORDS

	% Pala. exam ranking		% Metro. exam ranking		% Prov. exam ranking	
	(1)	(2)	(3)	(4)	(5)	(6)
Three generations have record	−0.0539***	−0.0577***	−0.0122	−0.0189*	−0.0433***	−0.0358***
	(0.00940)	(0.0111)	(0.00940)	(0.0108)	(0.00993)	(0.0117)
Two generations have record	−0.0268***	−0.0332***	−0.00171	−0.00479	−0.0222***	−0.0273***
	(0.00702)	(0.00796)	(0.00709)	(0.00804)	(0.00756)	(0.00864)
One generation has record	−0.0166***	−0.0246***	0.00115	−0.00212	−0.0153**	−0.0160**
	(0.00613)	(0.00687)	(0.00615)	(0.00693)	(0.00661)	(0.00738)
% Pala. exam ranking				0.109***		0.0705***
				(0.0102)		(0.0108)
% Metro. exam ranking		0.108***				0.0932***
		(0.0100)				(0.0107)
% Prov. exam ranking		0.0611***		0.0817***		
		(0.00939)		(0.00942)		
Birth County	Yes	Yes	Yes	Yes	Yes	Yes
Controls[a]	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,877	12,244	12,769	12,244	12,677	12,244
R^2	0.003	0.195	0.000	0.187	0.002	0.187

Robust standard errors in parentheses. Significant at *10%, **5%, ***1% level.
[a] Controls: year dummy, age, schooling, registered family status, provincial exam place, specialty classic.

high-ranking families perform about 7% (about 20 places) better than ordinary families; those middle-ranking, low-ranking, and education status only families perform about 3% (about 9 places) better than ordinary families. Candidates from families that are of officialdoms without ranking perform roughly the same as those of ordinary families.

IV.C. The Effect of Family Backgrounds across Different Exams

We now consider the effect of family backgrounds on two other exams: the metropolitan exam and the provincial exam. Table VI gives the specification between the number of records and different exam outcomes.

Columns (1), (3), and (5) reports the effects of family backgrounds on exam outcomes without controlling for the outcomes of two other exams. Interestingly, it seems no effect of family backgrounds is shown on metropolitan exam outcome; however the effect seems quite strong in both palace exam and provincial exam. The result remains largely the same after controlling for other two examination outcomes.

V. DISCUSSION AND CONCLUSION

Our results show that, from many different perspectives, better family background have a significant effect on palace exam and provincial exam outcomes. In the palace

exam, candidates from high-ranking families perform 4% better than those from low-ranking families; candidates from low-ranking families also perform 3% better than those from ordinary families. The effect acts quite differently in the metropolitan exam.

Two major competing hypothesis can explain this phenomenon. Firstly, the human capital accumulated in a better family background may help the candidates perform better. This requires that the human capital needed in metropolitan exam is different from two other exams. However, from a pure institutional perspective, the examination rules and the scope of examination is much more similar in metropolitan exam and provincial exam.[7] What drives candidates with good family backgrounds perform almost as good as those from an ordinary family in the metropolitan exam remains a puzzle.

The second hypothesis is that candidates from better family backgrounds are more manipulable on the exam outcomes. Although the authorities tried hard, implemented harsh punishments to prevent possible corruptions or cheating behaviors, these behaviors did occur, especially in late Ming (Wang, 2012).[8]

Despite the outcome of the palace exam often determines the first job assigned to *Chin-shih*s, only first three ranked *Chin-shih*s are explicitly announced to offer works ranked 6 or 7 in *The Hanlin Academy*; the vast majority of the candidates are offered to be 7-ranked county magistrates, which seems largely the same (Qian, 2004). It is possible that the outcomes are manipulated by high-ranked families to protect their kids to remain in the first three rank, but there seems still a gap between middle/low-ranked and ordinary families, suggesting this may not be the only channel.

Furthermore, it is also a puzzle why the manipulative power disappears in the metropolitan exam, since the job difference seems much more larger once one did not pass the metropolitan exam (as is showed in Table II). It is also a possibility that since the ranking itself of the metropolitan exam (given that one passed the exam) does not matter a lot, so the extensive margin of the manipulative power may lie on whether passing the exam or not, and those did not passed the exam are not under our observations. However, similar arguments can be made to the outcome of the provincial exam, but it acts differently to those of metropolitan exam. More works can be done on this if we try to link the officials that hosted the exams and the family background data of those outstanding-performed candidates. Nevertheless, no matter which hypothesis takes hold, our evidence suggests that the civil exam system seems much less fair and contributes less on social mobility than many may expect.

To sum up, we made following several contributions to the literature. Firstly, this is the first work to date trying to estimate the effect of family backgrounds in stead of

[7] It takes three days to take both the metropolitan exam and the provincial exam. The first day tests the understanding of sentences in *The Four Books* and *The Five Classics*. The second day tests argumentative essays and some other governmental-used documentation forms. The last day tests commentary and suggestions on some policies. The palace exam only test for commentary and suggestions (Wu, 2000).

[8] The most common cheating behavior is bringing notes. Corruption known to date is to manipulate the quotas after the exam in order to help some specific candidates (Wang, 2012).

pure descriptive statistics. Secondly, the strong multicollinearity between the record of past three generations supports the "circulation of elite" hypothesis in Elman (2000). Thirdly, although it is possible that the fairness of the exam deteriorates overtime, our evidence show there is still significant effects from family backgrounds in early Ming. Furthermore, family backgrounds seems acted differently in different exams, suggesting human capital accumulation may not be the only channel that drives the outcome. Last but not least, our estimation suggests that high-ranking families have the greatest superiority over ordinary families (which may possibly be channeled through both human capital accumulation and manipulating power); middle and low ranked families still owns a great superiority over ordinary families (which is more likely to be channeled through human capital accumulation).

Still some pitfalls are discussed here as the following. Firstly, no other institutions are here for us to compare with the civil exam system, making it hard to justify whether our estimated effects from family backgrounds is large or not. Secondly, this may be too local an estimation of social mobility relative to the whole society. Maybe some other data from the records of provincial exams may help. Thirdly, the controlling power of the variables in our dataset may not be good enough; the quotas implemented in the provincial and metropolitan exams also makes it hard to represent personal ability.[9] We need some other variations to control more on personal human capital accumulation. At last, it is possible that some greatest effects on palace exam outcomes are from some really elite and influential families, which is still out of our identification. If we try to link the *Chin-shih*s with the social network data in CBDB may partially solve the last two problems.

[9] That is, a candidate with 100% rank province exam in Chiang-hsi may have quite different ability from those 100% ranked candidates in Kuei-chou.

Appendix I. Numbers of *Chin-shih*s and Quotas for Metropolitan and Provincial Exams by Year

			Quotas for Provincial Exam by Province															
Year	Numbers of *Chin-shih*s	Quota for Metro. Exam	Ying-t'ien 應天	Shun-t'ien 順天	Chiang-hsi 江西	Fu-chien 福建	Che-chiang 浙江	Hu-kuang 湖廣	Ho-nan 河南	Kuang-tung 廣東	Shang-tung 山東	Ssu-chuan 四川	Shang-hsi 山西	Shen-hsi 陝西	Kuang-hsi 廣西	Yun-nan 雲南	Kuei-chou 貴州	Total quota for Prov. exam
1430	100	100	80	50	50	45	45	40	35	40	30	35	30	30	20	10	5	545
1433	99	100	80	80	50	45	45	40	35	40	30	35	30	30	20	10	5	575
1439	99	100	82	47	64	54	56	51	35	41	31	25	38	30	23	10	5	592
1442	149	150	100	100	65	60	60	55	50	50	45	45	40	40	30	13	7	760
1445	150	150	100	100	65	60	60	55	50	50	45	45	40	40	30	13	7	760
1448	134	150	100	100	65	60	60	55	50	50	45	45	40	40	30	15	10	765
1451	201	200	202	112	190	122	170	133	100	92	109	110	94	90	49	24	13	1610
1454	345	350	205	126	247	144	130	139	105	124	104	110	122	81	65	37	18	1757
1457	294	300	135	135	95	90	90	85	80	75	75	70	65	65	55	20	10	1145
1460	156	150	135	135	95	90	90	85	80	75	75	70	65	65	55	20	10	1145
1464	247	250	135	135	95	90	90	85	80	75	75	70	65	65	55	20	10	1145
1466	349	350	135	135	95	90	90	85	80	75	75	70	65	65	55	20	10	1145
1469	247	250	135	135	95	90	90	85	80	75	75	70	65	65	55	24	16	1155
1472	250	250	135	135	95	90	90	85	80	75	75	70	65	65	55	24	16	1155
1475	300	300	135	135	95	90	90	85	80	75	75	70	65	65	55	24	21	1160
1478	346	350	135	135	95	90	90	85	80	75	75	70	65	65	55	24	21	1160
1481	294	300	135	135	95	90	90	85	80	75	75	70	65	65	55	24	21	1160
1487	351	350	135	135	95	90	90	85	80	75	75	70	65	65	55	24	21	1160
1490	298	300	135	135	95	90	90	85	80	75	75	70	65	65	55	24	21	1160
1493	298	300	135	135	95	90	90	85	80	75	75	70	65	65	55	26	24	1165
1496	298	300	135	135	95	90	90	85	80	75	75	70	65	65	55	26	24	1165
1502	297	300	135	135	95	90	90	85	80	75	75	70	65	65	55	26	24	1165
1505	303	300	135	135	95	90	90	85	80	75	75	70	65	65	55	26	24	1165
1511	349	350	135	135	95	90	90	85	95	75	90	70	90	100	55	29	26	1260
1517	349	350	135	135	95	90	90	85	80	75	75	70	65	65	55	29	26	1170
1521	326	350	135	135	95	90	90	85	80	75	75	70	65	65	55	29	26	1170
1529	323	320	135	135	95	90	90	85	80	75	75	70	65	65	55	29	26	1170
1532	316	320	135	135	95	90	90	85	80	75	75	70	65	65	55	29	26	1170
1535	325	320	135	135	95	90	90	85	80	75	75	70	65	65	55	29	26	1170
1538	320	320	135	135	95	90	90	85	80	75	75	70	65	65	55	40	25	1180
1541	294	300	135	135	95	90	90	90	80	75	75	70	65	65	55	40	25	1185
1544	312	320	135	135	95	90	90	90	80	75	75	70	65	65	55	40	25	1185
1547	301	300	135	135	95	90	90	90	80	75	75	70	65	65	55	40	30	1190
1550	320	320	135	135	95	90	90	90	80	75	75	70	65	65	55	40	30	1190
1553	403	400	135	135	95	90	90	90	80	75	75	70	65	65	55	40	30	1190
1556	296	300	135	135	95	90	90	90	80	75	75	70	65	65	55	40	30	1190
1559	303	300	135	135	95	90	90	90	80	75	75	70	65	65	55	40	30	1190
1562	299	300	135	135	95	90	90	90	80	75	75	70	65	65	55	40	30	1190
1565	394	400	135	135	95	90	90	90	80	75	75	70	65	65	55	40	30	1190
1568	403	400	135	135	95	90	90	90	80	75	75	70	65	65	55	40	30	1190
1571	396	400	150	150	95	90	90	90	80	75	75	70	65	65	55	40	30	1220
1574	299	300	135	135	95	90	90	90	80	75	75	70	65	65	55	45	30	1195
1577	301	300	135	135	95	90	90	90	80	75	75	70	65	65	55	45	30	1195
1580	302	300	135	135	95	90	90	90	80	75	75	70	65	65	55	45	30	1195
1583	341	350	135	135	95	90	90	90	80	75	75	70	65	65	55	45	30	1195
Mean	286	288	132	127	96	87	88	84	76	72	72	68	64	63	51	29	21	1131

Source: Numbers of *Chin-shih*s are from CBDB *Chin-shih* dataset. Quota for metropolitan exam and provincial exam are from Wu (2009) and Qian (2004).

Note: Quota for provincial exams are the provincial exams held one year before the palace exams were held. There's no quota restrictions for the provincial exams on years 1439, 1451, and 1454; the reported numbers are the numbers of *Chu-jen* produced that year in that province.

Appendix II. A Typical *Chin-shih* Sample

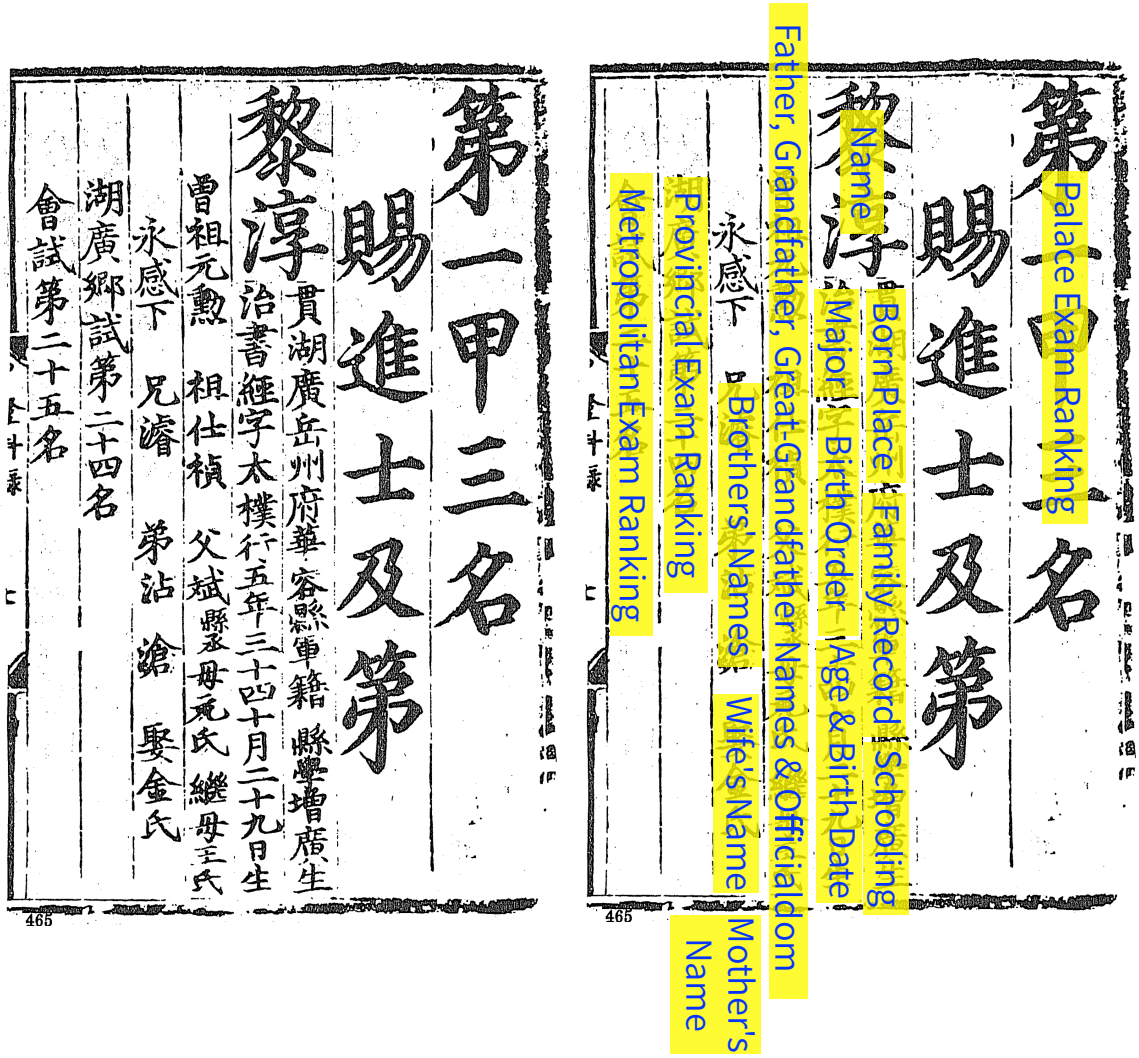

Figure III: A Typical *Chin-shih* Sample from *The List of Passing Civil Exam*

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