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The impacts of Confucianism on gender inequality in Vietnam

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Abstract
We quantify the influences of Confucianism on gender inequality in present-day Vietnam. We use the number (or density) of the most successful test takers in the Vietnamese imperial examinations (1075–1919) in a given district as a proxy for mastering the subject of Confucianism. Using an instrumental variable approach based on the historical expansion of Vietnamese territory and distances to the test venues, we consider the effects on labor, health, and educational outcomes for females relative to males. We find that Confucianism has long-lasting negative impacts on gender inequality in all considered aspects. However, the results also suggest that when present-day females pursue more years of schooling, they tend to perform better than males.

Keywords Confucianism · Gender inequality · Labor · Education · Health · Vietnam

1 Introduction

Gender equality and research on this issue are increasingly important in the twenty-first century, with "gender equality and women's empowerment" adopted as one of the United Nation's Sustainable Development Goals in 2015. Meanwhile, research on the origins of gender inequality is expected to help achieve this goal. Giuliano (2017) reviewed several important historical origins of gender roles that have contributed to gender inequality, including agriculture (technology), language, pre-industrial societal characteristics (such as matrilocality), family structure, and religion.

In particular, religious teachings and practices may have a profound effect on gender norms from generation to generation. For example, Protestantism emphasizes that both men and women should read the Bible (Giuliano 2017). A study on nineteenth-century Prussia (Becker and Woessmann 2008) finds less gender inequality in education in areas

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where the Protestant share of the population was large. Similarly, a study of Africa's colonial period (Nunn 2014) shows that Protestant missions had a large long-run impact on females' education, while Catholic missions had an impact on only males' education. However, to our knowledge, there are no such quantitative studies on the influence of religion on gender roles in East Asia.

In particular, elucidating the impacts of Confucianism on present-day gender inequality is important. Stretching back millennia, the doctrines of Confucianism formed the ethical foundation upon which ancient state institutions were built in East Asia, particularly those in China and its sphere of influence, including Korea and Vietnam. Confucian doctrines relegated women to an inferior social status, making them dependent on male family members for their entire lives[1]. Women were prohibited from taking the imperial examinations (Rosenlee 2006, page 129) in China and Vietnam, and thus literary learning ("文" in Chinese) became an aspect of male privilege. In addition, Confucianism established a norm of gendered division of labor; men worked outside the home ("外" in Chinese, meaning "exterior") and women worked inside the home ("内" in Chinese, meaning "interior") (Rosenlee 2006, pages 82 and 127). The oppression of women may have resulted from a combination of filiality, patrilineality, and ancestor worship (Rosenlee 2006, page 123) because filial devotion is to one's father's lineage. Thus, many important present-day economic outcomes, including labor participation rate, intra-household labor division, and education would be influenced by the historical legacy of Confucian doctrines.

Today, the Confucian sphere of influence covers roughly 1.5 billion people (about 20% of the world's population). China, South Korea, and Vietnam are ranked 107th, 102nd, and 87th, respectively, among 156 countries included in the Global Gender Gap Report 2021 from the World Economic Forum.[2] It is likely that ancient (informal) institutions may persist into the present day as cultural norms (Alesina and Giuliano 2015). Many studies (e.g., Das Gupta et al. 2003) have suggested the influence of Confucianism as one of the causes of son preference, which has resulted in skewed sex ratios in present-day China, Korea, and Vietnam. However, simply blaming cultural norms as the cause is far easier than providing evidence of their impact by performing quantitative estimations on a proxy for culture and various corresponding outcomes.

Meanwhile, it is possible that present-day institutions in the Confucian sphere have enhanced gender equality. All of the abovementioned countries have replaced Confucianism with different state ideologies. Present-day China and Vietnam are communist nations, and communism can be expected to have positive impacts on gender roles and equality. Campa and Serafinelli (2019) find that women from the former East Germany place a greater emphasis on career success compared with women from the former West Germany, with an even greater difference seen in areas with higher female employment growth. Meng and Kidd (1997) show a higher labor force participation rate and a lower gender wage gap in China as a result of communist policies. Chinese women who grew up under communist ideology are reported to have a greater incentive to compete (Booth et al. 2019). Hence,

[1] The Four Books and Five Classics—the main canonical text of Confucianism—prescribes three obediences and four virtues for women as filial piety. The three obediences from the Five Classics instruct women to obey their father during childhood, their husband when married, and their sons when widowed in order to maintain the social order. The four virtues impose rigid standards on women, namely, diligent work, modest manner, proper speech, and moral behavior.

[2] The report is available at https://www3.weforum.org/docs/WEF_GGGR_2021.pdf. Highest gender equality is on the top of the list.

investigating whether the influence of Confucianism has survived the transition to communism is a worthy challenge.

Against this background, we aim to quantify the influence of Confucianism on gender inequality in present-day Vietnam. In particular, we attempt to elucidate mechanisms that either perpetuate or block the influence of Confucianism because, of the countries in the Confucian sphere, Vietnam might be the least influenced by Confucianism today (as it is ranked highest among countries in the Confucianism sphere in the Global Gender Gap Report 2021). On the one hand, there are statistics and research results that suggest the persistence of Confucian influence may be unlikely. For example, the Global Gender Gap Report ranked Vietnam 26th in economic participation and opportunity for women among the 156 included countries. Vu and Yamada (2018) show that the gender wage gap in Vietnam declined from 2002 to 2014 because of increases in educational attainment and specific paid work participation by women. Vu (2014a) suggests that Vietnamese parents are just as concerned about their daughters' education as their sons' when assigning housework. On the other hand, the Global Gender Gap Report ranked Vietnam 152nd in health and survival. Son preference continues to be prevalent in Vietnam (Vu 2014b) and the skewness of the sex ratio has been accelerating since 2005 (Guilmoto 2012). Vietnamese husbands continue to neglect housework even when they have lower educational attainment and lower income compared with their wives (Vu 2019).

In this paper, we investigate the effects of Confucianism on gender inequality in present-day Vietnam by considering the core values of Confucianism toward women and girls. We examine three main factors, namely, participation in economic activities, health (female survival—sex ratio between females and males under 5 years of age), and relative educational attainment of women compared with men. We construct a dataset of districts from various data sources such as the 2012 Vietnamese Economic Census, 2009 Population and Housing Census, and 2010 Household and Living Standard Survey.

To construct a proxy for the influence of Confucianism in Vietnam, we use the number (or density) of successful test takers who passed the imperial examinations at the national level during 1075–1919 (hereinafter, Confucian elites) per district (or the district's area in square kilometers when density is used). The content of the examinations was mainly about Confucianism (Ngo 2006). Therefore, successful examinees were very likely the most knowledgeable people about Confucianism in the country at the time. Furthermore, Vu and Yamada (2018) find a strong correlation between the number of Confucian elites per district across Vietnamese dynasties. Confucianism would be expected to have an outsized influence on many cultural norms because Confucian elites held important positions in the imperial courts and would have been held in high regard by their compatriots and their descendants.

We conduct analyses at the district level and use an instrumental variable (IV) approach. We examine whether the number (or density) of Confucian elites is associated with relative outcomes between men and women. We construct an IV from the product of the average distance from each district to the imperial test venues and a weight. The weight represents the eligibility of people in a given district to take the imperial tests during the time period in which they were given. Because Vietnam acquired half of its present-day territory in the last 700 years, eligibility to take the imperial tests varies and is exogenous to the people in each district. If the legacy of Confucianism is minimal, we expect the estimated coefficients of interest to be statistically insignificant in explaining the outcomes.

We find a long-lasting negative impact of Confucianism on gender equality for almost all considered outcomes despite substantial changes in Vietnamese society and formal institutions. Our results suggest that the mechanism at play is favoritism towards boys in the selection into

beneficial aspects, for example, schooling. We find that, when women pursue more years of schooling in the present day, they tend to perform better than males. Yet, despite their best efforts, women as a group are unable to overcome the overall inequality in the present day resulting from the selection in favor of men from Confucianism.

Our study contributes to the literature in several ways. First, it quantifies the influence of Confucianism on various outcomes in terms of the core norms of Confucianism regarding gender. Second, it provides a novel proxy for the influence of Confucianism in quantitative analysis. Specifically, this proxy captures the quality of mastering knowledge about Confucianism. Third, our results demonstrate that the legacy of Confucianism survives via informal institutions even after the transition to communism and despite the lack of formal training (schools) and written language in the form of Chinese characters. One possible explanation is that workers in agriculture–aquaculture–husbandry account for a large share of the local labor force, particularly in districts having Confucian elites. The selection of men due to privilege based on Confucian teachings remains compatible with these types of production.

The remainder of the paper is organized as follows. Section 2 describes the data and Section 3 outlines our methods and econometric specifications. Section 4 reports the main results. Section 5 presents the conclusion and discusses some remaining issues.

2 Data

We construct a dataset of districts in Vietnam by combining a list of Confucian elites with the 2010 Vietnamese Household Living Standard Survey (VHLSS), the 2012 Vietnamese Economic Census, the 2009 Population and Housing Census, and the 2009 NEEU and then match the data by district (see Online Appendices 3–4 for descriptive statistics).

First, we use the list of Confucian elites containing names, exam years, and hometowns (referring to present-day locations) compiled by Ngo (2006). We define Confucian elites as successful test takers who passed the national round of the imperial exams organized between 1075 and 1919. The number of Confucian elites in an area is used a proxy for the strength of Confucianism because the content of the imperial exams was mainly about Confucianism and its literature (Ngo 2006). The imperial exams were administered to choose men, regardless of their origin, to serve in the imperial courts or to become local government officers. In general, the imperial exams comprised two rounds of written tests, the regional round and the national round. Test takers had to pass the regional round to advance to the national round. The national round took place once every 3 years and was very competitive. Ngo (2006) notes the selection rate at the national round was 1 per 100 test takers in 1463. The venue for the national round test was in the capital of the country. During 1400–1407, test takers had to first travel (perhaps mainly on foot) to the capital and then had to stay there for almost a year to prepare for the national round exams (Ngo 2006). Those who passed the national round were interviewed by the emperor with the assistance of the emperor's top Confucius scholars. The purpose of the interview was to decide the top-ranked test takers, who would receive special gifts from the emperor as well as his esteem. Their names were carved into the stele stones and stored in the Temples of Confucius in Hanoi and Hue (Nguyen dynasty) from 1442. Therefore, the total number of successful test takers in a district during 1075–1919 can be used as a proxy for the strength of Confucianism in the area based on the Confucian focus of the test content and the difficulty of selection at the national round. Ngo (2006) collects the list of Confucian elites from stele stones, as well as from ancient books on successful imperial test takers. We count the

total number of Confucian elites during 1075–1919 in each district from the list. We also use the density of Confucian elites per square kilometer to perform a robustness check by dividing the total number of elites by the district area.[3]

Second, we calculate labor outcomes aggregated at the district level based on the 2010 VHLSS and the 2012 Vietnamese Economic Census (VEC) from the General Statistics Office of Vietnam (GSO). The VHLSS is a biannual nationally representative survey covering 46,995 households and 185,696 people. The VHLSS contains the labor outcomes of respondents from the most recent 12 months prior to the survey. Our calculation targets the 22–55-year age cohort.[4] In addition, the 2012 VEC includes information on the gender of the person holding the highest position (i.e., owner and/or director) in 339,000 firms in Vietnam. We calculate the rate of females in the top position of firms in each district.

Third, we use the 2009 Population and Housing Census (hereinafter, population census) conducted on April 1, 2009 by the GSO. The census captures 100% of the Vietnamese population (86.89 million). We also use the version that covers 15% of the population and contains additional information on migrants.

Fourth, we construct several outcomes related to standardized math scores (*zscore*) by test takers who took the 2009 National Entrance Examinations to Universities (NEEU). A higher *zscore* indicates better test performance. We use the data of Vu (2022) but limited to 1991-born test takers (see Vu 2022 for the data description).[5] Given once a year (in July), the NEEU is a national examination administered by the Ministry of Education and Training. Under Vietnam's education laws, test takers born in 1991 would have attempted the entrance exams for universities and colleges for the first time in their lives in 2009. Mathematics is a compulsory subject for every grade from 1 to 12 and is also the most popular test subject in the NEEU (Vu 2022). We aggregate various outcomes at the district level (specified in Section 3.2).

We combine the list of Confucian elites with these aggregated outcomes obtained from the VHLSS, VEC, population census, and 2009 NEEU, using the same district identity to create a district-level dataset. We use geographical information from each district as control variables. We obtain information on the 1992 Global Land Cover Characterization and the 1996 Landsat Imagery from the United States Geological Survey Earth Resources Observation and Science Center. We extract the elevation, cropland ratio, and urban land ratio for each district. We combine geographic information system data with the population census data to obtain the population density. We also measure the distance from each district to the coastline, using shape files obtained from the Database of Global Administrative Areas (www.gadm.org).

3 Methods and Specifications

3.1 Methods

We use a reduced form equation to regress the outcomes of each district i on the number of Confucian elites ($nElite_i$) (and separately, their density per square kilometer, $dElite_i$) located

[3] We use the density of Confucian elites per 2009 district population as an alternative, but the interpretation of such results is not different from the results using district area. The results using district population are available upon request. Ideally, the density of elites should be constructed from the population of the district during one (or an average) imperial period. The district area should be also the corresponding old administration division. Unfortunately, such data are not available.

[4] The legal retirement age for women was 55 in 2008. People aged 22 years had most likely completed their schooling.

[5] We use their highest *zscore* if the test takers had more than one score (e.g., they took exams for a 4-year university and a 3-year college separately on two different days).

in the district in an ordinary least squares estimation followed by an instrumental approach. The outcomes cover labor outcomes, sex ratio, and educational attainment by gender.

Our target is to estimate β_1

$$Outcomes_i = \beta_0 + \beta_1.\widehat{nElite_i} + \beta_2.X_i + \epsilon_i, \tag{1}$$

where X_i is a vector of the natural conditions and characteristics of district i. However, many district-related factors would be expected to affect the number of Confucian elites in the past as well as gender equality in the present day, including the number of educational facilities. This is one of the reasons that we need to use an instrumental approach. (1) is the second stage of this approach.

Before estimating (1), we implement the first stage

$$nElite_i = \alpha_0 + \alpha_1.IV_i + \alpha_2\, X_i + u_i, \tag{2}$$

where IV_i is an IV. The fitted value from (2) is used in the second stage of eq. (1).

We consider the variations in test venues and the expansion of Vietnamese territory (see Online Appendices 1 and 2) to construct the IV for the number of Confucian elites as follows:

$$IV_i = \sum_{k=1}^{179} \left(eligible_{ik} \times Distance\ to\ test\ venue_{jk}\right) / \sum_{k=1}^{179} eligible_{ik} \tag{3}$$

We set up a dummy $eligible_{ik}$ for each district i. $eligible_{ik}=1$ if district i was the territory of Vietnam at the kth imperial exams ($Eligible_{ik}=0$ if otherwise).[6] Four distinguished test venues ($j=4$) correspond with the eight Vietnamese dynasties that organized the imperial exams during 1075–1919 (see Online Appendix 1). Distance serves as a proxy for educational costs. Considering the geography of Vietnam, the cost of traveling to the test venue would have accounted for a significant proportion of the total educational expenditure for each test taker.

We argue the validity of this IV from several perspectives. First, the IV can be used as a proxy for the educational costs of people in the past and it also has a strong association with the number of elites (see Online Appendix 5). Second, the IV would be exogenous for the district people. The component $Distance\ to\ test\ venue_{jk}$ is associated with changes in Vietnamese dynasties that are exogenous to imperial test takers. The distance is dependent on the imperial exam locations, which were where the emperors lived or where their capitals were located because the emperors interviewed the test takers in the final round of examination. As shown in Online Appendix 1, there were several different capitals during 1075–1919. Particularly, during 1529–1592, Vietnam was ruled concurrently by two different dynasties and therefore had two capitals.[7] Some of the capitals were chosen for historical reasons[8] rather than geopolitical or cultural reasons.

[6] Due to some missing information in the list compiled by Ngo (2006), we have data corresponding to 179 imperial exams for analysis.

[7] Ngo (2006) notes that test takers could choose which dynasty's test they took without border restrictions during this period.

[8] A typical example is Hue, the capital of the Nguyen dynasty (about 600 km south of the previous capitals, as shown in Online Appendix 2). During 1598–1787, under the second Le dynasty, the country was ruled by two lords, one of the Trinh clan and the other of the Nguyen clan. The Trinh clan lived in the north and their capital was the present-day city of Hanoi. To avoid conflict with the stronger Trinh clan, Nguyen Hoang, the first lord of the Nguyen clan moved to Hue, the southmost city in the Le dynasty's territory. Later, the Nguyen clan annexed new territories and extended their domain further to the south. Finally, the Nguyen clan was able to unify the country, consolidate power, and establish the Nguyen dynasty from 1802. The Nguyen dynasty kept Hue as their capital, where it had been located for their first Lord.

The component $eligible_{ik}$ is also exogenous to people in the past because the eligible number of the imperial examinations is associated with territorial expansion events. During thirteenth to eighteenth centuries, the territory of Vietnam was expanded to the south (see Online Appendix 2), nearly doubling in size. People in the newly acquired territory were not eligible to participate in the imperial examinations prior to annexation. That is, people living in these areas prior to annexation were not Vietnamese (i.e., not ethnic Kinh) and did not share the same culture, language, and institutions, including those that administered the imperial exams (see Dell et al. 2018).

According to Kiviet (2020), it is impossible to test the exclusion restriction of the IV when using an IV for an endogenous variable. The exclusion restriction condition means that the IV does not have a direct impact on the outcomes. Third, for this reason, we can use only arguments to justify the exclusion restriction condition. Thus, we added some geographic controls. Most of imperial test locations (Hue, Vinh Loc, and Tho Xuan) do not have a critical role in present-day economic activities. Their corresponding nighttime light intensities in 2009,[9] a proxy for economic activities, are not among the highest ranked districts (see Online Appendix 1). The IV has no significant correlation with nighttime light intensity, and the raw correlation between the IV and the logarithm of the nighttime light is small (0.05).

The relative outcomes would have some advantages for our estimations on equality in education. The possible impacts of imperial test takers on present-day education might occur via two channels, namely, education boosting thanks to continuous investment in education (as shown by Vu and Yamada 2023) and the Confucian influence on gender roles. However, wherever the outcome is the relative ratio between the two genders, effects resulting from education boosting are equalized within the ratio.[10] Meanwhile, the effects of Confucianism's influence on gender roles should remain.

3.2 Specifications

We construct labor, health, and educational achievement outcomes for the district-level analysis. Wherever possible, we generally have three outcomes for each category. We construct one outcome for each gender and a relative one by dividing that of female by that of male. The relative outcomes show differences among districts in terms of gender inequality. The only exception is the sex ratio, that is, the number of males per female.

Specifically, we calculate three labor market outcomes. The first outcome is the economic activity participation rate in the district by gender. We sum by gender the number of people who reported working for income[11] in the district. We divide the total by the corresponding-gender district population to obtain the *participation rate*. For the second outcome, we first calculate the gap between wife and husband according to an indicator of participation in economic activities. One of the two (i.e., wife or husband) is the household head. The indicator equals 1 if one of the two declared working for income in the VHLSS and equals 0 otherwise. Thus, the gap in the indicator (*gap within the household*) can be

[9] 2009 nighttime light data are from the US National Oceanic and Atmospheric Administration (Version 4 DMSP-OLS Nighttime Lights Time Series). We extracted and constructed an adjusted logarithm of mean nighttime light intensity as $lnlight = ln(raw\_value + (raw\_value\,\hat{}\,2 + 0.001)\,\hat{}\,(1/2))$.

[10] If the impact of education boosting is observed only for males, we expect no impact of imperial test takers on the present-day female population in the subsample of females only. However, our later results show that this is not the case.

[11] Both salaried jobs (regardless of working hours or contract) and self-employed work are included.

−1, 0, or 1. We aggregate the average gap per district from the corresponding households. The third outcome is the ratio of females in the highest position of firms located in the district. The ratio is constructed by counting the number of women among those holding the highest position in all firms located in the district in 2012.

In addition, we construct general indicators for health and education. For the health outcome—namely, the survival rate of girls versus that of boys—we count the number of boys aged 0–4 years in the population census and divide by the number of girls in the same age group to determine the *sex ratio* per district. For the education outcome, we count the average years of schooling for each district based on its population aged 22 years and older, the majority of whom completed their education in 2009.

For age cohort–specific district indicators of education, we add three outcomes for three age cohorts (11–14, 15–17, and 19–21 years) corresponding to middle school, high school, and post-high school (tertiary education). We consider the school attendance rate for each district by dividing the number of people confirmed as "attending school" as of April 1, 2009 by the corresponding total population of the same age cohort. We perform the same calculation for those who had dropped out of school as of April 1, 2009.[12] We also calculate the non-enrollment rate in each district for each age cohort.

Furthermore, we construct several indicators related to the math *zscore* [13] of 1991-born test takers on the NEEU. First, we calculate the average *zscore* per district and gender (*F* for females and *M* for males) as well as the differences in the average *zscore* between the two genders in the district ($F-M$). Second, we count the number of female (male) test takers per district who had a *zscore* great than 1 and divide the result by the total number of NEEU female (male) test takers to obtain the ratio. We divide the ratio of females by that of males to obtain the relative ratio. Third, we perform a similar procedure for the relative ratio of test takers having a *zscore* less than −1. The second and third indicators measure the differences in terms of inequality between the far ends of the *zscore* (distribution)

Finally, we use six district characteristics as controls in every estimation, including the ratio of the Kinh ethnic group in 2009, population density, 1996 elevation, 1992 cropland and urban land ratio, and the distance to the coastline. The information is taken from the 2009 population census and the abovementioned satellite data.

4 Results

4.1 Economic Activities

We find evidence of adherence to Confucian norms based on the participation rate (or selection) in economic activities by gender as well as the ratio of females in the top positions of firms. We focus in particular on the intra-household division of labor by examining the gap in the indicator (*gap* with*in the household*) of participation in economic activities between wife and husband. The results shown in column (6) of Table 1 provide clear evidence of adherence to Confucian norms. A one standard deviation (SD = 11.2) increase in the number of Confucian elites is associated with a 0.04-times higher likelihood of the wife being inferior to her husband in terms of participation rate. Also, we find a negative

[12] Wednesday, April 1, 2009 was in the school calendar.

[13] *Zscore* is the standardized test score. It is constructed from the (raw) score as follows: $zscore = (score - Mean(score))/SD(score)$. As mentioned earlier, a higher *zscore* indicates better test performance.

Table 1 The impact on the involvement of females in economic activities (22–55-year-old population)

	Participation rate						Female ratio in highest position in a firm	
	Female		Male		Gap within the household (Wife's – Husband's)			
	OLS	IV 2nd stage	OLS	IV 2nd stage	OLS	IV 2nd stage	OLS	IV 2nd stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Elite number	−0.0004	−0.0006	−0.0002	0.0011	−0.0007	−0.0035***	−0.0025***	−0.0084***
	(0.0005)	(0.0011)	(0.0005)	(0.0010)	(0.0005)	(0.0011)	(0.0004)	(0.0009)
R-squared	0.140		0.219		0.042		0.195	
F-statistics[†]		126.7		126.7		126.7		126.4
N districts	680	680	680	680	680	680	686	686

[†] Kleibergen–Paap Wald rk F statistic for testing H0: Weak identification test.

Robust standard errors in parentheses (*** $p<0.01$, ** $p<0.05$, * $p<0.1$)

Other controls were the Kinh ethnic rate, population density in 2009, urban land ratio and cropland ratio in 1992, mean elevation in 1996, and distance to the coastline in every estimation

relationship between the number of Confucian elites and the ratio of females in the highest position of firms in the district, as shown in column (8) of Table 1. Meanwhile, as shown in column (2) of Table 1, the negative sign of the coefficient, though statistically insignificant, suggests that females in districts having more Confucian elites may be less likely than those in other districts to participate in economic activities.

4.2 Sex Ratio and General Educational Attainment

We find a long-lasting impact of Confucianism in the 2009 sex ratio among children under 5 years of age in the district, namely, sex selection. More specifically, a one-SD increase in the number of Confucian elites has a nexus with approximately 246 "missing" girls (i.e., 246 additional boys) among 10,000 girls in the 0–4-year age cohort in the district, as shown in the IV second stage in Column (5) of Table 2. This equals 3105 missing girls (621 annually) for a typical Vietnamese district in Vietnam with a population of about 126,000 people. We consider sex selection as both prenatal selection (sex-selective abortion) and postnatal selection (neglect of daughters). Previous demographic studies have blamed Confucianism (son preference) for sex-selective abortions without direct statistical evidence. Our continuous variable for the number of Confucian elites is the best statistical evidence for this argument.

In addition, we note that in comparison with their counterparts' outcomes in other districts, both genders in a district with Confucian elites have higher educational attainment associated with the number of Confucian elites (see columns (6) and (7) of Table 2). This is likely due to continuous investment in education in these districts (Vu and Yamada 2023).

However, gender inequality within a district still causes problems. Regarding the division of work within households, females in districts with Confucian elites are more likely to be inferior in terms of participation in economic activities. Even when they work, they are less likely than females in other districts to be in the top position of a firm.

Table 2 The impact on sex ratio and years of schooling

Age cohort	0–4	22+		
	Sex ratio	Years of schooling		
	M/F	Female	Male	F/M
OLS	(1)	(2)	(3)	(4)
Elite number	0.0011***	0.0268***	0.0314***	−0.0004**
	(0.0001)	(0.0042)	(0.0045)	(0.0002)
R-squared	0.283	0.159	0.465	0.054
IV 2nd stage	(5)	(6)	(7)	(8)
Elite number	0.0022***	0.1522***	0.1634***	−0.0009
	(0.0003)	(0.0181)	(0.0161)	(0.0008)
F-statistics[†]	126.2	126.2	126.2	126.2
N districts	688	688	688	688

Notes: as for Table 1

4.3 Educational Attainment for Specific Age Cohorts

First, we find that gender inequality is persistently associated with the number of Confucian elites in terms of school attendance and non-enrollment rates. In relative terms, a one-SD increase in the number of Confucian elites in the district has a nexus with a 0.013 times lower school attendance rate and a 0.05 times higher probability of never-enrollment (i.e., the first selection, to go to school or to never go to school) for the 11–14-year age cohort, as shown in columns (18) and (12) of Table 3. In the 15–17-year age cohort, the corresponding figures are 0.0094 and 0.0021 times, but they are not statistically significant.

However, we find the opposite effect in the outcome of school dropout rate, as shown in column (15) of Tables 3 and 4. A one-SD increase in the number of Confucian elites in the district is associated with a 0.01 (0.005)-times lower relative school dropout rate for girls compared with boys for the 11–14-year (15–17-year) age cohort. However, the improvement in the dropout rate for females may not sufficiently compensate for the worse never-enrollment rate. Therefore, the aggregated impact is still a loss for females.

Second, regarding university placement (Table 5) in the 1991-born cohort, when the mean *zscore* per district is considered, we find that the difference between females and males in the same district in terms of *zscore* (at the mean) is positively associated with Confucian elites. At the higher end of the *zscore* (i.e., more than 1 SD), the association is positive—a gain for females. In contrast, the association at the lower end of the score distribution ($zscore < -1$) is negative. The results shown in column 11 of Table 5 suggest that parents in districts with Confucian elites might have pushed boys having a low probability of passing the NEEU to sit for the test compared with parents in other districts. In contrast, girls having a low probability of passing the NEEU are less likely to sit for it in districts with Confucian elites (as shown in column 10 of Table 5). This may be a sign of discrimination against females in districts with Confucian elites.

Third, regarding the 19–21-year age cohort (Table 6), the interpretations of the results are similar for the relative attendance rate and never-enrollment rate; that is, greater gender inequality is associated with Confucian elites. The attendance rate among people aged 19–21 years is probably linked with post-high school education, which is likely to be a tertiary education program.

Table 3 The impact on pursuing education among the 11–14-year age cohort

	School attendance rate			School dropout rate			Never-enroll rate		
	Female	Male	F/M	Female	Male	F/M	Female	Male	F/M
OLS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Elite number	0.0023***	0.0027***	−0.0004***	−0.0023***	−0.0025***	−0.0021***	−0.0001***	−0.0002***	0.0025**
	(0.0003)	(0.0003)	(0.0001)	(0.0003)	(0.0003)	(0.0005)	(0.0000)	(0.0000)	(0.0011)
R-squared	0.296	0.219	0.361	0.220	0.212	0.284	0.425	0.260	0.466
IV 2nd stage	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Elite number	0.0116***	0.0124***	−0.0013***	−0.0104***	−0.0113***	−0.0097***	−0.0015***	−0.0015***	0.0047*
	(0.0011)	(0.0012)	(0.0004)	(0.0010)	(0.0011)	(0.0018)	(0.0002)	(0.0002)	(0.0025)
F-statistics[†]	126.2	126.3	126.3	126.2	126.3	126.3	126.2	126.3	126.4
N districts	688	687	687	688	687	687	688	687	686

Notes: as for Table 1

Table 4 The impact on pursuing education among the 15–17-year age cohort

	School attendance rate			School dropout rate			Never-enroll rate		
	Female	Male	F/M	Female	Male	F/M	Female	Male	F/M
OLS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Elite number	0.0044***	0.0046***	−0.0009***	−0.0043***	−0.0045***	−0.0012**	−0.0002***	−0.0003***	0.0031**
	(0.0006)	(0.0006)	(0.0003)	(0.0006)	(0.0006)	(0.0006)	(0.0001)	(0.0000)	(0.0015)
R-squared	0.293	0.275	0.209	0.253	0.266	0.214	0.450	0.250	0.451
IV 2nd stage	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Elite number	0.0199***	0.0202***	−0.0021	−0.0189***	−0.0193***	−0.0048***	−0.0021***	−0.0020***	0.0094***
	(0.0019)	(0.0019)	(0.0013)	(0.0018)	(0.0018)	(0.0011)	(0.0003)	(0.0003)	(0.0036)
F-statistics[†]	126.3	126.3	126.3	126.3	126.3	126.3	126.3	126.3	126.4
N districts	687	687	687	687	687	687	687	687	685

Notes: as for Table 1

Table 5 The impact on NEEU test scores among those born in 1991

	Ratio of test taker having *Zscore* < −1 among test takers in the district			Mean *Zscore* of all test takers in the district			Ratio of test takers having *Zscore* > 1 among test takers in the district		
	Female	Male	F/M	Female	Male	F-M	Female	Male	F/M
OLS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Elite number	−0.0006***	0.0005***	−0.0083***	0.0025***	−0.0003	0.0028***	0.0007***	0.0004*	0.0014**
	(0.0002)	(0.0001)	(0.0013)	(0.0006)	(0.0005)	(0.0004)	(0.0002)	(0.0002)	(0.0006)
R-squared	0.232	0.311	0.060	0.429	0.576	0.138	0.449	0.492	0.062
IV 2nd stage	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Elite number	−0.0033***	0.0015***	−0.0374***	0.0096***	−0.0021	0.0116***	0.0022***	0.0006	0.0047*
	(0.0006)	(0.0004)	(0.0047)	(0.0018)	(0.0014)	(0.0015)	(0.0005)	(0.0005)	(0.0026)
F-statistics[†]	127	127	127	127	127	127	127	127	128
N districts	679	679	673	679	679	679	679	679	657

Notes: as for Table 1

4.4 Robustness Checks

The results are mainly robust for various specifications. First, since Vietnamese districts vary in size, an alternative dimension of the main variable should be considered. We replace the number of elites per district with the density of elites per district in square kilometers and repeat all estimations in Tables 1, 2, 3, 4, 5 and 6. In general, the results of the new estimations are consistent with those of the original estimations, as shown in Online Appendices 6–11.

Second, since the favorable living area of the district would be important, we address this issue by using the density of elites per 2009 population instead of the number of elites per district area. The main interpretations of these results are similar to those of the main reported results. Third, we deal with spatial correlation, a well-known issue first indicated by Conley (1999). The impacts would have correlation based on the spatial dimension rather than being within the physical border of the district. Therefore, we use a method suggested by Colella et al. (2019) and repeat the main estimations, using several assumptions about the physical distance where spatial correlations may be most pronounced (namely 25, 50, and 100 km).[14] The results based on the number of elites are robust among the three distances used for spatial correlations, as shown in Online Appendices 12. However, the exceptions are related to the never-enroll rate and the ratio of test takers having $zscore > 1$, which are statistically insignificant (as shown in Online Appendix 13).

Finally, we construct an alternative IV, which is described in detail in Online Appendix 14. We repeat the estimations in Tables 1, 2, 3, 4, 5, 6 and 7, using the alternative IV. The corresponding results in Online Appendices 15–21 show similar interpretations.

4.5 Mechanism

We acknowledge that many channels and factors can explain the transmission of Confucian teachings and why the impact of Confucianism persists. First, although we use the total number of Confucian elites during 1075–1919 per district as a proxy for the strength of Confucianism, the Confucian culture and its teachings on gender norms were transmitted over time, from generation to next generation. Vu and Yamada (2023) show that districts with more Confucian elites in one dynasty tended to have more Confucian elites in the following dynasties. Because Confucian elites are examples of successful members of clans and villages, a Confucian culture is created and strengthened over time. In addition, the regulations of clans with Confucian elites would likely be influenced by Confucian teachings. This is because the Confucian elites in the clan would likely hold important positions in the clan (or village) and they would likely imbue local regulations with Confucian learning and practices. Nguyen (2005) finds village records of Confucian elites donating rice fields they received from the emperor to the village for the purpose of raising educational funds. Influenced by Confucianism, the regulations of clans (villages) were passed down to the following generations via family rules and teachings, which may also have contributed to the formation of local gender norms.[15]

[14] A typical district with an area of 434 km^2 is approximately equal to a circle with a radius of 12 km. Therefore, a special correlation setting of 25 km would be a reasonable assumption because this is the approximate distance between directly adjacent districts.

[15] The effects of communism on the transmission of gender norms at the local level are similarly explained by Boelmann et al. (2021).

Table 6 The impact on pursuing education among the 19–21-year age cohort

	School attendance rate			School dropout rate			Never-enroll rate		
	Female	Male	F/M	Female	Male	F/M	Female	Male	F/M
OLS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Elite number	0.0005	0.0007	−0.0022**	−0.0005	−0.0006	0.0001	−0.0002**	−0.0004***	0.0053***
	(0.0006)	(0.0005)	(0.0009)	(0.0006)	(0.0005)	(0.0004)	(0.0001)	(0.0001)	(0.0018)
R-squared	0.306	0.329	0.188	0.295	0.324	0.030	0.527	0.312	0.521
IV 2nd stage	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Elite number	0.0060***	0.0063***	−0.0076***	−0.0056***	−0.0060***	0.0001	−0.0033***	−0.0028***	0.0148***
	(0.0013)	(0.0012)	(0.0021)	(0.0013)	(0.0012)	(0.0008)	(0.0005)	(0.0003)	(0.0037)
F-statistics†	126.3	126.3	126.3	126.3	126.3	126.3	126.3	126.3	126.4
N districts	687	687	687	687	687	687	687	687	686

Notes: as for Table 1

Table 7 Associations between Confucian elites and present-day indicators

Variables	Ratio of incoming migrants	Ratio of incoming migrants	Agriculture-Aquaculture-Husbandry worker ratio	Agriculture-Aquaculture-Husbandry worker ratio	Cropland area per Agriculture-Aquaculture-Husbandry worker	Cropland area per Agriculture-Aquaculture-Husbandry worker
	OLS	IV 2nd stage	OLS	IV 2nd stage	OLS	IV 2nd stage
	(1)	(2)	(3)	(4)	(5)	(6)
Elite number	−0.0005**	−0.0015***	0.0033***	0.0097***	−0.0001***	−0.0002***
	(0.0002)	(0.0005)	(0.0007)	(0.0014)	(0.0000)	(0.0001)
R-squared	0.184		0.439		0.087	
F-statistics[†]		126.4		126.7		115.2
N districts	685	685	680	680	654	654

Similar to Table 1. The 15% population version of the 2009 Population Census contains information on whether the individuals (age > 5) moved to live in the district within last 5 years. We used this information to calculate the percentage of the migrants among district population (age > 5). Other outcomes were calculated from the VHLSS 2010, the cropland ratio, and district population 2009

Second, the continued predominance of agriculture–aquaculture–husbandry production would be a plausible economic reason for the persistence of Confucian teachings into the present day. As shown in column 4 of Table 7, Confucian elites are associated with a higher share of labor force participation in such production, which often requires physical labor such as pulling a plough and thus tends to favor males (Alesina et al. 2013). Therefore, the teachings of Confucius and the gendered division of labor espoused by Confucianism remain compatible with this type of production.

Third, it is possible that village culture and institutions persist and help to maintain the teachings of Confucius without referring to it directly. In the past, emperors did not interfere with village regulations or how villages were organized (Dell et al. 2018). The government did not provide funding for paid positions at the village level from the national government budget until 2009 (Vu and Yamada 2023). In addition, the teachings of Confucius are not transmitted directly from traditional Confucian books because Vietnamese people no longer use and are not able to read the original versions.[16]

Fourth, the resistance to incoming migrants might be another plausible explanation for the persistence of Confucian influences. As shown in column 2 of Table 7, districts with Confucian elites are negatively associated with the ratio of incoming migrants during 2005–2009. The results also suggest that in districts with Confucian elites, cultural norms are less welcoming of incoming migrants and their culture. This might be because districts with Confucian elites tend to be associated with smaller cropland area per worker (column 6 of Table 7). Thus, the district people may be hesitant to welcome incoming migrants, especially those engaged in the same type of production work, because the incoming migrants would likely compete with district residents for the same scarce resource, namely, cropland.

4.6 Discussion

Although the imperial exam system generally had a positive effect on both genders, the effect may not be equally distributed by gender. In particular, the effects on education would occur via the custom of investing in human capital (Vu and Yamada 2023) and may explain some of the gains in specific educational outcomes among girls in districts with Confucian elites compared with girls in other districts.

However, the selection effects of Confucianism may not be strong enough to prevent progress among females who obtained an equal amount of additional schooling as males. We find that at present, females are still underrepresented in post-high school education compared with males (see column 12 of Table 6) in association with the number of Confucian elites in the district. Although females in districts with Confucian elites might have more years of schooling compared with females in districts without Confucian elites, they do not reach the top position in firms as much as they do elsewhere (column 8 of Table 1). When married, they are subject to a greater gender gap in the division of work within the household compared with females in other districts (column 6 of Table 1).

We have some possible explanations for the observed improvement in school dropout rates and in the NEEU test score (especially at the higher end of its distribution) in present-day districts with more Confucian elites. First, there is selection by gender under Confucian

[16] We further note that Vietnam absorbed neo-Confucianism. That is, the dynasties followed the ideologies of Confucius but did not worship Confucius as a religious figure. It is not easy to find public places of worship devoted to Confucius in Vietnam.

teachings. We observe less gender equality in terms of, for example, the sex ratio, never-enroll rate, and school attendance rates. However, we also find some gains for females. These gains are found not just among the 1991-born cohort but also in other age cohorts (11–14, 15–17, and 19–21 years) in terms of school dropout rates. When included in the selection, present-day females in the 11–14- and 15–17-year age cohorts in districts with Confucian elites may have tried harder in school (relative to males) and were therefore less likely to drop out. As a result, when these females advance to higher grades and sit for the NEEU, they may have performed better than their male counterparts in terms of their NEEU *zscore* in 2009. Second, parents may value their daughters' educational success as much as their sons' due to the impact of Vietnam's learning culture. Females in districts with Confucian elites might have recognized this attitude and tried harder in order to continue their education and pass the 2009 NEEU.

5 Conclusions

Using an IV approach, we examined whether there is a persistent effect of Confucianism, proxied by the number (or density) of Confucian elites in a district, in gender inequality in present-day Vietnam. We found that the impact of Confucianism on gender inequality is persistent in terms of participation in economic activities, sex ratio, and school attendance rate. The impact might be due to selection into beneficial aspects, such as schooling. We also found some gains for girls, who are likely more determined to attain additional years of schooling as well as to have relatively lower school dropout rates and a higher mean NEEU *zscore* in association with the number of Confucian elites in their districts. However, these gains could not compensate for the losses resulting from selection in favor of males due to the influence of Confucianism.

We acknowledge several limitations of our study. First, non-elite districts might have applied Confucian practices at different levels; however, we considered all non-elite districts to be of the same level. Second, the list of Confucian elites used in this study is the largest such list presently available, but it is incomplete. These limitations will be addressed in a future research scheme when more data and information are available for analysis.

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Authors' Contributions Tien Manh Vu: Shaping the research ideas and methods; data processing and analyses; result interpretations; writing and improving the manuscript.

Hiroyuki Yamada: Shaping the research ideas and methods; result interpretations; improving the manuscript.

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Data Availability The datasets generated during and/or analyzed during the current study are not publicly available due to proprietary but are available from the corresponding author on reasonable request.

Declarations

Ethical Approval Not applicable.

Conflict of Interests None.

References

Alesina, A., Giuliano, P.: Culture and institutions. J. Econ. Lit. **53**(4), 898–944 (2015). https://doi.org/10.1257/jel.53.4.898

Alesina, A., Giuliano, P., Nunn, N.: On the origins of gender roles: women and the plough. Q. J. Econ. **128**(2), 469–530 (2013). https://doi.org/10.1093/qje/qjt005

Becker, O.S., Woessmann, L.: Luther and the girls: religious denomination and the female education gap in nineteenth-century Prussia. Scand. J. Econ. **110**(4), 777–805 (2008). https://doi.org/10.1111/j.1467-9442.2008.00561.x

Boelmann, B., Raute, A., Schönberg, U.: Wind of change? Cultural determinants of maternal Labor supply. CESifo Working Paper No. 9094. https://www.cesifo.org/en/publications/2021/working-paper/wind-change-cultural-determinants-maternal-labor-supply (2021)

Booth, A., Fan, E., Meng, X., Zhang, D.: Gender differences in willingness to compete: the role of culture and institutions. Econ. J. **129**(618), 734–764 (2019). https://doi.org/10.1111/ecoj.12583

Campa, P., Serafinelli, M.: Politico-economic regimes and attitudes: female workers under state socialism. Rev. Econ. Stat. **10**(2), 1–16 (2019). https://doi.org/10.1162/rest_a_00772

Colella, F., Lalive, R., Sakalli, S.O., Thoenig, M.: Inference with arbitrary clustering. IZA Discuss. Pap. Ser. **12584**, 1–15 (2019)

Conley, T.G.: GMM estimation with cross sectional dependence. J. Econ. **92**(1), 1–45 (1999). https://doi.org/10.1016/S0304-4076(98)00084-0

Das Gupta, M., Jiang, Z.H., Li, B.H., Xie, Z.M., Chung, W., Hwa-Ok, B.: Why is son preference so persistent in east and South Asia? A cross-country study of China, India and the Republic of Korea. J. Dev. Stud. **40**(2), 153–187 (2003). https://doi.org/10.1080/00220380412331293807

Dell, M., Lane, N., Querubin, P.: The historical state, local collective action, and economic development in Vietnam. Econometrica. **86**(6), 2083–2121 (2018). https://doi.org/10.3982/ECTA15122

Giuliano, P.: Gender: an historical perspective. NBER Working Paper: Working paper. **23635** (2017). https://doi.org/10.3386/w23635

Guilmoto, C.Z.: Son preference, sex selection, and kinship in Vietnam. Popul. Dev. Rev. **38**(1), 31–54 (2012) https://www.jstor.org/stable/41857356

Kiviet, J.F.: Testing the impossible: identifying exclusions restrictions. J. Econ. **218**(2), 294–316 (2020). https://doi.org/10.1016/j.jeconom.2020.04.018

Meng, X., Kidd, M.: Labour market reform and the changing structure of wage determination in China's state sector during the 1980s. J. Comp. Econ. **25**(3), 403–421 (1997)

Ngo, D.T.: List of Vietnamese Imperial Elites 1075–1919 ("Các nhà Khoa bảng Việt Nam", in Vietnamese). Edited by Ngo Duc Tho. Literature Publishing House, Hanoi (2006)

Nguyen, H. M.: Several documented imperial education at village and commune level from recorded stelae ("Vài tư liệu về tình hình giáo dục Nho học ở cấp làng xã qua tư liệu văn bia" in Vietnamese). Shino-Nom proceedings ("Tạp chí Hán Nôm" in Vietnamese), 4(71) (2005). http://www.hannom.org.vn/web/tchn/data/0504.htm

Nunn, N.: Gender and missionary influence in colonial Africa. In: Akyeampong E, Bates R, Nunn N, Robinson JA Africa's Development in Historical Perspective, pp. 489–512. Cambridge University Press, New York (2014)

Rosenlee, L.H.L.: Confucianism and Women - a Philosophical Interpretation (SUNY Series in Chinese Philosophy and Culture). State University of New York Press, Albany, New York (2006)
Vu, T.M.: Are daughters always the losers in the chore war? Evidence using household data from Vietnam. J. Dev. Stud. **50**(4), 520–529 (2014a). https://doi.org/10.1080/00220388.2013.875535
Vu, T.M.: One male offspring preference: evidence from Vietnam using a split-population model. Rev. Econ. Househ. **12**(4), 689–715 (2014b). https://doi.org/10.1007/s11150-013-9183-z
Vu, T.M.: Home appliances and gender gap of time spent on unpaid housework: evidence using household data from Vietnam. Singap. Econ. Rev. **64**(1), 97–114 (2019). https://doi.org/10.1142/S0217590817430019
Vu, T.M.: Effects of heat on mathematics test performance in Vietnam. Asian Econ. J. **36**(1), 72–94 (2022). https://doi.org/10.1111/asej.12259
Vu, T.M., Yamada, H.: Decomposing Vietnamese gender equality in terms of wage distribution. Pac. Econ. Rev. **23**(5), 705–731 (2018). https://doi.org/10.1111/1468-0106.12269
Vu, T.M., Yamada, H.: Legacies of Vietnam's imperial examinations, 1075–1919: more investment in education and better educational outcomes. J. Comp. Econ. **51**(1), 2–14 (2023). https://doi.org/10.1016/j.jce.2022.09.004