

The Growth Consequences of Confucianism: Evidence from Qing, Republican, Maoist, and Reformist China *

Myung Soo Cha
Yeungnam University
mscha@ynu.ac.kr

Last modified 16 July 2025

This study analyzes county level datasets of China to isolate the growth consequences of Confucianism measuring the prevalence of the worldview with the density of Confucian academies and instrumenting it with the state involvement in academy establishment. IV regressions show that the philosophy discouraged both thrift and ingenuity, which is confirmed by OLS results based on an extensive set of controls. Under Mao's rule, more Confucian, hence less affluent counties tended to grow and industrialize faster because the state supported them to boost regime stability. Estimated effects, which are empirically consistent and theoretically coherent, accounted for one quarter of the Great Divergence, although the rapid growth of reformist China far surpassed them.

JEL classification: N15, N35, O11, O15, O53

Key words: culture; Confucianism; growth; China

* Financial support from the Academy of Korean Studies (AKS-2014-KFR-123001) is gratefully acknowledged. I am thankful to Kate Yoon for providing invaluable research assistance, painstakingly linking the count-level areas defined in different administrative systems prevailing in Qing, Republican, and communist China. My thanks are also due to Yuanyuan Liu for providing some of the data analyzed in this paper. Earlier versions of the paper were presented at the Korean Economic History Society Meeting held at Ehwa University in 2016 and All-UC and Asia-Pacific Economic and Business History Conference held at Caltech in February 2018.

Until the demise of the Qing dynasty in 1911, Confucianism has remained the state orthodoxy in China for more than a millennium (de Bary (1983: 150)). Despite the systematic attempts by the post-1949 regime to vilify the doctrine and replace it with communism, “the Confucian way was virtually synonymous with the Chinese way.”¹ Given that Chinese accounted for nearly one fifth of the world population in 2015, the persistence of the Confucian mindset in China alone, not to mention in Japan, Korea, and Vietnam, makes it the third most influential value system of the world after Christianity and Islam.²

Tracing the origins of capitalism to the spirit of Protestantism, Max Weber(1920: 408, 525) described Confucianism as a world view inimical for growth: not denouncing wealth accumulation, the Confucian ethic encouraged individuals to adjust themselves to the world, rather than to change it by inspiring them to achieve “cultured-status position” rather than save as “tools of God”. When this claim was made, the technological leadership achieved by the Song remained yet to be discovered by Joseph Needham, and the East Asian growth miracle had yet to take place, which has been attributed to the Confucian preference for such as diligence, thrift, and learning (Morishima(1982); Zakaria and Lee(1994)).

The divergent perspectives are not necessarily inconsistent with each other, because they focus on distinct proximate causes driving economic growth, i.e. technological progress and the accumulation of human and physical capital, and because, depending on models, long run growth may be driven by thrift as well as by ingenuity.

This study identifies the impact of Confucianism on accumulation, innovation, and growth taking advantage of the developmental gaps observed across different places in China, the birthplace of the worldview. Confucianism prevailed with different intensity in different counties of China, because the length of the exposure to Confucianism depended on their location in the multi-cultural empire, which was created through cycles of conquest and invasion. The costs of travel and transportation remained high in pre-communist China, and the communist state controlled the movement of people, ensuring that capital and labor

¹ Quoted from Judith A. Berling’s article on Confucianism, <https://asiasociety.org/education/confucianism>, which was accessed 11 July 2019.

² This statement is based on the figures found on the website of Pew Research, <https://www.pewresearch.org/fact-tank/2017/04/05/christians-remain-worlds-largest-religious-group-but-they-are-declining-in-europe/>), accessed on 15 May 2019.

markets remained less than perfectly integrated, and that performance gaps – potentially created by Confucianism -- persisted across different regions of China.

As a metric of the Confucian influence in different counties, this study uses the number of Confucian academies as standardized by population. The place of learning and worship, known as *shuyuan*, first appeared in the Tang and flourished in the succeeding dynasties in association with the rise of the Neo-Confucian movement, the revival of the Confucian philosophy in Song China after centuries of being eclipsed by Buddhism and Taoism.

Figure 1 Presence of Confucian Academies versus Income Levels and Growth

The density of *shuyuan* is correlated with a variety of growth outcomes observed in Qing, Republican, Maoist, and reformist China, such as income growth and level (see Figure 1) as well as interest rates, savings, educational attainment, and invention, which can be interpreted as evidence of Confucianism causing development only after addressing the issues of reverse causation, confounding, and spatial correlation.

The imperial government supported, repressed, and supervised Confucian academies because they served both to boost and threaten regime stability. This study isolates the growth effect of Confucianism instrumenting the measure of Confucianism with the state involvement in academy establishment as indicated by the number of state-sponsored academies per capita. IV estimates are presented side by side with ordinary least squares estimates obtained using extensive sets of controls to show that the two distinct estimation procedures give usually comparable and not infrequently close results. The estimated effects of Confucianism on innovation, learning, savings, and income levels and growth are consistent with each other, with existing estimates, with paradigmatic models of economic growth, and with facts about the Chinese economic history.

As estimation results show, Confucianism promoted learning but checked thrift and ingenuity. In the Qing and Republican eras, the growth disadvantages prevailed over advantages causing more Confucian counties to underperform vis-à-vis less Confucian counties. Under Mao's rule, more Confucian counties did better than less Confucian counties, because the communist party shifted resources towards less developed or less friendly regions away from the rest of China. In reformist China, the Confucian check on growth reemerged. This study contributes to the literature on the impact of Confucianism on the Chinese economic growth, which tended to focus on the role of civil examination, one of the

archetypical Confucian institutions of imperial China (Lin(1995); Gao(2016); Chen, Kung, and Ma(2020); Shiue(2017)), although studies exist exploring how Confucianism affected growth through the accumulation of physical capital and regime stability (Liang(2010); Kung and Ma(2014)).

The second contribution refers to the Great Divergence debate, where the availability of capital, state capacity, and technological progress have been identified as proximate causes driving the Chinese underperformance vis-à-vis northwestern Europe. While capital scarcity has long been cited as being responsible for the growth failure occurring in Qing and Republican China, little is known about why Chinese saved less than Europeans (Tawney (1932: 48); Elvin (1973: 314); Allen(2009)). Different explanations of Needham's Grand Question have been provided, which tended to be informed guesses rather than claims grounded on hard evidence (Parente and Prescott(2002), Mokyr(1990; 2016); Lin(1995)). Views diverge on whether the Chinese state checked or helped technological progress (Mokyr(1990); Brandt, Ma, and Rawski(2014)).

Lastly, this article presents new evidence on how culture (including religion) affects economic growth. Existing studies typically analyzed international datasets focusing on trust, reciprocity, and cooperation (Barro and McCleary(2003); Greif and Tabellini(2017)). This study estimates the impact of Confucianism on factor accumulation and innovation taking advantage of regional variations within a single country. When compared to various countries, different administrative regions of China offer a greater abundance of pertinent information with less spatial variation because they have long been under the control of a centralized bureaucracy. This characteristic helps one better address omitted variable bias.

This paper begins with a brief introduction to Confucianism, specifically its Neo-Confucian variety, which is followed by a section justifying the use of the access to Confucian academies as an indicator of the prevalence of the worldview in separate places of China. The third section describes the county and prefectural level datasets and empirical strategy this study uses to isolate the developmental effect of Confucianism. Econometric results are reported in the fourth section. Section five integrates and interprets the findings drawing on paradigmatic models of economic growth and prominent facts about the Chinese development and growth, showing that estimated effects align with each other and with theoretical predictions. The final section summarizes and concludes.

I. Confucianism and the Chinese Development

To provide context for this paper's subject matter and to facilitate the interpretation of findings, this section outlines the socio-political agenda advocated by Confucian masters comparing it with the historical trajectory of late imperial China.

A. Confucianism

Confucianism emerged as a system of belief in China in the 6th-5th century BCE distinguishing itself from Buddhism and Daoism with its intense concern about the earthly well-being of humanity. The medieval period saw Confucianism of the Chinese antiquity (as advocated by Confucius (BCE 551-479) and Mencius (BCE 372-289)) being eclipsed by the two rival doctrines. The decline was reversed in the Song era (960–1279), when Neo-Confucianism was elevated to the status of the state-sponsored orthodoxy and of the academic foundation of civil examination in the Yuan (1271-1368) (de Bary(2009: 154)). Pioneering the Neo-Confucian revival, Cheng brothers (Cheng Hao 程顥, 1032–1085 and Cheng Yi 程颐, 1033-1107) advocated *daoxue* (道学), Learning of the Way, the fundamental principles governing how the world worked, differentiating it from the traditional scholarship, *wenxue* (文学) focusing on memorizing classical texts and composing literacy pieces (Bol(2008: 82-83)). The philosophical initiative was taken over by Zhu Xi (朱熹, 1130-1200), a Confucian entrepreneur sometimes likened to Thomas Aquinas, who marketed the theoretical system so successfully to lead it to be labelled as Zhu Xi-ism. According to Bol(2008: 80), Neo-Confucianism (Confucianism hereafter) is supported by five assumptions: 1) “relations of power” exist, 2) “the division of labor” is inevitable, 3) “kinship and family” matter, 4) “historical accumulation of cultural capital” is relevant, finally 5) “some of the things that impinged on human life operated independently of human intention.”

First, Confucian masters idealized a centralized, small, and pro-market government, which stands in contrast to comprehensive state interventionism as advocated by Legalists and the Song economist and politician, Wang An-shi (1021-86). Confucian scholars conceived the emperor as a human, rather than divine, figure, who were on a morally equal footing with ministers and in need of being cultivated (meaning checked) by scholar-officials, the “self-appointed interpreters of the sacred message” of the classics deriving authority fundamentally from “their own insights” (Ching(2013: 202)).

Second, “the division of labor” referred to the Confucian hierarchy of occupations listing scholar-officials, peasants, handicrafts, and merchants in descending order of dignity. This represented an expression of anti-commercialism, if not an anti-market ideology, which differed superficially from that prevailed in pre-1700 Europe (McCloskey(2010: chapter 41)). Third, the emphasis on blood ties underlay the promotion of family farms paying taxes and providing military service as the foundation of the state. The Confucian idealization of peasant economy aligned with the support for a centralized state in the sense that the alternative to independent peasant households were slaves farming *encomiendas* controlled by autonomous warlords with hereditary power.

Fourth, the “historical accumulation of cultural capital” represented euphemism for the conservative attitude saying that current problems can be solved by restoring the ancient order as idealized in classical texts (de Bary(2009: 174); Mokyr(2016: 310)). Lastly, the assumption of things operating “independently of human intention” expressed passive submission to nature and super-natural beings, which has been referred to by Weber(1920) as incomplete liberation from magic and superstition (*Entzauberung*) and contrasts with the Baconian “acceptance of the growth of useful knowledge as a critical ingredient of economic growth” (Mokyr(2016: 98)).

To sum, advocating a non-interventionist state controlled by scholar-officials and supported by landowning peasants, Confucianism promoted learning, which was more idealistic than empirical and encouraged backward-, rather than forward-looking mentality.

B. Late Imperial China

Beholding the intellectual, political, and social development unfolding in imperial China, Confucian masters would have felt more vindicated than frustrated.

The Tang/Song transition was associated with the “social transformation from a medieval aristocracy to a gentry society,” and as a result elite status ceased to be inherited and came to be acquired through civil examination success.³ To acquire gentry status through

³ See Elman(1991: 13) and von Glahn(2016: 1-2). The non-ascription of elite status stands in contrast to the persistence of the hereditary nobility in early modern Europe. Accounting for about 2% of the population, the Chinese gentry enjoyed privileges, which included stipends, better protection of property rights, the commutation of punishments, the exemption from

examination success, millions of adult males kept themselves busy reading Confucian classics. Examination success required the rote learning of ancient classics from childhood, which possibly inculcated Chinese with conservatism and fatalism (Elman(2000: 261)). With the demise of regional warlords and the rise of the gentry, the emperor “shifted from being a figure with administrative power to one with symbolic power, tightly constrained by the system he was part of, even if he did not always act according to the ideals his ministers urged upon him” (Bol(2008: 126)). Supplementing the bureaucratic control, local gentry provided unpaid assistance in education, famine relief, irrigation, and tax collection. The Confucian dream of building an empire of family farms was fulfilled as manorial order and serfdom declined and “a shift to an agricultural regime based on small-holder ownership and tenancy” occurred in Tang/Song China.⁴ This is indicated by the average of provincial farmland Gini in the early twentieth century in China being equal to 0.55, which was substantially exceeded by the wealth Gini of England in the eighteenth and nineteenth centuries, 0.8 (Brandt and Sands(1992: 189, Table 6.3); Di Matteo(2016: 232, Figure 4)). The relatively equal distribution of farmland entailed the Chinese gentry earning incomes primarily from outside agriculture including public service, commerce, and teaching.⁵

C. Developmental Consequences of Confucianism

The broad correspondence between the Confucian agenda and the evolution of imperial China suggests that Confucianism and the Chinese history interacted with each other (Alesina and Giuliano(2015)). This sub-section focuses on state capacity, innovation, learning, and thrift to show that except for its effect on human capital accumulation the consequences of

corvée labor, and preferential tax rates. See Chang(1955), Eberhard (1962: 22-23), Elman(2000: 241), and Wang(1973: 34).

⁴ Brandt, Ma, and Rawski(2014: 49). According to Elvin(1973: 250), “by the beginning of the nineteenth century, the Chinese countryside was becoming predominantly a world of smallholders.”

⁵ Chang(1962: 197, 326-33). As Milanovic, Lindert, and Williamson (2007: 47) observed, for the elite in late imperial China “Land was a much less important source of income than at a similar stage in European history”, although “Income from government jobs provided resources for purchase of land and thus income from landownership.”

Confucianism for the Chinese development remain either insufficiently substantiated or theoretically ambiguous or both.

The Confucian advocacy for small peasants evokes the causation from land equality to public provision of education in Americas as highlighted by Engerman and Sokoloff(2000), because it was paralleled by Zhu Xi's promotion of mass, rather than elite, education, which inspired the establishment of the system of community and public schools in late imperial China.

Existing studies tend to show that Confucianism promoted human capital accumulation through investment in civil examination success. Genealogical information has been analyzed by Shiue(2017) to show that fertility depended negatively on the returns from examination success, which, given child quantity/quality tradeoff, suggests that the meritocratic institution mattered for the accumulation of human capital. As Gao(2016) found out, civil examination passers took initiatives to build modern primary school in Republican China creating jobs for themselves, which is consistent with Chen, Kung, and Ma(2020)'s claim of the investment for examination success significantly improving educational attainment in contemporary China.

Highlighting the abundance or scarcity of capital as a cause to explain the British success and the Chinese failure, the literature tended to overlook the reasons why the late imperial China was starved of capital.⁶ As Liang(2010) assumed, the Confucian exaltation of "kinship and family ties" speeded up capital accumulation by leading parents to care more about the welfare of children. The boost to savings based on bequest motive however may have been at least partially offset by the reduction in precautionary savings, which was caused by the access to grain storage for famine relief, the Confucian system of social security run by the local gentry's voluntarism (Shiue(2005)). Theoretically, the consequence of the Confucian advocacy of smallholders is ambiguous. Assuming that the world view did reduce land inequality, weakened landlordism may have lowered the savings ratio, if landlords saved a greater fraction of incomes than peasants. On the other hand, if peasants either faced greater uncertainty or had greater risk aversion or had more limited ability to diversify risks when compared with landlords, savings would have increased as a result of greater land equality.

⁶ See Tawney (1932: 48), Elvin (1973: 314), and Keller, Shiue, and Wang(2021) on the Chinese capital scarcity. Comparing higher wages prevailing in Britain vis-à-vis China, Allen(2009) traced the origins of the British industrial revolution capital abundance and labor scarcity.

Typically supported by narrative evidence, the prevailing assessment of the Confucian impact on productivity advance tends to be unfavorable. Lin(1995) claimed that civil examination process misallocated resources from technological development towards directly unproductive activities. In Mokyr(2016: 19, 310)'s view, Confucianism's backward orientation was responsible for the Chinese underperformance in innovation, which was exacerbated by the underdevelopment of the competitive market for ideas. Markets for ideas flourished in early modern Europe on the network of impersonal transactions, which was supported by the "general morality" of the European corporations as opposed to the "limited morality" of the Chinese clans as promoted by Confucianism (Greif and Tabellini(2014); Mokyr(2016: 296)).

Chinese emperors have traditionally been portrayed as "oriental despots" wielding absolute power through the officials selected through civil examination (Wittfogel(1959)). According to Mokyr(1990), technological progress stalled after the series of brilliant inventions made in the Song, because innovation was subject to the whims of autocrats. In a similar vein, Parente and Prescott(2002) argued that civil examination strengthened emperors vis-à-vis the military and censorate, which impeded technological development.

The plausibility of claim of the imperial control suffocating the Chinese creativity has been undermined by the evidence of the capacity of the Chinese state remaining limited as Confucian masters hoped. Although "centralized rule and the dominance of a single ruler, combining religious and political authority, were already facts of historical life before Confucius came on the scene", "Neo-Confucianism contributed to a transformation of political system", whereby "the early imperial vision of a powerful ruler ... lost credibility" (de Bary (1983: 139); Bol(2008: 119)). The Chinese gentry competed with the state over the control of land and labor, weakening the state capacity. The imperial bureaucracy being thinly spread over a vast territory, the principal-agent problem arose weakening the fiscal capacity of the Chinese state when compared with the states of western Europe and reducing the Qing state to a "presiding state. . . . [that] was usually content to reign and loosely regulate rather than vigorously rule" (Rosenthal and Wong(2011); Sng(2014); Brandt, Ma, and Rawski(2014: 79)). Therefore, Brandt, Ma and Rawski(2014: 79) attributed the underperformance of late imperial China vis-à-vis early modern Europe to the lack of "the capacity of the state to formulate and implement policies that support and encourage development".

II. Measuring Confucianism

The prevalence of Protestantism differed in different place of Prussia depending inversely on the distance to Wittenberg, where Martin Luther studied and preached (Becker and Woessman(2009: 557)). Similarly, the high costs of travel, transportation, and book production in pre-1911 China meant that those closer to the centers of the Neo-Confucian movement were more strongly swayed by Confucianism, while those farther away were more influenced by Bhuddism or Daoism. While Confucius travelled around principality states of the Spring and Autumn period China, Cheng brothers stayed put in Luoyang (in Henan province) declining to accept numerous offers of appointments to public offices. Zhu Xi, an imperial examination passer, achieved his empire-wide fame not by skillfully climbing the bureaucratic hierarchy, but by building a network of intellectuals from his base in Youxi (in Fujian province) through founding academies, delivering lectures, and writing letters and commentaries on classical texts.⁷

[Figure 2 here]

Figure 2 shows that log of the number of academies per capita was negatively and significantly correlated with the lesser of the distances from the centroids of different counties to either Luoyang or Youxi.

[Figure 3 here]

To further justify the use of the prevalence of academies as a measure of Confucianism, Figure 3 shows that the density of academies was capita was positively and significantly associated with Qing civil examination success as measured by the number of the passers of the Qing metropolitan examination per million people in 1920, which required heavy investment in the knowledge of Cheng-Zhu orthodoxy.

Having first emerged in the Tang (618-907) era, Confucian academies, *shuyuans*, spread in the Song (960-1279) period, when Neo-Confucianism emerged to overshadow Buddhism and Daoism (Walton(1999: chapter 1)). After the Yuan (1271-1368) stagnation, Confucian

⁷ Zhu Xi “spent only a few years in actual offices and spent less than 40 days at court.” Bol(2008: 139).

academies multiplied at an increasingly rapid pace, with about a quarter of academy foundation taking place in the Ming (1368-1644) and nearly 60% in the Qing (1636-1911). The proliferation of academies depended on state support to such an extent that Walton(1999: 9) described *shuyuans* as a “middle space” between the private and official education. Three types of Confucian academies existed, including academies funded entirely 1) by the gentry or 2) government or 3) by a combination of both private and public resources, of which purely private academies accounted for about one half of all *shuyuans* ever launched (Chen and Deng(1997: 354-59)). The imperial state aided academy building by directly contributing funds, granting exemptions from prefectural taxation, and exhorting wealthy individuals. The involvement was aimed at deflecting the support for Buddhism, providing employment for unsuccessful examination candidates, and controlling local society (Walton(1999: 18, 164-70)). Buddhism, due to its monastic and spiritual focus, lost favor among Chinese elite and was eventually overshadowed by Confucianism, which emphasized loyalty, order, and social harmony. A large number of licentiates unable to find bureaucratic employment has been cited as a cause of the demise of the Ming regime, an issue, which was particularly relevant for the Qing era, when the increase in public offices was far outpaced by population growth (Miyazaki(1982: 122-4); Elman(1991: 14)). As *shuyuans* proliferated and their influence in local affairs grew, government oversight intensified. In a significant move in 1733, the Qing state formalized its control by implementing a system of government supervision. This required academies to be licensed and recognized officially with awarded plaques, signaling their legitimacy and adherence to state regulations. The imperial state's willingness to exert its authority was evident when academies were perceived as a threat to central power. A prime example is the Donglin Academy, founded in 1604 in the lower Yangzi region, where the state power remained substantially weaker than elsewhere because the abundance of degree-holding gentry promoted landlordism and damaged the integrity of the peasant economy (Esherick and Rankin(1990: 17-24)). The institution was forcibly closed down in 1622, and tragically, six of its members were executed two years later. This drastic measure occurred after the Donglin literati faction's failed power struggle against a formidable eunuch who wielded significant influence in Beijing, effectively controlling a

series of ineffective emperors.⁸ This episode starkly illustrates that Confucian academies often functioned as political bases for the local gentry, who were actively vying with the imperial state for power and resources.

[Table 1 here]

All in all, the state's involvement in *shuyuan* establishment and operation was driven primarily by a strategic imperative: to ensure regime stability, maintain social order, and foster cultural cohesion across the multi-ethnic empire. Panel A of Table 1 shows that the intensity of state intervention as measured by the number of government-sponsored academies per million people, was orthogonal to geography (like soil suitability and distance to three major rivers) or to history (as indicated by the minimum distance to the four historic capitals and by the year of county establishment) or to commercial development (as indicated by a binary variable equal to unity if county seat is labeled as "busy" (冲) in 1820 and to zero otherwise) on the other.

As seen in panel B of Table 1, however, public sponsorship of *shuyuans* was not completely randomized. The density of government-supported academies was positively correlated with the presence of ethnic minorities and negatively with the distance to Beijing, indicating that the imperial state prioritized stability in areas prone to racial conflicts and closer to the corridors of power. More Christianized counties by 1920 had received more resources from the Qing government for the promotion of academies, which, given the Qing repression of Christianity, suggests that nonconformist counties attracted greater public support for Confucian academies.⁹ Additionally, the density of state-assisted academies was negatively correlated with the Great Leap Forward famine mortality and positively with the income level and industrialization as observed in 1982, when a census was taken after 38 years of interruption to mark China's transition to a market economy, taking advantage of computers

⁸ See Dardess (2002), who likened the incident to the 1989 Tienanmen Square protests. The *shuyuan* entry in An Encyclopedia on Chinese History, Literature, and Art, <http://www.chinaknowledge.de/History/Terms/shuyuan.html>, describes similar incidents.

⁹ This correlation is consistent with the coincidence of Xi Jinping's crackdown on Christianity and promotion of Confucianism from 2014 onwards. <http://www.chinaknowledge.de/History/Terms/shuyuan.html>, describes similar incidents.

and the technical assistance from Japan and the U.S. These associations suggest that Beijing gave preferential treatment to counties it perceived as relatively unfriendly, diverting resources away from the rest of China. This phenomenon warrants further consideration when interpreting the estimation results presented below.

III. Data and Empirical Strategy

This section describes the datasets analyzed and the econometric strategy this study uses to identify the causality between Confucianism and growth outcomes.

A. Treatment variable

In 1996, Xiaofeng Ji published the Dictionary of Confucian Academies [*Zhongguo shuyuan cidian*], providing a comprehensive list of the 7,014 Confucian academies that have ever been established, categorizing each as either privately or government sponsored. Using this compendium, this study counted the number of *shuyuans* for each county, excluding institutions established after 1911 but including those before 1912 but remaining inactive by 1911. Academies established by missionary workers from Europe and the U.S. in the nineteenth and early twentieth century were excluded. The density of academies was derived by dividing total with county population in 1920 as given in Stauffer(1922). For the lack of reliable information on the pre-1775 population, the pre-1775 *shuyuan* density, used in Qing-interest rate regressions (see below), refers to county total as standardized by area.

B. Outcome variables

This study analyzes the developmental outcomes analyzed occurring under the four separate regimes, which include Qing, Republican, Maoist, and post-Maoist China. They refer to human and physical capital accumulation, innovation, and income level and growth.

Human capital accumulation is measured by 1) the number of civil examination passers in the Qing as share of population in 1920, 2) literacy in 1982, 3) adult population share of individuals with secondary education in 1990, and 4) crude birth and death rates in 1989. The data appendix describes the sources of the information.

The availability of physical capital is indicated by 1) the rates of interest in Qing and Republican China, 2) the amount of savings per rural household from 1929-1933, and 3) the savings ratio in rural China in 1988. The Qing interest rate, the only prefectural level data

used in this study, refers to the rate of return from intertemporal grain trade, which is based on the rate of monthly increase in grain prices as collected and made available by Keller, Shiue, and Wang(2021). The dataset includes 24,322 observations from 1775-1838, which was regressed on dummy variables indicating different types of grain and different prefectures.¹⁰ Monthly interest rate was derived using the constant and coefficient estimates on prefecture dummies, which was multiplied with 12 to obtain annual interest rate. The rate of interest for Republican China equals the average of nominal rates on loans for productive and nonproductive uses as reported by Buck(1937b)'s survey of 141 counties from 1929-1933. The source also provides the amount of savings and loans in cash and agricultural products in 102 counties, which were added up to derive savings per rural household. Lastly, the county-level savings ratio in 1988 is derived using the information on the net income and savings for 3,696 rural households as collected by the Chinese Household Income Project, known as the CHIP.

Innovation is measured by the number of patents granted to manufacturing firms by the State Intellectual Property Office of China from 1998-2009 when China emerged as one of the world's top patent-filing country. He, et al. (2018) compiled the list of 332,682 patents granted to the manufacturing firms covered by the Chinese manufacturing census and made it available on the website of the China Patent Data Project, <http://sites.google.com/site/sipopdb>. Referring to the inventions made by the firms having addresses within China, the patents exclude design and utility improvement. Based on the locational information as indicated by postal codes of the firms, the number of patents by county was standardized with the census population in 2010.

Income levels are indicated by the 1) urbanization in 1920, 2) rural wage around 1930, and 3) per capita nighttime light emission in 2020. The income growth from 1993-2020 is based on nighttime luminosity because the gross domestic regional product information as published by the government of People's Republic of China (PRC hereafter) is known to suffer reliability issues (Rawski(2001); Chen, Chen, Hsieh, and Song(2019); Bloomberg report on April 19, 2018).

¹⁰ While Keller, Shiue, and Wang(2021)'s data spans 1770-1860, to ensure the temporal precedence of the density of academies over interest rates, pre-1775 observations were dropped. Post-1838 observations were also discarded because the Opium War broke out in the following year possibly affecting the availability of capital in different areas to degrees.

C. Instrument

To isolate the causal impact of Confucianism on economic development, this study instruments *shuyuan* density with the number of state-sponsored academies per million people.

$$\begin{array}{rcl} \textit{Academies/population} & = & 7.85 \textit{ Instrument} + 1.25 \\ & & (0.01) \qquad (0.71) \end{array} \quad (1)$$

R-squared = 0.88

F statistic = 11871

Standard errors in parentheses.

Equation (1) presents the result of regressing the number of academies per capita on the instrument, where the coefficient estimate on the number of academies supported by the government is positive and highly significant. Note the large F-statistics, also indicating the relevance of the instrument.

[Table 2 here]

As noted above, depending primarily on ruling elite's assessment of the affability of individual counties, the intensity of the government involvement in academy building was statistically independent from geography, history, and commercial development, which helps the variable to satisfy exclusion restriction. While Confucian academies varied in size and prestige, ranging from family to village and royal academies, "the typical academy included a central ceremonial hall, ...; in front of it was a lecture hall,...; and wings of dormitories were placed symmetrically along corridors to the left and right. There was often a library and a sacrificial hall for the worship of Confucius and his disciples, as well as a kitchen, granary, and bathhouse, and pavilions, ponds, and gardens" (Walton(1999: 27)). Such an establishment, paling in comparison with European castles and cathedrals in terms resource requirements, could be financed by a well-off landholding family, which makes it seem unlikely that the public involvement in Confucian academies affected development through channels other than propagating Confucianism, that is, either by crowding out private

investment or by spurring commercialization or industrialization. Table 2 presents evidence of non-correlation between the density of state-supported *shuyuans* and developmental outcomes, highlighting those that, as the following section indicates, were significantly affected by Confucianism. Regressing outcome variables on the instrument incrementally adding controls on the right-hand side tended to lower p -values but not as far as to reach the conventional level of significance, showing that exclusion restriction is justified.

Cross section regressions using spatial data can generate spuriously small standard error when spatial correlation exists (Kelly(2019)). Using residuals from conventional IV regressions, this study routinely carries out Moran's I test, a geographical analogue to Durbin-Watson test, and report chi-square statistic to test the null of spatial independence. When the test detected the presence of spatial autocorrelation, arbitrary correlation regressions were run, a technique developed by Collela, et al.(2020), which provides standard error taking into account arbitrary dependence of errors across. Otherwise, two-stage least squares estimates are presented with clustered standard errors.

D. Controls

In accordance with standard practice, this study presents Ordinary Least Squares (OLS) estimates alongside instrumental variable (IV) estimates to provide insight into the extent of endogeneity bias. The two sets of estimates are often comparable and sometimes close to each other, which may be interpreted as indicative of the bias not being serious or the instrument not strong enough. This study refrains from reporting Hausman test results comparing IV and OLS estimates, which frequently yielded negative chi-square statistics reflecting the prevalence of spatial autocorrelation as well as clustering (see the following section). Furthermore, the test, which assumes the validity of instrument, barely goes beyond being suggestive.

OLS regressions use an extensive set of controls, controlling for prefectural or provincial fixed effect. The controls are either geographical or historical. Geographical controls include the distance to coastline, to three major rivers (including the Yellow, Yangzi, and Pearl), to Beijing and Shanghai, to the five treaty ports (including Guangzhou, Xiamen, Fuzhou, Ningbo, and Shanghai), to Qing postal routes, and to the grand canal linking Beijing and Shanghai, which were calculated using the coordinates and vectorized county borders available as parts of the sixth version of the China Historical Geographic Information System

(CHGIS 6 hereafter). The geographical controls also include elevation, relief, and soil suitability indices for growing rice, sorghum, and wheat, which were taken from sources as indicated in the data appendix. Finally, given that China is an unusually large and multi-ethnic country embracing a “quarter of humanity” and covering more than 6% of the world land mass, ordinary least squares regression control for the serial founder effect and the impact of the Columbian exchange as highlighted by Ashraf and Galor (2013) and Galor and Özak(2016), respectively.

From the late nineteenth century onwards, waves of modernization engulfed China, which included railroadization, the penetration of Christianity, and the diffusion of modern medicine and schooling. The impacts of the four shocks are measured, respectively, by the distance to railroads, the population share of communicants and constituency, the density of hospitals, and population share of primary school students, which were calculated using information from the sources as listed in the data appendix.

E. Linking Separate County-Level Datasets

The cross-section dataset analyzed in this study is defined in terms of the Chinese administrative system in 1911 as described by the CHGIS 6. The system comprises 1,986 county-level units, which include 1,369 *xians* (县) and a miscellaneity of non-*xian* districts. The average and median area of the 1986 county-level districts are 5,652 km² and 2,043 km², respectively. County-level units were subsumed under prefectures (*zhou*, 州), each of which in turn belonged to one of the twenty-four provinces (*sheng*, 省) of the Qing. CHGIS 6 lists 289 prefectures, which is equivalent to each prefecture including 6.9 counties on average. The average and median prefectural areas are 43,475 km² and 13,569 km², respectively. The county-level population data in 1920 as compiled by Stauffer(1922) is an essential piece of information needed for standardization, which cover the 1,704 county-level administrative units in the eighteen provinces in the core and the two Manchurian provinces, Liaoning and Jilin.¹¹ Hence, this study excludes from analysis the counties in the six provinces in the

¹¹ The core provinces include Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Yunan, Zhejiang, and Zhili, which comprises present day Beijing, Hebei, and Tianjin.

periphery, including Heilungjiang, Inner Mongolia, Ningxia, Qinghai, Xinjiang, Xizang (Tibet).

The census data for 1982, 1990, and 2010 include 1,990, 2,038, and 2,471 county-level areas, respectively. The increasing number of county-level areas reflected demographic expansion and urbanization, which caused county-level areas to be merged or split and their names and status to change. County-level areas as defined in different systems of administration prevailing in different points in the timeline of the Chinese history were linked using the information available from Temporal Gazetteer API as developed by Harvard University, <http://maps.cga.harvard.edu/tgaz/>, *Zhongguo xingzheng quhua tongshi* [History of Administrative Division in China] edited by Linxiang Fu and Baoheng Zheng and published by Fudan University Press, and various internet resources including <http://baike.baidu.com> of China and <http://shuiren.org/kodaichimei/> of Japan.

[Table 3 here]

Table 3 presents the descriptive statistics of the causal and outcome variables.

IV. Growth Consequences of Confucianism

According to the Maddison Project Database, the Chinese living standards had been on the decline until around 1840, when the trend reversed into slow improvement. Triggered by the economic opening after the Opium War(1839-42), the modern economic growth speeded up considerably with the establishment of the People's Republic of China, despite the setbacks caused by revolutions, wars, and policy-made disasters. Total fertility rate fell from seven in the mid-1960s to 2.7 when the One Child Policy was promulgated in 1979, which was followed by further decline to below unity as of 2023. Although mortality fell in parallel, fertility decline slowed down population growth from 2.5% p.a. in the mid-1960s to zero in 2020 and subsequently to the negative territory. Per capita output grew 2.6 times under the Maoist regime, 1949-79, which, although dwarfed by the post-1979 growth spurt, compares favorably with the world average per capita output increasing 2.1 times from 1950-80. Manufacturing output accounted for 13% of the aggregate output in 1931, rose to 44% in 1980, and then fell slightly to 43% in 2010 (Minami and Makino(2014: 452, 453, 455)).

This section presents the evidence on the developmental consequences of Confucianism in four sub-sections, reporting the results on human and physical capital accumulation (A and B, respectively), technological progress (C), and lastly, income growth and level (D).

A. Human Capital

To isolate the causal impact of Confucianism on human capital accumulation, we examine the literacy in 1982, the adult population share of secondary school graduates in 1990, the success in the Qing civil service examination, and crude birth and death rate in 1989.

[Table 4 here]

During the eighteenth century, the Chinese literacy rose was approximately 20%, which rose in 2003 to 91% (Buck(1937: 373, Table 10); Naughton(2006: 223)). Columns (1) and (2) show that Confucianism promoted literacy in 1982, when census takers found 67% of Chinese adults being able to read or write with the share varying between 22% and 94% across counties. The impact on the literacy in 1982 as estimated by ordinary squares and instrumental variable methods were similar and statistically significant. The IV estimate of the impact of *shuyuan* density, 9.33E-05, times the mean of the density, 26, implies that in the absence of Confucian academies literacy in 1982 would have been lowered by 0.25% point. When the PRC was established in 1949, secondary school enrollment rate was as low as 2%, which suggests that secondary school graduates represented a tiny fraction of the Chinese adults at that time (Gao(2015: 77, Table 3.2)). The dependent variable in columns (3) and (4) is the share of secondary graduate in adult population in 1990, when 41% of Chinese had secondary education. The IV estimate, which exceeds OLS estimate considerably, shows that Confucianism significantly boosted secondary education, implying a 0.23% point reduction in secondary schooling attainment in the absence of Confucian academies.

Columns (5) and (6) show that Confucian academies significantly enhanced the chances of success in the Qing civil examination as measured by the population share of passers in national examination, known as *jinshis*. The IV coefficients in columns (4) and (6) are consistent with Chen, Kung, and Ma(2020)'s estimation that doubling *jinshi* density would have increased the population share of high school graduates by 0.13% point in 2010. The IV coefficient estimate on *shuyuan* density, 4.26, together with the total number of *jinshis*

generated from 1646-1904 per million people in 1920, 59.18, implies that doubling *jinshi* density would have required increasing academy density by 13.89 ($=59.18/4.26$), which would have raised the share of people with secondary education by 0.12 % ($=13.89 * 8.9E-05$) point in 1990.

Lastly, columns (7)-(10) show that Confucianism lowered fertility without affecting mortality in 1989. Column (8) presents an IV coefficient estimate on *shuyuan* presence, $-3.52E-6$, which implies that the hypothetical closure of all academies would have raised population growth by 0.009% ($=3.52E-6*26$) point. Note that despite the 1979 introduction of One Child policy its enforcement remained uneven, particularly in rural China, due to the multiple loopholes it contained (Rodriguez(2023)).

To sum up, Confucianism promoted the accumulation of human capital of both traditional and modern types, a finding, which aligns with the persistent effect of civil examination on the progress in modern education (Gao(2016); Chen, Kung, and Ma(2020)). Consistent with the theory of child quantity/quality tradeoff, the boost to fertility was associated with a check on fertility.

B. Physical Capital

To identify Confucianism's impact on physical capital accumulation, this subsection uses the rate of interest and savings as dependent variables.

[Table 5 here]

Comparing the rates of interest rate inferred from the seasonal fluctuation of grain prices in Britain and China from 1770-1860, Keller, Shiue, and Wang(2021) found that, when compared with Britain, real interest rates remained about 3% points higher – 8.4% vs 5.4% -- and less correlated across different prefectures in China. The outcome variable in columns (1) and (2) of Table 5 is the rate of interest from 1775-1838 based on Keller, Shiue, and Wang(2021)'s grain price data, which ranged from -4.25% and 97.74% across prefectures around the mean of 9.8%. The OLS and IV coefficient estimates on the density of pre-1775 academies are positive, broadly comparable, and highly significant, suggesting that Confucianism reduced the availability of capital. The IV estimate, indicating one academy per million people increasing the rate of interest by 0.328% point, implies that closing down

all academies would have lowered interest rates by 8.5 ($=0.328*26$) % points, which substantially exceeds the 3% points gap between Britain and China.

Buck(1937b) reported the nominal interest rates in the 141 counties from 1929-33, which were dispersed between zero and 130% around the mean of 31% per year, resulting in the coefficient of variation of nominal interest rate being 0.49.¹² Columns (3) and (4) report Confucianism's effect on the interest rate. The IV estimate in column (4), 0.249, which is comparable to the IV estimate in column (2), 0.328, implies that Confucianism raised the interest rate by 6.5 ($= 0.249*26$) % points.

The average amount of per household savings in the 102 counties as recorded in Buck(1937b) was 38 yuan from 1929-33, varying across counties between 0.02 and 245 yuan. Consistent with its positive impact on the interest rate, Confucianism significantly reduced savings in 1930 (columns (5) and (6)), an effect, the magnitude of which did not depend significantly on estimation method, although the OLS coefficient estimate was significant at 14% level. The IV coefficient estimate implied Confucianism reducing household savings by 9.3 ($=0.359*26$) yuan reduction, which is equivalent approximately to one quarter of the average amount of savings, 38 yuan. Assuming the household savings ratio in 1930 equaled Kung-chia Yeh's estimate of the 1931-36 investment ratio, 5%, Confucianism lowered the savings ratio by 1.25% points.¹³

Buck(1937b) noted substantial real wage gaps among the 154 counties surveyed from 1929-33 as evidenced by the coefficient of variation of 0.52. Columns (7) and (8) of Table 6 show that Confucianism hardly affected real wages. Buck(1937b) provides the estimate of calorie intake per male equivalent in 130 counties, which varied between 1,730 and 5,471 with the average being equal to 3,278 -- well above 2,800, the level Buck(1937b) quoted as the standard. Columns (9) and (10) show that Confucianism significantly boosted calorie intake with the IV and OLS coefficient estimates being similar. This together with the lack of Confucianism's impact on real wages is consistent with its adverse effect on savings in columns (5) and (6). Lastly, columns (11) and (12) report the estimated effect of Confucianism on the rural savings ratio in 1988 based on the CHIP data, which ranged around the mean of 0.27 between 0.0004 and 1.02 across counties. Although OLS and IV

¹² The average is similar to the nominal interest rates found in other sources as quoted by Brandt, Ma, and Rawski(2014: 55).

¹³ The investment ratio was taken from Rawski(1989: 241).

estimates are similar, only the OLS estimate was statistically significant, which suggested Confucianism lowering the savings ratio by 1.5% points, a magnitude comparable to the effected estimated usings 1930 rural savings data, 1.25% points.

C. Invention

Post-Mao China achieved productivity advance both by importing technology through multinational corporations and by carrying out in-house innovation. As Chinese firms strove to improve efficiency, inventive activities exploded as is indicated by the six-fold increase number of patent filing in the first decade following 1997 (Hu and Jefferson(2009: 298)). Xie and Zhang(2015) analyzed firm-level data on patenting in reformist China to find that domestic and private sector firms accounted for an increasing share of patenting at the expense of foreign and state enterprises, and that rising wages and sex-ratio imbalance caused firm in labor- and female-intensive sectors to be more innovative.

[Table 6 here]

Finding that the number of patent filings and R&D spending were positively correlated, Dang and Motohashi(2015) concluded that patenting is a “meaningful indicator” of innovation in China. Columns (1) and (2) of Table 6 present significantly negative OLS and IV coefficient estimates on the density of academies, which suggest that Confucianism reduced the number of patent filings per capita from 1998-2009. The IV coefficient, -0.018, which is one half as large as the OLS estimate, implies that hypothetical closure of *shuyuans* would have increased the number of patent filings per capita by 0.5 ($=0.018*26$), a 1.7% rise when evaluated at the mean per capita patent filings of 27. According to Zhao and Liu(2011: 13, Table 4), the elasticity of TFP growth with respect to patent filing growth was 0.048, which implies that banning Confucianism boosted TFP growth by 0.08% point ($=1.7\%*0.048$).

D. Income Level and Growth

Urbanization ratio has been used as a proxy for income levels for an agrarian autarky because a larger portion of population living in urban areas means a smaller share of labor force employed in agriculture being able to feed the whole population, that is, a higher level of labor productivity in agriculture (Acemoglu, Johnson, and Robinson(2001); Ashraf and

Galor(2013), and Bai and Kung(2015)). In 1920, the residents in the 336 cities having residents no less than 25,000 accounted for 7.6% of the Chinese population.¹⁴ Columns (3) and (4) of Table 6 indicate that the urban development in 1920 hardly depended on Confucianism, which is consistent with the insignificant coefficient estimate in rural wage regression. The outcome variable in columns (5) and (6) is the per capita output growth in reformist China, proxied by the growth of per capita nighttime light emission from 1993-2020. The estimated impact was significantly negative with unit decline in *shuyuan* density raising per capita luminosity 0.0019% (OLS) or 0.0013% (IV). From 1993-2020, mean per capita luminosity growth across counties was 5.1% per year, and the Chinese per capita GDP grew 6.4% annually. These figures indicates a light-to-output elasticity of 1.1 ($=6.1/5.4$), which, together with the IV coefficient, implies the abolishment of Confucianism accelerating per capita output growth by 0.031 ($=0.0013*26/1.1$) % point.¹⁵ Recall that the instrument, the intensity of public involvement in academy building, directly affected developments Maoist China achieved, which precluded running IV regressions to determine Confucianism's impact on the outcomes as revealed by the 1982 census (Table 1). As seen in Figure 1, *shuyuan* density and the per capita output in 1982 were positively and significantly associated, which survived the inclusion of various controls and prefectural fixed effects on the right-hand side of OLS regression equation. Given Confucianism's failure to affect either 1920 urbanization or the real wages around 1930, this suggests that income levels rose significantly faster in more than in less Confucian counties owing to the Maoist state's support.¹⁶ The 1982 income *level* advantage of more Confucian counties was offset by the subsequent resurgence of their income *growth* disadvantage from 1993-2020,

¹⁴ Stauffer(1922). The urbanization ratio falls within the range of two available estimates. According to Rozman(1974: 300), the population share of residents in cities with at least 10,000 residents was 6-7% in the Ming and early Qing. Defining urban areas as places having residents more than two thousand, Xu, et al.(2017: 322) concluded that "there was a downward trend in the level of urbanization from 11%–12% to 7% in the late 18th century, a level at which it remained until the early 1900s."

¹⁵ The elasticity is exceeded by Beyer, Hu, and Yao(2020)'s for developing economies, 1.55.

¹⁶ OLS estimation also indicated that counties with greater academy density had achieved greater industrialization and suffered less mortality during the Great Leap Forward famine.

which resulted in the lack of Confucianism's effect on the level of per capita luminosity in 2020 as seen in columns (7) and (8).

V. Integration and Interpretation

[Table 7 here]

Table 7 summarizes the magnitude of Confucianism's effect on growth related variables as reported in the preceding section, except for human capital. Are these figures reconcilable? How significant were they economically? What narrative elucidates the underlying mechanisms through which Confucianism influenced the growth-related variables in China in ways as evidenced by the econometric results? Drawing on the Solow model of economic growth and the facts about Chinese economic development, this section integrates the estimated effects of Confucianism and discusses the plausibility of different hypotheses of the developmental consequences of the ideology. The model is more convenient for required simulations than the Ramsey model, which involves adjusting unobserved time preference and predicts counterfactually declining savings ratio during the transition to steady state. According to Campbell and Lee(2001: 456), the Qing differed from the preceding dynasties by allowing "unprecedented spatial mobility resulting in a major expansion and redistribution of the Chinese population." Confucianism's negligible impact on urbanization or rural wages underscores the efficacy of the Qing labor mobility: the worldview's potential impact on income levels was effectively neutralized by workers relocating from impoverished to prosperous counties.

The pre-1911 Chinese literacy compared unfavorably with that in Tokugawa Japan or in Catholic countries of Europe, confirming de Bary (2009: 174)'s verdict that despite "a dominant Confucian tradition that exalted learning and insisted on its wide diffusion as the sine qua non of a viable political and social order," it "found itself incapable of realizing its educational aims except on the basic level of the family or in the higher but much more restricted sphere of the ruling elite."¹⁷ The Confucian preaching's limited contribution to

¹⁷ According to Dore(1965: 321), in Tokugawa Japan, 43% of boys and 10% of girls "ever have got some kind of schooling." For the European literacy in 1900, see Becker and Woessmann(2009: 543, Figure II).

human capital implied that the Confucian check on physical accumulation and innovation prevailed, hence that Confucianism checked growth prompting workers to leave more Confucian for less Confucian areas and driving the Great Divergence. This conjecture is consistent with the finding that Confucianism slowed down income growth from 1993-2020. As quantitative evidence shows, the Great Divergence did not erupt with the British industrial revolution. Instead, incomes in China and northwestern Europe have trended in opposite directions at the latest from 1700 onward. To decompose the widening income gap into parts attributable to capital accumulation and productivity advance, write growth accounting equation in differences:

$$\Delta g_y = \Delta g_A + \alpha (\Delta g_K - \Delta g_N) \quad (1),$$

where Δg_x is the gap in the growth of x between Britain (representing western Europe) and China, with y , A , K , and N denoting per capita output, total factor productivity, aggregate capital stock, and population. According to Broadberry, Guan, and Li(2019: 33, Table 6), from 1700-1840, per capita output increased 0.37% per year in Britain but decreased 0.43% annually in China, hence $\Delta g_y = 0.37\% + 0.43\% = 0.80\%$. Total factor productivity grew 0.26% in Britain but fell 0.1% in China p.a., hence $\Delta g_A = 0.26\% + 0.1\% = 0.36\%$.¹⁸ The remaining 0.44% point was attributable to per capita capital growth, of which, assuming $\alpha=1/3$, 0.1% point was attributable to faster population growth in China, 0.8%, v.s. in Britain, 0.5%. This leaves 0.34 (=0.44-0.1)% to be attributed to capital accumulation gap, $\alpha \Delta g_K$. The Great divergence was driven more or less equally by productivity divergence than by capital accumulation gap.

To evaluate Confucianism's contribution to the Great Divergence, assume that Britain and China embarked on the transition to separate steady states in 1700 from an identical level of productivity and per capita capital, hence identical level of per capita output.¹⁹ Calibrate the

¹⁸ For details on the Chinese TFP growth see appendix.

¹⁹ According to Broadberry, Guan, and Li(2019: 33, Table 6), in 1700 the Chinese per capita output was 30% lower than the British per capita output. However, one can overlook this gap considering the significant margins of error inherent in historical national accounting as discussed by Solar(2021).

Solow growth model to the Chinese economy during the eighteenth and early nineteenth centuries by setting the savings ratio equal to 5%, population growth to 0.8%, and labor-augmenting technological progress to -0.15%, which equals total factor productivity growth divided by the labor share, $2/3$. The model predicted that per capita output fell 0.30% from 1700-1840, which is considerably slower but not widely different than the estimated per capita output contracting 0.43%. Next, calibrate the Solow model to the contemporary Britain, setting population growth equal to 0.5%, labor-augmenting technological progress to $0.39(=0.26*1.5)\%$, and letting the British savings ratio stay at 5% until 1760 and then rise linearly to 9% in 1830, mimicking the trend as estimated by Broadberry and Pleijt (2021: 32). The British Solow model predicted per capita output growing 0.37% p.a. from 1700-1840, which is close to the estimated per capita output growth of 0.34% p.a. (Broadberry, Guan, and Li(2019: 33, Table 6)). In both models, where the depreciation rate equals 7%, the half-life of convergence is 13-14 years with 90% of convergence being achieved during the first 44-45 years.²⁰

Recall the result based on the savings observation circa 1930 that the hypothetical closure of all Confucian academies increases the savings ratio by 1.25% point from 5% to 6.25% (Table 7). According to the Chinese Solow model, this results in a 9.5%-points reduction in the marginal product of capital in steady state, an impact not too far away from the decline between 6.5% and 8.5% points as estimated using Qing and Republican interest rates (Table 7).²¹ The 1.25% point increase in the savings ratio speeds up per capita output growth by 0.0788% point, an effect, which is close to the boost to the income growth due to total factor productivity growth caused by the abolition of Confucianism, 0.0793% point. Lastly, Confucianism slowed down the Great Divergence by lowering fertility, which speeded up per capita output growth by 0.0029% point. Thus, Confucianism explains $0.16(=0.0788+0.0793-0.0029)\%$ point of the predicted 0.67 ($=0.30+0.37$)% per capita output growth gap between Britain and China, equivalently, 23% of the Great Divergence.

The adverse impact of Confucianism on savings, which contradicts the conventional wisdom that Confucianism encourages frugality (Morishima(1982: 83-4); Liang(2010: 207)), possibly

²⁰ See appendix for the details of parametrization.

²¹ Steady state real interest rate, set equal to the marginal product of capital less depreciation, 33% in China and 15% in Britain, significantly exceeded the real interest Keller, Shiue, and Wang inferred from seasonal fluctuation of grain prices.

arose from the system of famine relief, which, as Yongzheng emperor lamented, cultivated a dependent lifestyle (Shiue (2005)). Alternatively, as Weber(1920) observed, “The typical Confucian used his own and his family’s savings in order to acquire a literacy education and to have himself trained for the examination”: according to Elman(2000: 249), captivated by the dream of examination success, 2% of working age male population kept themselves away from productive activities in the eighteenth century, when salt merchants from Yangzhou squandered their wealth by investing in building political networks, with imperial examination success being a crucial aspect of this strategy (Ho(1962); Mote(1999: 249, 764-65)).

It is neither plausible nor empirically supported that China’s productivity underperformance originated from primitive market institutions. Confucianism, which promoted a non-interventionist state, did not actively discourage market activities. As Keller, Shiue, and Wang(2007 and 2021) found out, around 1800 the grains markets in Britain and China remain similarly well integrated although China suffered some disadvantage in terms of financial development. According to Jones(1995)’s R&D-based model, steady state productivity growth does not depend on the size of the R&D sector, which rejects either the Confucian aversion to state intervention or diversion of talents to rent-seeking as an explanation of China’s productivity failure. This process of elimination leaves the Chinese productivity underperformance to be explained by the “lack of intellectual curiosity about things not close at hand and immediately useful” or the ejection of the idea of knowledge accumulation and promotion of familism limiting the development of market for ideas (Weber(1920: 231; 247); Lin(1995); Rosenthal and Wong(2011); Mokyr(2016)).

More Confucian counties, which did not differ from less Confucian counties in terms of either real wages or urbanization in Republican China, acquired income advantage over less Confucian counties by 1982, suggesting that the growth in the intervening decades was positively associated with the prevalence of Confucianism. This had little to do with the conflicts in 1930s and 1940s the Chinese civil war and second Sino-Japanese war, which, unlike the spatial distribution of Confucianism (see panel A, Table 1), were geographically concentrated in Manchuria and coastal regions. As suggested above, the outperformance of more over less Confucian counties arose from the communist party’s strategy to reinforce regime stability by providing greater support to more at the expense of less Confucian counties. Given the history of Confucianism impeding growth in pre-communist China, this policy was implemented under the banner of regionally balanced development, a place-based

intervention, the effect of which persisted due to the restriction on factor mobility.²²

Adopting a Soviet-style command system, the People's Republic of China focused on building capital-intensive industries, raising manufacturing's GDP share from 13% in 1931 to 44% in 1980 (Naughton(2006: chapter 3)). As Lardy(1978: 173) observed, "Peking has continued to use centralized policy instruments, such as redistributing investment resources from rich to poor regions, subsidizing the social expenditures of less-developed areas, controlling the interindustry and interregional structure of wages to mitigate income inequality in the industrial sector, and regulating the terms of trade between industry and agriculture so as to transfer sizable income to the poorer rural population." Deng and Shen(2019: 20) agree: "In 1958-78, ... 80 percent [of aggregate state investment] was allocated in the 'rear' or 'outback' provinces to achieve 'pseudo-development'."

Furthermore, different studies concluded that the Great Leap Forward famine (1958-60) erupted because the communist leadership diverted food grains from regions of higher agricultural productivity to affluent regions of poorer food availability including urban areas (Kung and Lin(2003); Meng, Qian, and Yared (2015)).

The estimated effect of Confucianism on the income growth in reformist China was not large (a 0.026%-point reduction from 1993-2020 when incomes grew 6.4% annually), which can be misleading in the sense that it represented the net outcome of Confucianism's larger and mutually offsetting impacts on productivity advance and capital accumulation. Slowing down productivity advance, the worldview speeded up capital accumulation in reformist China, which is counterintuitive and stands in contrast to the Confucian hindrance to capital stock growth in pre-communist China. To prove this, consider the Solow model calibrated to the

²² As Chan, Henderson, and Tsui(2008: 784-5) observed, "In the Maoist era, population was held in place by the *hukou* system..., which acted as an internal passport arrangements, regulating mobility and granting citizenship in the locality; despite the *hukou* reforms in the early 1980s, many impediments to migration remain." Under Maoist rule, capital was subject to a various kinds of plan allocations and assignments, and regional capital markets remained weakly integrated in reformist China by international standards (Boyreau-Debray and Wei(2004)). Deng and Shen(2019: 20) agrees: "In 1958-78, ... 80 percent [of aggregate state investment] was allocated in the 'rear' or 'outback' provinces to achieve 'pseudo-development'," which resulted in fixed capital investment in the periphery increasing three times as fast as in coastal regions.

People's Republic of China, which differs from the Qing Solow model by having total factor productivity grow 1% per year and the savings ratio rise from 10% in 1952 to 45% in 2020, following the trend revealed by the Chinese national accounts. The model predicts that during the half century capital stock grows 5.85% p.a., which is exceeded by 5.91%, the speed of capital accumulation occurring when, due to the hypothetical absence of Confucianism, the savings ratio remains 1% point higher each year. The slight advantage arises from the faster accumulation during the first two decades of transition, which disappears gradually as the savings ratio rose, turning into disadvantage in 1973. The reversed gap grew until 1989, when it began to decline, eventually disappearing in steady state. In 2000, despite the higher savings ratio, capital stock grew 0.09% point slower under the counterfactual (that is, non-Confucian) than under the simulated (that is, Confucian) scenario.²³ The reversal of accumulation advantage after two decades is due to the base effect and diminishing returns to capital: the reduced capital stock due to Confucianism implied the same amount of investment resulting in a faster rate of capital accumulation (the base effect) and a larger output expansion (due to higher marginal product of capital), hence a greater amount of savings.

The estimated effect of Confucianism on capital accumulation in 2000, 0.09% point, aligns with its estimated impact on innovation, savings, population growth, and per capita output growth as given in Table 7, lending credibility to the findings presented in the preceding section. Assuming $\alpha = 1/3$ and letting Δg_x in equation (1) represent the gap between the growth of x occurring under non-Confucian and Confucian setting in 2000, set Δg_K to -0.09%, substituting 0.08% for Δg_A and 0.008% for Δg_N . These figures imply $\Delta g_y = 0.047\%$, which approximates 0.031%, the per capita output growth acceleration as predicted by the coefficient estimate in the per capita luminosity growth equation from 1993-2020.

VI. Conclusions

Growth literature suggests that the cross-county gaps in living standard observed today depend on events occurring centuries earlier. The persistence arose, either because growth-

²³ See appendix for calibration details on the Solow model. Simulations using the model suggest that for most of the pre-reform decades, 1959-79, capital stock grew more rapidly in more than in less Confucian counties, which confirms that more Confucian counties industrialized faster in Maoist China due to government support.

affecting attributes are genetically transmitted or because beliefs and values are handed down generation after generation through socialization (Guiso, Sapienza, and Zingales (2006); Harrison and Huntington (2002); Spolaore and Wacziarg(2013)) or both. This study examined the developmental consequences of Confucianism, taking advantage of the varying intensity with which it prevailed in different regions of China as indicated by the spatial distribution of Confucian academies. Instrumenting the metric of Confucianism with the intensity of state intervention in academy creation, we found that the worldview encouraged education but discouraged wealth accumulation and technological progress. The IV estimates, which takes into spatial autocorrelation, were usually either consistent with or similar to OLS estimates, aligning with each other, with existing estimates, and with magnitude implied by the Solow model.

Confucianism's growth effect was mixed, promoting education and lowering but impeding savings and innovation. The net effect was negative, which accounted for nearly one quarter of the Great Divergence although in reformist China, where per capita output grew 6% per year, the Confucian check on growth looked less than impressive. Although Zhu Xi advocated universal schooling as Martin Luther did, the Confucian promotion of human capital accumulation was outweighed by the adverse effect of Confucian check on innovation and physical capital accumulation because the Qing education often represented investment in rent-seeking career and diverted resources away from physical capital accumulation. Moreover, it cultivated a conservative mindset and hindered the emergence of markets for ideas. This confirms McCloskey(2010: 162)'s observation that "education can discourage innovation, when sociology and politics are not right." The net growth outcome of these opposing effects was negative although backward counties with stronger Confucian tradition grew faster in Maoist China due to the state's commitment to regionally balanced development.

Despite its persistent effects, culture is not destiny and can change because of external shocks or conscious efforts. The Confucian ethics do not present obstacles to market functioning although they are not enthusiastic about profit making. As McCloskey(2010: chapter 41) observed, western Europe had long remained only superficially different from China in looking down upon commercial activities before what she called the "Bourgeois Revaluation" took place in the eighteenth century to drive the sustained and rapid increase in living standards in the following centuries. Hence, the PRC's ongoing initiative to resuscitate Confucianism and repress Christianity to bolster regime stability is ill-conceived even from

the viewpoint of China's ruling coalition. In the short term, the ideological drive may help elite sustain autocracy, but it ultimately weakens its viability by hindering technological progress, hence income growth.

Appendix: Data Sources

Treatment

Location of Confucian academies: Ji(1992)

Outcomes

A. Human capital

Civil examination passers: Bielenstein(1992)

Literacy in 1982: 1982 census

Secondary education attainment, 1990: CHGIS 6.

Crude birth and death rate, 1989: 1990 census

B. Saving and interest rates

Monthly grain prices c. 1800: Keller, Shiue, and Wang(2021)

Nominal interest rates c. 1930: Buck(1937b)

Calorie intake per male equivalent: Buck(1937b)

Real wages: Buck(1937b)

Household savings, c. 1930: Buck(1937b)

Rural savings, 1988 Chinese Household Income Project, CHIP:

<https://www.icpsr.umich.edu/web/DSDR/studies/9836>

C. Innovation

The China Patent Data Project, <http://sites.google.com/site/sipopdb>

D. Level of activity

Urban and total population, 1920: Stauffer(1922)

Nighttime light emission: Earth Observation Group,

<https://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html> and

https://eogdata.mines.edu/nighttime_light/annual/v21/2020/

Controls

Soil suitability: gaez.fao.org

Elevation and relief: the Soil and Terrain Database (SOTER) and the digital elevation model based on GTOPO-30 from the U.S. Geological Survey and included as a part CHGIS 5.

level and variability of precipitation and terrestrial air temperature:

http://climate.geog.udel.edu/~climate/html_pages/archive.html.

Railroad network: the railway map of 1961 available from the Library of Congress's Geography & Map Division under the digital ID g7821p.ct002148 and the railway map of 1990 available as a part of CHGIS 4.

Christian penetration: the population share of the sum of Christian communicants and the constituency in 1920, available from Stauffer(1922).

Hospitals run by mission organizations in 1920: Stauffer (1922: Appendix, i-xlii, lxxxiv, lxxxv, lxxxviii-lxxxix) as standardized by area.

Appendix: Solow Models for Britain and China

Table A1 Calibrating the Solow Models for Britain and China

	Britain	Qing China	People's Republic of China	Sources
Population growth	0.5%, 1700-1840	0.8%, 1700- 1840	0.7%, 1950- 2020	Maddison Database
Total factor productivity growth	0.26%	-0.1%	1%	See description below.
Savings ratio	5% up to 1760 rising linearly to 9% in 1830	5%	increases linearly from 10% in 1954 to 45% in 2020	See description below.
Depreciation ratio	7%	7%	7%	Conventional

Notes: the British savings ratio is based on Broadberry and Pleijt(2021: 32). The Chinese saving ratio in pre-1949 China approximates K Yeh's estimate of investment ratio in the 1930s as quoted in Rawski(1989: 241). These estimates confirm McCloskey(2010: 131) saying that pre-Industrial Revolution Britain and eighteenth-century China did not differ in terms of the savings ratio. The post-1950 savings ratio mimics the trend as indicated by the national accounts of the People's Republic of China, <https://data.worldbank.org>; Broadberry and Pleijt(2021: 31)'s TFP growth estimate for Britain, 0.26%, falls within the range of the agricultural TFP growth between 0.2-0.3% as estimated by Allen(2009). Hence, let the Chinese TFP growth in the eighteenth and early nineteenth centuries was represented by its agricultural TFP growth, which was derived by subtracting from agricultural output growth the weighted average of labor and land input growth, assuming away capital input and applying 0.5 as the land share. According to Broadberry, et al. (2018: 41, panel C, Appendix Table), the Chinese agricultural output grew 0.4% p.a. from 1720-1810, which, together with Xu, et al. (2017: 393, Table A1)'s estimate of land yield growing 0.2% per year from 1724-1812, implies acreage expanding at 0.2% per year. Labor input growth in agriculture was set

equal to population growth, 0.8% per year. Total factor productivity growth in China from 1950-2020 was estimated using the capital stock data from the Penn World Table 10.1 and per capita output and population data from the Maddison database and setting the capital share equal to 1/3. With the TFP growth thus estimated, 1.0% p.a., the model tracked the pre-1980 growth trajectory closely but under-predicted the output growth in post-Mao decades. As experiments indicated, raising TFP growth to improve tracking performance did not affect the estimated effect of Confucianism on the capital accumulation and technological progress in reformist China significantly.

References

- Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review* 91 (5): 1369–1401.
- Aird, John S. 1983. "The Preliminary Results of China's 1982 Census," *China Quarterly* 96: 613–40.
- Allen, Robert. 2009. *The British Industrial Revolution in Global Perspective*. Oxford: Oxford University Press.
- Allen, Robert C. 2009. "Agricultural Productivity and Rural Incomes in England and the Yangtze Delta, c.1620-c.1820," *Economic History Review* 62 (3): 525–50.
- Ashraf, Quamrul, and Oded Galor. 2013. "The 'Out of Africa' Hypothesis, Human Genetic Diversity, and Comparative Economic Development," *American Economic Review* 103 (1): 1–46.
- Bai, Ying, and Ruixue Jia. 2016. "Elite Recruitment and Political Stability: The Impact of the Abolition of China's Civil Service Exam," *Econometrica* 84 (2): 677–733.
- Bai, Ying, and James Kai-sing Kung. 2015. "Diffusing Knowledge While Spreading God's Message: Protestantism and Economic Prosperity in China, 1840–1920," *Journal of the European Economic Association* 13 (4): 669–98.
- Barro, Robert J, and Rachel M McCleary. 2003. "Religion and Economic Growth across Countries," *American Sociological Review* 68 (5): 760–81.
- Beattie, Hilary J. 1979. *Land and Lineage in China: A Study of T'ung-Ch'eng County, Anhwei, in the Ming and Ch'ing Dynasties*. Cambridge University Press.
- Becker, Sascha O, and Ludger Woessmann. 2009. "Was Weber Wrong? A Human Capital Theory of Protestant Economic History," *Quarterly Journal of Economics* 124 (2): 531–96.
- Beyer, Robert CM, Yingyao Hu, and Jiaxiong Yao. 2022. *Measuring Quarterly Economic Growth from Outer Space*. International Monetary Fund.
- Bielenstein, Hans. 1992. "The Regional Provenance of Chin-Shih during Ch'ing," *Bulletin of the Museum of Far Eastern Antiquities* 64: 1–178.
- Black, Sandra E, Paul J Devereux, and Kjell G Salvanes. 2005. "Why the Apple Doesn't Fall Far: Understanding Intergenerational Transmission of Human Capital," *American Economic Review* 95 (1): 437–49.
- Bol, Peter Kees. 2008. *Neo-Confucianism in History*. Cambridge, Mass.: Harvard University Asia Center.
- Bolt, Jutta, and Jan Luiten Zanden. 2014. "The Maddison Project: Collaborative Research on Historical National Accounts," *Economic History Review* 67 (3): 627–51.
- Brandt, Loren, Debin Ma, and Thomas G Rawski. 2014. "From Divergence to Convergence: Reevaluating the History behind China's Economic Boom," *Journal of Economic Literature* 52, 52 (1): 45–123.
- Brandt, Loren, and Barbara Sands. 1992. *Land Concentration and Income Distribution in Republican China*. Edited by Thomas G. Rawski and Lillian M. Li. *Chinese History in Economic Perspective*. Berkeley: University of California Press.
- Broadberry, Stephen, Hanhui Guan, and David Daokui Li. 2018. "China, Europe, and the Great Divergence: A Study in Historical National Accounting, 980–1850," *Journal of Economic History* 78 (4): 955–1000.
- Broadberry, Stephen, and Alexandra M. de Pleijt. 2021. "Capital and Economic Growth in Britain, 1270–1870: Preliminary Findings," Oxford Economic and Social Working Papers No. 186.

- Buck, John Lossing. 1937a. *Land Utilization in China: A Study of 16,786 Farms in 168 Localities, and 38,256 Farm Families, in Twenty-Two Provinces in China, 1929-1933*. Chicago: Chicago University Press.
- Buck, John L. 1937b. *Land Utilization in China. Volume 2, Atlas: A Study of 16,786 Farms in 168 Localities, and 38,256 Farm Families in Twenty-Two Provinces in China, 1929-1933*. Nanjing: University of Nanking.
- Campbell, Cameron, and James Lee. 2001. "Free and Unfree Labor in Qing China: Emigration and Escape among the Bannermen of Northeast China, 1789-1909," *History of the Family* 6 (4): 455-76.
- Chan, Kam Wing, J Vernon Henderson, and Kai Yuen Tsui. 2008. "Spatial Dimensions of Chinese Economic Development," Edited by Loren Brandt and Thomas G. Rawski, *China's Great Economic Transformation*. Cambridge: Cambridge University Press.
- Chang, Chung-li. 1962. *The Income of the Chinese Gentry*, Seattle: Univ. of Washington Press.
- Chen, Gujia, and Hongbo Deng. 1997. *Zhongguo Shuyuan Zhidu Yanjiu [A Study on Confucian Academies of China]*. Hangzhou: Zhejiang jisoyu chubanshe.
- Chen, Ting, James Kai-sing Kung, and Chicheng Ma. 2020. "Long Live Keju! The Persistent Effects of China's Civil Examination System," *Economic Journal* 130 (631): 2030-64.
- Chen, Wei, Xilu Chen, Chang-Tai Hsieh, and Zheng Song. 2019. "A Forensic Examination of China's National Accounts." National Bureau of Economic Research.
- Ching, Julia. 2013. "The Goose Lake Monastery Debate," *Journal of Chinese Philosophy* 40: 189-204.
- Dang, Jianwei, and Kazuyuki Motohashi. 2015. "Patent Statistics: A Good Indicator for Innovation in China? Patent Subsidy Program Impacts on Patent Quality," *China Economic Review* 35: 137-55.
- Dardess, John W. 2002. *Blood and History in China: The Donglin Faction and Its Repression, 1620-1627*. Honolulu: University of Hawai'i Press.
- De Bary, William Theodore. 1983. *The Liberal Tradition in China*. New York: Columbia University Press.
- . 2009. *The Trouble with Confucianism*. Cambridge, Mass.: Harvard University Press.
- Deng, Lan, and Jie Chen. 2019. "Market Development, State Intervention, and the Dynamics of New Housing Investment in China," *Journal of Urban Affairs* 41 (2): 223-47.
- Di Matteo, Livio. 2016. "Evolution of Wealth Inequality 1668 to 2016."
- Dore, Ronald Philip. 1965. *Education in Tokugawa Japan*. University of California Press.
- Eberhard, Wolfram. 1962. *Social Mobility in Traditional China*. Leiden: EJ Brill.
- Elman, Benjamin A. 1991. "Political, Social, and Cultural Reproduction via Civil Service Examinations in Late Imperial China," *Journal of Asian Studies* 50 (1): 7-28.
- Elman, Benjamin A. 2000. *A Cultural History of Civil Examinations in Late Imperial China*. Univ of California Press.
- . 2009. *A Cultural History of Modern Science in China*. Cambridge, Mass.: Harvard University Press.
- . 2013. *Civil Examinations and Meritocracy in Late Imperial China*. Cambridge, Mass.: Harvard University Press.
- Elvin, Mark. 1973. *The Patterns of the Chinese Past*. Stanford: Stanford University Press.
- Engerman, Stanley L., and Kenneth L. Sokoloff. 2000. "Institutions, Factor Endowment, and Paths of Development in the New World," *Journal of Economic Perspective* 14 (3): 212-32.
- Esherick, Joseph W., and Mary Backus Rankin. 1990. "Introduction," *Chinese Local Elites and Patterns of Dominance*. Berkeley: University of California Press.
- Fu, Linxiang, and Baoheng Zheng. 2007. *Zhongguo Xingzheng Quhua Tongshi [History of Administrative Division in China]*. Shanghai: Fudan University Press.

- Galor, Oded, and Ömer Özak. 2016. "The Agricultural Origins of Time Preference," *American Economic Review*, 106 (10): 3064–3103.
- Gao, Pei. 2016. "Risen from Chaos: The Development of Modern Education in China, 1905–1948." London School of Economics and Political Science.
- Greif, Avner, and Guido Tabellini. 2017. "The Clan and the Corporation: Sustaining Cooperation in China and Europe," *Journal of Comparative Economics*, 45 (1): 1–35.
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2006. "Does Culture Affect Economic Outcomes?," *Journal of Economic Perspectives* 20 (2): 23–48.
- He, Zi-Lin, Tony W Tong, Yuchen Zhang, and Wenlong He. 2018. "A Database Linking Chinese Patents to China's Census Firms," Scientific data 5, 5. Nature Publishing Group: 180042.
- Ho, Ping-Ti. 1962. *The Ladder of Success in Imperial China: Aspects of Social Mobility, 1368–1911*. New York: Columbia University.
- Hu, Albert Guangzhou, and Gary H Jefferson. 2009. "A Great Wall of Patents: What Is behind China's Recent Patent Explosion?" *Journal of Development Economics*, 90 (1): 57–68.
- Ji, Xiaofeng. 1996. *Zhonggu Shuyuan Cidian [A Dictionary of Confucian Academies]*. Nanjing: Zhejiang Jiaoyu Chubanshe.
- Jones, Charles I. 1995. "R & D-Based Models of Economic Growth," *Journal of Political Economy* 103 (4): 759–84.
- Keller, Wolfgang, and Carol H. Shiue. 2007. "Market Integration and Economic Development: A Long-Run Comparison," *Review of Development Economics*, 11 (1): 107–23.
- Keller, Wolfgang, Carol Shiue, and Xin Wang. 2021. "Capital Markets in China and Britain, 1770–1860: Evidence from Grain Prices," *American Economic Journal: Applied Economics*, 13 (3): 31–64.
- Kelly, Morgan. 2019. "The Standard Errors of Persistence." University College Dublin. School of Economics.
- Kung, James Kai-sing, and Justin Yifu Lin. 2003. "The Causes of China's Great Leap Famine, 1959–1961," *Economic Development and Cultural Change*, 52 (1): 51–73.
- Kung, James Kai-sing, and Chicheng Ma. 2014. "Can Cultural Norms Reduce Conflicts? Confucianism and Peasant Rebellions in Qing China," *Journal of Development Economics* 111: 132–49.
- Landes, David S. 2006. "Why Europe and the West? Why Not China?" *Journal of Economic Perspectives*, 20 (2): 3–22.
- Lardy, Nicholas R. 1978. *Economic Growth and Distribution in China*. Cambridge: Cambridge University Press.
- Liang, Ming-Yih. 2010. "Confucianism and the East Asian Miracle," *American Economic Journal: Macroeconomics* 2 (3): 206–34.
- Lin, Justin Yifu. 1995. "The Needham Puzzle: Why the Industrial Revolution Did Not Originate in China," *Economic Development and Cultural Change* 43 (2): 269–92.
- McCloskey, Deirdre N. 2010. *Bourgeois Dignity: Why Economics Can't Explain the Modern World*. Chicago: Chicago University Press.
- Meng, Xin, Nancy Qian, and Pierre Yared. 2015. "The Institutional Causes of China's Great Famine, 1959–1961," *Review of Economic Studies* 82 (4): 1568–1611.
- Milanovic, Branko, Peter H. Lindert, and Jeffrey G. Williamson. 2007. "Measuring Ancient Inequality." National Bureau of Economic Research Working Paper No. 13550.
- Minami, Ryoshin, and Fumio Makino. 2014. *China[中国]*. Tokyo: Toyokeizaishimposha.
- Miyazaki, Ichisada. 1981. *China's Examination Hell: The Civil Service Examinations of Imperial China*. New Haven: Yale University Press.
- Mokyr, Joel. 1990. *The Lever of Riches: Technological Creativity and Economic Progress*. Oxford: Oxford University Press.

- . 2016. *A Culture of Growth: The Origins of the Modern Economy*. Princeton: Princeton University Press.
- Morishima, Michio. 1982. *Why Has Japan Succeeded??: Western Technology and the Japanese Ethos*. Cambridge: Cambridge University Press.
- Mote, Frederick W. 2003. *Imperial China 900-1800*. Cambridge, Mass.: Harvard University Press.
- Naughton, Barry J. 2006. *The Chinese Economy: Transitions and Growth*. MIT press.
- Parente, Stephen L, and Edward C Prescott. 2002. *Barriers to Riches*. Cambridge, Mass.: MIT press.
- Rawski, Evelyn Sakakida. 1979. *Education and Popular Literacy in Ch'ing China*. Ann Arbor: University of Michigan Press.
- Rawski, Thomas G. 1989. *Economic Growth in Prewar China*. Berkeley: University of California Press.
- Rawski, Thomas G. 2001. "What Is Happening to China's GDP Statistics?" *China Economic Review*, 12 (4): 347–54.
- Rodriguez, Sarah Mellors. 2023. *Reproductive Realities in Modern China*. Cambridge: Cambridge University Press.
- Rosenthal, Jean-Laurent, and R. Bin Wong. 2011. *Before and Beyond Divergence: The Politics of Economic Change in China and Europe*. Cambridge, Mass.: Harvard University Press.
- Rozman, Gilbert. 1973. *Urban Networks in Ching China and Tokugawa Japan*. (Princeton: Princeton University Press.
- Schmidt-Hebbel, Klaus, and Luis Servén. 2000. "Does Income Inequality Raise Aggregate Saving?," *Journal of Development Economics*, 61 (2): 417–46.
- Shiue, Carol H. 2005. "The Political Economy of Famine Relief in China, 1740–1820," *Journal of Interdisciplinary History* 36 (1): 33–55.
- . 2017. "Human Capital and Fertility in Chinese Clans before Modern Growth," *Journal of Economic Growth* 22 (4): 351–98.
- Sng, Tuan-Hwee. 2014. "Size and Dynastic Decline: The Principal-Agent Problem in Late Imperial China, 1700–1850," *Explorations in Economic History* 54: 107–27.
- Solar, Peter M. 2021. "China, Europe, and the Great Divergence: Further Concerns about the Historical GDP Estimates for China." EHES Working Paper No.217.
- Spolaore, Enrico, and Romain Wacziarg. 2013. "How Deep Are the Roots of Economic Development?" *Journal of Economic Literature* 51 (2): 325–69.
- Stauffer, Milton Theobald. 1922. *Christian Occupation of China*. Shanghai: China Continuation Committee.
- Tawney, Richard Henry. 1932. *Land and Labour in China*. George Allen and Unwin, London.
- Von Glahn, Richard. 2016. *An Economic History of China: From Antiquity to the Nineteenth Century*. Cambridge: Cambridge University Press.
- Walton, Linda A. 1999. *Academies and Society in Southern Sung China*. Honolulu: University of Hawaii Press.
- Wang, Yeh-chien. 1973. *Land Taxation in Imperial China, 1750-1911*. Cambridge, Mass.: Harvard University Press.
- Weber, Max. 1920. *Konfuzianismus Und Taoismus Aufsätze Zur Religionssoziologie I. Tübingen: JC B Mohr*. Vol. 305. *Gesammelte Aufsätze Zur Religionssoziologie, Volume I* 305. Tübingen: JC B Mohr.
- Wei, Shang-Jin, and Genevieve Boyreau-Debray. 2004. "Can China Grow Faster? A Diagnosis on the Fragmentation of the Domestic Capital Market." International Monetary Fund.
- Wittfogel, Karl August. 1959. *Oriental Despotism: A Comparative Study of Total Power*. New Haven: Yale University Press.

- Xie, Zhuan, and Xiaobo Zhang. 2015. "The Patterns of Patents in China," *China Economic Journal* 8 (2): 122–42.
- Xu, Yi, Zhihong Shi, Bas Van Leeuwen, Yuping Ni, Zipeng Zhang, and Ye Ma. 2017. "Chinese National Income, ca. 1661–1933," *Australian Economic History Review* 57 (3): 368–93.
- Zakaria, Fareed, and Kuan Yew Lee. 1994. "Culture Is Destiny: A Conversation with Lee Kuan Yew," *Foreign Affairs* 73: 109–26.
- Zhao, Yanyun, and Siming Liu. 2011. "Effect of China's Domestic Patents on Total Factor Productivity: 1988–2009," School of Statistics, Renmin University of China.

Table 1 Correlation between Density of State-Sponsored Academies and Geography and History

A. Uncorrelated

	Soil suitability index	County founding year	Distance to historical capitals	Distance to major rivers	Distance to postal routes	Busy county
Correlation	-0.032	0.01	0.023	-0.026	-0.0028	-0.013
coefficient	(0.18)	(0.69)	(0.35)	(0.28)	(0.91)	(0.60)
No. of obs.	1,662	1,549	1660	1,662	1662	1,662

B. Correlated

	Distance to Beijing	Ethnic minority	Christianity, 1920	Famine Mortality, c.1960	Per capita output, 1982	Industrialization, 1982
Correlation	0.049	0.048	0.092	-0.092	0.098	0.059
coefficient	(0.05)	(0.049)	(0.0002)	(0.0002)	(0.0001)	(0.02)
No. of obs.	1662	1662	1658	1,662	1,659	1660

Notes: *p*-values in parentheses; distance to historical capitals refers to the minimum of the distance to Beijing, Kaifeng, Nanjing, and Xian; ethnic minority is a binary variable assigning unity to racially mixed counties and zero to predominantly Han counties; major rivers include the Yellow, Yangzi, and Pearl rivers; “busy county” is a dummy variable set equal to one for counties labeled as "busy" (冲) in 1820, evidence for communication and trade routes, and to zero otherwise; famine mortality is measured by the ratio of the size of the cohort born after to that born during the Great Leap Forward famine.

Sources: see data appendix; author’s calculation.

Table 2 Correlation between State-Sponsored Academies per Capita and Measures of Development

Correlation with	Interest rate, circa1800	Calorie intake, 1930	Interest rate, 1930	Household savings, 1930	Literacy, 1982	Savings ratio, 1989	Crude birth rate, 1989	Per capita patents, 1998-2009	Growth of per capita luminosity 1993-2020
Correlation coefficient (<i>p</i> -value)	0.051 (0.44)	-0.067 (0.45)	0.078 (0.36)	-0.129 (0.20)	0.009 (0.73)	0.022 (0.75)	-0.019 (0.48)	-0.015 (0.55)	0.024 (0.34)
No. of obs.	229	130	141	102	1,660	208	1420	1641	1,616

Sources: see appendix.

Notes: *p*-values in parentheses.

Table 3 Summary Statistics:

	Mean	S.D.	Max	Min
<u>Treatment</u>				
Academies per million persons	26.31	80.88	2265.43	0
State-sponsored academies per million persons	14.77	60.58	1887.86	0
<u>Outcomes</u>				
A. Human capital				
Literacy, 1982	0.67	0.11	0.94	0.22
Secondary education attainment, 1990	0.41	0.12	0.80	0.09
Qing exam passers per million persons in 1920	104.47	993.65	37397.65	0
Crude birth rate, 1989	0.02	0.005	0.04	0.009
Crude death rate, 1989	0.006	0.001	0.011	0.002
B. Interest rates and savings				
Real interest rate, % per year, 1775-1838	9.81	7.12	97.74	-4.25
Nominal interest rate, % per year, c.1930	30.9	15.18	129.6	0.0
Savings per household, c.1930	38.32	46.18	244.82	0.02
Real wages, c. 1930	1.21	0.63	3.8	0.007
Calorie intake, c.1930	3237.38	786.94	5470.5	1406
Rural savings ratio, 1988	0.27	0.21	1.02	0.0004
C. Innovation				
Log patent filing per capita, 1998-2009	27.00	157.76	157.76	0.00
D. Income growth and level				
Urbanization, 1920	0.05	0.15	1.88	0.00
Log per capita luminosity, 2020	-3.81	1.03	-16.50	4.63
Growth in per capita luminosity from 1993-2020	0.06	0.05	0.33	-0.06

Table 4 Impact of Confucianism on Human Capital Accumulation

	Literacy, 1982		Secondary schooling, 1990		Pre-1911 Exam success	
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	IV	OLS	IV	OLS	IV
Academies	8.01E-05*** (3.25E-05)	9.33E-05*** (2.72E-05)	1.48E-05 (1.44E-05)	8.90E-05*** (1.49E-05)	6.38*** (2.32)	4.26*** (1.18)
Geographical control	Y	N	Y	N	Y	N
Modernization shocks	Y	N	Y	N	Y	N
Prefectural fixed effect	Y	Y	Y	Y	Y	N
R squared	0.665	0.585	0.637	0.559	0.363	0.328
No of obs.	1645	1645	1645	1645	1654	1654
Moran'I, $\chi^2(1)$	0.01	2807.63***	7.06**	7134.54***	42.69***	12.68***

(Continued)

	Crude birth rate, 1989		Crude death rate, 1989	
	(7)	(8)	(9)	(10)
	OLS	IV	OLS	IV
Academies	-8.80E-07 (6.33E-07)	-3.52E-06** (1.12E-06)	2.71E-07 (2.38E-07)	2.24E-07 (2.45E-07)
Geographical control	Y	N	Y	N
Modernization shocks	Y	N	Y	N
Prefectural fixed effect	Y	Y	Y	Y
R squared	0.613	0.522	0.597	0.507
No of obs.	1405	1405	1645	1645
Moran'I, $\chi^2(1)$	4.49**	3984.51***	0.23	4867.62***

Source: author's calculation

Note: standard errors are clustered unless when statistically significant Moran's I's required running arbitrary correlation regressions.

Table 5 Impact on Interest Rates and Savings

	Interest rate, 1775-1838		Interest rate, c. 1930		Savings per Household, c.1930	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Academies	0.192** (0.078)	0.328*** (0.040)	0.208** (0.104)	0.248** (0.114)	-0.409 (0.214)	-0.359* (0.183)
Geographical control	Y	N	Y	N	Y	N
Modernization shocks	N	N	Y	N	Y	N
Provincial fixed effect	Y	Y	N	N	N	N
Prefectural fixed effect	Y	Y	Y	Y	N	N
Moran's I, $\chi^2(1)$	2.18	5.99**	10.96***	20.11***	0.00	0.24
R squared	0.264	0.164	0.843	0.602	0.315	0.034
No. of obs.	141	141	141	141	102	102

Table 5, continued

	Real Wage c.1930		Calorie Intake c.1930		Savings Ratio, 1988	
	OLS	IV	OLS	IV	OLS	IV
	(7)	(8)	(9)	(10)	(11)	(12)
Academies	0.004 (0.003)	-0.002 (0.003)	0.005* (0.002)	0.006** (0.003)	-0.0007* (0.0004)	-0.0006 (0.001)
Geographical control	Y	N	Y	N	Y	N
Modernization shocks	Y	N	Y	N	Y	N
Provincial fixed effect	N	N	N	N	N	Y
Prefectural fixed effect	Y	Y	Y	N	Y	Y
Moran's I, $\chi^2(1)$	12.93***	5.35**	17.17***	3.50*	22.85***	32.54***
R squared	0.825	0.636	0.948	0.740	0.832	0.802
No. of obs.	154	154	130	130	208	208

Source: author's calculation.

Note: standard errors are clustered unless when statistically significant Moran's I's required running arbitrary correlation regressions.

Table 6 Impact of Confucianism on Innovation and Income Level and Growth

	Patents 1998-2009/Pop2010		Urbanization 1920		Logged per capita luminosity in 2020		Growth of per capita luminosity from 1993-2020	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Academies	-0.036***	-0.018***	11.82	6.58	-4.98E-05	8.92E-05	-1.9E-5***	-1.3E-5*
Geographical control	(0.014)	(0.005)	(23.93)	(24.77)	(1.63E-04)	(0.0001)	(7E-6)	(7E-6)
Modernization shocks	Y	N	Y	N	Y	N	Y	N
Prefectural fixed effect	Y	N	N	N	Y	N	Y	N
Moran's I, $\chi^2(1)$	Y	Y	Y	Y	Y	Y	Y	Y
	24.66***	572.39***	13.28***	34.78***	6.33***	1142.56***	3.10*	20929.89***
R squared	0.540	0.531	0.185	0.160	0.540	0.448	0.824	0.665
No of obs.	1618	1618	1654	1654	1624	1624	1595	1595

Source: author's calculation

Notes: standard errors are clustered unless when statistically significant Moran's I's required running arbitrary correlation regressions.

Table 7 Confucianism's Impact Summarized

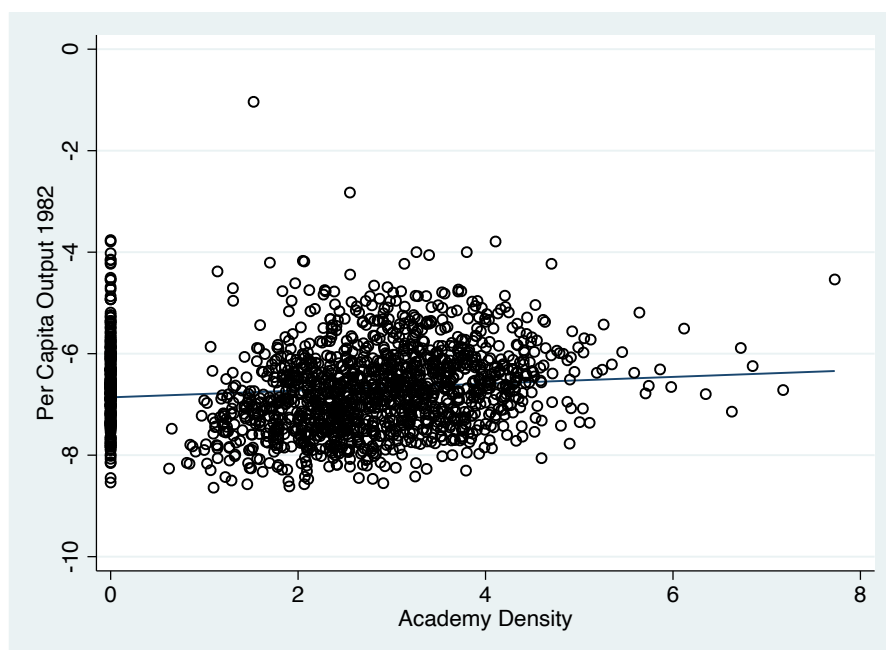
	Effects	Periods	Evidence	Sources
Human capital	positive	Qing, Maoist, and reformist eras	Literacy; secondary schooling; civil examination	Table 4;
Crude birth rate	-0.009% point	1989	Crude birth rate	Column (8), Table 4
Interest rates	+6.5~8.5% points	1775-1838; 1929-33	Qing grain prices; rural interest rates	Columns (2) and (4), Table 5

Savings ratio	-1.25~1.5% points	1929-33; 1988	Household savings; CHIP	Columns (6) and (11), Table 5
Total factor productivity growth	-0.08% point	1998-2009	Patent filings	Column (2), Table 6
Per capita output growth	-0.031% point	1993-2020	Nighttime luminosity	Column (6), Table 6

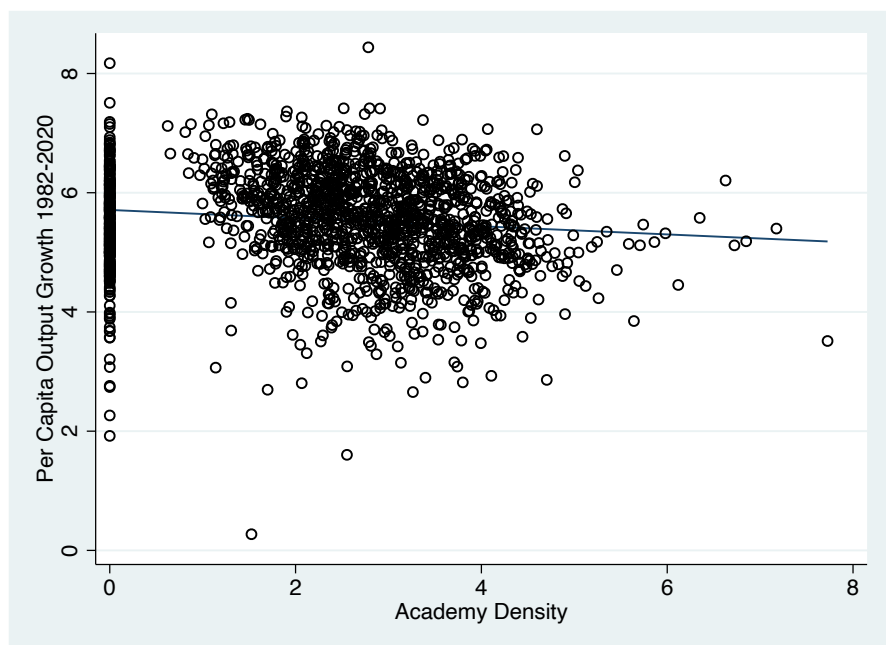
Sources: as indicated in the rightmost column of this table

Figure 1 Density of Confucian Academies vs. Income Level and Growth

A. Income Level 1982



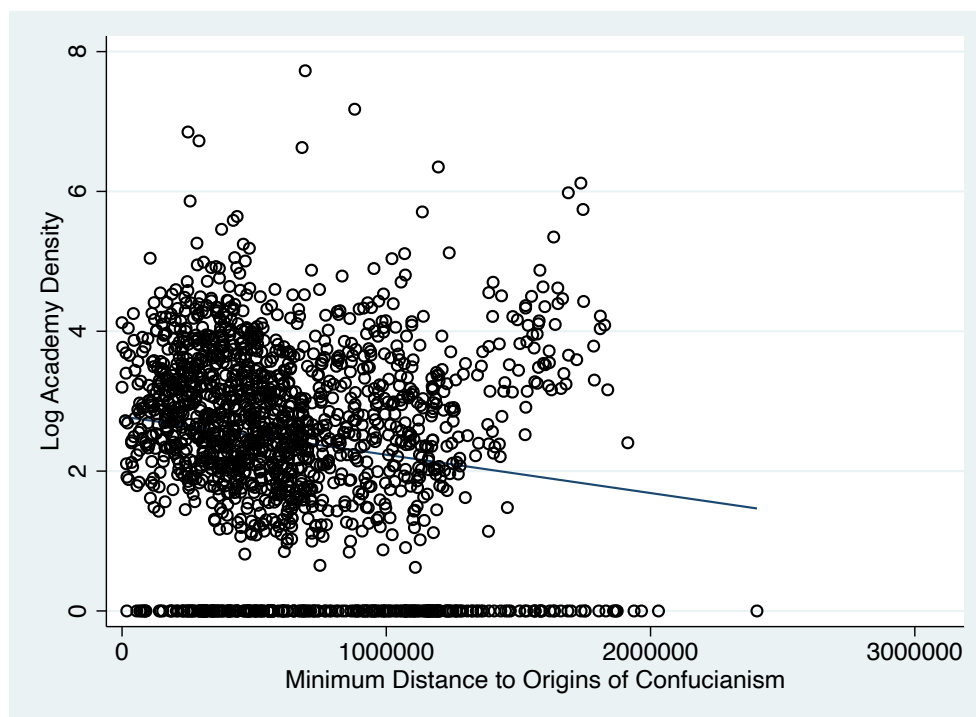
B. Income Growth, 1982-2020



Sources: 1982 census; Earth Observation Group.

Note: per capita output growth 1982-2020 refers to the ratio of per capita nighttime light emission in 2020 to per capita output in 1982.

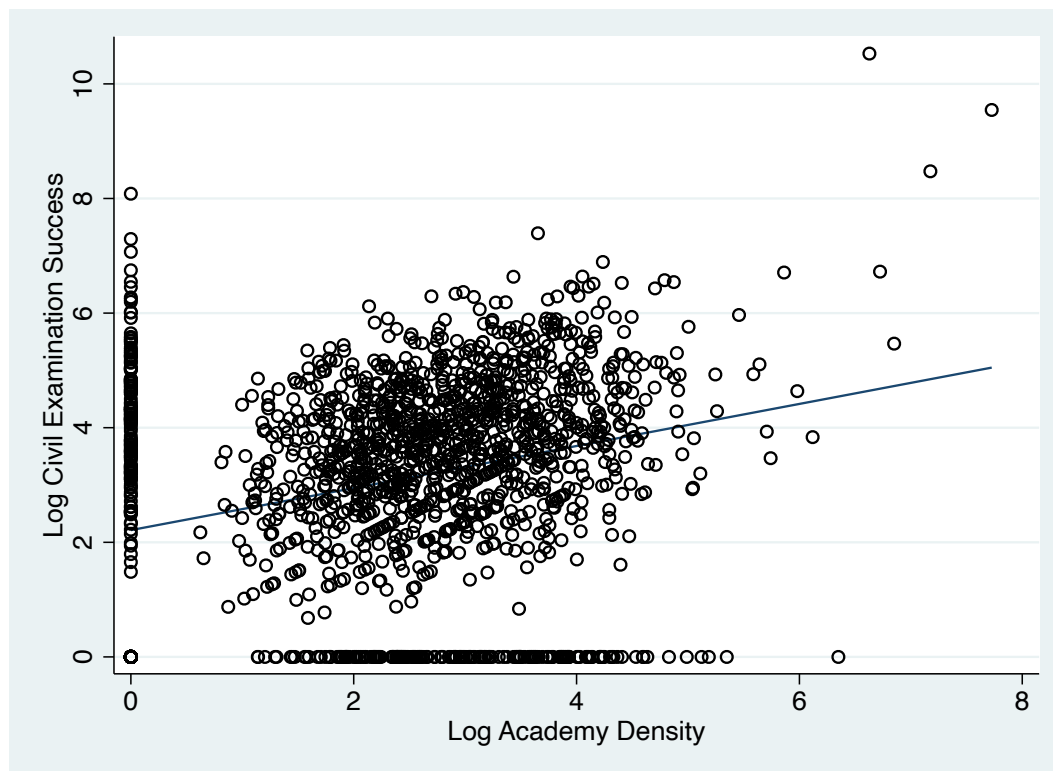
Figure 2 Minimum Distance from the Origins Neo-Confucianism Density of Confucian Academies



Notes: vertical axis measures log of the number of academies per million people plus unity; x axis in meters; the negative slope of regression line is significant at 1% level.

Sources: Bielenstein(1992); Ji(1966); CHGIS 6.

Figure 3 Density of Academies and Examination Success



Notes: X-axis - log of the number of academies per million people plus unity; Y-axis - log of the number of examination passers per million person plus unity.

Sources: Bielenstein(1992); Ji(1966); Stauffer(1992).