

The Written Word and the Development of the State in China and Europe ¹

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Abstract

State formation depends not only on demand-side factors, such as military competition, but also, fundamentally, on the supply of ideas and techniques in a society. We argue that these ideas can sometimes come from unexpected quarters before then being adopted by those who rule. Using prefecture level data for China during the Tang (618-906 CE) and Northern Song (960-1127 CE) dynasties, we show how woodblock printing techniques first developed by Buddhists in competition with Taoists and Confucians provided for a technology that could give a broad number of people access to the written word. This was critical for the development and expansion of the Imperial Examination system, which aided in constructing a state bureaucracy. In Medieval Western Europe, by contrast, the religious monopoly held by the Catholic Church gave it little incentive to develop new techniques to broaden access to the written word. This then helped contribute to the political divergence between China and Western Europe, as European rulers seeking to construct a bureaucracy had a more limited pool of talent to draw upon. The broader lesson here is that in order to better understand state formation, we may need to consider the incentives for social actors outside the state itself to develop new techniques.

Introduction

It is known that China developed a powerful and extensive state bureaucracy many centuries before this same development took place in Western Europe. It is also known that the Chinese Imperial Examination played a critical role in leading to this outcome. Many recent scholars, as well as early scholars going back to Ping-ti Ho (1962), have emphasized how the examination system also had an influence on social mobility as well as on binding China together territorially.¹ Existing scholars have spent less time asking how in China it was possible to give a broad number of people access to the written word, a necessary precondition for sitting the exam. This is the question we ask in this paper, and in so doing we draw a comparison with Medieval Europe where access to the written word remained extremely limited.

From the late Tang Dynasty onward, for potential exam candidates who could not afford expensive hand copied manuscripts the use of books produced by woodblock printing became an alternative, and more easily available form of access. The puzzle about woodblock printing is that the core techniques and materials necessary to develop it existed in both China and Medieval Europe, but only in China did this method of giving access to knowledge take root and spread widely, in fact widely throughout East Asia. So why China and not Europe?

We provide evidence to show that an environment of religious competition in China under the Tang Dynasty helped kick start the invention of woodblock printing. The first printed texts in China were not those produced to train exam candidates, and this simple fact does not bode well for the idea that woodblock printing developed in China simply because there was a need to have a broad pool of candidates to take the Imperial Examination. It was instead Buddhist monks who took the first steps in developing woodblock printing as they sought to spread the word about their faith. From its origins, Buddhist doctrine had emphasized how spreading the Buddhist canon via the written word was a sacred act.² In China under the Tang Dynasty an environment of religious competition made

¹There are a number of excellent recent political economy studies on the examination system and its consequences for development, social mobility and territorial integration, particularly from the Song Dynasty onward (Wen, Wang, and Hout, 2023. Chen, Kung, Ma 2020. Bai and Jia 2016. Jiang and Kung 2020. Kung 2022, Ho 1962).

²In a fascinating study, Constance Miller (1983) has previously emphasized the importance of Buddhism for the development of woodblock printing in China, and she has contrasted this with Europe. She does not emphasize the

this all the more necessary, as Taoism was well established as something resembling an official religion. The Buddhists were also in practice challenging well entrenched Confucian doctrine, even though Confucianism was not strictly speaking a religion.

The situation in Medieval Europe could hardly have been more different as an environment of religious monopoly weighed against the spread of printing in the way that had occurred in China. Like several recent important contributions, we emphasize the role the Catholic Church played in European state formation. Anna Grzymala-Busse (2023) and Jørgen Møller and Jonathan Doucette (2022) have emphasized how institutional practices developed within the church were subsequently adopted by secular rulers. Bruce Bueno de Mesquita (2022) and Anna Grzymala-Busse (2023) have emphasized the importance of competition between Catholic and secular rulers. Our account emphasizes the lack of competition between the Catholic Church and other religions.

The Catholic Church faced no incentive to modify its longstanding doctrine, which did not emphasize any need for the great mass of the people to have direct access to the word of God. In this environment it sufficed to have religious texts be hand copied. In other words, religion failed to kick start the development of printing. Things would, of course, be different after the arrival of Protestantism, an event that occurred after the time period we consider, but which only reinforces the idea of a link between religious competition and the spread of the written word via printing.³

The quantitative empirical basis for our claims comes from a cross sectional dataset at the prefecture level on printing, schooling, and examination outcomes during the Song Dynasty. We also have cross sectional data on the presence of Buddhist monasteries during the previous dynasty, the Tang. Given that Buddhism in China was key to the early development of printing, we hypothesize that the presence of Buddhist monasteries in a prefecture during the Tang Dynasty would be associated with a cluster of three related outcomes during the subsequent Song Dynasty: (1) the presence of centers for woodblock printing, (2) the presence of “county” schools that were government supported, and (3) a higher degree of social mobility in examination outcomes. We proxy for social mobility by using a measure of the number of individuals from a given prefecture in the Song Dynasty who attained *jinshi* status—the highest status in the imperial examination—

role of religious competition as we do.

³Buringh and van Zanden (2009) have documented the continuous increase in book production in Western Europe between the sixth and the eighteenth centuries. Starting from a low base there was a steady increase and most notably after the development of movable type printing.

who had not had a member of their extended family attain this same status in the previous five generations. For lack of a better term we call these individuals “commoner” *jinshi*.⁴

The causal sequence we have in mind is as follow. We know that the first woodblock prints in China, which appeared during the Tang Dynasty, were Buddhist texts, and we know that this initial era of printing was intimately involved with Buddhist monasteries. This would mean that a number of individuals in the areas where a monastery was located would acquire the skills (in particular carving) to make woodblock prints, and these techniques could be passed on from generation to generation. This would then facilitate the development of woodblock printing. Those trained to carve could subsequently apply this same skill to the production of the secular texts that would have been used in schools and which would have lowered the cost of books, giving a greater pool of candidates from varied backgrounds access to the imperial examination. Techniques for printing would be expected to diffuse from one location to another over time, but we would expect this to not be an instantaneous or complete process. Therefore, we would expect to observe that the three core outcomes we consider for the Song Dynasty would be correlated with the prior presence of a Buddhist temple during the Tang Dynasty.

Our baseline regression specifications show the partial correlations between the number of Buddhist monasteries in a prefecture during the Tang Dynasty and our three key outcomes during the subsequent Song Dynasty (printing centers, county schools, and examination outcomes) after controlling for prefecture population during the late Tang, province fixed effects, as well as latitude, longitude, and their product. We observe a positive and statistically significant correlation between the number of Buddhist monasteries present in a prefecture prior to the year 845 CE and each of our three Song Dynasty outcomes.

In addition to our base specification for each of the three outcomes, we also make use of two further specifications that use what is known as the Huichang Persecution of Buddhism, which occurred late in the Tang Dynasty, to further explore whether it was Buddhist monasteries that made the difference. The persecution occurred under the Emperor Wuzong, who reigned from 840 to 846 CE, and who became a fervent adherent of Taoism. We should expect any effect of Buddhism on our key outcomes during the subsequent Song Dynasty to be dependent on the differential severity

⁴We also have data on the presence of printing centers during the Tang Dynasty, but we do not know the date at which these were established. If we did know the precise dates during the Tang Dynasty when the printing centers and monasteries were established, we could adopt a difference-in-differences design.

of the persecution across the prefectures in our dataset. Areas in which there was no persecution should show a stronger positive correlation between the presence of Tang monasteries and printing centers, county schools, and examination outcomes during the Song era.

The Buddhist persecution involved repossession of lands controlled by monasteries and the establishment of a quota for each Chinese province that limited the number of Buddhist monks that could be present. There were four different levels of severity for this quota established at the provincial level. Importantly, the persecution did not take place in some prefectures, either because they were not under central government control at the time or because local authorities refused to carry out the persecution.

Our second specification for each of our three outcomes augments our baseline specification by adding an interaction term that multiplies the number of Buddhist monasteries in a prefecture during the Tang era with a dummy variable that shows whether the Buddhist persecution took place in a given prefecture.

Our third specification for each outcome focuses on the subsample of prefectures in which the persecution of Buddhists took place. We augment our baseline specification by adding an interaction term that multiplies the number of Buddhist monasteries by a variable ranging from 1 to 4 that reflects the assigned severity of the persecution.

The results of our tests using the Buddhist Persecution during the reign of the Emperor Wuzong continue to suggest that the presence of Buddhist monasteries was associated with the subsequent development of printing centers, the establishment of county schools, and also social mobility via the presence of *jinshi* from families who had not yet had a member attain this status. However, it is clear that this observed effect, if it is indeed an effect, appears to have occurred only in those prefectures that were not subject to the persecution. We believe this reinforces our interpretation about the consequences of Buddhism. In closing the paper we also acknowledge and discuss the fact that given available data and consequences for causal identification, our results should primarily be seen as suggestive.

We make no claim that our empirical results—with their focus on Buddhism—explain on their own the political divergence between China and Western Europe, as that began well before the medieval era. What we take them as instead illustrating is how a particular religious environment helped lead to the development of a woodblock printing, an important new technology that helped

allow for the construction of a robust bureaucratic state. This implies that because demand alone does not automatically generate a supply of innovations necessary to construct a state, then the supply of innovation can often come from unexpected places. Said otherwise, borrowing someone else's innovation—perhaps created with a totally different purpose in mind—can help to build a state. In biology this is an example of what is called “exaptation.”⁵ Joel Mokyr (1997) has argued that there are many cases of exaptation in the process of economic innovation. Perhaps this is also the case with state formation.

That woodblock printing was invented for one purpose and then borrowed to serve another should perhaps not surprise us when we consider the link between writing and the state in a broader context. Throughout history the presence of writing has been strongly predictive of state development, yet writing as we think of it today is thought to have been independently invented in only three societies, in Ancient Sumeria, among the Olmecs of Mesoamerica, and in China during the Shang dynasty. Everyone else was a borrower.⁶

Different State Trajectories in China and Europe

While China and Western European countries each eventually developed strong state bureaucracies, the two regions arrived at this outcome through different trajectories. By the medieval era—and in fact long before—China had a state bureaucracy while bureaucratic arrangements in Western Europe remained rudimentary.

A first way to see this difference is through government revenues raised relative to the size of the economy, given that a bureaucracy collects revenue and in fact needs revenue to be able to function. In China during the early part of the Song Dynasty, revenues regularly stood at ten percent of GDP and even higher. In the kingdoms of England and France at about the same time, revenues stood at about one percent of GDP.⁷ A difference as big as an order of magnitude in this setting is large.

⁵This is a term that was coined by Gould and Vrba (1982) to refer to situations where a particular trait evolves for one purpose and then ends up being used for a different purpose. The classic example offered is that of feathers on birds. Some think that in bird ancestors, such as *archaeopteryx*, feathers evolved first as a means of temperature regulation and were only subsequently used for flight.

⁶Stasavage (2021) presents results to how how proximity to one of these original three centers of writing increased the likely that a society adopted it while also increasing the likelihood that a state was present.

⁷These statistics are reported in Stasavage (2020, p.12). The underlying Chinese revenue data come from Guo (2019). The underlying English revenue data come from the Bank of England.

It also implies that even in the presence of possible measurement error, the true gap in revenues between the two regions must have been sizeable.

A second way to see the difference in state development is to look at the size of state bureaucracies during this period. In China in the year 1041 CE the Emperor Renzong of the Song Dynasty is said to have had ten thousand “capital and court” officials, and these would have been supplemented by many more lower level officials than that.⁸ Now contrast this with the situation in England, where as late as the fifteenth century the Exchequer had only forty salaried bureaucrats at Westminster. The Exchequer in the medieval era has been described as being “more of an occasion than an institution.”⁹

A more extensive bureaucratic state in China went hand in hand with a more systematic method of recruitment. Ideas about selection based on merit with some form of examination dated back to the Han dynasty in China (Li 2018). It would, however, take several more centuries before a full blown examination system emerged. First developed during the Sui Dynasty in the year 587 by the Emperor Yang, and further enhanced with the development of the *jinsi* exam in 605 CE, the Imperial Examination was expanded and regularized during the Tang Dynasty that followed. Nevertheless, the Tang aristocracy exploited the examination system to sustain their dominance. It was not until the subsequent Song Dynasty, following the demise of the medieval aristocracy due to a ninth-century rebellion, that the examination emerged as the principal avenue for ascending into the higher echelons of officialdom.¹⁰

In contrast with China, those medieval Western European monarchs who had something resembling a bureaucracy—although a thin one—most often opted to outsource by relying on members of the clergy and monastic orders. By doing this European monarchs were taking advantage of the fact that these were the people, by training, who already knew how to write, but in following this route they also fundamentally limited themselves. The church relied on communication in Latin, a language that was foreign to all but a few, and in its operations it placed little emphasis on spreading the Word of God widely. The use of Latin did allow for individuals from different countries to

⁸See Hartman (2015) and Smith (2009) for discussions of the Song bureaucracy.

⁹See Stasavage (2020, p.157) on the Exchequer and Barratt (2004) for a discussion of the Exchequer’s functioning in the thirteenth century.

¹⁰See Wang (2022), Chapter 4. It is also worth mentioning that the idea of an examination system for bureaucratic recruitment also spread to several other East Asian countries, and in particular Korea and Japan with varying degrees of success. See Yonawa (2013) on the Japanese case.

communicate, but it also then limited access.

One might ask whether China during the Song Dynasty was able to maintain a more extensive state bureaucracy simply because it was substantially richer than any Western European society at the time. In practice, this seems unlikely to have been the case. While the gap between China and Western European countries in terms of both revenue and numbers of bureaucrats was an order of magnitude or more, the estimated difference in per capita GDP was sizeable, but still only about fifty percent.¹¹

One might ask further how Chinese dynasties prior to the Song Dynasty succeeded in some cases in maintaining large bureaucracies without the benefit of printed books. The answer here is that dynasties such as the Han (202 BCE to 220 CE) maintained large bureaucracies, but candidates were not selected on merit and they likely had lower levels of literacy. During the Han Dynasty officials were recruited via recommendation from local elites, a system which gave the central state less autonomy.¹²

Religious Competition and the Written Word in China

Buddhism's arrival in China was a gradual process that started around the first half of the first century BCE, primarily through the Silk Road, entering the Chinese territory at Dunhuang and spreading through Gansu to the "region within the Passes" and the North China plain. By the middle of the first century CE, Buddhism was being documented in contemporary Chinese sources.¹³ Initially, it was predominantly observed within foreign merchant communities in larger cities. However, from the fourth century CE, Buddhism began to permeate all tiers of Chinese society, encompassing the court, aristocratic families, the peasantry, and urban inhabitants. The development of Buddhism was further propelled by the establishment of monasteries across China, often funded by affluent patrons, contributing to the religion's widespread acceptance and deep roots within the social fabric of China.¹⁴

¹¹This is based on the comparison by Broadberry, Guan, and Li (2018) between per capita GDP under the Song Dynasty and in England at roughly the same time.

¹²See Bielenstein (1980) for an extensive treatment of the bureaucracy under the Han.

¹³Zurcher (2007), pp.22-23.

¹⁴Weinstein (1987), p.3.

Buddhism's Competition with Confucianism and Taoism

Buddhism's expansion in China was met with considerable opposition, primarily from Confucian officials who were troubled by the increasing wealth and tax-exempt status of Buddhist monasteries. The assertion by Buddhist monks that their allegiance was not to the state or family but to a higher, spiritual cause sparked outrage among these officials. They perceived this as a potential threat to the stability of Chinese society and its institutions.¹⁵ In contrast to India, where Buddhism competed with similar religious groups, in China, it came into direct conflict with the imperial bureaucracy and the government itself.¹⁶

Buddhism's gradual expansion among the rural populace in China, beginning around 300 CE, also significantly eroded the influence of Taoism—an indigenous Chinese religion—leading to an intensified anti-Buddhist stance among Taoist leaders and their court representatives. Taoism, a religious movement originating in later Han times, aimed at achieving bodily immortality through various practices, including the use of certain drugs, physical exercises, meditative techniques, and social virtues. The primary doctrine, found in numerous scriptures, was believed to have been revealed by avatars of the Old Master (*Laozi*), with the *Daode jing* being the fundamental text. This gave rise to the 'huahu theory' around the second century CE, suggesting that Buddhism was merely a version of Taoism modified for foreign populations. Taoists frequently employed this theory to contest Buddhism, arguing it was a diluted, debased form of Taoism unsuitable for Chinese society, which had preserved the pure teachings of the Old Master. This rivalry further complicated the religious landscape and intensified the competition between Taoism and Buddhism in China.¹⁷

During the Tang Dynasty, Buddhism and Taoism vied fiercely for court patronage, with the preference often hinging on the personal background and inclinations of individual rulers.¹⁸ The Tang Dynasty, with its lineage allegedly tracing back to *Laozi*, the legendary founder of Taoism, was the first to prioritize Taoism over Buddhism. In 625, the Tang's founding emperor, Gaozu (618–626 CE), issued an edict establishing Taoism and Confucianism as the state's main pillars, relegating Buddhism to a foreign religion's status. However, the second emperor, Taizong (626–649

¹⁵Weinstein (1987), p.3.

¹⁶Zurcher (2007), pp.255-6.

¹⁷Zurcher (2007), pp.289-290.

¹⁸See detailed accounts of each Tang emperor in Weinstein (1987), pp.5-53.

CE), after suffering a significant military defeat later in his life, shifted his stance, proclaiming Buddhism superior to both Confucianism and Taoism. Furthermore, in 678, Gaozong (649–683 CE) elevated Taoist scripture, the *Daode jing*, to the same status as Confucian classics in civil service examinations. The only female sovereign in Chinese history, Empress Wu (665–705 CE), raised in a family with strong Buddhist leanings, sought to legitimize her rule amidst Confucian and Taoist opposition. She pivoted towards Buddhism and, in 691, issued an imperial edict that placed Buddhism above Taoism, arguing that Buddhism enabled the changing of the “Mandate of Heaven.” Despite this fluctuating favor, all Tang emperors acknowledged Buddhism’s profound influence over their subjects, indicating the complex interplay between Buddhism, Taoism, and political power during the Tang Dynasty.¹⁹

During the Tang era, significant hubs of Buddhism were the capital cities (Chang’an and Luoyang), the Yangtze River region, and Sichuan Province. The transportation facilities in Chang’an, Luoyang, and along the Yangtze River, facilitated the dissemination of Buddhism. However, Sichuan, with its unique geographical positioning, emerged as a critical epicenter for Buddhism.²⁰

Bordered by protective mountains and rivers, Sichuan often became a haven for monks amidst turbulent dynastic transitions. For instance, at the end of the Sui Dynasty, numerous monks sought refuge in Chengdu—the capital city of Sichuan Province—preserving and perpetuating their teachings there. One notable figure among them was the renowned Tang-era monk, Xuanzang. His religious quest began in Chengdu, later leading him on a journey to India. He managed to acquire over 657 Indian texts, which he brought back to China. Remarkably, he translated the majority of these texts into Chinese, significantly enriching the Buddhist literary corpus in the country.²¹

¹⁹Barratt (2008) makes a case that the Empress Wu also favored the early development of woodblock printing.

²⁰For an in-depth exploration of the development of Buddhism in Sichuan, refer to Li (2004), pp.205-208.

²¹Weinstein (1987), pp.24-27. The tumultuous period marked by An Lushan’s insurrection (755–763 CE) and the resulting social upheaval ignited a religious fervor. Post-An Lushan era Buddhism, distinct from the complex metaphysical systems of the Buddhist schools in the first half of the Tang, was characterized by its popular appeal. This shift indicates that Buddhism, even before the rebellion, contained elements that resonated broadly with the Chinese people, facilitating its mass acceptance and further outreach. See Weinstein (1987), pp.58-63.

Religious Competition and the Invention of Printing

Woodblock printing in China, a practice dating back at least a thousand years to the Tang Dynasty, involves a meticulous process.²² Typically, pear or jujube wood blocks are planed and shaped to mirror the dimensions of two pages. A paste or size, often derived from boiled rice, is then spread over the surface to prepare it for character reception. A professional scribe transcribes the pages on thin, transparent paper, which, while still damp from the paste, is adhered to the block in a reversed position. Once the paper is rubbed off, the reversed inked writing remains visible on the wood. The workman, armed with a sharp graver, then carefully carves away the uninked portion of the wood, leaving the characters raised. Errors may be corrected by inserting small pieces of wood, but due to the process's efficiency, it is often simpler to replace and re-cut the entire block. Unlike Western printing, Chinese printing employs no press; rather, a printer uses two brushes on a shared handle, one to ink the characters and another to press the paper onto the block, capturing the impression. The work can be divided, with one person inking the block and another taking the impression. Due to the speed and precision of this method, a single worker can produce thousands of copies per day. Each thin, one-sided printed sheet is then folded back, with blank sides inward, and stitched together at the outer edge.²³

Religious competition was a major driving force for the invention of woodblock printing. Buddhism, Taoism, and Confucianism, driven by the imperative of duplicating and disseminating their teachings to broaden their followers, each innovated technologies to affordably replicate texts on a large scale. In the words of Thomas Francis Carter, "It can be said with equal truth that every advance into new territory made by printing has had as its motive an expanding religion."²⁴ Among the three, it was Buddhism that played the most crucial role in the initial emergence of printing technology and its subsequent development.²⁵

Chinese printing's inception was profoundly intertwined with Buddhism, starting with image printing, progressing to mantras, and finally culminating in the printing of sutras.²⁶ The practice of creating Buddha images with "Buddha seals," originating from India, was introduced to the Tang

²²For an introduction to the origin of printing in China, see Brokaw (2005), pp.8-23; Chia (2002), pp.7-13; Twitchett (1983), pp.68-86.

²³Carter (1925), pp.34-35.

²⁴Carter (1925), p.26.

²⁵Xin (2018), p.16.

²⁶Xiang (2001), p.126.

Dynasty circa 660 CE.²⁷ Utilizing these seals, Buddhists replicated a myriad of Buddhist images, adhering to the belief that duplicating a sutra or a Buddhist image was a virtuous deed with the potential to cure illnesses and purify souls.²⁸ Often, single sheets of paper carried hundreds, if not thousands, of Buddha figures, each seal generating numerous prints, thus sparking the early development of printing.

The transition from Buddhist seals to woodblock printing in China was driven by two key factors. First, the widespread use of Buddhist seals stemmed largely from the constraints experienced by sutra scribes. While capable of transcribing text, they required seals and subsequently, woodblock printing, to generate images.²⁹ Such printing catered to a significant social demand for affordable religious images.³⁰ Second, the progression towards woodblock printing was further influenced by the necessity to print in Sanskrit, an unfamiliar and unwritable script for most Chinese Buddhists, presenting a challenge possibly greater than creating drawings for printing.³¹

The advent of printing in Taoism originated with talisman seals. Historically, Taoist practitioners often carried large seals, typically made from jujube wood, when traversing mountainous and riverine terrains. These seals, engraved with as many as 120 characters, were employed to exorcise evil spirits.³² Taoist priests also utilized the impressions of wooden seals, spanning several inches square and bearing the name of *Laozi* or another eminent figure, as charms.³³ Even though it appears that Taoists may have developed the seal impression into something akin to a block print before the Buddhists, motivated by their need for charms, the correlation between Taoist seals and woodblock printing remains more indistinct and uncertain.³⁴

The Confucian tradition significantly contributed to the early development of printing through the technique of ink rubbings from stone inscriptions. This practice entailed moistening a thin, resilient paper, placing it onto the stone's surface, and pushing it into all grooves using a stiff

²⁷Xin (2018), p.19.

²⁸Zhang (2006), p.38.

²⁹Xin (2018), p.20.

³⁰Carter (1925), p.57.

³¹Xin (2018), p.22.

³²Xin (2018), p.19.

³³Carter (1925), p.11.

³⁴Carter (1925), p.13. Initially, seals were carved using a mold. When pressed onto a flat surface, they required inking, typically with vermilion, which resulted in white characters on a red background. However, an innovative shift occurred when the concept of carving seals in relief was introduced. These new seals, when inked with vermilion, produced red characters on a white ground. This marked a significant development, playing a pivotal role in the early history of printing, as it necessitated characters to be carved in reverse and in relief. See Carter (1925), pp.12-13.

brush. After drying, a padded silk or cotton swab, dipped in sized ink, was gently passed over the paper. Once removed, the paper bore a clear and lasting impression of the inscription in white on a black background. This technique resembled block printing but differed in that the characters were incised into the stone rather than embossed in relief, as in wood. Importantly, the text direction remained the same as on the original stone, given the ink's application on the paper's side facing away from the stone.³⁵

As asserted by Thomas Francis Carter, it was the union of these two processes, the Buddhist and Taoist seals, and the Confucian rubbing, that produced the great official block printing.³⁶ In the same vein, Xin Deyong contends, “The origin of woodblock printing technology, with seals and stone rubbings, is the combination of stone rubbing transmission and seal technology, which is sufficient to promote the development of woodblock printing.”³⁷ When the Confucian Classics were cut in wood—the event that marked the beginning of large-scale block printing—those in charge of the work had no idea of printing. They thought they were continuing the ancient practice of cutting inscriptions, using wood instead of stone, after the analogy of certain Buddhist and Taoist prints that they had seen, for the sake of ease and economy. It was thus that the wooden block and its printed impression developed naturally from the stone inscription and its rubbing. The Buddhist and Taoist prints—which had developed from charms and seals—gave the idea of cutting the inscription in reverse and gave also a new technique for taking the rubbing.³⁸

One might ask if it is the case that the entry of Buddhism as a new religion helped lead to the invention of printing in China, then why did this not take place at an earlier date in Buddhism's home country of India. A key period to look at would be under the Mauryan Empire (321-185 BCE), that unified India for a time, and in particular at the reign of Ashoka (r. 268-232 BCE), who is said to have recognized and promoted Buddhism, albeit while still continuing to recognize other faiths. In an environment of religious competition it is possible that incentives to invent printing would have existed as would later be the case in China under the Tang Dynasty. However, there was a crucial—and preceding—technical difference between language in China and India. In China a shift to printing could have a larger and more immediate impact. In China during the Tang Dynasty,

³⁵Carter (1925), p.19.

³⁶Carter (1925), p.21.

³⁷Xin (2018), p.16.

³⁸Carter (1925), p.22.

as is the case today, there were multiple dialects but with a single Chinese system of characters. The same character meant the same thing irrespective of what dialect was spoken locally. In India a much different situation prevailed. First of all, there was a greater diversity of languages, and not just dialects of the same language. Second, there was no common system of symbols, letters, or characters that could be used to express the same idea irrespective of what local language or dialect prevailed. Finally, at the time of the emperor Ashoka, the system used for official inscriptions, the Brahmi script, would itself come to be written in different ways in different places. All of this combined in a way that would have made the initial impact of printing weaker than would be the case in China. This may explain why there was less technological progress in India in this area, but we cannot know this with certainty.

Buddhist Monasteries and the Spread of Printing and Education

In the wake of printing's inception, Buddhists held a profound conviction that reproducing a sutra or a Buddhist image was an act of profound virtue. This sentiment catalyzed a widespread devotion to printing activities, involving not only private individuals but also authoritative figures, culminating in voluminous production.³⁹ A testament to this reverence is evident in the discovery of the Diamond Sutra in Dunhuang. A dedication from 868 CE indicates it was printed for the welfare of Wang Jie's parents, earning it global recognition as the world's oldest surviving printed book.⁴⁰ Sutra-printing institutes, typically situated within Buddhist monasteries, produced a plethora of materials, ranging from religious texts to secular books.⁴¹ Notably, between 972 and 983 CE, the entire Buddhist canon, the Tripitaka, was published in Chengdu. This monumental task required the carving of 130,000 blocks to create over 5,000 volumes, marking a pivotal milestone in printing history.⁴²

Religious institutions had unique advantages in the printing industry. For instance, to promote Buddhism, fervent followers often raised funds independently for the carving and printing of scriptures.⁴³ Moreover, monasteries had the advantage of accessing nonprofessional labor, such as

³⁹Zhang (2006), p.38.

⁴⁰Zhang (2006), pp.23-4.

⁴¹Zhang (2006), pp.49-60.

⁴²Carter (1925), p.89.

⁴³Zhang (2006), p.64.

religious devotees, women, and idle peasants, enabling them to carve blocks inexpensively.⁴⁴

Therefore, Buddhist monasteries in medieval China functioned as crucial educational establishments. They bridged the transition from private schools during the Han era to large academies or '*shuyuan*' during the Song Dynasty.⁴⁵ These monasteries were strategically located in tranquil, secluded areas, equipped with expansive libraries containing both secular and Buddhist texts and staffed by learned monks, making them prime venues for focused study. Students often resided within the monastic premises for independent study of classical texts without distraction in preparation for civil service examinations. These monasteries, funded by income from monastic land, offered a democratic form of education, providing free lodging and food to commoners aspiring for success in the civil service exams.⁴⁶ The monasteries, with their substantial and stable book collections, served as reliable and inexpensive sources of knowledge, a function particularly crucial in an era where local libraries were scarce, and only aristocratic families had private book collections.⁴⁷ The fourth century had already witnessed the monasteries evolve as centers of secular learning and education, attracting talented individuals from lower social classes and allowing them to participate in the cultural life traditionally exclusive to the gentry. This development marked a significant shift in Chinese social history as it blurred rigid class boundaries and created a platform for intellectual pursuits irrespective of social origin.⁴⁸

Printing and Education in the Song Dynasty

Woodblock printing was the mainstay of the Chinese printing industry, particularly during the Song Dynasty. At this time, printing was largely employed for religious and commercial purposes, with religious scriptures, calendars, and almanacs being the dominant forms of printed material. The government, recognizing the potential of this technology for mass reproduction, began to use it for the dissemination of standardized editions of the Classics and other ideologically important texts during the Five Dynasties period and subsequently in the Song era. The rise of the examination system in the Song Dynasty further amplified the need for orthodox texts for study, thereby propelling

⁴⁴Brokaw (2005), pp.8-10.

⁴⁵Scholars have argued that Buddhist methods for training monks served as the catalyst for the development of academies. See Kieschnick (1997), p.118; Zhou (1933), p.79; Yan (2009), pp.886-894.

⁴⁶Zhou (1933), p.77; Yan (2009), pp.925-927.

⁴⁷Zurcher (2007), p.9.

⁴⁸Zurcher (2007), p.75.

the growth of the printing industry. By the twelfth century, commercial publishers had begun to take the lead in the book trade, even though the scarcity of surviving Song and Yuan imprints makes it difficult to fully assess the impact of this publishing boom.

According to one anecdote, in 1005 the chancellor of the Directorate of Education trumpeted a recent surge in the number of carved woodblocks deposited in his office:

At the beginning of the dynasty the number of book woodblocks was fewer than four thousand. But, now they are over one hundred thousand, with the Classics, the histories, and their proper commentaries all provided for. When I was young and made a career of Confucian learning, I observed that fewer than 1 or 2 percent of school students could be supplied with the Classics and their commentaries. Now woodblock editions are abundant and all families of scholars as well as commoners have them.⁴⁹

By the Song Dynasty's end, books had been printed in at least 91 prefectures scattered throughout 15 of its 17 circuits. One twentieth-century scholar estimates possible print runs of 84,000 copies in the tenth century.⁵⁰ Unfortunately, we as of yet lack more complete estimates of the total number of books produced in China by century during the Tang and Song eras. This would allow us to make a more direct comparison with the figures produced for the important study by Buringh and van Zanden (2009) for Western Europe during the same time period.

Despite the development of movable-type printing in the eleventh century, the industry continued to prefer woodblock printing. This was largely due to the Chinese language's complexity, which necessitated the reproduction of several thousand characters, making movable-type fonts economically unfeasible for many printers.

In spite of the increasing popularity of printed texts, much was still handwritten and hand copied.⁵¹ The enduring relevance of manuscripts and hand-copied text in China can largely be attributed to the high esteem in which the art of calligraphy was held.⁵² Nevertheless, Lucille

⁴⁹McDermott (2005), p.55.

⁵⁰McDermott (2005), pp.56-9.

⁵¹For a discussion of the continuing importance of handwritten manuscripts, see Brokaw (2005), pp.15-16.

⁵²Book collectors often commissioned copies of error-free editions in exquisite calligraphy; in these instances, the manuscript copy would have higher value than other, inferior, printed editions. Economic constraints also played a role in the perpetuation of hand-copying; a reader unable to afford text purchases might borrow books to copy, as long as they could locate a generous collector willing to lend their books—a rarity. The practice of book copying was also seen as a way to demonstrate reverence and accumulate merit; this is particularly evident in the common practice of copying sutras (occasionally using one's own blood) or funding the copying of sutras as a popular method

Chia's examination of the Jianyang publishing industry from the Song to the end of the Ming posits that the range of imprints in the Song was not markedly less than in the late Ming, and the societal impact of printed materials was substantial, highlighting the transformative role of printing in the Song era.⁵³

A major barrier to literacy in premodern Europe, the great expense of books, was therefore absent in China. The availability of cheap books was an important condition that not only permitted widespread popular literacy in China but promoted upward social mobility as well.⁵⁴ According to Evelyn Rawski's account of education in late imperial China, beginning from the ages of two to five, boys born into the households of degree holders, officials, and wealthy men began learning to read and write at home. Since their parents or relatives were literate, instruction was informal, and sometimes carried out by women. In these early years a boy learned to recognize approximately 2,000 characters, and to write a smaller but significant number, so that by the time he was enrolled in formal studies with a tutor (between the ages of five and seven) he had already passed through elementary schooling. While boys of elite families typically studied with a private tutor, sons from households in more modest circumstances could be sent to schools run by teachers in their own homes or in nearby temples. Villagers could also get together and invite a teacher to set up classes. Boys from families too poor to pay for schooling were not necessarily barred from the classroom: the clan schools and the public charitable schools were often established primarily for this group. Such schools therefore marked the lowest boundaries of educational opportunity for poor boys.⁵⁵

During the Song era, a system of public schools was established. At the lowest ladder was the county schools, which were of a middle school nature and did not have an age limit for enrollment. After the boys received a primary education at home, clan schools, or charitable schools, families that had an aspiration for the imperial exams would send them to these county schools for further education.⁵⁶ The teaching material primarily included the Five Classics and the Six Arts, with

of exhibiting devotion to Buddha and earning religious merit. Although the publishing industry undeniably thrived by the early twelfth century of the Song Dynasty, some researchers argue that print only became widespread among both the educated and uneducated during the Ming Dynasty, from the mid- to late sixteenth century. See e.g., McDermott (2005). This hypothesis is bolstered by the continued prevalence of manuscripts over printed material in collections.

⁵³Chia (2002), pp.12-13.

⁵⁴Rawski (1979), p.109.

⁵⁵Rawski (1979), pp.25-28.

⁵⁶For the majority of families, literacy served a pragmatic purpose: it was a tool for safeguarding against deception by tax collectors, government officials, and soldiers. It was predominantly the affluent families, able to bear the opportunity costs associated with their sons dedicating several years exclusively to education, who sent their children

moral character and artistic ability as the standards of training. Each school had its own farmland to serve as a regular source of funding. Students boarded within the school premises, with the school providing for their meals, lodging, and books.⁵⁷

The Development of Religious Monopoly in Europe

The religious landscape of medieval Western Europe could hardly have been more different from that of China. Instead of having three distinct doctrines, each of which vied for support, the Catholic Church had a near monopoly on adherents. Under these conditions, the church faced little incentive to alter its longstanding attitude that the masses did not need to have direct access to the written word of the Old and New Testaments. The end result for Medieval Europe was that while there was one similarity in having a common written administrative language (Latin as opposed to Chinese), access to the written word remained limited to either the clergy, monks, or scattered inhabitants of the towns. For those who would have liked to construct a bureaucratic state, they had a limited supply of talent to draw upon.⁵⁸

Constance Miller (1983) has argued that medieval Europeans had the raw skills and materials necessary to develop woodblock printing, and so the explanation for their failure to develop this technology must lie elsewhere. Europeans knew of carving; they had ink; they had a history of printing seals; and they had various raw materials that could be used for making paper. In spite of this, block printing of text first appeared in Europe only a few decades before Gutenberg's movable type printing.⁵⁹ This same point about seals helping to lead to the development of woodblock printing in China was already made by Carter (1925), almost a century ago.

To see how the relationship between Christianity (and subsequently Catholicism) and the written word developed we can start with the beginning. Within a few decades after the death of Jesus,

to county schools. See Rawski (1979), pp.21-2.

⁵⁷Chen (2018), pp.202-212.

⁵⁸We should note here that a different situation prevailed for people of the Jewish faith in Europe at this time as the ability of adult males to read scripture was seen as being beneficial for participating in services. As described by Reif (1990, pp.151-152), "Since it was degrading for a Jew to be unable to participate fully in those aspects of the synagogal service that involved simple recitation of Hebrew and a mark of some distinction to be knowledgeable enough to undertake the rarer and more difficult readings, the basic aim of elementary education was to set him on the road toward these achievements." As explained by Botticini and Eckstein (2012), access to the written word then aided members of this group in professions like trading and money lending.

⁵⁹The earliest known European block print is from 1423 (Miller 1983, p.54).

the movement that would come to bear his name quickly became an urban phenomenon, as has been abundantly documented in the classic account by Meeks (1983). For this reason, we can presume that a number of church members by nature of the trade they exercised and the fact that Latin and Greek were still both written and spoken languages would have been literate. With this said, prior estimates of high literacy in the Ancient Mediterranean world are not supported by historical evidence.⁶⁰ Under these conditions, Christian rituals—taking place often in secretive locations—quickly took on a character where those few who were literate would read to the many who could not (Gamble 1995). It is hard to escape the idea that at this early date it was already the origin of the Latin Mass. In this case those listening could understand the Greek or Latin that was spoken, but centuries later for medieval Europeans this would no longer be the case.

If we move forward to the early medieval period, and the Carolingian era in particular, by now the fact that affairs of church or state were conducted in Latin certainly made access to the written word a challenge for all but a few Europeans. The monopoly position of the Catholic Church during this era did not only result in those outside the church having restricted access to Old and New Testaments; it also had consequences for the lower clergy within the Church itself. Some have argued that an emphasis on a high level of written Latin, which by now had diverged from spoken language for three centuries, meant that many regular clergy could read and understand only a number of simple texts (Nelson 1990, p.264).

The other obstacle to literacy in Carolingian Europe was that in the absence of a technology for printing, book production was a luxury pursuit, further restricting access. As evidence of this, consider the following statement by Lupus of Ferrières, who in the year 858 was considering sending a book to Archbishop Hincmar of Reims.

I have been afraid to send you Bede's *Collectanea* on the apostle taken from the works of Augustine, chiefly because the book is so large that it cannot be concealed on one's person nor very easily contained in a bag. And even if one or the other were possible, one would have to fear an attack of robbers who would certainly be attracted by the beauty of the book, and it would therefore probably be lost to both you and me.⁶¹

Later in the Medieval era, it is apparent that there were numerous attempts to translate both the

⁶⁰The main text arguing that there was not widespread literacy in the Ancient World is Miller (1991).

⁶¹Lupus of Ferrières as quoted in McKitterick (1989), p.135

Old and New Testaments into the vernacular, particularly into French. At first, in some cases these efforts appear to have been tolerated by church authorities. Some within the church argued that the Bible, if carefully and accurately translated into the vernacular, could help support the orthodoxy (Sneddon 2012). In the end, however, this opinion does not appear to have carried the day. By the thirteenth century, with the rise of sects such as the Cathars that were considered to be heretical, the Catholic Church acted much as one might expect a monopoly under threat to react: it restricted access to the written word once again. The difference with the situation in China, where Taoists had seen Buddhist scriptures as a threat, is that in this case it was the Catholic Church's own texts that it thought were being used against it. To see the logic here consider the following statement by the Council of Toulouse, held in the year 1229 to formulate a reaction to the Cathars.

We prohibit also that the laity should be permitted to have the books of the Old or the New Testament; unless anyone from motives of devotion should wish to have the Psalter or the Breviary for divine offices or the hours of the blessed Virgin; but we most strictly forbid their having any translations of these books.⁶²

While the Catholic Church in Western Europe acquired a monopoly position, we need to ask whether the existence of competition within the Church itself might have led to an incentive to develop printing. One period to consider is the early thirteenth century as two recently established "mendicant" orders, the Dominicans and the Franciscans, came into conflict with the secular clergy in the towns of Western Europe.⁶³ It is said by some that the Dominicans and Franciscans were better than the secular clergy at leading a moral way of life, and their higher level of education put them in a better position to transmit the Christian message (Vauchez 1995, p.233). It is also clear that the Franciscans and Dominicans did more to provide services for the cities that hosted them, serving often as diplomats and mediators (Vauchez 1995, p.250).

Could the competition between the mendicant orders and the secular clergy—the recent arrivals—have prompted them to spread the written word more widely just as had happened with the Buddhist monks in China several centuries before? A key difference here was that unlike the Chinese Buddhists, the Franciscans and Dominicans were not proposing any fundamentally new or

⁶²Statement from the Council of Toulouse (1229) as reported in Peters (1980), pp.194-195.

⁶³"Secular" here was used to refer to priests who were ordained but not part of an established monastic order.

different doctrine. In fact, when Pope Gregory IX made the Inquisition a permanent institution in 1233 he turned to the Dominicans and the Franciscans to administer it. They were the orthodoxy.

In sum, as Catholic Christianity acquired a near monopoly on religious adherents in Western Europe, it at first developed a technology of worship that compensated for the fact that most adherents were illiterate. The maintenance of this technology—with the vast majority of people not reading and only listening in a language that they could not understand—further reinforced this tendency. It was true that monasteries in Europe, as had been the case in China, were associated with book production (Buringh and van Zanden 2009), but this was production for a few without the development of new techniques for spreading the word more widely.

Empirical Tests With Chinese Data

Our empirical tests are based on cross-sectional estimates where we examine the correlation between the number of Buddhist monasteries in a prefecture during the Tang dynasty and three key outcomes under the subsequent Song dynasty. The first of these is the number of printing centers in the prefecture. The second measure is the number of “county schools.” in the prefecture during the Song Dynasty (Northern Song period). These schools were state supported. The third measure is what we call, for lack of a better name, the number of “commoner” *jinshi*, a category that we will define below.

The principal observable we control for is prefecture population during the late Tang era as a measure of initial population. We also include province fixed effects in some of our estimates in order to control for time constant unobservables at that level.

Data Sources

China Biographical Database

We utilized the China Biographical Database (hereafter CBDB) as the primary data source to investigate the relationship between *jinshi*, their kinship networks, and geographic locations during the Song Dynasty (960-1279).⁶⁴ Specifically, we extracted information on 35,003 individuals

⁶⁴CBDB, Aug. 2022

who passed the civil service exam in the *jinshi* subject (*c_entry_code* = 36), and whose entrance (*c_enter_year*) fell between the years 960 and 1127, the Northern Song period. Subsequently, we focused on pre-processing this dataset to obtain three key pieces of information for each *Jinshi*.

First, we computed the kinship relationship for each *jinshi* with their paternal and maternal clans using the *KINSHIP_CODES* data in the CBDB. To control for family background, we assigned a generation number to each person starting with the individual as generation 1, and incrementally by 1 for each level of ancestry appearing in CBDB. We then counted the minimum generation assigned to an individual apart from themselves and determined whether they were within 5 generations (approximately 1 century) of a bureaucrat within their extended family. If the answer to this question was “yes,” then they could not be considered a commoner *jinshi*.

Second, we extracted the choronyms of each *jinshi* from the *BIO_MAIN* data in CBDB. This information was used to identify whether the individual came from an aristocratic family stretching back to the Tang Dynasty. If the answer to this question was “yes,” then they could not be considered a commoner *jinshi*⁶⁵

Third, we retained a single location for each *jinshi* by prioritizing the “basic affiliation” (*ji guan*) in the CBDB, which represents the scholar’s registered hometown. If this information was missing, we used the “actual residence” (*luo ji*), “household registration address” (*ben guan*), “moved to” (*qian zhu di*), “alternate basic affiliation,” or “place of refuge” (*bi bing zhi di*), in that order. We then mapped the *jinshi* individuals to an original Northern Song administrative map to obtain prefecture information using x y coordinates in the CBDB address data.

The Historical Atlas of China

We used Tan Qixiang’s (1982) *Historical Atlas of China* as a valuable resource for the historical maps of the Tang and Northern Song Dynasties. In order to accurately capture the territorial boundaries and provincial and prefectural divisions of these periods, we performed a process of georeferencing whereby the historical atlas was matched to a contemporary geo-coded map of China. Specifically, for the Tang territory and administrative map, we utilized the administrative map of 741 CE from *The Historical Atlas of China*, while for the Northern Song Dynasty, we

⁶⁵A “choronym” is an element of the name that indicates that someone comes from a particular region, which in many cultures connotes elevated status.

employed the corresponding map from 1111 CE. By aligning the contemporary borders on the historical maps with those on the modern geo-coded map, we were able to accurately georeference both sets of maps. Subsequently, we marked the locations of prefectural governments in accordance with the georeferenced maps for both the Tang and Northern Song Dynasties.

Printing Centers

During both the Tang and the Northern Song era centers for woodblock printing emerged in some areas of China but not others. By “printing center” here we are referring to both government funded and privately funded commercial publishing houses. These centers published the Confucian Classics—necessary material for studying for the examination—as well as religious and commercial texts. The bulk of the woodblock printed books from this era were produced in these centers, although a few were also produced in smaller scale operations.

We relied on two primary sources to collect data on where printing centers were located. We utilized Zhang Xiumin’s (2009) *Invention of Chinese Printing and Its Influence*, which provided a comprehensive list of major cities known for woodblock printing during the Tang and Song dynasties. To ensure the accuracy of our data, we cross-referenced these locations with those recorded in Tsien Tsuen-Hsuei’s (1985) *Science and Civilisation in China* (Volume 5). Once we had identified the relevant printing locations, we marked the cities as printing centers within corresponding prefectures.

Buddhist Temples

For Buddhist monasteries, we use the data from the Buddhist Geographical Information System (BGIS), constructed by Jiang Wu, based on *Catalog of Buddhist Monasteries in Tang and Five Dynasties (Tang wudai fosi jikao)*.⁶⁶ The data include Buddhist temples and their geo-coded coordinates.

County Schools

For the Northern Song county schools, we drew on Zhou Yuwen’s (1996) *Prefectural and County Schools in the Song Dynasty*, which provides valuable information on the county schools of the

⁶⁶Li (2006); Wu (2022).

period.⁶⁷ We recorded the counties that had at least one county school by the end of the Northern Song Dynasty (960-1127 CE). Although Zhou's work included establishment dates for some county schools, the proportion of missing information led us to adopt a binary indicator of whether a county had a public school by the end of the Northern Song Dynasty, as well as the number of counties within each prefecture that had at least one public school by this time.

Tang Population

For population in the Tang Dynasty, we use the data from Dong Guodong's (2002) *History of Chinese Population (Volume II)*. The data include prefecture-level household figures from four reigns—Zhenguan (627–649 CE), Kaiyuan (713–741 CE), Tianbao (742–756 CE), and Yuanhe (806–821 CE). For the empirical analysis, we use the data from the Yuanhe era.

Locations of Buddhist Temples and Printing Centers

Figures 1-3 show first the distribution of Buddhist temples across China during the Tang Dynasty, then the correspondence between Buddhist temples and printing centers during the Tang Dynasty, and then finally the correspondence between Buddhist temples and printing centers under the subsequent Song Dynasty. We can see a clear pattern where printing centers during both the Song and Tang eras are located in proximity to Buddhist temples. There is also a clear pattern of spatial correlation of printing centers. In our empirical tests to follow we will report standard errors that take account of the possibility of spatial correlation.

⁶⁷Zhou (1996), pp.25-64

Figure 1: This figure presents the location of Buddhist monasteries that existed at any point during the Tang Dynasty (618-907 CE).

Tang Buddhist Monasteries

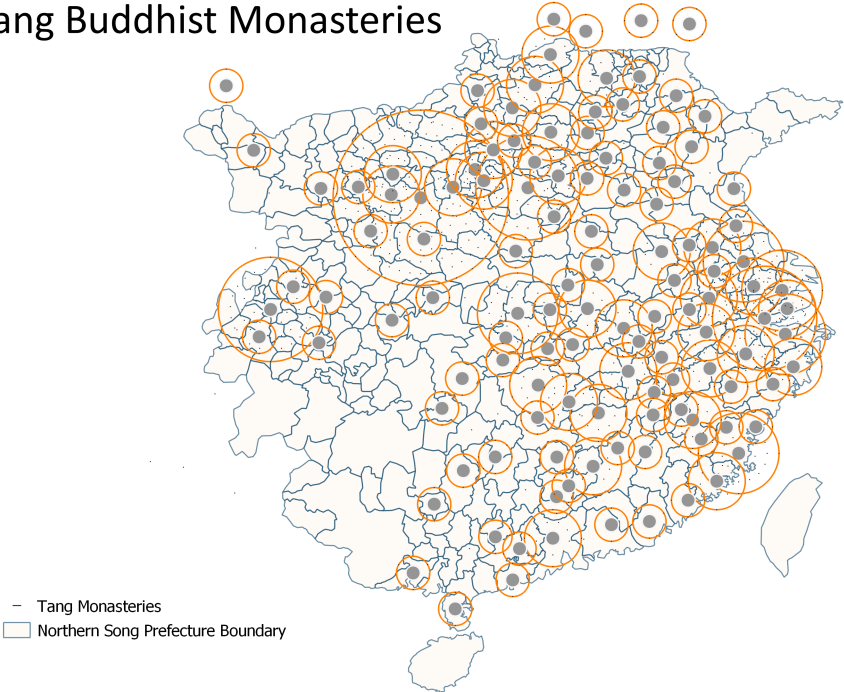


Figure 2: This figure presents the location of Buddhist monasteries and of printing centers during the Tang Dynasty (618-907 CE).

Tang Buddhist Monasteries

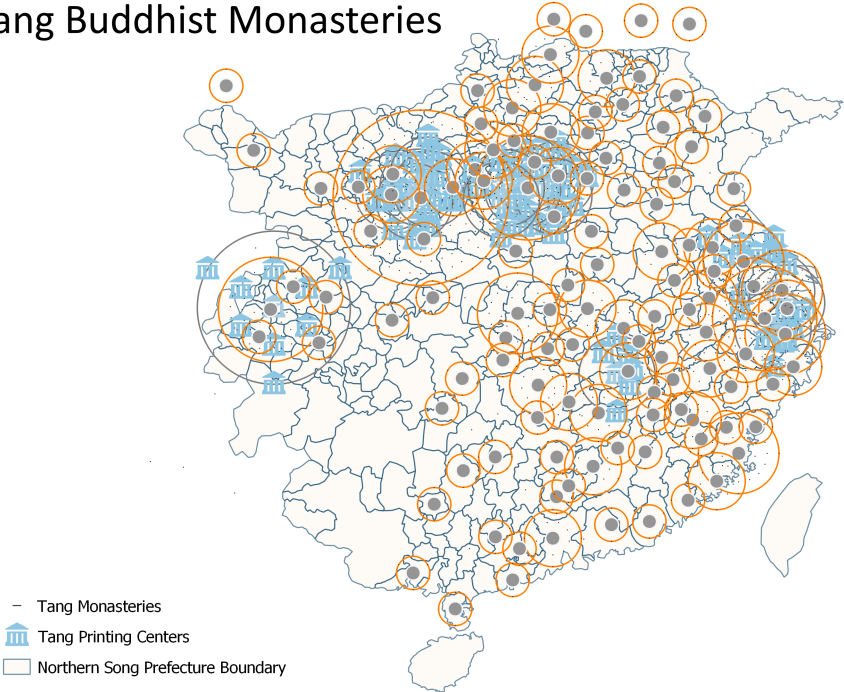
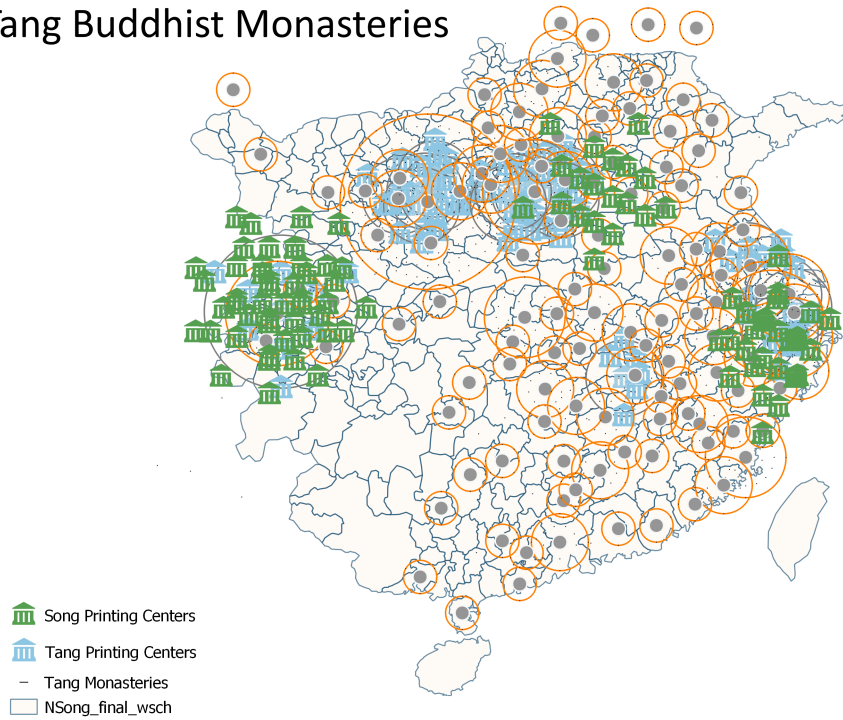


Figure 3: This figure presents the location of Buddhist monasteries and of printing centers during the Tang Dynasty (618-907 CE) and the Song Dynasty (Northern Song period) (960-1127 CE).

Tang Buddhist Monasteries



Empirical Strategy

Our baseline empirical investigation focuses on examining the cross-sectional associations between the number of Buddhist temples in a province during the Tang era and subsequent outcomes under the Song Dynasty. This includes the number of printing centers in a prefecture, the number of counties in a prefecture with county schools, and the presence of “commoner” *jinshi* in the Northern Song Dynasty. In our analysis, we control for the late Tang population (*Population_i*) as recorded between the years 806 and 821, and we incorporate provincial fixed effects (λ_j) as well as latitude, longitude, and their product.

Our baseline specification is as follows where i indicates prefecture ID, j denotes province, and X is a vector of geographic coordinates (latitude, longitude, and their product).

$$Y_i = \beta_0 + \beta_1 \ln(\text{Tang Monastery}_i + 1) + \beta_2 \ln(\text{Population}_i) + \gamma(X_i) + \delta_j + \epsilon_i \quad (1)$$

In addition to our baseline specification, we also report two further specifications that make use of the differential application of the Buddhist persecution under the Tang Emperor Wuzong, who reigned from 840 to 846. In order to explain the motivation for these two specifications we need to first provide some background on the persecution.

Emperor Wuzong was marked by his deep-rooted aversion towards Buddhism, which was not only politically and economically motivated, but also stemmed from his fascination with Taoism. He believed in the Taoist alchemists who promised to use various potions and elixirs to make him immortal, a practice that ultimately shortened his life. His animosity was further intensified by the perceived threat from the Uighurs, whose Manichaean religion was introduced into China by Persians in the year 694. Wuzong’s resentment of Buddhism mirrored the frustrations of the Taoist clergy, who had been eclipsed by the Buddhists, and who sought to regain their prominence.⁶⁸

In the year 845, Wuzong issued two comprehensive edicts targeting monastic property and the Buddhist clergy. The first edict prohibited Buddhist monasteries from holding estates and mandated the surrender of all monastic wealth, such as slaves, cash, grain, or cloth, to the secular authorities for governmental use. The second edict demanded the laicization of all Buddhist monks and nuns under the age of forty. Later that year, a third decree was issued, restricting the size of the clergy

⁶⁸For background of the persecution, see Weinstein (1987), pp.115-130.

and the geographical distribution of monasteries. The emperor imposed a quota of maximum monasteries and clerics to each province based on its “grade.” And the “grade” of a province was determined according to its population sizes.⁶⁹ It was hoped that strict enforcement of these policies would be ensured by dispatching censors to various regions.

Thanks to the diary of a well known Japanese Buddhist monk named Ennin, who traveled extensively in China during the reign of Emperor Wuzong, we have a firsthand account showing that this extensive planned persecution was actually carried out, though with a differential affect according to areas. His diary provides much detail on the confiscation of goods, the destruction of temples, and monks being forced to give up their practice. Ennin himself was forced to flee back to Japan.⁷⁰ Ennin also observed in some areas local officials simply refused to carry out the persecution. Despite the court’s orders, pro-Buddhist military commanders in certain regions refused to implement the edicts, providing refuge to large numbers of monks.⁷¹ In still other areas the persecution could not be carried out because the Tang central government lacked control of the area due to a prior revolt known as the An Lushan Rebellion.

In the areas where the persecution took place during Wuzong’s reign it had a profound impact on Buddhism in China. Over 4,600 monasteries were dismantled, more than 260,500 monks and nuns were defrocked, and over 40,000 chapels and hermitages were destroyed. The confiscation of vast tracts of monastic land and the addition of 150,000 ex-slaves to the tax registers signified the scale of the dismantlement. The destruction of scriptures, particularly Chinese commentaries and treatises, posed a significant threat to the preservation of ‘orthodox’ interpretations of the Buddhist canon nurtured over centuries within each of the Buddhist schools.⁷²

If there was indeed a mechanism whereby the presence of Buddhist monasteries during the Tang Dynasty led to the accumulation of a pool of artisans skilled in woodblock printing, then we should expect that in areas where the persecution under Wuzong either did not happen or was

⁶⁹Chang’an would be permitted only four monasteries, each with a maximum of thirty resident monks. Luoyang was, likewise, to be allowed four monasteries with a total of one hundred and twenty monks. Outside Chang’an and Luoyang, a single monastery would be permitted in each of 41 specified provinces, with its number of monks and nuns to be determined in accordance with the “grade” of the province: 17 provinces would be allowed a maximum of 20 clerics each; 15 provinces, 10 clerics each; 8 provinces, 5 clerics each. And one province, 13 clerics. For details of the decree, see Weinstein (1987), pp.132-3.

⁷⁰See Reischauer [1955a] (2020), and in particular pp.347, 353, 358, 373, and 376

⁷¹Li (2004), pp.93-97. See also Reischauer (1955b), p.270 for the contemporary description of this by the Japanese monk named Ennin.

⁷²Weinstein (1987), pp.135-147.

weak, we should expect to observe a more positive correlation with our outcomes during the Song Dynasty (printing centers, county schools, and social mobility via the examination system).

We estimate a second specification where we augment the baseline regression by including an interaction term that multiplies the number of Buddhist monasteries in a prefecture during the Tang era with a dummy variable *Persecution*, indicating whether the persecution actually took place in the given locality. Within our data, prefectures that experienced the persecution tended to have about twice the initial population when compared with prefectures that did not experience a persecution at this time, and this difference is statistically significant. We control for initial population in our specification.

$$Y_i = \beta_0 + \beta_1 \ln(\text{TangMonastery}_i + 1) + \beta_2 \ln(\text{Population}_i) + \beta_3(\text{TangMonastery}_i * \text{Persecution}_i) + \beta_4 \text{Persecution}_i + \gamma(X_i) + \delta_j + \epsilon_i \quad (2)$$

We then estimate a third specification that focuses on the subsample of prefectures where the Buddhist persecution did take place. We then add an interaction term to our baseline specification that multiplies the number of monasteries in a prefecture during the Tang era by a variable *Persecution Level* that captures the severity of the persecution quota—with four different levels—assigned by the imperial administration. Within the subsample of prefectures that experienced the persecution we might expect there to be a more positive correlation between Buddhist monasteries and our Song Dynasty outcomes should be more positive in those areas that experienced a lighter persecution. However, given the severity of even the “light” persecution quotas, we might not expect this interaction term to be statistically significant.

$$Y_i = \beta_0 + \beta_1 \ln(\text{TangMonastery}_i + 1) + \beta_2 \ln(\text{Population}_i) + \beta_3(\text{TangMonastery}_i * \text{PersecutionLevel}_i) + \beta_4 \text{PersecutionLevel}_i + \gamma(X_i) + \delta_j + \epsilon_i \quad (3)$$

Empirical Results

The results of estimates of our three equations can be seen in Tables 1, 2, and 3 with Conley standard errors that take into account spatial correlation.⁷³

We begin by showing the results for our three specifications when the number of printing centers in a prefecture during the Song Dynasty is our dependent variable. Here we consistently see a positive and statistically significant coefficient on the variable capturing the number of Buddhist monasteries in a prefecture during the Tang Dynasty. In specification (1) the estimated effect of an increase in the number of monasteries is statistically significant but also rather small. It would take an increase in nearly twenty monasteries for an additional printing center to be observed. The small magnitude of this effect may be attributable to the fact that many monasteries present during the Tang era were destroyed during the persecution under the Wuzong era and never rebuilt. The results of specification (2) in Table 1 suggest that this may indeed have been the case. The coefficient on the Tang monasteries variable is now five times larger, and given the negative coefficient on the interaction term, this applies only to prefectures that did not experience the persecution. In areas that did experience the persecution, the estimated effect of Tang monasteries is essentially zero. Finally, in specification (3) we use the subsample of prefectures that did experience the persecution, and we examine whether the apparent effect of having had a Tang monastery depends on the scheduled severity of the persecution. The negative and statistically significant interaction terms suggests this was indeed the case. We could think of this as the intent to treat effect of the Buddhist persecution.

⁷³We report Conley standard errors that take into account spatial correlation in our data based on geodetic distance. We do this first because of the theoretical possibility that if in a given area there is a pool of skilled artisans trained in the carving necessary for making woodblock printing this may spill over as individuals create new printing centers in adjacent areas. We do this also because the distribution of Song Dynasty printing centers in Figure 2 shows a clear pattern of spatial clustering within several fairly large areas. The distance cutoff we use for our standard errors is 500 kilometers with a Bartlett kernel that is a set of weights such that the closest nearby observation is given maximum weight and the weights then decrease in linear fashion until an observation at a distance of 500 kilometers, in straight line distance, is given a weight of zero. Our results are robust to using either a larger distance cutoff or a smaller distance cutoff, although our standard errors were slightly larger, though still statistically significant, with a small distance cutoff of 20 kilometers or less.

	<i>Dependent variable:</i>		
	Northern Song Printing Centers		
	(1)	(2)	(3)
Tang Monastery	0.0555 *** (0.0185)	0.2596 *** (0.0615)	0.0730 *** (0.0250)
Tang Monastery*Persecution		-0.2219*** (0.0610)	
Persecution		0.8915*** (0.2287)	
Tang Monastery*Persecution Level			-0.0194*** (0.0073)
Persecution Level			0.0452 (0.0238)
Population 806-821 (ln)	✓	✓	✓
Latitude	✓	✓	✓
Longitude	✓	✓	✓
Lat.*Long.	✓	✓	✓
Provincial FE	✓	✓	✓
Conley SE (Cluster: Province)	✓	✓	✓
Observations	268	268	228
R ²	0.1037	0.2194	0.0643

Cross sectional regressions with a sample of up to 268 prefectures from 23 provinces based on the 1111 CE administrative map, with the number of county-level printing centers as the dependent variable. The independent variables include the number of Tang monasteries within each prefecture in 617-845 CE, logged population between 806-821 CE, latitude, longitude and their product as well as provincial fixed effects. *p<0.1; **p<0.05; ***p<0.01.

Table 1: **Tang Dynasty Monasteries and Northern Song Printing Centers**

We next show the results for our three specifications when the dependent variable is the number of counties within a prefecture that have a county school. Here again we see that the coefficient on the Tang monasteries variable is positive and statistically significant in all three specifications. Based on specification (1) an additional Buddhist monastery in a prefecture during the Tang era is associated with an additional 0.14 counties in that prefecture having a county school during the

Song era. This would seem like a small effect, but it is the case that the median prefecture in our sample had only one county school, which is perhaps a better way of putting the magnitude of the effect into perspective. In specification (2) we see that the estimated effect of having had a Tang monastery is substantially larger in prefectures that were not subject to the Buddhist persecution under Emperor Wuzong. Finally, in specification (3), which considers only those prefectures that were subject to the persecution, the interaction term is indeed negative, consistent with the idea that a more severe scheduled persecution dampened the long run effect of having had a Buddhist monastery, but it is less precisely estimated ($p=0.14$)

	<i>Dependent variable:</i>		
	Northern Song Counties with Public Schools		
	(1)	(2)	(3)
Tang Monastery	0.1425 *** (0.0185)	0.2399 *** (0.0529)	0.0730 *** (0.0250)
Tang Monastery*Persecution		-0.1056** (0.0433)	
Persecution		0.0932 (0.1980)	
Tang Monastery*Persecution Level			-0.0390* (0.0263)
Persecution Level			-0.0225 (0.1084)
Population 806-821 (ln)	✓	✓	✓
Latitude	✓	✓	✓
Longitude	✓	✓	✓
Lat.*Long.	✓	✓	✓
Provincial FE	✓	✓	✓
Conley SE (Cluster: Province)	✓	✓	✓
Observations	248	248	209
R ²	0.3929	0.4073	0.4097

Cross sectional regressions with a sample size of up to 248 prefectures from 23 provinces based on the 1111 CE administrative map. The dependent variable is the number of counties within a prefecture that have a county school. The independent variables include the number of Tang monasteries within each prefecture in 617-845 CE, logged population between 806-821 CE, latitude, longitude and their product as well as provincial fixed effects. *p<0.1; **p<0.05; ***p<0.01.

Table 2: **Tang Dynasty Monasteries and Northern Song County Schools**

We finally report our estimates where the dependent variable captures the degree of social mobility associated with the examination system. Our dependent variable, commoner *jinshi*, counts the number of individuals from a given prefecture who attained *jinshi* status during the Northern Song era and for whom no one else in their extended family had attained this status in the previous five generations and finally whose name lacked a choronym. In all three cases the coefficient on

the Tang monastery variable is positive and statistically significant. In the base specification the presence of a Tang monastery is associated with an increase of slightly more than one *jinshi* during the Song era. This may seem like a small effect, but it can be put into perspective by the fact that nearly half of the prefectures in our sample had zero commoner *jinshi* recipients during this period. In specification (2) we see a substantially larger effect of having a Tang monastery, but given the interaction term, this applies only to prefectures that did not experience the Buddhist persecution under Emperor Wuzong. In the final specification we see that the interaction term has a small coefficient, and it is not statistically significant. Evidently, given that a prefecture experienced the persecution, the severity of the quota assigned does not appear to have influenced subsequent outcomes for social mobility. This may again be due to the fact that even the lowest level for the persecution quota was quite severe. What seems to have mattered more was whether the persecution was experienced at all.

With regard to our social mobility results, we should also note that we have focused on individuals attaining the *jinshi* degree, the highest level in the Imperial Examination, because this is the one exam degree that is consistently coded in the China Biographical Database. There were lower degrees in the exam system, but a *jinshi* degree would guarantee a path to elite government positions during the Song. We would expect that social mobility at the *jinshi* level may have also been correlated with social mobility at these other examination levels.

Overall, our empirical results are supportive of the idea that the presence of Buddhist monasteries, which had emerged in an era of religious competition, was associated with the subsequent development of printing centers, county schools, and a degree of social mobility with regards to the imperial examination system. Though our results support this conclusion, we should nonetheless be cautious in interpreting them. We are able to control for time constant factors at the provincial level via inclusion of fixed effects. We have also been able to control for one measure of geographic location as well as for initial population. We have shown further that any effect of having Buddhist monastery during the the Tang era appears to have been mediated by the subsequent persecution under Emperor Wuzong. What we have not been able to do is control for time varying unobservables at the provincial level or for either time constant or time varying unobservables at the prefectural level. Concerns about this might be alleviated if we could make the claim that whether a prefecture experienced the Buddhist persecution was as if random (after controlling for initial population), but

this was likely not the case.

	<i>Dependent variable:</i>		
	Commoner Jinshi		
	(1)	(2)	(3)
Tang Monastery	1.1320 *** (0.3272)	7.1707 *** (0.8156)	0.9170 *** (0.4380)
Tang Monastery*Persecution		-6.5520*** (0.9311)	
Persecution		16.6683*** (4.5546)	
Tang Monastery*Persecution Level			-0.1577 (0.0073)
Persecution Level			0.1293 (0.0238)
Population 806-821 (ln)	✓	✓	✓
Latitude	✓	✓	✓
Longitude	✓	✓	✓
Lat.*Long.	✓	✓	✓
Provincial FE	✓	✓	✓
Conley SE (Cluster: Province)	✓	✓	✓
Observations	268	268	228
R ²	0.0437	0.1300	0.0281

Cross sectional regressions with a sample size of up to 268 prefectures from 23 provinces based on the 1111 CE administrative map. The dependent variable “commoner jinshi” is the number of *jinshi* per prefecture during the Northern Song era for whom no one in their family had been a *jinshi* in the previous five generations. The independent variables include the number of Tang monasteries within each prefecture in 617-845 CE, logged population between 806-821 CE, latitude, longitude and their product as well as provincial fixed effects. *p<0.1; **p<0.05; ***p<0.01.

Table 3: **Tang Dynasty Monasteries and Commoner Jinshi**

Conclusion

State formation depends fundamentally not only on the desire or demand for a state, but also on the supply of ideas and techniques that allow people to construct one. We have argued that these ideas and techniques can sometimes originate in unsuspected places. In China during the Tang Dynasty, competition between the Buddhist and Taoist religions, as well as with Confucian doctrine, prompted the creation and diffusion of a form of woodblock printing that gave a great number of people access to the written word. This allowed for the development of an Imperial Examination system that drew upon a vast pool of candidates from different areas of China and different social ranks. In other words, it strengthened the Chinese state. In Medieval Western Europe a different set of developments took place, as absent competitor religions, the Catholic Church had little incentive to develop new techniques to expand access to the written word. In fact, the individual monks and clerics who had access to hand copied manuscripts in Latin had every incentive to restrict it.

We are not by any means arguing that religious competition provides the sole explanation for the political divergence between China and Western Europe at this time. In fact the political divergence began long before this date. What we are suggesting is that building a state often depends on new inventions, and it is often easier to borrow an invention from someone else rather than trying to invent one by oneself. We know that the written word has been critical to state development in a great many societies, yet only three societies are thought to have invented writing on their own. Everyone else borrowed it from their neighbors. And so it makes sense that the same conclusion should apply in the case of further innovations, such as printing, that allow for spreading the written word more widely. Ultimately, the Chinese state borrowed woodblock printing from the Buddhists who had the idea first. Other rulers in East Asia would then borrow this technique from the Chinese, along with a broader model of state development. In Medieval Western Europe many innovations in state development were also borrowed from social actors, and in particular the Catholic Church (Grzymala-Busse 2023, Møller and Doucette 2022). Yet, this did not include a model based on broad access to the written word.

As a final observation, we can suggest that if state formation sometimes depends upon ideas borrowed from social actors, then it may also be likely to occur in the presence of a certain type of society, one in which there is a degree of competition between different actors giving them an

incentive to innovate.

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