

URKEW WORKING PAPER

Efflorescence in Tang-Song China

Ting Xu

URKEW Working Paper

Efflorescence in Tang and Song China

[Not for citation without permission]¹

Ting XU

London School of Economics

t.xu1@lse.ac.uk

Abstract

The paper examines the historical trends in the relations between economic development and cultural change in pre-modern China. The principle question addressed in this study is: what is the role played by culture and institutions in China's long-term economic development? In examining the issue, this essay looks at 'efflorescence' in Tang (618-907AD)-Song (960-1279AD) China, especially the regimes for the production and diffusion of useful knowledge in these periods. 'Efflorescence' is an analytical concept first developed in Goldstone's pioneering general study 'Efflorescence and Economic Growth in World History' (2002), and in this paper I argue that it is a particularly useful concept for approaching economic and cultural change in imperial China. Going beyond Elvin's 'the high-level equilibrium trap' which focuses on the economic and ecological factors, 'efflorescence' offers a global

¹ The author is a member of the European Research Council funded project 'Useful and Reliable Knowledge in Global Histories of Material Progress in the East and the West' (URKEW) based in the Economic History Department, the London School of Economics. The paper is derived from my presentation at the URKEW research seminar on 27 January 2010 at the LSE. I am grateful to Professors Harriet Zurndorfer and Ian Inkster for their comments on my presentation. I thank Professors Patrick O'Brien and Michael Palmer for reading the first draft and their comments. Any errors remain, of course, my responsibility.

perspective and helps to integrate effectively cultural and socio-economic analysis in the examination of the historical trends in relations between economic development and cultural change in China. 'Efflorescence' involves both Smithian and Schumpeterian growth in per capita and total incomes, reflecting technological and institutional innovations. Efflorescence has a tendency to move towards a static equilibrium from where only major social and political upheavals are likely to create new opportunities for economic growth.

The study concludes that China, lacking substantial cultural and institutional innovation, became a victim of its own economic success. The Tang and the Song dynasties presided over most prosperous periods in Chinese history based upon regional specialisation, market expansion, river transportation and foreign trade as well as the generation and diffusion of useful knowledge among cultural, intellectual and business networks. However, from Song times onward, cultural unity gradually superseded cultural pluralism. For example, Buddhists and Daoists came under increasing pressure from the secular authorities. Thus the efflorescence under the Song dynasty in outcome operated to restrain future further cultural and institutional breakthroughs which adversely affected the trajectory for the production and diffusion of useful and reliable knowledge across the Chinese empire.

Introduction

Tang China (618-907) was economically prosperous and politically strong: the territory of China was expanded, foreign trade was developed.

Literature and arts attained high levels of development. In the reign of Xuanzong (r. 712-756), China took centre-stage in the world economy, marking 'the rise of the East in World History' (Adshead, 2004). The Song economy was even more remarkable for commercial and technological and urban growth. But the Song was not nearly as politically and militarily successful as the Tang.

In order to have a comprehensive view of the economies of Tang and Song China, we need to examine political, economic, cultural and intellectual forces which have shaped China's economy throughout its history (Adshead, 2004). While we know a good deal about Tang and Song political and economic regimes, the cultural and intellectual spheres have relatively been ignored. In this essay, I focus on this question: what were the roles played by the cosmological (especially the attitudes toward nature) and institutional forces (especially educational institutions) in the generation and diffusion of useful knowledge for the long-term economic development of China? In particular, I will examine various 'sites' and 'regimes' that produced and disseminated useful knowledge during the medieval period. I will compare these 'sites' and 'regimes' in the Tang and the Song and show how the differences paved the way for the different trajectories between China and Europe for the rates and patterns of material progress.

Spatial and temporal trends and cycles

The first question is how to represent medieval economic development in China. We require a theoretical framework that could take account of all relevant political, economic, cultural and intellectual factors at work. Economic historians refer to 'extensive growth' emanating from increases in inputs with stable technology and 'intensive growth' (Schumpeterian growth) with higher rates of technological change. But concepts such as 'growth', 'stagnation' and 'crises' are problematic as they may imply a linear transformation and easily fall into dichotomies such as those of 'growth vs. non-growth' or 'growth vs. stagnation'. For China, notions of

‘spatial and temporal trends and cycles’ seem more heuristic especially for the medieval economic development of North China (Hartwell, 1967), and Skinner has pointed out that ‘the Kaifeng cycle was essentially a regional rather than an empirewide phenomenon’ (1985: 274). He suggests that ‘historical analysis is inseparable from regional analysis’ (1985: 290).²

Efflorescence a term recently coined by Goldstone involves both Smithian and Schumpeterian growth, reflecting technological and institutional innovations over cycles of growth and stagnation (2002: 333).

‘Efflorescences’ have occurred in both European and Chinese economic contexts and it may be extended to Tang and Song China.

In Goldstone’s model of long run growth ‘the normal tendency is for an efflorescence to create a number of interlocking practices that are initially fruitful, [...] tend to stabilize [and then become forces leading to inertia so that] only a major social or political [can] create [...] opportunities for major episodes of growth’ (Goldstone, 2002: 354). In these representations China became a victim of its own precocious economic success.

Elvin has argued that an economic and ecological explanation may be more consistent and can be verified, unlike concepts such as ‘mentality’ (that is, values/cultures) (1984, 379). Jones has also pointed out that ‘it is not likely [to be] helpful to rely for an explanation on value shifts, in the sense of changes in unobservable preferences’ (1988: 82). Yet purely economic and ecological examinations of the orthodox view that the Song period was a key turning point in Chinese economic history has been

² Regional cycles also indicate the shift of ‘production centres’ and knowledge transfers within the empire.

subjected to critical debate over data, details and methodology.³ The concept of 'efflorescence' gives us an opportunity to look at both socio-economic and cultural factors and interactions between them. As Adshead has argued, 'a world order need not be mainly economic. Its different registers, political, economic, social, intellectual and so on cannot be privileged *a priori*. In the case of the period AD 500-1000, the intellectual register of the world order, specially its religious institutions, was more significant than its economic' (2004: 14-15, italics in original). My analysis below will be broadly historical to include economic, political, and cultural factors.

The Economic Bases of the Tang-Song Efflorescence

Agriculture and the land system

The Tang dynasty tried to establish an 'equitable' system of land tenure (*juntian zhi*). But large estates (*zhuangyuan*) of landed property in land were accumulated by noble families and high-ranking officials,⁴ and many Buddhist and Daoist monasteries (Twitchett and Fairbank, 1979: 26-27). A 'manorial economic system' emerged under the Song which included tenants bound to the soil of larger estates which did, however, shield them from the pressure of excessive government taxation (Twitchett and Fairbank, 1979: 27). In many ways the system in China resembled the development of a régime seigneuriale in Europe. Yet it might be wrong to overemphasise the servile aspect of tenancy: the state still retained control over defence functions, and there was no feudal superstructure

³ On a review of such as a question, see e.g., Wright (2007).

⁴ Land was granted to officials according to their civil and military ranks (Elvin, 1973: 60-61; Zheng, 2002: 144, 249). Although after their period of tenure, officials had to return back the land to the government, through illegal purchase from the farmers, they had accumulated large private estates and manors.

(regime féodale) (Elvin, 1973: 69). The system persisted into the Ming and early Qing periods and collapsed during the eighteenth century into new rural order dominated by small landholders (Elvin, 1973: 235). Under the manorial system, owners of large estates could concentrate on a wide scale economic development.⁵ At the same time, manoralism weakened central government. This may be one of the reasons to explain the political and military weakness of the Song state (Elvin, 1973: 83). The existence of the manorial system without a feudal superstructure marked a divergence from the European as well as the Japanese trajectories.

The medieval Chinese economy expanded extensively across the southern frontier and China's population moved to rice-producing areas of the Yangtze Delta (Elvin, 1973: 211; Shiba, 1983: 90; Kelly, 1997: 953).⁶ Already in the Tang period, the economic centre began to shift from the North to the South (Deng, 1993: 29; Zheng, 2002: 125). This shift continued in the Song and was 'China's equivalent to the discovery of America'. 'Globally it was the most significant piece of territorial extension and exploitation between 500 and 1000' (Adshead, 2004: 75). Between the eighth and twelfth centuries Chinese agriculture expanded and yields increased especially in the South by the use of wet-field cultivation and improved hydraulic techniques (Elvin, 1973: 113). The colonisation of the South alleviated the pressure of population growth and adverse climate changes in the North and gave rise to new centres for the generation of useful knowledge.

⁵ In my analysis below, I will show that large manors provided financial support for the development of private education.

⁶ See also Kuhn (2009: 71).

Transportation, the city and trade network

The moving frontier for agriculture was facilitated by the development of transportation by land and water which linked areas of production to centres of consumption and facilitated movements of taxes, officials, and troops.⁷ The Grand Canal (a nationwide transportation system) was built in the Sui period (581-618). It linked the South (especially the Yangtze delta) to the North. Large scale transportation projects promoted the development of cities and their regional agrarian hinterlands as Adam Smith observed. Regions became specialisation on agricultural, commercial or industrial activities traded along networks of waterways (Shiba, 1970: chapter 2; Kelly, 1997: 954) and transformed a subsistence into a commercial economy (Smith, 1776: 25).⁸ Specialisation created conditions and incentives for innovation (Mokyr, 1990: chapter 9; Kelly, 1997: 955).

Commercialisation and market expansion stimulated the growth of cities and transformed of urban life (Shiba, 1970: chapter 4). Cities are both market-led and market-making. Jacobs refers to cities rather than countries as 'engines' for growth and they became centres of knowledge formation (1970, 1984). The capital of Northern Song, the city of Kaifeng, is a good example.⁹ As Hartwell has pointed out, capacities of its hinterland and a transportation network to sustain the large non-agricultural population was crucial to its rise. Road and river transport

⁷ On waterway network and the economic transformation of Song China, see e.g., Kelly (1997).

⁸ Smith (1776: 26-30) has noticed the relations between waterway network and economic development in eastern provinces of China in the chapter 'the division of labour is limited by the extent of the market'.

⁹ Large cities already emerged in the Tang dynasty. The Tang capital Chang'an was the largest and most cosmopolitan city in the world at that time.

also facilitated foreign trade.¹⁰ Foreign goods from Southeast Asia, India, the Near East, and possibly even Europe appeared on markets in Kaifeng (Hartwell, 1967: 143). 'The value of K'ai-feng trade at the end of the eleventh century was equivalent to well over £12,400,000 whereas the imports and exports of London in 1711 were worth no more than £8,450,000 and probably much less' (Hartwell, 1967: 144). Apart from Kaifeng, Fuzhou and Wenzhou evolved into important cities in the Northern Song (Skinner, 1985: 276). During the eleventh century the centre began to shift to Quanzhou which was opened to foreign trade in 1087 and became the largest port in China (Skinner, 1985: 276).¹¹ These cities along the Southeast coast formed another cluster for regional economic development.¹²

The regional and international trade networks that evolved between 7th and 13th centuries created conditions for the transfer of knowledge and promoted cultural pluralism. They included imported technologies and social capital, Buddhism¹³ along with the circulation of ideas, peoples and skills came into the Chinese empire¹⁴ through both priests and merchants.¹⁵ Along with Buddhist religion, astronomy, mathematics and

¹⁰ Tang China began to build ships for long journeys. By the Song times China had acquired improved knowledge on geography, astronomy, mapmaking and shipbuilding. See Waley-Cohen (1999: 26, 37-38).

¹¹ In the Song times, Guangzhou was also an important port for overseas trade.

¹² On Complimentary map see Skinner (1985: 277).

¹³ Buddhist monasteries played an important economic role. For example, it operated pawnshops and mutual financing associations. See Waley-Cohen (1999: 20).

¹⁴ Waley-Cohen used the phrase 'multicultural ambience' to describe pluralism under the Tang (1999: 21). For example, the Tang army employed foreign (Nepalese and Tibetan) soldiers. The Tang capital Chang'an was full of foreigners including Turks, Persians, Uighurs, Sogdians, Arabs, Jews, Indians, Koreans, Tibetans, Malays, and Japanese (Waley-Cohen, 1999: 23).

¹⁵ Islam and Christianity also entered China with priests and merchants coming across central Asia. However, they did not take root in China in the same way as Buddhism. See Waley-Cohen (1999: 13).

the latest technologies were also introduced to China by the travellers (Waley-Cohen, 1999: 13). In particular, with the importation of Buddhism, Indian sciences (for example, Indian knowledge of astronomy) were transferred to the existing Chinese body of knowledge.¹⁶

Yet compared with their European counterparts, Chinese cities did not enjoy political freedom and full-fledged legal status. City residents lacked 'civic consciousness' and autonomous associations (Elvin, 1973: 177).

Mining and Iron Industry

Technical achievements in Tang and Song times were impressive. For example, Tang tri-coloured glazed pottery, block printing, movable-type, gunpowder and firearms (application of gunpowder to military purposes was slowed down in the Song),¹⁷ water-powered wheels for irrigation (Chinese noria), spindle-wheels, silk-reeling frames, treadle-operated looms, and more.

One distinct example of a proto 'industrial revolution' singled out by Jones (1988: 35) was the development of a large scale ferrous mining and iron industry between 750 and 1100. The output of pig iron per person multiplied several times between late Tang and early Song (Hartwell, 1962,

¹⁶ Via China, Buddhism and various kinds of useful knowledge were also diffused to other parts of Asia such as Japan, Korea and Vietnam. It was 'the mutual harvesting of knowledge' (Waley-Cohen, 1999: 33). Europe was also a beneficiary of the knowledge transfer. For example, sericulture of China was transferred to South Europe. From the seventh century, Constantinople surpassed Chinese producing areas and became the centre of the silk industry. See Waley-Cohen (1999: 27). Imported knowledge and artefacts from Asia later contributed to the reordering of European cosmology from Copernicus (d. 1543) onwards. Globally, exported technologies from China became 'ingredients in the re-rise of the West' (Adshead, 2004: 77).

¹⁷ Formulas for flare mixtures appeared in Chinese alchemical books of the ninth century A.D. or a little earlier, see Sivin (1990: 165).

1966, 1967), which was made possible by the use of coal as a fuel. The expansion of the iron industry was also made possible by the growth of cities such as the capital Kaifeng as a metropolitan market and other political and industrial centres in the North (Hartwell, 1967: 118). Iron by the 1020s became an important item for sale in Northeastern China (Hartwell, 1967: 124).

Print

Among the most important of technologies developed during the Tang era were print and clockwork.¹⁸ Printing contributed to communication, intellectual development and higher education. Block printing was invented between the late Sui and the early Tang (roughly 590-640), and movable-type printing was invented in the Northern Song around 1040. The diffusion of woodblock printing was driven by the spread of Buddhism. 'By the middle of the tenth century, print had become an accepted medium of communication in Confucian circles' (Kuhn, 2009: 41). Print also became a means by which the state managed to increase its control over the generation and diffusion of knowledge.

Printing contributed to the dissemination of new technologies. For example, agricultural treatises and ancient scientific texts were published with woodcut illustrations of tools and appliances. Jia Sixie's (?-?, a middle-level official in the Northern Wei dynasty 386-543) *Qimin yaoshu* (the Essential Techniques for the Common People) written in the sixth century was printed in the early eleventh century by the order of the

¹⁸ When exported to the West in the 14th and 15th centuries, moveable print became one of the major contributing factors to the birth of the Renaissance, the Reformations and the Scientific Revolution (Adshead, 2004: 77-80).

emperor. Other publications include Chen Fu's (1076-1156) *Treatise on Agriculture* (Chen Fu Nongshu written in 1149) in the Southern Song period, and Wang Zhen's *Treatise on Agriculture* appeared around 1300 during the period of the Yuan dynasty.

A decline in material prosperity

The decline of the Iron Industry occurred in post-Song China because the Yellow River¹⁹ shifted course at the end of the twelfth century, Jurchen and later Mongol economic policy, and the lost of the main market of Kaifeng following the Mongol invasion in 1233 (Hartwell, 1967: 149-153).²⁰ These same factors probably explain the decline of the Song economy as a whole.²¹ That economy was based on efficient connexions between land and river transportation, cities and regional markets, transnational and knowledge transfers. However, we need to go beyond the economic and political conditions, and look at social institutions and cultural attitudes.

Cosmology

Elvin has argued that 'from the tenth to the fourteenth century China advanced to the threshold of a systematic experimental investigation of

¹⁹ On the changes with the Yellow River, see also Zhang (2009).

²⁰ On the debate over whether there was a real post-Song decline in the iron industry, see e.g., Wright (2007).

²¹ Population density is a good guide to total growth. Take the population density in the Lower Yangtze from the Song dynasty to the early Ming dynasty for example. From the years 980-1010, population density in this area underwent an explosive growth, then a slow growth occurred between 1010 and 1200 followed by a mix of fast and slow/zero growth between 1200-1280. Then the population density declined between 1280 and 1390 with an exception of Suzhou. See Shiba (1988: 148). Thanks to Professor Mark Elvin for drawing my attention to this issue.

nature, and created the world's earliest mechanized industry' (1973: 179). He sees the 14th century as a turning point (Elvin, 1973: 203). When the institutionalisation of the examination system for the recruitment of a meritocratic bureaucracy made Chinese society 'inward-looking' (Elvin, 1973: 204), attitudes towards the investigation and manipulation of nature changed.

Traditional Chinese thought included no systematic notions of 'nature' (Lloyd and Sivin, 2002: 141, 200). Instead the Chinese were more concerned with 'correlations' (Henderson, 1984; Lloyd, 1996: 93; Lloyd and Sivin, 2002: 141). The Chinese word 'ziran' meant 'something that exists without something else causing it', and it did not carry the meaning 'nature' until 1881 when Chinese borrowed this sense from the Japanese (Lloyd and Sivin, 2002: 200). Generally speaking, the Chinese used *qi* (everything that is perceptible but intangible), *yin-yang* and *wuxing* (five phases) and applied these notions in the fields of science and medicine (Lloyd and Sivin, 2002: 196-200). Above 'qi', there was another important notion of 'dao' (the way)²² which both the sage and common people need to follow. 'The notion of a purely physical concept did not attract Chinese, nor was it requires requisite for sophistication in scientific thought' (Lloyd and Sivin, 2002: 200). So, a basic feature of the Chinese systematic thought about the external world is that 'the body and the state were miniature versions (not just models) of the cosmos' with the emperor as 'the indispensable mediator of this set of mutually resonant systems' (Lloyd and Sivin, 2002: 214). The institutions of the empire needed to

²² 'Dao' originates from Daoism (*daojia*), and its definition is fluid. Confucianism is not exclusive to other groups of thought and ideas, rather it had acquired 'a host of eclectic components' that are practical and acceptable (Liu, 1988: 39). Many elements of Buddhism and Taoism were absorbed by Confucianism.

correspond to the orders of the body, the state and the cosmos. The Chinese cosmology was thus closely linked to the moral and political spheres (Lloyd and Sivin, 2002: 185).

In Tang times, in tandem with cultural pluralism, there was intellectual pluralism. Confucianism has not become a state orthodoxy for thought. Benefiting from deep involvement in distribution networks (for example, the camel network and the cross-Indian ocean network), Buddhism was fully introduced to China. The traditional religions of Daoism and Confucianism coexisted with imported Buddhism which over time was transformed to serve China's own needs.²³ Under the Song, the appropriation of foreign ideas became even stronger. The incorporation of Buddhism and Daoism did not fundamentally challenge correlative thought (Henderson, 1984: 46). Compared with Europe, in China, no religion played the dominant role as that Christianity played in Europe, where it shaped the 'scientific culture'.²⁴

Yet correlative thinking was not without criticism which was raised by many Confucian scholars in the Tang and Song times. For example, during the Northern Song period, different and new interpretations of the Confucian classics and competition between diverse schools of thought emerged each trying to establish a new orthodoxy within Confucianism (Liu, 1959: 18). These schools of thought shared the same view that moral

²³ See Ropp (1900: xi)

²⁴ Gaukroger (2006) pointed out: 'Christianity set the agenda for natural philosophy in many respects and projected it forward in a way quite different from that of any other scientific culture' (Gaukroger, 2006: 3). Aristotelianism was incorporated by Christianity and was extended to inquiries into the natural world -- you are doing the God's work to explore and manipulate nature. But in China there was no such universal law imposed by God.

governance is the ultimate goal, but they differed in the approaches they thought necessary to achieve it (Liu, 1959: 22). One group advocating utilitarianism was led by Wang Anshi (1021-1086), a councillor during the reign of Shenzong (r. 1068-1085). Wang and his supporters concerned with statecraft and practical issues such as fiscal management and national defence. This utilitarian outlook was attacked by conservative Confucians who often argued that pursuing profits (*li*) was not worthy, although they also argued that material efficiency was a legitimate goal. Wang's ideas later were rejected (Liu, 1959: 23). Another emphasis was on self-cultivation and personal morality, and a third strand attempted to establish a metaphysical basis for morality which they argued was more important than utility. Both schools converged during the Southern Song period and were transformed into the orthodoxy of Neo-Confucianism under the Yuan and Ming (Liu, 1959: 24).

Neo-Confucianism (*lixue*) is often called the 'Cheng-Zhu school': Cheng refers to Cheng Yi (1033-1107) and Cheng Hao (1032-1085), northern Song neo-Confucian 'pioneers', and Zhu refers to Zhu Xi (1130-1200), a southern Song synthesiser of the school's thought. *Lixue* is also called *daoxue*, (school of 'the Way') or *songxue* (Song learning).

Neo-Confucians introduced the concept of *li*, assumed a correspondence between *li* (the principles, or patterns of construction and operation) and morality, and discussed distinctions between *li* and *qi* (Henderson, 1984: 119, 125-126). The notion of *li* was given new metaphysical foundations: it was normative ('things ought to be'). In order to search for the principles, Confucians needed to investigate the 'things' (*gewu*) or nature through several ways including experiments and the invention of technologies

(Kuhn, 2009: 2). *Gewu* also included the study of objects, events, and actions in the natural world (Tillman, 1978). For example, in 1247 Song Ci (1186-1249) published *Collected Writings of Washing Away of Wrongs* (Xiyuan jilu). The book was a systematic study of forensic medicine. Shen Kuo (1031-1095), a polymath and statesman of the Northern Song dynasty, published an encyclopaedia of *Notes Taken in Mengxi* (Menxi bitan) between the years 1086-1093. The book has 609 entries including one about the invention of movable-type printing by Bi Sheng (?-1051) in the 1040s and a discussion of the potential use of fossil fuels. *Gewu* went beyond the moral and ethical spheres, and these writings can be connected to the proliferation of technologies.

Even if the ultimate goals for *gewu* were moral and ethical principles, *gewu* was one moral and natural spectrum. 'Things' seemed worthy of investigation were primarily 'current affairs' and books on classics and history (Henderson, 1984: 126). Furthermore, to search for *li*, a Confucian needs to examine himself inwardly so that he might better understand the outside world. Thus, as Nakayama has argued, moral issues and the investigation of nature phenomenon and Chinese philosophy of nature remained undifferentiated; thus it played 'an inhibitory role in the development of the modern way of thinking' (1973: 40). *Li* or *tianli* (the principles of universal heaven/heavenly principles) is thus not just a purely philosophical, abstract, and metaphysical system but also includes moral, social and political concerns.

Confucian cosmology shaped the structure of Chinese society. The Confucians regarded agriculture as the basis of society which they divided

into four categories: gentlemen (*shi*) had the highest status, followed by farmers (*nong*) and artisans (*gong*), and merchants (*shang*) who had the lowest status.²⁵ In reality the boundaries between these four categories were blurred. Many officials had engaged private trade or had close contacts with merchants. Access to education and prestige given to learning were keys to social status. Throughout Chinese history, education was elitist in nature. Before the seventh century access to education depended largely on birth (Lloyd and Sivin, 2002: 20). The diffusion of useful knowledge was usually undertaken by a minority people in the society (*shi* or the elites) because they were literate and in touch with relevant texts (Lloyd and Sivin, 2002: 27). Technical knowledge was transferred by lower-status healers and craftsmen who acquired it through either apprenticeships or as family secrets. The links between these upper and low groups suggests that the conduits of knowledge transfer in traditional China were weak.

From the Song onwards, examinations were gradually integrated into the elite culture, and served as a channel for upward mobility in society. However, the proportion of people who succeeded by way of the examination system was tiny (Lloyd and Sivin, 2002: 20; De Wreedt, 2007: 14). The pass rate was low and social status such as landholding and marriage played familiar roles. In general, education remained elitist. Moreover, as the gentry elite were both scholars and officials, their intellectual and political activities were intertwined (Liu, 1998: 15). At the top elites possessed both outstanding scholarship and governmental

²⁵ Under Tang rules, three groups of people were forbidden to take part in the civil service examinations: law breakers; sons of craftsmen and merchants; clerks working in the county and prefectural magistrate offices.

positions. Their concerns were basically for the stability of the state and social values. This society exerted profound influences on thoughts and public affairs (Liu, 1988: 15). Their priorities for universal moral and political values downplayed the special and vocational subjects in higher forms of education.

Relations between the self, the state and the world of nature were fused into an ideology.²⁶ Under the Chinese neo-Confucian cosmological framework, the family remained the locus of moral and social education. It is often said that Chinese society is collectivist while Western society is individualist.²⁷ But it seems more appropriate to use Fei Xiaotong's distinction between 'the differential mode of association' (*chaxu geju*) to describe the structure of Chinese society (1992: 11). Chinese society lacked discrete social organisations that could transcend personal relations, and there was only an abstract entity the 'all-encompassing *tianxia*' (everything under heaven) (Fei, 1992: 76). Instead Chinese society was composed of overlapping networks of people linked together through kinship and networks spreading out from each individual's personal connections. In Fei's view societies in traditional rural China was 'egocentric' and people were 'selfish' (1992: 61). Relations between teachers and students in traditional China could be seen as a reflection of its social structure. For example, Lloyd and Sivin represent the 'schools of thought' (*jia*) as 'lineages' referring to 'a relationship between masters and disciples over several generations that is ritually centred on the transmission of a charismatic written text' (Lloyd, 1996: 32). To belong to a

²⁶ See Lal (1999).

²⁷ For example, Lal (1999) has argued that individualism is an important aspect to examine Western cosmology.

jia carried the sense of belonging to a family and therefore promoted filial respect. In the relationship, students could not be expected to argue against the teacher boldly in the manner of the debates between teachers and pupils in the European universities (Lloyd, 1996: 33).

Institutional Foundations

Polity

The Tang was a multicultural dynasty. The emperors were not pure Han in ethnic identity but rather were descendents from the Tuoba Xianbei, a Tuko-Mongol group of North China. They were also engaged in large military and geographical expansion. The political system was open in certain respects. For example, the civil service examination system created channels for upward mobility based on merit rather than birth. Internal monitoring mechanisms emerged within the bureaucracy. Open criticism of the government was allowed. Women had better positions than at other times, and the court gave social space for women.²⁸ From the middle of the eighth century, Tang military power began to diminish. In trying to avoid the regional and civil wars of the late Tang, the Song emphasised civil rule rather than military governance.²⁹ The military weakness of the Song forced Song emperors to operate in a multi-state system (Shiba, 1982).³⁰

The Education

The central official School System

²⁸ The information was given by Professor David McMullen in his lecture for the URKEW group on 16 June 2010 at the LSE.

²⁹ On a general introduction on the Song civil rule, see e.g., Kuhn (2009).

³⁰ But this multi-state system also made the Song cultivate an expansion of its foreign trade system, see Shiba (1982).

A degree of *professionalism* (for example, the establishment of the system of the imperial medical colleges) had emerged under the Tang (Adshead, 2004: 82, 188). The official school system was a key feature. Its curriculum was divided into three main categories: classical learning (*jingxue jiaoyu*), 'concrete learning' (*shike jiaoyu*) and professional learning (*zhiye jiaoyu*). Under each category, there were diverse subjects (See Table 1). Classical learning included the Confucian classics. It embodied two subsystems: the Directorate of Education and a separate system for the education for aristocrats. For concrete learning, there were three specialised colleges: law (*lü xue*, penal law),³¹ mathematics (*suan xue*) and calligraphy (*shu xue*, including study on philology and palaeography).³² Professional learning was provided by governmental departments in charge of astronomy and the calendar, veterinary studies, and divination. These governmental departments performed as research institutes and educational institutions. They were sites for the generation and dissemination of useful knowledge. The Tang inherited the Sui's administration system of six ministries (*liu bu*) as the central bureaucracy. The Ministry of Rites (*li bu*) was the highest-level administrative authority of education under the Tang. The Tang government consisted of three departments (*sansheng*): the Central Secretariat (*zhongshu sheng*), the Chancellery (*menxia sheng*), and the Department of State Affairs (*shangshu sheng*). The secretariat was responsible for making policy. The Chancellery passed documents to and from the emperor. The Department of State Affairs comprised six ministries which executed policy in the areas of: personnel, household, rites, military administration, Justice, and public

³¹ Emperor Yang of Sui (r. 604-618) established the education on penal law (Song and Wang, 1999: 234).

³² There was discontinuity in the specialised colleges in 658. In 662 they were revived but were put under the control of the government departments which employed their graduates. The law college was under the control of the Supreme Court of Justice (*dali si*), the mathematical college was under the Imperial Observatory Service (*taishi ju*), and the College on calligraphy was under the Imperial Library (*mishu sheng*). In 671, they were again returned to the school systems. See Twitchett and Fairbank (1979: 276).

works. Among the regimes of six ministries, the ministry of public works (*gong bu*) was in charge of engineering construction, water control, land management and transportation. Technical officials (usually middle or lower level officials in a bureaucracy classified into nine grades) were responsible for projects of water control, dissemination of agricultural technologies and publication of calendars essential for agriculture (Mei and Li, 1992: 127-128).

Table 1: The Tang central educational system

Directorate of Education (<i>guozi jian</i>) for classical learning
School of 'the Sons of the State' (<i>guozi xue</i>)
Imperial University (<i>tai xue</i>)
School of Four Gates (<i>simen xue</i>)
School of Broadening Literary Accomplishments (<i>guangwen xue</i>)
Schools for aristocracy
School for Daoist studies (<i>chongxuan xue</i>)
Schools for Concrete Learning
School of Calligraphy (<i>shuxue</i>)
School of Mathematics (<i>suan xue</i>)
School of Law (<i>lü xue</i>)
Imperial Medical Office for professional study
Six special medical schools including veterinary studies
Astronomical/Astrological Office for professional study
Calendrical studies
Astrological studies
Water clock studies

Tang higher education looks aristocratic in nature. Places in the Directorate of Education were reserved almost exclusively for the sons of nobles or of higher-ranking officials. For classical learning, the subject of *guozi* (*guozi xue*) admitted the sons and grandsons of officials of the third and higher rank. The subject of *taixue* admitted sons and grandsons of officials of the fifth and higher rank. The subject of *simen* (*simen xue*) admitted students aged below 25 years old from official schools at the

prefectural and county levels including sons and grandsons of eighth ranked officials, and Confucian licentiates. The examination subjects of *mingjing* (Learned in the Classics) and *jinshi* (Advanced Scholars) were the most popular (tongdian: vol. 15, examination and selection 3). Concrete learning was derogated by the gentry, and its students were from the sons and grandsons of lower-status officials and from the common people (Song and Wang, 1999: 327-329). The average age for entering official schools at the county, prefectural and central levels was between fourteen and nineteen; for education in law, the average age was between eighteen and twenty-five (Xin Tangshu: vol. 44, examination and selection 1). Teachers in the central official schools were also integrated into the regimes of nine-fold bureaucratic ranking system (*jiupin zhi*), holding various official ranks and enjoying relevantly high salaries (see Appendix 1).

Following the Tang, the highest administrative authority for higher education under the Song was the Ministry of Rites with the Directorate of Education as its executive body. The former made policies and laws regarding education and civil service examinations, and the latter administered schools. In the late northern Song, the Directorate of Education and Imperial University were combined.³³ Local official schools developed rapidly during the Song period. Under the reign of Renzhong (r. 1023-1063), the court assigned land (*xuetian*, literally scholar land) to finance prefectural and county official schools. The schools then rented out land to tenants and collected rents which formed the major source of

³³ The name of Imperial University was abolished in the Yuan, Ming and Qing dynasties (Qiao, 1999: 108).

the school revenues. Unlike the Tang, students from the Song directorate school students were not guaranteed official posts,³⁴ and the importance of central official schools diminished. The civil service examination became the major force shaping Chinese higher education and the educational field (Lee, 2000: 78). Competition emerged over the content of the examination system (De Weerd, 2009).

The Examination Systems

Among several kinds of 'social innovation' in Tang and Song China, the civil service examination was most important.³⁵ It was established under the Sui (581-618) and early Tang dynasties and promoted by the Empress Wu (625-705) as a way to undermine power of the nobility. Hereditary status began to be supplanted by merit as the standard for choosing imperial officials. In Tang China, candidates from humble backgrounds had but few chances to enter for examinations.³⁶ In AD 607, Emperor Yang of Sui established '*jinshi ke*' (an examination for qualifying as 'advanced scholars') which marked the foundation of the civil service examination system. Twelve examination subjects appeared on the syllabus: 'illustrious talent' (*xiuca*),³⁷ 'Classics' (*mingjing*),³⁸ 'Advanced

³⁴ Under the Tang, the pass rate was very low – two percent among the candidates. Yet candidates who passed the examinations remained a minority among officials. Other channels to enter into officialdom included recommendation by senior officials because of hereditary privilege or by transfer from the clerical service. See Twitchett and Fairbank (1979: 275).

³⁵ It was not until the 18th and 19th centuries that civil service examination was imported into Europe.

³⁶ Under the Tang, candidates could enter for the examinations in two ways by studying in the central official schools or being selected by their local prefectures. The second way was usually for a tiny group of candidates from lower-status families.

³⁷ It was a test on composing five 'policy discussion essays' (*ce*). It was established in early Tang times and abolished in 651. See Twitchett and Fairbank (1979: 275-277).

³⁸ It was a test on classical Confucian canons: the 'Large Classics' (*dajing*, including *the Spring and Autumn Annals* and the *Zuo Commentary*), the 'Medium Classics'

Scholars' (*jinshi*),³⁹ 'Legal Knowledge' (*mingfa*),⁴⁰ 'Calligraphy' (*mingshu*),⁴¹ and 'Mathematics' (*mingsuan*),⁴² 'one history' (*mingshi*), 'three history' (*sanshi*), 'Kaiyuan Rites' (*Kaiyuan li*), 'Taoist learning' and 'Examination subject for children' (*tongzi ke*)⁴³. The first six were the most important exam subjects.

The Song system continued to examine the classics, rites, history, law and military studies, but the subject 'advanced scholar' became the most important of all.⁴⁴ Song policy favoured literary studies and downplayed military studies. It expanded the scale of the examinations, the publications industry and sponsorship for education. Song policy

(*zhongjing*, including the *Book of Poetry*, the *Rites of Zhou* and the *Book of Rites*), the 'Small Classics' (*xiaojing*, including the *Book of Change*, the *Book of History*, the *Gongyang Commentary*, and the *Guliang Commentary*), the *Analects of Confucius*, and the *Classics of the Filial Piety*. See (xintangshu 44, xuanjuzhi 1). Examination included a test on 'Five Classics', 'three Classics', 'two Classics', 'one Classics'. During the reign of Gaozong (r. 649-683), the *book of Laozi* was also included in the learned classics.

³⁹ In the early Tang, the test was five policy discussion questions and several questions on the two 'large Classics' based on memory skills. The three commentaries on the *Analects of Spring and Autumn* were later included. In 681, a test of writing 'miscellaneous essays (*zawen*)' was added. The new test included proverbial essays (*chen*), petition to the throne (*biao*), and poetic writings (*shi*). The *jinshi* exams were regarded the most important to pass distinguished candidates and could lead them to the high-rank bureaucratic posts. The competition was fierce. The successful candidates also formed their own literary style in the literati circle. From the ninth century onwards, they began to play important roles in the intellectual and political life (Lee, 2000: 135-137). The term *jinshi* also became the name of the highest degree obtained in the exams after the fourteenth century.

⁴⁰ It was a test on the Tang Codes (*Tanglü*) which laid the foundation of legal codes in subsequent dynasties. Candidates were applicants and graduates from the College of Law.

⁴¹ It was a test on the correct use and writing of Chinese characters. Successful candidates could enter into low-rank official posts (the ninth-middle rank).

⁴² It was a text on mathematical texts. Candidates were mainly from the College of Mathematics. Successful candidates could be low-rank officials.

⁴³ It was a test on the *Analects* and *Classic of Filial Piety*. Candidates should be usually under ten years old.

⁴⁴ The reform of 681 changed both *mingjing* and *jinshi* examinations. The *mingjing* demanded more textual knowledge of the canonical books. The *jinshi* also required knowledge of Confucian classics, but it emphasised literary skills and writing policy discussion essays.

examiners tried to improve 'fairness' and to suppress 'nepotism' in the examination and selection processes by introducing new procedures such as removing names from exam papers. In all the policy promoted upward mobility.⁴⁵ Competition became intense. In 1071, the reformist councillor Wang Anshi abolished degrees in classics, history and law and substituted a single degree which contained three levels. First, candidates needed to pass the prefectural examinations (*jieshi*) held every third year in the fall.⁴⁶ Successful candidates (*juren*) then took the departmental examination (*shengshi*) in the early spring. Those who passed then proceeded to the palace examination (*dianshi*) organised by the Ministry of Rites under the Department of State Affairs (*shangshu sheng*) in the late spring (Chaffee, 1995: 23; De Weerdt, 2007: 8). The central examination system became increasingly separate from the school system.

In early Song times, poetic composition was the major subject. Later tests on classics were emphasised (Qiao, 1999: 37). Apart from the Confucian canons and poetic compositions, the syllabus also included policies (*ce*) concerned with some practical issues as famine relief, water conservation, economic development, grain transportation, the use of punishment, education, canal building, management of Buddhism, etc. Technological knowledge was not examined. Candidates replied on *precedents* to discuss current policy and governance issues. Under the Southern Song, *ce* became a difficult area for candidates from humble social background,

⁴⁵ For example, in 1256 of the Southern Song dynasty, among the 570 'advanced scholars' (*jinshi*), there were 307 scholars from humble backgrounds (53.9%). There were only 26.6% scholars whose fathers or grandfathers held official titles (most were lower-status officials). See Qiao (1999: 128).

⁴⁶ In the early years of the Song dynasty, there were changes in the frequency with which the examinations were held, but in 1066 the three-year interval became standard. See Chaffee (1995: 51).

because only candidates who had close contact with officials could get access to the materials on Song policies to prepare for the exams.

The Northern Song reformers advocated an empire-wide school system⁴⁷, but government schools and curricula were gradually subordinated to the civil service examinations. Many agents (examiners, teachers, students, commercial printers) became involved in the shaping of the educational and examination system. Under Southern Song, the centralised control of the Northern Song dynasty diminished, and was transformed into 'elite activism' (De Weerd, 2009: 375). The trend towards decentralisation was also manifested in the publishing industry. During mid-Northern Song time, the Directorate of Education became the largest official centre for book collection and publication (Qiao, 1999: 22-24), editing and publishing books of the highest quality. Book publication by local official schools appeared in Song times. Private publication concentrated in areas like Hangzhou, Sichuan and Fujian appeared. Producing cheap books would help pupils prepare for official exams. Anthologies of successful and model essays written by former 'advanced scholars' and collections of poems became best-sellers (Qiao, 1999: 114). Trends towards a less centralised system made the imposition of a single curriculum difficult (De Weerd, 2009: 377). The examination system was transformed from state-centred to a network-based mode. Different intellectual schools competed with each other to attract the court, officials, teachers and students to accept their modes of instruction and discussions of governmental affairs for the exams (De Weerd, 2009: 385). One of the

⁴⁷ In the late Northern Song, governmental schools were spread to most prefectures and counties, and education was made more accessible. Landholding and the development commerce provided the economic base for such increase in governmental schools. See (Chaffee, 1995: 16).

reasons why Neo-Confucianism was eventually taken up by the literati and the bureaucracy was that its modes of exegesis of the classics and discussions of policies became the basic texts for teachers and students in the examinations (De Weerd, 2009: 384-385).

Curricula

The Tang curriculum for higher education was based on five classical Confucian canonical texts entitled *Standard Meanings of the Five Classics* (*wujing zhengyi*) compiled under the direction of Kong Yingda (574-648), a distinguished Confucian scholar recognised by the emperors. The Five Classics included the *Book of Poetry* (*shijing*), the *Book of Rites* (*lij*), the *Book of History* (*shujing*), the *Book of Change* (*yijing*), the *Spring and Autumn Annals* (*chunqiu*). These Five Classics were published in 653 by the court and ended debate over different commentaries on Confucian classics that had persisted since the late Han dynasty (206BC-220AD). It became the official curriculum for candidates taking exams in the classics.

Northern Song policy continued with Tang tradition emphasising literary skills (Bol, 1994: 76-107). Pupils were first taught to memorise as many as characters as possible in order to compose essays. In 988, the Tang edition of the *Standard Meanings of the Five Classics* published and edited new versions (Qiao, 1999: 165). Between 988-1003, the Northern Song also edited other Confucian classics including the *Rites of Zhou* (*zhouli*), the *Ceremonies and Rites* (*yili*), *Gongyang Commentary* (*Gongyang zhuan*, a commentary on the *Spring and Autumn Annals*), and *Guliang Commentary* (*Guliang zhuan*, another commentary on the *Spring*

and Autumn Annals).⁴⁸ Together with the *Five Classics*, these four classics as well as the *Classics of Filial Piety (xiaojing)*, the *Analects (lunyu)*, the *Mencius* and a dictionary named *Erya* (approaching elegance) became the standard texts for all examination candidates.

Changes in the curriculum for 'higher education' reflected politics at court and the relations between central and local government. Under the Northern Song, the court and its officials exerted strict control over the curriculum and made the state-curriculum mandatory for the civil service examinations (De Weerd, 2007: 11). For example, in the 1070s, Wang Anshi authorised a set of new commentaries on the Classics which were distributed to government schools as essential for preparations for the examinations. The governmental policies also compelled the private publishing industry to print editions of the state-authorised books for the curriculum. Under the Southern Song, control over curriculum by the court relaxed. The importance of scholars (*boshi*, teachers in the Directorate of Education) declined. Power shifted to individuals who might not have had any formal association with central official schools. The Neo-Confucianism which emerged lacked formal organisation; instead, multiple curricula were established by good masters. They became for a while arenas for intellectual competition among the literate elite, especially those who engaged in teaching. Curricula thus embodied the teachers' own intellectual and political agendas. 'Given the new relationship between the examinations and the scholar-officials, they were not merely defining curricula for examination preparation; curricular standards also reflected

⁴⁸ There were three commentaries on the *Spring and Autumn Annals*. The third one is *the Commentary of Zuo (Zuozhuan)*.

elite conceptions of statesmanship and local leadership' (De Weerd, 2007: 11).

These changes in curricula reflected the socio-economic as well as intellectual transformations (for example, the views of what constituted useful knowledge). During the Northern Song period, utilitarianism was emphasised by Wang Anshi and his supporters (Liu, 1959: 14). Thus a reformist group represented the interests of the emerging medium-sized landowners (located mainly in the southern areas).⁴⁹ A minority of bureaucrats such as Wang were respondent to the growth of economic and commercial activities. They tried to introduce new methods to strengthen state finances and promoted trading activities. Their views were manifested in curriculum changes and the differing views they held about the relative value of specialised and general education. Thus Wang Anshi emphasised a detailed knowledge of institutions and economics and application of the classical principles to current problems of statecraft. Practical subjects such as law, military affairs, and medicine and a little later, mathematics, were added to the curricula.⁵⁰ Poetic composition was replaced by discussions on practical issues. However, the majority, confined by orthodox Confucian ideas, tended to stick to the traditional policy of restricting all government involvement with trade (Liu, 1959: 21). Wang's reforms were eventually rejected, and the generalist approach to curriculum development prevailed, putting more weight on morality (Chaffee, 1995: 19). This mode of education promoted stability not only in

⁴⁹ Opponents to Wang's reform were large landlords (located primarily in the northern areas) (Liu, 1959: 16).

⁵⁰ See also Liu (1959: 6).

the range of thought but also in intellectual thought in total, and particularly in attitudes toward authorities contained in classical and canonical texts.

Intellectual networks and alternative centres of learning

Apart from schools and central examination systems, intellectual networks and other centres of learning also constituted sites and regimes for the generation and diffusion of useful knowledge. Some scholars (e.g., Adshead, 2004: 118) have argued that ‘an associationism’ contained non-kinship associations existed in Tang times. . Expansion of the scale of education and the civil service examinations gave rise to such associational activities in the private sphere. Many were based on ‘class of year’ (*tongnian* 同年) -- the same year of passing the examination or ‘*nianyi*’ (年谊 the friendship of the successful students in the same year). Degree also created ties between the successful candidates and examiners. Some associations were established by processes of local or regional solidarities (or ‘*xiangyi*’ 乡谊, friendships among men of similar origin) or experience of the same professions (*tonghang* 同行) which later were transformed into guilds or trade guild halls. In Tang and Song China, friendship and association were closely linked. But this raises another question about whether or not the models of civil society, the public sphere or the general ‘associational culture’ in the European sense could be applied to the Chinese context of that time to explain the emerging non-kinship associations.

Another way of examining the intellectual network for knowledge transfer is to look at the relations between wealth, commercial activity, educational

development and examination success (Chaffee, 1995: 142). The regions of the Southeast coast and the Yangtze Delta are typical examinations. The development of economy and commerce (maritime commerce for example) aided the candidates' success in the exams in this region. The examination success in turn gave these regions political influence (Chaffee, 1995: 156-183; Liu, 1959: 18).

In addition to secular associations, religious associations developed fast and served as alternative centres for learning under the Tang.⁵¹ Buddhist and Taoist monasteries were often located in mountains and possessed large estates, libraries and enjoyed a relatively free intellectual atmosphere. They became places for learning for scholars. Confucian education was provided in Buddhist monasteries. Seventy percent of monasteries in the Dunhuang region⁵² were engaged in Confucian teaching (Song and Wang, 1999: 420). In early Song times, many scholars from humble backgrounds boarded at monasteries or temples for study before the entry into officialdom after the successful passing of the exams (Qiao, 1999: 68). Under the Song, there was still coexistence between Confucianism, Buddhism and Daoism coexisted, but later Buddhism and Daoism were gradually suppressed by the imperial authorities. Many monasteries were destroyed and transformed into local official schools or private academies.

Alternative centres for education were also located in the private sector. Private education developed fast in the Tang period when imperial court,

⁵¹ Thanks to Professor Tim Barratt for raising this issue on 16 June 2010 at the URKEW seminar at the LSE.

⁵² Dunhuang was an important staging post on the old Silk Road.

officials, monasteries, large landowners all possessed manors. Manorialism provided a material base for the growth of private education (Song and Wang, 1999: 362). Many scholars gave private lectures. Officials in office could also teach privately. Under the Tang, private lectures by the professors and teaching assistants from the Directorate of Education was a common. Moreover, emperor Wen of the Sui (569-618) had decreed that the prefectural and county officials were to move every three years. They thereby diffused useful knowledge. Lectures by retired officials were another form of private education under the Tang. It is worth mentioning that in private lectures, the relationship between teachers and students was voluntary. Students could choose different teachers to study and different schools of thought to learn. Another distinct feature in the Tang private education was that many women attained very high levels of education and performed important functions in their children's early stage education.

Mountains were another place for learning. Many scholars retreated into mountains for study especially in the late Tang. They also gave lectures which attracted many travelling students. However, the mountains they chose were not simply remote and isolated areas; instead, the locations were all near cities and convenient for cultivating networks between scholars and officials. Scholars who studied and lectured in the mountains were not real recluses but men with various agendas. For many of them, the real purpose to study in the mountains was to develop their reputation which would be crucial for them to enter into the bureaucracy. For example, since the mid-Tang, the power of local officials was expanded, and their advisers including private teachers could become officials

through recommendations and recruitment from senior officials. Private study in the mountains was later transformed into *shuyuan* (private academies) in the Song period.

Schemes of Classifying Knowledge

The development of printing under the Tang and Song facilitated publication and collection of books and promoted schemes for classifying knowledge. The Tang and Song emperors collected books and even participated directly in major publishing projects. The Imperial Library had the most comprehensive and authentic copies of books. Since the Eastern Jin dynasty (316-420), collections of books were divided into four categories: *jing* (Confucian classics), *shi* (history), *zi* (philosophy), *ji* (literature). This way of classifying books was adopted by the Sui Emperor Yang Guang (569-618) and rulers of the following dynasties.

One category of book that was hard to put to any *jing*, *shi*, *zi*, and *ji* category mentioned above was the *leishu* (*encyclopaedia*), designed to classify knowledge drawn from a wide range of sources. The purpose for the compilation of *leishu* was to preserve literature and to facilitate the research. *Leishu* provided information for good governance strategies and for the candidates' preparing for exams.⁵³ Although translated into English as *encyclopaedia*, *leishu* differed from them in many ways. The compilation of *leishu* emphasised original sources, and the arrangement of categories and sections referred to original sources. More information was supplied on literary, history and human affairs, and less attention was

⁵³ Encyclopaedias of excerpts of classical and historical texts were compiled for examination candidates.

given to natural phenomenon. Once finished, there were few revisions and new editions. The indexes are not clear.

Under the reign of the Tang emperor Gaozu (r. 618-626), Ouyang xun (557-641) and scholars compiled *Yiwen leiju* (Classified Excerpts from Ancient Writers) in 624. It had 100 *juan* and 45 sections (*mu*) including heaven, earth, rulers, rituals, officials, politics, military issues, clothes, food, birds, disasters and other categories. There were more than 730 subsections. For example, under the section of heaven, there were subsections on, for example, the sun, the snow, the wind and the rain. Other Tang official encyclopaedia included *Tanghuiyao* (Institutional History of the Tang dynasty) and *tongdian* (Comprehensive Institutions). Under the order of emperor Taizong of the Song (r. 976-997), many encyclopaedias were published. Li Fang (925-996) and other scholars compiled the *Extensive Records of the Grand Tranquillity Reign* (*Taiping guangji*)⁵⁴ between the years 977-978. It is an anthology of tales, novelettes, dreams and ghost stories from the Han to early Song dynasties. It also contained information such as literature, painting, medicine, grass and trees, animals and objects. It included 500 *juan*, 92 categories (*lei*) and 150 specific sections (*mu*). For example, under the category of animals, there were sections on cow, horse, sheep, dog, and pig. Li Fang also compiled the *Imperially Reviewed Encyclopaedia of the Grand Tranquillity Reign* (*Taiping yulan*) between the years 977-983. Songtaizong read three *juan* a day. It was the largest encyclopaedia of Chinese knowledge available in print at that time. It contained 1,000 *juan*

⁵⁴ *Taiping xingguo* (Ascended Nation in Grand Tranquillity) is the name of one reigning period of the Song emperor Taizong between the years 976-984. Because many encyclopaedias were compiled and finished during this period, their names often began with 'Taiping' (Grand Tranquillity).

(volumes), 55 sections (*bu*) and 4,558 subsections (*mu*) selected from various 2,579 sources of books. The general categories were followed the orders of heaven (*tian*), earth (*di*), human (*ren*), affairs (*shi*) and objects (*wu*). Sections and subsections were divided according to four categories of *jing*, *shi*, *zi* and *ji* mentioned above. Under the subsections, materials were arranged in chronological order covering numerous areas including heaven, earth, emperors, officials, rituals, military affairs, punishment, medicine, flora and fauna.⁵⁵ Yue Shi (930-1107) compiled the *Record of the World during the Grand Tranquillity Reign* (*Taiping huanyu ji*) between the years of 976-983. The book contained 200 *juan* and dealt with local economy, custom and geography of the Song. It also had detailed information on agriculture, forestry, husbandry, fishing, and herbs and medicine. Historical books were another major scheme for classifying knowledge. They were the places where useful knowledge was located.

Concluding Remarks

From the above analysis, we could see that to develop a properly comprehensive view on the long-term economic development in China, we need to examine a wide spectrum of political, economic, cultural and intellectual forces. 'Efflorescence' is a useful conceptual approach to help us to achieve the goal. We have seen that in Tang China, there were 'regimes' (e.g., cultural transfer, distribution networks) or 'sites' (e.g., the specialised colleges) for the production and diffusion of knowledge. But efflorescences in Tang and Song China also created an equilibrium. If the Song cultural and institutional breakthrough had continued, China might have experienced a similar economic trajectory to that of Europe. But

⁵⁵ On an index of the *Taiping yulan*, see Qian (1934).

Neo-Confucianism eventually unified thinking and became state orthodoxy in the Yuan and Ming dynasties, the steady state became hard to break out of equilibrium. Cultural unity superseded cultural pluralism and the institutionalisation of the examination system and bureaucracy entrenched the system.

Although there was a certain degree of development in 'professionalism' (marked by the diversity of means and choices; specialists) in the Tang times, this was not a trend that was continued in the Song and later dynasties.⁵⁶ It was superseded by 'meritocracy', with the introduction of the civil service examination. Although this kind of system selected officials mainly on merit, it also created a consensus of belief around values and ends and designed to produce generalists. This shift led to the failure of the Wang Anshi reforms in the northern Song. As a result, the social position of proto scientists and proto engineers in traditional China was attached to the bureaucratic structure, as Needham (1969: 24) has pointed out. The astronomer, for example, was a civil servant rather than an independent scientist (Needham, 1969: 186).⁵⁷ Artisans and engineers were also integrated into the bureaucratic structure, many of them actually worked in imperial workshops and arsenals. Technicians⁵⁸ were eager to find patrons that were usually officials (Needham, 1969: 24). The lack of professionalism not only adversely affected the development of science

⁵⁶ See Adshead (2004: 83).

⁵⁷ Calendrical astronomy is important to the political order. Astronomy was seen as an 'orthodox science', associated with the ruling class, and alchemy and chemistry 'unorthodox science' associated with Daoism.

⁵⁸ There was also a group of technicians, as Needham has pointed out, who were minor officials, and who were well educated but did not achieve a high status in the bureaucratic hierarchy.

and technology in China but also became a serious problem for governance of the empire.⁵⁹

As Elvin has pointed out, 'we are compelled to conclude that, at least in the case of textiles, the basic obstacle in the way of further technological progress in China after this time [1500] was not a lack of better scientific knowledge. Rather, it must have laid in a weakening of those economic and intellectual forces which make for invention and innovation' (Elvin, 1973: 199). As we have seen in this essay, regional economic development were driven by increased specialisation and relied heavily on different networks which created incentives for innovation and creativity, for example, market expansion, waterway transportation and foreign trade. The generation and diffusion of useful knowledge was based on cultural and technology transfer as well as intellectual networks. Yet from the southern Song onwards, the ongoing cultural transformation became 'internally reinforcing'. This pattern persisted into the 20th century (T. C. Liu, 1988). This cultural pattern was not stagnant, and was renewed and reinforced, but it did so within the existing pattern (T. C. Liu, 1988: 9). Qian (1985) argued that China had rarely provided the necessary 'software' (political-cultural conditions to sustain intellectual creativity and innovation and cultural pluralism), although 'hardware' (e.g., paper, printing, gunpowder, and magnetic compass) was invented much earlier in China than Europe. This created 'inertia' and the non-development of Chinese science.⁶⁰ When pluralism was surpassed by unity, the problems with

⁵⁹ For example, in the Ming, the public finance was weak. On this, see e.g., Huang (1974).

⁶⁰ On discussion of a paradox for China between development and stagnation, see Deng (1999).

useful knowledge in China are not the capacities to generate it but the conduits to diffuse it, as the important networks disappeared.

Another important transition was the decline of aristocracy in the Tang. Civil service examinations made the diminishing central control dispersed to localities. The generation and diffusion of knowledge was transformed from a state-centred mode to an elite-centred mode. It then depended heavily on the elite networks and their perceptions of knowledge.

Appendix 1: Annual salaries of the teachers of the Tang Directorate of Education

Teachers	Rank	Wude (618-626) (dan)	After Zhenguan (627-649) (dan)
Director (<i>jijiu</i>)	3 rd rank secondary class	360	360
Vice-director (<i>siye</i>)	4 th rank secondary class (lower section)	260	260
Professor of the school of 'the sons of the state' (<i>guozi boshi</i>)	5 th rank principal class (upper section)	100	100
Teaching assistant of the school of 'the sons of the state' (<i>guozi zhujiao</i>)	6 th rank secondary class (upper section)	90	90
Professor of the Imperial University (<i>taixue boshi</i>)	6 th rank principal class (upper section)	100	100
Teaching assistant of the Imperial University (<i>taixue zhujiao</i>)	7 th rank secondary class (upper section)	70	70
Professor of the School of the Four Gates (<i>simen boshi</i>)	7 th rank principal class (upper section)	80	80
Teaching assistant of the School of the Four Gates (<i>simen zhujiao</i>)	8 th rank secondary class (upper section)	50	62
Professor of the 'Five Classics' (<i>wujing boshi</i>)	5 th rank principle class (upper section)	N/A	200
Professor of the school of Broadening	6 th rank principle class (upper section)	100	100

Literary Accomplishments (<i>guangwen boshi</i>)			
Professor of Law (<i>lüxue boshi</i>)	8 th rank secondary class (lower section)	50	62
Teaching assistant of law (<i>lüxue zhujiao</i>)	9 th rank secondary class (lower section)	30	52
Professor of Calligraphy (<i>shuxue boshi</i>)	9 th rank secondary class (lower section)	30	52
Professor of mathematics (<i>suanxue boshi</i>)	9 th rank secondary class (lower section)	30	52

Source: Song and Wang (1999: 373)

Notes: zheng (no.) shang = no. rank principal class upper section

zheng (no.) xia = no. rank principal class lower section

cong (no.) shang = no. rank secondary class upper section etc.

In the Tang dynasty, one *dan* equals around 53 KG.

Bibliography

Adshead, S. A. M. 2004. *Tang china: The Rise of the East in World History*. Basingstoke: Palgrave Macmillan.

Barrett, T. H. 1990. 'Religious Tradition in Chinese Civilization: Buddhism and Taoism', in P.S. Ropp (ed.), *The Heritage of China: Contemporary Perspectives on Chinese Civilization*, 138-163. Berkeley: University of California Press.

Bol, Peter. 1994. *'This Culture of Ours': Intellectual Transitions in T'ang and Sung China*. Stanford: Stanford University Press.

Chaffee, John W. 1995. *The Thorny Gates of Learning in Sung China: A Social History of Examinations*. Albany: State University of New York Press.

Collins, Randall. 1998. *The Sociology of Philosophies: A Global Theory of Intellectual Change*. Cambridge, Mass.: Harvard University Press.

Deng Gang. 1993. *Development Versus Stagnation: Technological Continuity and Agricultural Progress in Pre-Modern China*. Westport, Conn., London: Greenwood Press.

Deng Gang. 1999. *The Premodern Chinese Economy: Structure Equilibrium and Capitalist Sterility*. London: Routledge.

Deng, Kent. 2003. Development and Its Deadlock in Imperial China, 221B.C.-1840A.D., *Economic Development and Cultural Change* 51:2, pp. 479-522.

De Weerd, Hilde. 2007. *Competition over Content: Negotiating Standards for the Civil Service Examinations in Imperial China (1127-1279)*. Cambridge, Mass.: Harvard University Press.

Du You 杜佑. [reprint 1978]. *Tongdian* 通典 (Comprehensive Institutions). Taipei: Dahua shuju.

Elvin, Mark. 1973. *The Patten of the Chinese Past: A Social and Economic Interpretation*. Stanford: Stanford University Press.

Elvin, Mark. 1984. 'Why China Failed to Create an Endogenous Industrial Capitalism: A Critique of Max Weber's Explanation', *Theory and Society*, Vol. 13, No.3, Special Issue on China (May), pp. 379-391.

Elvin, Mark. 1996. *Another History. Essays on China from a European Perspective*. Broadway, Australia: Wild Peony.

Gaukroger, Stephen. 2006. *The Emergence of a Scientific Culture: Science and the Shaping of Modernity 1210-1685*. Oxford: Clarendon Press.

Goldstone, Jack A. 2002. 'Efflorescences and Economic Growth in World History: Rethinking the "Rise of the West" and the Industrial Revolution', *Journal of World History* Vol. 13, No. 2, pp. 323-389.

Grimm, Tilemann. 1977. 'Academies and Urban Systems in Kwangtung', in G. William Skinner (ed.) *The City in Late Imperial China*, 475-498. Stanford: Stanford University Press.

Hall, John A. 2001. 'Confessions of a Eurocentric', *International Sociology* 16:3, pp. 495-503.

Hartwell, Robert M. 1966. 'Market, Technology, and the Structure of Enterprise in the Development of the Eleventh-Century Chinese Iron and Steel Industry', *Journal of Economic History* 26: 1, pp. 29-58.

Hartwell, Robert M. 1967. 'A Cycle of Economic Change in Imperial China: Coal and Iron in Northeast China, 750-1350', *JESHO* 10. 1, pp. 101-159.

Hartwell, Robert M. 1967. 'The Evolution of the Northern Sung Monetary System', *Journal of the American Oriental Society* 87. 3, pp. 102-159.

Hartwell, Robert M. 1971. 'Historical Analogism, Public Policy and Social Science in Eleventh and Twelfth Century China', *American Historical Review* 76, pp. 690-727.

Hartwell, Robert M. 1982. 'Demographic, Political, and Social Transformation of China, 750-1550', *Harvard Journal of Asiatic Studies* 42. 2, pp. 365-442.

Hartwell, R. M., *Iron and early industrialism in eleventh-century China* (Chicago, 1963).

Herbert P. A. 1988. *Examine the Honest, Appraise the Able: Contemporary Assessments of Civil Service Selection in Early Tang China*. Canberra: Australian National University, Faculty of Asian Studies.

Huang, Ray. 1974. *Taxation and Governmental Finance in Sixteenth-Century Ming China*. London: Cambridge University Press.

Hymes, Robert P. 1986. *Statesmen and Gentlemen: the Elite of Fu-chou, Chiang-hsi, in Northern and Southern Sung*. Cambridge: Cambridge University Press.

Jacob, Jane. 1970. *The Economy of Cities*. New York: Random House.

Jacob, Jane. 1984. *Cities and the Wealth of Nations: Principles of Economic Life*. New York: Random House.

Jones, E. L. 2003 (3rd edition). *The European Miracle: Environments, Economics and Geopolitics in the History of Europe and Asia*. Cambridge: Cambridge University Press.

Jones, E. L. 1988. *Growth Recurring: Economic Change in World History*. Oxford: Clarendon Press.

Kracke, E. A. Jr. 1953. *Civil Service in Early Sung China, 960-1067*. Cambridge, Mass.: Harvard University Press.

Kelly, Morgan. 1997. 'The Dynamics of Smithian Growth', *The Quarterly Journal of Economics*, 112, 3 (Aug.), pp.939-964.

Kuhn, Dieter. 2009. *The Age of Confucian Rule: The Song Transformation of China*. Cambridge, Mass.: Harvard University Press.

Lal, Deepak. 1999 [2nd printing]. *Unintended Consequences: The Impact of Factor Endowments, Culture and Politics on Long-Run Economic Performance*. Cambridge, Mass.: The MIT Press.

Landes, S. David. 1998. *The Wealth and Poverty of Nations: Why Some Are So Rich and Some So Poor*. London: W. W. Norton & Company.

Li Bozhong 李伯重. 2001. 'Lishi shang de jingji geming yu jingjishi de yanjiu fangfa 历史上的经济革命与经济史的研究方法 (Economic Revolutions in the History and Research Methods in Economic History)', *Zhongguo shehui kexue* 中国社会科学 (Chinese social sciences) no. 2, pp. 171-185.

Li Fang 李昉. [reprint 1960]. *Taiping yulan* 太平御览 (the Imperially Reviewed Encyclopaedia of the Grand Tranquillity Reign). Beijing: Zhonghua shuju.

Liu, James T. C. 1959. *Reform in Sung China: Wang An-shih (1021-1086) and his New Policies*. Cambridge, Mass.: Harvard University Press.

Liu, James T. C. 1988. *China Turning Inward: Intellectual-Political Changes in the Early Twelfth Century*. Harvard: Harvard University Press.

Lloyd, G. E. R. 1996. *Adversaries and Authorities: Investigations into Ancient Greek and Chinese Science*. Cambridge: Cambridge University Press.

Mei Ruli 梅汝莉 and Li Shengrong 李生荣. 1992. *Zhongguo keji jiaoyu shi* 中国科技教育史 (*The History of Chinese Technical Education*). Hunan: Hunan jiaoyu chubanshe.

Mokry, Joel. 1990. *The Lever of Riches: Technological Creativity and Economic Progress*. Oxford: Oxford University Press.

Mokry, Joel. 2002. *Gifts of Athena: Historical Orgins of the Knowledge Economy*. Princeton: Princeton University Press.

Nakayama, S. 1973. 'Joseph Needham, Organic Philosopher', in S. Nakayama & N. Sivin (eds), *Chinese Science: Explorations of An Ancient Tradition*. The MIT Press.

Nakayama S. and N. Sivin (eds.) 1973. *Chinese Science. Explorations of an Ancient Tradition*. The MIT Press.

Needham, Joseph. 1956. *Science and Civilisation in China: Vol. 2 History of Scientific Thought*. Cambridge: Cambridge University Press.

Needham, Josephy. 1969. *The Grand Titration: Science and Society in East and West*. London: Allen & Unwin.

Needham, Josephy. 1969. *With the Four Seas: The Dialogue of East and West*. London: Allen & Unwin.

O'Brien, Patrick. 2009. 'The Needham Question Updated: A Historiographical Survey and Elaboration'. *History of Technology* Vol. 29: 7-29.

Ouyang Xiu 欧阳修. [reprint 1975]. *Xin tangshu* 新唐书 (The New Tang History). Beijing: Zhonghua Shuju.

Pomeranz, Kenneth. 2000. *The Great Divergence: China, Europe, and the Making of the Modern World Economy*. Princeton: Princeton University Press.

Ropp, P.S. (ed.) 1990. *The Heritage of China: Contemporary Perspectives on Chinese Civilization*. Berkeley: University of California Press.

Qiao Weiping 乔卫平. 1999. 中国教育制度通史：第三卷 宋辽金元（960-1368AD）(The General History of the Chinese Institutions of Education: Vol. 3 Song Liao Jin Yuan 960-1368AD). 李国钧, 王炳照 总主编 (Li Guojun, Wang Bingzhao eds.) 济南: 山东教育出版社.

Sivin, Nathan, 1984. 'Why the Scientific Revolution Did Not Take Place in China—or Didn't it?' in *Transformation and Tradition in Sciences*, edited by E. Mendelsohn. New York: Cambridge University Press, pp. 531-54.

Sivin, Nathan. 1990. 'Science and Medicine in Chinese History', in P.S. Ropp (ed.), *The Heritage of China: Contemporary Perspectives on Chinese Civilization*, 164-196. Berkeley: University of California Press.

Skinner, G. William. 1985. 'The Structure of Chinese Society', the *Journal of Asian Studies*, Vol. 44, No. 2, pp. 271-292.

Smith, Adam. 1776 [reprint 1993]. *An Inquiry to the Nature and Causes of*

the Wealth of Nations: A Concordance. Savage, Md: Rowman & Littlefield.

Song Dachuan and Wang Jianjun 宋大川 王建军. 1999. 中国教育制度通史：第二卷魏晋南北朝 隋唐（220-960AD）(The General History of the Chinese Institutions of Education: Vol. 2 Wei Jin Nanbei chao Sui Tang 220-960AD). 李国钧, 王炳照 总主编 (Li Guojun, Wang Bingzhao eds.) 济南: 山东教育出版社.

Twitchett, Denis and John K. Fairbank (eds.). 1979. *The Cambridge History of China: Vol. 3, Sui and T'ang China, 589-906, Part 1*. Cambridge: Cambridge University Press.

Qian Wenyuan. 1985. *The Great Inertia: Scientific Stagnation in Traditional China*. London: Croom Helm.

Qian Yaxin 钱亚新. 1934. Taping yulan suoyin 太平御览索引 (The Index of the Imperially Reviewed Encyclopaedia of the Grand Tranquillity Reign). Shanghai: Shangwu yinshuguan.

Waley-Cohen, Joanna. 1999. *The Sextants of Beijing: Global Currents in Chinese History*. New York: W. W. Norton.

Wong, R. Bin. 1997. *China Transformed: Historical Change and Limits of European Experience*. Ithaca: Cornell University Press.

Wright, Tim. 2007. 'An Economic Cycle in Imperial China? Revisiting Robert Hartwell on Iron and Coal', *JESHO* 50: 4, pp. 398-423.

Shiba Yoshinobu. 1970 (reprinted 1992). *Commerce and Society in Sung China*, translated by Mark Elvin. Ann Arbor: University of Michigan.

Shiba Yoshinobu. 2000 [1988] 宋代江南经济史研究 (Study of the Economic History of the Song Jiangnan Area), trans. Fang Jian, He Zhongli, Nanjing: Jiangsu Chubanshe.

Shiba Yoshinobu. 1982. 'Sung Foreign Trade: Its Scope and Organisation', in Morris Rossabi (ed.) *China among Equals: The Middle Kingdom and Its neighbours 10th-14th Centuries*, pp. 89-115. Berkeley: University of California Press.

Tillman, Hoyt Cleveland. 1978. 'The Idea and Reality of the 'Thing' during the Sung', *Bulletin of Sung Yüan Studies* 14, pp. 68-82.

Zhang Ling. 2009. 'Changing with the Yellow River: An Environmental History of Hebei, 1048-1128', *Harvard Journal of Asiatic Studies*, 69: 1 (June), pp. 1-36.

Zheng Xuemeng 郑学檬[et al.]. 2002. *Zhongguo jingji tongshi vol. 4 中国经济通史第四卷* (The general economic history of China, vol. 4). Changsha: Hunan renmin chubanshe.