

Movers and Shakers of Knowledge in China during the Ming-Qing Period

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A. The Jesuit Period, c. 1600–1840

1. How did it all begin?

The 19th century was a period when many twists and turns occurred in Chinese history. These changes undermined the old social order and upset the previous economic equilibrium.

These shocks had come from the outside long before the 19th century, first in the form of persistent attempts by the Portuguese to settle in Macao (since 1557) and by the Dutch to colonise Taiwan (1624–61).¹ Secondly, changes brought about by religious conversion by the Jesuits such as Matteo Ricci (利玛竇, 1552–1610) who reached Macao in 1582 and gradually worked his way to the top to obtain permission to enter Beijing in 1601.² Giulio Aleni (艾儒略, 1582–1649) followed the footsteps

¹ After da Gama established a cross-ocean sea route to Asia in 1498, it took about fifteen years for Portugal to trade directly with China: around 1513, Jorge Alvares became the first European merchant to reach Da-ao (or Tamao) near the Guangdong coast (Braga 1939). It took another four years for the Portuguese under Fernão Peres de Andrade to establish relationships with Canton officials and to send their first ambassador, Tomé Pires, to Beijing (see Boxer 1953).

² He got his work permit to stay in Beijing as a clock-repairing artisan, not as a Jesuit missionary, see 利玛竇 (Matteo Ricci). c. 1610. 利玛竇中国札记 (*Matteo Ricci's Diary on China*). Ricci was mentioned in the official history of the Ming 明史 *Ming Shi* (*The History of the Ming Dynasty*).

of Matteo Ricci. He arrived in China in 1613.³ Both men and spent the rest of their life there. Thirdly changes came from trade by the importing of goods such as silver (especially the Manila Galleon Trade of 1565–1815) and opium (from 1729 onwards) to China.⁴

So by 1800, the Chinese had about 200 years' experience of contact with Europeans and were exposed in a limited way to Western knowledge. This period was also a period of active engagement of the European Jesuit missionaries in China. During this period, although increasingly frustrated by the Chinese ways of conducting business (ranging from the notorious *Cohong* trade monopoly and the *kowtow* to the throne) and the occasional naval skirmishes between the Chinese and Europeans,⁵ no European force really challenged China's sovereignty and its Asia-wide influence. Instead, a great deal of respect was paid by Europeans to the Celestial Empire of the Far East. Early Jesuits all learnt and mastered the Chinese language and customs. Chinese law was observed (or at least it appeared to be), by most foreigners.⁶ Those who

³ Francis Xavier (1506-52), attempted to establish a mission on Macao. He did not succeed in entering mainland China.

⁴ It is stated that 1571 was the year when the first recorded commercial shipment of silver from the West arrived in China (Flynn and Giráldez 2002). However, von Glahn sets the date as far back as 1550 (1996). In 1729, the Portuguese shipped the first recorded 200 chests of opium to Macao, ushering in the age of the opium trade with China (Phipps 1835). The first British opium cargo arrived half a century later in 1773 (Pritchard 1929).

⁵ Small-scale naval friction between the Chinese and the Portuguese and then the Dutch first took place in the first half of the seventeenth century (ZBK 1992).

⁶ The Ming judiciary system was considered fair by Europeans. During Zhu Wan's anti-smuggling campaign in China's East Coast, the unlawful Portuguese traders

managed to establish a relationship with China were only able to achieve what they did with extreme patience and readiness to take instructions from the Ming-Qing Confucian bureaucracy. The best example was Portuguese stationed in Macao, who were used by the Chinese government as watch-dogs and mercenaries to drive away unwanted attention to the Empire from other Europeans (such as the Dutch, Spaniards, and British), a tactic known as ‘using barbarians to check barbarians (以夷制夷 *yiyi zhiyi*)’.⁷ From the European point of view, they had to appear Sinicised, and ingratiate themselves with the Confucian elite to get anywhere in China.

From the viewpoint of the Celestial Empire, their confidence in dealing with Europeans was deeply rooted in China’s accumulated experience with nomads along its long frontiers over millennia. In the past, the empire successfully curbed those nomads with ‘carrots’ (such as marriages, bribes and invitations to join the empire) and ‘sticks’ (e.g. military campaigns to drive Huns out of Central Asia during the Western Han Period). Confucian cultural assimilation played an important part (especially the Sinicisation of the Manchus during the Qing).⁸

captured in Zhejiang were sent into exile in Guangxi Province, some 1,200 kilometres away. Only four were executed for their killing of Chinese soldiers. The Portuguese offenders were very impressed by their fair trial by the Chinese Court (see Boxer 1953).

⁷ The Ming state created an incentive by treating the Portuguese differently from other Europeans so long as the Portuguese were ‘well-behaved’ by Chinese standards (see Morse 1926–29; see also Schurz 1938).

⁸ See Deng 1999: ch. 5.

In this context, useful European knowledge was considered, at best, novel by the Chinese Confucian elite. Overall, very few took it seriously unless such knowledge served the empire directly to make public goods better for China's traditional economy. European knowledge and instruments were strictly limited to almanacs (astronomy), water control and cartography (geometry). The employment of European Jesuit astronomers continued until Emperor Daoguang (道光, r. 1821–50) ended the practice in 1838.⁹

The late Ming Establishment recruited these missionaries to work for the Imperial Observatory in designing a more accurate calendar system. Matteo Ricci and Diego de Pantoja (庞迪我, 1571–1618) set the precedent.¹⁰ Ricci was succeeded by Sabbatino de Ursis (熊三拔, 1575–1620)¹¹, followed by Johannes Schreck (邓玉函, 1576–1630);¹² and Johann Adam Schall von Bell (汤若望, 1592–1666).¹³ The Ming project

⁹ Gaetano Pires Pereira (毕学源, ?–1838), a Portuguese Jesuit who died in his post as the Director, was the last foreigner employed by the Imperial Observatory.

¹⁰ Diego de Pantoja, a Spanish-born Jesuit, is believed to have accompanied Ricci to Beijing after 1599 to work for the Ming government.

¹¹ Sabbatino de Ursis, an Italian-born Jesuit, first came to China in 1606 under the recommendation of Matteo Ricci. He succeeded Ricci in 1611 to take charge of the Imperial calendar project.

¹² Johannes Schreck, a German-born Jesuit, first came to Macao in 1619, entered China in 1621 and reached Beijing in 1623. He died on his post as Officer of the Ming Imperial Observatory working on the new Ming Imperial Almanac (大明崇祯历书).

¹³ von Bell, a German-born Jesuit, came to China in 1622. He was the successor of Johannes Schreck by the invitation of the then Ming Premier Xu Guanqi (徐光启) in 1630. In 1623 he took advantage of repairing a piano for Emperor Chongzhen to try, unsuccessfully, to persuade the emperor to convert to Christianity. His biography was included in Zhao Erxun. 1927. 清史稿.

gradually developed into the new *Ming Imperial Almanac* (大明崇祯历书) during 1629–34.¹⁴ Others such as Nicolas Longobardi (龙华民, 1565–1655 年)¹⁵ and Jacques Rho (罗雅各, 1593–1638)¹⁶ joined by invitation. Schreck, von Bell and Jacques Rho are believed to be responsible for building at least three instruments of European technology for the observatory: a zodiac armillary sphere, a quadrant, and a celestial globe.

The trend continued in the early Qing who inherited the Ming approach by employing Jesuits including Johann Adam Schall von Bell (for his second time), Ferdinand Verbiest (南怀仁, 1623–88),¹⁷ Thoma Pereira (徐日升, 1645–1708),¹⁸ Philippus Maria Grimaldi (闵明我, 1639–1712),¹⁹

¹⁴ 《明史·历一》：‘时帝已深知西法之密 ... 诏西法果密，即改为《大统历法》，通行天下。未几国变，竟未施行。’

¹⁵ Nicolas Longobardi, an Italian-born Jesuit, was the successor of Matteo Ricci. It remains unclear when he first entered China.

¹⁶ Jacques Rho, an Italian-born Jesuit, first came to China in 1624. He was invited to Beijing in 1630 to join the Ming Imperial Observatory.

¹⁷ Ferdinand Verbiest, a Belgian-born Jesuit, entered China in 1659. He was involved in the Qing firearms design in 1675. Like von Bell, Verbiest was appointed the post of Director of the Imperial Observatory in 1669. He supervised the construction of six new instruments for the observatory from 1670 to 1674: a zodiac armillary sphere, an equatorial armillary sphere, two altazimuths, a quadrant, and a celestial globe. His biography was included in Zhao Erxun. 1927. 清史稿.

¹⁸ Thoma Pereira, a Portuguese-born Jesuit, came to China in 1672. He worked in the Imperial Observatory in the 1670s and 80s. He worked for the Qing as one of the official translators and interpreters for the 1689 Sino-Russian Treaty of Nerchinsk (尼布楚条约). It was documented that he did all he could to protect China's interests against the Russian attempt to encroach its territory. Incidentally, the treaty has been commonly regarded as an equal and fair treaty for China, very rare during Qing history.

Joachim Bouvet (白晋, 1656–1730),²⁰ Jean Francois Gerbillon (张诚, 1654–1707),²¹ Bernard-Kiliam Stumpf (纪理安, 1655–1720),²² Joseph Giuseppe Castiglione (郎世宁, 1688–1766),²³ Ignatius Koenig (戴进贤, 1680–1747),²⁴ Andre Pereira (徐懋德, 1690–1743),²⁵ Augustin de Hallerstein (刘松龄, 1721–74),²⁶ and several others.²⁷

Increasingly, those Jesuits who ended in Beijing had little to do with the religious mission that they were meant to accomplish. Amongst them,

¹⁹ Philippus Maria Grimaldi, an Italian-born Jesuit, was the successor of Ferdinand Verbiest to work for the Imperial Observatory.

²⁰ Joachim Bouvet, a French-born Jesuit, first arrived in China in 1688 and was employed by the Qing state from 1707 to 1717 to map the entire Qing Empire with the European technology of cartography.

²¹ Jean Francois Gerbillon, a French Jesuit, first arrived in China also in 1688 and was employed by the Qing court in 1689 as an official interpreter and translator for the Sino-Russian Treaty of Nerchinsk.

²² Bernard-Kiliam Stumpf, a German Jesuit, was employed by Emperor Kangxi in 1696 to build China's first glass-making factory. He joined the Qing Imperial Observatory in 1715 and was responsible for building a European-style theodolite.

²³ Joseph Giusepp Castiglione, an Italian Jesuit, arrived in China in 1715 and was employed almost immediately as the court artist for 50 years until the end of his life. He held the post of Official of the Third Rank (三品) of the Qing.

²⁴ Ignatius Koenig, a German Jesuit, arrived in China in 1716 and reached Beijing in 1717 to take up his position in the Imperial Observatory. He was promoted to Director of the Imperial Observatory (钦天监正) in 1725.

²⁵ Andre Pereira, a Portuguese Jesuit, worked in the capacity of Deputy Director of the Imperial Observatory alongside Koenig.

²⁶ Augustin de Hallerstein, an Austro-Hungarian Jesuit, was the successor of Ignatius Koenig in charge of the Imperial Observatory.

²⁷ They did mainly house-keeping for the Imperial Observatory: Antonius Gogeis (鲍友管, 1701–71), Félix da Rocha (傅作霖, 1713–81), José de Espinha (高慎思, 1722–88), José Bernardo de Almeida (索德超, 1728–1806), André Rodrigues (安国宁, 1729–96), Alexandre Gouveia (汤士选, 1787–1807), Vervissimo Monteiro da Serra (高守谦, ?), and finally, Gaetano Pires Pereira (毕学源, ?–1838).

von Bell was the most successful politically. Despite his connection with the Ming, von Bell was trusted by the Manchus after 1644 and consequently appointed the Director of the Imperial Observatory (钦天监正). From 1651 to 1658, he was promoted from Official of the Fifth Rank in Waiting (从五品) to Official of the First Rank Proper (正一品), reaching the very top of the bureaucratic ladder.²⁸

During the early Qing, there was a continuation of the knowledge flow from the missionaries to the Imperial court and circulated exclusively within the court itself. A recent television programme by China Central Television claimed that Emperor Kangxi (康熙, r. 1662–1722) was a keen learner of European science (mathematics in particular), and had a close relationship with von Bell, Verbiest, Bouvet, and Gerbillon. Like Kangxi, Emperor Qianlong (乾隆, r. 1736–95) also developed a taste for European artefacts and hired a group of Europeans as court officials.

Those Jesuits who became officials were in the minority. Also, they depended heavily on the support of Chinese scholar-officials who were able to appreciate their technical knowledge and skills, meaning that they had to find their opposite numbers in the Qing bureaucracy in order to prise the door ajar.

Apart from those highly specialised fields of study such as mathematics and astronomy the Jesuits lured the horse (Qing society) to where the water was. But they could not force the horse to drink. So,

²⁸ His fast-track promotion eventually got him into trouble. He was imprisoned on death row in 1664 after the death of Emperor Shuizhi, but Emperor Kangxi (康熙 r. 1662–1722) pardoned him in 1669.

judged by the end result of knowledge formation, dissemination and impact, they were qualified as 'marginal movers and shapers knowledge' in China. They were at best ordinary knowledge-providers instead.

2. Why did Western knowledge not take China by storm before 1800?

To employ foreigners and to import foreign knowledge were not unprecedented by the time of the Ming and Qing. During the first century A.D. Buddhism was introduced to China from India. During the Mongol Yuan, the bureaucracy hired Muslim astronomers and adopted an Islamic Almanac (回回历) which was used to compliment China's own Almanac (大统历) from the early Ming. So, it was logical for the Ming-Qing authorities to recognise the utility of European astronomers and the Christian Almanac. After all, China was an empire that appreciated input from different ethnic groups.

In terms of cultural influence measured by religious conversion, what the Jesuits achieved was marginal compared to the Buddhist monks since the first century A.D. Many emperors converted to Buddhism but none to Christianity. It is documented that a few officials were converted by the Jesuits, but only at the end of the Ming period. The best example was Xu Guangqi (徐光启, 1561-1633 A.D.) who was born into a merchant-landlord family in Shanghai County (now Shanghai). He received strict traditional Confucian training and took the traditional route to officialdom. In 1581, at the age of 19, he passed the Imperial Examinations at the level of Cultivated Talent (秀才, *xiucaì*), and earned a

living by teaching; first in his hometown and then in Guangdong and Guangxi, two of the southernmost provinces of China, where he came into contact with missionaries. In 1597, at the age of 36, he passed the Examinations at a higher level and became a Recommender (举人, *juren*); at the age of 42, he passed the highest level of the Examinations to obtain the degree of Presented Scholar (进士, *jinshi*), after which he was selected to be a fellow of the Imperial Academy. In 1607, he was appointed Examining Editor (检讨, *jiantao*), a formal rank for scholars in the academy. It took him another 21 years progress to History Tutor to the Emperor in 1628, a position reserved exclusively for high-ranking scholar-officials. In 1630, he was accorded the title of Imperial Academician (翰林院学士, *hanlinyuan xueshi*), and two years later, at the age of 70, he was appointed Minister of the Rites (礼部尚书, *libu shangshu*) with the title of Second Grade Grand Secretary (东阁大学士, *dongge daxueshi*), which was *de facto* Premier at that time (Ku 1980). In 1633, he was finally promoted to First Grade Grand Secretary (文渊阁大学士, *wenyuange daxueshi*), the highest position a scholar could hold. He was also dubbed *taizi taibao* (Grand Guardian of the Heir Apparent), an honour granted to only a few outstanding ministers. Xu died at his post later that year, and was posthumously honoured by the emperor with the title of Most Wise Literate Administrator (文定, *wending*) (Zhang T. 1739 vol. 251: no. 9).

Through his life, Xu always kept abreast of science and technology (Wan G. 1963; Shi S. 1963; Hu D. 1985:175–93; Wang Yianjun 1987; Bernard 1973:67–93; Bray 1984:64–9). By 1600 he had met Matteo Ricci,

who attracted him to Christianity and Western science and technology developed since the Renaissance. Xu converted to Catholicism on 15 January 1603 and adopted the name of Paul, studying Western astronomy, geography, water control and philosophy under Ricci's tutelage in 1604. From 1606 to 1607, he cooperated with Ricci to translate *Fundamentals of Geometry* (几何原本, *Jihe Yuanben*) in order to enlighten his Chinese contemporaries. In 1612, with the collaboration of Sabbatino de Ursis, an assistant of Ricci, he completed a translation of *Western Irrigation Methods* (泰西水法, *Taixi Shuifa*) and produced some new astronomical equipment for a more accurate calendar. When in charge of amending the calendar in 1629, he built three telescopes, just 21 years after its European invention. In short, Xu worked as *guanxi* (关系) for the Jesuits and European knowledge to make some modest progress at the time.

Even so, Xu Guangqi is best known in Ming-Qing history as a promoter of best practice in agriculture because he believed that China's problems resulted ultimately from the regression of the rural economy (Kang C. 1960:7). In this context, Xu's search for alternatives in effective almanac-making and water control was logical according to his Confucian training; that Jesuit missionaries became a source of information was serendipitous.

Even if we consider his conversion to Christianity, the motivation was to 'compliment Confucianism with the Christian learning' (天学补儒) instead of replacing the former with the latter or absorbing the latter purely due to curiosity. There was a political agenda. On this point it is questionable whether Xu was ever truly converted. However, Xu's

approach was echoed two centuries later during the later Qing by ‘Chinese knowledge as the foundation and the Western knowledge for utility’ (中学为体西学为用, *zhongxue weiti, xixue weiyong*).

Along with Xu, there were two other Ming ranking court officials who took a similar route: Li Zhizao (李之藻, 1565–1630) who was Deputy Minister of Public Works (工部员外郎) and converted to Catholicism on 3 March 1610, adopting the name of Leo; and Yang Tingjun (杨廷筠, 1557–1627) who was Imperial Inspector (监察御史) and converted to Catholicism during Easter of 1613 with the adopted name of Michael.²⁹ However, Xu Guangqi, Li Zhizao and Yang Tingjun should be considered exceptions rather the rule: open conversions of high-ranking bureaucrats to Christianity were rare in the following Qing period.³⁰ Also, compared with Xu, Li and Yang were less technologically intrigued by European knowledge.

On the flipside, those Jesuit missionaries in China had to join the Ming-Qing bureaucracy and behave like Confucians as a prerequisite. They had no choice but to convert to the Confucian bureaucracy; Matteo Ricci called himself a ‘Western Confucian’ (西儒) to identify himself with the Chinese code of conduct.³¹

It is important to note that before 1800, joint efforts were made between scholarly Jesuit missionaries and Qing scholarly officials to

²⁹ They were later called ‘Three Pillars of the Catholic Church in China’ (天主教三柱石), due to Church propaganda rather than their actual impact on Chinese society.

³⁰ The most known case was Wei Yiji (魏裔介, 1616–86), a Qing official of the First Rank (一品).

³¹ See Xu Haisong 徐海松. 2000.

translate European books or co-write textbooks in Chinese. Preliminary research indicates that 400 to 700 such works were produced,³² of which 120 were works on science and technology.³³ Ricci, a productive man, was involved in 24 such works. Thirteen were included in *The Qing Imperial Complete Collection of Books* (四库全书) of 3,470 books in all.³⁴ European knowledge had only occasional publicity, subject to approval at the highest level. For example, the second edition of the Ming calendar received the title *The New Western Almanac* (西洋新法历书) only with the endorsement of Emperor Shuizhi (顺治, r. 1644–61).

Given that a long time lag often appeared before adoption, it has remained unclear how readily available these works were across the empire, or how well the knowledge in these works was actually adopted by the Chinese. The Ming Imperial Almanac project was in fact abortive: by the time it had received permission for use from Emperor Chongzhen (崇祯, r. 1628–44), the Ming Dynasty was doomed. So the almanac was never put into practice under the Ming.³⁵ Also, there is no evidence that the European water control technology recorded in *Western Irrigation Methods* (泰西水法) jointly by Xu Guangqi and de Ursis was ever put into practice on China's soil until the end of the Qing. Some very straightforward European techniques such as perspective in painting were never mastered by the most talented Chinese court artists, despite all the

³² The lower figure comes from Li Nanqiu 黎难秋. 1993.

³³ Hou Wailu 侯外庐 1960.

³⁴ See 《四库全书》‘子部’.

³⁵ 《明史·历一》：‘八月，诏西法果密，即改为《大统历法》，通行天下。未几国变，竟未施行。’

efforts made by Joseph Giuseppe Castiglione who was Emperor Qianlong's favourite.

Overall, for about two centuries from c. 1582 when the first Jesuit group was allowed to enter mainland China, till 1773 when the Jesuit missions were finally ended by Pope Clement XIV, the European influence on China's knowledge stock was hardly noticeable (quantitatively speaking). By 1800, there was no sign that China had been persuaded to adopt European knowledge on a large scale. There was no sign either that European knowledge was able to fundamentally affect ordinary Chinese life.

Meanwhile, China continuously and comfortably enjoyed trade surpluses with Europe and America. Emperor Qianlong claimed in a letter of 1793 to King George III of England (r. 1760–1820) that the Celestial Dynasty of the Qing was so abundant that it relied on no goods from those Western countries which, in contrast, lived on China's exports of tea, porcelain, and silk and that he was doing the West a favour in permitting sea trade at Macao.³⁶ No one seemed to dispute Qianlong's conclusion at that time. The Emperor is criticised for his attitude of complacency and arrogance, or Sino-chauvinism, but not for the veracity of the claim.

By the same token, China did not need European knowledge in most areas. After all, it had developed independently a cluster of technologies that allowed it to lead the world from c. 100 B.C. to c. 1550 A.D., according

³⁶ '物产丰盈, 无所不有, 原不藉外夷货物以通有无. 特因天朝所产茶叶, 瓷器, 丝斤为 西洋各国及尔国必需之物, 是以加恩体恤, 在澳门开设洋行, 俾得日用有资, 并沾余润'.

to Joseph Needham.³⁷ Also, until the arrival of the Jesuits, China was a donor of technology to Europe, at least indirectly with sometimes very long time lags.³⁸ Needham was adamant that “the word ‘stagnation’ was never applicable to China at all; it was purely a Western misconception. A continuing general and scientific progress manifested itself in traditional Chinese society, but it was violently overtaken by the exponential growth of modern science after the Renaissance in Europe”.³⁹ In Ricci’s phrase, ‘the Chinese believe that they themselves are the only people to possess real sciences and technology’.⁴⁰ Thus, traditional Chinese science and technology still had some ‘shelf-life’ by 1800. With it came opportunity costs for change: “If it ain’t broke, don’t fix it.” This determined the slow and patchy dissemination of European knowledge to China even with the help of influential court officials.⁴¹ It also determined a new trend with which European knowledge became a spiritual refuge for Chinese intellectuals during the early Qing period.⁴²

³⁷ Needham developed a chart to show how science and technology evolved in China and Europe. In his conclusion of his life-time of work on science and civilisation in China, Needham asserted that it was Galileo who marked the turning point after which Europe overtook China gradually (see Needham. 2004, vol. 7).

³⁸ See Needham. 2004. *Science and Civilisation in China*, vol. 7.

³⁹ See Needham. 2004. *Science and Civilisation in China*, vol. 7.

⁴⁰ See 利玛竇 (Matteo Ricci). c. 1610. 利玛竇中国札记 (*Matteo Ricci’s Diary on China*).

⁴¹ It is commonly known as 西学东渐, literally ‘Western knowledge trickling to China’, see Xu Haisong 徐海松 2000.

⁴² Including Huang Zongxi (黄宗羲, 1610–95), Fang Yizhi (方以智 1611–71), Zhang Erqi (张尔岐, 1612–77), Gu Yanwu (顾炎武, 1613–82), Wang Fuzhi (王夫之, 1619–92), Wei Xi (魏禧, 1624–80), and Lü Liuliang (吕留良, 1629–83).

B. Westernisation Period, 1840–1910

1. What Changed the Old Pattern: Rebellions or an Invasion?

It is a commonly held perception that at the turn of the nineteenth century, the Manchu rule over China was in big trouble internally, as the Qing Empire was struck repeatedly by natural and man-made disasters which in turn led to ‘local militarisation’, social unrest and rebellions,⁴³ as if all of these were unprecedented in the history of China.⁴⁴ But from the viewpoint of the long-term history of rebellions, rebellions in the entire nineteenth century under the Qing were by no means the most frequent, the most lasting or on the largest scale. In effect, it was one of the quietest periods since the Yuan Mongol rule.⁴⁵ In other words, the Qing social unrest and rebellion were well within the threshold of tolerance for a major dynasty.

Speaking of the possible causes for unrests and rebellions, there was no evidence that the Qing state was more rent-seeking than the Ming. Overall, the Qing state performed better than its Ming counterpart in tax burden control and disaster relief. Astonishingly, the Qing total rural tax revenue was frozen from 1715 to 1840 under the policy of freezing the total tax revenue (永不加赋, *yongbu jiafu*), unprecedented in both China’s

⁴³ For example P.A. Kuhn advocated the hypothesis of an irreversible crisis across the empire; see Kuhn 1970.

⁴⁴ Attempts have been made even to provide archival data to support the theory of crisis, see 陈振汉 1989. 《清实录经济史资料》.

⁴⁵ See Deng 1999.

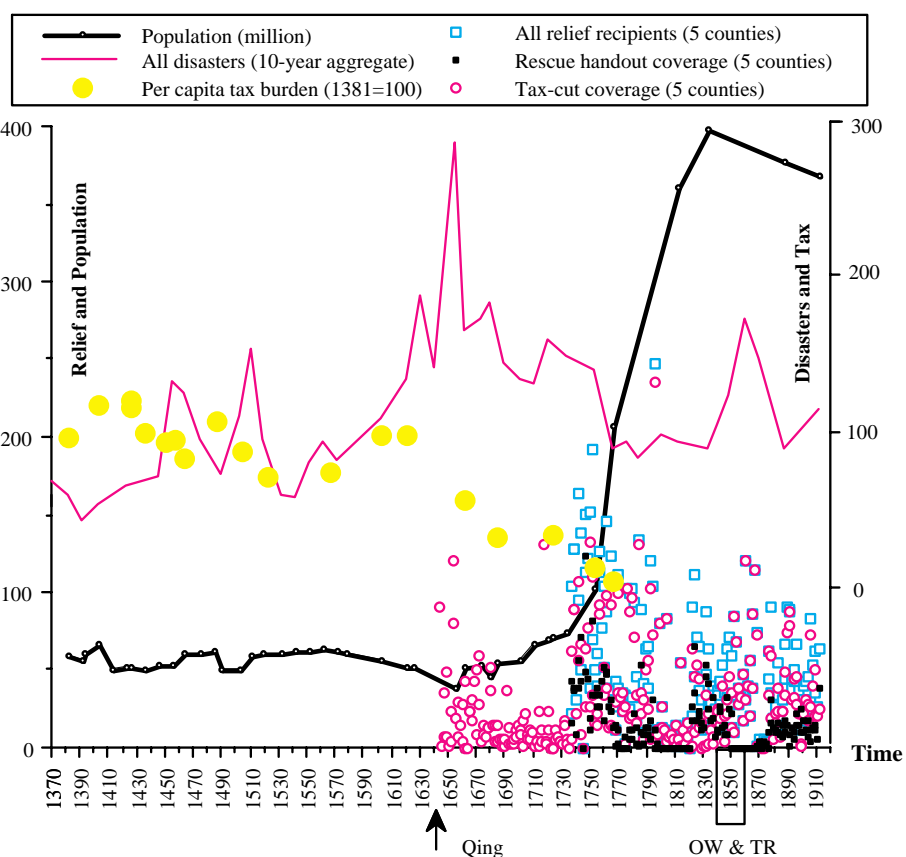
history and the history of Asia.⁴⁶ In the absolute sense, the highest annual tax revenue collected in grain under the Qing (at 1820) was only 29 percent of its counterpart under the Ming (at 1502). In relative terms of tax burden per unit of land, the highest rate under the Qing (at 1661) was only 17 percent of the peak of the Ming (1542).⁴⁷ More strikingly, the per capita tax burden in 1766 was merely 8 percent of that in 1381 under the Ming.⁴⁸ So, surpluses of unprecedented quantities were left in the private hands (see Figure 1).

Figure 1. Tax Rates, Disaster Aid and Population Growth, 1370–1911

⁴⁶ Zhao, *History of the Qing*.

⁴⁷ Deng, *Maritime Sector*, p. 124.

⁴⁸ Liang, *Dynastic Data*.



Source: Deng 2003; Liang 1980; Zhao 1927. Per capita tax burden based on Liang.
Note: Yearly figures are used for disaster aid undertakings. OW & TR – ‘Opium War and Taiping Rebellion’ (1840–65).

In addition, public goods were better provided by the Qing than that of the Ming seen from the scale of the Qing disaster aid (revealed in Figure 1 and Table 1). Considering that the Qing had in all 1,672 counties,⁴⁹ the empire was covered times over by the aid undertakings during the Qing.

Table 1. Recipients (Counties) of Qing Disaster Aid

⁴⁹ If all the 402 county equivalent units are counted, the total number is 2,074. See Zhao, *History of the Qing*.

Year	Tax Exemptions	Aid hand-outs	Total
1674-83	917	0	917
1684-93	477	0	477
1694-1703	423	0	423
1704-13	380	0	380
1714-23	1084	0	1084
1724-33	389	0	389
1734-43	2235	1417	3652
1744-53	2783	2358	5141
1754-63	2433	1812	4245
1764-73	1944	495	2439
1774-83	2399	406	2805
1784-93	2346	697	3043
1794-1803	2761	231	2992
1804-13	569	0	569
1814-23	775	555	1330
1824-33	883	1334	2217
1834-43	934	1028	1962
1844-53	1690	575	2265
1854-63	2190	0	2190
1864-73	1598	67	1665
1874-83	1417	624	2041
1884-93	2228	544	2772
1894-1903	1202	703	1905
1904-11	1431	594	2025
Total	35488	13440	48928
Average	1478.7	560	2038.7

Source: Zhao, *History of the Qing*; cf. Myers and Wang.

Table 2 highlights quantities of resources devoted by the Qing state to disaster aid in both food and cash. Most interestingly, the ratio between food aid and cash aid was practically 1:1. Given the private nature of the Qing economy and sophistication of China's economy-wide markets, the

Qing state clearly took advantage of the market efficiency in disaster aid, where speed of delivery meant lives. On the other hand, the cash aid would certainly refuel China's market growth through linkages via the Keynesian 'snowballing effect'.

Table 2. Resource Inputs by Qing Aid Schemes, 1666–1911

Year		Food aid (<i>shi</i>)	Cash aid (silver <i>liang</i>)
1666		70,000	
1711			100,000
1738			200,000
1742-6	4,400,000	3,900,000	
1753-7	200,000	2,000,000	
1770-8	5,200,000	1,575,000	
1784-6	870,000	2,350,000	
1822-3	100,000	5,140,000	
1831-6	290,000	50,000	
1847			900,000
1865-9	1,170,000	970,000	
1872-9	350,000	1,200,000	
1883-9	740,000	1,690,000	
1890-8	815,000	1,790,000	
1900-11	382,500	3,350,000	
Total		14,587,500	25,215,000
Total in value (两 silver <i>liang</i>)*			47,971,500
Value (silver <i>liang</i>)*		22,756,500 (A)	25,215,000 (B)
A:B ratio			0.9
Lives rescued	79,706,100-118,569,360	86,941,320-132,706,540	
Total lives rescued (rounded to nearest thousand)		166,647,000-251,276,000	

Source: Zhao, *History of the Qing*.

Note: *Mean price at 1.56 *liang* of silver per *shi* of rice derived from the rice price range of 0.94 to 2.18 *liang* of silver per *shi* in the Yangzi and Pearl deltas of the 17th and 18th centuries (see Marks, 'Rice Prices'; Wang, 'Secular Trends of Rice Prices').

In contrast, the Ming state spent far less even on its hunger relief. It was a scandal that in 1579, the Ming Treasury was able to spend lavishly

24 million *liang* of silver on a royal wedding,⁵⁰ but had no money to aid a famine in Shaanxi Province. The famine was only aided by collecting money from prisoners in exchange for freedom.⁵¹ On several occasions the Ming state actually shamelessly increased taxes during disasters (in 1599, 1618 and 1619). Indeed, in *The History of the Ming Dynasty* (明史), there are merely four figures regarding famine relief for the entire span of the dynasty: (1) tax exemptions of 2.77 million *shi* of rice for Jiangsu and Zhejiang in 1436,⁵² (2) tax exemptions of two million *shi* of rice for Jiangsu and Zhejiang in 1454,⁵³ (3) rescue handout of one million *shi* of rice and wheat to Jiangsu in 1455,⁵⁴ and (4) rescue handout of 400,000 *shi* of grain to Shaanxi in 1485.⁵⁵ In population terms, the Ming state only helped it from declining sharply, even given the marked improvement of the land/man ratio.

Hence, there was no reason why the Qing state could not put up with those rebellions and continue to rule the country longer than the Ming.

Clearly, what did change China was not internal unrest that formed a backdrop for the empire anyway, but a foreign invasion. It was not an invasion from northern nomads, but from Europe in the form of the Opium War in 1840. The defeat, humiliation and heavy costs of the Opium War served as a wake-up call for the pragmatic part of Chinese culture in

⁵⁰ Zhang, *History of the Ming*, vol. 21.

⁵¹ Zhang, *History of the Ming*, vol. 10.

⁵² Zhang, *History of the Ming*, vol. 10.

⁵³ Zhang, *History of the Ming*, vol. 11.

⁵⁴ Zhang, *History of the Ming*, vol. 11.

⁵⁵ Zhang, *History of the Ming*, vol. 14.

general and that of Confucianism in particular. Indeed, Confucianism justifies changes if the country faces critical crises and challenges. The vision of modernity and Westernisation began to undercut China's timeless Physiocracy at both the ideological and mundane levels. Indeed, frequent changes became something that was unchanged in Chinese history between 1840 and 1940. Confucian pragmatism allowed the Qing system to be malleable and avoid brittleness.

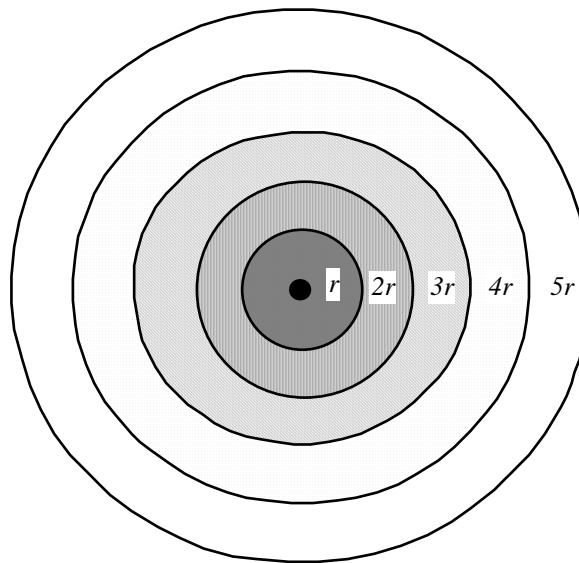
2. New Ideology of Social Darwinism vs. Old Confucian Culturalism

The lesson that the Qing elite learned from the Opium War defeat was very different from what China had experienced previously. Before that war, the Chinese had accepted their fate when under the alien attacks and conquests at least three times: under the Jin Tartar (1115–1234), the Mongols (1271–1368), and the Manchus (1644–1911). The Confucian ideology aimed at gradual cultural assimilation of the alien conquerors known as 'cultivating the barbarians' (*yirou kegang*, 以柔克刚, literally 'removing the rough edges with softness'). This was a game of 'Confucian culturalism', a competition of good behaviour according to a strict code of conduct, rather than of military strength and brutality. The game of Confucian culturalism was playable only on the condition that the alien conquerors accepted their cultural inferiority, and that they wanted to become something higher. The tactic worked repeatedly for the Chinese.

All students of the Confucian classics know the description of the Zhou system of 'five-level circles' (五服, *wufu*) in Chapter 'Tribute to King Yu' (禹贡, *yugong*) in Confucius's *The Book of History* (尚书, *Shangshu*)

(see Wu G. 1993: 118–19). This system embodied the Chinese view of East Asia, as illustrated in Figure 2.

Figure 2. China-centred World Order in Asia



Note: Shades represent different tax rates; r —domain of the King's Land with a 500-*li* radius; $2r$ —domain of the Lords' Land in a ring of 500-*li* radius; $3r$ — a ring of the frontiers of 500-*li* radius; $4r$ —domain of the Semi-barbarians' Land in a ring of 500-*li* radius; $5r$ —domain of the Barbarians' Land in a ring of 500-*li* radius.

Here, the capital city of the Zhou régime was considered the centre of civilization with its immediate domain of 500 *li* in radius (1 Zhou *li* = equivalent to 346.5 meters; see Liang F. 1980: 540–44), called the King's Land (甸服, *dianfu*). Second, as one moved outward, there were two circles under the names of the Lords' Land and Vassals' Land (侯服,

houfu), both being parts of the civilized world with the outer boundary 1,500 *li* away from the Zhou capital. Third, there was a ring of the the frontiers (绥服, *suifu*) where the Zhou civilisation ends. Fourth, it was a Semi-barbarians' Land (要服, *yaofu*), a periphery with half-civilized inhabitants, a half-way house between China-centred civilization and the aliens called the 'barbarians'. Finally, there was the Real Barbarians' Land (荒服, *huangfu*) where the population did not read or write, nor observed any of the rites observed by the Chinese.

In this system, Chinese civilization created a centripetal force which given sufficient time, would materialise the goal of the Confucian 'Great Commonalty' (大同, *datong*).⁵⁶ Indeed, the orthodox Confucian concept of being Chinese meant little in terms of ethnicity but a great deal regarding culture. In other words, a 'Chinese' person in the Confucian vocabulary is merely a cultural being. Thus, 'Confucianised' outsiders of non-Han origin were not only accepted into Chinese society, but were also absorbed by the officialdom, including the afore-mentioned Europeans such as Matteo Ricci and Sabbatino de Ursis. On the other hand, those Chinese who left China to live in foreign lands were regarded as the 'de-Sinicised' and considered automatically to be 'abandoned by the Celestial Empire' (天朝弃民, *tianchao qimin*).

It is worth noting that there exist some common misconceptions regarding the Chinese view of the world order, much coming from the interpretation, word for word, of *Zhongguo* (中国), literally meaning 'the

⁵⁶ *Datong* is commonly translated into 'Great Harmony', too narrow to reveal the active cultural assimilation from the centre.

centre/middle kingdom/empire'. Almost all Western writers have accepted such a judgment from which one can infer a vision of a tightly closed, xenophobic attitude.

But it would be wrong to assume that the Chinese elite were always in the dark: from the fifteenth century the Chinese closely noted and documented the rise of European colonialism along their traditional trading routes in Southeast Asia and the Indian Ocean region. They were well aware of European technology in the form of ship design and weaponry.⁵⁷ Studies were conducted of the Europeans themselves. This is evident Chen Lunjiong's (陈伦炯) *Travels of the Seas* (海国闻见录, *Haiguo Wenjian Lu*) written in as early as 1730.

The Qing elite were aware that the invaders of Opium War were very different. Unlike the Jesuits who were willingly to learn from China and hence tacitly accept China's cultural superiority, the British never accepted culturally inferiority to the Qings. This alone threw the game of Confucian culturalism out of the window. On the other hand, the Qing elite did not want China to become a European colony despite the fact that the ruling Manchus themselves were colonisers in the seventeenth century. But everyone agreed that China was weak; something needed to be done fast before it was too late. History proved that the Qing elite was pragmatic and the Qing system was malleable, so changes began.

First and foremost, together with Confucian culturalism, the preference for benevolent rule, and the distaste for military government

⁵⁷ See Drake 1975.

had to go. Rather than promoting competition for the most civilised, best mannered and highest respected, the new religion was social Darwinism – although Charles Darwin’s book was published after the Opium War – meaning the survival of the fittest in a new world of competition for hegemony. The Qing elite was also fully aware that the means to achieve a victory were modern arms in the form of strong ships with powerful canons (坚船利炮, *jianchuan lipao*).

Undoubtedly, social Darwinism led to a new knowledge of statecraft. It turned out to be the key catalyst for all changes in post-Opium War China.⁵⁸ This change in ideology ushered in an era of changes that China was sometimes unprepared for.

3. New Movers and Shapers of Knowledge in the Era of Changes (c. 1840–1910)

The 1840 Opium War marked a failure of the Manchu regime, as the Qing state was unable to maintain China’s national security. The *Pax Manchuriana* was over. This alone undermined massively the ever-shaky legitimacy of the Manchu rule. To allow China to be colonised by any foreign group would have meant the end of the Manchu ruling clique, and it was vital for them to be seen as ‘flawless’. They deliberately chose Han Chinese to carry out reforms; if they were successful, the Manchus claimed credit and if not, they blamed the Han. This determined that all the

⁵⁸ It is commonly agreed that social Darwinism was the corner-stone of all political thought in China during the post-Opium War period, see Pusey, James R. 1983. *China and Charles Darwin*. Cambridge [Mass]: Harvard University Press.

new movers and shapers of knowledge during the Era of Changes were ethnically Han Chinese.

In 1839 on the eve of the Opium War, Lin Zexu (林则徐, 1785–1850), Imperial Commissioner (钦差大臣) in charge of the ban on the opium trade from 1838 to 1840, began to have European knowledge and information collected and translated into Chinese, including newspapers and magazines published in Portuguese-controlled Macao,⁵⁹ Emericide Vattel's *Law of Nations* (滑达尔各国律例) written in c. 1758, Hugh Murray's *Encyclopaedia of Geography* (四洲志) published in 1834, and Algernon S. Thelwall's moralising essay on the British opium trade with China entitled *The Iniquities of the Opium Trade with China* (对华鸦片贸易罪过论) published in 1834. Immediately after the Opium War, there was a surge of information about Europe such as Wei Yuan's (魏源) *A Comprehensive Survey of Off-shore Countries* (海国图志, *Haiguo Tuzhi*) written in 1841,⁶⁰ Chen Fengheng's (陈逢衡) *A Brief History of England* (英吉利记略, *Yingjili Jilue*) written also in 1841, Wang Wentai's (汪文泰) *A Study of England of Red-haired Barbarians* (红毛番英吉利考略, *Hongmaofan Yingjili Kaolue*) written in 1842, and Liang Tingnan's (梁廷楠) *Four Essays on Off-shore Countries* (海国四说, *Haiguo Sishuo*) in 1846, Xu Jishe's (徐继畲) *Records of Lands and Peoples Overseas* (环瀛志略, *Huanying Zhilue*) in 1848, and Xia Xie's (夏燮) *Main Events between China and the West* (中西纪事, *Zhongxi Jishi*) in 1850. It is important to

⁵⁹ They included 《澳门月报》 (The Chinese Repository), 《澳门新闻纸》 (The Canton Press), and 《广州记事报》 (The Canton Register).

⁶⁰ The main body of text was Lin Zexu's 《四洲志》.

note that compared with the early works of the Jesuits which involved religious pursuit and pure science and technicality in their ivory tower, the new trend in the 1840s was for a wider range of mundane and tangible information concerning Europe, especially in terms of humanities (customs, values, law and social conditions).

There was also heated discussion on how to play the game of social Darwinism against the westerners. Lin Zexu, who had first-hand experience in dealing with the invading British forces, pointed out that naval warfare was the British trump and that it would be self-defeating if China did not build a modern navy with gunboats.⁶¹ Xu's contemporary, the scholar Wei Yuan (魏源, 1794–1857) changed the term *yi* (夷, meaning 'barbarians') to *yang* (洋, meaning 'sea-borne' or 'foreign') in his work written in the 1840s entitled *Punitive Expedition of Foreign Fleet under the Daoguang Reign [1821–50]* (道光洋艘征抚记) where he urged 'learning from Europe in order to turn foreign strength into China's strength to build a rich country with strong armed forces' (尽转外国之长技为中国之长技, 富国强兵).⁶² Earlier, in 1841, Wei Yuan put forward the slogan of 'learning advanced technology from Europeans to fight against them' (师夷之长技以制夷).⁶³ In 1858, the Deputy Minister of Wars (兵部左侍郎) Wang Maoyin 王茂荫 asked permission from the throne to circulate *A Comprehensive Survey of Off-shore Countries* amongst all court officials and the royal

⁶¹ '洋面水战，系英夷长技'，'剿夷而不谋船炮水军，是自取败也'，《林则徐书简》。

⁶² 魏源 '道光洋艘征抚记 - 下'. It is important to note that Meiji Japan copied from Qing China exactly the same approach after their 1868 Restoration, despite that fact that the *kanji*富国强兵 was pronounced as *fokoku kyohei*.

⁶³ See Preface of his 海国图志.

circle. He argued that ‘although hard, it is not impossible to resist against the Europeans [so long as we know their strength] (夷难御，而非竟无法之可御).⁶⁴ All this was the prelude of the path-breaking Westernisation Movement, which commenced in 1860.

In a historical twist, the strongest push for change to take place occurred internally when the pseudo-Christian Taiping Rebellion (太平天国起义) and Nian Rebellion (捻军) both broke out in 1851 to threaten the very foundation of the Qing rule. Out of desperation, Zeng Guofan (曾国藩, 1811–72) and his subordinate Li Hongzhang (李鸿章, 1823–1901), both provincial officials at that time, were permitted to organise local armed forces; the Hunan Army (湘军, *xiangjun*, formed in 1854) and the Anhui Army (淮军, *huaijun*, formed independently also in 1854), which were financed independently by local taxes.⁶⁵ They each ran a large personalised quasi-government institution called *mufu* (幕府, meaning ‘personal staff’). Each *mufu* employed at any given time several dozen highly qualified people for different tasks.⁶⁶ This was the *de facto* franchising of the Qing state (administration and defence). From then on, the Qing court could no longer monopolise the armed forces. These new armies proved to be more efficient than the Qing standing army of the Eight Banners (八旗, *baqi*): Zeng’s Hunan Army eventually put down the

⁶⁴ 《筹办夷务始末》(咸丰朝).

⁶⁵ This was ‘local militarization in Qing China’.

⁶⁶ 李志茗. 2002.

Taiping in 1864, while Li's Anhui Army eliminated the Nians in 1868. During the military confrontations both men appreciated the effectiveness of the European arms in life-or-death situations. This ushered in Westernisation and modernity led by military technology.

By now, Wei Yuan's slogan from the 1840s of 'learning from Europe in order to turn foreign strength into China's strength to make China a rich country with strong armed forces' had a more poignant meaning.⁶⁷

The shift of political power and military command to the Han Chinese was highly rational, at least in the short run, for the Manchu ruler. However, such a division of labour put the Manchus in a bad light, as inevitably they appeared inadequate in a changing world. Also, things did not always turn the way the Manchus initially wanted, as the use of Han Chinese to pioneer changes cut both ways: it created an alternative, military power centre in the Qing bureaucracy in the hands of the Han Chinese. Nevertheless, it proved that traditionally trained Chinese scholar officials were fully capable of looking to learn new ideas and new tricks.

On the other hand, the crackdown on both the Taiping and Nian rebellions that once controlled a vast area and intended to drag China backwards to its traditional agrarian growth path cleared a main obstacle at the grassroots level for dramatic changes to be implemented.⁶⁸ Now the

⁶⁷ Prince Yixin (奕訢) wrote to the throne in 1860 that learning from Europe would help fight against the peasant rebellions, see 史仲文, 1997.

⁶⁸ The Taiping Rebellion, the most powerful rebellion since 1368, swept the richest regions in the 1850s, the Qing government lost as much as 90 per cent of its regular revenues.

reformers had undisputed leadership for changes to take place.

The most significant development during the entire period of 1860–1910 when changes were pushed peacefully to rebuild China's strength with the combination of maintaining Chinese ideology as the foundation and introducing Western knowledge for utility (中体西用) in 'Self-strengthening Movement' and 'Westernisation Movement' (自強运动, 洋务运动: 1860–94), and the 'One-hundred-day Reform' (戊戌变法: 1898), all aiming at altering China's growth trajectory towards modernity.

The masterminds of these changes were known as the Westernisers (洋务派, *yangwu pai*), whose members were all ranked Qing officials well-educated in Confucian tradition: Zeng Guofan, Li Hongzhang, Zuo Zongtang (左宗堂, 1812–85, Zeng's subordinate), Shen Baozhen (沈葆楨, 1820–79, also Zeng's subordinate), and Zhang Zhidong (张之洞, 1837–1909, Li's subordinate). Their spiritual leader was 冯桂芬 (1809–74) who advocated the need for adopting Western knowledge and producing Western tools and machines (采西学, 制洋器).⁶⁹ The group gained support from Prince Yixin (奕訢, 1833–98). From time to time the Dowager Empress Cixi (慈禧太后, 1835–1908) also cut in to offer her half-hearted support.

The Westernisers were succeeded after the 1894 Sino-Japanese War by a more radical group called the Reformers (维新派, *weixin pai*)

⁶⁹ 中国史学会. 1957.

headed by 严复, 1854–1921), Kang Youwei (康有为, 1858–1927), Tan Citong (谭嗣同, 1865–98), and Liang Qichao (梁启超, 1873–1929), who launched the ‘1898 Reform’ (戊戌变法), also known as the ‘100-day Reform’ (百日维新), in a bid to re-mould China in a European model. They were even more Western than the Westernisers and backed by Emperor Guangxu (光緒, r. 1875–1908).

The ‘Self-strengthening Movement’ and ‘Westernisation Movement’ took place first in those provinces where Westernisers were in charge, while the Reformers worked exclusively top-down.

4. Opening the Floodgate for European Knowledge

During the Jesuit period, European knowledge trickled to China mainly through the handiwork and services of the missionaries themselves. The Chinese were yet to be fully convinced that there was a need to Westernise for modernity. This was changed after China’s historical defeat in the Opium War with the rise of the Westernisers. For the first time, the floodgate of European knowledge was opened up and kept open.

Firstly, a new government organ, the Foreign Affairs Department (总理各国事务衙门, *zongli geguo shiwu yamen*), was established in early 1861. Apart from diplomacy, the department dealt with customs, naval defence, and the procurement of arms. Foreign Affairs Department marked the beginning of modern foreign relations and diplomacy in China, in which China related to other nations as equals and recognized the

importance of trade with them.⁷⁰

Secondly, there was a drive for knowledge modernisation. The Foreign Affairs Department spearheaded the pro-active diffusion of advanced knowledge from Europe by running the Capital Foreign Language Academy (京师同文馆, *jingshi tongwenguan*) and schemes for Chinese students to study in the West.

The academy ran an open system of recruitment to ensure the authenticity of knowledge from the West. In 1869, it appointed William A. Martin (丁韪良, 1827–1916), a Yale-educated missionary as Dean (总教习). Martin served in that capacity for 25 years. In the south, the Translation Division of the Jiangnan (Kiangnan) Arsenal in Shanghai (江南制造局翻译馆) was established in 1868 and became the main source of written information regarding European knowledge.⁷¹ In the same year it hired John Fryer (傅兰雅, 1839–1928), a Briton, as Translator in Chief.

Thirdly, the stock of European knowledge increased steadily after 1860. Under Martin's leadership, international law received priority in both the curriculum and the translation projects of the Capital Foreign Language Academy, something China urgently needed in engaging with the West.⁷² Twenty-four textbooks were produced by translation or

⁷⁰ See Gilbert 1929.

⁷¹ The Jiangnan Arsenal was established by Li Hongzhang in 1865.

⁷² Martin spoke fluent Chinese. His first Chinese translation was Henry Wheaton's 1836 work of *Elements of International Law* (万国公法) which was first published in 1864. This work was re-translated into Japanese in 1865. He went on to translate two more law textbooks (《公法便览》 and 《公法会通》) and wrote two of his own (《邦交提要》 and 《中国古世公法论略》 (*International Law in Ancient China*)).

compilation including law (x6), mathematics (x3), astronomy (x3), chemistry (x3), linguistics (x3), physics (x2), medicine (x2), economics (x1), and world history (x1).⁷³ Outperforming Martin in Beijing, Fryer was involved in the production of 129 books in his three-decade long service in the Jiangnan Arsenal. He also established the first popular modern scientific journal in China called *Magazine of Nature* (格致汇编, *gezhi huibian*) in 1875 and ran it until 1892.⁷⁴

In *Translated Works from the Last Forty Years with Brief Descriptions* (江南制造局译书提要, *Jiangnan Zhizaoju Yishu Tiyao*) published in 1909, the technical subject areas covered included mathematics (calculus and analytical geometry), electricity, metallurgy, chemistry, medicine, physics, astronomy, geology, geography and cartography. Countries covered included the British Empire, France, Germany, Italy, Spain, Portugal, Holland, Belgium, Denmark, Norway, Sweden, Switzerland, Austria, Hungary, Greece, Poland, Russia, Turkey, Egypt, Persia, India, United States, Mexico, Peru and Brazil. There were also specific publications on foreign armed forces: the British, French, German, Italian, Austrian, Russian, Persian, Indian, and Japanese, regarding steam-engine ships, shipyards, marines, weapons, communication, navigation, sea routes, naval warfare, coastal defence, ship deployments, battle formation, and annual budgets.⁷⁵

According to Liang Qichao's (梁启超) statistics in 1896, there were

⁷³ 丁韪良《同文館題名錄》。

⁷⁴ 王扬宗. 2000.

⁷⁵ 江南制造局翻译馆. 1909.

352 translated Western books available in China overall, under the three categories of knowledge (学), politics (政) and morals (教).⁷⁶ By then, China had a decent range of the European knowledge. Also, a critical mass was built up to change the knowledge structure of the Chinese elite.

Fourthly, the formation and improvement of human capital became the priority. It is documented that in 1866 Zuo Zongtang sent his appeal to the Foreign Affairs Department that to learn from the West ‘depends much on education, ... After the training China will have the right specialists to supervise production of ships and to navigate a fleet; and everything will work for China’.⁷⁷

This target was largely realised in China’s modern sector. The afore-mentioned Capital Foreign Language Academy, designed to introduce European knowledge systematically, was the beginning of modern education in China, which departed gradually from the old Confucian tradition.⁷⁸ It had an eight-year system to train competent linguists and diplomats.

On the military front, the first naval academy (马尾船政学堂, *mawei chuanzheng xuetaang*) was established in 1867 in Majiang (马江), Fujian Province, to train officers. The academy employed several dozen French

⁷⁶ 梁启超. 1896.

⁷⁷ ‘仍归重于设学堂, ... 学成而后, 督造有人, 管驾有人, 轮船之事, 始为一了百了’. See 左宗堂. c. 1885. ‘上总理各国事务衙门’.

⁷⁸ In 1876 the curriculum of the academy included English, French, Russian, German, mathematics, physics, chemistry, astronomy, navigation, international law, politics, world history, and world geography. It merged in 1902 with the newly-established Capital Academy (京师大学堂), the predecessor of Peking University (北京大学).

instructors to train ten Chinese youngsters.⁷⁹ This trainer–trainee ratio demonstrates just how serious the Chinese authorities were when dealing with naval affairs. The second naval academy was established in Tianjin (天津) in 1880; the third in Huangpu (黄埔), Guangdong Province, in 1887; the fourth in Nanjing (南京) in 1890; and the fifth in Yantai (烟台) in 1903.⁸⁰

The training in those academies was predominantly Western. According to *Regulations of the Northern Sea Fleet* (北洋海军章程, *Beiyang Haijun Zhangcheng*), a governmental publication in c. 1890, the Northern Fleet Training School (水师学堂, *shuishi xuetang*) ran four-year courses to train young cadets. The basic subjects included (1) English, (2) geography, (3) mathematics (extraction of a root, algebra, and logarithm), (4) geometry, (5) physics, (6) chemistry, (7) astronomy, and (8) meteorology. The specialized courses included cartography, steam engine operation, hydromechanics, calculation of longitude and latitude, reckoning, pilotage, artillery, and surveying.⁸¹ The Northern Fleet Seamen's Training Centre (练勇学堂, *lianyong xuetang*) adapted the British standard in training sixteen- and seventeen-year olds with minimum literacy but knowledge of cables and knots, handling of sails, steering, use of the compass, rowing, swimming, and use of firearms and swords.⁸²

Moreover, from 1876 onwards, naval cadets were sent to foreign naval academies and shipyards in Western Europe, mainly Britain and

⁷⁹ Hao 1929.

⁸⁰ Hao 1929.

⁸¹ See Anon. c. 1890.

⁸² See Anon. c. 1890.

France, to learn the latest technology and crafts.⁸³ From 1905 on, naval cadets were also sent to Japan for the same purposes.⁸⁴ Foreign advisers and technicians, often in their dozens, were always on the payroll of the Chinese naval establishments,⁸⁵ some reaching the rank of admiral of the Qing navy.⁸⁶

However, progress was not always made in a linear fashion. There were hiccups even amongst the most devoted Westernisers. In the wake of the Opium War until the beginning of the Westernisation Movement, there was a period when efforts were made to upgrade China's technology without the help of Westerners or their knowledge. In 1841, local officials in Guangzhou built a human powered paddle-wheel boat in an attempt to make it look like a British steamboat used during the Opium War.⁸⁷ In the following year, two more ships of the European appearance were built, one with a copper-clad hull and the other with a primitive engine. Neither ship seemed sea-worthy.⁸⁸ This was low level, almost child-like imitation, which did not show any understanding the essence of the steamboat technology.

Twenty years later, in 1861, Zeng Guofan established the first factory, the Anqing Arsenal (安庆内军械所), in Anhui to produce firearms of

⁸³ Hao 1929.

⁸⁴ Hao 1929.

⁸⁵ See Hao 1929.

⁸⁶ Hao 1929.

⁸⁷ It is documented that the vessel was 67 *chi* long, 20 *chi* beam, equipped with 36 oars and two paddle-wheels. It took ten men to paddle the wheels, see 魏源《海国图志》.

⁸⁸ It is reported that one ship was launched in a river but it did not steer well ('放入内河，不甚灵便'), see 文庆.《筹办夷务始末》.

the European style. It employed only Han Chinese; and its production depended on small-scale traditional handicrafts. In addition, in 1862, it hired four technicians Xu Shou, Xu Xianyin, Hua Hengfang and Hua Shifang (徐寿, 1818–84; 徐建寅, 1845–1901; 华蘅芳, 1833–1902; 华世芳, 1854–1905) to experiment on steam engine design by guesswork. The factory eventually managed to build the first wooden hull steamer the *Huanghu* (黄鹄) in China in 1865.⁸⁹ But the performance of the ship was deeply disappointing: according to Zeng Guofan's judgment, the ship was useless: 'too slow in manoeuvring and not quite getting it right'.⁹⁰ So, the first attempt to re-invent the wheel without the input of proper knowledge did not succeed in opening the black box of European steam engine design and shipbuilding. Zuo Zongtang thus reached the conclusion that copying from the Europeans was the way out if China still wanted to be in the social Darwinian race.⁹¹

A new approach began in 1866 when Zuo sent a report to the throne to ask permission to hire European technicians in Qing shipyards.⁹² Soon, in 1868, John Fryer joined the Jiangnan Arsenal in Shanghai. Thanks to the Translation Division of the arsenal, Xu Shou and Xu Xianyin (now transferred from the Anqing Arsenal) were in a close partnership with John

⁸⁹ The ship had one cylinder steam engine, about 18 metres long (55 尺, *chi*), 25 tons' displacement. It travelled at a speed of about 10 kilometres (20 里, *li*) per hour.

⁹⁰ It was reported as '行使迟钝, 不甚得法', see 曾国藩 1876. 《曾文正公全集》.

⁹¹ Zuo believed that by copying European technology, China would be able to remove Europe's comparative advantage and fight back '夺彼族之所恃', '师其长以制之', see 左宗堂. c. 1885. 《左文襄公全集》.

⁹² See 左宗堂. c. 1885. '拟购机器雇洋将试造轮船先陈大概情形折'.

Fryer who functioned as a channel of reliable information of European technology. The partnership soon paid off: in 1868 the *Huiji* (惠吉), a 60 metre long (180 *chi*), 600-ton gunboat (8 cannons) with nearly 400 horsepower, was launched. It was the first functional modern naval vessel built on China's soil.⁹³ In the following decade until 1876, seven more steamships were built in the Jiangnan Arsenal. The largest was the *Yiyuan* (驭远) with a displacement of 2,800 tons.

Also in 1866, the Fuzhou Shipbuilding Bureau (福州船政局, *fuzhou chuanzheng ju*) and the Fuzhou Shipyard (福州造船厂 or 马尾造船厂) were established by Shen Baozhen, the Minister of Naval Affairs (船政大臣, *chuanzheng dachen*) at that time. More radical measures were taken during the first decade (until 1875) to get access to European technical knowledge by not only hiring French technicians and but also putting them in charge of all the technical aspects of the shipbuilding operation. The gamble paid off: during the first 10 years the shipyard launched 15 large steam ships with an aggregate displacement of 170,000 tons. The shipyard became the backbone of the Qing modern shipbuilding. It went on to build another 25 ships from 1876 to 1907 with the total displacement of 300,000 tons. The shipyard claimed 70 percent of China's total modern ship output by the end of the Qing.⁹⁴

Qing shipbuilding easily matched that of the Meiji Japan by 1885 (see Table 3). Before the 1894–5 Sino-Japanese War for Korea, China's possession of modern warships was not too far behind that of Meiji Japan,

⁹³ See Hao 1929.

⁹⁴ See福建省地方志编纂委员会.

either.⁹⁵

Table 3. Chinese and Japanese Naval Shipbuilding Compared, 1870–85

Name	Hull	Length	Beam	Draught	Horsepower
<u>A. Shanghai (Jiangna Arsenal)</u>					
威靖 <i>Weijing</i> (1870)	Wooden	205.5 <i>chi</i>	30.6 <i>chi</i>	11.0 <i>chi</i>	605
海安 <i>Hai-an</i> (1872)	Wooden	300.0	42.0	19.0	1,800
致远 <i>Zhiyuan</i> (1875)	Wooden	300.0	42.0	21.0	1,800
保民 <i>Baomin</i> (1885)	Wooden	225.3	36.0	14.3	1,900
<u>B. Yokohama</u>					
Seiki (1876)	Wooden	203 ft	35 ft	13 ft	443
Banjo (1880)	Wooden	153 ft	25 ft	12 ft	659
Jingei (1881)	Wooden	249 ft	31 ft	14 ft	1,450
Kaimon (1884)	Wooden	210 ft	32 ft	16 ft	1,267
Tenryu (1885)	Wooden	210 ft	35 ft	17 ft	1,267

⁹⁵ Smith 1955.

Chinese ships: 魏允恭《江南制造局记》上海：文宝书局石印，1905；王尔敏. 1963. 《清季新兴兵工业的兴起》. 台北：中研院近代史研究所. p. 82.

Japanese ships: Jentschura, Hansgeorg; Jung, Dieter and Mickel, Peter. 1977. *Warships of the Imperial Japanese Navy, 1869-1945*. Translated by Antony Preston and J. D. Brown. Annapolis: Naval Institute Press.

Finally, the Westernisers also took a shortcut by importing ships and arms from Europe (and later Japan), which accounted for 55 percent of all naval ships in the new Qing navy (Table 4).

Table 4. Modern Naval Ships Obtained by the Qing Navy, 1862–81

<u>Year</u>	<u>Imports</u>				<u>Locally Built</u>			<u>Total</u>
	Br	Fr	Gm	US	FZ	JN	SY	
1862-71	13	1	1		2	2	1	20
1872-81	12		3	2	18	3		38
Total (1)	25	1	4	2				32
Total (2)					20	5	1	26

Source: Based on Hao 1929.

Note: Br – Britain; Fr – France; Gm – Germany; US – United States; FZ – Fuzhou Shipyard; JN – Jiangnan Arsenal; SY – individual shipyards.

5. Difference Made by the New Movers and Shapers: the Case of a New Navy

The Westernisers were responsible for the establishment of a wide array of modern industries and infrastructure ranging from cotton textiles, shipping, railroads and banking. Results were also delivered. But their priority was always given to modern arms, which makes a good case for us to see the effectiveness of the new movers and shapers.

Firstly, from 1865 onwards, the Jiangnan Arsenal mass produced modern arms soon becoming the largest arms production centre in East Asia and one of the largest in the world at that time.

Secondly, the Qing navy came a long way from its humble start with only 30 traditional warships.⁹⁶ By 1875, China had a new navy with two modern fleets—equipped with modern ships and Western methods of recruitment, training, and management: the Northern Sea Fleet (北洋海军, *beiyang haijun*) and the Southern Sea Fleet (南洋海军, *nanyang haijun*).⁹⁷ There were also provincial naval forces in Fujian and Guangdong Provinces.

Such progress impressed Western observers. In the 1870s, they reported that ‘China was rapidly becoming a formidable adversary’, ‘Chinese military power was vastly different from what it had been in 1860’, ‘the output of factories and shipyards was impressive’, ‘Chinese-built warships would soon equal the highest European standards’ with ‘the

⁹⁶ Hao 1929.

⁹⁷ See Xia 1989.

whole official class determined to restore China's international position'.⁹⁸ Overall, China was reported as having firepower that could vie with the most powerful nations in Europe.⁹⁹

Soon, the new navy began to show off in foreign and international waters. Table 5 contains the main events of its overseas tours. On the 1886 and 1891 tours, the fleet had 2 cruisers accompanied by 3–4 frigates.¹⁰⁰ These tours demonstrated the sailing range of the fleet.

Table 5. Qing Naval Tours, 1870–1911

<u>Year</u>	<u>Places Visited</u>
1870	Singapore, Pinang, Korea Bay
1875	Singapore, Pinang, Luzon, Japan
1886	Pusan, Hungnam, Nagasaki. and Vladivostok (Haishenwei), Inch'on, Seoul, Nagasaki
1887	Korea
1890	Korea
1891	Tokyo
1907	Singapore, Saigon
1909	Singapore, Batavia (Jakarta), Surabaya, Pontianak, Yogyakarta, Ujung Pandang, Saigon

⁹⁸ Wright 1957.

⁹⁹ See Wright 1957.

¹⁰⁰ Hao 1929.

Source: Based on Hao 1929.

Note: *For the occasion in May 1911 of the coronation of George V (r. 1910–1936), King of the United Kingdom and Emperor of India.

China had its first opportunity to try out its new navy in 1873 after Japan sent three thousand marines to invade South Taiwan. The Minister of Naval Affairs Shen Baozhen led a fleet with seven thousand marines to force the Japanese to withdraw.¹⁰¹

During the Franco-Chinese War in 1883–5 and the Sino-Japanese War in 1894–5, the new Qing navy caused severe damage to the French and Japanese fleets, respectively. In the case of the Franco-Chinese War, the Qing navy threw more war matériel than the French and thus won the sea battle. China lost the war only due to its diplomatic failure. In the Sino-Japanese War of 1894–5, Japan won the war by a narrow margin with heavy losses on its side. Japan won by its military tactics (with the help of the British military advisers) rather than its firing power.¹⁰² In comparison with the days during the Opium War in 1840 when the naval supremacy was so completely on the British side, during the 1880s and 1890s China became a naval power for the industrial world to recognise.

It is important to note that the Qing naval capacity was not destroyed after these two wars. After the 1911 Revolution, as many as forty-one of the ships were inherited by the navy under the Nationalist

¹⁰¹ Hao 1929

¹⁰² Wright 1957

government with a total displacement of 39,795 metric tons with a total propulsive force at 126,200 units of horse-power, 370 cannons, and forty-seven torpedo tubes. These ships continued their services into the 1930s.¹⁰³ Earlier, in 1899, the Italian navy sent six warships to China with an ultimatum to establish a concession in the coastal Zhejiang Province. After sizing up the Italians, Qing officers convinced the Imperial Court that the Qing navy was fully capable of defeating the invaders. The Italians withdrew empty-handed.

C. Final remarks

During the Ming-Qing period, there were two patterns of knowledge diffusion from Europe to China. The first was a Jesuit-centred top-down pattern. It proved to be very slow. From the year Matteo Ricci arrived in Beijing in 1601 to the Opium War in 1840, the Jesuits' efforts at very best reached the Imperial Court circle but more or less were confined to the ivory tower. For two and a half centuries, knowledge from Europe failed to make a significant difference in a society that was submerged in Confucianism and was obsessed with a competition for the best behaviour in a neatly woven structure. Among many things, it did practically nothing to help China's national security.

A new group of elites who acted as movers and shapers of knowledge emerged only after the Opium War, with the adoption of social

¹⁰³ See Hao 1929.

Darwinism that marginalised the need for a moral high ground of benevolence in social policies. Only then, was the floodgate for practical European technology and knowledge to flow quite freely in society and tackle more immediate and tangible challenges. So, in terms of the scale, scope and speed of changes, the 50 years of the post-Opium War period (1840–90) broke all the records in the history of the empire of China.

This observation implies that China did not have the necessary conditions to develop its indigenous capitalistic industrialisation. Capitalism and industrialisation had to be introduced from the outside.

References (to be included)