

16. PRODUCTION IN CHINA

Production in China developed in conditions much less favorable than those in Europe. The regime of government was far less conducive to economic progress, and commerce consequently developed much more slowly. There were two periods, however, in which conditions were less unfavorable and during which economic progress was significant—the First Transformation, continuing into the early part of the Crisis, and the Second Transformation. We will examine in this chapter how production developed in each of these two periods.

In each period, it was market expansion that drove the development of production. So, for each period, we will begin by examining the nature of that expansion. We will then look at its impact on agriculture and on industry. We will conclude the chapter by considering what light the evidence of preindustrial China sheds on the validity and usefulness of our theory.

THE FIRST TRANSFORMATION AND THE EARLY PART OF THE CRISIS

Beginning with the An Lushan rebellion in 755, the empire slowly fragmented, and the tribute state gradually weakened its grip. The result was steady, even rapid, economic progress, which continued for a while, even after reunification under the Song.

During the Crisis, as we saw in Chapter 14, the environment became increasingly unfavorable. Different zones were affected at different times. The economy of North China was the first to suffer—devastated by war and natural disaster during the invasions of the Jurchen and Mongols. The economy of the Lower Yangzi was laid low in the late Song by crushing exaction, but it recovered under the Mongols. The Southeast Coast prospered until the beginning of the fourteenth century, when restrictions on foreign trade throttled its economy.

Expansion of the market

The initial impetus for market expansion, for a steady increase in long-distance trade, came from extrinsic changes. This were amplified by multiplier effects that sustained and extended the process.¹

¹See Chapter 2 for an explanation of extrinsic changes and multiplier effects.

Extrinsic changes

The first extrinsic change was an increase in government spending. The decentralization of government in the late Tang, and the subsequent fragmentation of the empire, distributed spending away from the imperial capital and towards the capitals of provinces and, later, of independent states.² This resulted in strong local demand for military supplies and for luxury goods, which stimulated long-distance trade. When the Song reunited China in the tenth century, the country was already far more prosperous, with correspondingly far greater government revenue. This enabled the Song to spend lavishly, both on their armies and on an expanding and well-paid bureaucracy.³

The second extrinsic change was the growth of maritime trade, which consisted in this period primarily of imports of raw materials and exports of manufactured goods.⁴ The traditional trade with South-East Asia, Japan, and Korea expanded. And, from the eighth century, a new maritime trade with India and the Middle East developed rapidly.⁵ This was initially largely in the hands of foreigners, but by the tenth century Chinese merchants were capturing a significant and growing share.⁶ By the late thirteenth century, the three principal ports of China were home to a fleet of some 4,000 substantial, sea-going vessels.⁷

In addition to these extrinsic increases in demand, there was also an extrinsic reduction in trading costs. The fading of government restrictions made both travel and the transportation of goods much easier. Governments also invested heavily in transportation infrastructure. Song China eventually boasted over fifty thousand kilometers of navigable waterways and a system of arterial roads radiating from the capital to the far reaches of the empire.⁸ Also, as the government came to rely increasingly on maritime commerce as a source of revenue, it built harbors to accommodate it and created a navy to protect it.⁹

²(Twitchett 1966)

³See Chapter 14.

⁴(Gernet 1996) Ch. 14; (Deng 1997) Ch. 5

⁵(Ma 1971), (Clark 1991) Ch. 2.

⁶(Clark 1991) Ch. 5

⁷(Liu 2005) Appendix E.

⁸(Liu 2005) Appendix E; (Gernet 1996) Ch. 14

Multiplier effects

The impact of these extrinsic changes was amplified by multiplier effects. The expansion both of government and of commerce led to a rapid increase in urbanization, with the emergence and growth of new commercial cities. The growing cities drew their supplies primarily from their own immediate hinterlands, but demand spilled over into inter-regional and even into inter-zone trade.¹⁰ Inter-zone trade benefited too from a growing demand for luxury goods on the part of the expanding class of wealthy officials and merchants who lived in the cities.

In addition to this demand multiplier, there was also a supply multiplier. As production expanded in response to increasing demand, reorganization and technological progress lowered the cost of many goods. This increased the quantities demanded and further boosted long-distance trade.

There was not, however, much of a trading cost multiplier. As we saw in Chapter 13, exaction from commerce grew steadily and eventually, during the Crisis, became oppressive. Improvements in infrastructure and in the organization of transportation did lower the cost of carriage, but because of steadily increasing transit taxes the total cost of transportation fell little and eventually rose. Moreover, as we saw in Chapter 15, the organization of commerce developed little during this period, so that transactions costs remained high. The lack of financial development similarly kept financing costs high.

Geographic impact

The geography of China was less well suited to long-distance trade than that of Europe. It was far more fragmented—nine zones of trade rather than two in Europe.¹¹ And within only a few of the zones were regions connected by water—mostly by inland waterway; elsewhere, goods had to be transported largely by land.¹² As a result of this

⁹See Chapter 14.

¹⁰(Twitchett 1968), Gernet, 1996 #3663} Ch. 14, (Shiba 1970) Chs. III and IV, (Deng 2011)

¹¹(Skinner 1977) divides China into nine relatively isolated ‘macroregions’ that correspond quite well with what we have called zones of trade. This fragmentation continued into the twentieth century ((Rawski 1972) Ch. 4).

¹²Land transportation was also slower and more costly in China, because it relied more on human power and less on draft animals, which were far more expensive in China ((Elvin 1973) Ch. 17).

geography, the extrinsic changes and their multiplier effects had a significant impact in only three of China's eight zones—North China, the Southeast Coast, and the Lower Yangzi.¹³

North China experienced gradual growth under the Tang, but this accelerated significantly from the tenth century under the Song.¹⁴ For most of the period, North China hosted the imperial capital and much of the army, making it the main beneficiary of government spending.¹⁵ Heavy government investment in infrastructure created an extensive network of canals centered on the new capital, Kaifeng, which greatly facilitated inter-regional trade and regional specialization within the zone.¹⁶

The Southeast Coast was the zone that benefited most from maritime trade. Historically, ports along the entire coast had participated in this trade. However, after 714, when the Tang set up their Office of Maritime Trade in Guangzhou, maritime trade became concentrated there. The Song opened additional OMTs in several other ports in 1087, and one of these, Quanzhou in southern Fujian, rapidly eclipsed Guangzhou as China's principal port.¹⁷

The Lower Yangzi was the zone that benefited most from inter-zone trade with these other two zones. It had become the principal source of tribute grain and silk for the capital, and the Grand Canal had been built to facilitate the transportation of this tribute. Government spending in North China spilled over, directly and indirectly, into all of the neighboring zones, but especially—because of the Grand Canal—into the Lower

¹³A fourth zone, Sichuan, prospered from an active overland trade with Tibet and central Asia, but it was not as important as the other three and it was largely isolated from the rest of China. (Elvin 1973) Ch. 12

¹⁴(Skinner and Baker 1977), (Skinner 1985). From the eighth to the thirteenth century, the population of North China grew from around 20 million to over 33 million.

¹⁵(Ma 1971) Chs. 4 and 5. There was considerable spending, too, on the northern frontier—also in this zone—where the armies were located.

¹⁶Liu, 2005 #3621} Appendix E.

¹⁷(Ma 1971). (So 2000) compares Quanzhou's position in this period to that of Shanghai in the early twentieth century. By 1200, Quanzhou's population had risen to over half a million

Yangzi.¹⁸ Similarly, the Southeast Coast, connected to the Lower Yangzi by relatively inexpensive transportation by sea, exerted a strong demand for its products. When the Song lost North China to the Jurchen, they moved their capital to Hangzhou, and the Lower Yangzi zone became the direct beneficiary of the bulk of government spending.¹⁹

The axis of inter-zone trade, therefore, was predominantly north-south—northward from the Lower Yangzi along the Grand Canal to North China and southward by coastal shipping to the Southeast Coast. In this period, there was little east-west trade along the Yangzi.

The process of market expansion

Under the tribute state there was little long-distance commerce: long-distance flows of good were the result of tribute rather than trade. However, there was considerable local exchange. Farmers brought a part of their output to their local market towns, and those who lived close to cities produced vegetables, raw materials, and fuel for sale in the cities' official markets or in informal markets at the city gates. Similarly, artisans in towns and cities produced for the local market and sold directly to consumers. During the First Transformation, such local exchange increased enormously, with a host of new markets popping up in the country and near the growing cities.²⁰

Now, however, there was also a growing long-distance trade mediated by merchants. Much of this was driven by the demand of the expanding cities for supplies—no longer met entirely by flows of tribute. As urban demand exceeded the capacity of the cities' immediate hinterlands, merchants sought out supplies in neighboring regions and beyond. As merchants purchased certain local goods for resale in the cities, this raised their local price, causing local producers to produce more of these goods and less of others.²¹

In North China, government spending, especially on armaments and on construction, stimulated inter-regional trade in industrial goods. It did less for inter-regional trade in

¹⁸(Rozman 1974)

¹⁹The population of Hangzhou grew to over a million. ((Skinner 1985) Ch. 7)

²⁰(Twitchett 1966),

²¹(Rozman 1974) Also, the new goods the merchants brought to local markets stimulated additional effort and more production for the market.

agricultural goods, because of the abundance there of tribute grain.²² Even when this was insufficient, it was less expensive to import grain from the Lower Yangzi than from other regions in North China: it was relatively cheap there, and transportation via the Grand Canal was comparatively inexpensive. There was, however, a brisk inter-regional trade within North China in some of the non-agricultural products of the agrarian economy—especially in timber for fuel and construction.²³

In the Southeast Coast, Quanzhou and the other port cities similarly exerted a strong demand for supplies. When supplies of grain from their hinterlands proved insufficient, they imported grain from other regions within the zone, which were within easy reach by coastal shipping. Later, the Southeast Coast came to rely increasingly on grain imported from other zones, particularly from the Lower Yangzi.²⁴

Quanzhou initially served primarily as an entrepôt for manufactured goods: these arrived from other parts of China to be shipped overseas. Eventually, however, local industry developed and its output was added to the city's exports—both to other zones within China and to foreign markets.

The Lower Yangzi's trade with North China and with the Southeast Coast stimulated inter-regional trade within the zone itself. In particular, a number of major cities grew up along the Grand Canal. These began as centers for the transportation of tribute and developed into entrepôts for the capital's growing imports from other zones.²⁵ These cities drew their supplies increasingly from other regions within the Lower Yangzi. As in North China, inter-regional trade was facilitated by an extensive network of inland waterways.²⁶ Later, when the capital moved to Hangzhou, it relied much less on tribute for its provision than had Kaifeng and more on long-distance trade—importing hundreds of tons of rice a day.²⁷

²²(Rozman 1974)

²³Some of the timber was grown commercially ((Shiba 1970) Ch. III).

²⁴(Clark 1991) Ch. 6; (So 2000) Ch. 4.

²⁵(von Glahn 2003)

²⁶(Shiba 1970) Ch. II

²⁷(Skinner 1985) Ch. 7

Changes in agriculture

The basic mechanism of change in agriculture in China was the same as it was in Europe: expansion of the market induced a reorganization of production, and the two together stimulated technological progress.

The reorganization of production

As we have seen, market expansion had a strong impact on agriculture in two of the zones in particular—the Lower Yangzi and the Southeast Coast. The resulting economic opportunities there drew an ever-increasing migration from the north.²⁸ The share of China's total population living in the South in 609 had been no more than a quarter; by 1080, it had risen to two thirds.²⁹

In the North, peasants had owned their land subject to the payment of tribute. This pattern of landholding proved unsuitable, however, for the commercialized agriculture developing in the South. As in Europe, commercialization meant intensification.³⁰ Sometimes, as in Europe, this involved switching from grain to a more valuable non-grain crop,³¹ But more frequently in China it meant the cultivation of grain by more intensive methods—particularly, wet-field cultivation.

Conversion to wet-field agriculture required substantial investment in preparing the land—in leveling and walling paddies and in digging irrigation ditches.³² Such investment lay beyond the means of peasant smallholders, so it was mainly wealthy urban

²⁸(Hartwell 1982) There was migration as well to the Upper Yangzi (Sichuan) and, after the loss of the north, to Lingnan.

²⁹(Kelly 1997)

³⁰See Chapters 4 and 5.

³¹(Shiba 1970) Ch. III

³²(Johnson 1995)

investors—officials and merchants—who made the necessary improvements.³³ They then leased the improved land to peasant households, frequently migrants from the North.³⁴

By the end of the First Transformation, some 40% of all peasant households in China had become tenants on the improved land of the ‘great estates’ in the South.³⁵ Peasants generally found this more attractive than paying tribute on the unimproved land available from the state: the market for tenants was highly competitive, and landlords had to offer them more than they could earn as smallholders.³⁶ Even so, plots of improved land were generally smaller, because improved land was more productive.³⁷ The smaller size of plots was not, therefore, the result of ‘population pressure’ as has sometimes been suggested, but rather the result of intensification and increasing productivity.

In Southern Fujian, merchants played an important role in financing agricultural production. Such financing was particularly necessary for the non-grain commercial crops produced there, because of the long time to final sale: sugar, for example, took some eighteen months between planting and sale.³⁸ Merchants financed the necessary working capital by paying producers for their output in advance.³⁹ This required, of course, a relatively effective formal order, which was provided by the Office of Maritime Trade in Quanzhou. This type of financing did not spread to other regions—presumably for want of such a formal order.

³³(Twitchett and University of London. School of Oriental and African Studies 1962). Monasteries were also major owners and developers of land. ((Clark 1991) Ch. 3).

³⁴As commercialization raised the value of land, it stimulated the creation of more land through reclamation—again financed by urban investors ((Ma 1971) Ch. 2). The reclaimed land, too, was divided up and leased to peasant households.

³⁵Share contracts predominated; the basic split was usually 50/50 ((Chao 1986) Ch. 8).

³⁶Some historians have attributed the increase in tenancy to hardship—to peasants being driven from their land by poverty and debt. But tenancy grew fastest in the most prosperous regions and during times of prosperity. (Shepherd 1988)

³⁷(Clark 1991) Ch. 6. As we saw in Chapter 5, farm size is determined by the best alternative employment available to tenants ((Kislev and Peterson 1982)).

³⁸(Shiba 1970) Ch. III.

³⁹(So 2000) Ch. 3; (Shiba 1970). There is evidence, too, of forward contracts, where payment was made on delivery but at a price set in advance.

Regional specialization

There was also a geographic reorganization of production. Within those zones with significant inter-regional trade, individual regions came increasingly to specialize. There was even some specialization across zones.

Regions that were near to their markets—near in terms of the cost and speed of transportation rather than purely in terms of distance—specialized in bulky goods, like rice, or in goods that needed to arrive fresh, like vegetables and pond-raised fish.⁴⁰ More distant regions specialized in more valuable and less bulky products—often processing them locally to add value before they were shipped. For example, the hilly regions of the Southeast Coast produced tea, as well as bamboo for locally produced paper.⁴¹

Regional specialization was also driven by differences in growing conditions. For example, coastal Southern Fujian had little land suitable for grain, so its cities had begun quite early to import it from elsewhere. The consequent availability in areas close to the cities of inexpensive imported grain made it possible and profitable for producers there to specialize in commercial crops and purchase the grain they needed for their own subsistence.⁴² They specialized, in particular, in tea, sugar and fruits of various kinds—all grown mainly for export.⁴³

In the Lower Yangzi, good water transportation facilitated inter-regional trade and encouraged specialization according to growing conditions. The western part of Suzhou prefecture, for example, grew rice, while the eastern part grew wheat and barley and raised fish. And when cotton was introduced into western Songjiang, it displaced the cultivation of rice, which was then imported from the eastern part of the prefecture.⁴⁴

In the Lower Yangzi, there was even some regional specialization in agriculture by stage of production. For example, some regions specialized in the hatching of baby fish,

⁴⁰(Shiba 1970) Ch. III; (Rozman 1974)

⁴¹Similar regions in Europe tended to specialize in producing livestock and livestock products (see Chapter 3).

⁴²(So 2000) Ch. 3. (Clark 1991) Ch. 6 quotes a local official who complains that in some areas commercial crops “take up all the fields” and there is no room for rice!

⁴³The Southeast Coast had been for centuries a major exporter of tea ((Smith 1991)).

⁴⁴(Johnson 1995)

which were then transported up to 200 miles to be raised in fish ponds in other regions. In another example, some regions cultivated mulberry saplings, while others grew the trees and produced the leaves, while yet others specialized in raising the silkworms that ate the leaves.⁴⁵

There was also a little specialization across zones. Inter-zone trade in rice was driven initially mostly by short-term local shortages—except, as we have seen, a steady trade between the Lower Yangzi and North China. But as the Southeast Coast came to specialize in the production of non-grain commercial crops for export, it came to rely increasingly on rice imported from other zones for its own subsistence.

Technological progress

Technological progress in agriculture generally took the form of intensification, much as it did in Europe. As in Europe, intensive agriculture was not in itself new: many of the basic techniques had been known since the Han.⁴⁶ So technological progress was more a matter of diffusion, refinement, and adaptation than one of invention. And, as in Europe, diffusion, refinement and adaptation were driven by expansion of the market and by the reorganization of production.

The single most important intensive technique was the wet-field cultivation of rice. Refinements included better water control through the use of canals, dams, sluiceways, water-wheels, and water pumps. There were improvements too in soil preparation through the use of better implements and the more extensive application of fertilizers.⁴⁷ And the new practice of transplanting seedlings increased productivity significantly.

New varieties and new crops, mostly introduced from Southeast Asia via maritime trade, were another important form of technological progress that complemented intensification. Perhaps the most important were the new varieties of Champa (Vietnamese) rice, which ripened faster than the indigenous rice and were more resistant to drought.

⁴⁵(Elvin 1973) Ch. 12

⁴⁶(Chao 1986) Ch. 9

⁴⁷Fertilizers took the form of manure, river mud, and lime.

Champa rice was first introduced and cultivated widely in the eleventh century in the coastal regions of Southern Fujian—the main center of maritime trade.⁴⁸ Selective breeding further reduced the time to harvest, making it possible to grow two crops of rice in a single season—or one of rice and one of a different grain or a non-grain crop.⁴⁹ Selective breeding also produced varieties suited to different growing conditions; this allowed cultivation of early-ripening rice to spread throughout the Southeast Coast and to other zones—the Lower Yangzi in particular.

A new type of cotton plant, also introduced from Southeast Asia, allowed the cultivation of cotton to spread from Lingnan to southern Fujian and from there, in the twelfth and thirteenth centuries, to the Lower Yangzi.⁵⁰ We will see that during the Second Transformation cotton would revolutionize the economy of the Lower Yangzi, but it was already having a considerable impact by the end of the thirteenth century.

Because cotton could be grown in regions unsuitable for rice, it increased the total value of agricultural output and significantly increased the average productivity of land. Moreover, the spinning and weaving of cotton were simple enough to be undertaken by peasant households, providing an important supplement to rural income. Cotton also provided valuable by-products, including oil, fertilizer, and feedstock for the production of alcohol.⁵¹

In both the Southeast Coast and the Lower Yangzi, the same great landowners responsible for land improvement and reclamation were also responsible for promoting and financing technological progress. It was members of the emerging gentry, for example, who brought cotton and its associated techniques to the Lower Yangzi.⁵² The government played a role too—offering tax incentives for improvements in productivity

⁴⁸(Clark 1991) Ch. 6.

⁴⁹(Ma 1971) Ch. 2

⁵⁰The cotton tree-shrub had been introduced to Guangdong from Vietnam in the eighth century, but had never been a major crop there. The cotton bush, probably originally from India, proved far better suited to Chinese growing conditions. ((Johnson 1995) Ch. 2)

⁵¹(Deng 1997) Ch. 6

⁵²(Liu 2005) Appendix G

and engaging in agricultural extension to hasten the diffusion of new crops and new techniques.⁵³

As in Europe, much of the increase in agricultural productivity came not so much from new technologies as from producers switching to more productive technologies that already existed. What was different in China was that this was brought about less by the diffusion of technologies than by the migration of producers. Producers migrated from zones in the North where technology and growing conditions were less productive, to zones in the South where technology and growing conditions were more productive.

The extent of commercialization

The commercialization of agriculture came somewhat earlier in China than it did in Europe. Although agriculture began to reorient itself to the market at about the same time in China, it had a head start, because it was already structured as family farms. And examples of full specialization appeared much earlier—at least in a few regions.

Full specialization occurred first in the Southeast Coast—particularly in southern Fujian. The conditions there, and the story of its regional specialization, paralleled those of the Netherlands several centuries later. The Southeast Coast was also the pioneer in technological progress: new crops and new techniques generally appeared there first and then spread to other regions and to other zones. For example, double-cropping was common there by the end of the twelfth century and the region was already cultivating cotton and exporting cotton cloth.⁵⁴

Commercialization came more slowly to the Lower Yangzi and was initially only partial. New techniques and new crops arrived there from the Southeast Coast during this period, but they were not employed widely until the Second Transformation. There was some full specialization in commercial crops under the Yuan—in cotton in particular—but this too became widespread only during the Second Transformation.⁵⁵

⁵³(Twitchett and University of London. School of Oriental and African Studies 1962).

⁵⁴(Clark 1991) Ch. 6. The region resembled the Netherlands too in the proliferation of non-agricultural rural occupations. These included ocean fishing, fish-ponds, rural mining and industry (see below).

⁵⁵(Li 2003) argues that the agricultural achievements in the Lower Yangzi during the Song have been exaggerated

It seems likely that this difference in the degree of commercialization was the result of the difference in the degree of development of commerce in the two zones. As we saw in Chapter 15, commerce was far more developed in the Southeast Coast, and it was therefore better able to facilitate and to finance reorganization and technological progress in agriculture.

Changes in industry

Under the tribute state, most industrial production was undertaken by government enterprises—manufacturing in urban workshops, mostly located in the capital, and mining, smelting and other energy-intensive industries located in the country. These enterprises were often large—commonly employing thousands of *corvée* laborers. In addition to this direct government production, industrial goods—particularly textiles—were produced by peasant households under government direction as part of their tribute. The private production of industrial goods was limited to the output of artisans who sold directly to consumers in local markets.

These traditional forms of industrial production continued and even expanded during the First Transformation and the early part of the Crisis. But, in addition, there appeared for the first time a commercial industry producing for local markets and for long-distance trade.

The two zones most notable for their industrial development in this period were North China and the Southeast Coast. In North China, industrial development was driven by government demand and was dominated by state production; in the Southeast Coast, industrial development was driven by exports, and production was almost entirely commercial. There was, in addition, some development of commercial industry in the Lower Yangzi and elsewhere.

The expansion of traditional forms of industry

Government production grew enormously under the Song—especially in and around Kaifeng, the new capital.⁵⁶ Huge state workshops turned out arms, construction materials, supplies for the bureaucracy, and textiles and other luxuries for the court. Elsewhere, similarly large state enterprises engaged in construction, mining and metallurgy

⁵⁶(Ma 1971) Ch. 5.

(including the minting of coin), papermaking, salt production, and shipbuilding. One state copper mine alone employed some 100,000 workers. Most of the output of these state enterprises was intended for government use and was never offered for sale on the market. Workers were now paid rather than serving as *corvée* laborers..

The most important government industry was armaments. As we saw in Chapter 14, the Song tried to compensate for the poor quality of their armies by increasing their size and by investing heavily in weaponry. One consequence of this policy was the development of an enormous arms industry in Kaifeng.

To keep the arms industry supplied with iron and steel, several huge complexes of mining and metallurgy were established in the neighboring regions.⁵⁷ One such complex in the late eleventh century, for example, consisted of some three dozen large iron and steel enterprises, each employing around a hundred workers. Some of these enterprises were government-owned, while others were private—but presumably with good government connections.⁵⁸ In addition to supplying the arms industry, these complexes also supplied the construction industry in the capital and commercial producers of iron wares throughout the zone. Because of transportation costs, however, not much of their output seems to have found its way into inter-zone trade.

During the eleventh century, the iron and steel industries started to exhaust available supplies of wood fuel, and they gradually switched over to coal (more on this below). The result was further concentration of the industry—around several coalfields within easy reach of Kaifeng. The individual enterprises grew larger too—some producing thousands of tons a year each.⁵⁹

⁵⁷(Skinner 1985)

⁵⁸Not much seems to be known about the ownership and organization of the private iron and steel producers (Hartwell 1966)

⁵⁹(Hartwell 1967); (Hartwell 1966). Hartwell estimated total Chinese output in the late eleventh century at over 125,000 tons a year—comparable to that of Western Europe in 1700. More recent work, however, has cast some doubt on his numbers ((Wagner 2001)).

The emergence of commercial industry in the Southeast Coast

Commercial industry, like commercial agriculture, developed primarily in the Southeast Coast, especially southern Fujian. It developed to a lesser extent in the Lower Yangzi.

As we have seen, Quanzhou, in southern Fujian, was initially purely an entrepôt for manufactured goods—importing manufactures from other parts of China and re-exporting them overseas. However, a number of local industries soon emerged to serve the needs of commerce—shipbuilding in particular.⁶⁰ And other local industries emerged to produce inexpensive imitations of imported manufactures for the local market. By 1200, these imitations had improved sufficiently in quality to be suitable themselves for export.⁶¹ They were also cheaper, since they saved on the considerable transportation cost of bringing export goods from other parts of China.⁶²

In this way, Fujian became a major commercial producer of mass-market goods, primarily for export overseas. The most important of its industries were textiles (hemp, silk, and later cotton), porcelains, and metal products (pots and utensils of iron and copper, as well as copper coins). Mining and metallurgy developed in the hinterland to supply these industries.

All these industries were financed and developed—not by the state and its officials, as in North China—but by merchants and large landowners.⁶³ In addition, the merchants who exported the output probably financed the considerable working capital these industries required through advanced purchase, just as they financed the working capital of the region's commercial agriculture.

⁶⁰(Skinner 1985).

⁶¹(So 2000) Ch. 3. We saw this same pattern—first identified and described by (Jacobs 1969)—in European entrepôt cities.

⁶²(So 2000)

⁶³(Elvin 1973) Ch. 11; (So 2000) Ch. 8. There is no evidence of similar merchant involvement in the organization and financing of production anywhere else in China during the First Transformation ((So, Ho et al. 2005)).

The commercial silk industry in the Lower Yangzi

In the Lower Yangzi, the most important commercial industry to develop was silk textiles. Under the tribute state, peasant households had produced raw silk and low-quality silk cloth as part of their tribute. However, the production of high-quality silk was unsuited to peasant production because it required considerable skill and sophisticated equipment.⁶⁴ So the raw silk received as tribute was made into fine silk cloth in government workshops—mainly in the capital.

During the First Transformation, the government continued to produce silk in its workshops, but an increasing proportion of raw silk found its way onto the market—sold both by peasant producers and by the government. This raw silk was woven into cloth by commercial producers—mostly in the cities and towns of the silk growing regions, especially in the Lower Yangzi.⁶⁵ Commercial enterprises, while they were far smaller than the great government workshops, could be nonetheless quite large, each employing dozens of workers.

The commercial production of silk cloth initially developed to satisfy the growing demand of the zone's urban elite. This had been unleashed by relaxation of the sumptuary laws that had previously restricted the wearing of silk to the imperial palace and to the higher reaches of the bureaucracy. However, as the quality of this commercially-produced silk improved, it increasingly entered inter-zone trade and foreign maritime trade.⁶⁶

A commercial iron industry

Under the tribute state, iron, like silk, had been produced almost exclusively by government enterprises—huge smelters using enormous charcoal-fired blast furnaces. As we have seen, such government production continued during the First Transformation. However, it was now supplemented by growing commercial production—this time in the country.

⁶⁴(Bray 2000) Ch. 4; (Johnson 1995) Ch. 2

⁶⁵(Deng 1999) Ch. 2; (von Glahn 2003); (Liu 2005) Appendix F

⁶⁶(Liu 2005) estimates total silk output at 100 million pieces a year in the eleventh century; of this 15-20 million entered long-distance trade, mainly inter-regional.

Typically, a group of peasants would set up a joint enterprise to produce iron, just as did peasants in central Europe during the Commercial Revolution.⁶⁷ A typical enterprise might include a dozen to twenty households working together in the slack period between fall harvest and spring planting. They would gather fuel, mine the ore, and smelt it into iron.

Such enterprises, mostly in the Upper Yangzi and North China, sold their output directly in local markets to village blacksmiths and urban artisans. In the regions where such private production took place, the price of iron fell by as much as two thirds over the tenth and eleventh centuries.⁶⁸

Despite the emergence of commercial industry of various types, the government continued to dominate industrial production throughout the period, probably by a large margin.⁶⁹ Moreover, commercial production was subject to a great deal of government interference and predation. As we have seen, the government tended to take over successful industries as monopolies: for example, it made the sale of iron goods a state monopoly in 1083.⁷⁰ The government would also frequently make various types of industrial output a part of tribute: in some areas, households were registered as ‘iron-smelting households’ and required to deliver a quota of iron as tribute. And in times of fiscal emergency, the government freely requisitioned whatever industrial goods it needed.

Technological progress

As we would expect, the commercialization and reorganization of industry induced technological progress. Technological progress was particularly rapid in shipbuilding and navigation.⁷¹ As Chinese merchants began to challenge foreigners in maritime trade,

⁶⁷See Chapter 3.

⁶⁸The price of iron relative to rice.

⁶⁹(Moll-Murata 2005). In addition, much of the commercial production was in enterprises owned and financed by officials, and a good part was subject to government control through official monopolies ((Gernet 1996) Ch. 14).

⁷⁰(McNeill 1982)

⁷¹(Deng 1997) Ch. 2; (Shiba 1970) Ch. II.

shipbuilding expanded rapidly, especially along the Southeast Coast.⁷² The market soon grew large enough to support considerable specialization and division of labor. And vigorous competition led to a great deal of experimentation and rapid improvement in design. The compass, which had long been known in China, was used for the first time for navigation at sea in the eleventh century.

In silk textiles too, commercialization led to technological progress. Because the market for commercially produced silks was more sensitive to price, producers were more willing to compromise quality to lower cost; they therefore sought ways to mechanize production. To serve the industry's needs, new enterprises emerged that specialized in the design and production of textile machinery.⁷³ Among the machines they developed was one for reeling silk: worked by a treadle, it could draw a number of filaments simultaneously from cocoons boiling in a tub of water.⁷⁴ The machine-makers also developed spinning machines with multiple spindles.

Machines for spinning silk were later adapted to the spinning of hemp.⁷⁵ Such machines were, of course, beyond the means—and needs—of individual peasant weavers. It was the large landlords who acquired and set up these machines—much as they set up mills for wheat and kilns for ceramics. Peasants could bring their hemp to the landlord's machine to be spun into thread, paying for the service with a part of the output produced.

In the production of iron and steel, the charcoal-using blast furnace had been known since the Han. But this technology was unsuitable for the new, much smaller commercial producers. These producers rediscovered crucible smelting, first invented more than a millennium earlier, and developed smaller types of blast furnace.⁷⁶ In Europe, the progression was from small to large—from bloomery to blast furnace. In China, because of the early dominance of government production, it was from large to small.

⁷²(So 2000) Ch. 3

⁷³(Deng 1999) Ch. 2.

⁷⁴(Elvin 1973)

⁷⁵(Elvin 1972)

⁷⁶(Wagner 1995)

The transition from wood to coal in Song China paralleled that in Tudor England several centuries later.⁷⁷ As in England, it was the rising price of wood fuel in the capital that stimulated a search for alternatives. In 1068, coal deposits were discovered close enough to Kaifeng by water to make coal an economically viable alternative.

Government industries, such as brick and tile making, were the first to use coal, and by the end of the eleventh century it was being used widely in the capital in place of wood and charcoal. As in England, industries—including in China the important iron and steel industry—began to relocate close to the coal fields to reduce transportation costs.

Taking advantage of the new fuel frequently required modification of existing techniques and the development of new equipment. This culminated in the development of the coke-fired blast furnace and the production of steel by direct carbonization. The technology of coal mining improved too: mines became larger, shafts deeper, and new techniques and equipment were developed for drainage and ventilation.

Technological progress in armaments was accelerated by an arms race with the northern nomads, who quickly imitated each new Song weapon technology—mostly by recruiting Chinese artisans.⁷⁸ The most important innovations were in the military use of gunpowder. There was some commercialization of arms production: the government offered prizes to inventors of new weapons, and it relied on commercial suppliers for materials and, to some extent, for finished explosives and for machines to deliver projectiles.

THE SECOND TRANSFORMATION

The reestablishment of a tribute state by the first Ming emperor in the final part of the Crisis crushed market activity throughout China. However, the subsequent fiscal collapse under Yongle ushered in a gradual change in government policy and behavior. By the mid-fifteenth century, conditions had improved enough to permit a resumption of market activity.

Slowly, the command economy gave way to something like *laissez faire*. Money was privatized. Tribute in kind was commuted to payment of taxes in silver. Foreign trade

⁷⁷See Chapter 4 on England and (Hartwell 1967) on China.

⁷⁸(Gernet 1996) Ch. 14; (McNeill 1982).

was gradually liberalized. As the government showing increasing tolerance towards various forms of association, it became easier to organize commerce and production. The government improved its provision of formal order, and a limited rule of law came to prevail.

As we saw in Chapter 15, these changes in the political environment allowed commerce and finance to develop relatively rapidly—far beyond anything achieved during the First Transformation. As a result, trading costs declined, facilitating an expansion of the market. And financing became more readily available for the reorganization of production and for the adoption of new technology.⁷⁹

Cities recovered and, more so than during the First Transformation, many became predominantly commercial. Moreover, the cities of China now formed a much more integrated urban system. Towards the end of the period, a few commercial cities even achieved some measure of self-government.⁸⁰

Transportation recovered too, as the Ming repaired much of the damage sustained during the Crisis.⁸¹ Their largest investment was in a major renovation and upgrading of the Grand Canal.⁸² Later, under the Qing, there was also considerable investment in infrastructure at the local level—coordinated and often funded by the gentry.⁸³ This included the building and improvement of bridges, roads, and harbors. Such local initiatives were generally more useful economically than those of the state, since they were motivated by the needs of commerce rather than by those of government. With the arrival of European shipping, maritime transportation improved too. And improvements in shipping technology in the seventeenth and eighteenth centuries made possible for the first time an extensive coastal trade along the northern coast.

⁷⁹(Rowe 1984) Ch. 2

⁸⁰For example, see (Rowe 1984) on Hankou and (Ng 1983) on Amoy.

⁸¹(Skinner 1985)

⁸²(Liu 2005) Appendix E

⁸³(Brook 1998)

Expansion of the market

As in the First Transformation, extrinsic increases in government demand and foreign demand played an important role in initiating market expansion. In the Second Transformation, however, multiplier effects were much more powerful, helping to create an integrated internal market and setting in motion a process of self-perpetuating economic progress.

Extrinsic changes

The most important extrinsic change was the government's gradual commutation of tribute in kind to payment of taxes in silver.⁸⁴ This provided directly a major boost to domestic commerce and indirectly a powerful stimulus to foreign trade.

As had happened during the First Transformation, the crumbling of the command economy liberated a surge of commercial activity that had previously been held in check.⁸⁵ But now, starting in the late fifteenth century, this surge was reinforced by the government's gradual transition from tribute in kind to money taxes.⁸⁶ The government increasingly obtained what it needed by purchasing it in the market, which greatly increased total market demand. And producers increasingly sold their output to be able to pay their taxes, which greatly increased total market supply. The increase in demand and in supply created many new opportunities for profitable long-distance trade. This led first to an expansion of inter-regional trade within each zone and then later to an expansion of inter-zone trade.

As we saw in Chapter 14, the sharp increase in the monetary demand for silver raised its value in China well above its value overseas. This made it highly profitable to import silver and to export Chinese goods in return — particularly manufactures.⁸⁷ The result, from the early sixteenth century, was a significant expansion of foreign trade, aided by

⁸⁴(Liu 2005) Ch. III

⁸⁵(Li 2010) Ch. VI

⁸⁶By 1602 only 18% of the land tax (the government's main source of revenue) was collected in money, but by 1766 some 66% was ((Liu 2005) Ch. III).

⁸⁷(Brook 1998). The major exports at this time were copper cash, silks, and porcelain ((So, Ho et al. 2005)).

the gradual lifting of restrictions and by the arrival of Portuguese and Spanish traders. This expansion of foreign trade had its greatest impact initially on Lingnan and on the Southeast Coast.⁸⁸

Foreign trade was interrupted by the wars and restrictions of the Ming-Qing transition, but it resumed at the end of the seventeenth century and expanded more rapidly.⁸⁹ This acceleration was due to further easing of restrictions and to the replacement of Portuguese and Spanish traders by the more efficient Dutch and British.⁹⁰ Because of the resulting fall in trading costs, exports came to include, not only luxury goods, but also bulk commodities and inexpensive manufactures.⁹¹

Multiplier effects

Expansion of the market was boosted by multiplier effects. Most notably, the expanding market for cotton textiles increased the volume of production, which raised productivity through the usual mechanisms (as we will see). This drove down the price of cotton cloth and brought it within the reach of ordinary households, which led to a further significant expansion of the market.⁹²

The general expansion of the market raised incomes, and the resulting prosperity stimulated population growth—from about 65 million in 1400 to some 400 million in 1850.⁹³ Market expansion also brought increasing urbanization. Market towns and even commercial cities emerged, not only in the traditional urbanized areas on the coast, but also in the interior.⁹⁴ By the mid-Qing, the rate of urbanization in the Lower Yangzi had

⁸⁸(Rawski 1972)

⁸⁹(Myers and Wang 2002)

⁹⁰See Chapter 2 for a discussion of Dutch trading methods.

⁹¹(Zurndorfer undated)

⁹²(Bray 2000) Ch. 4. A bolt of cotton cloth cost 1.27 tan of rice in 1470, but only 0.82 tan in 1540.

⁹³(Brandt, Ma et al. 2012) The population doubled between 1750 and 1820.

⁹⁴As we saw in Chapter 14, the number of market towns doubled between the fifteenth and nineteenth centuries to over 20,000.

reached 20%.⁹⁵ Rising incomes, population growth, and increasing urbanization all increased the demand for goods, contributing to further expansion of the market.

We saw in Chapter 15 that there was an acceleration of commercial and financial development in this period which lowered trading costs—particularly the emergence of merchant networks and of native banks. This too contributed to market expansion. Lower trading costs were particularly crucial for the expansion of long-distance trade in bulk commodities such as grain and inexpensive manufactures such as cotton cloth. The resulting growth in the volume of long-distance trade opened the way for further reorganization and technological progress in commerce and finance.

The development of an internal market

By the eighteenth century, there had developed a well-integrated internal market that encompassed much of China.⁹⁶ In contrast with the First Transformation, inter-zone trade now consisted predominantly of bulk commodities and inexpensive manufactures.⁹⁷ Grain made up 42% of the total by value; cotton cloth, 25%; salt, 15%; and tea, 8%; raw cotton, raw silk, and silk cloth each accounted for an additional 3-4%.⁹⁸ Also, internal, inter-regional trade within zones trade now encompassed a much larger fraction of the country than it had during the First Transformation.⁹⁹

The Lower Yangzi was at the center of the growing inter-zone trade. As the cultivation of cotton expanded to supply its rapidly growing textile industry, the zone increasingly imported its grain from the Middle and Upper Yangzi and exported cotton cloth in return.¹⁰⁰ Then, as textile production continued to expand, local supplies of cotton proved insufficient and the Lower Yangzi began to import raw cotton from the

⁹⁵(Ma 2004); (Brandt, Ma et al. 2012). Much of the urban population lived in clusters of market towns rather than in cities—not unlike the pattern in the Early Modern Netherlands.

⁹⁶(Rowe 1984) Ch. 2. (Keller and Shiue 2007) find the market to be well integrated in the 1720s: prices moved together over distances as great as 700 km.

⁹⁷(Rozman 1974), (Hamilton 2006) Ch. 2

⁹⁸(Hamilton 2006), quoting a 1985 book by Wu Chengming.

⁹⁹(Skinner 1977)

¹⁰⁰(Deng 1999)

Middle Yangzi and from North China. Eventually these zones began to produce their own cotton cloth.

The Lower Yangzi was therefore again the hub of inter-zone trade, with trade to the north along the Grand Canal and to the south along the coast.¹⁰¹ However, there was now added to this a significant east-west trade along the Yangzi River, with an important new commercial center at Hankou. Also, as the difficulties of navigating the northern coast were overcome in the seventeenth and eighteenth centuries, there developed a significant coastal trade linking zones as far north as Manchuria with the Lower Yangzi, the Southeast Coast, and Taiwan.¹⁰²

By the eighteenth century, the internal trade in bulk commodities and inexpensive manufactures was spilling over into foreign trade.¹⁰³ China began to import raw cotton and rice from Southeast Asia and to export cotton cloth in return. When supplies of cotton became particularly tight in Lingnan and the Southeast Coast, the British East India Company started to import Indian cotton from Bombay, exporting sugar in return. And towards the end of the eighteenth century, Western merchants in Guangzhou began purchasing significant quantities of the high-quality cotton textile known as ‘nankeen’, produced at Songjiang in the Lower Yangzi.

However, despite these developments, commercialization of the economy was far from complete.¹⁰⁴ Less than half of total output entered the market: estimates vary from 20% to 40%.¹⁰⁵ The rest was still consumed directly by producers, by landlords receiving rent in kind, and by the state—which still took some of its exaction as tribute in kind. Of the output that did enter the market, only a small part entered long-distance trade. Of this,

¹⁰¹Trade between the Lower Yangzi and North China was now, however, more balanced—with a significant flow of raw cotton southwards.

¹⁰²(Mazumdar 1998) Ch. 6, (Zurndorfer undated)

¹⁰³(Zurndorfer undated)

¹⁰⁴(Deng 2005)

¹⁰⁵(Deng 2003); a survey in the 1920s found farmers selling about half their output ((Brandt, Ma et al. 2012) fn. 24).

an even smaller fraction entered foreign trade.¹⁰⁶ However, commercialization, while only partial, profoundly changed the nature of the economy.

Changes in agriculture

Since market expansion was far more extensive than it had been during the First Transformation, the commercialization of agriculture was both broader and deeper. The response to market expansion, as we would expect, was reorganization and technological progress.

Increasing commercialization

During the First Transformation there had been significant commercialization of agriculture in the Southeast Coast, and some in the Lower and Upper Yangzi. In the Second Transformation, there was significant commercialization not only in the Southeast Coast, but also in the Lower Yangzi, Lingnan, and Taiwan; there was also partial commercialization in the Middle Yangzi, Upper Yangzi and North China.

In all of these zones, long-distance commerce reached deeper into the country: as we saw in Chapter 15, merchants increasingly purchased directly from producers rather than from licensed brokers in the market towns.¹⁰⁷ For example, merchants seeking supplies of cotton for the textile industry of the Lower Yangzi appeared in the villages of the Middle Yangzi offering prices that made it twice as profitable to grow cotton there than to grow grain.¹⁰⁸ Peasants, now finding it easier to sell commercial crops, were quick to respond.¹⁰⁹

Long-distance commerce also brought new consumer goods, which gave peasants an additional reason to produce for the market—to obtain the money needed to buy them.¹¹⁰ The most important of these new consumer goods was cotton cloth, but there were other inexpensive manufactures as well. These included iron tools and implements and

¹⁰⁶Perhaps no more than one percent of total output: (Brandt, Ma et al. 2012).

¹⁰⁷(Shiba 1977)

¹⁰⁸(Elvin 1972)

¹⁰⁹(Brandt, Ma et al. 2014)

¹¹⁰This parallels the 'industrious revolutions' in Europe: see Chapter 2.

commodities such as betel-nuts, sugar, oil, and tobacco (smoking becoming popular in China in the seventeenth century).¹¹¹

In the most commercialized areas, peasants increasingly came to produce largely for the market. As we saw in Chapter 3, this meant they had to rely on the market for their subsistence.¹¹² And those who paid tribute in rice had to obtain that too from the market. Specialized producers also had to rely on the market for their inputs, intermediate goods, and consumer goods, which they would otherwise have produced for themselves.¹¹³

By the eighteenth century, such dependence on the market was feasible, because, as we have seen, there had developed a well-organized internal market for bulk commodities and inexpensive manufactures. This market made it possible, for example, for peasants in Guangdong to specialize in the cultivation of sugar or tobacco, while subsisting on rice imported from other regions within Lingnan.¹¹⁴ With respect to inputs, the most important development was the emergence of a long-distance trade in fertilizer (more on this below). And with respect to consumer goods, it was the long-distance trade in inexpensive cottons that relieved peasants of the need to produce their own cloth.

As we saw in Chapter 3, full specialization in a single crop requires there to be alternative employment for labor that would otherwise be left idle in the off season. The market began to offer such employment. In the Lower Yangzi, peasant women found work in the domestic manufacture of cotton cloth and in sericulture. Elsewhere peasant women found by-employment in other forms of light manufacturing—in the weaving of mats, for example, or the production of palm-leaf fans or rainwear—or in agricultural sidelines, such as the cultivation of medicinal herbs.¹¹⁵

More extensive commercialization also created opportunities for specialization in the provision of producer services. For example, itinerant sugar processors would arrive in an area at harvest time to crush cane and boil syrup for local growers; they would then

¹¹¹(Brook 1998).

¹¹²Even in the most commercialized regions, peasants continued to grow much of their own food((Mazumdar 1998) Ch. 5).

¹¹³(Brook 1998)

¹¹⁴(Mazumdar 1998) Ch. 5.

¹¹⁵(Shiba 1977); (Wong 1999)

follow the harvest to another area, moving their equipment by boat.¹¹⁶ Similarly, groups of itinerant weavers moved across the country, bringing their looms and other equipment with them, to process cotton, hemp, or ramie as they were harvested. And some peasants specialized in keeping oxen and leasing them out to others for plowing and for powering water-pumps for irrigation and drainage.¹¹⁷

As had happened during the First Transformation, the amount of land cultivated by the average household decreased in size. Again, some historians have interpreted this in Malthusian terms—as the result of a growing population pressing on a limited amount of land. However, in reality, it was, as earlier, simply a consequence of commercialization.¹¹⁸ Because of opportunities for remunerative by-employment, households allocated a smaller fraction of their labor to agriculture. So although the amount of land per household shrank somewhat, the amount of land per worker in agriculture actually increased.¹¹⁹ This diversification by rural households not only increased their income but also made it more secure.

Greater geographic specialization

Increasing commercialization meant greater geographic specialization. Whereas during the First Transformation specialization had largely been across region within a given zone, there was now increasing specialization across zones. The nature of geographic specialization reflected comparative advantage—differences in growing conditions and differences in distance from urban markets.

As we saw in Chapter 3, comparative advantage can change as the market expands. Consequently, several zones went through similar sequences of changing specialization. First, they cultivated rice for export. Then they cultivated cotton and imported rice. Then they produced cotton cloth or cultivated other commercial crops and imported raw cotton

¹¹⁶(Mazumdar 1998) Ch. 6

¹¹⁷(Goldstone 2003)

¹¹⁸(Li 2003)

¹¹⁹(Shih 1992) Conclusion.

in addition to rice. This sequence was followed at different times by the Southeast Coast, Lingnan, and the Lower Yangzi.¹²⁰

Migration

As in the First Transformation, there was a great deal of migration.¹²¹ It was now motivated, however, not by flight from war and exaction or by the attraction of better growing conditions, but by economic opportunities opened up by increasing commercialization.

For example, increasing commercialization in the interior, especially in the Middle and Upper Yangzi, drew large numbers of migrants from the already commercialized and much more crowded zones along the coast.¹²² The population of the Middle Yangtze, for example, increased ten-fold during the Second Transformation.¹²³

This migration was more or less spontaneous.¹²⁴ But other migrations were promoted and organized by merchant developers. The most important examples were the colonizations of Taiwan and Guangdong.¹²⁵

In the late Ming, Fujian developed a profitable export trade in sugar. By the early Qing, however, local production was struggling to keep up with growing demand. So Fujianese merchants began to organize production elsewhere.¹²⁶ In particular, as Taiwan opened up for settlement, they developed land there and brought in settlers from Fujian. The merchant developers provided the settlers with working capital and equipment and marketed the sugar they produced.¹²⁷ Fujianese merchants later developed sugar production in Guangdong in much the same way and with similar success.

¹²⁰(Zurndorfer undated)

¹²¹(Myers and Wang 2002)

¹²²(Deng 2012) Ch. 2; (Feuerwerker 1984).

¹²³(Deng 1999).

¹²⁴Although the Qing government did encourage this interior migration with a variety of incentives. (Deng 2012) Ch. 2

¹²⁵(Mazumdar 1998) Ch. 6.

¹²⁶(Ng 1983) Ch. 3.

¹²⁷At the same time on Taiwan, other merchants were organizing the commercial cultivation of rice for export to the mainland.

New forms of land ownership

In response to the onerous taxes and other obligations imposed on landowners by the government, there emerged during the Second Transformation a system of ‘layers of ownership’. The first of these layers was the freehold—known as the ‘sub-surface rights’—which naturally found its way into the hands of tax-exempt officials and gentry.¹²⁸ For sheltering their tenants from taxes they received a fixed rent, usually in kind.¹²⁹

The tenants possessed the right of cultivation—the ‘surface rights’. This second layer was a perpetual leasehold that could be freely sold, sublet, bequeathed, or posted as collateral for a loan. There was indeed an active market in ‘surface rights’ with considerable speculative trading.¹³⁰ Any number of additional layers could be created by subletting. The owners of ‘surface rights’ often sub-let to brokers who found and sublet to tenants who actually worked the land.¹³¹

Financing

Some of the wealthier tenants were able to finance their own working capital. Others, especially in Taiwan, relied on borrowing circles organized by mutual help societies.¹³² Other tenants, even less wealthy, financed their working capital by borrowing from pawnshops, which we have seen were proliferating in this period.¹³³

Increasingly, however, working capital was financed by merchants. This financing could take various forms—downpayment on a forward purchase, the provision on credit of inputs and supplies, or even an outright cash loan.¹³⁴ Repayment was generally in kind—in the crop being financed. Merchants were now better able to provide such

¹²⁸(Mazumdar 1998) Ch. 4

¹²⁹(Deng 1999) Ch. 2

¹³⁰Encumbrances on the sale of land, such as the right of first refusal of relatives, applied only to the freehold, making the leasehold a far more liquid asset.

¹³¹ ((Zelin 2004)).

¹³²(Ng 1983) Ch. 3. The attempt by the authorities to suppress these societies was one reason for a major revolt in Taiwan in 1721.

¹³³See Chapter 15. Also (Elvin 1970) and (Tanaka 1984).

¹³⁴See, for example, (Pan 1996) on sericulture and (Mazumdar 1998) Ch. 6 on sugar and other crops.

financing, because, as we have seen, they themselves had better access to credit—loans from native banks; trade credit through merchant networks; or trade credit from the *hong* merchants who controlled the export trade.¹³⁵

Merchant financing was possible, of course, only because there now existed mechanisms to ensure repayment. During the First Transformation, when merchant financing was largely limited to southern Fujian, it had relied on the formal order provided by the Office of Maritime Trade in Quanzhou. Now, the much more widespread merchant financing relied on a variety of mechanisms—most of them informal.

In the case of sugar cultivation, for example, merchants controlled the processing of cane, so that producers had no choice but to bring their crop to them in fulfillment of their forward contracts. Some merchant associations created militias, ostensibly for protection against bandits, but also to act as enforcers; secret societies (Triads) offered their services to perform the same function.¹³⁶ Lineages were presumably able to act as guarantors and enforcers.

When it came to investment in fixed capital—in improvements and in infrastructure—tenants increasingly financed it themselves, frequently acting together to do so. They often did this through lineages and other forms of association: ‘pseudo-lineages’ were sometimes created specifically for the purpose.¹³⁷ Alternatively, a small group of wealthy producers might come together to create a partnership with a written contract—much as merchants did—to finance investments.¹³⁸ And, like merchants, the working partners might increase their capital by admitting partners who were purely financial investors. Such structures were typically used to finance investment in the processing of sugar and other commercial crops. Projects of exceptional scale were

¹³⁵(Mazumdar 1998) Ch. 6. The *hong* merchants were financed in turn by the foreign merchants to whom they sold.

¹³⁶(Mazumdar 1998) Ch. 6

¹³⁷(Myers and Chang 1978) The new or improved land was often leased to members of the lineage in question.

¹³⁸(Mazumdar 1998) Ch. 6

undertaken by associations of groups of villages and gentry— again with the terms often spelled out in a written contract.¹³⁹

Technological progress

As during the First Transformation, much of the technological progress in agriculture took the form of diffusion of existing technology. Fast-ripening Champa rice and double-cropping, sugar and the new type of cotton plant—as we have seen, all appeared during the First Transformation, but it was not until the Second that they were adopted widely.¹⁴⁰

The delay was partly a consequence of the intervening Crisis. But it was also a result of the need to adapt crops and techniques to different growing conditions.¹⁴¹ Double-cropping also required considerable investment in the improvement of land, irrigation, and drainage: this became worthwhile again only with renewed market expansion and commercialization.

There were also some incremental improvements in existing technology—in water control, cultivation techniques, and implements, and in the machinery used to process commercial crops.¹⁴² There were, for example, new patterns of crop rotation that further increased the productivity of double-cropping. And agricultural implements not only improved but also became more available and more affordable as long-distance commerce lowered their cost.¹⁴³

There were, in addition, two major new advances. The first of these was in the use of fertilizers. Fertilizer was essential for double-cropping because of the otherwise rapid depletion of soil fertility. Farmers initially relied mainly on animal and human waste, but by the late Ming tightening local supplies and rising prices created a profit opportunity. Some merchants began to purchase night soil in the major cities and market it in the country.¹⁴⁴

¹³⁹(Myers 1982)

¹⁴⁰{Li, 1998 #4378(Ma 2004) Ch. 3

¹⁴¹(Goldstone 2003)

¹⁴²(Bray 2000) Ch. 3; {Li, 1998 #4378(Ma 2004) Ch. 3; (Gernet 1996) Ch. 20.

¹⁴³(Xu and Chengming 2000) p. 57

¹⁴⁴(Xue 2005)

Merchants also developed alternative fertilizers from various kinds of industrial waste—especially oil cake from soy and other seeds.¹⁴⁵ Initially, trade in these new fertilizers was mostly regional, but later a long-distance trade developed. This brought bean cake from North China, where soybeans were mainly grown, to the Lower Yangzi.¹⁴⁶ Bean cake proved superior as a fertilizer, requiring far smaller quantities and less demanding techniques of application.

The second major advance was the arrival and diffusion of new crops from the Americas—particularly corn, peanuts, sweet potatoes, and tobacco. Merchants brought these crops first to the Southeast Coast and Lingnan in the late sixteenth century, mainly via Southeast Asia.¹⁴⁷ Because the new crops could often be grown on land unsuitable for traditional crops, their cultivation brought new, marginal lands into use.¹⁴⁸

Corn and sweet potatoes partly replaced rice as the dietary staple. Sweet potatoes required far less land, labor, water, and fertilizer to produce subsistence amounts than did rice. So replacing rice as the subsistence crop with sweet potatoes freed up resources for the cultivation of commercial crops.¹⁴⁹

As in the First Transformation, much of the diffusion of more productive techniques and new crops was the result of migration. However it was not now migration from less advanced to more advanced regions. It was, as we have seen, the opposite. Farmers from the most advanced regions colonized less advanced regions, and they brought with them their superior technology. We have seen that merchants were active in promoting and organizing this colonization. However, local officials too played a role in the diffusion of technology—introducing new crops and improved seeds and techniques to their regions. They did so largely on their own initiative, rather than as part of any government policy.

¹⁴⁵(Bray 2000) Ch. 3

¹⁴⁶(Johnson 1995) Ch. 2. The extent and duration of this trade is controversial: see (Xue 2007).

¹⁴⁷(Rawski 1972) Ch. 4.

¹⁴⁸(Deng 1997) Ch. 6; (Rozman 1974)

¹⁴⁹(Mazumdar 1998) Ch. 5.

Changes in industry

During the First Transformation, a modest commercial industry had grown up alongside an expanding and still dominant state industry. During the Second Transformation, a significant commercial industry developed, while state industry declined into insignificance. The increasing commercialization of industry induced reorganization and technological progress.

Commercialization

In the command economy created by the first Ming emperor, industry was completely controlled by the state. State workshops, mostly in and around the capital, employed some two million corvée laborers. Peasant households produced cloth and other industrial goods as part of their tribute in kind.

Production in the state workshops was inefficient and wasteful and their output was often of poor quality. Costs were high and much of the expenditure found its way into the pockets of officials.¹⁵⁰ Under growing fiscal pressure from the early fifteenth century, the government scaled back its own production, particularly of textiles and iron, and increasingly purchased what it needed in the open market. At the same time, it gradually commuted tribute in kind to payment of taxes in silver.¹⁵¹

This growing government demand, together with increasing foreign demand, provided a strong stimulus for the development of commercial industry. But an even greater stimulus came from the growing internal market for cheap manufactures—most notably cotton cloth. By the late fifteenth century, members of the rising urban middle class were dressing themselves in cotton; by mid-nineteenth century, every peasant was doing so.¹⁵²

The growth of this internal market was made possible by the rapid development of commerce.¹⁵³ It was merchants who sought out new markets for industrial goods and who found, or created, new sources of raw materials. For example, merchants developed new

¹⁵⁰(Xu and Chengming 2000) Ch. 3

¹⁵¹(Brook 1998)

¹⁵²(Hamilton 2006) Ch. 4, quoting (Huang 1990).

¹⁵³See Chapter 15.

source of raw cotton for the textile industry of the Lower Yangzi in the Middle Yangtze and in North China. At the same time, they created in those zones new markets for the cotton cloth produced by that industry. Merchants provided producers with market feedback, enabling them to modify their products to suit the needs and tastes of their distant customers. And, as we will see, it was largely merchants who were responsible for the reorganization of industry that increased productivity and lowered cost and price—leading to yet further market expansion.

During the First Transformation, merchants had been active in this way only in the export-oriented economy of the Southeast Coast. During the Second Transformation, they were active throughout most of China. Correspondingly, commercial industry spread beyond the Southeast Coast to establish itself in many other zones.

Cities played a much greater role in this new commercial industry. During the First Transformation, cities had been mainly centers of administration and of commerce: urban industry had been limited to state workshops, mainly in the capital. During the Second Transformation, however, many cities became predominantly centers of commercial industry.

The government continued to operate some state workshops, even under the Qing—particularly in the production of fine silks and porcelains. However, even in these industries, commercial production came to exceed that of the government by a large margin.¹⁵⁴ In Nanjing, for example, state workshops operated some 600 silk looms while commercial producers operated over 30,000. And the production of cotton textiles, the largest and most important industry, was entirely commercial.

The organization of rural cotton production

Cotton cloth was well-suited to rural manufacture, since it required little skill and only simple equipment. Also, unlike raw silk, raw cotton could be stored for some time before it was spun and woven into cloth. This made the production of cotton cloth an ideal by-employment for specialized agricultural producers, enabling them to exploit off-season labor that would otherwise have been unemployed.

¹⁵⁴(Feuerwerker 1984; Moll-Murata 2005)

Cotton cloth was initially produced in the country, especially in the Lower Yangzi, as a part of the tribute the government required of peasants.¹⁵⁵ Both the Yuan and the early Ming promoted the rural manufacture of cotton to clothe their armies.¹⁵⁶

However, as tribute was gradually commuted to payment in silver, peasants increasingly produced cloth for the market instead. They would bring their output to the nearest market town and sell it there to local merchants; these, in turn, would sell it to the long-distance merchants who visited the market towns regularly to purchase cloth.¹⁵⁷

As production expanded, a division of labor emerged, mediated by local merchants.¹⁵⁸ Some producers came to specialize in ginning and bowing cotton, purchasing raw cotton from local merchants and selling them processed cotton in return. The merchants then sold this to other producers who specialized in spinning, purchasing from them the yarn they produced. This the merchants sold to specialized weavers, from whom they purchased woven cloth. By the late Ming, there had also developed a degree of geographic specialization, with some regions specializing in spinning and others in weaving.¹⁵⁹

Merchants also facilitated development of the industry by helping to stabilize the price of raw cotton. They bought cotton and stored it when it was abundant and its price low; they then sold it out of their stocks when supply was tight and the price high.¹⁶⁰ And, as we have seen, when the production of cloth began to outstrip local supplies of raw cotton, creating a chronic shortage, merchants sought additional supplies in other regions and other zones.¹⁶¹

¹⁵⁵(Zurndorfer 2011)

¹⁵⁶(Bray 2000) Ch. 4; (Zurndorfer 2011)

¹⁵⁷(Zurndorfer 2011) The long-distance merchants were typically members of the merchant networks of Shanxi and Huizhou.

¹⁵⁸(Johnson 1995) Ch. 2.

¹⁵⁹(So, Ho et al. 2005); (Johnson 1995) Ch. 2.

¹⁶⁰(Nishijima 1984)

¹⁶¹Producers in the Southeast Coast and Lingnan came to rely almost entirely on imported supplies—mainly from the Lower Yangzi.

With peasant households increasingly selling their output, the number of local markets grew steadily. In the Lower Yangzi, many of these markets met daily, making it easier for peasant producers to finance their own production. For example, a spinner might take her yarn to a nearby market at dawn and use the proceeds to buy processed cotton; she would then return home and spend the rest of the day spinning this into yarn; the next day, she would repeat the process.¹⁶² In this way, the amount of working capital required was limited to the value of a single day's raw materials, which many producers were able to finance themselves. Others, who could not do so or who were too far from a local market, were financed by local merchants who advanced them the necessary materials on credit.¹⁶³

The organization of cotton production in the cities

Fine quality cottons had always been produced in the cities. They were woven there by full-time professional weavers on larger, more sophisticated—and therefore more expensive—looms. The cloth was then finished by specialized dyers, calenderers, and printers.¹⁶⁴ Merchants also brought to the cities some of the better cloth produced in the country to be finished in this way.¹⁶⁵

In the seventeenth century, merchants began to organize in the cities the production of inexpensive cloth that had, until then, been produced only in the country. The reason for this was the system of licensed brokers that the government had established in the market towns in the sixteenth century.¹⁶⁶ As we saw in Chapter 15, the licensed brokers monopolized the mediation of trade between local producers and long-distance merchants, which enabled them to profit at the expense of both. This provided the merchants with sufficient incentive to organize production of inexpensive cloth in the cities—beyond the reach of the licensed broker monopoly.¹⁶⁷ By the late Ming, the total

¹⁶²(Elvin 1972; Zurndorfer 2011)

¹⁶³(So, Ho et al. 2005)

¹⁶⁴After dyeing, fine cotton cloth was calendered with large stone foot-rollers to give it luster.

¹⁶⁵(Zurndorfer 2011)

¹⁶⁶(Zurndorfer 2011)

¹⁶⁷(Xu and Chengming 2000) Ch. 2

production of cotton cloth in the cities, of all qualities, was rivaling production in the country.

Merchants organized production in the cities by employing contractors to recruit and supervise producers.¹⁶⁸ Most of the producers were specialized ‘loom households’, in which both sexes worked full time in weaving. There were also some larger workshops where subcontractor-overseers supervised wage laborers in spinning and weaving. The contractors, financed by merchants, provided the workshops and the loom households with materials and sometimes also with looms.

The finishing of the cloth was structured in much the same way, with merchants employing contractors to organize and supervise production.¹⁶⁹ These contractors were responsible for the cloth entrusted to their care and for the quality of the work performed on it. Contractors set up large workshops with the necessary equipment and recruited independent artisans and wage laborers to do the work; the artisans paid rent for the space and equipment they used. In this case too, the contractors financed production and were financed in turn by the merchants.

The scale of production was substantial. For example, in Suzhou, the principal center of cotton manufacture in the late Ming, some seventy of the city’s merchants were involved in the industry, and they employed over three thousand loom households. Some three hundred and forty contractors organized the finishing—in some four hundred and fifty workshops, each employing dozens of men.¹⁷⁰

Reorganization of rural cotton production in response to market change

In the eighteenth century, changes in the market for cotton textiles led to a transformation of rural cotton production in the Lower Yangzi.¹⁷¹ By then, the rural production of inexpensive cottons had spread to most of the other zones, shrinking the market for such cloth from the Lower Yangzi. At the same time, the Qing had ended the Ming practice of pre-empting the output of high-quality cottons, which allowed a

¹⁶⁸(Mazumdar 1998) Ch. 6

¹⁶⁹(Myers 1974); (Elvin 1973) Ch. 16

¹⁷⁰(Elvin 1972). Calendering alone employed some eleven thousand men.

¹⁷¹(Zurndorfer 2011)

commercial market for fine cottons to develop. As we have seen, this market received a significant boost in the late eighteenth century from a growing Western demand for Chinese ‘nankeens’.

Adaptation to these market changes required a shift in rural production from inexpensive to high-quality cloth.¹⁷² This meant the reorganization of rural production along the lines of the contractor system already in use in the cities. This reorganization was necessary, because the production of finer cloth required quality control by someone on the spot, as well as financing of the more expensive equipment and materials that were needed.

As a result, rather than purchasing cloth in the market towns from local merchants, long-distance merchants began to hire local contractors to organize and to supervise rural production. Finding reliable contractors was, of course, difficult, but brokers emerged who specialized in recruiting and vouching for dependable men. Under this new system of production, an increasing number of rural households—like these in the cities—made the manufacture of cloth their principal occupation; for these households, agriculture became the by-employment.¹⁷³

Since quality was now a major issue, branding became important. Each local contractor identified with a personal mark the cloth he delivered to the merchant for whom he worked. This merchant was generally a member of a merchant network, with the reputational advantage that this conferred.¹⁷⁴ However, the merchant too would try to establish an individual reputation by having his brand name dyed into the cloth that he sold: in distant markets, the better-known and more respected brands earned a premium.¹⁷⁵

¹⁷²The production of fine cloth had already spread from the major cities to smaller ones and to market towns ((von Glahn 2003)).

¹⁷³(Deng 1999) Ch. 2; (Johnson 1995) Ch. 2. In one rural district, some 30-40% of household specialized fully, with the rest producing part-time.

¹⁷⁴The merchant networks of Shanxi and Huizhou were particularly prominent: see Chapter 15.

¹⁷⁵(Zurndorfer 2011). Brand names were important for other consumer goods, too—for example, porcelain, tea, wine, boots, writing supplies, etc. ((Hamilton 2006) Ch. 4).

The organization of the silk industry

The production of inexpensive silks in the country declined as that of cottons grew.¹⁷⁶ Luxury silks, however, continued to be produced in the cities: their production, like that of fine cottons, required specialized skills and expensive equipment beyond the capacity of rural households. The reeling of silk into yarn still took place in the country, since it had to be done close to where the raw silk was produced. However, the weaving and finishing of silk cloth had become exclusively urban occupations.

With the emergence of a wealthy urban elite, beginning in the late fifteenth century, the demand for luxury silks increased greatly.¹⁷⁷ In the sixteenth, it increased again—significantly—when silk became a major item in the rapidly growing export trade.¹⁷⁸ Production spread from the cities of the Lower Yangzi to those of the Southeast Coast and Lingnan that were export entrepôts; by the late Ming, the silk industry in Guangzhou alone was employing some fifty thousand artisans.

The production of luxury silks in the cities was organized much like the production of fine cottons. Long-distance merchants obtained the raw materials in the country and financed production in the cities. Financing was even more important than it was for cottons, because materials and equipment were much more expensive. For this reason, merchants generally retained ownership of the materials and paid producers for the value added, as in the European domestic system.¹⁷⁹

As with cotton, merchants relied on contractors to organize and oversee weaving and finishing.¹⁸⁰ In the silk industry too, contractors guaranteed the security of the materials and the quality of the work, and they also guaranteed payment to producers. Since silk looms could be quite large, the contractors organized production in workshops rather than in the homes of the producers, with a single workshop typically housing twenty to thirty looms.

¹⁷⁶(Liu 2005) Appendix F

¹⁷⁷(Marmé 1993)

¹⁷⁸See above.

¹⁷⁹See Chapter 3.

¹⁸⁰(Myers 1974)

The organization of some other industries

Many other mass-market goods were manufactured in the cities. Ironware is one example. There had always been a long-distance trade in iron, but iron products had traditionally been produced locally by itinerant or village blacksmiths. By the mid-Ming, however, a number of cities had come to specialize in the production of mass-market ironware for long-distance trade.¹⁸¹ The most prominent of these was Foshan, near Guangzhou, which produced iron goods for the shipbuilding industry.

Another example of urban manufacturing was ceramics: the city of Jingdezhen in Jiangxi was home to an enormous ceramics industry. The city of Ningbo manufactured a wide variety of consumer goods, including bamboo umbrellas, latticework, beds, straw mats and straw hats.¹⁸² Several cities in the Lower Yangzi and Southeast Coast boasted significant publishing and printing industries, producing everything from popular fiction to law books.¹⁸³ Other industries—urban and rural—included residential construction, ship- and boat-building, and various kinds of food processing.

In all these industries, as with cotton and silk, merchants found and supplied materials, organized and financed production, and marketed the output.¹⁸⁴ The structure of organization was also similar, with merchants generally employing contractors to recruit producers and to supervise production either in the producer's homes or in workshops; for example, in the production of straw hats, a merchant might employ as many as twenty contractors, each dealing with thirty to fifty producer households.¹⁸⁵

Even the remaining state-owned enterprises were organized in much the same way. For example, the huge imperial silk workshops housed hundreds of looms, but production was organized through dozens of master contractors, each of whom ran his own enterprise within the workshop, operating a relatively small number of looms.¹⁸⁶

¹⁸¹(Xu and Chengming 2000) Ch. 5

¹⁸²(Shiba 1977)

¹⁸³(Rowe 1984) Ch. 2

¹⁸⁴((Hamilton 2006) Ch. 4

¹⁸⁵(Shiba 1977)

¹⁸⁶(Faure 2006) Ch. 2. There were similar arrangements in other state-owned enterprises, such as mines and kilns.

Industrial production spilled out of the major cities to smaller ones, to market towns, and even to villages; major cities developed extensive industrial suburbs that faded gradually into the country. This urban industrial expansion attracted large numbers of rural migrants. Often, the migrants retained connections with their place of origin and organized native-place associations in their new homes—much as did members of the various merchant and banking networks.

Certain regions specialized in training and exporting individuals with particular sets of skills—not only merchants and bankers, but also stonecutters and mechanics.¹⁸⁷ For example, Ningbo was famous for its fine furniture, but transportation costs made it difficult to export furniture to other cities. So instead Ningbo exported furniture-makers.

Some industries, however, remained exclusively rural—especially the extractive and energy-consuming industries. In these industries, many enterprises were small—particularly in mining. But there were some larger enterprises in mining, and also in metallurgy, paper-making, and brick and tile.¹⁸⁸

Enterprises in these rural industries were set up not only by merchants but also by large landowners—gentry and lineage trusts.¹⁸⁹ It was merchants, however, who led the way in opening up new territories for exploitation. It was merchants from Sichuan and Hunan, for example, who pioneered the mining of copper and lead in Yunnan and logging in Shaanxi.¹⁹⁰ Large enterprises in the country were structured in much the same way as those in the cities: merchants or wealthy investors provided the financing, but delegated the organization of the actual work to contractors.

Technological progress

In industry, as in agriculture, technological progress in this period consisted largely of the diffusion and refinement of existing technologies rather than of dramatic new

¹⁸⁷(Skinner 1976) By the nineteenth century, craft guilds were beginning to appear in the cities: as in Europe, one of their principal functions was the regulation of apprenticeships ((Liu 1988); (Morse 1909)).

¹⁸⁸For example, at the end of the sixteenth century, fifty thousand workers were employed by some thirty paper manufacturers in one district of Jiangxi ((Rozman 1974) Ch. 20).

¹⁸⁹(Li 2010) Ch. VI. But it was merchants who marketed the output—much of it exported to Japan and to Southeast Asia ((Deng 1999) Ch. 2).

¹⁹⁰(Rowe 1984) Ch. 2

inventions. The widening adoption of superior technology was driven by expansion of the market, commercialization, and reorganization.

In the rural manufacture of mass-market cotton cloth, households continued to make their own equipment. However, its quality improved steadily as experience accumulated, as better materials became available, and as growing prosperity provided the necessary financing. The geographic range of the industry was greatly expanded by a single simple discovery. North China had been considered too dry for cotton spinning and weaving, particularly during the summer. However, both turned out to be possible, so long as the work was done underground in cellars, where the humidity remained sufficiently high.¹⁹¹

There was technological progress too in the urban production of fine cottons.¹⁹² The late Ming saw the invention and adoption of treadle-operated, multi-spindle spinning frames. Looms improved greatly too, both in quality and in design. A major reason for these improvements was the emergence of specialized, brand-name producers of textile machinery—something made possible by the growth of the industry and the resulting expansion in the market for equipment.

Food processing increasingly employed water-driven machinery. Machines that were used to extract juice or oil included trip hammers and rolling mills. Water-driven hammers were used to pound incense and husk rice. Hammers for paper-making were powered by the paddle wheels of moored boats. Such mechanization became profitable as the scale of production increased to meet the needs of an expanding market.

Apart from process innovations such as these, there was also many product innovations, as Chinese craftsmen increasingly produced imitations of Western goods such as firearms, clocks, and optics.¹⁹³ The favorable ‘exchange rate’, created by the high price of silver in China, had been a boon to Chinese exports, but it had also greatly increased the price of Western imports. This created a considerable market for cheaper local imitations, even when they were of lower quality.¹⁹⁴

¹⁹¹(Zurndorfer 2011)

¹⁹²(So, Ho et al. 2005)

¹⁹³(Rawski 1972) Ch. 4

¹⁹⁴See Chapter 4.

CONCLUSION

Our purpose in studying preindustrial China was to test our theory of economic progress against the Chinese evidence. Is the theory—developed from a study of preindustrial Europe—capable of making sense of this new body of evidence? Does it help us understand the path of economic progress in China? Does it help us understand how it differed from that of Europe?

Understanding the path of economic progress in China

Traditionally, historians have seen the First Transformation—particularly the Song period—as the pinnacle of Chinese economic achievement; they have regarded the Second Transformation as inferior or even as a period of stagnation.¹⁹⁵ Recent scholarship has challenged this view, deprecating the ‘Song peak’, and seeing the Second Transformation in a much more favorable light.¹⁹⁶ The perspective we obtain from applying our theory supports this revisionist view.

Assessing the First Transformation

The First Transformation was well under way before the Song reunification. Economic progress continued after it *despite* the Song regime of government rather than because of it. Eventually, during the Crisis, the Song managed to choke off economic progress almost entirely.

The regime was harmful for a number of reasons. Exaction from commerce came to provide most of its revenue, and this exaction was frequently arbitrary and unpredictable. The government intervened extensively in the economy. While some commercial cities developed, they remained under relatively tight government control. Because the government did not permit voluntary association, there was almost no commercial or financial development. The Southeast Coast was something of an exception, and the government allowed a somewhat more favorable environment to develop there.

Because of the heavy exaction from commerce and because of the weakness of commercial and financial organization, trading costs remained high. Expansion of the market was therefore driven mainly by extrinsic increases in government and foreign

¹⁹⁵For a clear general statement of this view, see (Jones 1988).

¹⁹⁶(Brandt, Ma et al. 2012)

demand, and multiplier effects were weak. Only within a few zones was there significant inter-regional trade, and inter-zone trade was largely limited to high-value items.¹⁹⁷

As a result, the commercialization of agriculture was limited to the Southeast Coast and, to a lesser extent, the Lower Yangzi. There was little commercialization of industry, and state-owned and state-connected industry continued to dominate—with the exception, again, of the Southeast Coast. Some significant new technologies were invented or imported, both in industry and in agriculture. However, because the economic environment was unfavorable, the adoption and diffusion of these new technologies was limited, and overall technological progress was consequently modest.

Assessing the Second Transformation

During the Second Transformation, the regime of government was very different. Under the late Ming and Qing, official exaction was modest and fell largely on land rather than on commerce. Although private exaction was heavy, there was a significant class—the gentry—largely exempt from both types of exaction.¹⁹⁸ Merchant membership in the gentry or connections with it provided commerce with considerable protection from exaction. The regime was relatively laissez-faire—by default under the Ming and more intentionally under the Qing—and it intervened very little in the economy.¹⁹⁹ The government now permitted voluntary association.

In this comparatively favorable environment, commerce and finance developed relatively rapidly. Various forms of merchant association made possible a reorganization of commerce that improved its productivity. They also supported the emergence of various financial intermediaries. Commercial cities developed in a number of zones, and for the first time formed an urban network; some commercial cities achieved a measure of self-government. All of these developments contributed to a decline in trading costs.

¹⁹⁷Except for exports of rice from the Lower Yangzi to North China and the Southeast Coast.

¹⁹⁸See Chapter 14.

¹⁹⁹Although a part of the traditional tribute grain system and some traditional monopolies did persist. Mid-Qing officials still controlled about 20% of the grain produced ((Gates 1996) Ch. 2).

The decline in trading costs resulted in a deeper penetration of commerce into the country.²⁰⁰ This induced a widespread commercialization both of agriculture and of industry—not only in the few zones affected by the First Transformation, but much more widely throughout China. For the first time, industry became predominantly commercial. Widespread commercialization made possible an extensive internal trade in bulk commodities and mass-market manufactures—also for the first time.²⁰¹ While important new inventions may have been few, technology—both existing and imported—diffused and was adopted widely: technological progress, therefore, was substantial.

As in the First Transformation, extrinsic increases in government and foreign demand were important in initiating market expansion, but now economic progress was sustained by powerful multiplier effects. There was a strong demand multiplier: economic prosperity led to rapid population growth; there was also considerable urbanization as cities became centers of industry as well as of commerce. We have noted the effects of the trading cost multiplier. And, with improving organization and technological progress in production, the price of many goods fell in real terms—constituting a powerful supply multiplier. To a significant extent, therefore, economic progress became self-perpetuating.

Comparing economic progress in China and Europe

How far did China lag behind Europe and why? Recent work by members of the ‘California School’ has reignited interest in these questions and suggested some radically new answers.²⁰² They have made the case that, as late as 1800, China did not in fact lag behind Europe at all. They have suggested, rather, that incomes in the Lower Yangzi, the most advanced region of China, were comparable to those in the most advanced regions of contemporary Europe. They attribute the subsequent ‘Great Divergence’ simply to Europe’s geographic good luck.²⁰³

²⁰⁰We looked at the consequences of declining trading costs in the European context in Chapter 7.

²⁰¹(Rowe 1984) Ch. 2

²⁰²(Brandt, Ma et al. 2014) summarizes this literature.

²⁰³Specifically, easy access to coal and to the virgin lands of North America.

Other economic historians have challenged this assessment.²⁰⁴ In particular, they have shown that incomes in the Lower Yangzi were, in fact, no more than half those in the most advanced regions of Europe—more comparable to incomes in the stagnating parts of the European periphery.

Our theory can shed new light on this debate by going beyond quantitative comparisons to compare the nature of the respective economies. How did the economic environment in China at this time—during the Second Transformation—compare with that of the most advanced regions in Europe (under the associational state) and with those on its stagnating periphery (under the predatory state)? How is this reflected in the economic results?

Comparing environments for economic progress

We have seen that government in Second Transformation China resembled that of the European predatory state in principle, but that it was in some ways more like the European associational state in practice. Exaction in China, official and private, was both worse and better than it was under the European predatory state. It was worse in that even official exaction was unconstrained by the rule of law or by the need for the consent of the governed. It was better, in that there existed a substantial class, the gentry, that was largely exempt from both official and private exaction.

Government in Second Transformation China was also more laissez-faire than under the European predatory state, and voluntary association was less subject to government co-option. One result was that transportation infrastructure in China was provided at the local level by associations and gentry rather than, as under the European predatory state, by the central government. Formal order was far inferior in China to any in Europe, but a well-developed informal order served as a partial substitute. An important advantage of the Ming-Qing state over the European predatory state was that it offered the elite far fewer opportunities for entrepreneurship in predation. As a result, the elite in China directed much more of its entrepreneurial efforts towards commerce and production.

As we saw in Chapter 15, commerce and finance were far less developed in China than they were in Europe. However, almost all the commercial and financial development

²⁰⁴(Li and van Zanden 2012), (Broadberry and Gupta 2006).

in Europe took place initially under associational governments and later under the associational state. Commerce and finance were far less developed under the predatory state and much less competitive.

However, the merchants of the predatory states had access to the commercial and financial systems of nearby associational states—in particular, to their bourse markets. While trading costs were higher in the predatory states, they were not so much higher as they would have been without this access. China, for most of its history, was not able to ‘import’ commercial and financial services in this way. However, by the nineteenth century commerce and finance from the European (and American) associational states had reached China and were beginning to make a difference.

Overall, then, how did Second Transformation China compare as an environment for economic progress? In terms of government, it was somewhere between the associational state and the predatory state. In terms of commerce and finance, it was inferior to the associational state, while its ranking relative to the predatory state is less clear.

Comparing performance

In terms of results, Second Transformation China did quite well. Its commerce had progressed sufficiently to create an expanding inter-regional and inter-zone market in bulk commodities and mass-market manufactures. As we have seen, this induced widespread commercialization, both in agriculture and in industry, and led to increasing urbanization; the resulting prosperity supported significant population growth.

How did this compare with Europe? The economy of Second Transformation China circa 1800 certainly lagged behind those of contemporary European associational states. But it was far more dynamic than the economies of the predatory states in the stagnating parts of the European periphery such as Spain and Portugal. And these would have been even more stagnant, had it not been for their close proximity to the vibrant economies of the associational states.²⁰⁵

In agriculture, productivity in China may have rivaled that of the associational states, but not in industry.²⁰⁶ This was due principally to the comparative lack of

²⁰⁵(Acemoglu, Robinson et al. 2012) makes this point.

²⁰⁶(Li and van Zanden 2012)

mechanization—especially in textiles. What we learned about the economics of mechanization in Chapter 4 sheds some light on this.

In China, inexpensive textiles were largely produced in the country in household enterprises that operated on a scale that did not justify mechanization. While textiles were produced on a larger scale in the cities, the kinds of textiles produced there were luxury fabrics unsuited to machine production. In addition, as we have seen, mechanization economizes on labor but wastes materials: materials in China were dear relative to labor.²⁰⁷ Finally, the cost of capital was far greater in China: we have seen that interest rates were significantly higher because of the lack of financial development.

The gap in industrial technology between China and Europe was not, therefore, the result of a lack of inventiveness.²⁰⁸ It was, instead, the result of very different economic conditions that did not justify the adoption of more advanced technology—whether that technology was invented in China or in Europe.²⁰⁹ That is why China in 1800 was no more ready for an ‘industrial revolution’ than were France and Spain.²¹⁰

In many ways, the economy of Second Transformation China resembles that of Europe circa 1600, when Europe first developed an integrated inter-regional and inter-zone market in bulk commodities and mass-market manufactures.²¹¹ Agriculture, industry, and income in China’s most advanced regions resembled those of the Netherlands and England in the long sixteenth century.

From the perspective of our analysis, therefore, China does not look like an economic ‘failure’ in comparison to Europe’s ‘success’. Rather, the Chinese economy appears to

²⁰⁷(Elvin 1973) argues that there was a perennial shortage of cotton and correspondingly high prices: “...the persistent difficulty of obtaining raw materials cannot have made the creation of *labor-saving* machinery seem an urgent necessity.” p 215, italics in original.

²⁰⁸“the technological competence of Chinese was in no way inferior to that of Europeans; what was almost always absent was the intention of using their discoveries to obtain economic results.” (Baechler 1976) p. 31

²⁰⁹(Bhidé 2006). Europe had earlier made good use of technology invented in China: see Chapter 4.

²¹⁰For a comparison of England and France, see (Szostak 1991).

²¹¹(Dobado-Gonzalez, Garcia-Hiernaut et al. 2013) attribute much of the ‘great divergence’ to the much earlier development in Europe of such an integrated market (which they call ‘globalization’).

have been progressing along a recognizably similar path—but with a considerable lag.²¹² Had its economic progress not been interrupted subsequently by events—the Opium Wars, the Taiping Rebellion, and so on—there might well have been a ‘Great Convergence’ within a reasonable period of time.²¹³

Behind those unhappy events, of course, lay the weakness of China’s regime of government. As we saw in Chapter 14, while government weakness during the Second Transformation created a relatively favorable environment for economic progress, that same weakness left it incapable of protecting China against predation by foreign governments or of maintaining internal peace and order. Overall, therefore, the lag in China’s economic progress is explained quite well by the history of its government.²¹⁴

How well does our theory pass the test?

Overall, then, is our theory consistent with the Chinese evidence? The key elements hold up quite well—that economic progress is a self-perpetuating process; that this process is driven by commerce; that entrepreneurship, associations, and commercial cities all play an essential role; and that differences in its pace may be understood in terms of the obstacles placed in its way by government.

Economic progress as a self-perpetuating process

The theory we developed based on the evidence of preindustrial Europe sees economic progress as a complex self-perpetuating process.²¹⁵ At its core is the mechanism described by Adam Smith: market expansion raises productivity by inducing a reorganization of production and by promoting technological progress; higher productivity feeds back to generate further market expansion.

The two transformations of preindustrial China fit this pattern rather well. In both cases, expansion of the market was kicked off by extrinsic changes—declines in trading costs and increases in government and foreign demand. Demand and supply multipliers stimulated further market expansion in both transformations, but there was a strong

²¹²(Rowe 1984) Conclusion takes a similar position, as does (van Zanden 2009).

²¹³(Li 1998) takes a similar position.

²¹⁴(Deng 2012) takes a similar position.

²¹⁵Summarized in the Conclusion to Chapter 5.

trading cost multiplier only in the second. This created in China for the first time an extensive internal market with an active trade in bulk commodities and inexpensive manufactures.

In both transformations, as the market expanded, production was reorganized to take advantage of the new opportunities that market expansion opened up. However, the pattern of reorganization differed somewhat from that observed in Europe.

In China, the reorganization of agriculture was driven primarily by the need for financing and by efforts to avoid exaction: agriculture in China was already organized as family farms. In addition, migration played a much larger role in the reorganization of agriculture in China. During the First Transformation, association played a smaller role, but lineages were important in the Second.

State-owned industry was far more important in China, so the main story in the reorganization of industry was commercialization. In the reorganization of textile manufacture, there were parallels with Europe, with a similar move from country to city and then back again to the country. China also developed some unique forms of industrial organization—the business group and the contractor system—perhaps to compensate for the weakness of its financial system.

Market expansion and the resulting reorganization of production induced technological progress—primarily by making it profitable to adopt new technology. Much of this new technology became available during the First Transformation but had relatively little impact then, because economic conditions were not yet conducive to its widespread adoption.²¹⁶ In contrast, during the Second Transformation, existing technology—much of it dating from the First Transformation—was widely taken up, because the conditions for its adoption were now favorable. This pattern confirms our conclusion from the European evidence that technological progress is endogenous.

As in Europe, technological progress in agriculture primarily meant intensification and the introduction of new crops: of course, given the difference in climate, the specific techniques and crops were different. Migration, the diffusion of people as well as of technology, played a particularly large role in technological progress in China.

²¹⁶(Baumol 2002) Ch. 14

Technological progress in industry, in China as in Europe, primarily meant mechanization. However, we have seen that the extent of mechanization differed—especially in textiles—as a result of differences in economic circumstances.

We saw from the European evidence that while the Smith process is at the core of self-perpetuating economic progress, it is reinforced by, and reinforces, several other processes—a parallel process within commerce (the trading cost multiplier process); the complex of processes within cities described by Jane Jacobs; and the self-perpetuating process of invention described by W. Brian Arthur. We saw in Chapter 15 that there was a strong trading cost multiplier process in China during the Second Transformation. We observed earlier in this chapter elements of the Jane Jacobs processes in the imitation of imported European manufactures. While we have not seen evidence of the invention process, there is no reason to think it was not proceeding in China much as it did in Europe.

The central role of commerce in economic progress

Our theory sees commerce as playing a central role in economic progress. The market expands only when merchants find it profitable to mediate additional long-distance exchange. Also, it is merchants who provide much of the entrepreneurship and financing required for the reorganization of production in response to market expansion. And they also provide the entrepreneurship and financing required for the creation and adoption of technology and play an important role in its diffusion.

We have found strong confirmation for all of this in the Chinese evidence. Although there are differences in detail, we see in China, as in Europe, the vital role that merchants played in reorganizing production, in coordinating the new forms of organization—especially in industry—and in financing production.

Comparison between the First and Second Transformations shows more clearly than any European evidence just how essential commerce and finance are for economic progress. In Europe, because commerce and finance developed so early, one cannot see as clearly the consequences of their absence.

The importance of entrepreneurship, association, and commercial cities

Entrepreneurship is necessary at each step in the process of economic progress—market expansion, reorganization of production, and technological progress: in each case, someone has to see a profit opportunity and seize it. The organization both of production and of commerce requires joint action, so voluntary association is necessary in both cases. Commercial cities are where economic progress happens—playing a vital role in market expansion, in reorganization, and in technological progress.

The Chinese evidence confirms the importance of entrepreneurship. There are, however, differences in who provided it. In Europe, merchants played the leading role, with landowners too acting as entrepreneurs in agriculture and in land-connected industries. In China, when commerce was relatively weak during the First Transformation, the government and its officials played an important role. And in the Second Transformation, it was often the gentry with its protected status.

China provides clear evidence of the importance of voluntary associations.²¹⁷ Because of their suppression during the First Transformation, commerce and finance largely failed to develop; the direct impact on the organization of production seem to have been less severe. This difference is not surprising given that social technology is far more important in commerce. When voluntary associations were permitted during the Second Transformation, commerce and finance were at last able to develop. In Europe, because voluntary associations were always present, it is difficult to appreciate fully their importance.

For similar reasons, China illustrates better than Europe the vital importance of commercial cities. Commercial cities in Europe were catalysts and generators of economic progress. China did develop major commercial cities that played much the same role. However, there was a crucial difference: while commercial cities in Europe were relatively independent and self-governing, those in China were not. This had serious consequences for the development of commerce and finance.

²¹⁷Macfarlane credits differences in voluntary association between Europe and China as a major factor in explaining the differences in their development ((Macfarlane 2002), (Macfarlane 2000)).

In Europe, self-governing commercial cities provided commerce with a vital framework for joint action in the provision of public goods—in particular, protection against predation, a commerce-friendly formal order, and commercial and transportation infrastructure.²¹⁸ In China, commercial cities were only beginning to provide some of these things towards the end of the preindustrial period. In their absence, neither financial markets nor organized markets in general developed.²¹⁹ Of course, the absence of self-governing commercial cities in China also had a profound effect on the development of government there.

Understanding the pace of economic progress in terms of the obstacles

Our theory asserts that differences in the pace of economic progress are not a consequence of differences in external drivers: economic progress is self-perpetuating and needs no external drivers. Rather, observed differences in the pace of economic progress are the result of differences in external *obstacles*. Such obstacles are primarily the consequence of predation—mainly on the part of governments.

Once again, this is confirmed by the Chinese evidence. Differences over time in the pace of economic progress in China can readily be explained by differences in the obstacles placed in its path by government. As we have seen, this is true of the differences between periods in which economic progress was slow or negligible and periods in which it was faster, and it is true of the differences between the two periods of faster economic progress. It is true, as well, of the difference between the pace of economic progress in China and in Europe.

Moreover, the contrast between government in the First and Second Transformations and between government in China and in Europe provides additional insight into what is required of government in order for economic progress to proceed—not so much ‘perfect government’ as ‘government that is not too awful’. Government in the Second

²¹⁸Another public good was, of course, support in the rivalry for trade. On the positive side, China lacked the local monopoly and protectionism that this produced.

²¹⁹In Europe, the associational governments of commercial cities also contributed to the development of financial markets by being major borrowers—breaking a trail that others, particularly rulers, would later follow.

Transformation was far from ideal, but it was plainly good enough to sustain considerable economic progress.

The Chinese evidence also confirms that what really matters about government is negative rather than positive—what it should not do rather than what it should. Government does not need to play a positive role in promoting economic progress; all it need do is refrain from blocking it.²²⁰ We see too that when government does block economic progress, it is less its direct impact on production that matters than its impact on commerce and, through that, on market expansion.

There is also strong confirmation that if government is not too awful, economic progress will take care of itself. Indeed, the Chinese economy demonstrated a remarkable ability to find workarounds in less than ideal circumstances.

So, all in all, it seems our theory passes the test quite well.

²²⁰We will discuss in Chapter 17 in greater detail what it means to ‘get government right’.

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