Development or Involution in Eighteenth-Century Britain and China?

A Review of Kenneth Pomeranz's *The Great Divergence: China, Europe, and the Making of the Modern World Economy*

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KENNETH POMERANZ ARGUES THAT "the great divergence" between development and involution in Europe and China did not occur until after 1800. Until then, Europe and China were comparable in population history, agriculture, handicraft industry, income, and consumption. Europe before 1800, in other words, was much less developed than the last two decades of scholarship have led us to believe, while China before 1800 was much less involuted. To make his case, Pomeranz spotlights England, the most advanced part of Europe, and the Yangzi delta area, the most advanced part of China. They diverged only after 1800, mainly because of the lucky availability of coal resources for England, and also of other raw materials from the New World.

This is a surprising idea, going radically against received wisdom, but the argument has considerable appeal. It appears to be based on a very sound question: to ask not only the Eurocentric query of why China did not develop as Europe did, but also why Europe did not go down the path of intensification-involution as China did. It has, for many, the neat appeal of de-centering Europe, not only of its Enlightenment modernity, but also of what might be called its Enlightenment economy. For China specialists, it has the added appeal of placing premodern China in a position of equivalence with Europe. There is something that might even appeal

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to the nationalistic sentiments of some Chinese scholars: European success and Chinese failure in modern development can after all be attributed to some degree to European expansion (imperialism?) rather than some intrinsic European propensity. And the argument as to the hows and whys of European development has the apparent methodological strength of dealing in contingencies, rather than the unilinear inevitability suggested by the modernization construct.

But an argument such as this cannot be accepted simply because we like it for ideological or emotional reasons. We need to ask: has the evidence been generated to make the argument at least plausible? The evidential base of the book, however, is not easy to assess. It is not built on original research, but rather relies on past secondary scholarship. Systematic assessment is made doubly difficult because the book ranges far and wide, treating not only China but also India and Japan and even Southeast Asia, and calling on studies not only of Britain, or northwest Europe alone, but also of France, Germany, and even eastern Europe. And it covers a wide range of topics.

On the face of it, the evidence presented seems very admirable. It crosses the boundaries of two hitherto largely distinct bodies of scholarship. To the China specialist, the book shows intimidating acquaintance with European research. The China scholar who thinks Pomeranz is wrong about China faces the problem of having to address the European literature he relies on. And the Europeanist who thinks Pomeranz is wrong about Europe might forgive the weaknesses of evidence on the European side because, after all, the book is not by a Europeanist but by a China scholar who seems in full command of all the difficult language and materials of that still rather insular field. The danger of all this is that the book will not be assessed rigorously by either Europeanists or China scholars. Instead of trying to discuss everything covered in the book, this article will focus on its core empirical arguments about England and the Yangzi delta.[1] That is the base upon which the book stands or falls.

The English Agricultural Revolution

Pomeranz argues that agriculture in England and the Yangzi delta in 1800 was roughly comparable, neither one more developed or more involuted than the other. His main empirical bases concern capital use in agriculture and population dynamics. We will deal with both of those in due course. First we must review briefly the scholarship and evidence on the eighteenth-century English agricultural revolution, about which Pomeranz says nothing at all.

As E. Anthony Wrigley has shown, while the total population of England grew 210 percent from 1600 to 1800 (from 4.11 million to 8.66 million), the percentage of population engaged in agriculture actually shrank by about one-half, from 70 percent of the total to 36.25 percent. By 1800, in other words, just over one-third of the population was able to supply the rest with food. Since relatively little food was imported,[2] this means that "output per head in agriculture" expanded at least by three quarters between 1700 and 1800 (1985, 688, 700–1, 723).

[1]As Eric Jones (1981), Robert Allen (1994), and Anthony Wrigley (1985) all make clear, there are only scant data for eighteenth-century Wales, Scotland, and Ireland. Most observations about Britain are anchored on data mainly for England. I follow their lead here in referring to Britain and/or England without attempting overly precise differentiation.

[2]Amounting to just 10 percent of the total food consumed, in Eric Jones's estimate (1981, 68).

Robert Allen comes to essentially the same conclusions on the basis of more direct evidence. Relying on both estate surveys and contemporary observations such as those of Arthur Young, who traveled throughout England in the 1760s and reported on the details of several hundred farms, Allen concludes that while the size of the agricultural labor force changed little between 1700 and 1800, agricultural output, of both grain and livestock, more than doubled (1994, 102, 107). This eighteenth-century "agricultural revolution" was accomplished without increasing labor input per unit of land.[3] In fact, Allen suggests that labor input per unit of land probably decreased by about 5 percent due to greater animal use and economies of scale (1994, 104, 107).

Wrigley pointedly distinguishes between an increase in total output and in output per unit of labor time: "I have in mind changes which substantially increase labor productivity whether measured by the hour or by the year . . ." (1985, 728 n. 38). What Wrigley speaks to here is what I termed in my work development (involving increased labor productivity), to distinguish it from involution (involving diminishing marginal returns per unit of labor) and intensification (added labor input per unit of land) in the Yangzi delta (1990, 11). Wrigley concludes by posing the question of how English agriculture, "in a land long since fully settled," managed to circumvent "Ricardo's law of declining marginal returns to additional unit inputs of labor and capital" (1985, 726).

Eric Jones's, Robert Allen's, and Mark Overton's narratives of eighteenth-century English agriculture suggest a possible answer to that question, as well as a sharp contrast with the Yangzi delta. Before enclosure, cropping and animal husbandry were separate, one done on individual land and the other on common land. The spread of enclosed fields in the seventeenth and eighteenth centuries allowed cultivators to combine systematically grain cultivation with animal husbandry within their own fields. In the classic Norfolk rotation system of wheat-turnip-barley-clover (which became the norm in English agriculture by the time of Arthur Young's reports of the 1760s), food grains (wheat, barley) were alternated with animal-feed crops (turnips, clover) (Allen 1992, 111; Overton 1996, 3). The system served the purpose, first of all, of increasing livestock production. In Robert Allen's estimate, there was an increase of 73 percent (other than farm horses) between 1700 and 1800 (1994, 109, 113–14). In Eric Jones's estimate, there was an increase in both draft animals and other livestock between 1760 and 1800, of 69 percent in farm horses and 35 percent in other livestock (1981, 73). Such increases meant also enhanced productivity of farm labor, from the increased use of animal manure and animal power, as well as from the enhancement of soil fertility through the nitrogen-fixing properties of the forage crops.[4] (Overton [1996, 118] provides a quantitative representation of the total effects of the Norfolk system.) Fields under the Norfolk rotation, finally, could also be alternated with pasture in "convertible husbandry," to restore or enhance soil fertility (Overton 1996, 116–17). There were of course other causes for enhanced labor productivity as well, including improved seeds, new livestock breeds, improved methods of animal slaughter, economies of scale, and the like. But the change that a comparison with the Yangzi delta highlights is what might be termed capitalization per unit of farm labor, in the sense of increased use of animal power and fertilizer.

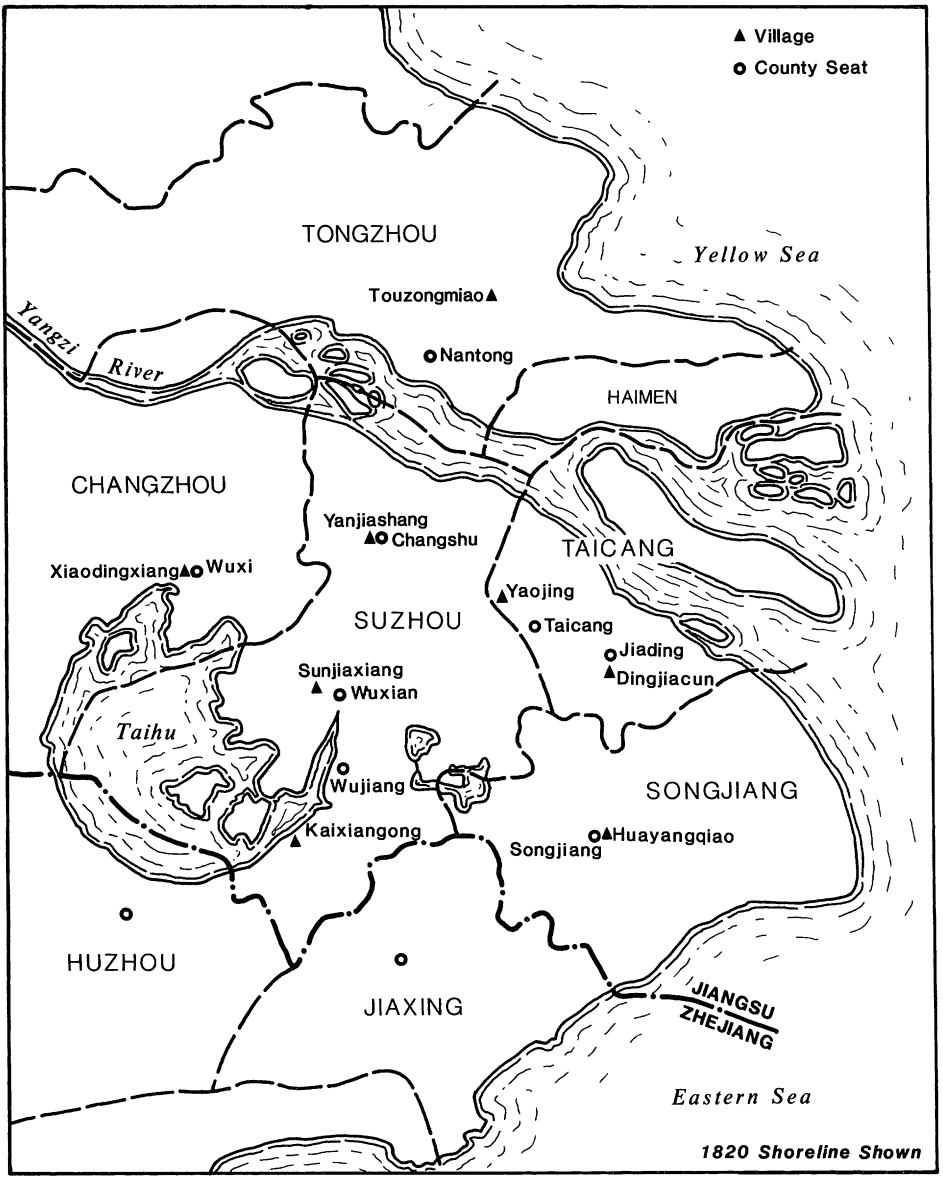
[3]Allen in his 1992 book, of course, argued that there were two agricultural revolutions: the yeoman revolution of the seventeenth century, as well as the landlords' revolution of the eighteenth.

[4]Turnips acted also as a "cleaning crop" by smothering the weeds (Overton 1996, 3).

Map 1. The Yangzi Delta in 1980. From Huang, 1990.

Agriculture in the Yangzi Delta

The central part of the Yangzi delta, roughly one-half of the total area (maps 1 and 2), had in 1816 a population of 12 million and a cultivated acreage of 15 million *mu* (six *mu* = one acre), or just 2.5 million acres, this in contrast to England, with a total population of 8.66 million in 1800 and agricultural land of 35.6 million acres (including not only arable but also pasture, meadow, and common land, which were



Map 2. The Yangzi Delta in 1820. From Huang, 1990.

relatively insignificant in the Yangzi delta).[5] In contrast to the English agricultural regime of mixing cropping with animal husbandry, the Yangzi delta's was virtually

[5]These figures include Songjiang and Suzhou prefectures, Taicang department, and Wuxi and Jiangyin counties, but not Tongzhou department to the north, Jiaxing and Huzhou prefectures to the south, and the rest of Changzhou prefecture. This central half was the focus of my 1990 book. The data given here are from Huang (1990, appendix table B.1, 341–42). The English population figure is from Wrigley (1985, 700). The agricultural land figure is for England and Wales and is from Allen (1994, 104).

a crops-only economy, with correspondingly less capitalization per unit of labor. And, in further contrast to the growing capitalization of eighteenth-century English agriculture, the Yangzi delta was moving in the opposite direction of ever greater labor intensification. The result, not surprisingly, was diminishing marginal returns to labor or what I call involution. We examine below each of these tendencies in turn.

The Crops-only Economy

While the English system alternated arable with pasture and, within the arable, animal-feed crops with human-consumed grains, the Yangzi delta fields were almost entirely under human-consumed crops. The typical Yangzi delta field was placed under spring wet rice followed by winter wheat (Li 1998, 39–40, 50, cf. 6, 15). Where food grains were not grown, the fields were usually under cotton or mulberries. There was only limited growing of *ziyunying* (*honghuacao*) (just 0.9 percent of the cropped area in the delta in the 1930s, for which we have exact data), or *astragalus sinensis*, as a winter crop, mainly as fertilizer for the fields, with only limited use as animal feed.[6] The main farm animal was the scavenging hog rather than the grazing horse, sheep, or cow as in England.

One of the basic facts that agrarian historians know is that at a given level of technology a unit of land under crops can support more people than one under livestock (to support people through meat, milk, cheese). John Lossing Buck in his mammoth study of China's farm economy suggested a ratio of six or seven to one (1937a, 12). What this means is that, absent major technological changes, high population density on a given amount of land will eventually drive out animal husbandry in favor of a crops-only economy. While English (and European) agricultural output generally consisted of roughly equal parts of crops and livestock, agriculture in the Yangzi delta at least since the seventeenth century consisted preponderantly of human-consumed crops (Chen and Wang 1983, passim; Jiang [1834] 1963, passim). In 1952, for which we have precise quantitative data, livestock (including fisheries) accounted for just 11.8 percent of total agricultural output in China (*Zhongguo tongji nianjian* 1983, 150).

The basic difference in agricultural structure between the eighteenth-century English crops-cum-animal husbandry and China's largely crops-only economy accounts, of course, also for the basic difference in diet between the two peoples. In one, the typical food consisted of nearly equal proportions of grain (bread) and cheese/butter/milk/meat (Drummond and Wilbraham, 1958 [1939], 206–10). In the other, it consisted rather of a preponderant proportion of grain (rice, wheat flour, corn, millet, sorghum), conceptualized in modern Chinese as the staple food (*zhushi*) accompanied by much smaller proportions of dishes (*cai*) or supplementary foods (*fushi*), that comprised for peasants just vegetables and on rare occasions also meat (mainly pork, and sometimes poultry and eggs).

The contrast extends beyond diet to clothing practices. The logic about feeding a population on animal products applies also to clothing: it took much more land to supply wool, for example, for a given number of people than it did cotton. And it took much more labor to place a field under cotton than to have it under sheep for wool. While the English of the eighteenth century relied mainly on wool for cold-weather clothing, Chinese peasants of the eighteenth century relied almost exclusively

[6]Jiang ([1834] 1963, 7a–b); Chen and Wang (1983, 15); the 0.9 percent figure is from Buck (1937b, 178). Note that *ziyunying* was used more than alfalfa.

on cotton-padded cotton clothing for cold weather (although the upper classes did use a lot of silk). That too tells about the differential proportions of animal husbandry in the two agricultural systems.

It should be obvious that, other things being equal, mixed farming made for a more capital-intensive agricultural regime, i.e., more use of animal manure and animal power (and also of soil fertility-enhancing forage crops per unit of labor). In a crops-only economy, continued population pressure without technological change drove out animal husbandry to allow for maximizing output per unit of land but inevitably through less use of capital per unit of labor and hence also of lower productivity per unit of labor.

Field investigations by Japanese Mantetsu (South Manchurian Railway Company) researchers in the 1930s have left us precise data that illustrate graphically the logic here. On the North China plain in the 1930s, the wage of a male agricultural worker was actually pegged at the same price as a donkey and only one-half that of a horse or mule, which was generally capable of providing twice the power of a donkey. Thus, a man hiring out with a donkey was paid as much as two men. The equation was based on the fact that it cost as much during work periods to feed a donkey as a man and twice as much to feed a mule or horse as a man. Under those conditions, animal use in farming came to be kept down to the barest minimum, employed only for those parts of the production cycle that could not be done by humans alone, mainly plowing of the land. Raising livestock (other than the scavenging pig) for food was thus largely ruled out. With that came less use of animal fertilizer (outside of pig manure) that, in turn, meant inevitably lower labor productivity (Huang 1985, chap. 8, esp. 148).

Eric Jones, in his study of English agriculture, emphasized the importance of its mixed farming regime. Pomeranz discusses Jones's work and his analysis but dismisses any difference in capital use between English (European) and Chinese agriculture. Per acre use of fertilizer, he argues, was "roughly comparable" between England and the dry-farmed North China plain (2000, 31–34, appendix B, 303–6). Here he seems to have forgotten the logic of his own argument. The point about involution, of course, is high intensity of labor use per unit of land and diminished returns per unit of labor. Given the different intensities of labor use per unit area, to suggest that fertilizer use per unit area was roughly comparable in the two areas is actually to provide *prima facie* evidence for much less use of capital per unit of labor in China. What Pomeranz has done, here and elsewhere (see below) in his book, is to fail to grasp the crucial distinction between land productivity and labor productivity and between labor intensification per unit of land and capitalization per unit of labor.

China's crops-only economy in fact differed from England's mixed economy even in the kinds of fertilizers used. Land scarcity ruled out fertilizing practices that required lots of land, such as the conversion of farmland into grazing pasture to restore soil fertility, as in English convertible husbandry. Even green fertilizers were kept to a minimum, requiring as they did use of the farmland for the crop. That kept the use of a crop such as *ziyunying* down to a very small proportion of the total cropped area. And there was little use of soil-enriching animal-feed crops, such as clover and turnip in the Norfolk system. In both the Yangzi delta and in North China the dominant fertilizer became pig (and human) manure and urine, accumulated household by household, which required the least use of farmland (since pigs could be fed with slop from the family kitchen), even though it required more labor to apply (especially in transporting the manure to the fields and spreading it bit by bit).

The increased use of (soy)beancake in the Yangzi delta in the eighteenth century, after it became available via coastal shipping from the northeast frontier, needs to be understood in this larger context. Made from the dregs left after pressing the oil out of the beans, beancake came to be applied as "chase fertilizer" in the delta, supplementary and in addition to the "base fertilizer" of pig manure (and sometimes in a third application following *ziyunying* or river mud, and then pig manure) (see, for example, Jiang [1834] 1963, 7a-b). Pomeranz is mistaken, in this connection, to suggest that delta peasants used beancake to replace manure in order to save labor (2000, 98).[7] Li Bozhong has argued, with suggestive evidence, that increased use of this fertilizer did not lead to improved yields. According to Li, rice yields in the delta improved little or not at all throughout the Ming and Qing, continuing to hover in the one to three *shi* range (one *shi* = 100 liters in volume, and about 160 catties in grain weight, or 176 pounds—see Appendix), even while fertilizer use increased. The reason, Li argued, was diminished effectiveness of fertilizer (or the diminished fertility of land): while a yield of one *shi* of rice required 53 catties (one catty = 1.1 pound) of fertilizer in the late Ming, it took 115 catties in the Qing, and 200 catties in the 1950s (1984, 34–35). Regardless, it is clear that imported beancake fertilizer soon came under the general logic of this labor-abundant economy: its price rose until the poorer peasants could no longer afford it, or could only purchase it from merchants on credit at usurious rates of interest (of 100 percent between spring planting and the fall harvest in the 1930s and 1940s) (Li 1984, 36–37; cf. Huang 1990, 130–32).[8] Returns to labor were thus quickly pressed down to the general levels prevailing in this crops-only economy.

Labor Intensification

In premodern animal maintenance itself, we might think of three different levels of labor intensification. The least labor intensive was the use of pasture, the next was that of animal-feed crops, like the turnips and clover of the Norfolk system, and the

[7]My thanks to Chris Isett for calling my attention to this error of Pomeranz's.

[8]In order to argue for the Yangzi delta's early development and a "fertilizer revolution," Li Bozhong (1998) reverses his earlier analysis with a numbers game. He refers to Bao Shichen's observation that "more than 10 million *shi* of wheat and beans" were shipped from the northeast to Shanghai annually and argues that the figure must have been in northeast (Guandong) *shi*, equal to 2.5 common (Jiangnan) *shi* (1998, 114, 209 n. 35, citing Wu 1985, 657). Thus, he says, there were really 25 million *shi* of "wheat and beans" shipped to Shanghai in the 1820s and 1830s. On that basis, he comes to an estimate that "there might well be around 20 million *shi* [of beans] left in Jiangnan." He concludes: "Twenty million *shi* of beans imported per year would raise grain output by 40 million *shi* if the beancake was all applied to rice, or raise yield per *mu* by one *shi*."

Now, quite a number of highly questionable leaps are made here. First, Bao's ten million *shi* figure is almost certainly not in Guandong *shi*. Indeed, Wu Chengming himself, upon whom Li relies, treats it as common *shi* when he quantifies the domestic long distance trade on the basis of this same observation (1985, 273). Second, the figure refers not to beancake but to "wheat and beans," of which probably quite a large proportion of the soybeans was used for purposes like beancurd and soy sauce, rather than for soybean oil and beancake fertilizer. Third, even if we accept Li's suggestion that all the soybeans were used for soybean oil and produced beancake, it still does not follow that all or even most of that was used as fertilizer. As Li himself notes, "most of the bean cakes were used for pig fodder" (and only converted to fertilizer as pig manure), rather than directly as fertilizer (1998, 114). That makes his concluding estimate of increased yields of one *shi* per *mu* pure counterfactual speculation. Nowhere does Li confront the evidence he himself presented earlier about diminished returns to fertilizer.

most labor intensive, the use of human-consumed grains. While English agriculture of the eighteenth century typically combined the use of pasture with animal-feed crops for animal husbandry, in the Yangzi delta there was virtually no use of pasture and only little use of animal-feed crops. Animals typically consumed for their coarse feed (*cusiliao*) the secondary produce (*fuchan*) from the fields, like grain dregs and dry mulberry leaves, and for concentrated feed (*jingsiliao*) in work periods, the food grains themselves (Chen and Wang 1983, 86, 88; Huang 1985, 148). What this meant was that draft animals were in direct competition with humans for the limited means of subsistence produced by the land, dubbed today "humans and animals [relying on] the same grain" (*renxu tongliang*), a basic characteristic of a labor-intensive, crops-only economy.

Beyond the differences between English animal husbandry and the Yangzi delta's, there were of course also significant differences in the degree of labor intensity in cropping itself. We can attempt here a preliminary estimate of labor input in English cropping by using the data that Robert Allen culled from Thomas Batchelor's detailed accountings. By those figures, one acre of wheat required labor costs equal to 25.6 days of an adult male, or 4.27 days per *mu* in Chinese measures; this compared to about seven days for the Yangzi delta, or a ratio of about 1 to 1.6 in terms of the difference in labor input per cropping of wheat.[9]

Now, in English agriculture, wheat was the most labor intensive of the different crops in the Norfolk rotation system of wheat-turnip-barley-clover, at a ratio to the other crops of about 4 to 3 to 3 to 1, according to Allen's tallying of the Batchelor data (1992, 158, table 8-3). And arable under the Norfolk system, we have seen, was often alternated in convertible husbandry with the even less labor-intensive pasture. Average labor input per unit of agricultural land in England, in other words, was easily less than one-half that of the labor input for wheat cropping.

In the Yangzi delta, by contrast, winter wheat was the least labor intensive of all crops. Rice required about 1.5 times as much labor as wheat in the Yangzi delta, ten days as opposed to seven days, or about 2.4 times more labor than English wheat (Huang 1990, 84, 125; Buck 1937b, 314). But no typical Yangzi delta household of the eighteenth century could survive on cultivating rice, or rice plus wheat, alone. Rice yields, the highest of all food grains, ranged in the delta between 1.5 to 3.0 *shi* per *mu,* a figure that had actually already been attained on the most productive fields in Suzhou prefecture by the eleventh century (Huang 1990, 89). If we take 2.25 *shi* (of husked rice) as an average yield (on different grades of land), a household of five with an average farm size of 7.5 *mu* (see below) would have produced a total output of 16.9 *shi* of rice. Since average consumption per capita per year of food grains alone was at least two *shi*, if a typical household placed all its fields under rice alone, it would barely meet its food-grain consumption needs, once we take into account the cost of rent, usually 40 to 50 percent of the crop, even without considering the production expenses. Winter wheat helped, adding one *shi* per *mu*, but rice plus wheat was still far from enough to provide for the household's total expenditures.[10] That was why the delta peasants turned to still more labor-intensive and higher yielding crops like cotton and mulberries.

[9]The figure for English labor input here is obtained by dividing Allen's figures for total labor expenses by his figure for average wage per day (1992, 158, 162; cf. Batchelor 1813, 582).

[10]On wheat yields in the delta in the eighteenth century, see Jiang ([1834] 1963, 10a; cf. Li 1998, 124). I am grateful to Chris Isett for reminding me to clarify further the difference between gross and net yields.

In high-lying Songjiang prefecture of the eastern delta, perhaps one-half of the cultivated acreage in the eighteenth century came to be placed under cotton (sometimes followed by winter wheat or beans), and elsewhere in the delta, from perhaps one-fifth up to two-fifths.[11] This was made possible by the long-term spread of cotton cloth between 1350 and 1850 until it became the sole fabric for peasant clothing, and the Yangzi delta came in the process to be a major supplier of cotton cloth for other areas. That switch from rice to cotton, even within the Chinese context, was a big step in further intensification. The cultivation of cotton alone typically required about twice as much labor per unit of land as rice, twenty as opposed to ten days per *mu*. That adds another factor of one to two to the difference between Yangzi delta wheat and rice.

But that is still just the beginning of the story. For the typical Yangzi delta peasant household, cultivation of the crop took up just a small part of the added labor a farm family put into cotton production. The delta peasant households typically grew the cotton, spun the yarn, and wove the cloth themselves, in the well-known three-in-one cotton-yarn-cloth (*hua-sha-bu*) production regime. Now, one *mu* of cotton typically yielded about thirty catties of (ginned) cotton, which in turn required about 160 days of labor, for spinning (91 days), weaving (23 days), and fluffing, sizing, and other miscellaneous tasks (46 days), to turn into twenty-three bolts of cloth (one bolt = 3.63 square yards—see Appendix) (Huang 1990, 46, 84; Wu 1985, 390; Xu 1992, 53). When a peasant household in the Yangzi delta switched a field from rice to cotton, in other words, it needed to put in as much as eighteen times more total labor.[12] The difference from a single crop of wheat would be a matter of 27 to 1.

Much the same applied to mulberries. As is well known, mulberries came to be widely grown on the built-up embankments of wet-rice fields in the low-lying southern part of the delta (in part in order to hold the soil), to form a distinctive combination of rice-cum-mulberry cultivation. In addition, in the late Ming (1368–1644) and after, sericulture in the delta spread to the extent that mulberry cultivation was said to "take over rice fields" (as conveyed in the saying *sang zheng dao tian*). Labor requirements for silk production included forty-eight days for one *mu* of mulberry cultivation, thirty days for feeding the silkworms, and fifteen days for reeling the raw silk which, like cotton cultivation–yarn reeling–cloth weaving, were typically combined inside the peasant household (while silk-weaving, because of its more expensive capital requirements for the looms, was typically done in town). That made for a total of ninety-three days per *mu,* compared to just over ten days for rice. For a peasant household to switch a rice field to mulberry growing for silk production, in other words, involved an increase in labor of about 9 to 1 (Li 1998, 90–95, 148; Huang 1990, 79).[13] The difference from a single crop of wheat would be about 13.5 to 1.

These multiples in labor intensity per crop make understandable the difference in average farm sizes between England and the Yangzi delta in the eighteenth century:

[11]Ye Mengzhu wrote in the late seventeenth century: "in Shanghai, the land is high with little water; thus peasants plant half the fields in rice and beans and half in cotton" (Li 1998, 52). On cotton-wheat double cropping, see Li (1998, 52–53). Systematic data from the 1930s show more than 60 percent of the cultivated acreage in (Qing) Songjiang prefecture under cotton, 40–60 percent in Taicang, and 20–40 percent in Jiaxing (Huang 1990, 26, map 4).

[12]If we adjusted the figure to take account of the labor needs of sideline production accompanying rice cultivation (mainly straw rope-making from rice stalks), which took about eight days per *mu,* the ratio would still be about ten to one (Huang 1990, 84).

[13]The ratio would be about 5 to 1 if we take account of straw rope-making.

150 acres in the south of England and 100 acres in the north (Allen 1994, 99), as compared to Yangzi delta averages of 0.92 to 1.58 acres (i.e., 5.5 to 9.5 *mu)* (Huang 1990, 342, appendix table B.2). If we take a simple average of those ranges, the difference would be 125 acres to 1.25 acres, a difference of 100 to 1. (If we were to compare England not with the Yangzi delta but with the dry-farmed North China plain, the difference would still be 125 to 3 acres, a ratio of 42 to 1) (Huang 1985, 322, appendix table B.1, 327, appendix table C.1).

Another way to think of the differences in labor intensity between English and Yangzi delta agriculture would be in terms of agricultural land per capita of farm population. The 1800 English figure is 11.3 acres, while the Yangzi delta's is 0.25 acre, or a difference of 45 to 1.[14] The above differences in labor intensity, farm size, and agricultural land per capita tell crucially about involution and development not only in farming but also in rural industry, rural incomes, and consumption. But this basic information is not discussed anywhere in Pomeranz's book.

Involution

Pomeranz asserts that the Yangzi delta was no more under a population/resource squeeze in 1800 than was Britain. But how likely is it that, under the technological conditions of premodern agriculture, a labor intensification differential of the dimensions discussed above did not represent diminished marginal returns to labor, i.e., what I termed involution? Obviously, as an organic entity, land yields are not infinitely inflatable in response to increased labor input. Even Ester Boserup, who focused mainly on how agricultural output rose with population, theorized that increased yields from land were generally obtained at the cost of more than the proportionate increase in labor time (1965, chaps. 4, 5).

Because of double-cropping, output per unit of cultivated area (to be distinguished from sown area) in the Yangzi delta was of course higher than in England. In the Yangzi delta, one acre under spring rice and winter wheat yielded 13.5 *shi* of rice (2.25 *shi* per *mu*) and 6 *shi* of wheat (one *shi* per *mu*), to make for a total grain output of 19.5 *shi*. By comparison, in England an acre of wheat yielded 21.5 bushels, or roughly 7.6 *shi* (one *shi* = 2.84 bushels). In terms of pound weight, the Yangzi delta yield was roughly 3,432 pounds per acre, while the English was roughly 1,290 pounds.[15] That is a differential in grain output between the Yangzi delta and England of about 2.7 to 1 per unit of land.

But that yield differential was attained by a much greater labor differential, as has been seen. If we compare the two agricultural systems in terms of labor productivity rather than land productivity, the ratios would be reversed. English

[14]The English figure is based on Wrigley's 3.14 million figure for rural agricultural population and Allen's 35.6 million acres figure for total agricultural land (Wrigley 1985, 700; Allen 1994, 104). The Yangzi delta figure is arrived at by dividing the average farm size of 1.25 acres by the average household size of five. Alternatively, if we estimate that ten million of the twelve million total population were engaged in agriculture and use the total cultivated acreage figure of 2.5 million acres, we come to the same figure.

[15]English wheat yields are from Allen (1994, 112, table 5.7). The equivalences used here between the eighteenth-century English Winchester bushel (35.238 liters, not the imperial bushel of 36.3687 liters) and the Chinese *shi* (one hundred liters), both volume measures, are of course approximate when translated into pound weight. English historians use a weight equivalent of sixty pounds for one bushel of wheat or 170.4 pounds per *shi*, quite close to the Chinese weight equivalent for one *shi* of rice (160 catties or 176 pounds.). I am grateful to Robert Allen for clarifying the English measures for me.

wheat, we have seen, attained a greater yield (1.27 *shi* per *mu*, compared to the delta's one *shi*) for considerably less labor input (four days per *mu*, compared to the delta's seven), for a difference in labor productivity of two to one.

Within the delta itself, winter wheat itself represented an involutionary step when compared to a single crop of rice. While rice yielded 2.25 *shi* for ten days for work, or 0.225 *shi* per day, wheat yielded just one *shi* for seven days of work, or just 0.14 per day. When the delta switched from an annual single crop of rice to double cropping of rice followed by winter wheat, in other words, it witnessed diminished returns to agricultural labor.

But the big story of involution in the delta is told not by wheat but by cotton and silk production. We know that spinning, the most time-consuming part of the cotton-yarn-cloth combined production regime of eighteenth century Yangzi delta households (91 of 160 days), only paid about one-third to one-half as much as farming or cloth-weaving (which were roughly the same in terms of payment per workday) (Huang 1990, 84–85). That meant that as a peasant household intensified land use by switching a field from rice to cotton, it was settling for less average returns per workday than rice farming in return for increased output per unit of land. That was part and parcel of what I termed involution and involutionary commercialization in my book.

The same logic of course applies to sericulture, in which the silkworm-raising and silk-reeling parts of the production, generally done by women, were paid about one-half the wages of a farm worker. According to Li Bozhong's most recent figures, the net value of the product from a *mu* under mulberries was 3.5 times that of a *mu* under rice while the total labor requirement, we have seen, was 9 times.[16]

It should be obvious that such involution or involutionary commercialization did not mean less absolute output per unit of land. Quite the contrary was the case. A peasant household working with a fixed-size farm could of course expand farm output by adopting an involutionary mode of operation through cotton or silk, because it would mean more employment and income for the household's labor even when average payment for such labor per workday declined. That was what I called growth (in output) without development (in labor productivity). On a given sized farm, involution could expand annual income for the household unit by using hitherto unemployed or underemployed household labor (the women, the elderly, the children) for the low-return work, a process I termed the familization of production. It could even result in expanded annual production and income for an individual cultivator by increasing the number of days worked by a factor greater than the diminished returns per workday. But such expansions had obvious limits and need to be clearly distinguished from development in the sense of enhanced labor productivity through increased use of capital per unit of labor, such as what occurred in eighteenth-century English agriculture and in the modern mechanization of agriculture.

As I made clear in my 1990 book, involutionary agriculture was what formed the economic basis for the paradox of the grandeur of traditional Chinese civilization and the economic weakness of modern China (1990, 332–33). In a given area defined by the limit of preindustrial logistics in food supply, an area with a (non-involuted) population of one million and a surplus of, say, 30 percent above subsistence could support a city of 300,000 (or the size of medieval London), but the same area with an involuted population of ten million and a surplus of, say, just 10 percent above

[16]Li (1998, 148, 95); cf. Huang (1990, 54). Despite his own evidence, however, Li maintains that there was no involution.

subsistence could support a city of one million (or the size of Chang'an at its height in the Tang [618–907]).[17] Herein was perhaps the logic of the complex cities, high culture, and elaborate state apparatus of imperial China. That same involuted economy, however, for reasons to be made clear below, meant counter-incentives against modern labor-saving capitalization of agriculture, and the consequent persistence of low agricultural labor productivity, and therefore also of low rural incomes. That was the heart of my idea of growth without development.

Pomeranz misconstrues what I meant by involution, as has been seen, by failing to distinguish between labor productivity and land productivity. Elsewhere he confuses involution with simple immiseration by equating it with a descriptive notion of sub-subsistence employment (2000, 320, appendix E). He then proceeds to argue against that mistaken understanding of involution by insisting on unrealistic incomes for household producers of yarn and cloth. He does this first by mistakenly imagining that three of the seven days involved in producing a bolt of cloth involved high-paid weaving (2000, 322), when in fact weaving took up only one of seven days, while low-paid spinning took up four (what Pomeranz missed was the two days for fluffing, sizing, and other miscellaneous tasks). He then turns the exceptional peasant producer who did only weaving and nothing else into the typical peasant producer (2000, 102, 322–23), by assuming a highly developed market for yarn when, in fact, until the coming of modern textile mills in the twentieth century, there was virtually no marketized yarn available for purchase. As Xu Xinwu has shown, as late as 1860, less than 1 percent of all yarn consumed in China was purchased on the market (1990, 264, 320, table B5; 1992, 53).[18] These misunderstandings of the basic conditions of production in the delta are what led Pomeranz to his unrealistic estimates of incomes from cotton cloth production (more below).

Involution and Industrial Development

An important question here is: what implications did the very different agricultural regimes of Britain and the delta hold for the transition to a modern industrial economy? The history of the Yangzi delta economy points to two main implications of involutionary agriculture: resistance to labor-saving capitalization and possible economies of scale from larger-scale farming and similar resistance by the family-farm cum home-industry production unit to labor-saving capitalization both in proto-industry and in modern industry.

Resistance to Labor-saving Capitalization of Agriculture

One consequence of an involuted regime, we have seen, was to drive out livestock raising and hence also the basis for more capital use per unit of labor in the form of animal power and animal manure. Involuted agriculture could lead to a situation in which human labor could become cheaper to use than farm animals to the extent that animal power came to be used not in order to save human labor but only under conditions in which there was no other choice, whether because of the weight of the

[17]The theoretical insight is original to Ester Boserup (1981, chap. 6).

[18]The shortage of marketized yarn was of course itself a consequence of an involuted production regime in which spinning and weaving were inextricably joined together in the family production unit.

work or the time pressures in the production cycle. This is not to suggest that Yangzi delta agriculture could only have headed farther and farther down a labor-intensifying and involuting path with no possibility of following a labor-saving path of capitalization, only that it was more likely and more difficult for it to do the one rather than the other. Where is the incentive to increase capitalization per unit of labor when labor is so cheap that one could substitute it for capital for less cost?

The recent history of Chinese agricultural modernization is instructive. During the decades from 1950 to 1980 when the modern mechanical revolution (mainly tractor use) along with chemical fertilizer use from the chemical revolution came to delta agriculture, farm production in the area continued still farther down the path of labor-intensification and involution rather than the reverse. The main purpose served by the introduction of the tractor in the Yangzi delta in the mid-1960s was to allow for an even more involutionary three-crop regime (of rice-rice-wheat), by adding a second crop of late rice to the first crop of early rice. Tractors brought this change by making it possible to plow the fields in the short rush period between the harvesting of the first crop of rice and the planting of the second. The addition of that second rice crop, as the peasants were quick to point out, required at least as much additional labor input (as well as fertilizer input) as the first crop, but it always meant diminished yields in the second crop. In the end, the three-fold rise in crop yields in this area brought by the modern agricultural revolution was attained by nearly a four-fold increase in labor input. The latter came from not only a doubling in the farm population but also the full mobilization of women for farm work, from perhaps 15 percent of all farm work up to 35–40 percent of all farm work, plus the increased number of days worked per year from 161 days per year in 1957 to 262 days in 1976–79, in Dwight Perkins' estimate for China as a whole. The result was that incomes per workday in the countryside, even in this most advanced of China's agricultural regions, remained largely stagnant. (On increased labor input, see Perkins and Yusuf 1984, 58, 66, 210; cf. Huang 1990, 236–41; 1991, 330). Low rural income remains a powerful drag today on Chinese development.

A related issue is the elimination of large units of (capitalist) farming by the small family farms. The household production unit was singularly well suited to an involuted economy and indeed formed its very backbone. Women, children, and the elderly could absorb work that male workers on the labor market would not perform. Take the household cloth production unit again: spinning paid just one-third to one-half what farming paid, and hence was something that adult male workers would not be willing to do. The fact that the household production unit could absorb such sideline work (*fuye*, "supplementary work," a particularly apt term) by the auxiliary labor of household members of low opportunity cost actually gave it a competitive edge over a wage-labor-based larger capitalist farm using hired labor, which faced higher labor costs. With its lower operating cost, the family farm could in fact sustain a higher rent, and hence a higher land price, than the capitalist farm, and could therefore drive out the latter. The result in the Yangzi delta was that the larger wage-labor-based farms that existed earlier in the Ming largely disappeared after the seventeenth century (Huang 1990, 58–69).[19]

[19]The contrast with the dry-farmed North China plain is quite striking in this respect. There the family production unit was not nearly as fully elaborated as in the Yangzi delta, because of the lower degree of involution of the farm economy (with dry-farmed crops rather than wet rice, a lower proportion of cotton farming, and an almost complete absence of mulberry cultivation). There, "managerial farms" using hired labor were much more competitive

That preponderance of small family farms eliminated the possibility for introducing economies of scale such as those that occurred in eighteenth-century English agriculture. Crop production as well as rural handicraft industry remained bound to the small-scale production of the family farm and individual household, and animal power and animal manure per unit of labor were kept to a minimum. The contrast with the enlarged enclosed farms and mixed cropping and animal husbandry in England could not be sharper. But it is a contrast that Pomeranz ignores.

All this is not to say that an agricultural system such as the Yangzi delta's had no possibility of labor productivity development. Here the example of Japan is instructive. There, too, premodern agriculture had been quite labor intensive. But there the eighteenth century saw little or no population growth, compared to the more than two-fold expansion in China (Smith 1977). And there the modern mechanical and chemical revolutions in agriculture that came in the twentieth century were accompanied by no large-scale increase in farm labor (Geertz 1963, 130–43). The result was large increases in farm labor productivity through increased capitalization per unit of labor and along with that the raising of the floor of rural incomes.

China today must seek a different path, having already witnessed the eating up of so much of the gains of the modern agricultural revolution by population increase. The distinctive path that rural China has followed is that of rural industrialization: the widespread development of village- and township-based modern industry (to be distinguished from the old handicraft industry), beginning with a kind of junkyard industry and labor-intensive processing of urban goods but developing over the past two decades also capital-intensive industries leading to enhanced labor productivity. In the twenty years from 1978 to 1997, this industrialization in the rural "collective" sector sustained an average growth rate of 19.3 percent per year and came by the end of the period to exceed the mammoth state sector in total industrial output by fully 20 percent (*Zhongguo tongji nianjian* 1999, 423, 424). In the process, "township and village enterprises" had come to employ a staggering total labor force of 129 million (*Zhongguo tongji nianjian* 1999, 137).[20] That is a stunning record by any standards.

But even then it had not managed yet to lower substantially total agricultural employment, since the total labor force in China had expanded by more than the number drawn into off-farm employment in this period. The number of people employed in agriculture continued to grow until 1991, from a total of 285 million in 1978 on the eve of vigorous expansion of rural industries, to an all-time high of 342 million. Only then did it level off, to hover in the 320 million range after 1994 (*Zhongguo tongji nianjian* 1999, 380).

The result is that although rural industrialization has allowed for significant de-involution and enhanced labor productivity in the most advanced areas like the east coast, many other areas remain mired in near-subsistence farming. But the way out of involution has been shown clearly enough. Continued development of rural industrial and other enterprises, when coupled with the eventual arresting and reversal

against family farms, so much so that in the eighteenth-century and after "managerial farmers" (my terms) and rich peasants came to account for most of the well-to-do households in the majority of North China plain villages (1985, 90–95, 72–79). Nevertheless, the low pay for farm workers in that context still resisted powerfully the capitalization of agriculture by increased animal power use, whether on large or small farms. That was the North China pattern of involution.

[20]In addition to industry, this figure includes construction, transport, and other non-agricultural enterprises (*Zhongguo tongji nianjian* 1999, 380).

of the long incline in Chinese population totals (by the draconian one child per couple policies of the last two decades, even though of necessity compromised in the countryside because peasants continue to have to rely on sons for old-age support), should bring de-involution and enhanced labor productivity to the rural economy.[21]

Resistance to Labor-saving Capitalization of Farm Industry

A similar logic of involution and resistance to capitalization can be seen in rural handicraft industry. In the Yangzi delta, the implications are detailed by Xu Xinwu, whose published collection of source materials and systematic analysis of delta cotton handicrafts are widely acknowledged to be the most authoritative available, based on decades of research by teams of researchers.[22] Xu shows that the three-spindle spinning wheel operated by a foot pedal was readily available in the delta by the eighteenth century. That technologically superior spinning wheel was able to produce at nearly two times the rate of a one-spindle wheel. But it did not gain real currency in the delta. Even as late as the early twentieth century, its use remained largely limited to the easternmost counties of the delta (in the eastern part of Qing Songjiang prefecture, where cotton cultivation was the most highly concentrated, but not in the western parts of that prefecture, nor in Suzhou, Changzhou, Jiaxing, or Huzhou prefectures, nor in Taicang department) (1992, 50–52; cf. Wu Chengming 1985, 386–87).[23] The logic, once again, was a simple one: the cheap auxiliary household labor used for such subsidiary production made the installation of the higher-priced multi-spindle wheel uneconomical. The three-spindle wheel had to be operated by an adult in her or his prime, while the single-spindle wheel was readily operable by the elderly and the children. On those terms, it was often cheaper to continue to use two spinners on two single-spindle wheels than it was to acquire a three-spindle wheel and operate it with

[21]Another intriguing possibility is to develop, with the help of modern inputs, large-scale animal husbandry in the relatively sparsely populated northwest, west, and southwest of China, creating thereby a mixed farming system for the national economy, even if not for individual family farms (Deng et al. 1999).

[22]The source materials collected, including all available written documentation and interviews with peasants and textile workers, are in Xu 1992. Systematic analysis and quantitative estimates are in Xu 1990.

[23]In his new book on early industrialization in the delta area, Li Bozhong uses an interview conducted by Xu Xinwu's research group in 1963 on twentieth-century use of the three-spindle wheel to argue that use of the three-spindle wheel must have been more widespread in the Qing than Xu concludes. He argues this without direct evidence and only by inference: that modern technology would have impacted the more advanced traditional technologies more than the less advanced. So, if the three-spindle wheel was fairly widely used in some areas of the delta in the twentieth-century, it must have been even more widely used in the Qing before the advent of modern textile factories (Li 2000b, 48–50, citing Xu 1992, 46). Li ignores Xu's evidence showing that use of the three-spindle wheel was limited almost entirely to the easternmost area of Songjiang (i.e., east of the Huangpu River, principally the counties of Shanghai, Chuansha, and Nanhui), and not used in the western parts of Songjiang or the other prefectures of the delta. For example, the 1917 Qingpu county gazetteer noted that only the eastern part (*dongxiang*) of Songjiang prefecture used the multi-spindle wheel. So too did the 1884 Songjiang prefecture gazetteer (Xu 1992, 50–51). Similarly, Zheng Guangzu of Changshu county recorded during the Daoguang reign (1821–51) that after he saw the three-spindle wheel in Shanghai, he "found a cart to take it back [to Changshu], but after many years still no one was able to use it." Even the "Xie family wheel" (*Xiejia che*), the most famous of all in the Qing, was a single spindle wheel (Wu 1985, 386–87).

just one spinner. The three-spindle wheel therefore remained restricted to a relatively small part of the delta.

Pomeranz, however, again overlooks the basic information in Xu's study. Thus, he assumes that adult women who spun all used the three-spindle wheel and that only "very young girls" who could not operate the foot-pedal wheel used the single-spindle wheel. On that basis, he arrives at what he considers an average daily output by taking the midpoint of what a three-spindle wheel and a single-spindle wheel produced in yarn, thereby exaggerating the typical output of an eighteenth-century spinner by 50 percent (2000, 320–21), this despite Xu's demonstration that the three-spindle wheel saw only limited use in the delta. This is another one of the errors (in addition to his misunderstandings of time spent in weaving relative to spinning in the production of cloth and of the availability of commercialized yarn) by which Pomeranz comes to his conclusion that delta women engaged in cotton production earned more than male agricultural workers—in his words: "her surplus above her own subsistence was 1.6 to 3 times that of a male agricultural worker" (2000, 102; cf. 320), this even though he knows and acknowledges that returns to spinning, which occupied the largest proportion of all work in the cotton economy, were sufficient only to provide "barely half the needs of an adult female" (2000, 102).

Pomeranz arrives at his figure by his grab-bag approach to empirical data, in this case to price data drawn from a variety of secondary sources. Those data, it turns out, are for different grades of cotton and cloth and are based variously on the easternmost counties of the delta (the *Mumianpu*), on the delta as a whole (Kishimoto), on North China (Fang Xing), and on national figures (Wang Yeh-chien) (2000, 316–23, appendix E). While useful for showing long-term trends in prices, these are of little or no use in estimating peasant incomes because of their inconsistency and because they are mostly retail prices in town charged by merchants, not prices received by peasants. But Pomeranz manipulates these disparate and inconsistent data to arrive at the implausible conclusion he wants, which is 7.2 to 9.3 *shi* of rice for a woman spinning yarn and weaving cloth each year, hence far above the normal grain subsistence requirement of an adult (about three *shi*) and "1.6 to 3 times" that of a male agricultural worker (2000, 318–19). Xu Xinwu's authoritative study, by contrast, uses not questionable price data but rather knowledge of the basic conditions of production to arrive at an estimated income of 0.1 *shi* for every bolt of cloth requiring 7 days of work, or 1 *shi* for every 70 days of work—only 3 *shi* per worker per year, if we use Pomeranz's 210 days per work-year figure (1992, 88ff). Pomeranz completely disregards Xu's figures.

Another issue is the difference between Yangzi-delta family-farm home industry and English proto-industrialization. As David Levine has shown, in England, proto-industry, by providing English peasants with employment opportunities alternative to farming, actually altered demographic patterns, leading to earlier and higher rates of marriage. The result was substantial population growth, a pattern most clearly illustrated in the community of Shepshed. Levine's hypothesis has since been largely confirmed by later studies of the Cambridge Group for the History of Population and Social Structure, based on rigorous and precise use of 404 parish registers (1977; Schofield 1994, 61, 87).

Yangzi delta family farm industry, however, did not lead to any dramatic changes in demographic behavior. The explanation can be found in Xu Xinwu's materials: rural handicrafts in the Yangzi delta in fact never became an independent alternative to farming for peasants but rather always remained a sideline activity supplementary to farming. We have not far to look for the reasons: as noted above, the largest portion

of the new productive activity consisted of spinning of yarn, accounting for four of the seven days required for a bolt of cloth. The payment for such work was so low as to provide only about half the subsistence of an adult woman. Even coupled with higher-paying weaving, the total annual income of a typical spinner-weaver was just three *shi* of rice, barely enough to cover the food-grain needs of one person. That being the case, cloth production could not in itself become a viable alternative to farming for supporting a family. Instead, it made for a production pattern in which delta peasant households typically combined grain farming with cotton cultivation and cotton handicrafts. For households on the margins of subsistence, as I suggested in my 1985 book, it was a pattern that might be likened to a person relying on the twin crutches of farming and handicraft industry to survive (191ff). Low income from farming had to be supplemented by income from handicrafts in order to maintain subsistence and vice versa.

There is a mountain of evidence to document how farming and proto-industry provided not alternative sources of subsistence for peasant households but rather mutually supplementary ones (see, for example, Xu 1981, 21–71). Let me quote from two particularly illustrative contemporary accounts. The first comes from the mid-eighteenth century, from Wuxi County, one of the most advanced areas of the delta:

> The peasants here get only three winter months of food from their rice fields. After they pay off their rent, they hull the rest of the rice, put it in a bin, and turn it over to the pawnshop to redeem their clothing. In the early spring, the entire household spins and weaves in order to exchange cloth for rice, because the family no longer has any grain left. By the fifth month, they take their winter clothing and pawn it for rice. . . . In the fall, whenever it rains, the sound of the shuttle of the loom again fills all the villages, and [the peasants] carry their cloth to trade for rice to eat. It is in this way that the peasants of our county, even in times of poor harvests, manage to eke out a living so long as the cotton ripens in other places.
>
> (*Xi Jin shi xiaolu* [Wuxi Jingui gazetteer, miscellaneous items] 1752, 1:6b–7b, cited in Huang 1990, 87)

The same applied to silk reeling. In 1662, the well-known intellectual Gu Yanwu (1613–82) put it in reference to Jiaxing (prefecture) in the southern half of the delta:

> Here the harvests from the rice fields are enough for only eight months of food for people. The remaining months as a rule are supplied by exchanging [silk] for rice. Taxes and family needs alike are dependent on silkworms. . . . All loans and contracts wait for the conclusion of sericulture for payment. Even for the winter taxes, they [the peasants] generally dare not sell rice to meet the payments, for fear that rice prices might rise. Instead, they usually pawn their rice for silver [to meet the tax payment], and then redeem the rice with interest after the silk work is done.
>
> (Huang 1990, 88)

Since rural home industry was not separated from farming, it is no wonder that the logic which obtained in a place like Shepshed in England, where proto-industry came to provide employment opportunities independent from farming and thereby enabled sons and daughters to marry before they could inherit the farm, simply did not obtain in the delta. According to Schofield, English population increase in the eighteenth century was mainly the result of the drop in the mean age at marriage from about 26 to about 24, along the lines of the logic outlined by Levine (1994, 74, 87). In China, because home industry remained closely tied to and supplementary to farm income, no real change has been detected (more below).

The implications that involuted home industry held for modern industrial development have been documented in considerable detail by existing research. Handicraft weaving was able to hold on with great force in twentieth-century China. Even as late as 1936, handicraft weaving still accounted for 38.8 percent of total cloth consumption in China (Xu 1990, 319, table B-4; cf. Huang 1990, 98). Handicraft weaving was able to hold on against a labor productivity differential of one to four compared to machine weaving because of low-cost family labor.[24] In spinning, by contrast, the labor productivity gap between handicraft spinning and machine spinning of one to forty virtually wiped out handicraft spinning: at those ratios, handicraft spinning even by low-cost subsidiary family labor could not survive, so close had yarn costs dropped to the costs of cotton (Xu 1990, 320, table B-5; cf. Huang 1990, 98). This is a story well known to China specialists, which I summarize here for the benefit of our Europeanist colleagues.

The difference between eighteenth-century Yangzi delta rural home industry and eighteenth-century English proto-industrialization extended also to the respective urbanization histories of the two. The Yangzi delta of the eighteenth century shows the rise of some new towns for cotton and silk processing and marketing (Huang 1990, 48–49) but nothing comparable to the urbanization delineated for England by Wrigley. According to the estimates of G. William Skinner, the proportion of the population that was urban (defined as living in towns of two thousand or more) in the Lower Yangzi Region in 1843 was just 7.4 percent (1977, 229). This is in sharp contrast to Wrigley's estimate of 27.5 percent in towns of five thousand or more by 1801 in England (1985, 688, 700–1, 723).[25]

The reason is obvious. The Yangzi delta did not undergo the kind of agricultural revolution that England did, and it was England's agricultural revolution that made possible the increased food supply to support a large off-farm population and hence a proto-industrialization that became increasingly town-based rather than one that remained tied to the family farm. The combination of the agricultural revolution with town-based proto-industrialization was what undergirded the urbanization demonstrated by Wrigley.

That "new urbanization," according to Jan de Vries, is to be distinguished from the premodern pattern of urbanization, which saw the growth of large, old administrative-commercial cities (with populations of forty thousand or more, including Paris and London). The new urbanization took place instead chiefly in smaller new towns and cities (of sizes between five thousand and thirty thousand). For de Vries, this was a Europe-wide phenomenon that began around 1750. While the proportion of Europeans living in larger cities remained stationary between 1750 and 1800 (growing just 0.2 percent over the period), the proportion living in the small cities and towns exploded four-fold (1981, 1984). Wrigley has refined de Vries'

[24]And also through innovations with the newly improved native cloth, which used ingeniously machine-spun yarn (i.e. foreign yarn or *yangsha*) for the warp and Chinese yarn (or handspun yarn) for the weft. The coarser hand-woven cloth proved to be more lasting than the finer count machine-spun cloth and hence continued to be favored by peasants (Huang 1990, 137).

[25]Cao Shuji's recent work comes to a higher estimate than Skinner's, but still only about one-half of Wrigley's for England, and much lower still if the towns of two thousand population were removed to make the tally more equivalent to Wrigley's which includes only towns of five thousand or more population (2001, chap. 17). Note that Skinner in his later 1986 study of Sichuan suggested that he may have to revise this 7.4 percent figure upward to 9.5 percent (1986, 75 n. 43).

data and argument for England to show that this new urbanization was first and foremost an English phenomenon, traceable to the dynamic rise and expansion of towns after about 1670 (1985). China would not experience that kind of vigorous small-town growth until the development of modern industry in the countryside in the 1980s (Huang 1990, 48–49, 264).[26]

An "Industrious Revolution?"

Reviewing the contributions of the past two decades in European economic history, Jan de Vries points in particular to four areas of accumulated research: first, the demonstration that an agricultural revolution occurred in the century preceding the Industrial Revolution; second, demographic changes of the sort identified by Levine, Wrigley, and Schofield as outlined above; third, the "new urbanization" that established "a framework for regional economic development in which industrial growth could occur (rather than being itself a product of that industrialization)"; and, finally, proto-industrialization, giving new by-employment to female and child labor and giving rise to the demographic changes just outlined (1994, 251–52; cf. 1993). These accumulated findings make up what de Vries characterized as the "Revolt of the Early Modernists," who broadened our understanding of the Industrial Revolution by locating its roots in the early modern period.

De Vries has now added the hypothesis of an "industrious revolution," meant to be a fifth component of the package. The model is meant, first of all, to solve the conundrum posed by evidence of lower average wages and yet higher total consumption. What de Vries suggests is that employment of women and children lowered average wages but raised household total incomes. The industrious eighteenth-century households, with women and children as well as the men working off-farm in both country and town, supplied on the one hand more rural goods for urbanites, and on the other hand more consumption demand for urban goods. The changes in consumption, especially, set the stage for the Industrial Revolution to come. This industrious revolution and its accompanying consumption changes (consumption revolution?), in other words, joined with the other changes identified by the "Revolt of the Early Modernists" to power the Industrial Revolution.

Given de Vries' intent and the substance of his hypothesis, it is surprising that Pomeranz would have tried to equate the Yangzi delta with de Vries' industrious revolution since in China, after all, there was no nineteenth-century Industrial Revolution to explain. But that is what Pomeranz decided to do (2000, 17), along the same lines as R. Bin Wong's brief discussion earlier (1997, 30–31). For them, the equation apparently seemed an obvious one because of the facts of employment of women and children, and of a lower average income. They argue, therefore, that what I called involution in the Yangzi delta should really be understood in the terms of de Vries' industrious revolution.

To make such an equation, however, requires quite a complicated set of arguments. First, the revolution part must be removed from eighteenth-century

[26]All this of course runs counter to Li Bozhong's attempt to equate Chinese early industrialization with English and European proto-industrialization. Li does not consider the fact that in England, proto-industry came to be town-based and separated from farming, accounting thereby for de Vries' new urbanization, while in the Yangzi delta cotton spinning and weaving, as well as silk reeling, remained tied to farming (2000b).

Europe, lest the equation with China break down. Pomeranz therefore erases both the agricultural revolution and the new urbanization. He makes no mention of them at all, despite de Vries' highlighting of them in the same article on the industrious revolution. Next, European proto-industrialization must be made to look purely involutionary rather than revolutionary, in order to make it look more like the Yangzi delta. Thus, Pomeranz reduces David Levine's important work to a simple argument for dead-ending involutionary change (2000, 93) and ignores Levine's main contribution, which has to do with the logic he uncovers that proto-industrialization allowed employment in town, altered demographic patterns by permitting earlier and more universal marriage, and paved the way for industrial capitalism. Pomeranz turns Levine's "nascent capitalism" theme into an argument for just involution. In this way he tries to take the revolution out of de Vries' industrious revolution.

Robert Brenner has made crystal clear the difference between an involutionary pattern of proto-industry and an emergent capitalistic one by comparing the inland southern Low Countries with the northern Low Countries near the sea, from the twelfth century through the seventeenth century. In one, handicraft industry remained tied to peasant production, mainly a prop for survival through involutionary production at diminished incomes. In the other, it came to be separated from farming, completely oriented to the market and to profit, and anticipated the coming of industrial capitalism (2001). Pomeranz misses completely the revolutionary side of such Dutch and English handicraft industry.

Next, to make his equation work and not to violate de Vries' scheme too grossly, Pomeranz found it necessary, as has been seen, to insist on a high income for women spinner-weavers in the Yangzi delta—hence the kind of data manipulation discussed above. He found it necessary to fashion for the delta more of a marketized environment than was actually there, hence the imagination of a highly developed market for cotton yarn when there was no such, and of spinners using the three-spindle foot-pedal wheel as typical of the delta when most continued to use the single-spindle wheel. Finally, he capped off those with the implausible construction of a supposedly typical woman spinner-weaver who earned several times the wage of a male agricultural worker.

As might be expected, he does not deal with the problem of why the Yangzi delta did not exhibit urbanization comparable to Europe, even though I had made that point strongly in my book. Thus, he misses the crucial difference between the revolutionary side of European proto-industrialization and involutionary Chinese rural home industry: one became increasingly a town phenomenon, while the other remained almost exclusively a sideline to family farms. One gave rise to the new urbanization, while the other, even in the Yangzi delta, remained mainly a rural phenomenon.

In spite of his rather drastic skewing of de Vries' scheme, Pomeranz tries to imitate de Vries' incorporation of demand-side economics by looking also at consumption, although he does not want those changes to be revolutionary. So he set himself the task simply of trying to argue that there was no real difference between China and Europe in consumption (chap. 3). What he set out to do here, as with all the other topics above, is to try to make eighteenth-century England and Europe involutionary rather than revolutionary, in order to equate it with China, while at the same time to make the Yangzi delta less involutionary than I suggested, in order to equate it with England and Europe.

He ignores, first of all, the evidence de Vries and others have generated to document the big changes in consumption patterns in the seventeenth and eighteenth centuries, not just among town people but also rural people. There is de Vries' own study of the Friesian peasants of the Dutch Republic on the basis of probate records.

As de Vries put it, these peasants "gradually acquired a variety of 'urban goods'—mirrors, paintings, books, clocks—and gradually upgraded the quality of their home furnishings." The probate inventories show that "simple wooden storage boxes made way for great oak chests, tin and wooden bowls and dishes made way for pottery and delftware. Curtains seemed unnecessary in the sixteenth century; by 1700 they were ubiquitous." There were, moreover, "growing collections of silver display objects, from spoons, decanters, and bible clasps, to personal adornments for both men and women" (1993, 100).

Lorna Weatherill's work with some three thousand English probate records covering both towns and villages in eight regions shows much the same pattern in England. Her list of key goods resembles de Vries', including books, clocks, mirrors, table linen, and silver, which she shows to be increasingly common among rural people during the period 1675 to 1725 (1993, especially 219, table 10.2, 220, table 10.4).

It is on the basis of such evidence that de Vries builds his case for his industrious revolution, in which the entry of women and children into employment enlarged the supply of rural goods to the towns, raised household surplus incomes, and increased rural consumption of urban goods. That, we might say, was what set up the classic rural-urban exchange about which Adam Smith wrote, one that for Smith would lead to spiraling development in both (Smith [1776] 1976: 401–6).

Pomeranz ignores all of this and sets about instead to make his own case for equivalence in consumption between England and the Yangzi delta (and between Europe and China). He devotes much space to tea and sugar consumption, but those were really items of relatively minor importance in the peasant household when compared to, in order of the proportion they occupied in the budget, food-grain, cotton and cloth, vegetables, salt, meat, and edible oils. Twentieth-century ethnographic research shows that tea and sugar together accounted for just 5 percent of all commodities purchased by Yangzi delta peasants (Pomeranz 2000, 117–23; Huang 1990, 96–97). The key item Pomeranz considers is cloth consumption, which was indeed important. But here he makes a particularly misleading comparison: his subject is consumption, but on the cloth comparison between England and the Yangzi delta he switches to per-capita production instead. That allows him to find approximate equivalence between the Yangzi delta and England, showing 14.5 pounds of cotton and two pounds of silk produced per capita in the Yangzi delta, as against 12.9 pounds (of cotton, wool, and linen) produced per capita in England in 1800. He leaves the reader with the impression that consumption per capita approximated those levels (2000, 138). He then tries to estimate national per-capita consumption, by arguing implausibly that cotton output in China in 1750 must have been about the same as it was in 1870 or 1900 and that, given the smaller population in 1750, per-capita cloth consumption in 1750 must have been about twice as much as later. On that basis, he comes to the figures of 6.2 to 8 pounds per person for China, compared to 8.7 pounds in the United Kingdom and 6.9 pounds in France (2000, 140–41, appendix F). Though he had noted earlier that "both linen and wool are generally lighter per square foot than cotton, amalgamating these different kinds of textiles biases the comparison against China," he comes, not surprisingly, to the conclusion that "Chinese textile consumption stacked up quite well against that of Europe in the mid- to late eighteenth century" (138, 142).

What Pomeranz has done here is to ignore once again basic knowledge. The Yangzi delta was the leading exporter of cotton and cloth in China, as conveyed by the expression "[the Yangzi delta] clothes the empire" (*yibei tianxia*). A peasant household cultivating an average sized farm of 7.5 *mu* and placing 20–50 percent of

it (1.5 to 3.75 *mu)* under cotton, would have produced 45 to 112.5 catties of cotton (thirty catties per *mu)*, enough for 34 to 85 bolts of cloth (about 1.32 catties of ginned cotton for each bolt—see Appendix). As we have seen, the reason for such a high concentration on cotton by Yangzi delta peasants was to maximize output per unit of land under severe subsistence pressures, this in order to exchange cotton and cloth for grain in order to support the family. By Xu Xinwu's estimates, the peasants of the most highly concentrated areas of cotton production in Songjiang prefecture sold 70–90 percent of their cotton and cloth, mainly for export to other regions of China. To equate their production with their consumption, therefore, is most misleading. By Pomeranz's figures and suggestion, the Yangzi delta peasant would have consumed more than ten bolts of cotton cloth, and two bolts of silk, enough to make more than ten new outfits of cotton cloth and two of silk each year!

Xu's figures show that cotton cloth consumption for China as a whole averaged about 1.5 bolts per person before the coming of Western imperialism, or about 2 catties (2.2 pounds) of ginned cotton, plus 0.6 catty (0.66 pound) per person for wadding. This figure would grow to two bolts per person in 1936, because of the larger output of cotton, greater availability of machine-spun yarn and lesser durability of machine produced cloth as opposed to native cloth (the former, according to Xu's sources, lasted just two years per outfit, while the latter lasted three). Xu provides detailed figures for 1840, 1860, 1894, 1913, 1920, and 1936, anchored on firm and precise 1936 data (1990, 314–15). That seems to me a much more plausible scenario than Pomeranz's shaky assumption that 1750 acreage and yields must have been the same as 1870 and 1900, for neither of which he has firm figures. Why should population increase have had such a drastic depressive effect on cloth consumption after 1800 but such an expansive effect before? In his eagerness to make his argument, Pomeranz (332) even argues against Li Bozhong, on whose work he otherwise relies a great deal. He manages to criticize Li for relying on Xu Xinwu and calls on Wu Chengming's book for support, apparently unaware of the fact that Xu was the author of the sections on cotton in the book edited by Wu (Xu 1990). Xu's figures, of course, suggest a national fabric consumption figure per capita just one-third to one-half that of Pomeranz.

To date, little systematic work has been done on other aspects of Chinese consumption. Fang Xing's 1996 article, which Pomeranz cites, is one of the first serious attempts, by using imaginatively several agricultural treatises from the seventeenth and nineteenth centuries.[27] Fang's intent in his study is to argue for substantial improvement in living standards in the Yangzi delta between the early seventeenth century and the eighteenth century. He uses a plausible figure of two bolts of cloth consumed per person per year, without change between the two periods. His argument for an improved standard of living concentrates mainly on expanded "supplementary food" (*fushi*, or mainly meat, fish, poultry) consumption. According to Fang, expenditures for food accounted for 76 percent of the total family income in the seventeenth century, but fully 83 percent in the eighteenth, this because of increased consumption of supplementary foods, while consumption of food grains remained largely constant (55 percent in the early period, and 54 percent in the later). The order of that increase consisted of the larger number of celebratory days when peasants consumed meat, fish, and poultry. In the earlier period, such consumption occurred on fewer holidays, mainly New Year's. By the eighteenth century, Yangzi delta peasants might have celebrated this way as many as twenty days a year. Even

[27]The treatises used are the 1658 *Bunongshu*, 1834 *Pu mao nong zi*, and 1884 *Zuhe*.

so, Fang acknowledges, there was some decline evidenced in the fact that food-grain consumption had changed from the consumption of only rice, a higher-priced fine grain (*xiliang*), to the consumption of a mixture of rice (60 percent) and the lower-priced coarse grain (*culiang*) of barley, and broad beans (1996, 91–98). This kind of change, and the modest improvement in consumption suggested, seems to me possible under the involutionary regime of the Yangzi delta, but it is not at all of the order of changes delineated by de Vries for his industrious *revolution*.

Much more needs to be done on Chinese consumption before a serious comparison can be made with European consumption. Chinese household division documents, supplemented by detailed searches through the gazetteers, might provide information comparable to European probate records for information on inherited durables. But the big and important story was probably in perishables, like the food-grain, supplementary foods, and cloth consumption Fang Xing emphasizes (1996). An additional item of significance might be fuel. The Yangzi delta peasant had no heating fuel to speak of, only rice stalks for cooking. The use of coal for home heating was very rare, and firewood was a luxury available to only very few. The contrast with England here was probably as great as that in meat consumption.

Population History

We come now to the issue of China's population history, the related question of female infanticide, and what those show about development and involution. In Pomeranz's view, female infanticide was part and parcel of the picture he wishes to construct for the Yangzi delta: of comparability with eighteenth-century Europe, in this case in its use of preventive checks, to result in a fertility rate even lower than Europe's, and therefore one that gave rise to no more severe population pressure than in England. That is consistent with his overall view of the eighteenth-century Yangzi delta as a place that saw no more involution than England. For this part of his argument, he calls mainly on the authority and works of James Lee.

Pomeranz and James Lee's Argument and Data

James Lee has argued (as have many others) first of all that female infanticide was widely practiced in China. In his coauthored book with Cameron Campbell and in another with Wang Feng, Lee makes his case on the basis of differential mortality rates of male and female children in the records of the northeastern community of Daoyi in Liaoning province, with an enumeration of 12,000 peasants for the period between 1774 and 1873. If we assume the same mortality rates for unregistered children, and Lee guesses that about one-third of male births and two-thirds of female births were never registered, then it is probable that "between one-fifth and one-quarter of all females died from deliberate infanticide" (Lee and Wang 1999, 51; Lee and Campbell 1997, 58–70). Lee also uses the unusually complete imperial household registers, with a count of 33,000 people between 1700 and 1830, to suggest that "one-tenth of all female children were probably killed during the first few days of life" (Lee and Wang 1999, 49). Pomeranz cites Lee to the effect that 25 percent of new infant girls were killed in China (38).

We need to set aside here the issue of the precise extent of female infanticide. Lee's Daoyi estimates are based as much on educated guesswork as on enumerated

data. A truly convincing figure will have to await future research and more direct evidence. The actual rate no doubt varied substantially over time and space, and might well have been substantially lower than what Lee suggests for Daoyi. Our concern here, however, is with what Lee, and Pomeranz, do with the numbers they constructed.

Female infanticide, we are told by Lee and Pomeranz, is actually "postnatal abortion." It tells not about subsistence pressures in the sense of Malthusian "positive checks"— i.e., deaths from the population and land squeeze in which food production fails to keep up with population increase so that food prices rise, real wages decline, and malnourishment, starvation, and death result—but rather about the absence of such. It tells about the use of "preventive checks" comparable to the delayed marriage of Europe (Pomeranz 2000, 38; Lee and Wang 1999, 61; Lee and Campbell 1997, 70). The point Lee and Pomeranz, along with R. Bin Wong and Li Bozhong (Wong 1997, 22–27; Li 2000a), want to make is that Chinese population history was equivalent to the European in that it was not, as Malthusian mythology would have it, mortality driven by positive checks. Rather, it was fertility driven by preventive checks in the manner of European population.

The key here is the notion of postnatal abortion. If the children killed were seen as aborted, even though they were already born, then they should not be counted in the mortality rates, and therefore also not in the life expectancy count.[28] Thus, when Lee compares Daoyi, Liaoning, with European data based on parish registers at birth, he counts only Daoyi children at age six months and not at birth (Lee and Wang 1999, 55 table 4.2).[29] By that count, life expectancy in Daoyi was twenty-nine. It was on that basis that Lee, and Pomeranz, came to the conclusion that Chinese mortality and life expectancy were both roughly comparable to the European.

But if Lee's own figure of life expectancy of twenty-nine at age six months in Daoyi were adjusted by his own estimated female infanticide rate of 25 percent, we would be talking about a female life expectancy at birth of just under twenty-two. That would make the life expectancy count for the Yangzi delta not at all comparable to the thirty-four to thirty-five figure for England in the eighteenth century (Schofield 1994, 67ff).

In addition to erasing female infants killed from the mortality data, treating female infanticide as postnatal abortion removes those babies also from the count of "total marital fertility." Again, if the infants killed were aborted and not quite born, then they would not be counted in the fertility data.[30] Thus, we find that Lee makes no adjustments for female infanticide in his count of total marital fertility in Daoyi. What he does is to adjust only for under-registration on the basis of estimates of unregistered male children, without trying to take account of the larger under-registration of female children, as he indicates honestly (Lee and Campbell 1997, 90 n. 10; but not mentioned in Lee and Wang 1999, 85–86). He, and Pomeranz, comes thereby to the conclusion that Chinese married women bore a surprisingly low number of babies (Pomeranz 2000, 41), with a total marital fertility of about six. That makes Chinese fertility rates even lower than west European ones of 7.5 to 9 in the period 1550–1850, according to Lee and Pomeranz (Lee and Wang 1999, 8; Pomeranz 2000, 41).

[28]Cao and Chen (n.d.), in an early draft (April 2001), first pointed this out.

[29]Pomeranz mistakenly cites Lee's figure as being for the age of one year when Lee's figures are actually for one *sui*, a Chinese count that Lee and Wang equate with an average of about six months (Pomeranz 2000, 37; Lee and Wang 1999, 55).

[30]See note 28 above.

Stevan Harrell pointed out some time ago, in his introduction to the volume that resulted from a conference of China demographers, that recorded figures should be adjusted upward by 25 percent to take account of infant mortality and female infanticide. That applies, for example, to Liu Ts'ui-jung's work with five genealogies from the South China area for the period 1300–1900, for genealogies focus mainly on sons and simply would not record infant daughters who died or were killed (Harrell 1995, 15; Liu 1995). In contrast to Lee, Ted Telford, working with thirty-nine genealogies from Tongcheng county (in Anhui province neighboring the delta) with a total of 11,804 people counted in the period 1520–1661, arrived at an estimate of total marital fertility of eight to ten by adjusting his data with a presumed moderate female mortality rate of 250 per one thousand (1995). And Arthur Wolf, on the basis of rock-solid data from the Haishan area of Taiwan in 1906–45 under Japanese colonial administration, retrospective interviews conducted in 1980–81 of 580 women in seven sites in China originally studied by John Lossing Buck, and the high-quality data gathered in 1931 by Chiao Chi-ming for Jiangyin county in the delta, came to an estimate of 7.5 (1985).

Lee's figures for total marital fertility would actually be similar to Wolf's and Telford's if the 25 percent of daughters estimated by him to have been killed are counted among the births. That would make Lee's data very different and he would not be able to conclude, as he did, that Chinese fertility data show a rate even lower than the west European (Lee and Wang, 1999 chap. 6, esp. 90; cf. Lee and Campbell 1997, 92).

In short, Lee's (and Pomeranz's) interpretation of female infanticide as postnatal abortion and therefore not to be counted as either death or birth is actually the linchpin in their two principal arguments: that Chinese mortality (or life expectancy) was not so different from Europe, and that preventive checks operated in China even more than in Europe. If one interprets the female infants killed differently, and counted them as both births and deaths, one would on the basis of their own data and estimates arrive at a different picture from what they argue.

Arthur Wolf, moreover, has shown in his meticulous review of Lee's books that even if we accept Lee's figures as constructed, there are more plausible alternative explanations for them than the deliberate birth control that Lee infers—i.e., of "late starting, early stopping, and long spacing," in addition to postnatal abortion. Having the first child rather late, Wolf suggests, can be explained by early marriage and relatively late menarche. Ceasing to have children rather early, moreover, can be accounted for by either earlier marriage (hence higher number of years married at an earlier age and correspondingly lower coital frequency) or earlier menopause attributable to poor health or malnutrition. Long spacing between children, finally, also can be explained by poor nutrition and by the necessity on the part of the poor to hire out away from home. Wolf calls on direct evidence from in-depth interviews to support his argument. For him, low Chinese marital fertility is itself to be explained by poverty and subsistence pressures, not their absence (2001).

A Different View

Let us return here to the question of what to make of female infanticide. In Lee's view, daughters in China were killed because of choices made in a context of cultural preferences that favored sons, and of "a peculiar attitude toward life" in which "the Chinese did not consider children during the first year of life as fully 'human'" (Lee and Wang 1999, 60–61). But did gender preference alone lead to the killing of one's

daughters, or was it other pressures that first dictated infanticide and only then did the cultural preference for sons make for the choice to kill daughters? And, given the fact that new infants were and are almost everywhere in China celebrated at the end of the first month after birth (*manyue*), is it really true that children were not seen as fully human until after their first year of life?

To settle the issue fully we would need to have more class-specific analysis of Chinese demographic behavior, although there have been some suggestive beginnings. Stevan Harrell has shown, on the basis of three genealogies from Xiaoshan County (in Zhejiang province) in the delta with data from 1240 to 1904, that higher status (i.e., degree-holding and therefore presumably more well-to-do) families had more recorded children than others. This was because the rich tended to marry earlier and could also take in younger concubines (1985). And Arthur Wolf, on the basis of the excellent Taiwan data, reinforces and extends Harrell's suggestion by showing that wealthier farm families (not just degree-holding gentry families) had higher recorded marital fertility rates (1985, 182–83). Zhou Qiren, finally, reconstructing the population history of three villages surveyed systematically by Japanese Mantetsu researchers, suggests that while richer peasants had more sons because they could afford to, poor peasants had more sons because they could not afford not to, in order to survive and maintain themselves in their old age on the incomes their sons could earn by hiring out (2000). Together these findings suggest that female infanticide might have been mainly a practice of poorer peasants who were driven by survival dictates to keep trying for more sons.

Contemporary observers of the late imperial period certainly attributed female infanticide mainly to poverty and the high cost of dowries, and officials urged that orphanages be established to deal with the problem (Ho Ping-ti 1959, 58–62; Waltner 1995). The Italian Jesuit Matteo Ricci (1552–1610) who lived and worked in Ming China from 1583 to 1610, put matters especially clearly:

> A far more serious evil here is the practice in some provinces of disposing of some infants by drowning them. The reason assigned for this is that their parents despair of being able to support them. At times this is done also by people who are not abjectly poor, for fear that the time might come when they would not be able to care for these children and they would be forced to sell them to unknown or cruel slave masters.
>
> (Waltner 1995, 200)

An obvious example would be a land-poor or landless couple. While more well-to-do landed peasants could look to the customary practice of retaining a part of the family land for old-age support (as *yanglaodi*, or "old-age support land"), they could not. They had to pin their hopes on sons, who would be required by both law and custom to support them by hiring out (Huang 2001, chap. 8). Daughters would not be able to do so. Moreover, even if they were to do their best to scrape by and raise the daughter, they would likely be faced with the prospect of having to sell her later on. In that kind of condition of existence, it seems to me, the killing of daughters becomes more understandable.

I do not mean in this line of thinking to suggest that the poor must have been the only ones who resorted to female infanticide, but rather that they likely accounted for the majority of such actions. Even Lee acknowledges that ". . . Chinese parents in the past curtailed their fertility or killed their children in response to the dictates of household economy . . ." (Lee and Wang 1999, 10). In his earlier book with Cameron Campbell, he actually placed female infanticide under the rubric of Malthusian

positive checks rather than the preventive checks that he argued for later (1997, chap. 4). But that understanding got lost in the later dramatic argument against Malthusian mythology and for a fertility-driven rather than mortality-driven Chinese demographic regime.

Lee's own data actually suggest that poverty probably played an important role. His imperial lineage data, as has been seen, suggest a female infanticide rate of about 10 percent. And Lee uses those figures to argue that if female infanticide occurred even in well-to-do families, then it must have been society-wide rather than poverty specific. But the data point to another line of reasoning, for even his own data show that low-ranking nobles, a larger proportion of whom were presumably impoverished, were more prone to kill their female infants than high-ranking nobles (Lee and Wang 1999, 58). More important, even if one assumes that almost all of the 33,000 of the imperial lineage members counted were relatively well-off, we still must account for the difference between the 10 percent rate of that population and the 25 percent rate estimated by Lee for the Daoyi peasant population. Could it be that poverty accounted for at least three-fifths of the female infants killed in Daoyi?

Lee's (and Pomeranz's) interpretation, once again, seems motivated mainly by the wish to find equivalence with Europe for China. In Lee's case, that leads him to another questionable reconstruction of China's demographic history. As Cao Shuji and Chen Yixin (forthcoming) show, Lee's decision to rewrite Chinese population history in the European fertility-driven mold leads him to erase from the demographic record the massive disasters of the mid-nineteenth century. Thus, he arrives at a straight-line pattern of Chinese population change for the period 1700 to 1950, as would be consistent with the "fertility-driven regime" that he asserts, rather than one with abrupt downs that would be consistent with one punctuated by mortality crises (Lee and Wang 1999, 28). He thereby erases the terrible toll of lives exacted in the mid-nineteenth century by the wars of the Taiping uprisings in the south and the Yangzi delta and of the Muslim uprisings in the northwest, and finally by the massive drought in the north. Cao Shuji's new research, based on exhaustive use of local gazetteers and prefecture-by-prefecture reconstructions of population totals and changes, suggests a total death toll from these devastations between the years 1851 and 1877 of a whopping 118 million (2001, 5:455–689). I leave to others the task of systematic assessment of Cao's estimates but, even if we allow for a margin of 100 percent error in his estimates, we would still be talking about a death toll of sixty million, about one-seventh of the total population of the time.

The mid-nineteenth century, of course, was not the first of the massive disasters that accompanied dynastic transitions throughout most of Chinese history. The record, it seems to me, argues for a population history that was powerfully shaped by mortality, even if not in a strictly and narrowly Malthusian sense of positive checks. It should not be equated with the fertility-driven model of preventive check (of delayed marriage) for early modern and modern Europe constructed by Malthus, any more than female infanticide should be equated with the absence of subsistence pressures.

The Mounting Social Crisis

Could the larger context for female infanticide have been the mounting social crisis that would climax in the mid-nineteenth century disasters? Recent research in Chinese legal history suggests that the same subsistence pressures behind female infanticide led to widespread selling of women and girls, so much so that the Qing

Code added no fewer than sixteen new substatutes to deal specifically with such actions. The majority of those new substatutes were promulgated in the Qianlong reign (1736–1796) (Xue [1905] 1970, substatutes 275–03 to 275–18). And investigations into case records show that the buying and selling of women were so widespread that litigation stemming from such transactions accounted for perhaps 10 percent of all civil cases handled by the local courts. We know that the Qing legal system, though more accessible than previously assumed, was nevertheless perceived by the general population as a forbidding one that most entered into only reluctantly. Under the circumstances, it is perhaps not unreasonable to speculate that only a low percentage of all instances of the buying and selling of women was litigated. If we use a figure of 5 percent, that would mean a total incidence of such transactions of 165,000 a year. At 1 percent, it would mean 825,000.[31] Regardless of what the precise numbers might have been, the selling of wives and daughters by the impoverished reached such a scale that the Qing Board of Punishment had come by 1818 specifically to excuse such actions from punishment, on the grounds that the poor forced by survival pressures to sell themselves should be shown compassion and not be punished (Huang 2001, 157, 168–69).

Another related social phenomenon was the rise of an unmarried "rogue male" population, a result both of poverty (because the men could not afford to get married) and of the imbalance in sex ratios that followed from female infanticide. Recent research shows that this symptom of the mounting social crisis led, among other things, to large changes in Qing legislation vis-à-vis illicit sex (Sommer 2000). Even more telling, perhaps, is the host of new legislation targeting specifically the "baresticks" single males (*guanggun*) and related "criminal sticks" or bandits (*guntu*, *feitu*), clearly a major social problem in the eyes of the authorities of the time. As with the mounting problem of trafficking in women and girls, the Qing state promulgated no fewer than eighteen substatutes to deal with the new social problem (Xue 1970 [1905], substatutes 273–07 to 273–24).

These were just some symptoms of the long-term trends observed by numerous contemporaries of the eighteenth century, from the Qianlong Emperor down to local officials and literati (Yan 1993, 188–89). The best-known of the latter, of course, is Hong Liangji (1746–1809), dubbed by some (not entirely appropriately) "China's Malthus" for his two famous essays of 1793 on "Reign of Peace" ("Zhiping") and "Livelihood" ("Shengji"). As someone who came from a poor background himself, Hong was keenly sensitive to the lot of the poor. He had also traveled widely throughout the country, had compiled numerous local gazetteers, and was well informed about the social-economic conditions of the country. According to Hong,

[31]A total of sixty-eight or more than 10 percent of the total of the 628 Qing "land, debt, marriage, inheritance related" cases I collected from the counties of Baxian in Sichuan, Baodi in Hebei [Qing Shuntianfu], and Danshui-Xinzhu in Taiwan for the period 1760–1909, had to do with the buying and selling of women (2001, 157, 1996, 240). If we use the figures I proposed in my study that civil cases totaled one-third of the total caseloads of local courts, and that local courts averaged a total of 150 cases per county per year, then we are talking about a total of perhaps five cases per county per year (1996, 173–81). If those that were litigated amounted to 5 percent of all instances of such transactions, then there were something on the order of one hundred such transactions per county per year, or a total of 165,100 (1,651 *xian*, *ting*, and *zhou* in the Qing) cases each year in the country as a whole. An assumption that litigated cases amounted to 1 percent of all such transactions would increase the total fivefold, or to 825,000. All this of course is just to make a very rough guess at the possible dimensions involved. A larger sample, both in numbers of cases and numbers of counties, if it can be done, will be needed to come to a more reliable estimate.

the increase of population in China had in the past century of peace far outstripped the increase in cultivated land and in the means of subsistence. The prices of goods had risen steeply, while wages had dropped sharply. The gap between rich and poor had widened, and the numbers of unemployed had greatly increased, posing serious threats to social order. The poor, finally, had been the first to suffer and die from hunger and cold, and from famines, floods, and epidemics. In addition to the essays, Hong left numerous poems expressing his compassion for famine victims and the impoverished, based on his own firsthand observations. The famines he described and commented on specifically were the 1774 drought in the Huai'an area (in northern Jiangsu) north of the delta, and the floods in the following year in nineteen counties centering on Jurong county in the western part of the delta. Thirty years later, in 1804–06, he wrote again about the severe flooding in the Yangzhou area just north of the delta and about the famine and drought the next year in his own hometown Changzhou area in the delta. This time he himself took on the work of managing famine relief work in the area, after making a large personal donation for the purpose.[32]

Lest anyone think that Hong's observations apply only to the end of the eighteenth century, let me briefly call also on William Rowe's monumental new study of Chen Hongmou (1696–1771), one of the exemplary officials of the eighteenth century. Rowe quotes from a letter Chen wrote around 1744:

> As the benevolent and solicitous policies of our glorious Dynasty have gradually taken effect, the people have continued to multiply. Newly reclaimed marshes and highlands have been turned to productive use. And yet I worry that our limited supply of land is increasingly inadequate to support our ever-growing population . . . . This is a problem that no imperial official can cease to be anxious about for even a moment.
>
> (Rowe 2001, 156)

In a memorial of 1742 to the Qianlong emperor, Chen had emphasized how "people's livelihood" had declined in recent years because of (in Rowe's words) "mounting pressures of population growth on resources." On these as well as a great deal of other evidence, Rowe notes forcefully that "This [food] was also, I would argue, the single most important policy area in Qing China, at least prior to the unprecedented military and cultural threat presented by the West." And, Rowe continues, "In Chen Hongmou's day . . . it is safe to say that nearly all in government were preoccupied with them [the adverse population-to-resources levels]" (2001, 155–56, 188 n. 13).

Rowe's observations are largely consistent with my own studies of Qing law. Qing law on civil matters, I have suggested, evinces a survival ethic, in sharp contrast to the contract and profit ethic that the Republican Civil Code of 1929–30 borrowed from the German Civil Code of 1900. Qing law provided generous terms of redemption for peasants forced by subsistence pressures to sell their land; it forbad lenders from charging usurious interest against peasants forced to borrow for survival; it upheld the rights to long-term tenure of uprooted peasants who reclaimed waterfront or hillside land; and it banned the selling of women and children by those

[32]The content of Hong's two essays is summarized in Ho Ping-ti (1959, 271), though in an abstracted theoretical tone rather than in the tone of realistic observations of the original (Hong [1793] 1877; Yan 1993, 184–90). I have adjusted the paraphrasing here accordingly. On Hong's impoverished background and sympathy for the poor, see Chen Jinling 1995. For his poems about the victims of famines and the lot of the poor, see pp. 48–54, and 321–26. On the numerous local gazetteers he compiled, see Yan Ming 1993, 130–48.

who would victimize the poor, while instructing its courts not to punish the poor forced by survival pressures to sell themselves (2001). The Republican Civil Code promulgated in 1929–30, after three drafts and revisions, would incorporate most of these among its practical stipulations, even while retaining the organizing logic of the original German blueprint.

Eighteenth-century trends, observations, and concerns such as those noted above make understandable the massive social crisis that would culminate first in the mid-nineteenth famines and popular uprisings, and then in the revolutionary redistributions under the Communists in the twentieth century. By "social crisis" here I do not mean to suggest a simple Malthusian notion of a subsistence crisis driven purely by population pressure. Rather, as I suggested some years ago, the Qing saw the conjuncture of population pressure with commercialization. In North China, while commercialization provided opportunities for enrichment to some, it brought impoverishment to many others who took market risks but did not fare well. In the Yangzi delta, involutionary commercialization represented by cotton and silk cultivation enabled the farm economy to absorb more population, but it did not substantially alter the pre-existing context of social inequality. The result of the conjuncture of population pressure with inequality was the formation of an expanding poor peasant class (in absolute numbers even if not necessarily in terms of proportions of the population), ranging from landless agricultural workers to tenant cultivators who also hired out as day-laborers (1985; cf. 1990). At the bottom of that poor peasant class were single males who could not afford to marry, large numbers of them part of a growing floating population of vagrants and mendicants who from the eighteenth century onward became a permanent feature of Chinese society (as is well discussed in Kuhn [1990, chap. 2], among other works).

Female infanticide, I would suggest then, was part and parcel of a host of symptoms of that larger social crisis. It tells about growing subsistence pressures among the poor, not about the absence of such as Pomeranz and Lee maintain. By the same token, the buying and selling of women tell about pressures on the impoverished, not about the absence of such, nor about the rational allocation of resources in response to market stimuli. Pomeranz, however, makes female infanticide a major pillar of his story of supposed equivalence of China with Europe. After relying on Lee's research and conclusions about Chinese population history, it is but a short step to his own conclusion: China before 1800 was no worse off than the British and European economies in terms of population pressure. And conversely, Britain was no better off. The two were equally poised for either involution or development. Their great divergence, therefore, occurred only after 1800.

A Matter of Coal?

For Pomeranz's view of what happened after 1800, we come finally to his arguments about coal, which he draws from E. Anthony Wrigley. Wrigley had argued powerfully for a distinction between the "organic economy" of preindustrial agricultural systems, based on human and animal power, and the "mineral-based energy economy" of the industrial revolution, based mainly on coal (and steam). In one, energy was largely limited to human and animal muscle, ultimately derived from the very finite resource of land. In the other, energy came from vastly greater supplies of coal, in which one man could mine some two hundred tons of coal a year, or many,

many times the amount of energy that he himself expended. It was this difference, according to Wrigley, that made possible the great advances in real wages per worker that distinguishes the industrial from the preindustrial economies (1988, 77, passim).

England, in this analysis, was gifted by chance with rich supplies and early development of coal. By Wrigley's account, England in 1700 produced already 2.5 to 3 million tons of coal a year, perhaps "five times as large as the output of the whole of the rest of the world" (1988, 54, citing Flinn 1984, 26). By 1800, England produced fifteen million tons a year, "when the combined production in all of Europe probably did not exceed three million tons" (1988, 54).

In emphasizing coal, Wrigley wanted to make the point that chance figured in England's industrialization. He pointedly argued against the rather teleological, "unitary" schemes of modernization (1988, 99–104). It should be clear, however, that to emphasize that chance figured in England's industrialization was not the same as to argue that chance alone is sufficient to explain industrialization, much less that coal alone mattered. The difference between the two arguments may not be immediately apparent, but it is a crucial one. To stress the importance of coal, on top of pointing out England's agricultural revolution and the urbanization it enabled, as well as other trappings of capitalism, is to make a sophisticated argument about the nature of economic change. As Wrigley put it: "a country needed not only to be capitalist in the conventional sense . . . but also to be capitalist in the sense that its raw materials were drawn increasingly from mineral stocks. . . . The English economy was capitalist in both senses of the word, but the connection between the two was initially casual rather than causal" (1988, 115). That is a very different thing from arguing that chance, or coal, alone mattered. In fact, Wrigley devoted in this book as much space to the agricultural revolution ("the advanced organic economy") as to the early development of coal ("mineral-based energy economy"). Each, for him, showed how England diverged early from other places.

Here's what Pomeranz does with Wrigley's argument and material. He notes early on the favorable position of England vis-à-vis coal; by contrast, he asserts, the Yangzi delta was hampered by difficult access to the coal mines in the northwest (2000, 57, 59, 64–65). He later observes, nevertheless, that even though "serious problems were building in the ecology" of the Yangzi delta, "it was probably not until well into the nineteenth century that they became more severe than problems in core regions in Europe [including England] and Japan" (2000, 229). That observation then sets up his argument of "ecological relief" for England, supposedly provided by coal and the colonies, which was not available to the Yangzi delta (2000, 274–78). He points especially to sugar from the New World, absent which, he says, England would have had to devote 1,300,000 acres to supply itself with sugar (2000, 275); and cotton, which would have required 9,000,000 acres in 1815, and 23,000,000 by 1830; and, finally, coal, absent which "would have required that the country magically receive 15,000,000 additional acres of forest" (2000, 276, citing Wrigley 1988, 54–55). The impression he leaves the reader with is: coal and the New World furnished England with raw materials totaling more than all of the cropland in England could have produced. Therefore, it was the chance access to coal and colonies, and that alone, that distinguished England from the Yangzi delta.

We have seen that Wrigley was speaking of English coal production during the eighteenth century, not after. And Wrigley, in any case, was speaking of the combination of the chance development of coal with England's distinctively advanced organic economy, not just of the chance development of coal. But Pomeranz turns Wrigley's observations about the 1700 to 1800 period in England into something

that occurs only after 1800. And he turns that into an argument that chance alone was sufficient to explain industrialization. What he has done here is to turn Wrigley's sophisticated argument that chance figured in England's industrialization into a simple argument that coal and colonies alone mattered. His skewed usage of Wrigley here is of course reminiscent of what he did with Jan de Vries' "industrious revolution."

His assertions about coal supplies in China and for the Yangzi delta are also highly questionable. Tim Wright's detailed study of the coal industry in China shows China to be one of the best-endowed countries in the world in terms of coal deposits (1984, 17). It also shows that, when industrial demand came, China's coal industry developed rapidly, raising output from just under 500,000 tons a year in 1896 to four million tons by 1936 (1984, 10–12, tables 1, 2, 3, 195). Readers who are modern-China historians will be familiar with the Pingxiang county coalmines in the Jiangxi-Hunan highlands which supplied Zhang Zhidong's Hanyang Iron Works in Wuhan via the Xiang River and the Yangzi River (see, for example, Hornibrook 2001). Obviously, those same mines could as easily have supplied the Yangzi delta. China's (or the Yangzi delta's) delayed industrialization, in other words, cannot be explained by the lack of availability of coal as Pomeranz asserts; rather, it is the lack of industrial demand that explains the non-development of China's coal industry. Pomeranz's argument, in short, places the cart before the horse.

Wrigley himself, finally, might have left an exaggerated impression of what mineral-based energy might do for agriculture. China's post-1949 experience shows that the coming of the mechanical and chemical revolutions to an already highly intensified and involuted agricultural system brought only limited expansions in output when compared to those in the industrial sector: just several-fold rather than much larger multiples, and then (in the Chinese case) only with extreme further labor intensification. The productive capacity of land was after all quite limited, even with mineral energy inputs. From that perspective, the two-fold increase in productivity attained by the eighteenth-century English agricultural revolution looks even more distinctive and important for England's industrial revolution than Wrigley himself might have suggested.

Two Contrasting Economies

Pomeranz, I wish to emphasize, has made a useful contribution. He set himself the commendable and difficult goal of addressing two separate bodies of scholarship without reducing either England-Europe or China to a theoretical abstraction. In so doing, he has helped raise questions that have hitherto been overlooked and has drawn the attention of Europeanists to the Chinese experience and of China scholars to the European. Moreover, no China scholar would fault his wish to de-center Europe and center China. We can all appreciate those worthy goals as well as the difficulties of trying to acquire solid control over both fields. Many of the failures of the book can be excused on these grounds. For the future, the moral may be to rely more on collaborations across the fields as well as to pay careful attention to empirical information.

It is ironic that Pomeranz should have chosen to use a comparison between pre-1800 Britain and the Yangzi delta to anchor down his argument of no economic difference between Europe and China until after 1800. England and the delta in the

eighteenth century, we have seen, were in fact virtually at opposite poles in a continuum from development to involution across Europe and China. In one, agriculture was much less intensive in terms of labor input per unit area, with average farm sizes one hundred times that of the other and cultivated acreage per capita forty-five times and substantially higher productivity per unit of labor. That agricultural economy experienced unmistakable labor productivity advance in the eighteenth century, due in no small measure to greater use of animal power and manure. Those productivity advances, in turn, helped to make possible the development of town-based handicraft industry that provided a separate alternative source of livelihood for many, enough to undergird demographic expansion and dramatic urbanization. In addition, there were substantial expansions in household incomes and big changes in consumption patterns, helping to drive increased rural-urban trade. Finally, there was the early development of coal production. The combined result was to make England better poised in 1800 for modern industrial and agricultural development than any other area of the globe.

In the Yangzi delta, by contrast, labor intensification and involution per unit of land had reached among the highest extent of any area of the globe. Rice, cotton, and silk cultivation were easily among the most labor-intensive production regimes in the preindustrial world. They exemplified what I term involutionary growth—i.e., absolute increases in output per unit of land at diminished returns per unit of labor. That involutionary growth made the Yangzi delta the most advanced area in China in terms of output per unit area, as well as in terms of its capacity to support complex cities, an elaborate governmental apparatus, and a sophisticated elite culture. But that advanced condition was achieved through extreme labor intensification per unit area, accompanied by lower capitalization per unit of labor and lower returns per workday. Rural home industry remained tied almost completely to the old family farm economy, each a necessary supplement to the other. No changes comparable to the sort found in England accompanied that involutionary growth. In one, we might say, there were five big changes (revolutions?), plus the early development of a mineral (coal); in the other, there was none of those.

All this is not to suggest that population, or agriculture (and home industry), alone could explain the development or non-development of modern industry, any more than market exchange (and division of labor) or production relations, or capital accumulation or property rights, or technology, or consumption demand, or coal. While the China-England comparison does highlight differences in labor intensification per unit of land and involutionary returns in both agriculture and rural home industry, the modern industrial revolution clearly must be understood as very much a conjunctural rather than a unicausal matter. The eighteenth-century English experience points to the importance of the intersection of multiple tendencies of at least semi-independent origins, although some were also clearly interconnected: an agricultural revolution, proto-industrialization, new demographic patterns, new urbanization, new consumption patterns, and large coal output. But none of those was present in eighteenth-century China or its Yangzi delta. What was present were not the roots of a nineteenth-century Industrial Revolution but rather the roots of a massive nineteenth-century social crisis.

Appendix: Weights and Measures

Chinese weights and measures vary over place and time. The catty (*jin*) used in this article refers to the *shi jin* ("market catty"), equal to 1.1 pound. The larger measure *shi* ("stone," not to be confused with *shi*, "market") is a volume measure, weighing in rice about 160 catties, or 176 pounds.

Rice yields may be expressed in terms of husked rice (*mi*) or unhusked rice (*daogu*). All references here are to husked rice. The conversion rate from unhusked to husked is generally 10 to 7.

Cotton yields are expressed here in terms of ginned cotton (*pimian*), not of unginned cotton (*zimian*). The bolt (*pi*) measure for cloth refers here to the "standard native cloth" (*biaozhun tubu*), weighing 1.0914 *guanjin*, equal to 1.32 catty (*shijin*), and measuring 3.6337 square yards, or 32.7 square feet. Ginned cotton loses about 4 percent in weight when fluffed, and cloth gains about 5 percent in weight when sized. Thus, the conversion from ginned cotton to finished cloth is very close to 1 to 1 in weight.

The *mu* used here is the standard *mu*, equal to 1/6 of one acre.

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