In their classic history of Chinese capitalism from 1550 to 1840, Wu Chengming and Xu Dixin (1985) took the labor-intensive nature of much Chinese industry as a sign of its backwardness. Xu and Wu particularly emphasized that the prevalence of rural industry in the Ming and Qing dynasties and the importance of laborers whose families also continued to farm indicated a failure to undergo true capitalist industrialization, which of necessity would involve proletarianization and urbanization of the work force and higher capital/labor ratios. In so arguing, Xu and Wu spoke both for a near consensus among historians in China at the time and for a perspective on the present which argued that whatever one thought of China’s experiments with small-scale rural industry under Mao, the country’s real industrial future lay in the gigantic steel mills and other factories of major cities. This view of both past and present was mirrored, oddly enough, by Western modernization theorists for whom the flourishing of labor-intensive rural industry was both a sign of the failure of true industrialization and something that, by taking advantage of exceptionally low wages, posed a continuing barrier to labor-saving technological change and “real” development.

As Chinese scholars have become freer to craft economic histories that do not depend on strict Marxist stages of development, various challenges to Xu and Wu have emerged, but thus far there has been no new synthesis on a comparable scale. The closest would be Li Bozhong’s works on agricultural and industrial development in Ming-Qing Jiangnan – particularly his massive book on “proto-industrialization” (2000) – which achieves a comparable temporal if not geographic sweep. In it, Li aims to reverse the empirical verdict of backwardness reached by
Xu and Wu: in case after case, he argues for a gradual increase in the concentration of ownership, scale of production, movement of production to towns and cities, increasing importance of fixed capital, increasing specialization among workers, and so on: all of which are taken as indicative of “progressive” or “advanced” sectors. Thus, despite Li’s strong interest in the literature on “proto-industrialization” in Europe, which suggests very complex and non-linear paths from an earlier phase of strictly regulated urban industry to rural industry heavily reliant on abundant cheap labor to the urban factory industry of the 19th and 20th centuries, his own notion of what constitutes “development” seems not that different from that of Xu and Wu: what differs is his judgment of how far China, or at least the Yangzi Delta, had moved along that path by 1850. And by comparison with advanced parts of Western Europe, any part of late imperial China has to continue to look “backward” by these criteria – at least if we focus on labor/capital ratios.

In what follows, I would like to pursue a different perspective: one which emphasizes the growth of labor-intensive, mostly rural, industry as characteristic of a Chinese pattern of development which, having accounted for the bulk of Chinese industrial growth for hundreds of years, and then played a significant role again in the last 30 years, cannot be treated as simply a dead end. Nonetheless, it has seemed in the last few years to be giving way to patterns of industrialization which seem more familiar from the last 200 years of Western history; in some ways, this resembles transitions which occurred roughly 20-30 years ago in Taiwan and after World War II in Japan.

Distinguishing this pattern of labor-intensive growth from one in which labor intensity is simply a response to capital shortages, low real wages, and limited technological change requires, among other things, searching for a different kind of technological change and industrial development: one in which technological change tended to be labor-absorbing, not only because labor was abundant, but because much technological change took the form of a proliferation of new products which were aimed at specialized market niches and required new skills for their production. These skills, in turn, often allowed those who possessed them to improve their standard of living despite working in a sector that was not “progressing” in terms of capital/labor ratios. Thus, labor-intensity could represent either relative stagnation (or even
immiseration) or a different and perfectly healthy kind of development; the complex tasks of sorting out these tendencies and their relationships to each other are still barely begun.

The discussion below will focus almost exclusively on one region: Jiangnan, which for most of the last millennium has been the wealthiest and most industrial area of China. Usually referred to in English as the Yangzi Delta, Jiangnan is actually the part of the Delta south of the river; except for a very narrow sliver (now absorbed into metropolitan Shanghai), the north shore of the Yangzi was considerably poorer, and has a very different social and economic history. Though geographically compact, the region has long been densely populated: by the 17th century, it had over 20 million people (one fifth to one sixth of the Chinese empire at the time); by the mid-18th century, about 32 million. It then grew very little for almost a century, suffered a large population decline during the Taiping Rebellion (1851-1864) and had just barely exceeded its mid-18th century population by the first census under the People’s Republic (1953). Since then it has again participated in the general rise in China’s population, though at a rate below the national average.

Jiangnan’s dense population and near-perfect location for trade before the age of steam – the Yangzi and its tributaries drain over 1/3 of present-day China, and coastal navigation from Jiangnan was relatively easy most of the year – encouraged the growth of various industries, which exported relatively high value per bulk finished goods (along the coast, up the Yangzi and along the Grand Canal) and imported bulkier products (mostly food and raw materials). At the same time, the geography was not particularly favorable to kinds of industry that required large amounts of energy, either mechanical or thermal. The Delta never had much forest (a significant part of it having been reclaimed from seaside marshes), and no coal; as I emphasized in a recent book, there was not even much coal that could be shipped to it at a reasonable price under pre-modern conditions. (Being largely reclaimed marsh, Jiangnan has few other kinds of mines, either.) While the area does have an enormous amount of water, it is also mostly flat and so has very little fast-moving water; while waterwheels and related devices were used to move the water itself for irrigation, the use of water power for industry was fairly limited. Wind was

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1 Though by certain measures, the Pearl River Delta may now be richer, and parts of Southern Manchuria have a larger percentage of their work force in industry.

available seasonally, and as late as the 15th century, the area probably still had the world’s most sophisticated windmills; but Jiangnan lies at the edge of the monsoon belt, and the alternation of very high winds with no wind at all did not encourage the development of this sort of power either. Meanwhile, crucial features of the built environment – in particular, dense population and a paddy-rice agriculture in which animal traction was much less needed than in dry farming on heavy soils – meant that animal power was relatively scarce, too. (The dense network of waterways also meant that they were not as important for transport as elsewhere.) As concentrations of commercial oil presses developed in certain Delta towns, these firms purchased livestock from elsewhere (mostly Jiangxi) for motive power, but found it quite expensive to feed them, as they competed for grass, straw, etc., with the area’s pigs and poultry (much more efficient converters of starch to protein) and with people who used straw for fuel. The gradual growth of these relatively large scale commercial oil presses, flour mills, etc., indicates that where there were sufficient returns to increasing scale, capital and energy intensive kinds of production could certainly out-compete smaller hand operations. However, the high cost of sustaining large animals and the relatively limited demand for the services they could provide other than turning heavy stones meant that the use of such equipment was kept to a minimum.

Under the circumstances, industry in Jiangnan primarily meant light industry, and usually small-batch artisanal production. For obvious reasons, this was particularly true of the various specialized luxury goods that the area was known for; but it also tended to be true of the products the area produced for a more general market: above all textiles, but also printed matter of various sorts, some processed foods (alcohol, soy sauce, pickled vegetables, etc.) and so on. If anything, production in textiles, by far the largest sector, probably became more dispersed with time, at least from the 15th-18th centuries: the centralized urban workshops under government supervision that the Ming (1368-1644) had tried to maintain at the outset of their dynasty lost much of their work force rather quickly, and soon lost most of the luxury market except for that part made explicitly to the state’s orders (e.g. official robes); in time, even some of that work came to be contracted out to private workshops in various Jiangnan cities. And the production of more

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3 Elvin 1971
5 It is worth remembering here that paddy rice not only needs less animal power to grow than wheat, but also to process; once it is threshed it is essentially ready to cook, while wheat is normally ground into flour. See Bray
ordinary textiles rather quickly became established in the countryside, where it became particularly associated with rural women. While there was some limited re-concentration of textile trades in towns and cities during the 18th and early 19th centuries (primarily of dyeing and other kinds of finishing rather than spinning and weaving), and large urban merchants handled much of the export\(^6\) of the cloth, most of the actual production remained in the countryside all the way into the 20th century.

The highly commercialized and industrialized countryside of rural Jiangnan has led, in recent years, to a number of comparisons with early modern Europe,\(^7\) though because of very different pre-occupations in the respective regional historiographies, China was rarely mentioned during the period when discussions of “proto-industrialization” were at their height. Any list of either similarities or differences is bound to be controversial, and my main intent here is not comparative, but setting out a few hypotheses along these lines will be useful for the discussion that follows.

Late Imperial Jiangnan had few institutional barriers to the growth of rural industry: guilds were not powerful, cities had no autonomous powers to speak of, the imperial state was generally quite happy to see peasant households develop multiple sources of income, and by the mid-17th century at the latest, very few estates remained which had the ability to either command or proscribe specific kinds of production. It also had a demographic regime and a land tenure system that encouraged an especially close relationship between agriculture and industry. By the 15th century (if not earlier) we see the emergence of a demographic system in which sex-selective infanticide, usually (though not always) victimizing girls, played a non-trivial role, and not only among the poor. The uneven sex ratios that resulted (exacerbated by a small number of elite men with multiple mates) meant that the poorest men rarely reproduced.\(^8\) Meanwhile the emerging land tenure system made it clear who those poorest men would be. Land ownership in the Delta was fairly widely distribute after the final break-up of great estates using bound labor during the 17th century civil wars. Throughout the 18th – 20th centuries, it is a reasonable guess that about half of all land was farmed by small-holding owner-cultivators, and the vast majority

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\(^6\) Throughout this paper, I will use “export” and “import” to discuss trade that crossed the borders of this *region* (which was, after all, more populous than most nations), whether or not it crossed the borders of China as a whole.

\(^7\) E.g. Wong 1997; Pomeranz 2000; Li 2000.

\(^8\)
of the rest by tenants. Probably only 10%- 15% of farm work was done by wage labor, and that figure includes work done by tenants and small-holders supplementing their income with a little casual labor, and sons in families that had a temporary labor glut while they waited for a father to retire.

Moreover, a property regime that emerged gradually from the 15th century onwards allowed a large percentage of tenants in the Delta to acquire strong usufruct rights that made it difficult to remove them unless they fell behind in the rent by at least the amount of their (often quite large) security deposit. Consequently, subsoil owners were generally not able to raise rents to a point which would have pushed tenants’ earnings down to the level of landless laborers’ earnings, despite a very active land market. Calculations of the income gap between tenants and landless laborers in the Delta remain preliminary, but various efforts I have made in different ways all generate differences between 2:1 and 3:1.

This combination of circumstances had many implications for the development of labor-intensive industrialization. First of all, it meant that the true proletariat – those who lived on wages alone – remained very small despite centuries of agricultural commercialization. In each generation, some men lost whatever land rights they or their fathers had had as owners or secure tenants; but since the previous generation’s landless men were precisely the impoverished males who did not reproduce, the newly landless replenished the ranks of a proletariat that would otherwise have died out rather then expanding it. (the amount of farm labor done for wages was still under 15% in the 1930s.)

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9 See Pomeranz 2006 for these various estimates, which generate similar results using both 18th and 20th century data. A difference this large may seem suspicious at first. However, it is confirmed by the fact that that rights of secure tenancy, which themselves became a tradable commodity, came to be worth more than sub-soil ownership, which conferred the right to collect rent. Since rent payments averaged about 40% of the total yield on a farm which double-cropped rice and wheat, and landlords in the Delta rarely covered production expenses other than taxes and local irrigation fees– which were probably about 10% of output – it stands to reason that the right to collect rent was worth about 30% of the harvest. Meanwhile a secure tenant would keep roughly 60% of the harvest, while the earnings of a landless laborer were worth about 15-20% of the harvest. Thus having a tenancy generated an income stream worth probably 40-45% of the harvest – considerably more than the income stream from collecting rent. Or, to put it another way, in order to be worth significantly more than the right to collect rent, the right of permanent tenancy would have to make a difference of significantly more than the 30% of the harvest that the right to collect rent yielded. This would suggest that an at will tenant’s share of the harvest must have been something less than 60-30=30% of the harvest – and thus less than half of the secure tenant’s share.

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11 Buck
Nor was the Delta’s population enlarged by large-scale immigration, as one might have expected since it was by far the richest part of the country. Debin Ma has estimated that per capita income in the 18th century Yangzi Delta exceeded the empire-wide average by about 54%; adjusting for a slight difference between his definition of the region and mine, and removing the Delta from the empire-wide figures generates a Delta/rest of China premium of over 70%. But a potential immigrant would benefit from this differential only if he could buy land or at least secure cultivation rights; and these were probably beyond the price range of the bulk of the poor in other regions. On the other hand, real wages for the unskilled seem not to have been much different among regions, nor between cities and countryside. It has made more sense for the poor of the Middle Yangzi, North China, etc., to seek empty land on the frontier (or even in the hills) than to try their luck in the relatively prosperous but crowded Delta; this is what the state encouraged as well, and it is precisely what the overwhelming majority of migrants did until well into the 20th century.

Under these circumstances production tended to concentrate in cities only to the extent that there was a strong economic rationale for doing so. Such rationales were more likely to involve proximity to particular kinds of markets than economies in production, and even those advantages were fairly limited for those goods that were easy to ship. While anecdotal evidence certainly suggests that consumption levels were higher in towns and cities than villages, much of this had to do with the clustering of elites there, not with differences in the real incomes of rural and urban laborers. Administrative and mercantile elites had long been concentrated in towns, and from the late Ming onwards, more and more Delta landlords congregated there as well; they left their tenants in charge of day to day farm operations, and paid stewards or bursars in charge of collecting rent. Meanwhile unskilled male workers as we have seen, earned no more in the towns than in the countryside. Thus, to the extent that anecdotal evidence, such as reports mentioning the existence of various kinds of shops, do suggest that various kinds of commodities

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13 Allen et. al. 2005: . See also See discussion in Pomeranz 2000: and data in Zhao 1983: 53-57. By contrast in the most advanced economies of early modern Europe – England and the Netherlands – urban and rural labor markets seem to have been rather loosely connected -- see Allen and DeVries 1994b.
for less privileged people were more widely sold in cities,\textsuperscript{16} this probably resulted not from differences in earning power, but from urban-rural differences in family structure and dependency ratios. Some unaccompanied males migrated to cities, but unaccompanied women almost never did; it has been estimated that Suzhou, the largest city in the region through most of the Ming and Qing, was about two-thirds male,\textsuperscript{17} with many of the men having wives and children in the countryside. Thus narrow or even non-existent wage differences (controlling for skill) would be quite consistent with a significant gap in observed consumption levels, and in the degree to which everyday goods and services were purchased, rather than produced by a worker’s family.

In the countryside, however, almost all adult males except the small proletariat (and even some of them\textsuperscript{18}) had wives, and many had daughters. The vast majority of these women did not farm, except perhaps a few days a year – a pattern that became more entrenched as average farm size as Delta population grew between roughly 1500-1620 and 1680-1770.\textsuperscript{19} But most of these women did produce some goods for the market, in addition to goods and services for home consumption. The most important and best documented part of their production for sale was textiles.

\textbf{Putting Textiles in their Place}

Textiles dominate our picture of Chinese industrialization from early times until very recently. Some of this stems from the fact that they were indeed ubiquitous; aside from food, clothing and shelter are our most basic needs. Part of this also stems from the role that textiles happened to have played in the initial transition to mechanized industry – first in England and then in many other countries – and to an enduring interest in why that transition did not occur earlier in China. Part of it also stems from the tremendous emphasis on textiles in late imperial sources themselves, often for reasons that had more to do with gender ideals and the desire for social stability than with economic productivity per se. Weaving, spinning and (for more wealthy women) embroidery were consistently valorized as the most appropriate economic

\textsuperscript{16} It is striking for instance, that Li Bozhong (2000: XX) in his attempt to show a continuing growth of proto-industry, shows that an ever wider range of goods for daily use were sold for cash; but wherever the new goods were produced, almost all his examples of places they were sold are urban.

\textsuperscript{17} Skinner 1977:

\textsuperscript{18} Sommer 2005:

\textsuperscript{19} Li 1996; Pomeranz 2005a.
activity for women, or even as the only appropriate one: literati warned each other repeatedly that if women were not engaged in textile production, they would become lazy, self-indulgent, and even excessively lustful, ruining their children, their families, and the social order more generally.\(^\text{20}\) This sense that textiles were particularly important naturally meant that they were also particularly well-documented. For all these reasons, a great deal of work (including some of my own) has taken textile production as “typical” of pre-modern Chinese industry, or even used it to stand for the whole industrial sector.

But while there is much that we still do not know about textile industries – as we shall see below—in relative terms they have been over-studied: they are the subject of a preponderance of work on the non-agricultural economy of imperial China, when they cannot have contributed a majority even of industrial output. We can see this if we look briefly at what we know about the consumption patterns of the poor.

Elsewhere, I have estimated the per capita output of textiles in the Yangzi Delta as having peaked at perhaps as much as 14 pounds per capita in the mid-18\(^{\text{th}}\) century. This is a considerably higher figure than most earlier estimates, but that makes it all the more useful for current purposes, since by using it we cannot underestimate the share of textiles in industrial production.\(^\text{21}\) A large portion of this output was sent out of the region, though we do not know exactly how much; if exports were 6 pounds (a bit over 40\% of production) at prevailing mid-

\(^{18}\) century prices, this would have roughly paid for the area’s foodgrain imports.\(^\text{22}\) Subtracting

\(^{20}\) For very useful discussions of this ideology, see Mann 1992, Mann 1997, and Bray 1997. Matthew Sommer (2005) has recently made the interesting suggestion that the connection between textiles and chastity was more than just symbolic: he argues that various sorts of occasional sex for pay arrangements were a far more important part of the lives of the very poor than we have realized, and that the state’s promotion of textile work for poor women was partly meant to stave off a (justified) sense that commercial sex, which had once been limited to certain specific, legally defined and debased status groups, was now spreading through a much wider portion of the commoner population.

\(^{21}\) Pomeranz 2000: 138-9, 330-333. Moreover, since I arrived at this estimate by working backward from rather conservative estimates of local cotton production, the most likely reason for my estimate being too high would be if I have underestimated the amount of cotton exported from Jiangnan in raw form, rather than after spinning and weaving—an amount that gradually rose over time. But since for purposes of estimating local consumption we want to subtract exports in any case, this is not a real problem.

\(^{22}\) A standard bolt of cloth weighing just under 4 pounds cost \(4\) tael\s at mid-century, so that 6 pounds of cloth for each of Jiangnan’s roughly 31,000,000 people would be worth roughly 18,600,000 tael\s. Jiangnan also imported roughly 1/5 to 1/6 of its grain consumption, which has been conservatively estimated at 2.17 shi per capita; using the 1/6 figure, we have .36 shi per capita, or slightly over 11,000,000 shi for the region. At roughly 1.7 tael\s per shi in 1750 (a 31 year moving average for that year is 1.67, according to Wang Yeh-chien; the price for that particular year averaged 1.8 tael\s), this would give us almost exactly the same figure. See Wang 1989: 427; Wang 1992: and
out that much would give us a per capita consumption of 8 pounds per annum. I am also now inclined to think that my earlier work under-estimated the net export of raw cotton from Jiangnan, so that local cloth production might have been as low as 10-11 pounds per annum; consumption might then have been as low as 6-7 pounds per annum (still higher than most other estimates). But since, for the point at issue here, a high figure makes the case harder to prove, let us stick for now with the 8 pound estimate; even that amount of cloth, it turns out, would not have been a very large amount of the total non-grain consumption of even poor Delta residents. Eight pounds of medium-grade cloth for each member of a 5-person family would cost 5.2 taels at what appear to have been representative mid-century prices.\(^{23}\) If we accept Fang Xing’s estimate of the total annual expenditures of a poor family in the Yangzi Delta of 32.6 taels, 55% of which went for grain, \(^{24}\) textiles would account for 37% of non-grain expenditures if the family bought the average quantity of textiles; as a poor family, though, they presumably bought much less than that. Since, as I have argued elsewhere, I think Fang Xing’s estimates of the spending (and income) of the poor are too conservative, I would be inclined to set this number lower. The number would be lower still, of course if we use earlier estimates of average textile consumption (which are lower than mine), or if we drop the unrealistic assumption that the poorest people in Jiangnan still consumed an average amount of cloth. Of course, some of the non-grain products that poor people consumed were other foods, and the data Fang presents do not allow us to break these other foods down into more or less unprocessed foods on the one hand (e.g. fresh fish, poultry or pork) and the products of processing industries (e.g. soy sauce, vinegar, refined sugar, and so on) on the other. Nor do we yet have a good sense of how much of the processed food consumed in the countryside was still processed at home rather than purchased. (A 17\(^\text{th}\) century manual for large landlords debates the relative merits of buying or brewing the alcohol to be provided to one’s laborers, indicating that at least the wealthy still had the latter option.\(^{25}\)) Thus the estimate above of the share of textiles in non-grain


\(^{24}\) Fang Xing 1996: 93.

\(^{25}\) Bunongshu
consumption would need to be increased to make it an estimate of the share of textiles in the consumption of industrial goods alone; but this number could be raised quite substantially and still be a minority of the non-farm goods (not to mention goods and services) purchased by even the very poor. When one adds in the purchases of more prosperous people and the purchases of producer goods, the share of textiles would presumably decline again. Cloth could have been a larger percentage of the value added in industry if a larger percentage of its final cost. This might well be true compared to many goods made with wood, since wood was becoming quite expensive, but there were probably also some goods which had a higher labor content. We need, then, to look far more closely at other industries such as food processing, construction, furniture, implement and tool-making, paper, and various sorts of services if we are to get a properly weighted overall picture of the late imperial economy: a project that is still in its infancy.  

Yet if textiles may have been over-emphasized in terms of their contribution to industrial output, they still deserve pride of place in terms of industrial employment. Nobody has good figures on total employment in any sector of the late imperial economy, but it is generally accepted that huge numbers of rural people spun and wove for the market throughout the country (with spinning using far more labor); involvement in this industry was especially prevalent in Jiangnan, which claimed to “cloth the empire.” To be sure, these women generally worked less than did full-time male laborers in other industries. Estimates of the average work year for female rural weavers in the 18th century range from about 160-210 days per year (though mid-19th and early 20th century numbers are higher), while men in shipyards and urban factories seem to have worked about 300 days per year. Yet even if we discount the number of laborers in textile production accordingly, and count each female labor day as less than a male labor day, the numbers of people involved in textile production were so huge that it has so have been the largest non-agricultural occupation, and probably took more labor time than raising the region’s grain supply. Li estimates that 1.4 million rural households in 3 key prefectures with one adult and one adolescent helper working 265 days a year could have produced 60% of

26 A good survey of our rather limited knowledge to date is Li 2000: 86-143.
27 Li (2000:41) suggests 265 days for 1860, and Xu (1992: 469 305 days for the early 20th century.
28 On shipyards, see Li 2000: 266. For other industries, see
29 For some estimates of the number of days required to raise the area’s grain supply, see Pomeranz 2002:544-6.
Jiangnan’s textile output, this implies 2.3 million households could produce the entire output at 265 days per year, or slightly over 3 million households at the 200 labor days a year usually considered plausible for mid-18th century women. If, following Xu Xinwu, we count each of the adolescent helpers as 1/2 an adult laborer, we would have roughly 4.5 million adult laborer equivalents in cotton cloth production alone in a region with about 31,000,000 people; silk production would have added at least 500,000 more. And again, if one accepts my considerably higher production estimates, labor inputs would have to be adjusted upwards as well, since there is a rough consensus on output per labor day.

A Case of Heavy Industry: Ship-building

Aside from construction, which was hopelessly dispersed, the largest heavy industry in late imperial Jiangnan was probably the construction and repair of boats. Even here, we must bear in mind that we can have so far seen only a piece of a much larger iceberg. Ordinary households had many thousands of local boats for fishing and for local transportation. But we know next to nothing about the making or repair of these boats. We also know very little about the much larger boats that merchants used for river transport up and down the Yangzi and other major rivers, though clearly these (perhaps unlike many of the household boats) were built by full-time, specialized artisans. What we have better information about are two classes of very expensive ships: the tribute grain boats that collected tax rice and hauled it up the Grand Canal to North China, bringing an assortment of goods back, and the sha chuan that plied the coastal routes to Fujian and Guangdong in one direction and Shandong, Tianjin, and Manchuria in the other. The former were largely produced and maintained by government employees, the latter by private shipyards. In both cases, though, these were large-scale production facilities with a concentration of specialized workers.

In the early 19th century, about 300 new tribute boats averaging about 75 tons each were produced each year at a cost of roughly 500,000 taels. Li Bozhong has estimated that this required about 3,400 full-time workers. Li estimates that private shipyards used about 5,000

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32 Li 2000:
33 Li 2000: 252, 256.
workers to turn out roughly 100 sha chuan of anywhere from 100 – 400 tons and worth about 600,000 tael per year during the same period.  

If we measure labor intensity in terms of tonnage produced per worker, this does not appear to be unusually labor intensive for a pre-industrial shipyard. Early 19th century tribute boats appear to have averaged about 75 tons, so that annual tonnage produced would have been 22,500 tons, or roughly 6.6 tons produced per worker per year. If we make a rough guess that sha chuan averaged 250 tons each, output at the yards producing them would have come to 25,000 tons per year, or 5 tons per worker employed. The late Stuart naval yards studied by D.C. Coleman produced an average of 3,522 tons of warships per year from 1663-1680; employment in these yards had supposedly been capped at 980 in 1654, but there were 800 workers at just one of the four yards in 1665, and 1,185 in 1687. (The totals soar thereafter.) This suggests a per worker output of no more than 3.5 tons per annum.

One cannot put too much stock in these numbers. Aside from the obvious uncertainties connected with the roughness of the figures, warships (which needed to be able to withstand the recoil of firing cannon, absorb a certain amount of impact, and so on) were presumably more complicated to make, ton for ton. Moreover, we do not have exact data that would enable us to compare how many parts were ready-made before they arrived at the shipyards in each case, as opposed to being fashioned there – information we would need to make this comparison rigorous. Still, it serves as a very rough suggestion that Yangzi Delta heavy industry may not have been unusually labor intensive; the more important point, I would guess, is that it occupied a far smaller share in total industrial production. Attempts to look at the crew size to tonnage ratio – a rough measure of capital intensity in shipping itself – also suggests rough comparability, at least in the early 18th century, but are at least equally fraught with uncertainty.

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34 Li 2000: 234, 239, 253-4, 257.
35 Coleman 1992: 78. I have excluded the years 1660-1662, for which output is extremely low (presumably due to lingering effects of political upheaval) and for 1681-8, for which much data is missing and those years that are recorded are below the average for the preceding 18. Thus, this figure should be a bit on the generous side.
36 Coleman 1992: 74, 76.
37 Xu and Wu 2000: 366 suggests an average crew size for sha chuan ranging from the low 20s to the low 30s, both in the early 18th century and early 19th; with these ships ranging from 100–400 tons, we would have a tons per man ratio of anywhere from 3.1 to 15.1, with the higher end of the range more likely (few sha chuan were actually as small as 100 tons.) Ralph Davis (1962:71) gives tons/man ratios for ships arriving in London from various ports in Western Europe and the New World which ranged from 8.4–10.8 in 1726 (and higher for ships going to Scandinavia and Russia). By 1766, however, these ratios had risen to 810.9–15.6 tons per man. In both contexts, differences in
If we could, it would probably be better to measure labor intensity in terms of value added per worker rather than physical output per worker. But for a rough comparison like the above one between English and Jiangnan shipyards, this is not currently possible: we lack equivalent market baskets or sufficient real price data (on the Chinese side) to make comparisons in those terms meaningful. Still, for purposes of making comparisons between these shipyard workers and other Jiangnan workers, it is worth making some attempt to measure value added in shipyards.

The value of output per worker in public and private Jiangnan shipyards works out to roughly the same range: 120-150 tael[s] per year. But that tells us little about how much of this output was the contribution of the workers, and I have not yet found materials that report this in any direct fashion. Using some very rough estimates based on the relative size of late Ming and 19th century ships that were otherwise of fairly similar design, information on the types and amounts of wood used in the Ming ship, and some scattered price data for the relevant kinds of timber from the late 18th century, I came up with a guess that timber was 46% of the cost of an early 19th century tribute boat; iron, which was used quite sparingly (mostly for nails and anchors) was perhaps another 2%. Since this was the bulk of the material used, and probably the most expensive part, we might make a rough guess that the value added at the shipyard was a bit less than half the value of the boat, and so 60-75 tael[s] per worker per year in the above workplaces. But an estimate based on such heterogeneous and incomplete sources is obviously subject to large errors – and even so, it lumps the contributions of labor and capital together.

It does, however, give us some vague idea of the gap in output per worker between this kind of labor and that done by most textile workers. I have elsewhere estimated the likely income of somebody combining preparation, spinning and weaving of cotton in proportion to the time needed for each task at roughly 12 tael[s] for a 210 day work year circa 1750. Some[body] who only wove (certainly skilled work) would have earned much more – perhaps over 40 tael[s] per

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38 The relevant data is drawn from Li 2000: 233-4, 300, 313, 315.
year – but such people would have been quite rare and unrepresentative. \(^{40}\) Since rural households almost always owned their own spinning wheels and looms, which were not that expensive anyway, separating the factor shares of labor and capital would not matter much for the textile trades. It seems likely, though, that such people produced a good deal less value added per labor day than did the men in shipyards, even when we adjust for the longer work year in shipbuilding.

If we make a further assumption – that output per worker was roughly similar in the much larger field of boat repair and maintenance – it also gives us some way of guessing the number of people employed in this relatively capital-intensive sector. About 5,000,000 liang per year was spent each year in large Jiangnan shipyards on the repair of sha chuan – a bit over 8 times the amount spent on building new ones. (These boats lasted an average of 30 years, but needed some work every year.) It seems a plausible guess, then, that a bit over 40,000 men worked in this area; perhaps another 2,000 were involved in repairing the much more frequently replaced but relatively low-maintenance tribute boats (to the tune of 300,000 taels per year); boat building and repair together would have employed not more than 50,000 in these yards. \(^{41}\) While not a trivial number, this would be no more than 2% of the number involved in rural textiles, and quite possibly under 1%, depending on one’s estimate of the latter workforce \(^{42}\) -- as opposed to something more like 5% in terms of value added. \(^{43}\) Both figures would be higher if we added people working on the much more numerous (but smaller) farmers’, fishermen’s, and riverine merchants’ boats, but given how little we know about building those kinds of boats, we could no longer say with confidence that all these people were involved in a relatively capital-intensive sector. And most of the other items mentioned above as correctives to too great a focus on textiles – processed foods, furniture, etc. – were probably far closer to cloth than to the building of large ships in both industrial structure and labor-intensity. (There were some large establishments in food processing, but except for salt producers, they usually seem to have

\(^{40}\) Pomeranz 2000: gives a much lower figure for full-time weavers, based on erroneously assigning time spent preparing cotton for spinning to the time needed for weaving; the error affects these calculations, but has no impact on estimates for households which combined all stages of the process, as most did.

\(^{41}\) Data on expenditures from Li 2000: 262.

\(^{42}\) Pomeranz 2000: 330-332 explores some of the problems in estimating the number of people involved in rural textiles in Jiangnan.

\(^{43}\) If my relatively high estimates of cotton textile output in Jiangnan are correct, their total value would have been around 110,000,000 taels per year, of which about ¾ would be value added after the removal of the seeds from the cotton.
grouped a lot of small-scale producers under one roof, with economies of scale focused more on purchasing and marketing than physical production.) Thus, while new information about mid-Qing heavy industry is interesting in its own right, and serves to suggest that where the logic of production required it, Jiangnan industries could be as capital-intensive as their counterparts elsewhere, it also suggests that such sectors were a much smaller part of industry in general than in the early modern West.

The principal reason for this emphasis on labor-intensive sectors was probably not a lack of capital, but of energy and raw materials. Perhaps a third of iron demand in Jiangnan was met by recycling scrap iron rather than purchasing new iron, almost all of which was imported.\(^44\) Serious timber shortages limited the expansion of boat-building, and eventually caused much of it to relocate to Fujian, Guangdong and parts of Southeast Asia; a good deal of brick and tile-making and other fuel-intensive industries also moved away during the Qing.\(^45\) Very little glass was produced, though the techniques for making good quality optical glass were known.\(^46\)

Textiles, on the other hand, flourished.

**Textiles and Labor-Intensity in the Late Imperial Yangzi Delta**

Labor-intensity can mean different things, with different implications. One possibility involves the substitution of very cheap labor for other factors of production which could do exactly the same thing: e.g. the use of human muscle, rather than wind, water, or animal power to turn a grinding stone. Unless they have a powerful political organization behind them, people doing such work are likely to earn relatively little, at least compared to people in economies where less labor-intensive methods are more common. Another kind of labor-intensity, with rather different implications, is the use of skilled human labor to do tasks that otherwise cannot be done at all: even today, certain very elaborate kinds of weaving, painting, pottery, and so on fall into this category, along with many services. If demand for these goods are sufficiently buoyant, the workers in these kinds of labor-intensive activities may be quite well paid. The implications for an economy in general are also quite different: an economy with large and growing sectors that are labor-intensive in the latter way (one might also call it human-capital-

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\(^{44}\) Li 2000: 303.

\(^{45}\) Li 1994: ; Li 2000: ;

\(^{46}\)
intensive) may be quite prosperous and developing if it can find trading partners to provide it with bulk goods. In late imperial Jiangnan, one finds signs of both kinds of labor-intensity, and of both becoming more entrenched with time.

To see these patterns at work, let us return to the textile sector. Numerous scholars have noted what Philip Huang calls China’s “cotton revolution”:

put simply, that in 1350 very few Chinese wore cotton, while by 1850 almost everybody did. It is also generally agreed that the percentage of this cloth that was sold on the market rather than produced for home consumption grew steadily over time, and was dominant by Qing times; that the bulk of this cloth (except for some very expensive and complex weaves) was produced by rural women; and that the Yangzi Delta was by far the largest producer of cotton cloth in the Empire, shipping large portions of its output to the rest of China and (to a lesser extent) beyond. It is also fairly clear that Jiangnan’s market share in cotton textiles peaked somewhere between 1680 and 1780, after which other regions became increasingly self-sufficient in low and medium grade cloth. While this was going on, Jiangnan increased its exports (and local usage) of higher grades of cloth, though we have no precise measures of this.

Over the last few years, we have come significantly closer to agreement on average per day earnings in cotton textile production – at least circa 1750. If one averages together all the parts of transforming ginned cotton into cloth, the work paid roughly 50-60 cash per day ca. 1750: with a 210 day work year, this would yield about 12 taels of silver. At mid-18th century prices, this would have bought about 7.2 shi of grain (576 kg), and suggests that even if half of income had to go for things other than grain, a woman doing this could have supported herself and 1 or 2 small children. This is well below what a male tenant farmer would have earned, but comparable to the likely earnings for a male laborer who found year-round employment (which many did not), and above what women had probably added to their families’ income when farms had been larger and they had joined in that sort of labor. There is, however, still much uncertainty about how those earnings were distributed: two sets of issues in particular need to be addressed here.

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48 Pomeranz 2002: 558-9; see also Pomeranz 2000a: . Huang, 2003: 158, who had earlier disputed these estimates, now says they are “in the ballpark.”
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The first set has to do with the variability of earnings from spinning and weaving. The earning power of textile workers appears to have been very volatile — but that volatility gradually decreased over the late imperial period. In good periods, women who mostly wove (even if they made only middle-grade cloth) could actually out-earn their farming husbands. But this is an artificial calculation, since it ignores the far lower returns in other parts of textile production, which were usually done within the same household. Since this other work was often done by a young daughter (sometimes as young as 9 years old), a figure for income “per laborer” or “per labor day” will depend in part on how we count the combination of mother and daughter: as 2 laborers, as 1.5 adult equivalents, or even as 1.33. (The “average” calculation above assumes that the same adult woman did all the work involved; if we instead assigned much of this labor to an adolescent whom we counted as only half a laborer, we could generate much higher earnings per adult labor day equivalent.) But note that these different calculations would not affect the income of the family unit, which was probably what mattered most to the people involved. At the extreme, assuming all the spinning and preparatory work was done by young girls who should be counted as half or less than half of an adult laborer, we would wind up concluding that the adult female labor force was very well paid, but that it worked only about 30 days a year (thus making them a very small percentage of the total labor force; it thus seems more useful to talk about the average returns across the whole process of turning ginned cotton to cloth, at least until buying yarn became very widespread in the second half of the 19th century.

Moreover, these earnings would vary a great deal from year to year. Below I have made estimates of the rice-buying power of a piece of middle-grade cloth for a few selected years, treating 1750 — the year I chose as an example in my recent book — as 100:50

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The data on which this is based is quite rough, but a few points do seem well-established nonetheless. First, the fluctuations are largely driven by changes in the rice price, which were much larger than those in the price of cloth until about 1700, and still somewhat more volatile than cloth prices thereafter.\textsuperscript{52} (Raw cotton prices were at least equally volatile, and would complicate the picture still further, since some weaving families produced their own raw cotton (and yarn) while others did not. For the most part, though, raw cotton prices seem to have moved enough in sync with those for rice -- suggesting both were driven by common demographic, monetary, climatic or other factors -- that they would usually reinforce, rather than vitiate, both the long-term trends and the fluctuations in real earnings.\textsuperscript{53}) Second, because rice prices were

\textsuperscript{51} Raw cotton prices seem to have fluctuated particularly wildly in the period between 1790 and 1810; 1800 happens to fall in a trough year, helping to produce this surprisingly good figure for cloth-makers’ earnings.

\textsuperscript{52}See Wang 1992:50 for a graphic depiction of annual deviations from the 31 year moving average of rice prices, which decreases markedly after about 1700. This accords with a general sense that this was a period with fewer of the massive disorders that would send prices wildly up or down. Huang (1990:82) somewhat mysteriously claims that rice prices in Jiangnan varied by season, but not much from year to year, which is not only belied by Wang’s 18\textsuperscript{th} century data, but by Huang’s own table of 17\textsuperscript{th} century data on p. 82: it shows, for instance 3 summer rice prices, which are 1.0, 2.0 and 4.0 taels per shi, and two 6th month prices, which are 1.3 and 4.9 taels per shi, respectively.

\textsuperscript{53}For spotty data on raw cotton prices at Shanghai see Zhang 1988: 205-6. From the late Ming until the late Kangxi period, general trends in raw cotton prices seem to map those for rice fairly well, so that they would make the fluctuations even wilder, but in the same direction. In mid-century, raw cotton prices, like those for rice, seem to
less volatile after about 1700, so were textile workers’ earnings. This reduced volatility may have had various causes, but the most important was probably the increased amount of rice reaching Jiangnan from more sparsely settled regions further up the Yangzi, relieving dependence on local harvest fluctuations. It is probably no accident that both references to women working in the fields in Jiangnan and references to men helping with textile work become increasingly scarce in the Qing dynasty: as the returns to both activities became more predictable, there was less reason for families to make sudden, all-out re-allocations of their labor from one activity to the other, and various reasons why, in the absence of wild fluctuations in return, they preferred to maintain the canonical “man plows, woman weaves” division of labor.\textsuperscript{54}

Second, though there were fewer wild fluctuations in the earning power of a given piece of cloth after 1700, there does appear to have been a gradual downward drift after 1750. (The high figure for 1800 is an exception here, but there are reasons to think that this reflected a temporary peak in the price of raw cotton rather than gains for spinners and weavers.\textsuperscript{55}) The early and middle years of the 18\textsuperscript{th} century, when real prices for cloth were no longer fluctuating wildly, but had not yet begun clear downward trend, would thus appear to be a golden age of

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\textsuperscript{54} Li 1996: ; Pomeranz 2000: ; Pomeranz, 2005b.

\textsuperscript{55} For spotty data on raw cotton prices at Shanghai see Zhang 1988: 205-6. From the late Ming until the late Kangxi period, general trends in raw cotton prices seem to map those for rice fairly well, so that they would make the fluctuations even wilder, but in the same direction. In mid-century, raw cotton prices, like those for rice, seem to have shown far less pronounced swings amidst a general rising trend (stronger for cotton than for rice). After 1790, rice prices were roughly flat for 10 years, doubled over the next five, and then fluctuated modestly around that new, higher price until the Taiping Rebellion. Cotton prices hit several extremely high spikes between 1790 and 1810 (as much as 6 times the usual price), but in general seem not to have shown much of a trend: Zhang says that on the eve of the Opium War they were roughly double early Qing prices, which is where Kishimoto’s scattered data (1997:139)suggest they had gotten by the 1790s. This bump in raw cotton prices would probably depress the surprisingly high real earnings for weavers estimated above for 1800, bringing that year back into line with the general downward trend after 1750, and strengthening further the point that short-term fluctuations became less important in the high Qing.
sorts for rural Jiangnan textile producers – an impression that is consistent with anecdotal evidence from contemporaries.

I have discussed elsewhere some of the reasons why the downward trend emerged, with market conditions in the rest of China -- in particular rising local demand for grain as hinterland populations increased, and the growth of local competition for the medium and low grade cloth imported by those regions from Jiangnan – playing the central role.\textsuperscript{56} It is important to note that this trend predates by several decades the further downward pressure on cloth prices caused by imports of machine-made goods from Europe.

Equally important, the 100-150 years following 1750 saw an increasing differentiation among cotton textile workers based on skill and happening in two stages. First, as various scholars have noted, Jiangnan partly compensated for the increased competition it faced in markets for ordinary cloth by producing more high-quality cloth: these higher grades of cloth often sold for twice as much as medium grade cloth, and continued to dominate their smaller market segments.\textsuperscript{57} To the extent that women were able to switch to producing these higher grades of cloth, the incomes of these particular women would have fared much better than is suggested by the declining buying power of cloth of constant quality: we would have a kind of industrialization that was based on rising skilllevels and provided at least modest rewards for those improving skills, rather than an immiserating and “involutionary” story.

But how much of the textile sector would this more positive story apply to? Li’s recent work on Jiangnan “proto-industrialization” seems to me to greatly strengthen the case for his (and my) earlier claim, also supported by Fang Xing, that the average quality of both the cotton cloth and the silk produced in Jiangnan was improving over the first half of the Qing dynasty.\textsuperscript{58} If we look at developments in commercial practices over the same period, we see that it became increasingly common to place trademarks of various sorts on high quality goods, and that these marks were recognized across very large distances – an important concomitant to these investments in producing higher quality goods.\textsuperscript{59} It should be noted here, however, that “higher

\begin{footnotesize}
\item[56] Pomeranz 2000: . See also Grove 2004: 433-5.
\item[58] Li 2000:  .
\item[59] Lai and Hamilton ; Li 2000:  .
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quality” need not always refer to cloth that lasted longer or felt better: in many cases this was more a matter of a greater range of styles, colors, etc. The important point is that they fetched a higher price -- and to the extent that weaving in each of these styles appears to have been a local specialty of sorts, learning that specialty would represent an investment in learning very specific skills with a significant market value. It appears that many of these improvements were not only important for the portion of its cloth that Jiangnan exported, but for a significant portion of its internal market, too – especially in Jiangnan’s cities. On the other hand, the importance of changes in style to this increase in “quality” leaves us in some doubt about how much of the higher prices were actually captured by calenderers, dyers and merchants, who tended to be male townspeople, rather than rural women weavers.
Meanwhile spinners, who produced a less varied product, would have faced a grimmer picture. Most accounts of the Qing period suggest that there were not great changes in the productivity of spinning, though as we shall see, there is some evidence to the contrary. A new, more efficient spinning wheel did make its appearance, but it also required greater strength (probably making it unsuitable for those families in which particularly young girls did this work) and does not appear to have spread very widely. Nor do I know of accounts suggesting major changes in the average quality of yarn or in the degree of product differentiation comparable to what has been noted for cloth. (Since far less cloth was marketed, this would be hard to trace even if it did happen.) Without such changes, spinners would have had no way to buffer unfavorable price trends--- and while our price data for yarn is even more fragmentary than for cloth and raw cotton, it seems very unlikely that these prices could have risen enough for spinners to maintain their mid-18th century real incomes during the late 18th and early 19th centuries. (After the mid-19th century, mechanized competition clearly caused hand spinners’ earnings to nosedive.) Thus, while I agree with Li that the economic position of spinners in the mid-18th century was probably a good deal better than some other scholars have suggested, I am skeptical of his claim that spinning alone was a viable way for an adult woman (or an unmarried male) to support themselves and a dependent or two throughout this period. For much of the 17th and 19th centuries, it must have produced very low earnings indeed.

In most cases, at any rate, spinning and weaving continued to be combined in the same households until at least 1860, making a separation between spinners’ and weavers’ earnings somewhat artificial, and the impact of any further divergence between those earnings largely invisible to us. It seems likely that those cloth-producing households that were selling in more quality-sensitive markets would have needed a more consistent quality of yarn, and thus might have been less inclined to use particularly young daughters for spinning; thus here too we might see a pattern involving a shrinking labor force and volume of output, with the more skilled workers remaining employed and being able to mitigate (but not fully overcome) the downward

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60 Huang 1990: 85, flatly denies that it was used at all outside Songjiang prefecture; Li 2000: 49-50, finds evidence that it was, but says we do not know how much.
pressure on their earnings from unfavorable price trends. To the extent that a group of spinners who were, on average, more mature than in earlier years could also make more use of the 3 – spindle wheel – which was more productive but harder to operate – this would reinforce these trends.

There is some evidence, though it is spotty, that there were in fact improvements in overall per hour productivity (which would have had to come primarily from changes in spinning): while sources generally agree on an estimate of 7 labor days for the transformation of raw cotton into a bolt of cloth in the 17th century, some 18th century sources say six, and at least one 19th century source says five. Overall, though, we would have to say that increases in skill-intensity were modest, and paid off even more modestly.

The Middle Nineteenth Century and Beyond

The enormous disruptions of the mid-19th century hit Jiangnan very hard in the short term: no region saw more fighting and loss of life during the Taiping Rebellion (1851-1864), for instance. In the longer run, however, these events may have done more to reproduce or even exaggerate tendencies already present in the region’s industrial development than to change these patterns.

On the one hand, once peace had returned, some of the problems that had been gradually intensifying over the previous century were considerably eased. A boom in rice imports from Southeast Asia, particularly after the 1870s, made up for the shrinking of imports from the Middle and Upper Yangzi. Timber imports from Manchuria rose significantly as the Qing increasingly dismantled barriers to settlement there (in part because dense settlement in that region, once seen as a threat to the Manchu way of life, now seemed one of the best possible defenses against losing the region to one of various imperialist powers); in addition, wood from Southeast Asia, Hokkaido, and later the Pacific Northwest began to arrive. The hills of Western Zhejiang and Anhui – the closest forested areas to Jiangnan -- had been seriously deforested in the last decades before the Taiping as imports from other areas fell, and during the 1840s the resulting erosion had caused the worst flooding downstream in Jiangnan that the Delta had seen in 200 years. After the Taiping, reforestation in the hill country west of Jiangnan was relatively

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63 Latham and Neal 1983; Brandt 1985.
successful, and Jiangnan again enjoyed ecological stability; this is in sharp contrast to some interior regions, which were more permanently thrown back on their own resources and never succeeded in repairing the environmental damage.\(^{64}\)

For the most part, light industry also recovered fairly well from the mid-century shocks. While we lack good data for the late 19\(^{th}\) century, data for the 1910s-1930s show that a large number of handicraft industries – tobacco processing, small-scale flour milling, soap-making, etc., -- at least maintained their absolute levels of production, even as competition from factories emerged.\(^{65}\) (Population growth in these 20 years was not large enough to make much difference.) Even the cotton textile industry, often singled out as having suffered terribly for foreign competition, actually presents a much more complex picture.

Cotton spinning, of course, was severely affected by competition with machine-produced yarn (first imported from Britain, then from India, then from Japan and from modern mills in Shanghai itself).\(^{66}\) For the most part, however, weaving fared relatively well. While imports did create competition, the availability of lower priced yarn was a significant plus, and total (though perhaps not per capita) demand grew as China’s population first recovered from mid-19\(^{th}\) century disasters and then reached new levels.\(^{67}\) Cloth imports, unlike yarn imports, never achieved a very large share of China’s market. To some extent, higher-end domestic markets in particular were protected by the greater durability of hand-woven cloth and by preferences for particular styles that Jiangnan weavers were used to supplying.\(^{68}\) A preference in some parts of the country for particular kinds of cloth which used imported yarn for the warp and hand-spun yarn for the weft even provided protection for some spinners, though overall their numbers certainly dwindled.\(^{69}\)

While we do not have systematic data, it seems likely that trends in textiles were not radically different from those in the century before 1850, though the difference between winners and losers may have become sharper. The availability of machine-spun yarn made it more

\(^{64}\) See Pomeranz 2001:
\(^{65}\) Rawski 1989: 76-78.
\(^{66}\) See, for instance Xu Xinwu 1988: 31-49.
\(^{67}\) Reynolds 1974; Feuerwerker1970; Rawski 1989. for a criticism of Rawski’s claim that per capita textile consumption increased, see Walker 1999.
\(^{68}\) Xu Xinwu: 1992; Reynolds 1974; Hamashita 1988: 21 makes the different but related point that Japanese producers needed information supplied by Chinese merchants to establish a foothold in the Chinese textile market.
\(^{69}\) Walker 1999
common than it had been before for some households to weave without doing their own spinning; to the extent that they could concentrate full-time on the far more remunerative work of weaving, they would probably have improved their earnings per labor hour, even though weavers also faced downward pressure on their earnings. Relatively skilled workers in cotton textiles were probably able to hold their own in terms of volume as population growth expanded markets and machine-made cloth made relatively modest inroads until well into the 20th century. 70 Those who operated in niches where competition with imported cloth was the most limited may have even improved their situation a bit (thanks to cheaper yarn).

Those who produced more ordinary kinds of cloth fared less well. The high Qing pattern I emphasized in my recent book, in which interior regions increasingly produced their own low and medium-grade cloth instead of buying it from Jiangnan was accelerated after 1850, since areas that were ill-suited to grow their own cotton and were not well-positioned to import bulky raw cotton often found it more worthwhile to import yarn, and thus they too began local weaving. 71 Moreover, Jiangnan producers who did simpler weaves also faced relatively direct competition with machine-made cloth; consequently, they saw their incomes squeezed as prices fell, even if they held on to market share fairly well. Linda Grove, among others, argues that the success of small Jiangnan firms that hired rural women to weave depended in part on the fact that the agricultural income of the women’s families made it possible to pay them less than would have been possible otherwise. 72 It is not clear exactly how cross-subsidization among the mix of occupations in rural households of the early 20th century worked, but there do seem to be fewer stories of widows supporting families entirely through textile work than we found in the 18th century. This may, in part, reflect cultural as well as economic differences, but it is one more piece of evidence suggesting that at least in Jiangnan most weavers faced harder circumstances than 150 years earlier. Meanwhile the still less skilled spinners, if they remained in this occupation, would have been hit very hard.

70 It seems likely to me that per capita cloth consumption actually fell quite a bit over the long term, as I do not see any evidence for increased output of raw cotton while population roughly doubled from the mid-18th to early 20th century, but most other scholars seem to doubt this; and even if per capita consumption did fall significantly, total output could still have increased.
71 Yamamoto 991, 1997, shows us this for various parts of Sichuan.
72 Grove 2004: 444-5.
For many women, spinning had always been an occupation concentrated in certain portions of their life cycle: they spun when they were adolescents (and perhaps again when they were elderly) and did at least some weaving during their most productive years. As noted above, Li Bozhong has recently argued for the existence of villages where adult women specialized in spinning alone prior to 1850, and did well by doing so, but such specialization seems to have been unusual, and there are reasons to think it would not have been a stable state of affairs. (For one thing, the local trade secrets that he suggests protected the monopoly of weaving villages would have been hard to reproduce and preserve in a world in which women customarily married out of their native village. The stability of such a division of labor would thus seem to require that the spinning villages be doing well enough that they would have no incentive to take up weaving, and on that point Li is unconvincing.) For the time being, it seems reasonable to assume that a life-cycle movement from spinner to either spinner/weaver or (in a few cases) full-time weaver, and then perhaps back again in old age, was much more common.

There is general agreement that the size of the cotton textile labor force shrunk substantially between the 18th and early 20th centuries, though it is hard to say for sure how much. At the same time, it also appears that the average number of days worked per year by those who remained involved in cotton textile production rose substantially: but so far, we do not have scholarship exploring what this combination of facts might mean. It would seem to suggest a continuing process of specialization, in which those who worked in cotton textile production did even more of this work and very little else (Xu Xinwu suggests that the average work year was 305 days a year in the early 20th century74) while many other people exited the cotton textile sector entirely. But within that more general pattern of specialization, the fates of different sub-groups was probably very different: the most skilled may have seen a real improvement in their fortunes, while a much larger group with more ordinary skills probably maintained their real incomes only at the price of significantly longer work year, and people toward the low end of the sector, if they stayed in it at all, must have done so on increasingly desperate terms.

Some of those women who did exit this sector returned to agriculture, as will be discussed shortly: this appears to have been a 20th century, rather than late 19th century

73 Li 1998: ; Pomeranz 2000: Xu :469
74 Xu 1992: 469.
phenomenon, and to have been associated with either temporary or permanent migration of the males in these families to Shanghai and other cities. One locally specific response that appeared more quickly was a boom in sericulture, which began immediately with the end of the Taiping Rebellion in 1864: a silkworm blight in France and Italy opened up large new markets, while technological innovations and local political changes facilitated the development of new centers of silk production in the Western part of the Delta. While both sericulture and the silk processing industries that arose alongside it were quite labor-intensive, it is impossible to attribute their growth to population pressure: they emerged in the aftermath of a calamitous civil war that left Jiangnan’s population density at its lowest level in centuries, and clearly represented a response to shifting global comparative advantage.

Some other established and very labor-intensive industries, such as straw mat making also expanded rapidly in the late 19th and early 20th century, taking advantage of the same combination of new markets and a movement of mostly young female labor out of cotton spinning. These varied considerably in the degree of skill required. At one end of the scale, high quality silk embroidery took a long time to learn, but also required very good eyesight, good coordination, and smooth rather than calloused fingers: it tended to be the occupation of relatively well-off young women for a fairly brief period in their lives, from shortly before marriage to a few years thereafter. At the other end, straw mat making could be learned in a day or two, required much less precise hand-eye coordination, and tolerated (indeed produced) rough, calloused hands: women could do this work for years, and could also combine it fairly easily with even fairly rough tasks in the home or on the family farm. In exceptionally large households, a woman of the senior generation seems to have allocated her daughters and daughters in law to these different kinds of production, with important implications for their position in the family.

What is less clear in this picture is how easily labor could be reallocated from one of these tasks to another as market conditions changed. Demand for all these commodities was quite volatile, at least in the early 20th century, and it is tempting to imagine that households, or even

75 Bell 1999:
76 Mann 1992:
individuals, who had skills relevant to more than one of these kinds of production might have shifted their work accordingly. To the extent that this did occur, it would resemble the pattern of movement among multiple tasks in rural industry that Kaoru Sugihara has emphasized for the Japanese case, and which he sees as continued by the less Fordist (relative to the United States and Europe) more flexible division of labor in modern Japanese industries. But we do not yet know enough to know how often this occurred in Jiangnan’s rural industries of the late Qing and Republic, or how often (as Mann’s anecdotal evidence suggests) assignment to one or the other of these types of production represented a moment of divergence between different life courses which could not easily be reversed to take advantage of temporary price shifts.

In some parts of the Delta (and in the immediately adjoining prefectures to the North), some women displaced from cotton textile production moved back into agriculture. This reversed a trend of at least the previous 200 years and quite possibly much longer, in which women in the Delta had played less and less of a role in farming. As average plot size shrank, men had needed less help, and as both the quantity and the skill requirements of textile work had increased, it had become less practical for women to put these tasks aside for agriculture. Some silk reeling and silk weaving, in particular (though it is not clear how much) had also moved out of homes and into reeling and weaving sheds in nearby towns, making it impractical for somebody doing such work to shuttle back and forth to the fields. Last but by no means least, the increased prosperity of the early and high Qing had made it possible for more families to achieve the additional respectability that came with keeping the family’s women largely out of the sight of strangers. As long as the textile sector had prospered, removing women from agriculture had required no economic sacrifice – far from it – and it was also consistent with human capital formation in two important ways. First, mothers who wove, particularly fancier weaves, could instruct their daughters in these skills, significantly improving their marriage prospects. Secondly, women who were weaving at home were thought to be ideally situated to instruct their children (both male and female) in the virtues of diligence, perseverance, and other valuable qualities, and in a more mundane way, were better able to supervise children closely than a woman in the fields would have been. For families with some social ambition but limited means (lower gentry households headed by the relatively young widows are the canonical

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77 Sugihara
examples, though not the only ones), indoor work was also consistent with at least loose supervision of a son’s early lessons in reading and recitation of basic texts.\(^\text{78}\) (Readers familiar with debates over women’s work in various periods of Western history may be inclined to wonder whether a complete withdrawal from paid work by women able to afford this would not have allowed larger investments in child-rearing, but there was no Chinese tradition valorizing such a withdrawal, even among the rich; on the contrary, women without economically productive activities were generally thought to pose a moral danger to the rest of their families.\(^\text{79}\) And from the 17\(^{th}\) to the mid-19\(^{th}\) centuries this normative “man plows, woman weaves” division of labor seems to have become reality for an unprecedented number of families:\(^\text{80}\) first and foremost in the Delta, but also in other regions as more local textile industries sprang up.

Beginning about 1890, however, we begin to see a reversal of this trend. In a few places toward the edges of the Delta, families with small farms sent one or more of their men to seek non-agricultural work, while women took over much of the farming. In some cases, this had a snowball effect of sorts: where women managed family farms and men had jobs that prevented them from returning to the farm even in periods of peak labor demand, their wives tended to hire other women rather than face the social complexities of supervising unrelated men; thus, particularly in some less accessible villages (from which men could not commute to urban jobs as easily), not only family farming but also the agricultural proletariat became feminized.\(^\text{81}\)

We should not make too much of this trend: in most households, men continued to do the bulk of the farming. Nonetheless, it is significant for a number of reasons. First, it indicates the flexibility of labor allocation in response to changes in the economic environment, despite preferences for a particular kind of gender division of labor. It also anticipates two connected phenomena that have occurred on a vastly larger scale throughout East and South China over the last 20 years. The first is the movement of men into off-farm jobs, usually without a permanent change of residence, and often without leaving the village at all. The second is a striking feminization of agriculture as the families of most of these men retain links to the land, even as

\(^{78}\) Mann 1987

\(^{79}\) See for instance, Mann 1992 and Jiaxing fuzhi 34:7a cited in Elvin 1999:151.

\(^{80}\) Li 1996; for a contrary view, see Elvin 1999: 144-54.

\(^{81}\) Bell 1999; Walker
farming accounts for a smaller and smaller percentage of the family’s income. We shall return to these issues later, as our story moves closer to the present.

The best estimate I have been able to make so far (based on highly imperfect data) suggests that Shanghai factory workers in the 1920s and 1930s had achieved a higher standard of living than was typical of tenants in the surrounding countryside: a sharp contrast to what I have argued for urban proletarians in the Qing.\textsuperscript{82} But the gap was still not a very large one, and many Shanghai laborers earned significantly less than factory workers; meanwhile, the group of landless laborers in the Delta countryside (who earned less than any urban laborers) remained quite small. It is thus less surprising than it may seem at first that unskilled jobs in Shanghai still seem to have drawn very few people, either male or female, from the Jiangnan countryside, despite the widespread perception of serious under-employment there: the vast majority of Shanghai’s true industrial proletarians came from the much poorer Subei region to the immediate North or from even poorer and disaster-ridden parts of the North China plain.\textsuperscript{83} Those who were even more down-trodden and unskilled also seem to have come primarily from places to the North: porters, dockworkers, night-soil carriers, beggars and sex workers of various kinds.\textsuperscript{84} (An exact count, however, is greatly complicated by the fact that some of these men engaged in two-step migration. First they often became farm laborers on the outskirts of Shanghai, replacing Jiangnan men who had gone to the city for petty commerce or artisanal jobs; then later they or their sons found jobs in the city itself.\textsuperscript{85}) Thus, while Shanghai sat at the edge of Jiangnan, and its growth from perhaps 200-250,000 in 1850 to over 3,000,000 in the 1930s\textsuperscript{86} was mostly fueled by immigration, the bulk of the immigrants did not come from Jiangnan.

Those Jiangnan men who did move to Shanghai were primarily artisans, organized in guilds with a strong native-place component: carpenters, printers, various sorts of metalworkers, painters, masons, and so on.\textsuperscript{87} (The same was true of another stream of immigrants from the relatively prosperous Canton area, who moved to Shanghai when it supplanted Canton as the

\textsuperscript{82} Pomeranz 2005a
\textsuperscript{83} Perry 1993: 48-57; Honig
\textsuperscript{84} Perry 1993: 52; Hershatter 1997:
\textsuperscript{85} Lu 1999: 42-55.
\textsuperscript{86} Lu 1999: 26, 55.
\textsuperscript{87} Perry 1993: 32-47.
primary center of foreign trade. Perhaps aided by the fact that technological change was slower in Shanghai industry than it was in the corresponding Japanese industries – and thus their skills remained relevant for longer – these artisanal groups were also successful in colonizing many of the new skilled occupations that sprang up in Shanghai: virtually all boilermakers in Republican Shanghai came from Wuxi, and most machinists from Ningbo and Shaoxing. A less positive way of looking at the same pattern might be to say that while Japan’s more rapid creation of a cohort of engineers and artisans with modern skills enabled them to move much more quickly beyond reliance on partially re-trained “traditional” artisans, who had proved themselves inadequate to many of the demands of modern industry, Shanghai relied on such people for a longer time. However one understands the cause and effect relationships, what is clear is that the kind of relatively skilled labor-intensive industry that characterized both urban and rural Jiangnan before 1850 remained important in 20th century Shanghai, even as those industries and workers were submerged by a flood of less skilled factory operatives from the North. At least as a working hypothesis, I would suggest that the continuities between old kinds of skilled work and new industries were even more important in Shanghai than in pre-war Japanese cities; and the resulting growth, if not as rapid as in Japan (and, of course, buried in a huge Chinese economy which included a number of probably stagnant or declining areas) was nonetheless impressive.

Moreover, at least until 1949, neither the skilled nor the unskilled immigrants to Shanghai cut their ties to their native places: this appears to be true both for those relocating from other towns and cities (e.g. ship-building carpenters who had previously worked in Ningbo or Canton) or from rural villages. Many female mill hands were contract laborers who were expected to return to the countryside after a few years, and who were forced to send most of their wages home.

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89 See Pauer 1987: 354-371 for a view of Japanese industrialization which minimizes the contribution of “traditional” skills; Sugihara 1996, 1997 and Morris-Suzuki 1994 are important examples of scholarship that places greater emphasis on the contribution of this traditional accumulation of skills and discipline. The present comparative point, I think, would hold even if Pauer is largely right about Meiji Japan, but is that much stronger if we accept Morris-Suzuki and Sugihara.
91 For estimates of the growth rate in Shanghai and the Lower Yangzi more generally in the early 20th century, see Ma XX
Male workers were more likely to move to Shanghai for good, but even they sometimes operated peri-urban vegetable farms, and frequently held on to their rural property; some even commuted from their villages. Rickshaw-pullers -- hardly industrial laborers, but a large and urban group nonetheless -- were very likely to remain part-time farmers; they have been called “semi-urbanites” and “true peasant-workers who kept one foot firmly planted in the countryside.” Other people came to the Shanghai area and began as tenants or laborers on farms near the city, gradually shifting more of their labor into urban activities as opportunities presented themselves. Thus not only did rural industry remain important; even in the country’s major industrial metropolis, urban and rural labor markets remained closely intertwined.

What sorts of non-farm jobs did men move into in the early 20th century? As we saw earlier, heavy industry was never a very big employer in Jiangnan, except for ship-building and construction; and what heavy industry there had been in the area did not generally fare well in the century after 1840. First of all, many of the basic conditions that made Jiangnan a rather unpromising place for heavy industry -- particularly, very high-priced fuel and the relative shortage of other power sources -- remained serious problems. Second, Jiangnan’s new membership in an international economy did not favor the location of heavy industry there, or indeed in China generally. To the extent that China did develop mechanized heavy industry in the years before 1949, this was generally done for reasons of political/military security, in marked opposition to the dictates of comparative advantage, and with the government playing a significant role. With no national government achieving anything like the degree of stability or fiscal strength that the new Imperial state achieved in Japan, China’s efforts to develop capital-intensive heavy industries were correspondingly much weaker. And to the relatively slight extent that China’s state-sponsored heavy industries did succeed, they tended to be located elsewhere than Jiangnan: near coal and iron and away from coastal locations, which were especially vulnerable to foreign powers. A plausible case can be made that, at least in the

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93 On female textile mill workers see Honig 1986. On the lingering rural ties of various groups of male urban workers see Lu 1999: 45-7, 80-81. On rickshaw pullers in particular see Perry 1993: 226-8; the quotation about “true peasant-workers” is on 228. On differences between “Northern” and “Southern” immigrants, see Perry 1993: 19-31.

94 On locational decisions, see Pomeranz 1993 (the Dezhou arsenal) and Kirby 1992, 2000 (Guomindang heavy industrial planning).
inter-war years, the economy of Jiangnan and the industrial sector of China (located disproportionately in Jiangnan) grew at overall quantitative rates not much different from Japan’s performance during those years. Factories were perhaps 10% of Jiangnan’s regional product circa 1933 – about the share they had in Japan’s national product 25 years earlier – suggesting to some a parallel, if slightly delayed growth path. Nonetheless, it seems clear that Jiangnan’s industry experienced nothing comparable to the structural transformations that occurred in 20th century Japan as its modern industrial sector moved beyond textiles.95 And by this time, of course, Jiangnan’s industry, including its factory-based industry, was not only comparatively labor-intensive because it was concentrated in particular sectors. Its wages had fallen far behind those of the North Atlantic countries, and then behind those of Japan as well; consequently, even within a given industry its firms used far less capital and energy, and far more labor, than firms in more advanced economies.96

Jiangnan did experience significant growth of factory-based light industry, primarily in Shanghai and Wuxi: mechanized cotton mills, cigarette factories, silk filatures, and so on. For the most part, these created unskilled jobs paying a good deal less than the skilled work within traditional artisanal employments. An adult male cotton mill worker in 1919 earned about one half the wage of a cement mason or carpenter, and an adult female cotton mill worker about one third as much.97 Even unskilled factory labor, however, paid much more than agricultural labor; thus, for the first time, we see a significant gap emerging between the wages of unskilled urban and rural workers. The gap between female mill workers and unskilled women in the countryside was probably considerably larger still, as the decline of spinning (and later the Depression-era collapse of silk exports) left increasing numbers of rural females out of paid labor almost entirely, while female mill hands earned almost as much as their male counterparts. Perhaps most significant, modern factories created for the first time a group of propertyless and unskilled men who could nonetheless afford to marry and have children; the average family size of households headed by mill-workers was 4.73 persons.98 (This was not true, however, of unskilled workers in many non-mechanized urban occupations. Shanghai rickshaw pullers, for

96 This was true even for mechanized plants in Chinese industry: for textile mills, see for instance Cochran 2000:
98 Yang and Tao 1931:22.
instance, remained overwhelmingly either single or living apart from a family in the countryside. No more than one quarter had dependents in the city.\(^\text{99}\)

While mill workers could not generally sustain their families on one person’s salary, this was clearly an important aspiration. In household budget surveys from 1920s and 30s Shanghai, it is striking how quickly married women and children drop out of the paid labor force once the household heads earns a bit more than mill hands did. Two surveys from the late 1920s/early 1930s suggest that a basic standard of living for working class family in Shanghai would have cost about $375 per year for a family of 5,\(^\text{100}\) such an income would have been just barely within the reach of a husband an wife who were both employed as unskilled laborers in a textile mill, and only if they worked all year round. (By contrast, a ship-builder working 12 months a year could support a family of 4 or possibly 5 at this level with his wages alone, but shipyard workers were less than 3% of the total industrial work force.) The Social Bureau estimated that 82% of (industrial) working class families could not meet their living expenses from wages alone.\(^\text{101}\) Other sources of income might have included having children collect rags and other junk, taking in a boarder, prostitution, etc; it has been estimated that in the early 1930s, Shanghai had about 100,000 prostitutes, in part due to the city’s lop-sided sex ratio.\(^\text{102}\) Workers who were slightly better off, or had arrived slightly earlier, often benefited from Shanghai’s rising rents, having leased a house and thereby acquired the right to sub-let parts of it.\(^\text{103}\) In the survey of cotton workers, the average family scraped enough just enough to meet this level of expenses, but husband and wife together accounted for only 63.6% of that income; another survey put the figure even lower.\(^\text{104}\) In a survey of printers’ families, husbands contributed 97% of all household income; among postal workers, 90%.\(^\text{105}\) Yet even male printers working 26 days a month, 12 months a year would have made just enough to buy the market basket described above

\(^{99}\) Calculated from Data in Lu 1999: 73, 77, 79.


\(^{101}\) Shanghai shi zhengfu shehuiju 1935: iii.

\(^{102}\) On sub-letting and boarding, see Lu 1999: 156-167; on trash-picking, estimated to have earned between .03 and .16 per day see Lu 1999:79. On the number of prostitutes, who often did this work as a part-time or temporary expedient between other jobs, see Hershatter 1997: 40.

\(^{103}\) Lu 1999: 160-67.


\(^{105}\) Cited in Perry 1993: 88.
for an average-sized family;\textsuperscript{106} apparently they preferred such a material standard of living with their preferred domestic arrangements to buying more goods but having other family members in the workforce, and my guess would be that this held for many more poorly paid white collar workers as well.

One imagines that this facilitated small but significant investments in human capital among better-off workers, such as educating children. Overall, rates of schooling among children of the Shanghai working class were quite low prior to 1949, but the absence of any income from children in families of better paid workers suggests that within this smaller group, rates of school attendance may have been quite high. The importance of income from children (and in some cases other household members) for the unskilled majority helps explain the very low percentage of children in school: only 15\% of boys 6-18 in the cotton mill workers’ families, and only 2\% of girls at the time of one major survey.\textsuperscript{107} While the rates of children who went to school at some point during their lives must be much higher, as were rates of literacy,\textsuperscript{108} this, like other aspects of the domestic ideal, would reflect one of the basic lines dividing struggling Shanghai residents from those among the skilled workers, white collar employees, and more successful self-employed people who constituted the respectable xiao shimin. It appears that for families that could afford it, keeping wives and children out of the labor force was a high priority. Despite the prominence of children under 15 in a number of observers’ accounts of the textile mills, statistics suggest that they were a very small percentage of the factory labor force by the 1920s. Assuming those statistics are accurate (there were, of course, reasons to undercount child workers), most of the large number of children who contributed something to their family incomes must have worked in equally bleak informal sector occupations: rag-picking, begging, street vending, etc. This may have been consistent with irregular school attendance and the fairly widespread basic literacy noted above, but probably not with much more.

\textsuperscript{106} Wage data from Shanghai sh zhengfu shehuiju 1935: 82.
\textsuperscript{107} Yang and Tao 1931 (1982): 86.
\textsuperscript{108} In a retrospective survey of 438 pre-revolutionary Shanghai residents in 7 largely working class communities (57\% said they had been unskilled workers, 18\% skilled workers, 16\% clerks or shop assistants), only 26\% were completely illiterate; 63\% had attended a formal school at some point. See data in Lu 1991: 325-327.
From the perspective of human capital formation, then, the gains of those on the lower rungs of the urban labor force were probably quite limited. For women working in the mills, getting out of the countryside allowed significant gains in income, and if they made a marriage that allowed them to move out of the paid labor force after a few years, they might have reaped some other gains as well; but their time in the mill would not have helped much. Some mills required basic literacy for employment, suggesting that they were getting young rural women with better than average attainments; adding to those attainments was another matter. Though a very few mills outside of Shanghai supervised their employees’ off-work hours closely and enrolled them (like it or not) in instruction which aimed to make them better wives, mothers, and citizens – a model well known from Japan – this was rare even in those cases, and I know of no cases in which such measures were adopted in pre-1945 Shanghai. (Women recruited from the countryside by labor contractors were often housed in dormitories, but the dormitories were run by gangsters, not the mills, and were purely for control, not education of any sort.) An apprentice system, begun after 1945, had a more serious educational component, but did not last long enough to be very significant. (Honig 1986:78-114.) Shanghai textile mill workers appear to have remained in Shanghai their entire lives; mills elsewhere often employed women who expected to return to their villages, or who commuted daily from their villages while working in the mill, but once women entered Shanghai mills they appear to have stayed in this industry (though often moving from mill to mill) past marriage, and for as long as they continued to work (Honig; Cochran; Köll). Unlike handicraft textile production, which was often favored over farm work in part because it was consistent with culturally-prestigious bound feet and relative female seclusion, mill work required the ability to stand and walk for long hours, and – except for the very few companies that had dormitories for their unskilled female workers that the firms themselves managed (on the Lowell or Osaka model) such women were considered to be out in public to an extent that raised questions for some observers about their morality. Clearly workers in the mills learned some skills, which were coveted by those with even grimmer prospects – as shown by the fact that some young women paid bribes to sneak into the mills and work unpaid for a while as they learned the trade – but there is reason to doubt that there was much spill-over of human capital acquired in the mills to other sectors. The workers in skilled
trades – and their families – would provide a different picture but they were, again, a small minority.

The People’s Republic

After 1949, Chinese industrialization became a higher priority than ever for the government, and Shanghai one of the most important sites for the construction of new industry. But for much of the Maoist period, this interest did not extend to rural Jiangnan (or any other rural area). The first six Five Year Plans focused on the creation of urban industry, using capital-intensive technologies which were at first often imported (or adapted) from the Soviet Union. In many cases, rural industry was deliberately dismantled. Rural areas were supposed to focus on maximizing agricultural output, and to allocate their labor accordingly. Politically powerful industrial ministries wanted no competition for their products, or for the raw materials (such as cotton or oilseeds) they were trying to procure from the countryside. Moreover, most rural industry was presumed to be destined to fade away, anyway. The crackdown on rural commerce that began in the mid-1950s only accelerated this decline of rural industries, particularly those that relied on specialization and far-flung markets.

Beginning in the late 1950s, of course, the Great Leap Forward once again promoted rural industrialization. But this was of a very different nature from the rural industries of the pre-1949 period, and especially from those of Jiangnan.

First of all, the emphasis was on creating industries to further local self-sufficiency, not producing commodities for sale to other regions. Second, most of the goods targeted were either intermediate goods (e.g. fertilizer, steel) or capital goods for agriculture (e.g. plows). Third, while the rural industrialization efforts of this era (and the somewhat parallel initiatives of the Cultural Revolution period) were extremely labor intensive, this was largely a matter of attempting to substitute enormous quantities of labor for capital in what were elsewhere very capital-intensive activities: steel production, chemical fertilizer production, dam building, and so on. And in sharp contrast to both the pre-1949 period and to post-1978 rural industry, the most intensive effort in the Maoist years was focused on matching or exceeding the size of the militarily strategic heavy industries of other great powers. These other powers were all countries
with factor endowments very different from China’s, and these strategic industries tended to be among the most capital-intensive and resource-intensive sectors of their economies. Between 1953 and 1979 (the first 5 five year plans) heavy industry received 90% of state-directed industrial investment. In the cities, this meant emphasizing the same sectors and technologies as those found in the Soviet Union and building enormous plants; in the countryside, where the state provided virtually no investment funds, it meant mass mobilization as a substitute for capital. If, as some scholars have argued, Japan’s turn to heavy industry in the interwar years should be seen as a largely mistaken turn away from sectors in which Japan could complement the era’s leading economies to ones which led instead to both economic and military competition with them, on very unfavorable terms, much of what occurred in Chinese industry from the 1950s to the 1970s can be seen as a much more extreme example of the same tendencies. If the choice of techniques in Chinese cities during this period sometimes looked like a parody of Alexander Gerschenkron’s predictions, the countryside sometimes looked like a parody of Arthur Lewis’ proposals.

It is worth remembering that in some ways a great deal was accomplished in the Maoist period, despite its huge excesses and failures. Life expectancy nearly doubled between 1949 and the mid-1970s (despite the catastrophe of 1958-61), literacy increased dramatically, and basic measures of public health improved very significantly. And though the extremely rapid population growth of the 1950s through 1970s is now generally viewed as a serious hindrance to further development, for millions of people at the time it represented one of the best things about the regime: the fact that virtually everyone could now afford to marry and reproduce, and could expect to see at least one child survive to adulthood. (Estimates of the percentage of males who could not afford to marry in the early 20th century vary and are based on very weak data, but most hover around 10-15%; marriages broken up by early death, wife-selling or abandonment during the crises of the 1920s, 30s, and 40s would make the proportion of people unable to continue their ancestral lines or enjoy family life much larger still.)

These achievements rested, however, mostly on gains in agriculture and a few related industries in which very the substitution of massive amounts of labor for capital was fairly

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110 Sugihara: ; Yasuba 1996:
successful. “Backyard” chemical fertilizer plants, for instance – though overshadowed by the famous failures of backyard steel – actually did fairly well, and enabled very large areas to increase their per acre yields significantly without straining the country’s transportation system or requiring massive investments in other technology and capital-intensive industries (e.g. natural gas production) important to the making of fertilizer in the West. The same seems to have been true, at least to some extent, with pesticides. The other great tool increasing modern per acre yields has been irrigation, and the electric power that is often necessary to move the water involved. Here, too, China adopted extremely labor-intensive approaches, building water control and hydropower facilities of all kinds with massive mobilizations of labor and relatively little machinery. In many ways the results were remarkably impressive: irrigated area roughly tripled from 1953 to 1980, and China, which had virtually no dams of 15 meters or larger in 1949, had over half of all such dams in the world by the 1980s. (Notably, these dams were concentrated in Central and Eastern China, where there was plenty of population to mobilize, and were generally constructed by locally-organized work units that were compensated by gaining title to the water and or power thereby harnessed. Despite the fact that rivers have the most power potential where the water is at higher elevations, and all of China’s major rivers do most of their falling in the far West – in the case of the Yangzi, 90% of its drop to the sea occurs before it even enters China proper – relatively few projects were built in the sparsely populated West until the mid-1980s.)

This strategy has had a considerable downside. We know there have been some catastrophic dam collapses due to substandard construction, and rumors of many more which have been covered up persist. Moreover, what were resource-saving strategies during the construction phase may not be resource-saving in the longer term: Chinese irrigation channels, for instance, have a fairly high rate of loss to evaporation and seepage, which in some cases are due to efforts to economize on materials. (It is not clear, however, that these loss rates are much

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112 Smil ; Gustafson ; Nickum .
113 114 Pomeranz 2001: ; Van Slyke: ;
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higher than elsewhere in the world.) Nonetheless, there have undoubtedly been great successes in this area, which were crucial to maintaining and improving popular welfare.

In the cities, where more capital-intensive, Soviet-style industrialization was pursued, it is harder to find clear and lasting successes. Both employment and output rose very rapidly in major urban industries during the 1950s-1970s, and the standard of living of urban factory workers also improved considerably. Many of the plants thus created, however, depended for their viability on administrative price-setting, preferential financing, and other special arrangements. Some of these capital-intensive plants were remarkably profligate with resources: China’s steel industry, for instance, used about 60% more energy per ton of steel produced than in most industrialized countries, cement plants about 50%, more and so on. Estimates of the energy intensity of China’s overall economy circa 1980 vary wildly depending on whether one calculates GDP by official exchange rates or by purchasing power parity, but there is now doubt that heavy industry was exceptionally energy-intensive; it appears to have used unusual quantities of water as well.

Since serious reform of the state sector began in the mid-1980s, a large portion of urban industry has had a great deal of difficulty remaining competitive. While to some extent these industries have been pressed by foreign or joint venture firms with more efficient management and different technologies, they have actually lost more of their markets to the new rural industries that have mushroomed since the mid-1970s. Rural industry grew at a rate of almost 20% per year for over 2 decades before slowing down a bit recently; it now accounts for more of China’s industrial production than does the urban state sector, and for the majority of rural income. And even these figures understate the importance of rural industry: after all, successful rural firms are periodically reclassified as the towns they are in become recognized as “urban,” but urban firms are never reclassified as rural. Thus a snapshot taken in any given year underestimates the cumulative impact of rural industrialization efforts. In sum, while the big, capital-intensive urban firms created under Mao have made some important contributions

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116 Howe 1971: ; Rawski 1979:
119 See, for instance Economy 1997:12 on water use in steel production.
120 Zhongguo tongji nianjian 1999: 423-4;
(notably in the training of workers and the development and adaptation of technologies), and some have reconfigured themselves to compete in the new environment, much of the story of Chinese industrialization from 1978 until quite recently now appears to be located back in the countryside after all, with labor-intensive methods at center stage. Another big part is the growth of urban-based private firms, which also tend to be smaller in size than state firms, more focused on light industrial sectors, and less capital-intensive.

The rebirth of labor-intensive light industry in the Chinese countryside began in the latter half of the Cultural Revolution decade, but was not much noticed until later: the standard English language survey of rural industry, completed in 1977, still makes almost no mention of light industry. However, the extreme decentralization that marked the peak of the Cultural Revolution encouraged relatively prosperous areas to develop rural industry through one of two routes. In rural areas which were relatively prosperous and in which local government remained relatively stable, the decline of effective central control and emphasis on self-sufficiency created opportunities to reinvest some of the local surplus in small factories making consumer goods for the local market or to expand production of producer goods on which state sector firms charged especially high mark-ups. When central government policies changed to actually encourage rural industrialization and trade after 1978, many of these localities found they had a significant advantage over their neighbors: they had plants up and running, had developed the skills and connections necessary to acquire needed inputs, and made quick profits selling to other rural communities; these profits were then re-invested, and a rapid expansion of these industries, largely under the control of local government, began. With time, an increasing number of the industries built in this way were leased to private entrepreneurs, but usually under terms that gave local government cadres (representing the community, at least in theory) a large continuing voice in the firms’ operations. These township and village enterprises (TVEs) remain a vital and dynamic part of the economy. In recent years an increasing number of them have been privatized, either through outright sale to their managers or to shareholders who include many or even all of the firm’s workers. Nonetheless, the local government appears to remain quite significant: a 1999 study suggested that township and village governments continued to hold 20-
25% of shares in these privatized firms, and to be important to them in other ways as well.\textsuperscript{124} They are particularly concentrated in areas along China’s Eastern seaboard, most of which had been important areas for light industry before 1949 (some newly prosperous parts of Shandong are the major exception); Jiangnan has the largest concentration of all.\textsuperscript{125}

The other pattern of development is most pronounced in the area around Wenzhou, a bit to the South of Jiangnan along the Zhejiang coast. Here, local government essentially collapsed during the Cultural Revolution, and private entrepreneurs took advantage of the disorder to revive handicraft and commercial occupations that had flourished before 1949. Though privately owned from the start, these firms usually needed the protection of a local official who allowed them to pretend to be part of an official collective enterprise (a practice called “wearing a red hat”). While cadre involvement has never been as important in these firms as in the more common TVEs, local officials have often been able to exert a significant influence on these firms as well, while providing crucial connections, help in contract enforcement, and so on.\textsuperscript{126}

The political interests of the cadres involved tend to reinforce the labor-intensive nature of these firms: for obvious reasons, cadres like policies that maximize local employment, and provisions to spread that employment around the community are often written into the lease for the facilities used by the TVE.\textsuperscript{127} For better and for worse, these firms also appear to reflect many elements of local community norms. Some have limits on the multiple by which managers’ earnings can exceed those of the lowest-paid workers; some insist that no family get 2 jobs before every family in the village has one person employed outside agriculture; others, in areas where women typically marry out of the village, reserve jobs that pay well or help one learn skills for males from the village, while filling dead-end jobs with young women and/or guest workers.\textsuperscript{128} They also receive substantial support from local government, to an extent which has led some scholars to describe the system as “local state corporatism.”\textsuperscript{129}

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\item \textsuperscript{124} Smyth 1999: 204.
\item \textsuperscript{125} Oi and Walder; Chan, Madsen, and Unger; . On the geographic concentration of TVEs see Naughton 1995: 154; West and Wong 1995: 71.
\item \textsuperscript{126} Parris 1993: 242-263.
\item \textsuperscript{127} Ruf 1999: ; Lin and Byrd 1985: . For a more recent survey see Christerson and Lever-Tracy 1997: 573-4.
\item \textsuperscript{128} Ruf 1999: ; Judd 1994: ;
\item \textsuperscript{129} Oi 1999;
\end{itemize}

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connections seem to be particularly important in securing (and enforcing) sub-contracting arrangements with state-sector firms in the cities and with exporters in special economic zones. Local government also often facilitates investments thought likely to be of use to more than one local TVE: it is not unusual, for instance, for local government to arrange for the hiring of urban skilled workers (including many who have been laid off from ailing state sector firms) to help with the acquisition of new technologies by a cluster of local TVEs.\(^{130}\)

While they may have originally emerged out of local initiatives (including some illegal ones), these rural industries became central to the Chinese government’s overall development strategy. This was not only a matter of economic development, but of the state’s plan for social stability: for a variety of reasons, the state has tried to encourage people to “leave the farm but not the village,” and to limit the rush of people seeking better jobs into China’s cities.\(^{131}\) For years, China’s industrial growth outstripped its rate of urbanization. Moreover, a large percentage of China’s urban growth was (and continues to be) “urbanization in place,” in which rural towns and even villages grow into larger urban agglomerations, rather than resulting from migration to what were already large urban centers.\(^{132}\) More recently, China’s cities have grown more or less apace with its very rapid industrialization. But even that stands in sharp contrast to much of the “developing world,” which has been urbanizing much more rapidly than it has been industrializing (fueling the rapid growth of peri-urban shanty towns). With coercive restraints on migration increasingly ineffective, the amount of capital needed to create a TVE job catching up to that in urban industry,\(^{133}\) and agricultural incomes lagging further and further behind urban ones,\(^{134}\) some key features of this pattern of growth may be nearing exhaustion; but even if that turns out to be the case, the pattern of the last quarter century, involving the creation of over 100 million rural industrial jobs, would remain well worth our attention.

As in an earlier epoch, many households that provide one or more laborers to rural industry also have some involvement with agriculture: another family member may farm, the worker

\(^{130}\) Ho 1994 on the “leave the farm but not the village” strategy; Solinger 1999 on continuing attempts to limit rural-urban migration (which was completely forbidden from 1960 to roughly 1980, and continues to be limited in numerous ways).

\(^{131}\) See Friedmann 1999: ; Song and Zhang 2002.Ebanks and Cheng

\(^{132}\) Solinger

\(^{133}\) Solinger

\(^{134}\)
him/herself may work in agriculture at peak season (some firms accommodate this with time off\textsuperscript{135}) or the family may simply have legal responsibility for a piece of land that they lease to others. But while many analyses of the rural industry boom, especially in its early phases, emphasized the ability of rural firms to employ “surplus” labor in the Arthur Lewis sense – workers who were previously employed in agriculture but could be removed from it with almost no loss in output – this is probably not much of a factor anymore, at least in Jiangnan. Already by the late 1980s, 20% of rural industry’s workers in this region came from outside the place where they found work;\textsuperscript{136} those migrants may have been “surplus labor” in the place they left, but they suggest a lack of such people in Jiangnan itself. Moreover, if these workers are living away from home and often sending money home, then they are not being subsidized by the agricultural households they came from in a way that allows industry to pay them less than their subsistence costs; if anything, subsidies are flowing the other way. Rural industrial wages in Jiangnan have gradually (though still not completely) converged with those in urban enterprises;\textsuperscript{137} Grove reports that in the case of textiles, rural wages were often higher than urban ones, even once benefits were included.\textsuperscript{138} Thus, rural industries must find their competitive advantage elsewhere. Such firms do seem to use older and cheaper equipment in many cases, and to compensate by using more labor. They tend to draw on rural savings for their capital, but this is at least in part because they have trouble accessing more formal financial institutions; many suffer from capital shortages, so it seems more likely that their access to rural money is a palliative for a handicap in financing, rather than something that confers an advantage. In general, a great deal about how these firms use (and are constrained by) their rural character remains unclear.

The kinds of industries created in the countryside during this boom are, of course, often very different from those which dominated rural industry in the Qing; and the state’s goal of eventually moving most of the population out of agricultural work is also a distinctly modern one. Yet in other ways, the resemblances to Qing policies and patterns are quite interesting. In

\textsuperscript{135} Smyth 1999: 200
\textsuperscript{137} Smyth 1999: 203
\textsuperscript{138} Grove 2004: 456-7. One important difference, however, is that urban firms often also face high costs for retired workers, which rural firms, being relatively new and not obligated to provide pensions, do not.
both cases, the regime seeks to increase rural stability by diversifying the economy of the countryside (and the sources of income for any given household), and wants to avoid forcing people to choose between economic advancement and living with kin. The regime may also hope that a proletariat that still has some rural resources and ties will be less militant, as some have argued has been true in Taiwan (as opposed to, say, South Korea).  These policies come with at least a rhetorical gloss which insists that the truly good and truly “Chinese” way to live is in the countryside. As in Taiwan and Japan at a comparable phase in their economic development, the macro picture is one in which light industry is once again dominant, rural industry plays a much larger role than at the comparable point in industrialization in most Western countries. The energy intensity of the Chinese economy, which reached stratospheric levels under Mao, has declined quite sharply since 1978 (in contrast to, for instance India, where there has been no post-reform change in energy intensity). While China’s energy use per dollar of GDP is still above the global average, that of the wealthy coastal provinces is about half the national level, and approaching that of other East Asian economies.

As in the late Imperial and Republican periods, the growth of rural industry in Jiangnan (and along much of the rest of the coast) is tied to long-distance trade, both foreign and domestic, and relies on the flow of imported primary products. Economizing on these resources (especially fuel) remains a crucial concern for many rural industries today – particularly now that producers of industrial inputs can generally sell them at whatever price the market will bear.

Meanwhile, new skills and technologies are often acquired not on a firm by firm (or family by family) basis, but as the property of a local territorial unit, with local governments or holding companies they control paying to bring in (for instance) urban machinists to transfer local skills to workers at several local firms at once. This pattern is reminiscent of the ways in which local officials in both Qing and Republican times would take responsibility for hiring weavers or other skilled workers to come demonstrate new techniques for the people under their jurisdiction, and of the ways in which particular villages guarded control of particular

139 Minns and Tierney 2003.

140 For policy debates related to this situation – and an increasing fear of being dependent on such imports, see Pomeranz 2001: .
specialties. In the case of Jiangnan firms, this pattern of urban-rural technology transfer is also aided by the fact that many skilled workers in Shanghai and other Lower Yangzi cities have roots in the smaller towns of Jiangnan (which, as we saw earlier, provided many of pre-revolutionary Shanghai’s artisans, though not its unskilled workers) and are amenable to retiring there, especially since it is a cheaper place to live.

Related to treating skill acquisition as a collective project – and to the still-widespread phenomenon of female exogamy – one also still finds a difference between the kinds of skilled labor-intensive production promoted for men and married women on one hand, and the relatively unskilled and poorly paid industrial work generally available to unmarried women on the other. (As noted before, there is also an increasing tendency for agriculture to become a feminine occupation in many better-off regions. Maoism made it clear that women could do virtually all agricultural tasks, but with the return to family farming, doing so no longer involves having them away from home and “exposed” to strangers; it is now more consistent with being at home than textiles or other industrial work, and since it generally pays less, it is unpopular with males. Where families have a choice as to who should get an industrial job, they generally choose a male.) Plant size is generally small, and better-paid work tends to involve being able to move flexibly among a variety of tasks rather than extreme “Fordist” specialization. Foreign investors working with these firms tend to emphasize their ability to switch production lines quickly, adapt to new designs and short production runs, etc.

This description of the strengths of rural Jiangnan firms – and the tendency of many small to medium firms to cluster in industrial districts where they share certain physical and intangible resources – seems to recall the advantages of skilled labor-intensive production in areas such as Sabel and Piore’s “third Italy.” Yet a far more common picture of China’s rural industries – both in the Western press and in most of the academic literature – emphasizes a far darker picture, with very low-wage workers producing large quantities of low value-added products for very price-conscious buyers (e.g. Wal-Mart) or producing the least skill-intensive and remunerative

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143 See for instance Mann 1992: ; Friedman, Pickowicz and Selden ; Smyth 1999: 192. 144 Judd 1994: 145 146 147
parts of fancier products in commodity chains where the design, branding, and other high-profit activities occur downstream.\textsuperscript{148} It is, of course, true that there is a great deal of this kind of rural industry in China -- though more in the lower-wage, more export-oriented Pearl River delta than in Jiangnan. It is crucial to know how much rural industry there is in Jiangnan that fits the more positive “non-Fordist” picture: if this is actually rare, then the significance of any positive legacy of older labor-intensive industries would be very limited. The argument is complicated, from our perspective, by a debate over whether firms in rural areas are less likely to innovate than urban ones – quite apart from the degree of labor-intensity in either setting.\textsuperscript{149} For current purposes, it is worth noting that at least some literature suggests that firms in highly accessible rural areas – which would certainly describe Jiangnan – may be as well-positioned for innovation as urban firms.

For China in general, there are definite signs of moving into more skill-intensive products over time, even within the generally low value-added textile sector. The average price per square meter of Chinese apparel exports to the U.S. went from $2.50 in 1988 to over $4.00 just 7 years later, while the global average for apparel exported to the U.S. held almost perfectly steady at $3.50.\textsuperscript{150} Other evidence of rural firms moving up the value added ladder is plentiful – what I have found is anecdotal, but it is a lot of anecdotes.\textsuperscript{151}

Meanwhile, in a 1993-4 survey of 404 rural industrial firms in coastal China that had obtained at least some foreign investment, the authors found that 28\% of them did all the product design in-house; for the Jiangnan firms in the sample, the percentage was 41\%.\textsuperscript{152} Thirty-three percent of the Jiangnan firms (as opposed to 13\% of all the firms and less than 10\% of Guangdong firms) sold all their products directly to the consumer, and thus presumably made whatever profits there were in marketing and branding; 48\% (as opposed to 24\% for the sample as a whole) sold at least some of their output directly to consumers.\textsuperscript{153} In general, firms that sold at least some of their output to Chinese consumers were more likely to do at least some of the

\begin{footnotesize}
\textsuperscript{148} See for instance Keeble 1992; North and Smallbone 2000
\textsuperscript{149} Christerson and Lever-Tracy 1997: 578.
\textsuperscript{150} For one example, based on surveys taken in Jiangnan and in other parts of Jiangsu (with Jiangnan firms being by far the most innovative) see Sun and Wang 2004
\textsuperscript{151} Christerson and Lever-Tracy 1997: 580.
\textsuperscript{152} Christerson and Lever-Tracy 1997: 581.
\end{footnotesize}
product design in-house and to have a higher share of technical employees. This is unsurprising, since one would expect Chinese firms to be better positioned to do this sort of work when they were selling to domestic consumers than to foreign ones. It does, however, suggest that a survey focused on firms that have received foreign investment (which tend to be disproportionately oriented towards foreign markets) may understate the degree to which rural industrial districts are taking advantage of their undeniable flexibility to reap gains from more specialized production with a gradually increasing skill-intensity. In the longer run a key question is to what extent booming urban Chinese consumer markets will play the role that Hamashita, Sugihara, and others have argued that emerging Asian middle classes more generally played for Japanese industry a century ago: providing an expanding niche in which regional or national tastes gave East Asian producers an advantage. All of this, however, remains speculative.

In sum, one finds in the coastal TVE sector considerable continuity with patterns characteristic of the Yangzi Delta’s pre-mechanized patterns of industry, and a number of features that resonate strongly with Kaoru Sugihara’s notion of an “East Asian” form of development. It is important to note that this is not necessarily the story of China as a whole. Even among coastal boom areas, the Lower Yangzi appears to stand out; its factories, for instance, generally pay better wages and have a greater foothold in high value-added types of production than is the case in the Pearl River Delta. In many other parts of the country one still finds that there is much less rural industry, while the industry that does exist more closely resembles the capital and resource-intensive heavy industrial emphases of the wartime Nationalists and the Maoist period. But within at least this region, there seem to be enough resemblances to earlier patterns of labor-intensive industrialization to make it likely that this is more than coincidence.
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