Wages, Prices, and Living Standards

in China, Japan, and Europe, 1738-1925

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> "The difference between the money price of labour in China and Europe is still greater than that between the money price of subsistence; because the real recompence of labour is higher in Europe than in China."
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> –Adam Smith, Wealth of Nations, 1776, p. 189.

The comparative standard of living of Asians and Europeans on the eve of the Industrial Revolution has become a controversial question in economic history. The classical economists and many modern scholars have claimed that European living standards exceeded those in Asia long before the Industrial Revolution. Recently, this consensus has been questioned by revisionists (e.g. Pomeranz 2000, Parthasarathai 1998, Wong 1997, Lee and Feng 1999, Li 1998, Allen 2002, 2003, 2004, Allen, Bengtsson, and Dribe 2005) who have suggested that Asian living standards were on a par with those of Europe in the eighteenth century and who have disputed the demographic and agrarian assumptions that underpin the traditional view. The revisionists have not convinced everyone, however (e.g. Broadberry and Gupta 2005).

One thing is clear about this debate, however, and that is the fragility of the evidence that has been brought to the issue. While some writers have made real income comparisons between Europe and Asia, the comparisons have been based on scraps of information about wages and prices in Asia. Our knowledge of real incomes in Europe is broad and deep because scholars since the mid-nineteenth century have been compiling data bases of wages and prices for European cities from the late middle ages into the nineteenth century when official statistics begin. Apart from Japan, little comparable work has been done for Asia. We have been trying to fill that gap by constructing data bases of wages and consumer goods prices for China in the eighteenth and nineteenth centuries. These data can, then, be combined with Japanese data and compared to European evidence to assess the relative levels of real income at the two ends of Eurasia. The comparisons paint a less optimistic picture of Asian performance than the revisionists suggest.

Our procedure takes the hypothesis of Adam Smith at the head of this paper as its point of departure. We first compare the "money price" of labour in China and Europe. To do this, we express wage rates as grams of silver earned per day in the two regions. Silver coins were a universal medium of exchange in this period, and the terms on which they exchanged defined the market exchange rate of European and Asian moneys. Then we compare the "money price of subsistence." This is a more complicated problem since the subsistence foods were different in China and Europe. Our approach is to respect the culinary differences by reducing rice and wheat and other foods to calories and protein. Once that is accomplished, we can see how money wages and the costs of subsistence differed between Europe and China and what those differences imply for the "real recompence of labour"–our third task.

We investigate the following Asian cities: For Japan we present results for a composite picture of Kyoto-Edo in the eighteenth and early nineteenth centuries and Tokyo for the late nineteenth and early twentieth century, based on Bassino and Ma (2004). For China, we estimate real incomes in Canton and Beijing from the mideighteenth century to the 1920s. For comparison, we report estimates for Sichuan from 1875 to 1925. Levels of real income in these cities are compared to London, Amsterdam, Leipzig and Milan as worked out in Allen (2001).

Income

Our sources report daily wage rates. In the comparisons reported here, our income

measure is the annual earnings that a worker could have earned if he worked full time for a year. We assume that one year's work consisted of 250 days. Obviously, people could have worked more or less than that, and we discuss the implications of those possibilities later. The earnings from full time work provide a useful benchmark for comparing Europe and Asia and for defining family economic strategies.

Wage data of various kinds have appeared in numerous studies (Peng Xinwei, Chao Kang, Chao and Liu, Wu Liankai). However, none of these studies used wage series that are continuous and consistent, and they combine wage quotations from many regions, employers, and often job types. These data are helpful in identifying trends in the eighteenth century when information is particularly sparse, but we use more precisely defined series where possible.

Our Beijing investigation is anchored on the work of Sidney Gamble and his associates (Gamble 1943, Meng and Gamble 1926). Gamble was an American sociologist who lived in China in the 1920s and 1930s. He conducted a survey of workers in Beijing in 1921. This provided the weights for a consumer price index for Chinese capital for 1900-24, and that index, in turn, was used in a study of real wages for the period. Gamble also had historical interests. He studied the account books of a fuel story in the rural area outside Beijing (hereafter referred to as rural Beijing). From these he abstracted the wages of unskilled workers from 1807 to 1902. This is the most consistent wage series for nineteenth century China. Gamble and his associates also recorded wage series for unskilled construction workers in Beijing for 1862-1925 using the records of the Beijing Guilds for construction workers. These are our 'urban Beijing' data.

While Gamble's nineteenth century wage series is the most consistent and comprehensive available, much work remains to be done to adapt it to our purposes. The nineteenth century wage payments were recorded in copper cash, and we need to convert them to silver for comparison with prices and other wages. This helps resolve one of the most difficult problems in interpreting the 1807-1902 wage series. It was broken around the mid-19th century due to the monetary debasement in the period of the Taiping rebellion. We can connect the earlier and later components by converting to silver. This requires knowledge of the silver equivalent of copper cash across the nineteenth century. These conversion factors varied across China, and Gamble reports important information for the Beijing area from the accounts of the fuel store. We derive a consistent copper-silver exchange rate series from this source and compare it to other series in Appendix I.

A second issue in interpreting the 1807-1902 series is the question of payments in kind. The fuel store recorded cash wage payments. The question is whether the workers were also given food. This was a common practice in nineteenth century China, and Gamble included the value of the food given to construction workers in his 1862-1925 wage series. He does not discuss the matter for the 1807-1902 series, and we interpret his cash payments to include the value of any food payments in kind.

For the eighteenth century, the only solid information we have about Beijing wages is contained in the *Wuliao jiazhi zeli* ("Regulations and Precedents on the Prices of Materials"). These documents contain prices and building wages for many districts in China. While they were published in 1769, they probably described the state of the markets in the preceding thirty years. The wage quotations are cash wages and appear to include all aspects of labour compensation; no other provision was made, for instance, for the cost of providing workers with food in kind. The *Wuliao* indicates a daily wage of about .075 taels in Beijing. Fortunately, this is consistent with Gamble's early nineteenth century records indicating a

similar wage rate. This congruence is one reason we think that Gamble's 1807-1902 series represents the full payment to workers.

What about the rest of the eighteenth century? We have scattered data but no continuous series like Gamble's. Our approach to these data is to use regression analysis to summarize the geographical patterns and extract the rate of wage inflation. To do that, we estimate models with the silver wage[1] as the dependent variable and with the year and dummy variables representing provinces as the independent variables. The results for a preliminary analysis of a small sample of agricultural wages (21 observations) in four provinces (Jiangsu, Shanxi, Zhili, Henan) is shown in Table 1.

The first regression in Table 1 includes the year (minus 1769 to facilitate comparison with the *Wuliao jiazhi zeli*) and dummy variables representing three out of the four provinces. The coefficient on the year is equal to -.0000046, which is zero to the three decimal points shown in the table. The insignificance of the time trend is further confirmed in regression 2 which excludes the provincial dummy variables. They, indeed, account for the much higher R^2 in regression 1. The dummy variable for Zhili province in that regression is reasonable large and statistically significant indicating a higher wage level there than in other provinces analyzed. The data indicate an agricultural wage of .034 taels per day in Henan, .04 in Jaingsu and Shanxi, and .06 in Zhili in 1769. These wages are somewhat less than those shown for state building workers in the *Wuliao jiazhi zeli*.

In view of the constancy of the silver wage in the second half of the eighteenth century, we posit a rural Beijing wage of .075 taels per day for unskilled workers outside of agriculture. With the tael equal to 31.06667 grams, the Beijing wage equalled 2.33 grams of silver per day in the eighteenth century. This is a working hypothesis rather than a firm finding and may be revised in future work. This paper develops the implications of constant silver wages.

Canton

Our information on Cantonese wages is less comprehensive than our Beijing information. We are on firmer ground for the eighteenth century, for we have collected daily wages paid to Chinese workers employed on Dutch East Indies Company (VOC) ships docked in Canton. They support the view that nominal wages were constant in eighteenth century China.

Comparison of the VOC wages with the 1769 *Wuliao* indicates that the VOC wages were higher than normal in southern China. According to the *Wuliao*, unskilled workers were paid about .04 taels per day in Canton in 1769. Even porters and coolies working for the VOC ships earned twice that. Only the pay of cook's mates was similar to the earnings of state building labourers.

Our interpretation of the evidence is that the 1769 *Wuliao* indicates the level of the wage of unskilled workers in Canton, while the VOC records indicate the trend. Hence, in our analysis we postulate a constant wage of .04 taels per day across the eighteenth century.

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[1]The wage quotations were originally in copper cash, and we have converted them to silver on the assumption that the exchange rate rose linearly from 800 cash/tael in 1749 to 1150 cash/ tael in 1799. This pattern is suggested by the a large sample of exchange rates collected by Professor Hans Ulrich Vogel and discussed in Vogel (1987).

As with Beijing, this is a working hypothesis rather than a definitive conclusion.

Our next reliable information on Canton wages is for the early twentieth century. A government report summarizes wage rates of unskilled workers from 1911 to 1927. For the intervening period, we have no reliable information. The Imperial Maritime Customs Returns report Cantonese wages for 1882-1891. Comparison with other wages, however, shows these to be so high as to be incredible, and we exclude them from our analysis. Filling in the wage history of nineteenth century Canton is a priority for research.

Sichuan

We do not have information on wages and prices in eighteenth century Sichuan, but we have a useful compilation of daily wages and consumer goods prices at ten year intervals from 1875 to 1925. These provide a valuable extension of the geographic coverage at the end of the period we study.

Wage patterns in Europe and China

Adam Smith thought that the "money price of labour" was higher in Europe than in China. To test that, we compare the Chinese wages with their European counterparts. Here we build on our earlier studies of European wage rates (van Zanden 1999, Allen 2001). For many cities we have assembled daily wages earned by labourers in the building industry. We have been careful to exclude wage quotations where the earnings included food or other payment in kind that could not be valued and added to the money wage. As with China, we have converted the European wages to grams of silver per day by using the market price (in units of account) at which silver coins (of known weight and fineness) could be purchased.

Figures 1 and 2 graph the daily wage rates of unskilled workers in London, Amsterdam, Leipzig, Milan, and Beijing from the eighteenth century to the twentieth. Figure 1 shows the series from1738 to 1870. For this period, Adam Smith was half right. Wages were, indeed, highest in London and lowest in Beijing, but the other series show that the world was more complex than Smith thought. The silver wage in Milan or Leipzig was not appreciably higher than the wage in Beijing throughout the eighteenth century. The statistics of other European and Chinese cities show that this similarity was general.

Amsterdam occupies a peculiar position in Figure 1. Nominal wages there were remarkably constant for a century and a half. At the outset the Amsterdam wage was similar to the London wage. The same was true of Antwerp. Indeed, the low countries and the London region stand out from the rest of Europe for their high wages in the seventeenth and eighteenth centuries. These high wages were probably due to the active involvement of these regions in inter-continental commerce.

But this pattern changed as the nineteenth century advanced. The industrial revolution raised British wages above Dutch levels. Indeed, the early industrialization of Germany is seen in Figure 1 as a rise in the Leipzig wage.

These developments intensified after 1870 as shown in Figure 2. British wages continued to increased. By the First World War, German wages had caught up to the British level, and Dutch wages closed the gap as well. Italian wages were also growing, but the increase was muted compared to the industrial core of Europe.

Chinese wages, in contrast, changed little over the entire period. There was some increase in the silver wage after 1870, but Figure 2 emphasizes that the gain was of little importance from a global perspective. By the First World War, nominal wages in China were

very much lower than wages in Europe generally. Taken at face value, Adam Smith's generalization about Chinese and European wages was more accurate at the time of the First World War than when he penned it in 1776.

Price index

What of Adam Smith's second generalization? He remarked that "the difference between the price of subsistence in China and in Europe is very great." (189). Price indices are used to make comparisons of this sort. In modern theory, the problem unfolds like this: Suppose an individual or family receives a particular income and faces particular prices. The income and prices determine the maximum level of utility (highest indifference curve) that the individual can reach. Now suppose that prices change. What proportional change in income would allow the individual to reach the original indifference curve in the new price situation? The price index is supposed to answer that question. Comparing the actual change in income to the index shows whether or not consumer welfare has risen or fallen.

If we compare that theory to the realities of the eighteenth century, we see problems in relating the theory to the world. There are no insuperable problems in applying the theory to real income changes over time in either Europe or Asia provided we have full information about wages, consumer prices, and spending patterns. But how do we compare living standards between Europe and Asia? The pattern of goods–particularly foods–consumed in the two regions was radically different. The standard theory of consumer welfare assumes that all of the goods are available in both regions and that there is a 'representative agent' who would voluntarily choose to consume rice, fish, and sake when confronted with Japanese prices and bread, beef, and beer when confronted with English prices. In fact, all goods were not available everywhere, and, moreover, it is unlikely that there were people with flexible enough preferences to voluntarily shift their consumption between the European to the Asian patterns in response to changing prices. In that case, how can we compare living standards?

Our solution is to substitute objective equivalence for subjective indifference. Workers and peasants in pre-industrial Europe and Asia spent most of their income on food; much of the rest was spent on a narrow range of goods centred on cloth, fuel, lighting, and housing. We specify quantities or spending shares of these so that consumers in Asia and Europe have the same standards of living in objective terms. This is how we operationalize Adam Smith's notion of the 'money price of subsistence'.

In the case of the non-foods the procedure was simple. Each adult male is assumed to consume the following per year:

cloth (cotton or linen)--	5.0 square metres
soap	2.6 kg
candles	2.6 kg
lamp oil	2.6 l
fuel	3.0 - 5.0 million BTUs
rent	5% of commodity spending

A range of values was specified for fuel consumption. The high value was used in northern Europe and the low value in southern Europe. Different values were used on the grounds that more fuel was required to reach the same level of utility in the north in view of the colder

climate. Southern European values were used for China and Japan.[2]

In the case of food, the procedure was more complicated in view of the radical difference in diet between Europe and Asia. The choices are also of great importance given the large share of spending on food.

The first step was to specify a diet for Europe as in Table 2, which summarizes the spending assumptions for northern Europe. This diet is late medieval in inspiration in that it does not contain new commodities like sugar and potatoes introduced into Europe after the voyages of discovery. Substitutions were allowed in the diet to adapt it to different parts of Europe. The price of wheat bread, for instance, was used in Mediterranean Europe, while the price of rye bread was used in Germany and Poland. The price of meat used in each city was that of the most common kind. Also, 68.25 litres of wine were used in southern Europe in place of the 182 litres beer shown for northern Europe. These contain the same quantities of alcohol (8.19 litres) on the assumption that the beer was 4.5% alcohol and the wine 12%. In this way, the same framework was used throughout Europe, but its application was adjusted to each locality studied.

The same principle guided the comparison of consumer prices and living standards between Europe and Asia. The diet for Japan and each part of China was specified in terms of the culinary norms of the region, but it was required to yield the same objective characteristics as the Europe diet shown in Table 2. These characteristics involved calories, protein, and alcohol. The European diet shown in Table 2 yielded approximately 1940 calories per day, and the Asian diets were required to do likewise.

Different diets were specified for different parts of Asia. Rice was a major source of calories in Japan, Canton, and Sichuan. The specifics of the diet and the annual spending pattern for Canton are shown in Table 3. In contrast, little rice was consumed in Beijing. There millet, beans, corn, and wheat were the main sources of calories. We have little information on their relative importance even in the early twentieth century (Meng and Gamble 1926), and their quantities were specified to insure some variety while keeping costs down and meeting the protein requirement. The details are in Table 4.

The Asian diets were required to yield about 80 grams of protein per day as in the European diet. Asians consumed less meat than Europeans but more beans. Soy beans, in particular, are high in protein, and their consumption allowed the protein requirement to be satisfied without breaching cultural norms.

In addition, the Asian diets were required to yield 8.19 litres of pure alcohol per year. This was presumed to be sake and amounted to 49 litres per year (assuming 16.5% alcohol). Nineteenth century surveys indicate that the Japanese did, indeed, imbibe this much sake, so the requirement is not in conflict with their cultural norms (Bassino and Ma 2004). Surveys for China, however, suggest that consumption there was much lower. Whether this reflects preferences or income is less clear. We will consider the implications of this discrepancy later.

Having specified the consumption 'baskets' in Tables 2-4, we need time series of the prices of the items shown, so that the cost of the baskets can be calculated across the eighteenth, nineteenth, and twentieth centuries. We begin with Gamble's study of retail prices in Beijing in 1900-24 and extend those prices to earlier times and other places using a

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[2]The discussion of Japan in this paper draws heavily on Bassino and Ma (2004) and their extensions.

variety of other sources. These are explained in detail in Appendix II..

The cost of the basket is Adam Smith's 'money price of subsistence' and its history is plotted in Figure 3 for leading cities in China and Europe in the eighteenth and nineteenth centuries. As Smith claimed, China had the cheapest subsistence. The figure shows the consumer price index for both Beijing and Canton. There was very little difference between the two. This is important because the two cities represent the two agrarian halves of China–the northern small grain region and the southern rice region. Apparently, the integration of China's food markets was close enough to arbitrage away any differences in the price of food when reduced to nutritional characteristics.

There were fewer exceptions to Adam Smith's generalization about consumer prices than there were about wages: In most cities, European goods were more expensive than Chinese goods. Leipzig was almost an exception to this rule, for prices there were very little above those in China during the eighteenth century. Prices were highest in London followed by Amsterdam and Milan. After 1870, silver prices inflated more rapidly in Europe than in China, so the gap between the two widened. Also, there was a convergence of prices in Europe in the run-up to the First World War. By then, Adam Smith's generalization about Chinese and Europe prices was correct, as was the corresponding generalization about wages.

Comparison of Living Standards

The purchasing power of wages is usually measured by the ratio of the wage to the consumer price index. Our procedure elaborates that approach. In constructing the consumer price index, we specified a notional budget that was intended to achieve a particular level of utility. The budget was an annual budget for an adult male. If the man was supporting a family, the expenditures would have been higher, and we multiply the cost of the budget by three to represent the annual budget of a family. This increase is roughly in line with the calorie norms for a man, a woman, and several young children. On the income side, we assume the man worked 250 days in the year–roughly full time work allowing for holidays, illness, and slack periods. The ratio of estimated full time earnings to the annual cost of the family budget is a real wage index, and one that specifically answers the question whether a man working full time could support a family at the specified level of consumption. Real wage indices of this sort are called 'welfare ratios.' As we will see, many men did not earn enough to reach the specified level of consumption–their welfare ratios fell below one–and we will discuss how they adjusted to the deficiency.

Figure 4 shows welfare ratios for unskilled male workers from 1738 to 1923 in the Europe cities we have been discussing and in Beijing and its hinterland. Several features stand out:

1) Beijing was in a tie for last place with Milan. Italian cities had the lowest standard of living in Europe, so an optimistic assessment of Beijing's performance is difficult. In the late nineteenth century, we have series for both 'urban' and 'rural' Beijing. While the income of 'urban Beijing' was higher than that of more rural areas near the city, some of the gain might be specious since we have not measured house rents, and they are generally higher in the city than the country. In any event, 'urban Beijing' was at the bottom of the European league table.

2) The trend in the standard of living in rural Beijing was generally downward from the early eighteenth century to the beginning of the twentieth. The lowest values of the welfare ratio were reached during the Taiping Rebellion, and the rebound in the index afterwards merely

continued the slide that had proceeded the uprising.
3) The urban Beijing index rose noticeably in the early twentieth century and pulled away from the rural index. This may indicate a quickening economy in Beijing that had little impact in adjacent rural areas. The welfare ratios achieved in Beijing in the early twentieth century were still very low on a world scale and only kept pace with the modest gains realized in northern Italy with the onset of its industrialization at the end of the nineteenth century.
4) The most striking feature of Figure 4 is the great lead in living standards enjoyed by workers in the rapidly growing parts of western Europe. The standard of living of workers in London was always much higher than that of workers in Beijing. After the middle of the nineteenth century, London living standards began an upward trajectory and increased the lead over Beijing. While workers in Amsterdam in the eighteenth century also lived better than their counterparts in Beijing, the Dutch economy faltered in the early nineteenth century. By mid-century, however, growth resumed and real wages were climbing to new heights. At the same time, the rapid growth of the German economy was translating into rising real wages for workers in Leipzig. By the First World War, workers in the industrial core of western Europe had greatly increased their standard of living over their counterparts in Beijing. The standard of living there remained low and on a par with the regions of Europe that the industrial revolution had not reached.

Figure 5 tests the generality of these conclusions by including all of the Asian welfare ratios for comparison. There was variation in experience, but that variety does not qualify the conclusion that Asian living standards were at the low end of the European range. The history of living standards in Japan was very similar to Beijing's. Canton living standards look lower in the eighteenth century and showed no trend until they began to rise around the time of the First World War. In constructing the Canton welfare ratio, we chose a low wage for the eighteenth century (.04 Taels/day) in line with the 1769 *Wuliao* rather than following the VOC evidence recording higher wages paid by Dutch ships. Had we used VOC wages, the welfare ratio would have been raised to the level of Beijing. That would have been a valuable improvement from a Chinese point of view but would not have signified much on the world scale. Özmucur and Pamuk (2002) have found that real wages in Istanbul were at a low level like China's, so it may have characterized much of the non-industrializing world in the eighteenth century. There is evidence of rising living standards in Beijing, Canton, and Tokyo after 1870, but the gains were not enough to catch up to the standard of mid-eighteenth century London or Amsterdam let alone the much higher standard of living enjoyed by workers in those cities in the early twentieth century.

The low welfare ratios of Asian cities shown in Figure 5 raise the question of how one survived with a welfare ratio less than one. What that means is that a man working full time could not buy the goods that specify our reference level of well-being. What did low welfare ratios mean? To gain some perspective, we consider two cases.

The first is Sichuan, which had the lowest welfare ratio recorded (about .2). A value that low meant that a worker had barely enough income to keep himself alive: If someone in Sichuan in 1905 worked 250 days work and spent *all* of the income on rice, he could buy enough to take in 2216 calories per day averaged over the 365 days in the year. If he could work 300 days, he could buy 2659 calories per day if he spent all of his income on rice. Alternatively, he could spend three quarters of his income of rice and eat 1994 calories per day. The other 25% could be used for other foods, clothing, or rent. Those were the options with a welfare ratio of .2. The situation was dire.

Most Chinese in the cities we have studied did better than that. There were more

options with a welfare ratio of .5, which was not uncommon. A man earning .061 taels per day in c. 1750 in Canton would have had that welfare ratio. At the prevailing prices, it would have taken 82% of the earnings for 250 days to buy the family calorie standard of three times 1940 calories per day over the whole year. Of course, if the man increased his work time to 300 days per year, and his wife worked 200 days at the same wage, they would raise the family welfare ratio to one without any cheapening of the specified consumption basket. Rice wine amounted to one over fifth of spending in the specified budget and contributed little protein and only one tenth of the daily calories. Cutting the rice wine to 10 litres per year in Table 3 and increasing rice consumption to 117 kg would allow them to reach a welfare ratio of one with 450 days work per year. Chinese and Japanese families in the pre-industrial world could live as well as European labourers in the leading economies–but only by giving up drink and working twice as many days per year. (The same was true, of course, for Italian families.)

These examples indicate the three ways in which people could react to wages that were insufficient to purchase the life style corresponding to a welfare ratio of one. The first was by increasing the number of days worked. Wives worked in nineteenth century China, and their earnings made an important contribution to raising the family's standard of living. The second was by consuming less. By cutting back on non-foods and by concentrating spending on the cheapest sources of calories, a family could sustain itself with less income. Reducing the intake of protein and alcohol was an obvious strategy, and the Chinese budget surveys indicate that less alcohol was consumed than our welfare ratio postulates. The third was by reducing the number of non-earning family members. Fertility control was one option. In extreme cases, the wage might be sufficient only to support the worker himself, and he did not have a family.

Conclusion

Our investigation of Asian and European wages and prices shows that the situation was more complicated than Adam Smith suggested. Money wages in China were certainly less than those in the advanced parts of western Europe in the eighteenth century, but wage levels were similar in China and the lagging parts of the continent. By the twentieth century, however, wages were higher in all parts of Europe than in China. The cost of living was almost always lower in China than in the cheapest parts of Europe where we have measured it. As with wages, living costs were much higher in the leading parts of Europe than in China, and Europe as a whole inflated more than China at the end of the nineteenth century.

The upshot of the wage and price comparisons is that living standards were always low in China. In the eighteenth century, advanced cities like London and Amsterdam had a higher standard of living than Beijing or Canton. The standard of living in the Chinese cities we have studied was on a par with the lagging parts of Europe, the Ottoman Empire, and Japan. By the twentieth century, enough progress had occurred in even the backward parts of Europe that their standard of living exceeded that in China. And Chinese regions like Sichuan were poorer still. There seems to have been a decline in the standard of living in China over the eighteenth and nineteenth centuries, but most of the difference between Europe and China in 1913 was due to European advance rather than Chinese decline.

While Adam Smith neglected regional variation and, thereby, overgeneralized the comparison of Europe and China, he was closer to the mark than recent revisionists. Much of their critique of the traditional view has been directed against mechanisms that may have contributed to China's lack of economic development. The attack on Malthusianism and on

liberal opinion regarding the insecurity for property in China may well be correct. The revisionist historians have not devoted as much effort to measuring income differences between Europe and China. Our examination of the evidence suggests that revisionist optimism is misplaced. We do not claim to have given the final answer to this question–clearly the Asian data base could be greatly improved. But newly discovered data would have to be very different from what is currently at hand to convince us that pre-industrial Chinese living standards were similar to those in the leading regions of Europe. Adam Smith's pessimism looks closer to the truth.

Table 1

Eighteenth Century Wage Regressions

dependent variable--daily wage in Taels.
T-ratios in parenthesis

	Constant	Year-1769	Jaingsu	Shanxi	Zhili	R^2
1.	.034	-0.000	.0059	.0095	.0263	.43
		(-.025)	(.868)	(1.322)	(3.356)	
2.	.044	-0.000				.01
		(-.052)				

Notes: The first row for each regression shows coefficients and the value of R^2. The second raw shows r-ratios for the coefficients.

Year-1769 equals the year minus 1769. In this way, the constant and provincial dummy coefficients can be compared directly to the *Wuliao jiazhi zeli* .

Jaingsu, Shanxi, Zhili are dummy variables taking a value of one for each province. Henan is the excluded provincial dummy.

Table 2

Basket of Goods: Northern Europe

	quantity per person per year	price g. silver per unit	spending share	nutrients/day calories	grams of protein
bread	182 kg	.693	28.9%	1223	50
beans/peas	52 l	.477	5.7	160	10
meat	26 kg	2.213	13.2	178	14
butter	5.2 kg	3.470	4.1	104	0
cheese	5.2 kg	2.843	3.4	53	3
eggs	52 each	.010	1.3	11	1
beer	182 l	.470	19.6	212	2
soap	2.6 kg	2.880	1.7		
linen	5 m	4.369	5.0		
candles	2.6 kg	4.980	3.0		
lamp oil	2.6 l	7.545	4.5		
fuel	5.0 M BTU	4.164	4.8		
rent			4.8		
total		414.899	100.0%	1941	80

Note:
(1) Where oil and wine were consumed instead of butter and beer, 5.2 litres of olive oil were substituted for the butter and 68.25 litres of wine for the beer. 5.2 litres of olive oil yields 116 calories per day and no protein; 68.25 litres of wine gives 159 calories per day and no protein. In Strasbourg, the average prices 1745-54 were 7.545 grams of silver for olive oil and .965 grams of silver for wine.
(2) M BTU = millions of BTUs
(3) prices are in grams of silver per unit. Prices are averages for Strasbourg in 1745-54. The total shown in the price column is the total cost of the basket at the prices shown.
(4) Nutrients are computed assuming the following composition:

	Calories	Grams of Protein
bread	2450 per kg	100 per kg
beans/peas	1125 per litre	71 grams per litre
meat	2500 per kg	200 per kg
butter	7286 per kg	7 per kg
cheese	3750 per kg	214 per kg
eggs	79 each	6.25 each
beer	426 per litre	3 per litre
wine	850 per litre	0 per litre

Table 3

Basket of Goods: Canton

	quantity per person per year	price g. silver per unit	spending share	nutrients/day calories	grams of protein
rice	100 kg	.995	31.4	992	21
soy beans	53 kg	.698	11.7	604	53
meat	12 kg	1.697	6.4	82	6
rice wine	49 l	1.372	21.2	208	1
edible oil	2 l	3.337	2.1	48	0
soap	2.6 kg	1.377	1.1		
Cotton cloth	5 m	5.118	8.1		
candles	2.6 kg	2.753	2.3		
lamp oil	2.6 l	2.753	2.3		
fuel	3.0 M BTU	9.328	8.8		
rent			4.8		
total		317.263	100.0%	1935	80

Note:
(1) The prices are grams of silver per unit indicated in 1745-54. The shares are figured accordingly.

Table 4

Basket of Goods: Beijing

	quantity per person per year	price g. silver per unit	spending share	nutrients/day calories	grams of protein
wheat flour	30 kg	1.151	10.4%	279	9
millet	37 kg	.862	9.6	383	11
bean flour	35 kg	.882	9.3	371	21
corn flour	15 kg	.557	2.5	148	3
rice	10 kg	1.188	3.6	99	2
soy beans	28 kg	.698	5.9	319	28
meat	12 kg	1.697	6.1	82	6
rice wine	49 l	1.651	24.3	208	1
edible oil	2 l	3.337	2.0	48	0
soap	2.6 kg	1.377	1.1		
Cotton cloth	5 m	5.118	7.7		
candles	2.6 kg	2.753	2.2		
lamp oil	2.6 l	2.753	2.2		
fuel	3.0 M BTU	9.328	8.4		
rent			4.8		
total		332.324	100.0%	1939	81

Note:
(1) The prices are grams of silver per unit indicated in 1745-54. The shares are figured accordingly.

Figure 1

Daily wage of unskilled workers, 1738-1870

(grams of silver per day)

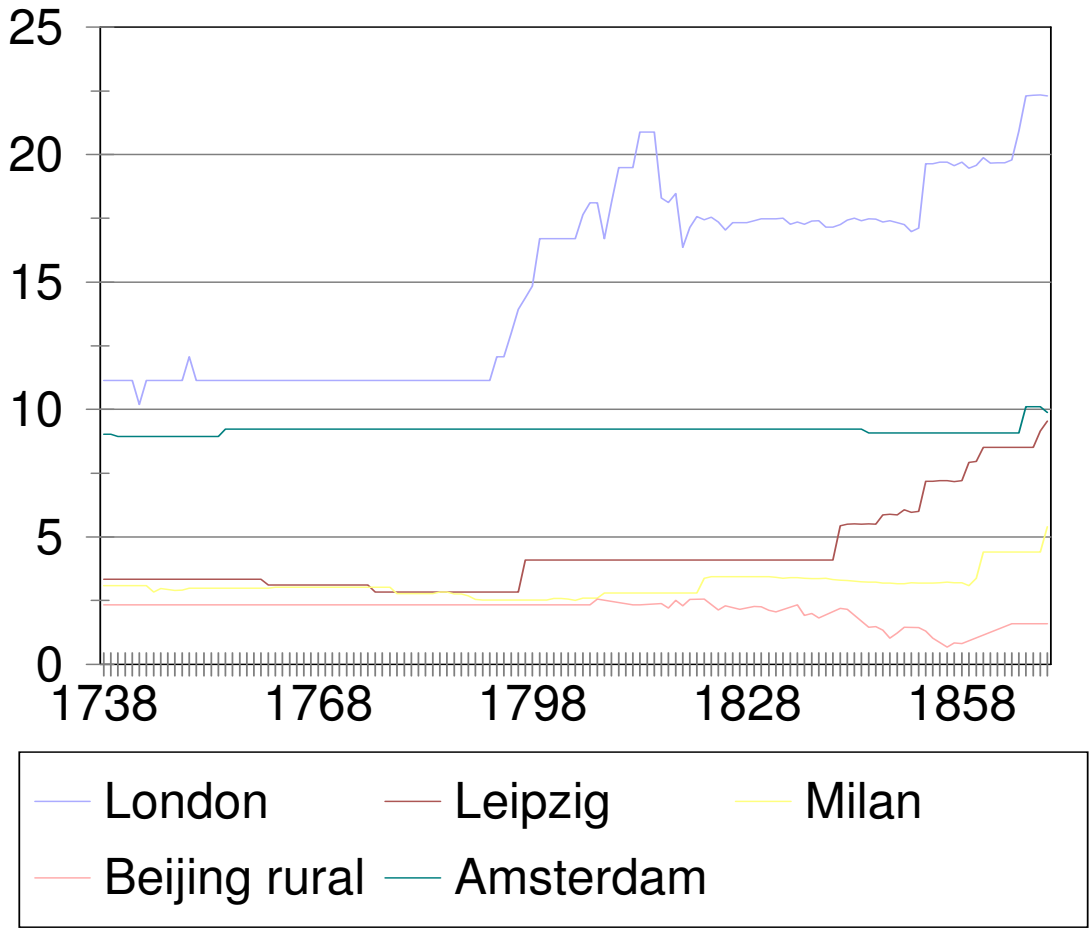


Figure 2

Daily wage of unskilled workers, 1870-1927

(grams of silver per day)

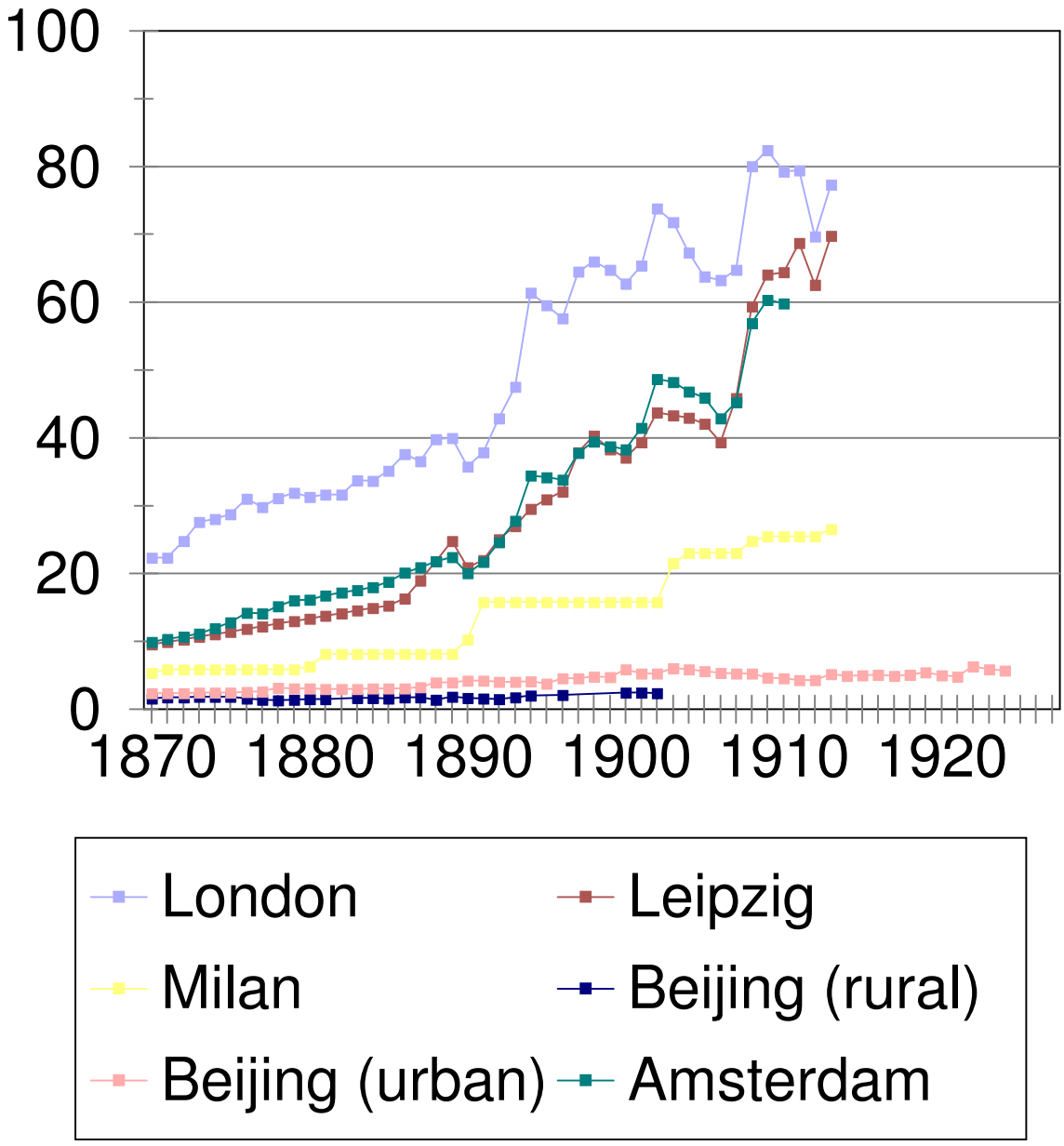


Figure 3

The Price of Subsistence in Europe and Asia

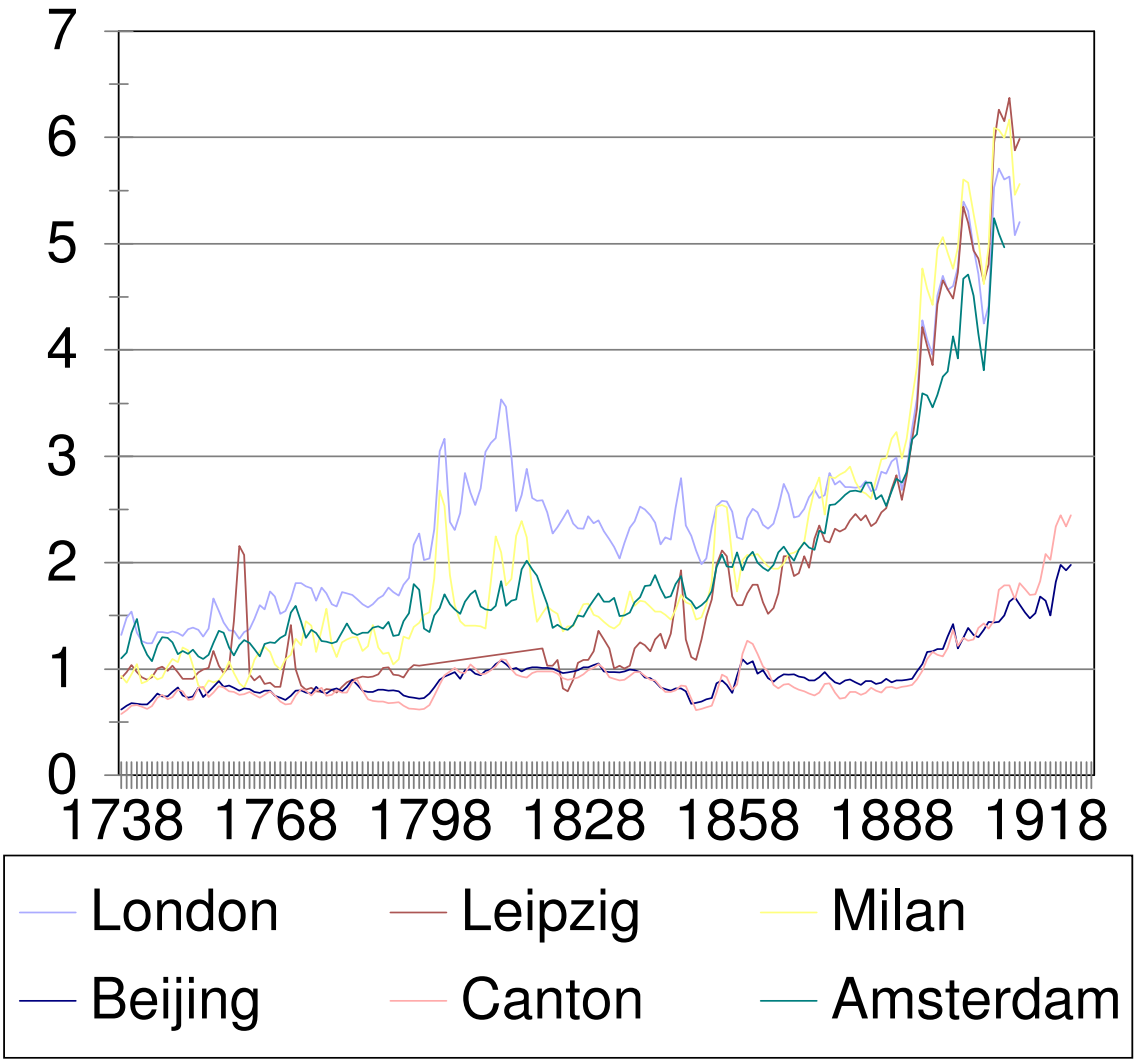


Figure 4

Welfare Ratios in Europe and Beijing

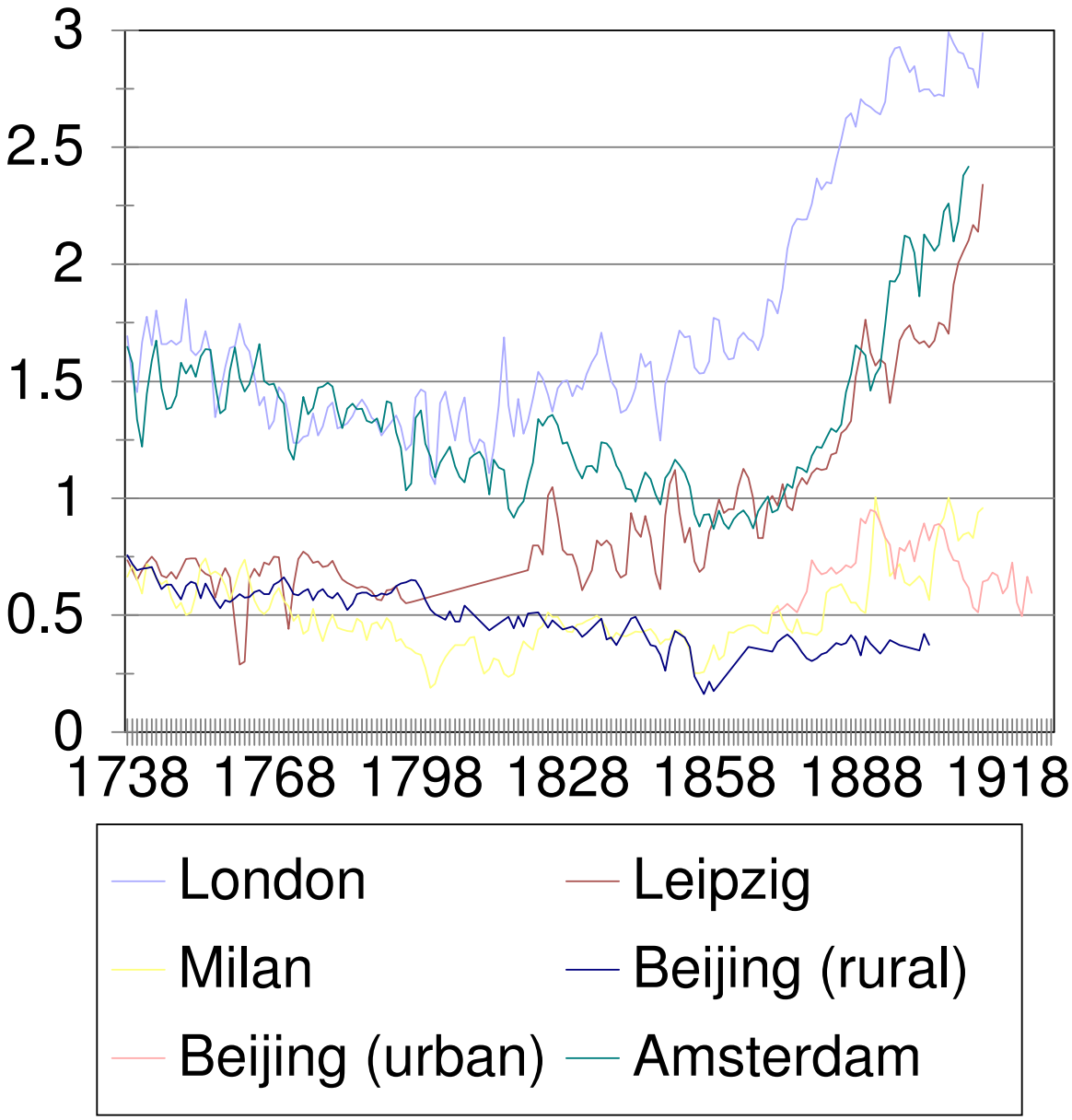
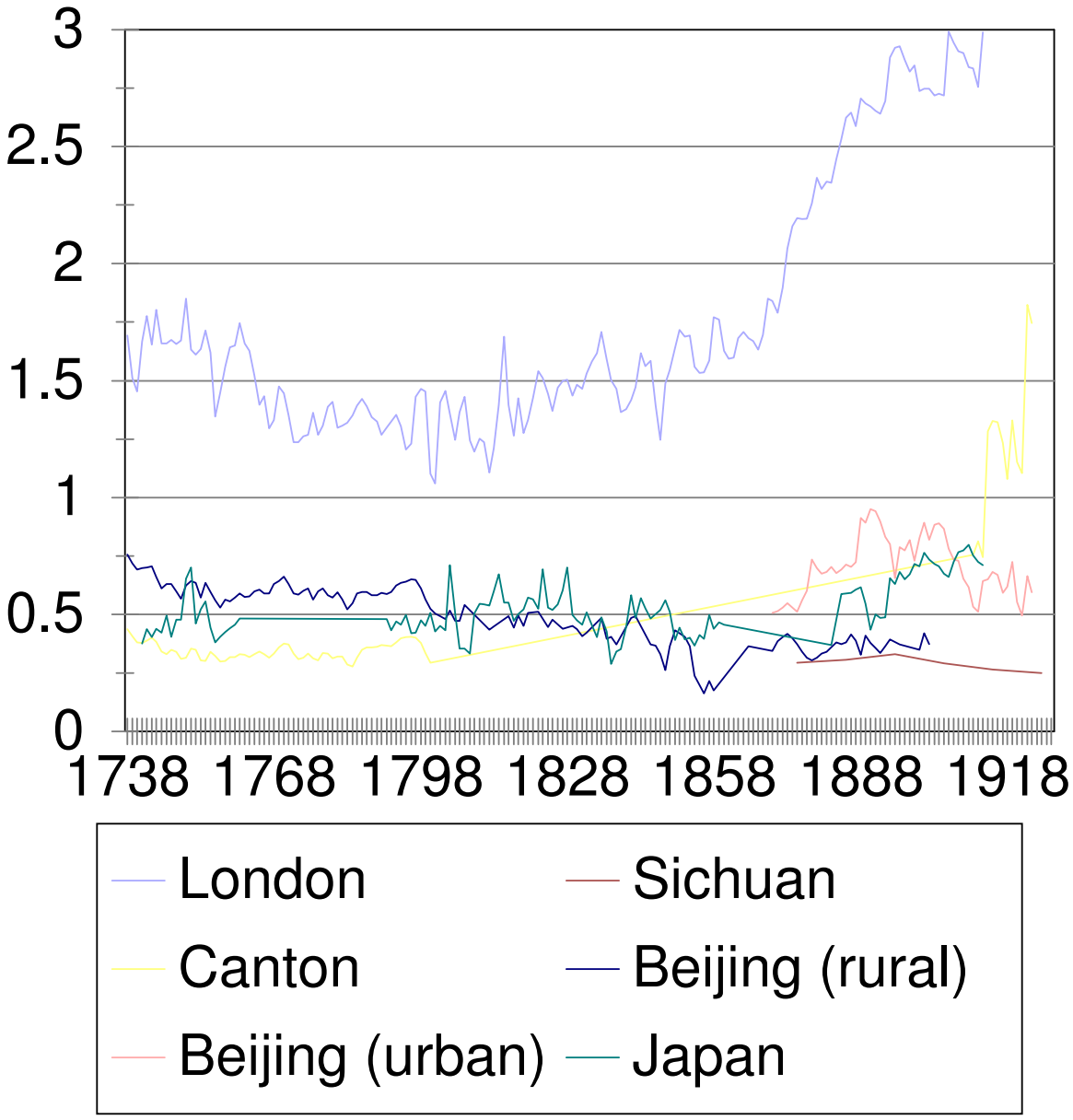


Figure 5

Welfare Ratios in London and Asia



Appendix I

Copper-Silver Conversion and Nominal Wage Series

To arrive at continuous and international comparable series of nominal wages from Gamble's work, it is extremely important to derive consistent copper-silver conversion rates. Here we compare three series of copper-silver exchange rates.

The first series can be found in Yan Zhong-ping et al (1955) copper-silver conversion rates. Yan et al derived the exchange rate series (1807-1850) from the account books of a merchant store located in Da-Liu Zheng of Ninjing County in Hebei province, about two and half hour away from Beijing city by train.

The second series can be inferred from Gamble (1943), which gave both silver and copper wage indices. Because, as Gamble indicated, there was a major debasement around 1860 due to the Taiping rebellion and also a change of monetary account in the fuel store account books. He broke his silver and copper wage series at 1860 setting 1845 as a base 100 for the pre and post-1860 respectively.

On p. 44, Gamble actually gave copper silver conversion rates in number of tiao per tael for 1807, 1827 and so on. On page 69, he gave exchange rates of tiao per tael for 1862, 1884, 1888 and 1892. Also, on p. 44, he tentatively remarked that a tiao was equal to 500 copper cash before 1860 and 100 copper cash after 1860. This gives us information to the link the pre- and post-1860 series. Multiplying these rates to tiao gives me the copper cash/silver tael conversion rates for those specific years. Then copper silver exchange rates for the intervening years could be interpolated from the ratio of copper and silver wage indices in Table 6 (pp.60-1).

The third series is from Peng Xingwei (p.548) for the period of 1870-1902. As we will see later, copper-silver exchange rates are likely to be different between the urban and rural Beijing areas. I will use the Peng series for converting the urban Beijing copper cash wages.

Figure 1 plots the three exchange rate series. It is interesting to note that the Yan Zhongping series and the Gamble implicit series before 1850 were identical in trend with a slight gap in level. This gives us to reason to believe that Yan Zhongping and Gamble may have used the same merchant account books. It is important to note that the sharp rise in the post-1860 exchange rates is a reflection of the monetary debasement in copper cash used in rural Beijing. On p. 65, Gamble noted the copper cash after 1860 was worth only one fifth of the pre-1860 period. So this copper silver rate is multiplied by 5. The Peng Xinwei series is supposed to be for urban Beijing. Despite their different levels, both the Gamble and Yan Zhongpin series show a gradual appreciation of copper cash towards the end of the century.

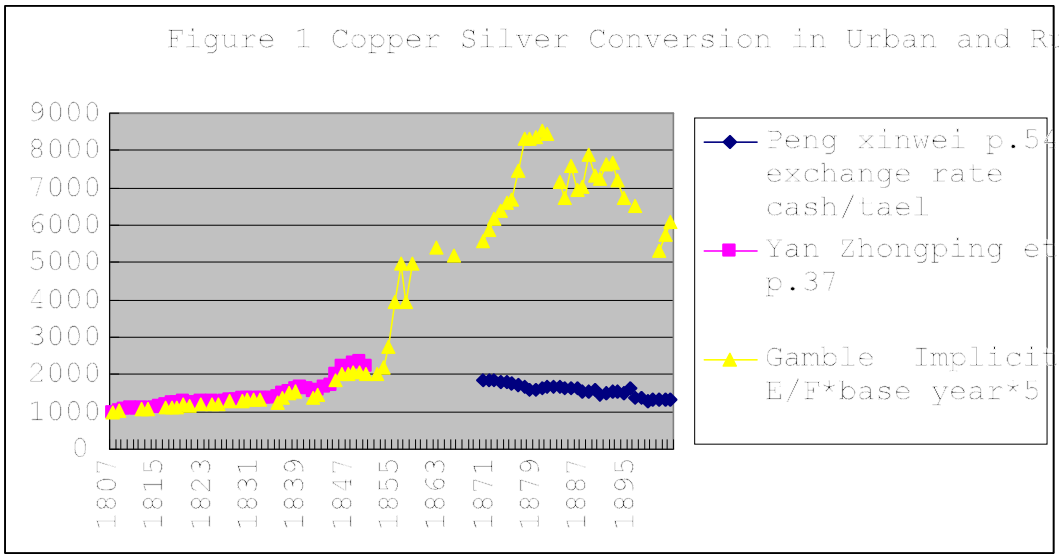


Figure 2 shows the two nominal wage series in silver taels. The procedure for deriving them is as follows. The rural Beijing silver wage series is converted from the copper wages (the 1-12 month average daily wages on Table 6, p.60) by using the Gamble implicit series of copper-silver rates. The urban Beijing series is composed of two parts. The first period 1870-1900 is derived by using the copper cash wages in Gamble (1943, p.66) divided by the Peng Xingwei copper-silver exchange rates. The second period 1900-1924 is converted directly from the Peng and Gamble (p.100).

Figure 2 shows a marked gap between the urban and rural wage series. Clearly, part of this wage gap can be explained cost of living differences (particularly the differences in housing rents, which unfortunately we do not have data). However, a crucial difference is the urban Beijing series included the food allowance in the total wage bill. In fact, for unskilled laborers, food allowance usually accounted for about 60 to 70% of the total wage bill. This is a crucial point for our interpretation on the issue of international comparison.

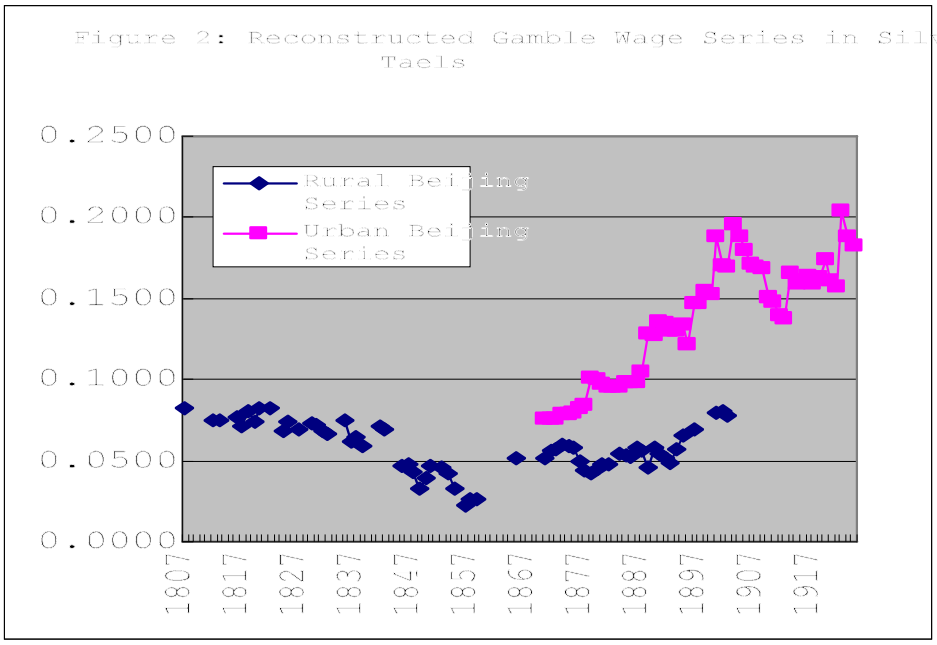


Figure 2: Reconstructed Gamble Wage Series in Silv
Taels
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
Rural Beijing Series
Urban Beijing Series
1807
1817
1827
1837
1847
1857
1867
1877
1887
1897
1907
1917

Appendix II

Sources of Chinese Price Series

Beijing

Our series of prices for Beijing and Canton begin with Meng and Gamble's (1926) study of wages and prices in Beijing between 1900 and 1924. For that period he collected the retail prices of most elements of our basket detailed in Table 4. We abstracted the following series (Meng and Gamble 1926, pp. 28, 38-9, 51, 59):

wheat flour
Lao Mi (blackened rice)
bean flour
millet
corn flour
pork
sweet oil
peanut oil
foreign cloth
coal balls

We treated 'sweet oil' as 'edible oil' in our scheme and 'peanut oil' as 'lamp oil'. Coal balls were two thirds coal dust and one third earth, and we converted the price to an energy basis by rating a kilogram of coal balls at two thirds of the energy content of coal, which was itself rated at 27,533 BTU's per kilogram.

To estimate the price of soy beans for 1900-08, we increased the wholesale price per kilogram of black beans by 50% to allow for trade mark-ups and quality differences. The wholesale price was derived from Li (1992), as will be explained. For 1909 onwards (when the Li series ends), we extrapolated the1908 price forwards based on Meng and Gamble's price series for bean flour.

We had no information on the price of candles, and we assumed their price was the same as that of lamp oil. Based on European precedents, we estimated the price of soap at half of the price of lamp oil.

Our next problem was to extend these series back to the pre-industrial period. It should be noted that in several important respects, Meng and Gamble's data were ideal: they were retail prices of goods that consumers actually bought. In contrast, many historical price series are wholesale prices of intermediate goods. Thus, Meng and Gamble recorded the price of wheat flour in a shop, while historians usually must make due with the price of unprocessed wheat in wholesale markets.

We tried to take advantage of these ideal features of Meng and Gamble's data in the following way. There are many studies of wholesale grain markets in China. We used Li's (1992) study of prices in Zhili province, which includes Beijing. From the graphs in her paper, we could read off the prices of wheat, millet, sorghum from 1738 to 1908 as well as the relative price of black beans to wheat. These were five year moving averages, so annual fluctuations are suppressed, but that is off little consequence for our study. (Professor Li kindly supplied us with some of the underlying series, which we used in preference to the graphed data. We are grateful to Professor Li for this material.) With these series we

extrapolated the retail prices of wheat flour, millet, corn, bean flour, and soy beans back to 1738. This procedure assumes that the ratio of the retail price of the consumer good to the wholesale price of the unprocessed good remained constant.

The retail prices of other products were extrapolated back to 1738 as follows:
pork, edible oil, lamp oil, candles–using the price of wheat flour
corn flour–using the price of soghum
rice (Lao Mi)–using the price of rice in the Yangtze delta (Wang 1992, pp. 40-7).

Two things can be said in favour of these extrapolations. First, most of the long term agricultural time series inflate at the same rate, so the values projected back into the eighteenth century do not depend critically on which price series is used for the extrapolation. Second, we can check the extrapolations by comparing the values we obtain in the eighteenth century for prices recorded in the VOC records for Canton. The extrapolated prices are similar to prices paid then. This gives us some confidence in our procedure.

The price series of cotton cloth was pieced together from several sources. First, the Beijing retail price of foreign cloth was projected back to 1871 using Feurerwerker's (1970, p. 344) series of the price of cotton cloth imported into China. Imported cloth was measured in pieces which were usually 40 yards long by 1 yard wide (360 square feet). Meng and Gamble's price was the price per hundred feet. We interpret that to mean 100 linear feet from a bolt of cloth, which we assume was three feet wide–a typical width. On those assumptions, the retail price per square foot of foreign cloth in Beijing was about 50% more than the price at which it was landed. This is not an unreasonable markup.

For eighteenth century cloth prices, we reasoned as follows: Pomeranz (2000), who discussed cloth prices and weaving incomes at length estimated the price in his low price scenario at .5 Taels per bolt[3]. On these assumptions 300 square feet of cloth were worth 4.59 Taels, and we use this as the eighteenth century counterpart to Meng and Gamble's price for a 100 foot length of a piece of cloth 3 feet wide, on our interpretation. Pomeranz (2000, p. 323) claimed that cloth prices were constant across the eighteenth century, and we have assumed the same.

For the years between 1800 and 1870 we were guided by the history of cloth prices in Indonesia. We have a series of the price paid for cotton cloth on Java from 1815 to 1871. From 1815-24, the price was 4.89 grams of silver per square meter, which compares to a Chinese price of 5.12 grams per square meter for the eighteenth century. This correspondence is reassuring since cotton cloth was trade across Asia, so we would not expect extreme differences in its price. Starting in the1830s, the price in Java dropped fairly quickly to a value of about 2.5 grams of silver per square meter and stayed at that level until 1871. That low price is like the value of cloth imported into China–2.36 grams of silver per square meter in 1871. We have assumed that cloth prices in China followed the same temporal pattern as those in Java: we continued the eighteenth century price derived from Pomeranz to 1830 and then interpolated prices linearly between 1830 and 1871.

The price of energy was also pieced together from diverse sources. For the 1739-1769, we used the price implied by charcoal prices in Zhili province in the 1769 *Wuliao*. For 1816, we used the price implied by the price of coal in Beijing given in Timkovski (1827, p.

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[3] (Pomeranz 2000, p. 319) decided that a 16 chi length of cloth cost .4 Taels. A bolt of 20 chi was 3.63 square yards according to Li 1998, p.xvii. Hence, the price of cloth was .5 Taels per bolt.

200). From 1900 onwards, we based our energy price on the price of coal balls. On of the striking features of this scattered information is that they should a fairly constant price of energy. In view of that constancy, we interpolated values for missing years.

Canton

With the exception of rice, we use the same series for Canton as we used for Beijing. For rice we use the price of rice in the Yangtze delta (Wang 1992, pp. 40-7). Close integration of rice markets makes this procedure reasonable.

Sichuan

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