JAPANESE UNSKILLED WAGES

IN INTERNATIONAL PERSPECTIVE, 1741-1913

Jean-Pascal Bassino

Paul Valéry University (Montpellier III)

Faculty of Mathematics and Social Science

Route de Mende, 34000 Montpellier, France

E-mail: bassino@mfj.gr..jp

Debin Ma

(Corresponding author)

GRIPS/FASID Joint Graduate Program

National Graduate Institute for Policy Studies

2-2 Wakamatsu-cho, Shinjuku-ku

Tokyo, 162-8677 Japan

Email: debinma@grips.ac.jp

ABSTRACT

Constructing consumption baskets for the benchmark periods of 1745-54 and 1882-86, and price indices, we calculate real wage series for Japanese unskilled daily laborers in 1741-1913. Matching caloric and protein contents in our Japanese consumption baskets with those in European baskets, we compare Japanese and European urban real wages. Real wage rates in Kyoto and later Tokyo are about a third London wages but comparable to wages in major Southern and Central European cities for the 1700-1900; second, there is a substantial surge in real wages in the Meiji period over that of the Tokugawa period. These findings have implications for the debate on conditions in Europe and Asia on the eve of the industrial revolution .

1. INTRODUCTION

How rich or poor was Japan before she embarked on the path of modern economic growth since the Meiji Restoration (1868)? Intellectual interest on this question, often in curious synchronism with the tempo of post-War Japanese economic miracle, surged up to the 1980s, and since then, eased into rational retrenchment. The pre-War pessimist consensus of a Tokugawa Japan being an extremely backward society was dispelled – a victory for the so-called optimists. But the optimists' subsequent claim that the 19th century Japanese living standards could be higher or comparable to contemporaneous Northwestern Europe may represent an overreach.[1] Two recent assessments on this debate have been far more cautious, giving the 1700-1870 Tokugawa economy a slow but positive 0.1% and 0.15% growth rate in real wages and per capita GDP respectively, yielding a purchasing power parity (PPP) adjusted to 1870 Japanese per capita income at slightly less than a quarter of that of the British level.[2]

Per capita GDP estimates for Tokugawa Japan were, as most scholars agree, highly tentative.[3] Yet, existing studies utilizing the far richer Tokugawa prices and wages data compiled in the past few decades almost exclusively focused on constructing real growth trends overtime, rather than absolute levels across nations. This is not surprising in view of the formidable methodological issues that confound international comparison even for the contemporary period.

---

[1] See Susan Hanley (1983, 1997) for the optimistic assessment of a high living standard in 19th century Japan. For Yasuba's rebuttal and his own assessment, see Yasuba (1986, 1987).

[2] For real wage growth, see Saito (2004). For real per capita income growth, see Maddison (2001), p. 255. On p. 264, Maddison gave 1870 Japanese and British per capita incomes at 737 and 3191 respectively in 1990 international dollars. This is fairly drastic upward adjustment in comparison with previous exchange rate based estimates which would give Japanese per capita income around the 1860s and 70s at only 10% of the contemporaneous British level.

[3] The few quantitative GDP studies such as Maddison (2001) and Yasuba (1987) that did extend to international comparison were largely back-of-envelope type of calculations.

Recent path-breaking works by Allen (2001, 2005), which use standard caloric and protein intake from consumption baskets as a benchmark for inter-regional and international comparison, have charted the trends and levels of five centuries of long-term real wages across Europe. Ozmucur and Pamuk (2002) and Zanden (2003) have extended this line of work beyond Europe. Allen (2005) makes a preliminary attempt to extend his real wage comparison to Japan, India and China. Given data and other constraints, however, his calculation of the purchasing power of Japanese real wages (1741-1913) relies on backward projection from the 1882 benchmark year and the use of an Indian consumption basket, both of which, we will show, incur serious index number problems.

This article adopts Allen's methodology for calculating real wages but utilizes actual 18th and 19th century Japanese wage and price data compiled by generations of Japanese scholars and reconstructed consumption baskets based on historical information on 18th and 19th century Japanese consumption patterns. As our Japan-Europe real wage comparison hinges on the caloric and protein contents in their respective consumption baskets, this current study largely focuses on the comparative purchasing powers of unskilled laborers, leaving the comparative studies for skilled laborers or high-income groups to future research that would need to confront more sophisticated issues of cross-national utility and welfare comparison.

 Our study reveals that the real wages for Japanese unskilled laborers in Kyoto and Tokyo for the Tokugawa period are roughly at about a third of the London level but comparable to those cities in contemporaneous Southern and Central Europe. We also show that our 1882-1886 benchmark period based Meiji real wage series nearly double that of the 1745-54 benchmark period based Tokugawa series. With warnings on the limitations of real wage comparisons, this current study seems to lend some tentative support to the view that the pre-Meiji Japanese initial conditions, while not under abject poverty, may not be much more favorable than other

developing countries such as Turkey or Java (Indonesia) as revealed in the studies by Ozmucur and Pamuk (2002) and van Zanden (2003). On the other hand, our finding of a discontinuous jump in real wages between late Tokugawa and Meiji periods raises new doubts on the prevailing view of a stagnant real wage profile for this transition period.

The rest of the paper is organized into four sections: section 2 briefly discusses the results obtained in previous studies; section 3 constructs the Japanese consumption baskets; section 4 presents the main result of our international comparison. Section 5 summarizes the main findings with a discussion.

II.   PRICE AND WAGE SERIES DATA

Research on wage and price series for Tokugawa Japan has been a thriving and productive enterprise in the last several decades.[4] For the 17-19th centuries, there are several series of nominal wages (Umemura 1961; Saito 1978) summarized in recent book and article by Saito (1998; 2005). One series is for the unskilled day laborers for the Kyoto and Tokyo area for 1741-1867, contained in the Mitsui company records (Mitsui Bunko 1989). Another series, originally constructed by Sano (1962), is the craftsmen's wages for the Kanto area for 1818-1894. Then there is the more comprehensive wage series compiled by the *Long-Term Economic Statistics* (LTES) project. This *LTES* series starts at 1880 and links to the present (Ohkawa et al., 1967). There are also available several consumer price indices and other deflators that have been used to derive real wage indices. Clearly, these are disparate real wage series differing in labor quality, definitions and regions. The real wage series from Mitsui Bunko ends in the 1860s while

---

[4] Comprehensive summary and discussion of studies on Japanese prices and wages can be found in Harada and Miyamoto (1985) and Saito (1998).

the LTES series starts from 1885 leaving the 1868-1884 period - the period that saw Japan's historically unprecedented economic and political revolution – in a statistical abyss.

To make up for this gap and arrive at a single continuous series for the Tokugawa-Meiji period, Williamson (1998) "patched" together the Sano and *LTES* series of real wages. In Figure 1, we present this "patched" series - the Williamson Index – rescaled to fit alongside the Saito Index (Saito 1998), which is a real wage index of for the unskilled laborers in Kyoto[5]. The Williamson Index indicates overall a stagnant Japanese real wages from the late-Tokugawa to the Meiji period, a trend also confirmed by Saito's own reconstruction of the Sano's series (Saito 2005, Appendix Table 2B). Unfortunately, this often-quoted thesis of Tokugawa-Meiji stagnancy in real wages, despite its problematic methodology, has rarely been rigorously tested.

In Figure 1, we present the Mitsui-Bunko and the *LTES* day laborers' real wages in kilograms of rice (in the right scale), that is, nominal wages divided by the current period rice prices, alongside the Saito and Williamson Indices with the year 1741 equal to 100 for both series (see the left scale in Figure 1). With rice having a disproportionate weight in consumption expenditure, it is not surprising that for the Tokugawa period, rice wage index in Figure 1 tracked fairly well the Saito Index which is deflated by a CPI where rice prices had a great share. The real discrepancy is for the Meiji period where the level of the *LTES* based rice wages rose consistently above that of the Mitsui Bunko based rice wages for the Tokugawa period. The right scale of Figure 1 shows that while a day's work by an unskilled laborer could purchase about 2 kilograms of rice on average in the Tokugawa era, a day's pay could buy him over three kilograms of rice in the 1880s and 1890s (both rice prices and nominal wages are presented in the appendix).

Our finding of the jump in rice wages between the Tokugawa and Meiji periods sharply

---

[5] Real wage series calculated by using nominal wage data reported in Mitsui Bunko, deflated using the consumer price index calculated by Shimbo (1978), which is based on price data reported in the same source.

contradicts the stagnant real wage trend as displayed in the Williamson Index. The basis for a stagnant real wage trend in the Tokugawa-Meiji transition period stems from two questionable sources. First is the original craftsmen's wage series compiled by Sano (1962), which as pointed out in Saito (2005), contains various data problems. Second and more fundamental is the problematic methodology of linking disparate real wages series at overlapping periods without a check on the actual levels of these wages in terms of real purchasing power. This, as we will show below, is a major problem in Allen's Japanese real wage series, which used backward projection from the Williamson Index.

Figure 1: Real Wage Indices and Rice Wages in Japan, 1741-1913
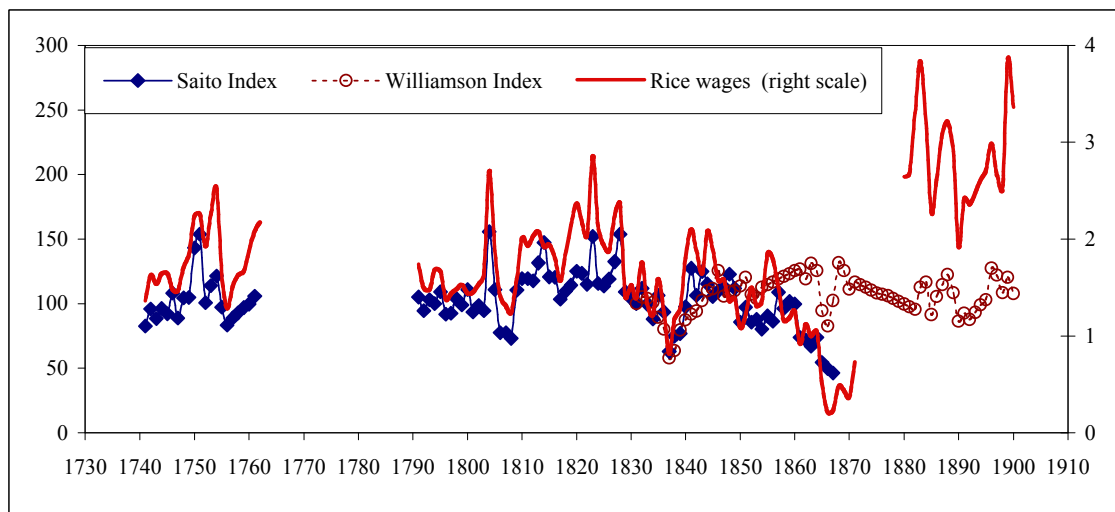
Notes: Saito Index and Williamson Index (1831=100, left scale); rice wages in kilograms of rice per day (right scale). The missing data for the period of 1762-1790 in the Mitsui Bunko records could possibly be due to the loss of archival material. Nominal wages data, which are missing for 1881, 1888-91, and 1893 in the LTES series, have been interpolated.
Sources: Rice price and nominal wages in Kyoto up to 1871 (Mitsui Bunko (1989), Tables 6 and 7); in Tokyo from 1880 (LTES volume 8, Ohkawa et al. (1967), page 245 for wages, page 153 for rice);

III.   CONSUMPTION BASKETS

Until recently, studies on wage and price series for Tokugawa Japan have not seriously attempted direct level comparison across countries, obviously hampered by the observed disparities in dietary and consumption patterns between Japan and the West. Our approach here is first to construct consumption baskets at both ends that would satisfy an annual per capita requirement of 1940 calories and 80 grams of protein plus a fixed quantities of linen and lamp oil. We then calculate the costs of these respective consumptions baskets with price data for our chosen benchmark periods. Thus, the levels of real wages defined as the ratio of daily wages to the cost of a consumption basket (annual expenditures for one adult) serve as our yardstick for the levels of living standards in Japan and in Europe (Allen 2005). As the levels of real wages adopted here are really an index of laborer's purchasing power of a combination of calories and proteins as well as fixed quantities of linen and lamp oil, they are similar to the concept of "welfare ratio" used in Allen (2001).[6]

Table 1 reconstructs two consumptions baskets A and B based on available consumption data for staple food in the early 18th, late 19th (Kito 1986, 1989; Umemura Takamatsu and Itoh, 1983) and the first surveys for non-staple consumption of the early 20th century (Toyo Keizai 1980). Consumption basket A, with its relatively higher quantities of rice, soybeans and fish, aims to capture the expenditure of the "normal" or average income group, while basket B, with a relatively higher amount of barley, but lower quantities of rice and soybeans and zero fish,

---

[6] In Allen (2001), the welfare ratio is calculated as the ratio of annual income of a representative household of unskilled worker (daily nominal wage multiplied by 250, assuming 250 working days and no other income) to the minimal expenditures for one household measured as three times the cost of the consumption basket per adult (assuming 5 persons per household, or the equivalent of three adults in terms of consumption). The real wage level, as defined in Allen (2005) is therefore equivalent to a welfare ratio divided by 750 (250 x 3); however, it should be noted that the consumption basket used in Allen (2001) also includes fuel and soap.

represents the subsistence consumption.

Table 1: Composition of Consumption Baskets (per capita per year)

	Japan A (this study)	Japan B (this study)	Europe Allen (2005)	India Allen (2005)
Bread, kg			208	
Beans (excluding soybeans), liter	4	4	52	52
Meat, kg			26	26
Butter (or ghi), kg			10.4	10.4
Soy beans, kg	52	26		
Rice, kg	114	30		143
Barley and wheat, kg	10	70		
Fish, kg	3.5			
Buckweat and others, kg	16	75		
Edible oil, liter	1	1		
Linen, m	5	5	5	5
Lamp oil, liter	2.6	2.6	2.6	2.6

Notes: Soybeans are used as a proxy for various processed products: soybean paste (miso), soy sauce (shoyu), tofu, and fermented soybeans (natto). Thus, our annual amount is higher than the actual consumption reported for the 1920s in surveys by the Ministry of Agriculture and Forestry (quoted in Toyo Keizai (1980), Showa Kokusei Soran, volume 2, p. 590). The diet of the interwar period included meat and milk, and a larger volume of fish. The average per capita consumption for 1921-1925 was 18 kg beans (of which 12.9 kg soybeans), 4.1 kg meat, 2.1 liters milk, 1.5 kg eggs and 8.1 kg fish.

In Table 1, we also present the European consumption basket used in Allen (2001 and 2005) alongside our Japanese baskets. The differences in their respective diets are striking – major food items in the European diet such as bread and meat were nearly non-existent in Japanese consumption. But what is more surprising is that the so-called Indian basket compiled and used by Allen for calculating Japanese real wages is far-removed from the actual Japanese consumption pattern as revealed by our Japanese baskets. His Indian basket allocated too much rice and implausibly large quantity of meat to Japanese consumers while completely ignoring their substantial intake of soybeans and non-rice grains.

In Table 2, we follow Allen and convert these food consumption baskets into comparable units of calories and proteins. It shows that, with their drastically different composition, Japanese baskets provided broadly equivalent amount of daily calories and proteins to Allen's European and India baskets. This is indicative of the long-standing tradition that rice and soybeans rather than meat intake had been the most important and cost-effective source of protein in the Japanese diet. As we show below, the validity of our international comparison on real wages hinges on the correct design and choice of consumption baskets.

Table 2: Calories and Proteins for Food Consumption Baskets (per capita per year)

	Calories				Proteins in grams			
	Japan A	Japan B	Europe	India	Japan A	Japan B	Europe	India
Bread, kg			1396				57	
Beans, liter	12	12	160	160	1	1	10	10
Meat, kg			178	178			14	14
Butter, kg			207					
Soy beans, kg	558	279			49	24		
Rice, kg	1096	288		1375	23	6		29
Barley and wheat, kg	92	646			2	17		
Fish, kg	10				2			
Buckwheat and others, kg	148	692			5	22		
Edible oil, liter	24	24		253				
Total	1940	1941	1941	1966	82	70	81	53

Notes: For rice caloric content, we used 3510 calories per kg reported by Mosk and Pak (1978) rather than 3573 in Allen (2005). For protein content, we used the 75 grams per kg, which is the average of 80 for brown rice and 70 for white rice given by Chang (2000) instead of 100 used in Allen (2005). Mosk and Pak (1978) use 65 but it seems to be for white rice. We used 2450 calories and 100 g of protein for bread, 1125 cal and 71 grams for beans (other than soybeans), 2500 cal and 200 g for meat, and 7268 cal and 7 g for butter, as in Allen (2001, 2005). We used the figures of caloric and protein contents reported by Mosk and Pak (1978) for most other foodstuff: 1050 cal and 181 g for fish, 3920 cal and 343 g for soybeans, 8800 cal and 0 g for edible oil, and 3370 cal and 88 g for barley, (caloric and protein contents for barley are used as proxy for barley and wheat; for buckwheat, we used 3370 cal and 108 g.

IV.   THE INTERNATIONAL COMPARISON

Our prices and nominal wages for the Tokugawa period mainly come from the published Mitsui company account books (Mitsui Bunko, 1989). We use the benchmark year 1750 (the ten year average of 1745-54) for Kyoto to match with Allen's mid-18th century benchmark for Europe.[7] As Allen (2005) had no Tokugawa prices and nominal wages but instead used the 1882 benchmark data from the *LTES* volume based on the India basket to project backward, we also construct an 1884 (the average of 1882-86) benchmark price and wages. After consistency checks, we decide to choose 1884 over 1882 to avoid the sharp price movement in the period of the so-called Matsukata deflation. We follow Allen (2005) to add five meters of linen and 2.6 liters of lamp oil in the Japanese budgets. Our price and wage data, all converted in grams of pure silver, are presented in detail in Table 3.

The cost of consumption baskets is clearly sensitive to the basket construction. For example, the costs of Japan basket B, the subsistent level basket in Table 1 that supplied roughly equivalent amount of calories and proteins as that of Japan basket A, would be roughly 40% cheaper and would correspondingly give a higher Japanese real wages than from basket A.[8] But this would also imply consumers with the cheaper Japan basket B would have to settle for a less desirable diet with inferior crops and no fish. To be comparable to the European baskets which are defined here more for the average income level, we use consistently the Japan basket A. In this regard, our real wage index, given a certain choice of baskets, is also welfare measure broader

---

[7] In the Mitsui Bunko records, there is also a nominal wage series for Tokyo (Edo) for 1818-1871. Although with a different trend, the levels for the Edo series are broadly equal to the Kyoto series. Here we use the Kyoto series only for the Tokugawa period.

[8] Costs of basket A for 1750 and 1884 benchmark periods would be 236 and 200 grams of silver respectively. This would give levels of Japanese real wages at 0.012 and 0.023 respectively, higher than the 0.09 and 0.012 deflated by cost of Japan basket A.

than a combination of calories and proteins required for subsistence.

With the information on nominal wages and total costs of budgets, we present our real wages in the last row of Table 3. The comparison shows that despite their much lower nominal silver wages for the mid-18th century, Japanese real wages for unskilled laborers, due to the relatively cheaper cost of consumption basket, are actually on a par with Milan and at about a third of the level of London. Furthermore, while nominal wages increased from 2.82 to 4.5 grams of silver between 1750 and 1884, total cost of their consumption basket actually declined from 326 to 277 grams, leading to a near doubling of real wages for unskilled laborers between these two benchmark periods. The price decline between these two periods is most pronounced for lamp oil, linen and soybeans, all of which were possibly associated with the opening of the country to international trade since the mid-19th century.

Table 4 presents our Japanese real wages data in fifty-year averages for 1750-1913 alongside those in London, Amsterdam, Strasbourg, Milan and Madrid. Table 4 gives the annual series (our annual Japanese real wages for 1750-1913 are presented in full in the Appendix table). Both Table 4 and figure 2 demonstrates unequivocally that real wages for Japanese unskilled laborers were clearly in the rank of those in Central and Southern European cities, but far below those in Northwestern Europe. It was only in the Meiji period that Japanese real wages of unskilled laborers began to rise beyond that of Southern Europe.

Table 3: Unit-prices (in grams of pure silver) and Expenditure Shares (percentage, in parentheses) in Consumption Baskets

	England 1750-59	Northern Italy 1750-59	Japan (Kyoto) 1745-54	Japan (Tokyo) 1882-1886
Bread, kg	1.37 (57.3)	0.91 (53.6)		
Beans (Other than soybeans), liter	0.42 (4.4)	0.58 (8.5)	0.99 (1.2)	1.01 (1.5)
Meat, kg	3.33 (17.4)	2.32 (17.1)		

Butter, kg	6.89 (14.4)			
Soy beans, kg			1.49 (23.8)	0.97 (18.2)
Rice, kg			1.49 (52.1)	1.5 (61.9)
Barley and wheat, kg			0.76 (2.3)	0.77 (2.8)
Fish, kg			2.18 (2,3)	2.19 (2.8)
Buckwheat and others, kg			0.61 (3.0)	0.62 (3.6)
Edible oil, liter		2.32 (6.8)	5.66 (1.7)	5.62 (2.0)
Linen, m	4.87 (4.9)	8.63 (12.2)	5,83 (8.9)	3.07 (5.6)
Lamp oil, liter	3.19 (1.7)	2.32 (1.7)	5.66 (4.5)	1.79 (1.7)
Total Cost of Basket	498 (100.0)	353 (100.0)	326 (100.0)	277 (100.0)
Nominal Wages (grams of silver)	11.14	3.44	2.82	4.5
Real Wages	**0.023**	**0.01**	**0.009**	**0.016**

Sources

1. Data for prices of rice, soybeans, beans, edible oil, lamp oil (kerosene), and linen in 1882-86 are retail prices in Tokyo reported in LTES (volume 8, Ohkawa et al. (1967), pages 153-156), converted to metric units by the ratios mentioned in the source; for barley, wheat, buckwheat and other grains, for which retail price data are not available, we first calculate the ratio of the farm gate prices of barley, naked barley, wheat relative to paddy for available years in 1874-1901; then we multiplied that ratio to the actual average retail rice price in 1882-1886; we adopted the same procedure for buckwheat and others (buckwheat, foxtail millet, proso millet, barnyard millet, sorghum); agricultural price data are in LTES vol. 8 (Ohkawa et al. (1967), p. 168-169); we calculated the ratio of wholesale price of fish (salmon and cod) to wholesale price of rice in 1882-86 and multiplied this ratio to the retail price of rice (wholesale price of fish and rice are from Historical Statistics of Japan, CD-ROM tables 17-16). All prices are converted into silver on the basis of 25 grams or pure silver per yen as in Allen (2005).

2. Data for prices of rice and lamp oil 1745-54 are based on Mitsui Bunko retail prices in Kyoto (Table 6). Prices of soybeans are available for Osaka in Mitsui Bunko from 1757 (table 3). Unit-price is slightly higher than the price of white rice in Kyoto (Table 6); considering that the soybeans traded in Osaka were of above average quality, we just assume that the soybeans price in 1745-54 to be equal to rice prices. Conversion ratio

based on the *LTES* (Volume 9, Umemura et al 1966, 250) are: 180 liters per koku, 150 kg per koku for rice, 129 kg per koku for soybeans, and 3,75 kg per kan. There are no retail prices for fish, barley and wheat, buckwheat and other grains, and linen for 1745-54. We derived them using their price ratio to rice in early Meiji (beans 0.63, barley and wheat 0.51, buckwheat and other grains 0.41). For price of cotton linen, we used price in Osaka in 1840-49 (Miyamoto 1963, 208-210) since raw cotton prices between 1746-50 and 1846-50 shown in Miyamoto and Harada (1985, 84) remained roughly constant. As lamp oil is rapeseed oil, we used the price of lamp oil as proxy for edible oil. Rapeseed oil in Japan is comparable to olive oil in Southern Europe used both for lighting and cooking. It is neither a cheap nor a low-quality item, as few alternatives existed (sesame oil was more a condiment than an edible oil). All prices in monme are converted into silver grams assuming 3.11 pure silver gram per monme.

3. For England and Northern Italy, we rely on calculation by Allen (2005). For Italy, 1 kg edible oil is assumed equivalent to 1 kg butter, in order to be consistent with Allen (2001, 2005). Caloric contents are only slightly different.

Table 4: Real wages of unskilled workers in Japan and selected European Cities

	1750-99	1800-49	1850-74	1875-99	1900-1913
London	0.020	0.020	0.025	0.037	0.040
Amsterdam	0.020	0.016	0.014	0.022	0.031*
Strasbourg	0.009	0.012	0.010	Na	na
Milan	0.007	0.005	0.006	0.009	0.012
Madrid	0.009	0.014	0.013	0.013	0.015
Kyoto (BM1750)	0.008	0.008	0.006		
Tokyo (BM 1884)				0.017**	0.020

Notes: * 1900-1910; ** 1882-1899.

Sources: the Kyoto (BM 1750) series is based on the benchmark 1745-54 (table 3) and the Saito Index used in figure 1. The Tokyo (BM 1884) series is based on the benchmark 1882-1886 (table 1) and extrapolated using nominal wages reported in LTES volume 8 (Ohkawa et al. 1967), deflated by using the consumer price index reported in Ohkawa and Shinohara (1979, 387), extended backward for the period 1882-1885 by relying on the early version of the LTES CPI (Ohkawa et al. 1967, 135). Series for the European cities are based on the series of welfare ratio constructed by Allen (2001), adjusted for taking into account differences in basket composition; the coefficient of adjustment for London, calculated on the basis of data reported by Allen (2001;

2005), is applied to other European cities.

Figure 2: Real wages in Kyoto and Tokyo in International Comparison
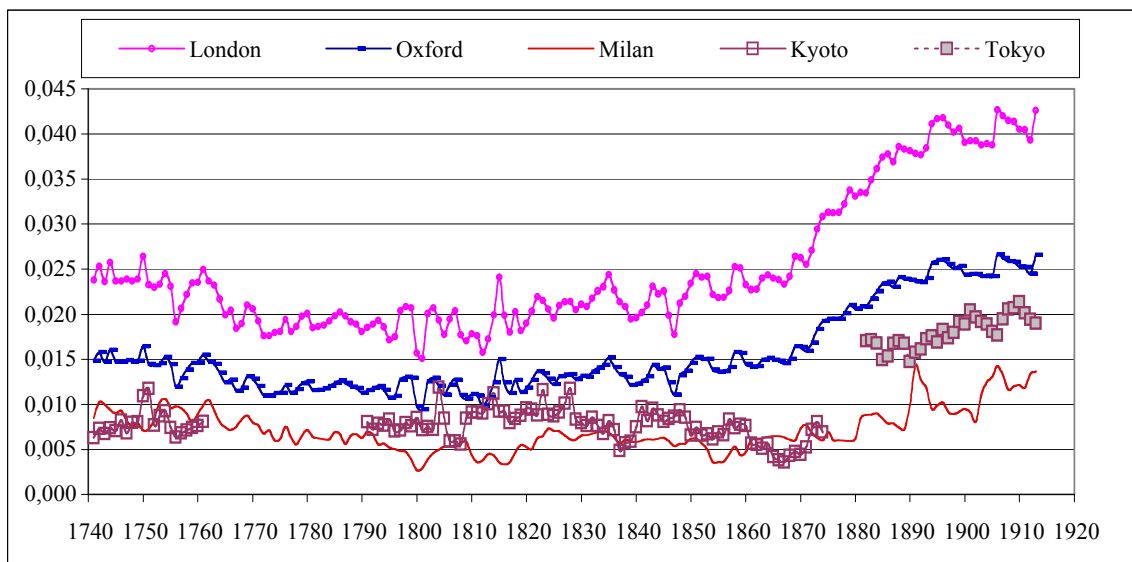
Sources: same as for Table 4.

V.   DISCUSSION AND SUMMARY

It is now possible to compare our real wages with Allen's findings. As indicated earlier, Allen's basket, with a much higher amount of rice and meat and no soybeans, yields a total cost of 540 grams of silver based on the 1882 *LTES* prices, nearly twice the cost of our Japan basket A (see Allen 2005, Appendix Table 5.3). Thus, his India-basket-deflated real wage for unskilled laborers for the 1882 benchmark, 0.009, is only half of our level for 1884 but happens to be identical to our 1750 benchmark period level (see Table 3). As Allen used his 0.009 level of real wage to project backward to the Tokugawa period using the Saito Index with the relatively trend-less Williamson index serving as the intermediate link, his back-cast Tokugawa real wages

ends up about the same as our 1750 benchmark based Tokugawa real wages, which are about 0.008 on average for 1750-1874 in Table 3. This is a pure coincidence that should not distract us from the problematic nature of backward projection method. Furthermore, Allen's series missed out the surge in real wages since the Meiji Restoration as revealed in our study.

For our Tokugawa real wages, we did some robustness checks by comparing the nominal wages and prices used in this study with other comparable series in Saito (1998, 2005). We are reasonably certain that our data, particularly the rice price, used in this study are within the normal range of other Tokugawa data. Thus, the near-doubling of our real wages between the Tokugawa and Meiji periods in our data is rather puzzling. Clearly, there are major differences in the objective and methods of statistical compilation between the Mitsui Bunko series and the *LTES* wages series. Furthermore, our simplified consumption baskets did not take into account such important items as housing rents, burning fuel, alcohol and etc. which might have changed in the Tokugawa-Meiji transition period. Most importantly, the Tokugawa-Meiji transition may have also spelled profound changes in labor institutions and labor contracts such as food allowance or side payments to cash wages. Whether or not this jump in real wages is a statistical illusion or an indication of real economic changes in the Tokugawa-Meiji transition period as argued, for example, by Huber (1971), is an issue for future research.

With these caveats in mind, we provide summary information of unskilled Japanese and U.K laborers' wages and income for the two benchmark periods in table 5. The table shows that our wages expressed in silver and grain units are broadly consistently with other independent studies, particularly the recent preliminary work by Lindert et al. (2004) on global price and wage comparison. Table 5 also reveals that the Kyoto-Tokyo grain wages relative to those in London are consistently higher than their relative silver wages. Furthermore, the Kyoto-Tokyo real wages relative to those of London are higher than both the relative grain and silver wages. This is

consistent with the theme of the recent article by Broadberry and Gupta (2003), which viewed this as an indication of higher relative U.K productivity in the tradable goods. In Table 5, we also present Angus Maddison's per capita income estimates (or "guess-estimates") for the 18th century.

Table 5: A Summary Comparison of Japanese and U.K Wages and Incomes (Numbers in parentheses are ratios over London with London = 100)

	Silver wages (in grams)		Grain wages (in kgs of bread)		Real wages		GDP per capita (in 1990 Int. dollars)	
Benchmark	1750	1884	1750	1884	1750	1884	1700	1884
London	11.14 (100)	34.36 (100)	8.1 (100)	15.5 (100)	0.024 (100)	0.036 (100)	1250 (100)	3622 (100)
Kyoto-Tokyo	2.8 (25)	4.5 (13)	2.74 (34)	3.95 (26)	0.009 (38)	0.016 (44)	570 (46)	836 (23)

Note: wage measured in kg of bread in London and Milan, the 5-year average of wage divided by the 5-year average prices of rice in kg in Kyoto-Tokyo. On the basis of the caloric content, adjusted for taking into account the cost of fuel for cooking rice, 1 kg of rice is regarded equivalent to 1.3 kg of bread (the ratio of the caloric contents is 1.43). GDP per capita data for Britain, Italy and Japan are from Maddison (2001), p. 206 and p.264 and Maddison (2004), pp.60-61. real wages are averages of 1745-54 and 1882-86 respectively.

VI. SUMMARY

To sum up, this article is a first attempt to make international comparison of 18th and 19th century Japanese real wages using current price benchmarks (rather than Meiji period back-projection). Our finding of a purchasing power of unskilled Japanese laborers being around a third of the London level seems to place Japan in the ranks with Turkey, Java or Southern Europe in the 18th century. This finding, subject to further tests, would have important implications both for the old debate on Japanese living standards and new understandings on the initial conditions for economic take-off. With Japan being part of the East Asian civilization, we

believe our study of Japanese real wages is also a contribution towards understanding the debate over the "great divergence" raised by Kenneth Pomeranz's (2000) recent work on China-Europe comparison and marks a step forward towards a more rigorous comparison of global living standards for the 18th and 19th centuries.

Our study also reveals important discontinuity in real wage purchasing power between the late-Tokugawa and early Meiji. This finding is a clear warning against backward projection methods based on the Meiji benchmark. While further careful research is needed to understand the cause of this discontinuity, it does serve to draw our attention to a re-evaluate the economic impact of the transition from Tokugawa to Meiji.

References:

Allen, R. C. (2001) "The Great Divergence in European Wages and Prices from the Middle Ages to the First World War" *Explorations in Economic History* 38, 411-447 (2001).

_____ (2005) "Real Wages in Europe and Asia: a First Look at the Long-term Patterns" forthcoming in R. C. Allen, T. Bengtsson, and M. Dribe eds. *Living Standards in the Past: New Perspectives on Well-Being in Asia and Europe.* Oxford: Oxford University Press.

Broadberry, S. and Gupta, B. (2003) "The Early Modern Great Divergence: Wages, Prices and Economic Development in Europe and Asia, 1500-1800." Department of Economics, University of Warwick.

Chang, T-T. (2000), Rice, in ed. K. F. Kiple and K. C. Ornelas. *The Cambridge World History of Food*", volume 1, pp. 132-149.

Hanley, S. B. (1983), "A High Standard of Living in Nineteenth-Century Japan: Fact or Fantasy?" *Journal of Economic History,* Vol. XLIII, No. 1, pp.183-192, March 1983.

Hanley, S. B. (1997), *Everyday Things in Pre-modern Japan: The Hidden Legacy of Material Culture*, Berkeley, Calif.: University of California Press.

Harada, T. and Miyamoto, M. (eds) (1985) *Reikishi no Nakano Bukka* (Prices in History: a Symposium). Tokyo: Toubensha.

Kito, H. (1986), "Meiji zenki no shushokuko zeito sono chiiki pattern (Food Composition and its Regional Pattern in Early Meiji)" *Sophia Economic Papers* Feb. 1986 Vol. XXXI, No. 2, pp.30-43.

Kito, H. (1989). "KinseiNihon no shusho kutaikei to jino henka (Staple Food and Population Change in Early Modern Japan)", in Hayami, Akira, Saito Osamu and Sugiyama, Shinya eds "Tokugawa shakai kara no teibo; hatten, kozo, kokusai kankei (*A Perspective from the Tokugawa Society: Development Structure and International Relations).* Tokyo: Toabunkan, pp. 32-55.

Lindert P., Allen R. C., Devereux, J., Hellie, R., Hoffman, P.T., Jacks, D.S., Ma, D. Mironov, B. N., Pamuk, S., van Zanden, J. L., Ward, M. (2004). "Preliminary Global Price Comparisons, 1500-1870" (http://www.iisg.nl/hpw/conference.html).

Maddison, A. (2001). *The World Economy: A Millennium Perspectiv*e, Paris: OECD Development Centre.

Maddison, A. (2004). *The World Economy: Historical Statistics.* Paris, OECD.

Mitsui Bunko (ed.) (1989). *"Kinsei Nihon goki ni okeru juyo bukka no dotai (Trends of Major Prices in Early Modern Japan).* Tokyo: University of Tokyo Press.

Miyamoto, M. (ed.) (1963). *Kinsei Osaka no bukka to rishi (Prices and Interest Rates in Osaka during the Pre-Meiji Period).* Tokyo: Sonbun sha.

Mosk, C. and Pak, S. (1978). "Food Consumption, Physical Characteristics, and Population Growth in Japan, 1874-1940." Working Paper no 102, University of California at Berkeley, Department of Economics.

Nishikawa, S. (1978), 'Productivity, subsistence, and by-employment in the mid-nineteenth century Chosho', *Explorations in Economic History* 15: 69-83.

Ohkawa, K. and Shinohara, M. (eds.) (1979) *Patterns of Japanese Economic Development, a Quantitative Appraisal.* New Heaven: Yale University Press.

Ohkawa, K., Noda, T., Takamatsu, N., Yamada, S., Kumazaki, Minoru, Shionoya, Yuichi and Minami, Ryoshin (1967). Bukka (prices), Choki Keizai Tokei (*Estimates of Long-Term Economic Statistics (LTES) of Japan since 1868),* vol. 8. Tokyo: Toyo Keizai Shinposha.

Ozmucur, S. and Pamuk, S. (2002). "Real Wages and Standards of Living in the Ottoman Empire, 1489-1914" *The Journal of Economic History,* Vol. 62, No. 2, June 2002, 293-321.

Pomeranz, K. (2000). *The Great Divergence: China, Europe, and the Making of Modern World Economy.* Princeton: the Princeton University Press.

Saito, O. (1978b). 'The labor market in Tokugawa Japan: wage differentials and the real wage level, 1727-1830', *Explorations in Economic History* 15: 84-100.

Saito, O. (1998). *Chingin to rodo to seikatsu suijun: Nihon keizaishi ni okeru 18-20 seiki*, (Wages, labor, and living standards in Japan from the 18th to the 20th century). Tokyo: Iwanami Shoten.

Saito, O. (2005). "Wages, Inequality and Pre-modern Growth in Japan, 1727-1894" forthcoming in R. C. Allen, T. Bengtsson, and M. Dribe eds. *Living Standards in the Past: New Perspectives on Well-Being in Asia and Europe.* Oxford: Oxford University Press, 2005.

Sano, Y, (1962). ''Kenchiku rôdôsha no jisshitsu chingin: 1830-1894 nen (Real wages of construction workers)', *Mita gakkai zasshi* 55: 1009-1036.

Shimbo, H. (1978), Kinsei no bukka to keizai hatten (Early modern prices and economic development), Tokyo: Toyo Keizai Shimposha.

Toyo Keizai (1980). Showa Kokusei Soran (Retrospective statistics of the Showa era). Tokyo: Toyo Keizai Shinposha.

Umemura, M. (1961), 'Kenchiku rôdôsha no jisshitsu chingin 1726-1958 nen (Real wages of construction workers, 1726-1958)', *Economic Research-Keizai Kenkyu,* 12: 172-176.

Umemura, M., Takamatsu, N.and Itoh, S. (1983). *Chiiki Keizai Tokei* (Regional Economic Statistics), Choki Keizai Tokei (*Estimates of Long-Term Economic Statistics (LTES) of Japan since 1868*), Volume 13.Tokyo: Toyo Keizai.

Umemura, M., Yamada, S., Hayami, Y., Takamatsu, N., & Kumazaki, M. (1966) Nogyo (Agriculture), Choki Keizai Tokei (Estimates of Long Term Economic Statistics (LTES) of Japan since 1968), Vol. 9. Tokyo: Toyo Keizai.

Williamson, J. G. (1998), 'Real wages and relative factor prices in the Third World 1820-1940: Asia', Harvard Institute of Economic Research Discussion Paper no.1844.

Williamson, J. G. (2000), 'Globalization, factor prices and living standards in Asia before 1940', in A.J.H. Latham and H. Kawakatsu, eds., *Asia Pacific Dynamism 1550-2000*, London: Routledge, 13-45.

Yasuba, Y. (1986). "Standards of Living in Japan Before Industrialization: From What Level Did Japan Begin? A Comment" *Journal of Economic History* Vol. XLVI, No. 1, 217-224.

Yasuba, Y. (1987), 'The Tokugawa legacy: a survey', *Economic Studies Quarterly* 38: 290-308.

Van Zanden, J. L. (2003). "Rich and Poor before the Industrial Revolution, a Comparison between Java and the Netherlands at the Beginning of the 19th Century." *Explorations in Economic History* 40 (2003) 1-23.

Appendix Table I. Daily Nominal Wages and Rice Prices in grams of silver for 1741-1871 and 1880-1913

Year	Daily Wages	White Rice (per kg)	Year	Daily Wages	White Rice (per kg)	Year	Daily Wages	White Rice (per kg)
1741	2.57	1.88	1814	3.22	1.68	1860	3.83	3.04
1742	2.81	1.73	1815	3.28	1.69	1861	4.20	4.58
1743	2.58	1.67	1816	2.81	1.57	1862	3.70	3.29
1744	2.72	1.66	1817	2.71	1.72	1863	3.69	3.68
1745	2.60	1.58	1818	2.75	1.47	1864	4.90	4.67
1746	2.66	1.80	1819	2.74	1.28	1865	4.23	8.32
1747	2.47	1.68	1820	2.77	1.17	1866	4.11	19.36
1748	2.89	1.69	1821	2.85	1.31	1867	4.26	18.49
1749	2.80	1.52	1822	2.97	1.46	1868	4.56	9.51
1750	3.58	1.60	1823	4.17	1.46	1869	5.88	13.53
1751	3.50	1.55	1824	3.31	1.55	1870	4.87	13.29
1752	2.57	1.33	1825	3.14	1.63	1871	5.66	7.75
1753	2.50	1.11	1826	3.42	1.82	1880	5,25	1,99
1754	2.63	1.04	1827	3.37	1.51	1881	*5,38*	2,01
1755	2.49	1.52	1828	3.97	1.68	1882	5,50	1,67
1756	2.49	1.94	1829	3.02	2.15	1883	4,75	1,24
1757	2.55	1.69	1830	2.83	1.86	1884	4,50	1,41
1758	2.52	1.55	1831	2.80	2.01	1885	4,00	1,76
1759	2.53	1.52	1832	3.00	1.71	1886	3,75	1,44
1760	2.49	1.33	1833	2.88	2.16	1887	4,00	1,29
1761	2.49	1.20	1834	3.03	2.50	1888	4,10	1,28
1762	2.49	1.15	1835	2.92	1.84	1889	4,20	1,45
			1836	3.11	2.50	1890	4,30	2,24
1791	2.55	1.47	1837	3.02	3.70	1891	4,40	1,82
1792	2.86	1.91	1838	2.95	2.51	1892	4,50	1,91
1793	2.80	1.89	1839	2.97	2.31	1893	4,88	1,97
1794	2.57	1.52	1840	3.08	1.71	1894	5,25	2,01
1795	2.75	1.65	1841	3.45	1.65	1895	5,50	2,03
1796	2.52	1.82	1842	3.36	1.79	1896	6,50	2,18
1797	2.55	1.77	1843	2.80	1.70	1897	7,25	2,72
1798	2.63	1.77	1844	3.59	1.73	1898	8,25	3,29
1799	2.57	1.68	1845	3.61	1.91	1899	8,50	2,21
1800	2.74	1.90	1846	3.30	2.10	1900	9,25	2,75
1801	2.57	1.77	1847	3.16	1.99	1901	9,75	2,82
1802	2.52	1.64	1848	2.81	2.07	1902	9,75	2,89
1803	2.49	1.52	1849	2.99	2.15	1903	10,00	3,31
1804	3.37	1.25	1850	3.00	2.76	1904	10,00	3,11
1805	2.36	1.26	1851	3.37	2.77	1905	10,25	3,01
1806	1.93	1.37	1852	3.00	2.00	1906	10,50	3,47
1807	1.90	1.45	1853	2.91	2.22	1907	12,25	3,79
1808	2.13	1.72	1854	3.14	2.30	1908	13,25	3,51
1809	2.75	1.72	1855	3.48	1.88	1909	13,00	2,98
1810	2.74	1.37	1856	3.34	1.87	1910	13,25	2,89
1811	2.75	1.43	1857	3.33	2.22	1911	14,00	3,82
1812	2.75	1.36	1858	3.37	2.91	1912	14,50	4,48
1813	2.91	1.40	1859	3.45	2.91	1913	14,75	4,82

Sources: for 1741-1871, based on Mitsui Bunko (1989); for 1880-1913, based on table 6 and LTES (Ohkawa 1967),

Table 5, p. 153; table 25, column 30, p. 245 (missing data for nominal wages interpolated for 1881, 1888-93, and 1893).

Notes: conversion units used: 1 silver monme = 3.11 grams of pure silver. 1 koku of rice = 150 kg; 1 yen = 25 gram of pure silver; 1 sho rice = 1.425 kg.

Appendix Table II: Real wage series for Kyoto-Edo (1741-1869) and Tokyo (1882-1913)

Year	Real wage	Year	Real Wage	Year	Real Wage	Year	Real Wage
1741	0.006	1791	0.008	1841	0.010	1891	0,016
1742	0.007	1792	0.007	1842	0.008	1892	0,016
1743	0.007	1793	0.008	1843	0.010	1893	0,017
1744	0.007	1794	0.008	1844	0.009	1894	0,018
1745	0.007	1795	0.008	1845	0.008	1895	0,017
1746	0.008	1796	0.007	1846	0.008	1896	0,018
1747	0.007	1797	0.007	1847	0.008	1897	0,017
1748	0.008	1798	0.008	1848	0.009	1898	0,018
1749	0.008	1799	0.008	1849	0.008	1899	0,019
1750	0.011	1800	0.008	1850	0.007	1900	0,019
1751	0.012	1801	0.007	1851	0.008	1901	0,020
1752	0.008	1802	0.008	1852	0.008	1902	0,020
1753	0.009	1803	0.007	1853	0.008	1903	0,019
1754	0.009	1804	0.012	1854	0.007	1904	0,019
1755	0.007	1805	0.008	1855	0.008	1905	0,018
1756	0.006	1806	0.006	1856	0.007	1906	0,018
1757	0.007	1807	0.006	1857	0.008	1907	0,019
1758	0.007	1808	0.006	1858	0.007	1908	0,021
1759	0.007	1809	0.008	1859	0.008	1909	0,021
1760	0.008	1810	0.009	1860	0.008	1910	0,021
1761		1811	0.009	1861	0.006	1911	0,020
1762		1812	0.009	1862	0.007	1912	0,019
1763		1813	0.010	1863	0.006	1913	0,019
1764		1814	0.011	1864	0.007		
1765		1815	0.009	1865	0.006		
1766		1816	0.009	1866	0.004		
1767		1817	0.008	1867	0.004		
1768		1818	0.008	1868	0.006		
1769		1819	0.009	1869	0.003		
1770		1820	0.010	1870	0.004		
1771		1821	0.009	1871	0,005		
1772		1822	0.009	1872	0,007		
1773	0.008	1823	0.012	1873	0,008		
1774	0.007	1824	0.009	1874	0,007		
1775	0.007	1825	0.009	1875			
1776	0.007	1826	0.009	1876			
1777	0.007	1827	0.010	1877			
1778	0.007	1828	0.012	1878			
1779	0.007	1829	0.008	1879			
1780	0.008	1830	0.008	1880			
1781	0.009	1831	0.008	1881			
1782	0.007	1832	0.009	1882	0,017		
1783	0.007	1833	0.008	1883	0,017		
1784	0.006	1834	0.007	1884	0,017		
1785	0.006	1835	0.008	1885	0,015		
1786	0.007	1836	0.007	1886	0,015		
1787	0.005	1837	0.005	1887	0,017		
1788	0.006	1838	0.006	1888	0,017		
1789	0.006	1839	0.006	1889	0,017		
1790	0.007	1840	0.007	1890	0,015		