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# Effect on Prices of Japan's Entry into World Commerce after 1858

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What happened to price ratios between exportables and importables in Japan as that country moved out of self-imposed economic isolation (ended in 1858) into free trade (the 1870s)? Average prices of exportables rose at least 3.5-fold relative to importables to converge on world market prices. At the extremes, in autarchy, Japan's price ratios on tea and bar iron were out of line with world price ratios no less than eight to one. By crude measures, it is estimated that Japan's national real income rose about 65 percent in the transition from economic isolation to free trade.

## I. Introduction

The purpose of this paper is to compare relative commodity prices in Japan and the rest of the world before and after Japan entered world commerce, and to attempt to estimate Japan's gain from trade. No other nation has made the leap from virtually no trade to a flourishing commerce in so short a time. The year 1858 marked the end for Japan of self-imposed restrictions which had limited exports and imports during the previous half century to an annual average for each of scarcely \$0.5 million. Within a dozen years foreign trade had multiplied some seventy-fold, to perhaps 7 percent of national income.

In order to accomplish the above objective, I first calculated average annual prices for each of Japan's products in a standard world currency unit—the U.S. gold dollar. Prices of similar products in world markets in the same unit were then calculated. Then, the relative prices in Japan were compared with relative prices in the rest of the world before and after Japan's entry into world trade. Further, changes in relative prices of exportables and importables were compared, which enabled me to

Many colleagues at the University of Washington and elsewhere made helpful suggestions on various drafts of this paper, but my greatest debt is to Prof. John E. Floyd. My thanks also go to graduate students here and in Japan who helped to unearth and translate Japanese sources.

analyze the effect of the opening of trade on the terms of trade. Finally, changes in per capita incomes relative to the prices at which incomes were spent were compared as Japan moved from isolation to trade, and the economic gain from trade to Japan was estimated.

A number of interesting conclusions emerge from the analysis: (1) on the basis of price data covering three-fourths of exports and half of imports, Japan's terms of trade improved no less than 3.5-half fold; (2) Japan's entry into commerce had little effect on the terms of trade of the Western world; and (3) the evidence suggests that real national income of Japan increased—perhaps as much as 65 percent—in the transition from economic isolation to trade. Real income effects of this magnitude greatly exceed the most favorable results predicted in any models of recent vintage with which I am familiar. (Johnson 1965; McKinnon 1966)

## II. Products and Prices

The pretrade period chosen was the decade 1846–55 and the posttrade period the nine years 1871–79. The first period was selected because both commodity prices and exchange rates among domestic currencies were fairly stable in Japan. From 1859 to 1868 (the latter year marks Meiji Restoration) political upheavals and monetary disorders in Japan led to chaotic changes in exchange rates and prices, making it very difficult to isolate the effects of entry into world markets. In addition, unusually bad harvests in Japan in 1866–67 forced grain prices far out of line from normal, and silkworm disease in Europe and the American Civil War distorted prices of silk and cotton products everywhere, especially during the 1860s. In Japan price statistics in post-Meiji currencies usually begin no earlier than 1870 or 1871, and for many price series which extend back into pretrade decades the terminal date is 1879. For these reasons I have chosen 1871–79 as the appropriate posttrade period to compare with 1846–55, the pretrade period.

Japanese price statistics as early as 1830 are now available, thanks to the diligent work of Japanese scholars.<sup>1</sup> The sources give monthly data covering a wide range of products traded in Osaka, then the chief commercial center of Japan. Less extensive price series are available for Kyoto and Edo (later named Tokyo). For some twenty commodities (half were exportables or importables and the rest home market goods), the produce of Japan was reasonably comparable in quality to counterparts abroad for which prices could be found. All pretrade prices were converted into Japanese gold *ryo* and then, in turn, into U.S. gold dollars

<sup>1</sup> The chief source is Miyamoto (1963). Other useful sources include Nakai (1952), Kinyu Kenkyukai (1937), Takahashi (1932), Ouchi (1932), and Kan'i Hoken Kyoku (1927).

on the basis of the U.S. price of the bullion contained in the gold *ryo*.<sup>2</sup> The gold content of the *ryo* was unchanged during the pretrade period. Actually, for purposes of calculating the changes in price ratios, the particular conversion rate of the *ryo* into the dollar is irrelevant—prices of Japan's exports and imports would be affected in proportion.

With regard to world prices, I have put together commodity prices for several places outside Japan. The key trading centers for most products were London, New York, Hamburg, Lyon for raw silk, and Manchester for cotton products. For all these markets, except Lyon, prices can be obtained from standard sources, usually beginning with 1845 or 1846.<sup>3</sup> Market exchange rates were used to convert prices to the U.S. gold dollar. In all cases, quantity units were converted to pounds.

### III. Japan's Exportables

The list of Japan's exportables is short.<sup>4</sup> During the 1870s, almost two-thirds of Japan's exports by value were silk and tea. Raw silk plus some cocoons and waste comprised 39 percent of exports, and tea made up 25 percent. Silkworm eggs averaged 6 percent—higher in the early years of the decade, but petering out at the end. Refined copper, dried fish, and coal were 3 percent each, and rice 6 percent. Relevant price statistics have been located only for raw silk, tea, refined copper, and rice. As can be seen in table 1, the prices of Japan's main exportables rose substan-

<sup>2</sup> The source of average monthly exchange rates between Japanese currencies in which commodity prices were recorded in the pretrade period is Miyamoto (1963, pp. 71–80, 113–21). For most years during the 1870s, average annual exchange rates on gold, silver, and paper yen, and on the Mexican dollar were calculated from weekly rates quoted in the *Japan Weekly Mail*. Other sources used include U.S. Department of State (1897, p. 352); Matsukata (1899, pp. 29–34; 147–57); and Mayet (1879, pp. 724–43).

<sup>3</sup> The chief sources are Sauerbeck's average annual prices for London and Manchester, and Soetbeer's prices for Hamburg recorded in U.S. Congress (1893); the *London Economist* for weekly average prices on cotton yarn, cotton piece goods, Japanese raw silk, tea, and rice; and *Seventh Annual Report* of the Silk Association of America, 1879 for London prices on Chinese, Japanese, and Italian raw silks. For the New York market, the following sources were used: U.S. Congress (1893) for Italian silk prices, weekly tea prices from New York *Journal of Commerce*, monthly tea prices from *Annual Reports* of the Chamber of Commerce of the State of New York. The sources of raw silk prices in Lyon in the 1870s are: Duplat (1873–76), and *Japan Weekly Mail* (1877, pp. 131–36, 159–60, 205–7, 233–34).

<sup>4</sup> For Japan's trade values, both exports and imports, the annual detailed compilations made by the various British consular officers at the ports of Japan (all published in *British Parliamentary Papers* and most in *Japan Weekly Mail*) were used. These figures, although based largely on the official trade returns, are more accurate than the latter because (1) they were adjusted for glaring undervaluations, and (2) they were recorded in Mexican dollars, whereas official returns were in a mixture of gold and silver yen. A good summary of the British reports for the years 1867–81 appeared in *Japan Weekly Mail*, September 9, 1882, pp. 1110–16.

TABLE 1  
SELECTED EXPORTABLES OF JAPAN: PRICES IN DOMESTIC  
AND FOREIGN MARKETS (IN U.S. GOLD DOLLARS)

EXPORTABLES	ANNUAL AVERAGES		PERCENT CHANGE
	1846-55	1871-79	
Raw silk (lb.):			
Yokohama:*			
Maebashi Best .....	\$3.30	\$4.95	+50
London:			
Chinese Tsatlee.....	3.97	4.85	+22
Japan Maebashi.....	...	5.30	...
Indian Cossimbuzar.....	3.80	4.87	+28
New York:			
Italian classical.....	6.06	7.10	+17
Milan			
Italian organzine.....	6.40	7.57	+18
Hamburg—all imports.....	4.01	4.34	+ 8
Average—all foreign prices.....	...	...	+19
Refined copper (lb.):			
Osaka.....	14.4¢	14.9¢	+ 3
London:			
Chile bars.....	19.7¢	16.0¢	-19
Rice (lb.):†			
Osaka:			
Middle grades.....	1.95¢	1.55¢	-20
Yokohama:			
Premium rice for export.....	...	1.98¢	...
London:			
Rangoon cargoes.....	2.32¢	2.05¢	-12
Japan rice.....	...	2.49¢	...
	1848-53‡	1871-79	
Tea (lb.):			
Osaka:			
High grade.....	19.7¢	28.2¢	+43
Middle grade.....	13.9¢	22.8¢	+64
Yokohama:			
Fine.....	...	27.8¢	...
Good medium.....	...	23.5¢	...
Medium.....	...	20.5¢	...
London:			
China Congou common.....	19.3¢	20.6¢	+ 7
New York:			
China Congou common.....	19.5¢	21.9¢	+12
Japan Uncolored common.....	...	26.1¢	...
China Gunpowder green.....	32.8¢	30.5¢	- 7
China Hyson green common.....	20.0¢	23.0¢	-20
China Hyson green best.....	73.3¢	66.0¢	-10
Hamburg—all imports.....	31.3¢	26.7¢	-15
Average—all foreign prices:			
Expensive teas.....	...	...	-13
Cheap teas.....	...	...	+10

\* In the pretrade period, the market for raw silk was near Edo. After trade opened the chief market was Yokohama.

† 1873-79 to fit availability of London price on Japan rice.

‡ 1843-53 to conform to availability of Osaka tea prices.

tially relative to world prices, eventually converging upon them.<sup>5</sup> These relative price changes are summarized in table 2.

Probably for minor exports such as dried fish, fish oil, vegetable wax, camphor, and low-quality coal, Japan's prices fell somewhat relative to those abroad, but continuous price data could not be found. There was a substantial export of silkworm eggs during the 1860s and 1870s, although this was an episode that was never repeated. When disease ravaged the silkworms of western Europe after 1853, raw silk producers sought to restore output by importing healthy Japanese eggs. So great were price differentials when markets were isolated, that after trade opened prices of eggs rose no less than fivefold in Japan and fell by half in France with ample margin remaining to pay costs of transport on Japan's eggs bound for Europe.

The overall increase in Japanese prices relative to world prices was 33 percent. This average was constructed using as weights the relative values of each product in Japan's exports during the 1870s, and adding silkworm eggs at a conservative trebling of relative price, and all other exports at an estimated 10 percent decrease in relative prices. In the case of tea, the relative price increase on cheap kinds (50 percent) was used, thus ignoring the larger relative rise in price on more expensive types (64 percent). The relative increase in the computed index of price changes on all exports is only slightly below the comparable figure on raw silk and tea alone—35 percent.

The absolute price differences between similar Japanese and foreign commodities are explainable on the basis of quality differences, tariffs, transport costs, and foreign exchange charges. With regard to silk, Yokohama's Maebashi Best was superior in quality to the Maebashi brand

TABLE 2  
RELATIVE PRICE CHANGES OF SELECTED EXPORTABLES:  
JAPAN AND WORLD MARKET

Exportables	Japan	World Market Average	Ratio: Japan/World Market
Raw silk . . . . .	+50%	+19%	+26%
Refined copper . .	+ 3%	-19%	+27%
Rice . . . . .	-20%	-12%	- 9%
Tea:			
Expensive . . . .	+43%	-13%	+64%
Cheap . . . . .	+64%	+10%	+50%

<sup>5</sup> The Yokohama commodity prices in table 1 (also in table 3) were calculated from weekly prices reported in *Japan Weekly Mail*. For the occasional periods when no prices were recorded, estimates were based largely on information and price quotations in British and American consular reports.

priced in London. The recorded price differential was only 7 percent, while for silk of identical quality the differential would have been between 15 and 20 percent. Grade for grade, Japan's raw silks fetched higher prices than China's, and the silks of both countries were cheaper than the higher quality Italian and French silks. During the 1870s in Lyon—the world's leading silk market—prices of raw silks from the four countries were in line with comparable qualities in London, New York, and Milan, but no Lyon prices could be found for the earlier years. Japan's refined copper met the standard of copper bars traded in London, and Japan's export rice was of higher quality than rice imported by Great Britain from southern Asia.

Quality variations among teas cannot be easily identified and grade names often failed to coincide among markets. In Yokohama the cheapest tea traded in large volume for which prices were consistently quoted was called "medium," while the cheapest tea priced in New York was called "common." The price differential between these two grades (27 percent) was roughly equal to the Japanese export duty (five percent) and transport and foreign exchange costs. Intermittent London prices on Japan's teas were in line with New York prices.

#### **IV. Japan's Importables**

The list of Japan's importables for which price data have been found is also short. It does include, however, representatives of groups which accounted for about 55 percent of imports during the 1870s—bar iron and nails (all metals 7 percent), raw cotton (1 percent), cotton yarn (18 percent), cotton shirtings (11 percent), other cotton cloth and products (8 percent), and raw and refined sugar (11 percent). With the exception of raw cotton and sugar, Great Britain supplied practically all these imports. The other half of imports was quite diverse and included mostly commodities Japan had never produced or for which domestic output was an extremely poor substitute. Woolen products dominated this group by value—over 20 percent of all imports. Other products were kerosene (comprising 3 percent of imports), clocks and watches, scientific instruments, rails and rolling stock, telegraph equipment, machinery, ocean-going steamships, papers and books, leather, a wide variety of chemicals and pharmaceuticals, and armaments and unspecified goods for government use.

Trade forced drastic reductions in Japan's prices as these converged toward world market levels. This is clearly indicated by the prices and price ratios shown in table 3 for Japan's importables. In raw sugar and cotton products, the ratio of Japanese prices relative to world prices fell by about one-half. The decrease was even greater on metals and refined

TABLE 3

## SELECTED IMPORTABLES OF JAPAN: PRICES AND PRICE RATIOS IN DOMESTIC AND FOREIGN MARKETS

IMPORTABLES AND MARKETS	AVERAGE ANNUAL PRICES IN U.S. GOLD DOLLARS			PRICE RATIOS		RATIOS OF 1871-79		RATIO OF JAPAN DOMESTIC TO IMPORTS 1871-79
	1846-55	1871-79 (Japan Domestic)	1871-79* (Japan Import)	1846-55	1871-79 (Japan Domestic) Import)	Percentages of Ratios 1846-55 (Japan Domestic) Import)		
Osaka-Yokohama to London								
Bar Iron (lb.):								
Osaka-Yokohama.....	9.65¢	3.81¢	2.70¢	568	215	38	27	141
London-Common bar.....	1.70¢	1.77¢	1.77¢					
Osaka to Hamburg								
Nails (lb.):								
Osaka.....	21.4¢	5.3¢	.....	500	132	26	.....	.....
Hamburg.....	4.28¢	4.0¢	.....					
Osaka-Yokohama to Manchester								
Ginned cotton (lb.):								
Osaka-Yokohama.....	23.1¢	15.3¢	12.6¢	206	101	49	40	121
Manchester-U.S.....	11.2¢	15.2¢	15.2¢					
Middling.....								
Cotton yarn (lb.):†								
Osaka-Yokohama.....	54.8¢	36.2¢	26.8¢	275	151	55	41	135
Manchester-No. 40's.....	19.9¢	23.9¢	23.9¢					
Mule Twist.....								
Cotton cloth (lb.):‡								
Osaka-Yokohama.....	65.1¢	36.8¢	30.0¢	260	132	51	42	121
Manchester-Gold End.....	25.0¢	27.8¢	27.8¢					
Shirtings.....								
Osaka-Yokohama to Hamburg								
Raw sugar (lb.):								
Osaka-Yokohama.....	5.39¢	3.38¢	3.05¢	110	58	53	47	111
Hamburg—all imports.....	4.91¢	5.81¢	5.81¢					
Refined sugar (lb.):								
Osaka-Yokohama.....	22.7¢	11.2¢§	6.60¢	371	139	37	25	147
Hamburg—all imports.....	6.12¢	8.05¢	7.15¢					

\* Yokohama for imports during 1871-79.

† Domestic: No. 14 count; imports: No. 16/24.

‡ Domestic: unspliced; imports: grey shirtings.

§ Japan domestic for 1871-73 only; same for Hamburg.

|| Import price averaged 7.6¢ in 1871-73.

sugar. But the declines were apparently not sufficient to equalize prices in Japan between domestic goods and competing imports. This disparity averaged about 30 percent as indicated item by item in the last column of table 3. Quality differences, for which evidence comes from consular reports and trade journals explain differentials in some cases. For example, Japan's ginned cotton and sugar were superior to their counterparts from China which supplied all Japan's imports of these products during the decade. Japanese bar iron was scarcely inferior to the cheapest bar iron available in England, but domestic cotton yarn and piece goods were surely below the standards of imports from England, although they improved during the 1870s as factory-made goods came to market. Consumer preferences and imperfections in markets were probably additional sources of price differentials. Some internal costs may also have been reflected in Osaka prices for domestic products, which were not present in Yokohama prices for imported goods.

As in the case of exports a weighted average of the change in price ratios on Japan's imports can be calculated. For the products covered in table 3, Japan's relative prices in the 1870s fell to 39 percent of the relative prices which prevailed in isolation, as indicated by the weighted average of the figures in the next to last column in table 3.

## V. Japan's Commodity Terms of Trade

In moving from isolation to virtually free trade, Japan experienced an apparent improvement of 3.5-fold in its commodity terms of trade.<sup>6</sup> At least that is a fair inference from the price data covered in this study. The relative price index on Japan's exportables went from 100 to 133, and the relative index on importables from 100 to 39. The change in the terms of trade is figured by dividing 133 by 39 to yield 340.

As I have already noted, the magnitude of the change in terms of trade is completely independent of the U.S. gold dollar value put on Japan's gold *ryo* to which I converted all Japan's prices in the pretrade period. I chose \$4.40 because it was the world market value of the bullion in the *ryo*, although there was no market exchange. Any other value would simply shift all Japan's prices (in terms of gold) down or up in equal proportion during autarchy. At seventy-five cents per gold *ryo* all Japan's prices would have risen in terms of gold from isolation to trade; at \$7.00 per *ryo* all prices would have fallen in terms of gold. But the relative price changes on Japan's products would not be affected.

This calculation of more than threefold improvement in Japan's terms

<sup>6</sup> During the 1870s Japan did not have completely free trade. Restrictions of little consequence were sometimes imposed, and duties on either exports or imports were not more than 5 percent ad valorem.

of trade greatly understates what actually occurred. Bar iron and tea occupy extreme positions in the array of relative prices during autarchy. In Japan a pound of ordinary tea cost about 30 percent more than a pound of bar iron (12.5 cents for the equivalent of Yokohama "medium" tea compared with 9.7 cents for bar iron), while in London tea of comparable quality cost eleven times as much as bar iron (19.3 cents compared with 1.7 cents). Japan's prices for these two products were out of line by a factor of eight to one. One can only speculate what the factor may have been for many other products compared with tea—lead, zinc, tin, petroleum (which Japan had in negligible amounts), glass, clocks, watches, some instruments and machinery, and guns—all of which Japan fashioned in crude form. If one had the prices and could adjust for quality differences, Japanese prices may well have been out of line with values in world markets in many products by a factor of twenty to one or more. There are bits of evidence that on clocks and guns the ratios were no less than twenty to one. In the case of goods Japan had never produced—wool and its products, rails and rolling stock, telegraph equipment, steam engines, ocean-going steamships, many machines and scientific instruments, and technical books—no basis exists for direct comparison. No attempt will be made here to estimate the degree of understatement in the calculated improvement in the terms of trade of Japan, but it can hardly be negligible.

## VI. Rest of World Terms of Trade

Did the entry of Japan into world commerce alter the commodity terms of trade for the outside world? The answer must hinge on Japan's exports rather than imports, because in no product did Japan buy more than a negligible fraction of world exports. In the 1870s Japan was a dominant seller in only silkworm eggs. Although she was a significant seller in two other products—raw silk and tea—she had only 8 percent of the silk market of the western world and 9 percent of the tea market. If one assumes unitary price elasticity of demand in the west for both products, then the addition of 10 percent to the supply consequent upon Japan's entry into trade would force prices down by 10 percent. This is an upper estimate, because we are not considering the typically positive elasticity of supply from competing sources. Had Japan not put its raw silk and tea on the market, China, her chief competitor, might well have sold even more. It is impossible, of course, to estimate export supply elasticity in the rest of the world. However, if one assumes it was unitary for both products, the subtraction of 10 percent from world supply (by taking out Japan) would have led to a 5 percent increase in the supply from producers in the rest of the world. The net effect of Japan's entry into trade would be a 5 percent decrease in the prices of tea and raw silk.

To assume that the supply elasticities of tea and silk were at least unity seems reasonable. For example, China had only 10 percent of the western market for raw silk, before disease decimated French and Italian production after 1853, cutting their output in half. But China responded immediately by a phenomenal expansion in exports; her annual average export quantity in the last half of the 1850s was more than three times the average of the decade before the disaster. Increased exports from China offset more than half the reduced supply from France and Italy. The addition of Japan's raw silk in the 1860s coincided with a contraction in China's exports, but in the 1870s both countries expanded silk exports and total consumption in the west was slightly larger than at midcentury.

Table 4 shows approximate annual consumption of raw silk in the western world and the main sources of supply.<sup>7</sup> From this it can be seen that by the 1870s China's expansion of exports almost offset the decline in production of raw silk in western Europe—an increase of 6.5 million pounds by China compared with a decrease of 8.0 million pounds by France and Italy—and that Japan's exports of 1.7 million pounds amounted to little more than the shortfall of Chinese expansion.

It is also likely that supply elasticity of tea was high. From midcentury through the 1860s when Japan and British India entered the market, the supply of tea to the West doubled in the face of increases in world prices of no more than 30 percent. In England, where nearly two-thirds

TABLE 4  
APPROXIMATE AVERAGE ANNUAL CONSUMPTION OF RAW SILK  
IN WESTERN WORLD AND MAIN SOURCES OF SUPPLY\*

PERIOD	TOTAL	SOURCE			
		France and Italy	China	British India	Japan
1846-53 . . . . .	21.0	17.0	2.0	n.a.	...
1854-60 . . . . .	17.0	8.0	6.8	0.4	neg. †
1861-70 . . . . .	17.5	8.0	5.7	0.2	1.5
1871-79 . . . . .	22.0	9.0	8.5	0.3	1.7

\* Expressed in millions of pounds.

† Negligible.

<sup>7</sup> Official statistics on production and trade of the countries concerned are often difficult to interpret because of lack of consistency in treating raw silk, thrown silk, silk waste, and even cocoons. The main sources used to build up estimates are: Macgregor (1850, vol. 1, chap. 3); British consular reports from France, the Italian States, Canton, Shanghai, and Yokohama—all published in *British Parliamentary Papers*; official trade returns of United Kingdom and of British India, and digests of official trade returns for France, Italy, and China (published regularly in *Statistical Abstract of Foreign Countries*, Board of Trade, London)—all published in *British Parliamentary Papers*; *London Economist*, 1854, pp. 32-34; *Japan Weekly Mail*, 1875, pp. 195-97; 1877, pp. 205-6; 1879, pp. 625-26; Silk Association of America, 1874, 1875, 1876, 1878, 1894; Rondot 1885; Silbermann 1897.

of the tea was sold, prices to consumers fell by one-third because tea duties were cut, and consumption doubled. These facts are consistent with high elasticities of both supply and demand. The data on tea supply to the West and prices in England are shown in table 5.<sup>8</sup> Overseas supply continued to expand in the 1870s despite lower tea prices, but this does not necessarily reflect a perverse elasticity of supply. It may well have reflected an outward shift of the supply schedule. Freight rates and other handling charges on tea were falling, and possibly the same was happening to costs of production. All over the world, the more expensive teas were losing ground to the cheaper teas. Any given reduction in costs per pound to both suppliers and consumers had greater leverage on cheap teas than on expensive types. This facilitated reallocation of resources toward the production of cheap teas.

We may conclude, therefore, that the opening of Japan to commerce with the West probably had negligible effect on the commodity terms of trade of the Western world, although it had enormous impact on the terms of trade of Japan (as shown above).

## VII. Japan's Gains from Trade

The attempt should be made to estimate Japan's quantitative gain from trade as it moved out of autarchy. There is little data except some exchange rates, commodity prices, values and quantities of trade, and wage rates of workers in the construction, lumber, and house furnishings industries. No general national statistics have been compiled on production or incomes for the years of autarchy in Japan, and very few reliable statistics of this sort have been compiled for post-Meiji much before 1878.

TABLE 5  
ANNUAL AVERAGE CONSUMPTION OF TEA IN WESTERN WORLD,  
MAIN SOURCES OF SUPPLY, AND LONDON PRICE\*

PERIOD	QUANTITY (MILLIONS OF LBS.)				LONDON PRICES CHINA'S CONGOU COMMON			
	Total	China	Japan	British India	In Bond		Duty Paid	
1846-53 . . . . .	85	85	...	...	19.5¢	100	69.0¢	100
1854-60 . . . . .	115	115	neg.	neg.	24.6¢	126	61.9¢	90
1861-70 . . . . .	174	160	8	6	24.9¢	128	44.6¢	65
1871-79 . . . . .	270	220	24	26	20.6¢	106	32.8¢	47

\* In U.S. gold currency per pound.

<sup>8</sup> Tea supplies to the Western world were estimated on the basis of official trade returns of the United Kingdom, United States, China, Japan, and British India, with occasional reference to the *London Economist*.

Contemporary accounts show that production of exportables (e.g., raw silk and tea) expanded in response to higher prices, but we do not know how much. Nor can we gauge how much output declined in pig iron, bar iron, raw sugar, and ginned cotton as Japan's producers faced up to low-priced imports. Actually, Japan's output of some import-competing products probably rose (e.g., cotton yarn and cloth and refined sugar), as cheap raw materials were increasingly obtained abroad and Western machinery was installed in factories. Domestic transport, port activity, and services associated with foreign trade all expanded rapidly. Total real investment and consumption must have been larger under free trade than under autarchy. But how much greater was real national income, and how much should be attributed to gains from trade?

It is possible, with sparse data, to make a rough estimate of changes in money incomes per capita relative to changes in the prices at which incomes were spent. Income statistics from 1845 to 1879 are represented solely by six series of daily wage rates in Edo-Tokyo for carpenters, stone masons, roof workers, and workers in *tatami*, lumber, and furniture.<sup>9</sup> Confidence in these figures is strengthened because (1) independent series beginning in 1873 for the same occupations are very similar to the figures I use, and (2) the data on wage rates for construction workers both in Kyoto and Osaka extending only from pretrade years to 1873 show bigger wage increases than those in Edo-Tokyo over the same time span. A price index for Edo-Tokyo would be limited to rice, soya bean paste, soya sauce, sake, salt, and rapeseed oil (and available only to 1871), but Osaka prices permit coverage of about fifty commodities.<sup>10</sup>

The indexes in terms of gold for both wages and commodity prices for 1871-79 are presented in table 6 with 1846-55 as base period. Commodities are in five groups: (1) home market (except grains), (2) grains, (3) domestic importables, (4) actual imports, and (5) exportables. All groups including the total are simple arithmetic averages. For many commodities the indexes are, in turn, arithmetic averages of several parallel series of price quotations on different qualities or geographic origin of the particular commodity (six series on rice, for example).

Except for importables and exportables, all groups are within the range 61-82, while the overall average of all prices (including prices of actual imports) is 71. Rice, by far the most important price among the fifty, stands at 76 (less than 10 percent above the average). Even if rice were given a 20 percent weight, the total index would be pushed to scarcely more than 72. Also, the exclusion of producers' goods would have negligible effect on the overall average. The wage-rate index, on the other hand, moved to 120. On this basis, real wage rates increased to 167.

<sup>9</sup> The index on wage rates was calculated from daily wage rates reported on an annual basis in Kan'i Hoken Kyoku (1927).

<sup>10</sup> Price data from Miyamoto (1963).

TABLE 6  
 WHOLESALE PRICES IN OSAKA AND WAGE RATES  
 IN EDO-TOKYO: ANNUAL AVERAGES  
 FOR 1871-79 IN GOLD\*

Commodities	Number	Price Index
Home market:		
Fuel and light.....	4	72
Building materials.....	5	64
House furnishings.....	3	61
Fertilizers.....	4	78
Edible fish.....	4	72
Food and drink (excl. fish and grains).....	4	73
Miscellaneous.....	4	82
Transport rates (Osaka to Edo by water).....	2	63
Home market average.....	30	71
Grains:		
Rice, wheat, barley, and soya beans.....	4	75
Domestic importables.....	8	50
Actual imports:		
Yokohama.....	7	41
Exportables.....	6	135
Average—all prices.....	55	71
Wage-rate index (Edo-Tokyo).....	6	120

\* 1846-55 = 100.

The crucial question in interpreting these figures on wage rates is whether they are fairly representative of changes in average incomes per capita derived from all sources. This turns essentially on the degree of factor mobility among various employments, and upon whether nonwage labor income, interest, profits, and rents moved proportionately with wages, or if not, whether some incomes rose sufficiently fast to offset the lag, or even fall, in others. In dealing with this problem, unfortunately, we have no statistical evidence and speculation would not be fruitful. Hence, in the absence of controverting evidence, one may conclude that Japan's real national income (for a constant population) may have increased by as much as 65 percent in the transition from autarchy to trade.

Japan's gains from trade were derived not only from improved commodity terms of trade but also from the application of superior technology from abroad. Even though the 1870s was only the second decade of trade, absorption of better technology from abroad, often embodied in part in specific commodity imports, progressed at a rapid pace: in mining and metallurgy (pumps and other machinery), in processing main exports, in manufacturing (textiles, sugar refining, beer, paper, matches,

printing, coinage, ship building, etc.), in transport (both rail and water), in communications (telegraph and postal service), in banking and other financial services, in municipal services (fire fighting, water supply, illuminating gas), in medical services, and in scientific activities (meteorology, hydrography, navigation, seismography, sericulture, and agronomy with a variety of special institutes, laboratories, and schools). The accelerating number of students, professional and technical people, businessmen, and government officials going abroad to learn and then returning to Japan was a significant part of the whole process of adopting improved technology in Japan. Also, the employment of foreign managerial and technical people speeded the process.

There may have been factors internal to Japan which would have raised real national income substantially from midcentury to the 1870s, even if Japan had remained in autarchy. But that likelihood seems dim, for the meager evidence suggests that during the last quarter century of isolation real wage rates moved up less than 0.5 percent per year at best, and may actually have been stagnant. The Meiji Restoration in 1868 was itself associated in some measure with the opening of Japan to trade. If the new government had reimposed economic isolation on Japan, there might have been some economic growth because of new leadership and the institutional changes wrought by the new regime. But the prerequisite for such growth would have been the more efficient mobilization and use of purely domestic resources. Perhaps in autarchy, but under new leadership, Japan would have developed cheap transportation (railroads and steamships), cheap communications (telegraph and postal service), and similar innovations. But it is certain that in autarchy price (and cost) ratios in Japan would have remained far out of line with relative prices in world markets.

### **VIII. Conclusion**

Japan is a classic example of a small country which in autarchy had commodity price ratios far out of line with price ratios prevailing in world markets. World commodity terms of trade were scarcely affected by Japan's entry into commerce because its share in world export supply was so small and the price elasticities of world supply and demand were relatively high. Consequently, Japan's terms of trade moved by at least 3.5-fold (and probably much more) to meet world terms of trade.

The improvement in Japan's commodity terms of trade was clearly a main source of total economic gain from entering world commerce. Together with the gains from adoption of improved technology from abroad, it may have accounted for a rise of as much as 65 percent in real national income.

## References

- British Parliamentary Papers*, 1845–85.
- Duplat, Paul. *Sericiculture, soies et soieries inventaire de 1873*; same title 1874, 1875, 1876. Lyon: Moniteur des soies.
- Japan Weekly Mail*, Yokohama, 1871–85.
- Johnson, Harry G. "The Costs of Protection and Self-Sufficiency." *Q.J.E.* 79 (August 1965): 356–72.
- Kan'i Hoken Kyoku. *Bukka oyobi Chingin ni Kansuru Chosa*. Tokyo: Kan'i Hoken Kyoku, Showa 2 [Postal Bureau of Insurance. *Survey of Prices and Wages*. Tokyo: Postal Bureau of Insurance, 1927].
- Kinyu Kenkyukai, *Wagakuni Shohin Soba Tokeihyo*. Tokyo: Kinyu Kenkyukai, 1937 [Finance Research Association, *Japanese Commodity Price Statistics*, Tokyo: Finance Research Association, 1937].
- London Economist*, 1845–80.
- Macgregor, John. *Commercial Statistics: A Digest*. 2d ed. 5 vols. London, 1850.
- McKinnon, Ronald I. "Intermediate Products and Differential Tariffs: A Generalization of Lerner's Symmetry Theorem." *Q.J.E.* 80 (November 1966): 584–615.
- Matsukata, Masoyoshi. *Report on the Adoption of the Gold Standard in Japan*. Tokyo: Government Press, 1899.
- Mayet, P. "National Debt of Japan." *Japan Weekly Mail*, June 7, 1879, pp. 725–43.
- Miyamoto, Mataji, sekinin henshu. *Kensei Osaka no bukkā to rishi*. Osaka Daigaku Kinsei Bukkashi Kenkyukai. Tokyo: Sobunsha, Showa 38 [Miyamoto, Mataji, chief ed. *Prices and Interest Rates in Osaka During Pre-Modern Period*. Osaka University Seminar in Price History. Tokyo: Sobunsha, 1963].
- Nakai, Nobuhiko (Mitsui Bunko), hensha. *Kinsei koki ni okeru shuyo bukkā no dotai*. Tokyo: Nippon Gakujutsu Shikokai, Showa 27 [Nakai, Nobuhiko (Mitsui Library), ed. *Movement of Major Prices at the End of the Pre-Modern Period*. Tokyo: Japan Science Advancement Society, 1952].
- New York, Chamber of Commerce. *Annual Reports*, 1850–80.
- New York *Journal of Commerce*, 1845–80.
- Ouchi, Hyoe, to Tsuchiya, Takao, hensha. *Meiji zenki zaisei-keizai shiryō shusei, dai 12 kan*. Tokyo: Kaizosha, Showa 7 [Ouchi, Hyoe, and Tsuchiya, Takao, eds. *Collection of Historical Materials on the Japanese Economy at Beginning of Meiji, XII*. Tokyo: Kaizosha, 1932].
- Rondot, M. N. *Les soies*. Chambre de Commerce de Lyon. Paris: Imprimerie Nationale, 1885.
- Silbermann, Henri. *Die Seide, ihre Geschichte, Gewinnung und Verarbeitung*. Erster Band. Dresden: Gerhard Kühtmann, 1897.
- Silk Association of America. *Annual Reports*, first, 1873, to twenty-second, 1894. New York Silk Assoc. America, 1873–94.
- Takahashi Kamekichi. *Tokugawa hoken keizai no kenkyū*. Tokyo: Senshinsha, Showa 7 [Takahashi, Kamekichi. *Study on the Tokugawa Feudal Economy*. Tokyo: Senshinsha, 1932].
- U.S. Congress. Senate. Committee on Finance. *Wholesale Prices, Wages and Transportation*. Rept. no. 1394 in 4 parts, by Aldrich. 52d Cong., 2d sess., 1893.
- U.S. Department of State. Bureau of Statistics. *Money and Prices in Foreign Countries*. Special Consular Reports, pt. 2. Vol. 13. Washington: Government Printing Office, 1897.