



The Association for  
Asian Studies

---

Technological Diffusion in Agriculture Under the Bakuhan System

Author(s): Kee Il Choi

Source: *The Journal of Asian Studies*, Vol. 30, No. 4 (Aug., 1971), pp. 749-759

Published by: Association for Asian Studies

Stable URL: <http://www.jstor.org/stable/2052985>

Accessed: 05/10/2009 03:58

---

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/action/showPublisher?publisherCode=afas>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).



Association for Asian Studies is collaborating with JSTOR to digitize, preserve and extend access to *The Journal of Asian Studies*.

<http://www.jstor.org>

# Technological Diffusion in Agriculture Under the Bakuhan System

KEE IL CHOI

OHKAWA and Rosovsky have contended that Japanese agricultural output began to increase rapidly after 1878, expanding at an annual growth rate of 2.4 percent without Western technology and with little additional capital, labor, or land.<sup>1</sup> In order to explain the alleged big rise in Meiji land productivity, they claimed that the Bakuhan system effectively blocked the diffusion of technology, thus creating a large technological backlog in the advanced regions of Tokugawa Japan. Once the Bakuhan system was abolished, the indigenous best farming technology flooded to all parts of Japan as if a dike had broken, resulting in a sudden increase in Meiji land productivity.<sup>2</sup>

Nakamura challenged this estimate of 2.4 percent on the grounds that official Meiji statistics grossly underestimated yields, particularly during the early years of the Meiji era. Nakamura further argued that Tokugawa land productivity was higher than Ohkawa and Rosovsky believed and that Meiji agricultural output increased at little more than 1 percent per year.<sup>3</sup>

---

Kee Il Choi is Professor of Economics at Worcester State College, Worcester, Mass.

The author would like to acknowledge helpful suggestions received from Professors Reischauer, Perkins, Rosovsky, and Craig of Harvard. He is particularly grateful to Professor Myers, colleague at the University of Miami, for his detailed criticism and suggestions, which resulted in useful revisions of the original draft of this article.

<sup>1</sup> For their detailed views see Kazushi Ohkawa and Henry Rosovsky, "The Role of Agriculture in Modern Japanese Economic Development," *Economic Development and Cultural Change*, Vol. 9, no. 1 (October 1960).

<sup>2</sup> Henry Rosovsky, "Rumbles in the Ricefields: Professor Nakamura vs. the Official Statistics," *JAS*, Vol. 27, no. 2 (February 1968), p. 358; and Kazushi Ohkawa, "Agriculture and Turning Points," *The Developing Economics*, Vol. 3, no. 4 (December 1965), p. 478. In his book, *Agricultural Development in China, 1638-1968* (Chicago, 1969), Dwight H. Perkins also used this argument to advance his own thesis. Simply stated, the themes of his book are: China's traditional agriculture produced enough grain for her population to grow from 65 million in 1400 to 400 million in the early 19th century, and 700 million in the 1950's. Half of this increase came from the expansion of cultivated land, mainly brought about by the advancing frontiers. The other half resulted from rising land productivity achieved by additional capi-

tal and labor but with little change in technology. Population increase was indispensable for opening up the frontiers and for increasing land productivity because double cropping would have been impossible without a supply of labor. Thus, for Perkins, population growth served as the major "engine" for agricultural progress. Explaining the insignificant role of technology in China, Perkins claimed that the best technology spread steadily and even rapidly across China, so that by some unspecified time between 1400 and 1950 there was no backlog of technology. Such a situation was able to occur because China, unlike Tokugawa Japan, had no border or feudal barriers. Perkins implied several times that technological diffusion was better in China than in Tokugawa Japan.

<sup>3</sup> Nakamura contends that there already existed surplus created by high Tokugawa productivity in agriculture. The Meiji Revolution merely created an institutional mechanism to exploit the surplus for industrialization. Nakamura sees an historical continuity in Meiji economic development. Nakamura believes that Meiji Japan, too, made sacrifices to achieve modest rates of economic growth whereas Ohkawa and Rosovsky indicate that the jump in Meiji land productivity came about without additional inputs but merely exploiting the technological backlog. See James I. Nakamura, *Agricultural Production and Economic Development of Japan* (Princeton, 1966).

In spite of this challenge, Ohkawa and Rosovsky still hold fast to their original position, although they have reduced their estimate from the original 2.4 percent to a lower growth rate of 2.0 percent.<sup>4</sup>

Ignoring controversy as to whether a 1 or 2 percent annual growth rate truly reflects the agricultural performance of early Meiji Japan, this essay questions the validity of two key propositions of the Ohkawa-Rosovsky thesis. The first is that the best indigenous farming technology alone accounts for the spurt in Meiji land productivity. This relationship implies that Meiji agriculture created a fresh surplus for industrialization without help or stimulus from other sectors of the economy.<sup>5</sup> Central and subsequent to the first proposition is that the Bakuhan system effectively blocked technological diffusion until the Meiji Restoration. This essay will argue that the Bakuhan system diffused rather than obstructed technology and accelerated agricultural development, thereby setting the stage for further acceleration of farm output during the early Meiji, and that regional differences during the Tokugawa period can be better explained on the basis of crop specialization and exchange associated with regional commercial development rather than discrepancies in farming technology among regions. If my proposition is true, it is possible to explain much of the agricultural development during the Tokugawa period as well as how farm production continued to increase after 1870.

**Hayami and Yamada** provide a clear statement to support the Ohkawa-Rosovsky allegation:

Under the feudal system, peasants were bound to their land, and were, in general not allowed to leave their villages except for pilgrimages to the Ise Grand Shrine or the Zenkoji Temple. Neither were they free to choose what crops to plant, nor to choose what varieties of seeds to sow. Barriers which divided the nation into feudal territories interrupted nationwide communications. Though feudal lords were anxious to raise agricultural productivity within their territories, in many cases they prohibited the export of the improved techniques from their territorial boundaries. Even within the territory of a lord, diffusion was not quite free. It is recorded that a village called Maesawa in Toyama Prefecture placed a guard at its border to prevent exportation of a variety of rice seeds selected in the village.<sup>6</sup>

<sup>4</sup> See Rosovsky, "Rumbles in the Ricefields," pp. 359-60; and Ohkawa, "Phase of Agricultural Development and Economic Growth," in Ohkawa, K., Bruce F. Johnston, and Hiromitsu Kaneda, eds. *Agricultural and Economic Growth: Japan's Experience* (Princeton, 1970), p. 9.

<sup>5</sup> To be fair to Ohkawa, it should be noted that he speaks of increasing sectoral interdependence and contribution of other sectors such as increasing and diversifying the demand for agricultural goods. But the only source of growth Ohkawa and Rosovsky identified clearly and specifically was the technological backlog. Particularly they failed to mention specialization of land and labor as a possible source of growth. See Ohkawa, "Concurrent Growth of Agriculture and Industry," in Roger N. Dixey, ed. *International Explorations of Agricultural Eco-*

*nomics* (Ames, Iowa, 1964), pp. 202-205.

<sup>6</sup> Yujirō Hayami and Saburō Yamada, "Technological Progress in Agriculture," in Lawrence Klein and Kazushi Ohakawa, eds. *Economic Growth: The Japanese Experience Since the Meiji Era* (Chicago, 1968), pp. 143-144. The question is whether border guards succeeded in preventing the smuggling of better seeds. Furthermore, such examples can be construed as proof that some han were bent on acquiring the best technology. The Bakuhan system was not responsible for the slow spread of technology. One has to remember that slow technological diffusion was universal in pre-modern times. An innovation did not travel more than a mile a year even in England on the eve of the First Industrial Revolution.

It is easy, as they have done, to characterize this society as rigid, hampered by countless market restrictions, and to cite, as proof, the decrees (*osadame*) issued during nearly three hundred years by more than two hundred seventy han.

Some Japanese historians have made similar generalizations to the effect that peasants were tied to their land, could not sell their land, and could not raise crops of their own choosing. I have yet to see concrete evidence of this. The historians may have fallen into the trap of assuming that the existent decrees restricting economic activity were, in effect, operative; yet examples have been found of peasants raising crop of their choice and leaving farming for other occupations. When the silk trade created an opportunity for peasants to make money, there was no indication that they were deterred from either going to Yokohama or raising raw silk, even at the cost of neglecting grain farming.<sup>7</sup>

One can of course cite examples in which hans attempted to keep their production techniques and superior rice seeds secret since they were mercantilistic and competitive. But at the same time this mercantilistic attitude prompted each han to ferret out the secrets from others. For agriculture, it is much easier to uncover secrets than to keep them.

Some han tried to restrict the flow of goods in order to be self-sufficient, but not necessarily to keep their technology from spreading to other han. And not every han restricted the movement of goods. For example, Chōshū favored free trade and kept Shimonoseki Port open to all.<sup>8</sup> Some han shared technology with others and also invited Confucian scholars from other parts of the country to serve as economic advisors.

More importantly, the Bakufu's domains (Tenryō) were located geographically in such a way as to enhance the diffusion of technology and interregional trade. The Bakufu's domains were vast, constituting approximately one-fourth of Japan's productive capacity. Its domains were not only concentrated in economically advanced regions but were also scattered all over the country. There are reasons to believe that the Bakufu concerned itself with the national economy and had to favor free interregional trade in order to feed and clothe the huge populations in big cities such as Edo, Osaka, and Kyoto.<sup>9</sup> It is known that the Bakufu attempted to prohibit han from setting up border checkpoints.<sup>10</sup> Furthermore, the Bakufu directly administered strategic places such as Edo, Osaka, Sakai, Hyōgo, and Nagasaki, where new knowledge was likely to originate and where people from all over the country met and spoke freely. These are primary considerations to keep in mind when discussing the diffusion of technology in the Tokugawa period.

---

<sup>7</sup> I came to entertain this view after doing research on life in Tokugawa villages in preparation for my forthcoming book. The manner in which Shibusawa Eiichi's father managed his indigo farm, peasant response to the emergence of a silk and tea trade in the 1860's, and reasons why the young men in Tokugawa villages left for Edo and Osaka in the 19th century, led me to believe that these restrictive decrees were usually dead letters. It should be added that han control over commoners was intact up to the 1870's although the Bakufu's control over the han disintegrated during the

sixties.

<sup>8</sup> Masamichi Yuri, *Shishaku Yuri Kimimasa den* (A biography of Viscount Yuri Kimimasa) (Tokyo, 1940), p. 83.

<sup>9</sup> Shigeaki Yasuoka, *Nihon hōken keizai seisaku shi ron* (A historical study of economic policies during the Tokugawa period) (Tokyo, 1959), pp. 35 and 38.

<sup>10</sup> Yasuzō Horie, *Kinsei nihon no keizai seisaku* (Economic policies of the han during the Tokugawa Period) (Tokyo, 1942), pp. 64 and 113.

Hayami and others are unclear as to what components of the best farming technology were allegedly bottled up in the advanced regions. At one place Rosovsky states that it was neither more intensive use of fertilizer nor improved seed selection but what he calls "better farming techniques" that were largely responsible for the improvement of farming.<sup>11</sup> He must mean that the best farming techniques were bottled up in the advanced regions. But how could the han governments prevent the diffusion of better farming techniques such as soil preparation methods, deep plowing, and better irrigation methods? One must differentiate between agricultural technologies that could be kept secret and those that could not. Anything that may be observed and imitated cannot be kept secret by border guards. For example, deep plowing could not be kept secret even by an army. Checkpoints could hold up innovation that required the transportation of certain things, but it would be extremely difficult to prevent the smuggling of superior seeds when people concealed them in bamboo canes.

A definitive assessment of the way in which farming technology was either blocked or diffused must await far more data than are now available. But several known facts are already at variance with the inferences and presumptions of Hayami and Yamada. The *semba kōki* (thresher) was invented near Osaka around 1700 and used all over the country by the end of the century. Another example is the nationwide adoption of *shinriki*, which boosted the rice output more than any other variety of rice did during the Meiji period.<sup>12</sup> It is interesting to note that *shinriki* was not an old variety bottled up in an advanced area. It was created by an innovative farmer in Hyōgo Prefecture around 1877. By 1886, the high productivity of this variety was well demonstrated and publicized nationally. Nationwide adoption began around the turn of the century with an increase in fertilizer input per area; this variety was noted for its greater response to fertilizer. By 1900, there were additional sources of fertilizers, such as the chemical industry in Osaka and Tokyo and soybean mash from Manchuria.<sup>13</sup>

Intensive use of fertilizer also required deep ploughing, which was met by the adoption of *Kake mochi tate karasuke*. Contrary to what Hayami and Yamada presumed, this superior plow was not bottled up in the high-yielding regions such as Kinki, but was used only in the relatively backward Kumamoto during the Tokugawa period.<sup>14</sup> During the Meiji era, this tool spread to the advanced regions and played an important role in Meiji agricultural progress. Thus, the diffusion of *shinriki* was a complicated process that could not be accounted for by simply spreading the word that *shinriki* was a high-yielding variety of rice.

According to Hayami and others, the best farming technology was bottled up in the high-yielding regions such as the Kinki.<sup>15</sup> But Kinki was the last place that han

<sup>11</sup> Rosovsky, "Rumbles in the Ricefields," p. 358.

<sup>12</sup> *Shinriki* became the predominant variety first in western Japan and then in other regions. Most of the high yielding varieties of rice did not come from the Tokugawa technological backlog but were created after the 1870's. See Yasuda, S., *Meiji iko ni okeru nōgyō gijutsu no hatten* (Development of agricultural technology since Meiji) (Tokyo, 1952), pp. 6-7 and 14.

<sup>13</sup> When Japan secured an imperial foothold in Manchuria after the Russo-Japanese War, the supply

of soybean mash increased. The eras of soybean mash and *Shinriki* use coincided. It is interesting to note that most of the chemical fertilizer plants were located in the Kinki and Tokyo area.

<sup>14</sup> Seiichi Tōbata, et al., "*Nihon nōgyō hattatsushi*" (A history of Japanese agricultural development) (Tokyo, 1954), IV, 233.

<sup>15</sup> Hayami and Yamada, p. 151. The Kinki region presently covers the prefectures of Kyoto, Osaka, Nara, Wakayama, Mie, Hyōgo, and Shiga.

governments could have set up effective artificial barriers. In fact, Kinki actually had fewer checkpoints than other regions.<sup>16</sup> This was particularly true with the Kinai part of the Kinki. The Kinai includes Kobe, Osaka, Nara, and Kyoto; it was the most commercialized region in the country and produced the highest yields of rice and cotton. Cotton productivity in the Osaka–Nara area was more than twice the national average.<sup>17</sup> It was impossible for han governments to establish any kind of artificial barrier or to exercise effective control over their territories in Kinai because the fragmented small land holdings owned by them and the Bakufu were so intermingled. Quite often a single village belonged to several lords and possibly to some lords from outside of the Kinai.<sup>18</sup>

The Bakufu's domains in the Kinai constituted more than a half of the Kinai region. There is little apparent reason why the Bakufu should have prevented the transfer of the best technology between its domains within the Kinai and its more backward possessions elsewhere in the country, as this transfer would only benefit the Bakufu.

Unlike other regions the Kinai had non-castle-town cities and towns, and the han did not exercise political control over these communities. While political control by the han in the Kinai economy was weak, market forces were strong. Merchants carried on business in the Bakufu domains such as Osaka, Kyoto, and Sakai, free from political harassment by the lords and in a fairly free atmosphere provided by the Bakufu.<sup>19</sup> It is inconceivable that artificial barriers established by the han could have been effective in a region where traffic, population density, and commercialization were so great.

**These arguments** suggest that factors other than improved technology may have been responsible for the high yields in Kinki. Probably the most important of these was specialization of land and labor in order to produce certain crops for the market.

Clarification of the relationship between farming technology and land productiv-

<sup>16</sup> Nobujirō Ōshima, *Nihon kōtsū shiron* (A study of Tokugawa Japan's transport) (Tokyo, 1964), pp. 331–332. The Kinai is an historical name meaning an area where the sovereign resides. The Kinai was the birth place of Japan's ancient civilization, as well as its rice and cotton culture. It seems that the Kinai was endowed with favorable and natural factors, as in ancient times natural factors were much more important in determining land productivity than technology. The Kinai is the economic heart of the Kinki region.

<sup>17</sup> Ryūmon sha, ed., *Shibusawa Eiichi denki shiryō* (Collection of biographical materials on the life of Shibusawa Eiichi), 58 vols. (1955–1965), X, 384. See also Noriyoshi Ukita, "Kinai nōgyō no tokushitsu to sono hempō," (The characteristics of the Kinai agriculture) in Minoru Shibata, ed., *Kinki ken* (The Kinki region) (Tokyo, 1969), p. 67.

<sup>18</sup> Noriyoshi Ukita, "Kinsei no Kinai nōson," (The Kinai agriculture during the Tokugawa Period) in Kenjirō Fujioka, ed. *Kinki rekishi jiri kenkyū* (A study of the historical geography of the Kinki) (Tokyo, 1958), pp. 232–236. The official

productive capacity of the two largest han in the Kinai were only 200,000 and 100,000 koku of rice.

<sup>19</sup> Generally speaking, the Bakufu was favorably disposed toward the chōnin in its domains, taxing them very little and relying instead on the land taxes, minting, and currency debasements for its fiscal needs. The Bakufu also protected the chōnin from political harassment by the daimyo. When the daimyo attempted to cheat the chōnin, a law suit ensued, and the Bakufu sided with the chōnin. More importantly, the tenryō was the place where the daimyo marketed their taxes in kind, and where a big share of national spending occurred. Some historians of the Tokugawa period have even claimed that the chōnin took refuge in the tenryō. For these views see Yosaburō Takekoshi, *Nihon keizai shi* (An economic history of Japan), 8 vols. (Tokyo, 1925), Vol. 1, pp. 312–313; Yotarō Sakudō, *Kinsei nihon no kahei shi* (A history of the Tokugawa currency) (Tokyo, 1958), pp. 144–170; Aizan Yamaji, *Gendai kinken shi* (The power of the modern businessmen) (Tokyo, 1908), p. 30.

ity is in order. The term, "farming technology," is probably best defined as that fund of farming experience and usage of inputs which will increase land productivity.<sup>20</sup>

Ohkawa and Rosovsky have clearly overlooked the relationship between specialization and productivity. Their comments are very vague as to whether the best farming technology was associated with a certain crop and cropping system, or with the cultivation of a variety of crops. Farmers who specialize in the use of their land and labor will have higher yields than those who do not, even if both share the same technology. But specialization is practical only where a high degree of commercialization and a well-functioning market system have developed. It is risky for a small farmer to specialize in commercial crops without a highly developed market system by which both farmers and city-dwellers can easily obtain foodgrains. If small farms can purchase grain, fertilizers, and seeds from urban markets and can depend upon a steady supply of these goods at prices they can afford to pay over long periods, they will be encouraged to specialize in commercial crops which cities are eager to buy. More family farms can then become dependent on markets to provide food in quantities sufficient to support their families over the farming cycles.

There is no question that of all the regions of Japan, the Kinai area was best suited to specialization and that a high degree of specialization and commercialization prevailed there. The Kinai had a high population density and contained many large cities which served as junction points and market centers. The Kinai centered around Osaka (400,000 persons), extended to Kyoto (400,000), and included such cities as Sakai (50,000), Fushimi (30,000) Hyōgo (20,000), and Nara. Osaka and Kyoto formed a commercial and financial complex which served as collection and distribution centers for commodities produced throughout the country. Kinai's large supply of high-grade rice enabled it to become the major center of wine production, producing nationally known brands of sake which were shipped to Edo. As a farming region, it produced the major crops of cotton, oilseeds, and vegetables, and one-third of Japan's cotton output.<sup>21</sup>

Double cropping was the rule and the use of commercial fertilizers was widespread. It is no wonder, then, that Osaka became the chief center for numerous wholesale fertilizer dealers. Kinai was able to raise commercial crops such as cotton because its huge population and the production of sake and oilseeds provided the region with such fertilizers as manures, sake mash, and oil mash. The main supply, fish fertilizers, was shipped all the way from Hokkaido to the Kinki via Shimonoseki, bypassing most of the northeast region where there was little specialization and commercialization. While fishermen from the Kinki did fish off Tokyo Bay to supply fish fertilizers to the Kinki, only the immediate areas surrounding Edo used commercial fertilizers because the areas raised vegetables.<sup>22</sup> Thus, what really

<sup>20</sup> Some examples are high-yield seeds, knowledge of when best to plant them, knowledge of how to prepare the soil, most productive tools, etc. Unlike industrial technology, the transferability of farming technology is limited: what is best for farmers of one region is not necessarily the best for farmers in another locale. The best time to sow will vary from region to region; crops will

be subject to different diseases and pests.

<sup>21</sup> Tōichi Nawa, *Nihon bōsekiyō no shiteki kenkyū* (A historical study of the Japanese cotton spinning industry) (Tokyo, 1948), pp. 56-57.

<sup>22</sup> Toshio Furushima, *Nihon nōgyō gijutsu shi* (A history of farming technology) (Tokyo, 1946), II, pp. 547-571.

prompted the farmers to use commercial fertilizers was not the knowledge that they would increase yield, but their specialization in commercial crops.

Thus, the high yield in the Kinai can be explained largely on the basis of the extensive commercialization and farming specialization there. If this argument is valid, it is quite likely that the alleged rapid rise in Meiji land productivity can be attributed chiefly to accelerated commercialization and specialization, brought about by the coming of railroads, the commutation of the land taxes, the great inflation (1877-1881), and general changes in demand.<sup>23</sup> The role of technological progress could have been very modest as this process took place. Crawcour has already expressed certain misgivings about the alleged contribution of technological progress to Meiji land productivity.<sup>24</sup>

The claim that the Bakufu han system effectively blocked the diffusion of technology not only is without factual substance but also, and more importantly, ignores the many changes that facilitated, rather than blocked, the diffusion of technology: increased urbanization, the growth of national markets, and improvements in communication and transportation, changes brought about principally by the operation of the Sankin Kōtai system. Under this system, the daimyo had to make costly trips every other year between Edo and their han; some of these trips took a month, with a retinue of more than a thousand.<sup>25</sup>

<sup>23</sup> As the land taxes were commuted from 1871, farmers were given freedom of choice in using their land and labor but were subjected to market discipline. In the past, agricultural products were marketed in Osaka and Edo by han, but with the commutation of taxes farmers had to sell their products. Consequently, there appeared local and regional markets.

The great inflation accelerated monetization and commercialization of the Meiji economy. One could argue that by the end of the inflation the Meiji economy had undergone a "commercial revolution." The rising farm prices in conjunction with the new land tax system (*chisō kaisei*) must have stirred entrepreneurship in agriculture. All in all, these changes accelerated commercialization and specialization which had been going on since the middle of the 19th century.

As everyone knows, market size defines the degree of specialization. The building of the railroad network during the Meiji period greatly expanded the markets for farm products, including rice. In addition, improvements and changes in lifestyle prompted farmers to specialize further. Farmers in Aomori Prefecture began to raise apples for distant markets partly because the Japanese began to eat apples, and partly because the railroads could transport apples to distant markets at reasonable costs. The rise in per capita income gave rise to the confectionary, shōyu-miso, and beer industries. The rise of such industries created a demand for wheat and soybean which, in turn, induced farmers to specialize in them. Without providing direct evidence, they allege that technological diffusion was accelerated with the Meiji

Revolution. I am in agreement although I do disagree with their statements on the extent and causes of acceleration. The acceleration after the Meiji Revolution was caused not so much by the disappearance of the feudal barriers as by the development of the railroad. The railroad increased factor mobility, as well as fertilizer distribution and population movement. People simply traveled more than ever before. This must have enhanced technological diffusion, although I have no direct evidence to indicate the extent. I also feel that market expansion, like free trade, introduces competition which, in turn, prompts farmers to adopt the best technology. These points of views can be supported by Tetsudō In, ed. *Hompo tetsudō no shakai oyobi keizai ni okeru eikyō* (Economic and social effects of the railroads) (Tokyo, 1916), Vol. 2.

<sup>24</sup> In this excellent article, differing from Ohkawa and Rosovsky, he indicates an increase in the labor input during the Meiji era. See E. Sydney Crawcour, "Japan, 1868-1920," in Richard T. Shand, ed. *Agricultural Development in Asia* (Berkeley, 1969), p. 16.

<sup>25</sup> The size of the official retinue and the trips' duration varied from daimyo to daimyo depending on their status and location. As late as the 1850's, a daimyo with only 100,000 koku domain made the Sankin kōtai trip with a retinue of several hundred. Once a lord of Chōshū made the trip with a retinue of two thousand, taking a month. See Kamekichi Takahashi, *Nihon kindai keizai keisei shi* (The formation of Japan's modern economy) (Tokyo, 1968), I, pp. 46-50.



As a result of the demands of the Sankin kōtai system, Japan came to develop a superior highway system, particularly the Five Highways that were praised by a Dutch envoy. In addition, nature favored inexpensive waterways between Edo and Shimonoseki along the Pacific coast. A rapid messenger service (*hikyaku*) was also developed. When Perry came to Japan, the han offices in Edo relayed the news quickly via messenger service to their han. The Sankin kōtai system served as a sensitive national nervous system through which new knowledge and new products could be disseminated around the country.<sup>26</sup> For example, upon their return to the han, daimyo and their retainers brought home Maoka raw cotton and cotton cloth famed for its excellent quality.<sup>27</sup> One can infer that the best seeds were similarly diffused around the country.

The Sankin kōtai system not only increased travel but it also required that the daimyo spend every other year in Edo and keep their heirs and wives in Edo permanently as hostages. Consequently, the daimyo maintained at least three huge mansions, in addition to offices, simple dwellings, warehouses, and even a han school. One estimate is that about 15 percent of han officials were stationed in Edo. Some han seem to have kept a permanent staff of several thousand retainers in Edo to serve the daimyo and their ladies; merchants and artisans congregated there as well.<sup>28</sup> By the late eighteenth century, Edo, with a population of one million, became the largest city in the world.

As the daimyo and samurai settled in urban centers they became travelers and needed cash. Edo living styles gradually became opulent and consumption behavior became marked by a competitive display of luxury goods. According to Yamagata Bantō (1784-1821), a daimyo with a 10,000 koku domain lived as if he had a 100,000 koku domain.<sup>29</sup> The daimyo and high officials in Edo held parties to entertain the high officials of the Bakufu. City merchants catered to the consumer demands of the daimyo and their ladies by supplying them with luxuries unimaginable in their han, and when big fires swept Edo, business boomed for lumber and construction firms.<sup>30</sup>

In addition to this conspicuous consumption, the requirements of the Sankin

<sup>26</sup> Shimazaki Tōson (1872-1943), in his long historical novel, *Yoake mae* (Before the dawn) (Tokyo, 1936) gives a very vivid picture of the Sankin kōtai system. He shows how it served as a sensitive national nerve system and stimulated the Tokugawa economy. This novel has great historical value as it was based on the records of his family, which had been for generations station masters on the Sankin kōtai highway. In accounting for the First Industrial Revolution it is often cited that England was blessed with inexpensive waterways and that no point in England was further than seventy miles from the coasts. One can say almost the same about Tokugawa Japan.

<sup>27</sup> Taichi Kenkawa, *Hompō menshi bōseki shi* (A history of the Japanese cotton spinning industry), 5 vols. (Tokyo, 1937-1941), II, p. 259.

<sup>28</sup> Takahashi, I, pp. 46-58. One of the Mito han's compounds covered 400 acres, while a small han's compounds covered four acres. Owari han

maintained 600 dwellings in Edo. See *Yoake mae*, II, p. 195. Honjō states that the sankin kōtai expenses often constituted 70% of the han's budgets, and that the han usually stationed about 20% of its officials in Edo. See Eijirō Honjō, *Bakumatsu no shin seisaku* (New policies during the end of the Tokugawa Period) (Tokyo, 1940), p. 145. The size of these compounds and their grandeur depended on a daimyo's status and vanity.

<sup>29</sup> Bantō Yamagata, "Yume no shiro," in Seiichi Takimoto, ed. *Nihon keizai sōsho* (Library of Tokugawa economic writings) (Tokyo, 1914-1917), XXV, pp. 322-323. Yamagata was one of the two leading chōnin-scholars in Osaka and wrote extensively on the economic and financial problems of his day. "Yume no shiro" is his major work.

<sup>30</sup> Here one is reminded of Sombart's thesis that luxury gave birth to capitalism. See Werner Sombart, *Luxury and Capitalism*, tr. W. R. Dittmar (Ann Arbor, Michigan, 1967), p. 114.

kōtai system cost the daimyo more than 50 percent of the han budget and plunged them into debt.<sup>31</sup> Japanese thrift and propensity to save are often cited to account for their success in economic development. But this institutional pressure of spending on the daimyo, who commanded a large share of the Tokugawa economy's production, greatly promoted economic development.<sup>32</sup> The Sankin kōtai spending was "waste," but such waste particularly simulated the Tokugawa economy to expand and develop. The conspicuous consumption and other Sankin kōtai expenditures required specie, since most of the spendings had to be done in the Bakufu domains. To the daimyo, the specie required growing more marketable agricultural products for Osaka and Edo. Also, economic development then meant the development of agriculture and of industries dependent on agricultural products as inputs. Thus, the Sankin kōtai indirectly created the impetus to import new crops, better crops, and more effective production techniques.

The institutional pressure to spend induced the daimyo, who were competitive and emulative, to strive for increased production, particularly of specialty goods. Han governments promoted the production of commercial crops such as wax, varnish, silk, sugar, cotton, and indigo. Himeji han became noted for its fine cotton, the production of which was encouraged by han government. Takamatsu han increased sugar production to sell in Osaka after austerity and borrowing failed to solve its financial difficulties. The lord of Yonesawa han encouraged horticulture by planting mulberry trees brought from Sendai han.<sup>33</sup>

The han governments became more mercantilistic than ever before. The statement of Murata Seifū (1783-1855), the author of the Chōshū han Tempō Reform, is quite telling:

The first principle of finance is to sell all the goods produced in Chōshū to other

<sup>31</sup> This view is widely held by writers of today as well as by Tokugawa writers. Today's writers include Honjō Eijirō, Tsuchiya Takao, and Yamaguchi Kazuo. Many Confucian scholars observed that the Sankin kōtai, the resultant urbanization, and the rise of a money economy plunged the daimyo into debt. Their writings are collected in *Nihon keizai sōsho*, 36 vols. It is essential to read the following works in order to understand the Tokugawa economy: "Seidan" by Ogyū Sorai (1666-1728), "Keizai roku" by Tazai Shudai (1680-1747), "Keizai dan" by Kaiho Seiryō (1755-1817), "Saitei no ho" by an unknown author, and "Yume no shiro." They are to be found in *Nihon keizai sōsho*, Vols. 3, 6, 18, 21, and 25.

<sup>32</sup> It is very difficult to document the fact that Tokugawa agricultural production increased extensively enough to create a surplus. Even Ohkawa, who thinks that the agricultural output did not increase significantly, states that a high surplus was created by unequal distribution of income, caused by the fact that the daimyo and their retainers, who constituted only about 7% of the population, taxed their peasants heavily. Japanese historians generally agree that peasants were exploited, since the tax rates ranged from 40 to 60%. However, it is im-

possible to estimate in reality the percentage of daimyo and retainer shares since it is very unlikely that what the peasants paid as taxes constituted such high percentages of what they actually produced annually. The Bakufu and the han governments also issued currencies which must have given them additional command over real goods via inflation. The fact that the daimyo taxed more than one fourth of the land outputs indicates the degree of the daimyo's grip on farmers. This high capacity to tax is one of the favorable factors that the Meiji government inherited. One wonders how Tokugawa political authorities could tax so much if the per capita income had been as low as suggested by Kuznets and others.

<sup>33</sup> Masana Maeda, "Kōgyō iken" (How to develop the Meiji economy) in *Meiji zenki zaisei keizai shiryō shūsei* (Collection of early Meiji financial and economic data), ed. Hyōe Ōuchi and Takao Tsuchiya, (Tokyo, 1931), XVIII, pp. 112-126. In many cases han were responsible for maintaining high quality of craftsmanship and products. After the Meiji Restoration, the quality of rice deteriorated in some localities as han government disappeared. See Yasuda, p. 16.

han in exchange for gold and silver and not to let any gold or silver produced in Chōshū go out of the han.<sup>34</sup>

What is really important is that while individual han may have been concerned solely with their own economy, their drive for more exports and specie resulted in expanding interregional trade and overcoming artificial and natural barriers. The volume of this interregional trade may be gauged by the two great national market centers, Osaka and Edo, which owed their growth to the Sankin kōtai system. About three million koku of rice, roughly 10 percent of the total rice crop, found its way into each of these two cities.<sup>35</sup> An even higher percentage of other commercial crops was collected there and then redistributed to the rest of the country. An estimated three-fourths of the three million koku of rice was marketed there by the han and the Bakufu. One-third of the total cotton output was shipped to Osaka and then distributed to other areas of the country.<sup>36</sup>

Because expansion of interregional trade results in the expansion of demand and higher prices, growth of trade makes innovations economically viable and speeds up the introduction of commercial fertilizers to the more remote areas. This development also stimulates merchants to attempt to diffuse improved technology.

**This essay** suggests the following tentative conclusions: autonomous and competitive han, driven by necessity, served as the major engines of agricultural development, stimulating interregional trade and diffusing rather than obstructing the diffusion of farming technology<sup>37</sup>; land productivity in areas like the Kinki rose considerably more than in other areas because farmers applied more labor to the land and specialized in certain crops for the market; the process of commercialization further stimulated farming specialization, particularly around growing cities. It seems, too, that the widespread use of commercial fertilizers was promoted by commercialization and specialization.

<sup>34</sup> Albert Craig, *Chōshū in the Meiji Revolution* (Cambridge, 1961), p. 30.

<sup>35</sup> The usual view among Japanese writers is that about 3 million koku of rice was marketed in Edo and Osaka, respectively. See Yamaguchi Kazuo, *Nihon keizai shi* (An economic history of Japan) (Tokyo, 1968), p. 63; Toshio Furushima, *Kinsei nōgyō no tenkai* (Agricultural development in Tokugawa Japan) (Tokyo, 1963), p. 62. However, Dohi Noritaka gives the figure of less than two million koku as the volume of rice marketed in Osaka about 1818–1829. In any case the volume of goods collected and distributed from Osaka constituted a large percentage of the total. I am inclined to feel that the combined market power of Osaka and Edo equalled that of London in the 18th century.

<sup>36</sup> Yamaguchi, p. 34.

<sup>37</sup> In my article, "Tokugawa Feudalism and the Emergence of the New Leaders of Early Modern Japan," *Explorations in Entrepreneurial History*, IX, no. 2 (1956), I initially put forward the thesis that Tokugawa feudalism contained a built-in mechanism. This mechanism was analogous to the price

mechanism under competitive yet oligopolistic conditions; Tokugawa feudalism contained particularly a ready-to-respond mechanism. I elaborate this thesis in my forthcoming book. The allegation that the Bakufu system effectively blocked technological diffusion implies a certain growth mechanism for the Tokugawa economy. I find it extremely difficult to use this explanation to account for the most unique characteristics concerning Meiji's modern economic growth. These characteristics are not the growth rates of the Meiji economy as much as the fact that Japan entered almost "instantly" the modern economic growth process (1885–1890), even ahead of some European countries. Events in Japan moved quickly from an initial acceptance of Western trade to a national commitment to development in 1871, and subsequently to the beginning of modern economic growth. If modern economic growth in Japan had started only in the twentieth century, then the kind of growth mechanism that the Tokugawa economy might have had and the entire Tokugawa period would only be of historical interest to students of economic development.

The further rise in Meiji land productivity can be largely explained by the accelerated commercialization and specialization after the Meiji Revolution. Thus, Meiji agriculture developed while receiving from and giving stimuli to the industrial and commercial sectors.<sup>38</sup> These relationships, if they are valid, call for a re-examination of the mechanism by which agricultural output rose after the 1870's and a reevaluation of the Tokugawa economy's contribution to Meiji economic development.

---

<sup>38</sup> This point fits more properly with the concurrent growth theory than does the proposition that a single input, indigenous farming technology, was responsible for the rise in Meiji land productivity. If one cites specialization and diffusion of

indigenous technology as the two sources of growth in land productivity, then it is much easier to explain the allegation that Meiji agricultural output increased with little additional capital, land or labor.