

China

Maddison (1998a) contains an extensive analysis of the course of population, total output, and per capita product over the past 2000 years. There is a greater mass of survey material on Chinese population for the past two millennia than for any other country, thanks to the bureaucratic system and its efforts to monitor economic activity for tax purposes.

In assessing the growth of agricultural output, Perkins (1969) is a masterpiece of scholarly endeavour, covering the period 1368–1968, on which I relied heavily. Perkins' analysis is basically Boserupian. He feels that China responded successfully to population pressure, and managed to sustain more or less stable per capita consumption over the period he covers. This was achieved by increases in cultivated area, in per capita labour input, and land productivity. It involved heavy inputs of traditional fertilisers, irrigation, development of crop varieties and seeds which permitted multiple cropping, diffusion of best-practice techniques by officially sponsored distribution of agricultural handbooks (available at an early stage due to the precocious development of paper and printing). Crops from the Americas were introduced after the mid-sixteenth century. Maize, peanuts, potatoes and sweet potatoes added significantly to China's output potential because of their heavy yields and the possibility of growing them on inferior land. Tobacco and sugar cane were widely diffused in the Ming period. The pattern of Chinese food consumption was heavily concentrated on proteins and calories supplied by crop production which makes more economic use of land than pastoral activities. Chinese consumption of meat was very much lower than in Europe and concentrated on poultry and pigs which were scavengers rather than grazing animals. Milk and milk products were almost totally absent. Chinese also made very little use of wool. Ordinary clothing came largely from vegetable fibres (hemp, ramie, and then cotton). Quilted clothing supplied the warmth that wool might have provided. The richer part of the population used silk. Silk cocoons were raised on mulberry bushes often grown on hillsides which were not suitable for other crops.

Chinese rural households had many labour-intensive activities outside farming. They raised fish in small ponds, used grass and other biomass for fuel. Important "industrial" activities were centred in rural households. Textile spinning and weaving, making garments and leather goods were largely household activities. The same was true of oil and grain milling; drying and preparation of tea leaves; tobacco products; soybean sauce; candles and tung oil; wine and liqueurs; straw, rattan and bamboo products. Manufacture of bricks and tiles, carts and small boats, and construction of rural housing were also significant village activities. Chinese farmers were engaged in a web of commercial activity carried out in rural market areas to which virtually all villages had access. All these non-farm activities appear to have intensified in the Sung dynasty (960–1280). Thereafter some proportionate increase seems plausible because of the growing importance over the long term of cash crops like cotton, sugar, tobacco and tea. In the nineteenth century well over a quarter of GDP came from traditional handicrafts, transport, trade, construction and housing and most of these were carried out in rural areas. It seems likely that their proportionate importance was just as large in 1500 as it was in 1820.

On the basis of Rozman's (1973) rough estimates, it would seem that there were no dramatic changes in the proportion of the urban population (persons living in towns with a population of 10 000 or more) in China between the Tang dynasty and the beginning of the nineteenth century. This is in striking contrast to the situation in Western Europe, and is a significant piece of corroborative evidence of the comparative performance of China and Europe.

Another type of evidence which is very useful is the detailed documentation and chronology of Chinese technology in Needham's *magnum opus* on Chinese science and civilisation. Although it is weak in analysing the economic impact of invention, it is an invaluable help in assessing comparative development in agriculture, metallurgy, textile production, printing, shipbuilding, navigation etc. and in its assessment of Chinese capacity to develop the fundamentals of science.

The big advance in Chinese land productivity, and the more modest advance in living standards came before the period we are examining here. The big shift from wheat and millet farming in North China, to much more intensive wet rice farming south of the Yangtse came in the Sung dynasty (tenth to thirteenth century). The evidence strongly suggests that per capita GDP stagnated for nearly six centuries thereafter although China was able to accommodate a large rise in population through extensive growth.

India

Maddison (1971) contained an analysis of the social structure and institutions of the Moghul Empire and of British India. For the Moghul period, I relied heavily on the economic survey of Abul Fazl, Akbar's vizier, carried out at the end of the sixteenth century (see translation by Jarrett and Sarkar, 1949). I had no firm conclusions on the growth rate from 1500 to 1820, but there was little evidence to suggest that it was a dynamic economy. There is no reason to think that the British takeover had a positive effect on economic growth before the 1850s.

The Cambridge Economic History of India, Vol.1 (Raychaudhuri and Habib, 1982) does not address the growth question very directly, and deals with India by major area, without trying to generalise for the country as a whole. Habib suggests that farm output per head of population may have been higher in 1595 than in 1870, or 1900, and bases this inference on the availability of more cultivatable land per head at the earlier period and apparently greater relative availability of bullocks and buffaloes as draft animals. On the other hand he also stresses the introduction of new crops in the seventeenth and eighteenth centuries. He is more upbeat about manufacturing: "The expansion of the domestic and foreign markets, and the rising public expenditure on urban developments, public monuments and the army suggest an upward trend in output and possibly labour productivity." (p. 305)

Shireen Moosvi (1987, p. 400) assumes that rural per capita consumption was about the same in 1601 as in 1901, but that urban income was bigger at the earlier date. She therefore assumes an aggregate per capita consumption level 5 per cent higher at the first date. Moreland (1920, p. 274) using the same sort of evidence as Habib and Moosvi, but with less intensive scrutiny, concluded that India was almost certainly not richer at the death of Akbar than in 1910–14, "and probably that she was a little poorer".

My own judgement is that Indian per capita income fell from 1700 to the 1850s due to the collapse of the Moghul Empire and the costs of adjusting to the British regime of governance (see analysis in Chapter 2).

Japan

There are no previous estimates of the long term macroeconomic performance of Japan before the Meiji Restoration of 1868. However, one can get some idea of what happened by comparing Japanese and Chinese experience.

In the seventh century, Japan tried to model its economy, society, religion, literature and institutions on those of China. Admiration for things Chinese continued until the eighteenth century, even though Japan was not integrated into the Chinese international order (with two brief exceptions) as a tributary state. However, Japan never created a meritocratic bureaucracy but let the effective governance of the country fall into the hands of a hereditary and substantially decentralized military elite. The institutional history of Japan from the tenth to the fifteenth century therefore had a closer resemblance to that of feudal Europe than to that of China.

Japan copied the institutions of Tang China in the seventh century, creating a national capital at Nara, on the model of China's Chang-an. It also adopted Chinese style Buddhism, and allowed its religious orders to acquire very substantial properties and economic influence. It adopted Chinese

ideograms, the kanji script, Chinese literary style, Chinese clothing fashions, the Chinese calendar, methods of measuring age and hours. There was already a substantial similarity in the cropping mix and food consumption, with a prevalence of rice agriculture, and much smaller consumption of meat and meat products than in Europe. There was greater land scarcity in Japan and China than in Europe or India, so the agriculture of both countries was very labour-intensive.

Although Japanese emperors continued to be nominal heads of state, governance fell into the hands of a hereditary aristocracy. From 1195 to 1868, the effective head of state was a military overlord known as the *shogun*.

From the seventh to the ninth century, the central government controlled land allocation in imitation of Tang China, but ownership gradually devolved on a rural military elite. The *shoen* was a complex and fragmented feudal system. Many layers of proprietors claimed a share of the surplus from a servile peasantry.

Technological progress and its diffusion were facilitated in China by its bureaucracy to a degree which was not possible in Japan, which had no educated secular elite. Knowledge of printing was available almost as early as in China, but there was little printed matter except for Buddhist tallies and talismans. The Chinese, by comparison, used printed handbooks of best-practice farming to disseminate the methods of multicropping, irrigation and use of quick ripening seeds which the Sung dynasty imported from Vietnam. The degree of urbanisation was smaller in Japan than in China. The division of Japan into particularistic and competing feudal jurisdictions meant that farming and irrigation tended to develop defensively on hillsides. The manorial system also inhibited agricultural specialisation and development of cash crops.

Whilst the Chinese had switched from hemp to cotton clothing in the fourteenth century, the change did not come in Japan until the seventeenth. Until the seventeenth century, Japanese production of silk was small, and consumption depended on imports from China. Shipping and mining technology remained inferior to that in China until the seventeenth century. Rural by-employments were slower to develop than in China.

The old regime collapsed in Japan after a century of civil war (*sengoku*) which started in 1467. The capital city, Kyoto, was destroyed early in these conflicts, with the population reduced from 400 000 to 40 000 by 1500. A new type of regime emerged from the wreckage, with a new type of military elite.

Tokugawa Ieyasu established his shogunal dynasty in 1603, after serving two successive military dictators, Nobunaga (1573–82) and Hideyoshi (1582–98) who had developed some of the techniques of governance which Ieyasu adopted (notably the demilitarisation of rural areas, the *kokudaka* system of fiscal levies based initially on a cadastral survey, the reduction in ecclesiastical properties, and the practice of keeping *daimyo* wives and children as hostages).

The Tokugawa shogun controlled a quarter of the land area directly. The imperial household and aristocracy in Kyoto had only 0.5 per cent of the fiscal revenue, the Shinto and Buddhist temple authorities shared 1.5 per cent. A third was assigned to smaller *daimyo* who were under tight control. The rest was allocated to bigger more autonomous (*tozama*) *daimyo* in rather distant areas who were already feudal lords before the establishment of the Tokugawa regime. These were potential rivals of the shogunate and eventually rebelled in the 1860s. But the shogun in fact held unchallenged hegemonial power after 1615 when he killed Hideyoshi's family and destroyed his castle in Osaka. The Tokugawa shoguns neutered potential *daimyo* opposition by keeping their families hostage, and their incomes precarious (between 1601 and 1705, "some 200 *daimyo* had been destroyed; 172 had been newly created; 200 had received increases in holdings; and 280 had their domains transferred" — Hall, 1991 (pp. 150–1). The shogun's magistrates directly administered the biggest cities (Edo, Kyoto, Osaka and some others), operated as the emperor's delegate, controlled foreign relations and the revenue from gold and silver mines.

The Tokugawa shogunate was not ideal for economic growth or resource allocation but it exercised a more favourable influence than the Kamakura (1192–1338) and Ashikaga (1338–1573) shogunates which preceded it. It initiated a successful process of catch-up and forging ahead. Between 1600 and 1868 Japanese per capita income probably rose by about 40 per cent, moving from a level below China, to a significantly higher position, in spite of the heavy burden of supporting a large and functionally redundant elite.

The Tokugawa established a system of checks and balances between the leading members of the military elite (*daimyo*) who had survived the civil war. It ensured internal peace on a lasting basis. Rural areas were completely demilitarised by Hideyoshi's 1588 sword hunt and the Tokugawa government's gradual suppression of the production and use of Western type firearms which the Portuguese had introduced in 1543.

The *daimyo* and their military vassals (the *samurai*) were compelled to live in a single castle town in each domain, and abandon their previous managerial role in agriculture. As compensation they received stipends in kind (rice), which was supplied by the peasantry in their domain. *Daimyo* had no fixed property rights in land and could not buy or sell it. The shogun could move *daimyo* from one part of the country to another, confiscate, truncate or augment their rice stipends in view of their behaviour (or intentions as determined by shogunal surveillance and espionage). *Daimyo* were also required to spend part of the year in the new capital Edo (present day Tokyo), and to keep their families there permanently as hostages for good behaviour. *Daimyo* were not required to remit revenue on a regular basis to the shogunal authority, though they had to meet the very heavy costs of their compulsory (*sankin kotai*) residence in Edo and respond to ad hoc demands for funds for constructing Edo and rebuilding it after earthquake damage.

This system of government was very expensive compared with that of China. The shogunal, *daimyo* and samurai households were about 6.5 per cent of the Japanese population, compared with 2 per cent for the bureaucracy, military and gentry in China. Fiscal levies accounted for 20–25 per cent of Japanese GDP compared with about 5 per cent in China, though the Chinese gentry had rental incomes and the Chinese bureaucracy had a substantial income from non-fiscal exactions. The Tokugawa did, however, achieve some savings by a very substantial reduction in Buddhist income and properties. They also made an ideological shift away from religion towards neo-confucianism. In both respects they were replicating changes which occurred in China in the ninth century.

The economic consequences of these political changes were important for all parts of the economy.

Growth of Farm Output in the Tokugawa Period

The farm population were no longer servile households subjected to arbitrary claims to support feudal notables and military. Rice levies were large but more or less fixed and fell proportionately over time as agriculture expanded. The ending of local warfare meant that it was safer to develop agricultural land in open plains. There was greater scope for land reclamation and increases in area under cultivation. This was particularly true in the previously underdeveloped Kanto plain surrounding the new capital Edo.

Printed handbooks of best practice agriculture started to appear on Chinese lines. *Nogyo Zensho* (Encyclopaedia of Farming, 1697) was the earliest commercial publication, and by the early eighteenth century there were hundreds of such books (see Robertson, 1984). Quick ripening seeds and double cropping were introduced. There was increased use of commercial fertiliser (soybean meal, seaweed etc.), and improvement in tools for threshing. There was a major expansion of commercial crops — cotton, tobacco, oil seeds, sugar (in South Kyushu and the Ryuku islands), and a very substantial increase in silkworm cultivation. Large scale land reclamation was initiated in the 1720s — partly financed by merchants.

Some idea of the progress of agricultural production in Tokugawa Japan can be derived from the *kokudaka* cadastral surveys initiated by Hideyoshi between 1582 and 1590. They assessed the productive capacity of land in terms of *koku* of rice equivalent (i.e. enough to provide subsistence for one person for a year). The *koku* as a volumetric measure equivalent to 5.1 US bushels or to 150 kilograms in terms of weight. This *kokudaka* assessment was the basis on which the shogun allocated income to *daimyo*. The smallest *daimyo* were allocated 10 000 *koku*, the biggest got much larger allocations (over a million *koku* in the Kaga domain at Kanazawa on the Japan Sea coast, 770 000 for the Satsuma domain in Southern Kyushu). In 1598, the total was estimated to be 18.5 million. The official estimate increased over time, as the cultivated area increased, but there were substantial and varying degrees of mismeasurement of the aggregate. Craig (1961, p. 11) gives examples of the difference between nominal and actual productive capacity for the late Tokugawa period; the actual yield for the 9 domains he specifies was one third higher than the official assessment. Nakamura (1968) made an estimate of cereal production for 1600 to 1872 which was adjusted to eliminate these variations in coverage of the official statistics. Table B–17 shows that cereal output per capita increased by 18 per cent from 1600 to 1820, and probably by a quarter over the Tokugawa period as a whole. In 1874, rice and other cereals were 72 per cent of the value of gross farm output, other traditional products 10.7 per cent, and relatively new crops (cotton, sugar, tobacco, oil seeds, silk cocoons and potatoes) 17.2 per cent. Most of the latter were absent in 1600 and most of these escaped taxation, so their production grew faster than cereals. If one assumes that these other items were about 5 per cent of output in 1600, this would imply a growth of total farm output per capita of about a quarter from 1600 to 1820, and over 40 per cent for the Tokugawa period as a whole. For the period before 1600 there is no real quantitative evidence, but it seems likely that there was little growth in agricultural output per head in the sixteenth century which was so severely plagued by civil war.

Table B–17. Japanese Cereal Production and Per Capita Availability, 1600–1874

	Cereal Production		Population	Per Capita Availability
	(000 <i>koku</i>)	(000 metric tons)	(000)	(kg)
1600	19 731	2 960	18 500	160
1700	30 630	4 565	27 000	169
1820	39 017	5 853	31 000	189
1872	46 812	7 022	34 859	201
1874	49 189	7 378	35 235	209

Source: First column for 1600–1872 from Hayami and Miyamoto (1988), p. 44; with 1820 derived by interpolation of their figures for 1800 and 1850. Their estimates were derived from Satoru Nakamura (1968), pp. 169–171. 1874 cereal production from Ohkawa, Shinohara and Umemura (1966), volume 9, *Agriculture and Forestry*, p. 166, with an upward adjustment of rice output by 1 927 *koku* — see Yamada and Hayami (1979), p. 233. In 1874, adjusted cereal output represented 72 per cent of the value of gross agricultural output at 1874–6 prices, other traditional crops 10.8 per cent, and other crops 17.2 per cent (see vol. 9, p. 148). The latter group consisted of industrial crops, potatoes and sericulture, most of which were unimportant in 1600. It seems highly likely therefore that per capita farm output rose more rapidly than cereal output. Col. 2, *koku* (150 kg.) converted into metric tons. Col. 3 is my estimate of population from Table B–7. Col. 4 equals col. 2 divided by col. 3. The standard production measure in Tokugawa Japan was in terms of husked rice, whereas in China the standard unit was unhusked rice. Perkins (1969) assumed a per capita availability of 250 kg. of unhusked rice for China in the period shown here. Using Perkins' (1969, p. 305) coefficient, this meant a per capita availability of 167 kg. of husked rice — higher than Japan in 1600, but lower from 1700 onwards. In 1872, Japan had net imports of rice which raised per capita availability to 219 kg, and in 1874 to 231 kg.

Performance in the Non-Farm Sector

Most analysts of the Tokugawa period (Smith, 1969; Hanley and Yamamura, 1977; Yasuba, 1987) stress the growing importance of industrial and commercial by-employments in rural areas.

Smith (1969) produced the classic analysis of rural non-farm activity, drawing on a 1843 survey of 15 districts of the Choshu domain. Komonoseki county had a population of 6501 families in a region at the extreme south of Honshu, with a big coastline projecting into the inland sea between Kyushu and Shikoku — an area particularly advantageous for trade with other parts of Japan. 82 per cent of the population were farmers, but 55 per cent of net income originated outside agriculture. The arithmetic average of Smith's district ratios suggests that industry produced nearly 28 per cent of family income. I am skeptical of the representativity of the Kaminoseki sample. If it were typical of all rural areas, and urban areas had a proportionately greater commitment to non-agriculture, one could expect over 30 per cent of late Tokugawa GDP to have been derived from industry.

Nishikawa (1987) presents a much more sophisticated and comprehensive account of the Choshu economy in the 1840s. Using the same survey material he constructed a set of aggregate input-output accounts. His analysis covers 107 000 households (520 000 population) including both rural and urban areas, i.e. a sample 16 times bigger than Smith's. His approach is in the national accounting tradition with careful consistency checks, merging of different data sources to estimate the labour force, gross output and value added by economic sector. On a value added basis, manufacturing (including handicrafts) accounts for 18.8 per cent of his aggregate. However, he points out that the survey data were seriously deficient for output. His aggregate therefore excludes *daimyo-samurai* military and civil government services, the activity of monks, nuns, priests and servants, urban services "concentrated in 'entertainment' such as inns, restaurants, teahouses, brothels, streetwalking, hair-dressing, massage and so forth". There is no imputation for residential accommodation. The construction sector is also omitted. If we augment Nishikawa's aggregate by a quarter to include the omitted items and bring it to a GDP basis, the structure of value added in Choshu in the 1840s would have been 53 per cent for agriculture, forestry and fisheries, 15 per cent for manufacturing, 32 per cent for the rest (including services and construction). Other very interesting features of the Nishikawa accounts are estimates of Choshu's transactions with other parts of Japan and demonstration of the physiocratic bias in the Tokugawa fiscal regime. 97 per cent of tax revenue consisted of levies on agriculture, 3 per cent was derived from levies on non agriculture. Apart from his structural analysis, Nishikawa also ventures an estimate of the rate of growth of per capita Choshu income between the 1760s and the 1840s of 0.4 per cent a year. However, this is based entirely on land survey estimates for fiscal purposes.

In 1500, less than 3 per cent of Japanese lived in towns of 10 000 population and over. By 1800 more than 12 per cent lived in such cities. Edo which had been a village became a city of a million inhabitants. There were more than two hundred castle towns, half of whose population were *samurai*. Kanazawa and Nagoya were the biggest with a population over 100 000. The old capital, Kyoto, had half a million (being the seat of the Emperor and his court and the centre of a prosperous agricultural area). Osaka became a large commercial metropolis, similar in size to Kyoto. This fourfold increase in the urban proportion contrasted with a stable and much lower ratio in China. Japan had a smaller proportion of small towns than China, because concentration of *samurai* in one single castle town per domain was accompanied by compulsory destruction of scattered smaller fortified settlements. There was also a decline in the size of Osaka in the eighteenth century as commercial activity increased in smaller towns and rural areas.

The urban centres created a market for the surrounding agricultural areas. They also created a demand for servants, entertainment and theatres. Merchants ceased to be mere quartermasters for the military, and acted as commodity brokers, bankers and money-lenders. They were active in promoting significant expansion of coastal trade and shipping in the inland sea (see Crawcour, 1963). Thus there was clearly a substantial increase in many types of service activity per head of population in Tokugawa Japan. However, the biggest service industry was that of the *samurai* and *daimyo* who supplied an exaggeratedly large amount of military and civil governance. The evidence suggests that they remained a stable proportion of

the population throughout the Tokugawa epoch. Yamamura's (1974) study suggests there was not much change in their household real incomes, and Smith's work on the falling incidence of fiscal levies in agriculture helps to reinforce this latter conclusion.

There was a very substantial increase in levels of education in Tokugawa Japan, and an emphasis on secular neo-confucian values rather than Buddhism. This improved the level of popular culture and knowledge of technology. There was a huge increase in book production and circulation of woodblock prints. Between the eighth century and the beginning of the seventeenth fewer than 100 illustrated books appeared in Japan but by the eighteenth there were large editions of books with polychrome illustrations and 40 per cent literacy of the male population.

In 1639, the Jesuits and the Portuguese traders were expelled from Japan, Christianity was suppressed and contact with Europeans was restricted to the small Dutch trading settlement in the South of Japan, near Nagasaki. This was done because the Portuguese were intrusive and thought to be a political threat. The Tokugawa were aware of the Spanish takeover in the Philippines and wanted to avoid this in Japan. The Dutch were only interested in commerce, but in the course of their long stay in Japan, their East India Company appointed three very distinguished doctors in Deshima (Engelbert Kaempfer, 1690–2, an adventurous German savant and scientist; C.P. Thunberg, 1775–6, a distinguished Swedish botanist; and Franz Philipp von Siebold, 1823–9 and 1859–62, a German physician and naturalist). These scholars wrote books which were important sources of Western knowledge about Japan, but they also had a significant impact in transmitting European science and technology to Japan.

The Japanese had depended on Chinese books for knowledge of the West (Chinese translations of works by Matteo Ricci and other Jesuits in Peking), but in 1720 the shogun, Yoshimune, lifted the ban on European books. An important turning point occurred in 1771 when two Japanese doctors observed the dissection of a corpse and compared the body parts (lungs, kidneys and intestines) with those described in a Chinese book and a Dutch anatomy text. The Dutch text corresponded to what they found, and the Chinese text was inaccurate (see Keene, 1969). As a result translations of Dutch learning (*rangaku*) became an important cultural influence. Although they were limited in quantity, they helped destroy Japanese respect for "things Chinese", and accentuate curiosity about "things Western".

Japanese exposure to Western knowledge was more limited than Chinese, but its impact went much deeper. The old tradition was easier to reject in Japan as it was foreign. However, contacts with foreigners and foreign ideas were often frowned upon by the authorities. Von Siebold was expelled from Japan in 1829, and a Japanese friend was executed for giving him copies of Ino Tadataka's magnificent survey maps for the Kuriles and Kamchatka. Nevertheless, the Dutch window into the Western world was important and influential in preparing the ground intellectually for the Meiji Restoration of 1868. Dutch learning (painfully acquired) was the major vehicle of enlightenment for Japan's greatest Westerniser, Yukichi Fukuzawa (1832–1901), whose books sold millions of copies, and who founded Keio University on Western lines.

Although the Tokugawa regime had a positive impact on Japanese growth, it had certain drawbacks.

It involved the maintenance of a large elite whose effective military potential was very feeble in meeting the challenges which came in the nineteenth century, and whose life style involved extremely lavish expenditure. The Meiji regime was able to capture substantial resources for economic development and military modernisation by dismantling these Tokugawa arrangements.

The system of hereditary privilege and big status differentials with virtually no meritocratic element, meant a large waste of potential talent. The frustrations involved are clearly illustrated in Fukuzawa's autobiography. The Tokugawa system was inefficient in its reliance on a clumsy collection of fiscal revenue in kind and overdetailed surveillance of economic activity. It also imposed restrictions on the diffusion of technology. One example of this was the ban on wheeled vehicles on Japanese roads and the virtual absence of bridges. These restrictions were imposed for security reasons, but made journeys

very costly and time consuming. There were also restrictions on the size of boats which inhibited coastal shipping, foreign trade, and naval preparedness. There were restrictions on property rights (buying and selling of land), arbitrary levies by the shogun, cancellation of *daimyo* debts, or defaults by samurai which inhibited private enterprise.

All of these, plus increasing pressures on Japan from Russia, England and the United States, eventually led to the breakdown of the Tokugawa system.

Aggregate Japanese Performance

There has been a good deal of research on the economic history of the Tokugawa period, but hitherto no aggregative quantification of performance except at a regional level. Most of the postwar revisionist historians (Akira Hayami, Yasuba, Nishikawa, Hall, Smith, Hanley and Yamamura) agree (in contrast to earlier Marxists) that there was substantial economic advance.

Levels of income were probably depressed in 1500 as a result of civil war but there may have been a modest increase in Japanese per capita income in the sixteenth century. For 1600–1820, there are indicators of substantial increase in performance in several sectors of the economy. For farming as a whole (including new crops — cotton, sugar, tobacco, oil seeds, silk cocoons and potatoes), gross output per head of population rose by about a quarter (see Table B–17 and accompanying text), and value added by somewhat less. In the early Tokugawa period, agriculture probably represented well over half of GDP.

There is substantial evidence of an expansion in the importance of rural household activity, and the large increase in the size of the urban population led to an increase in commercial activity and urban services. There were substantial improvements in education, and a large increase in book production. It seems likely that all these activities rose faster than agriculture.

An offset to these elements of dynamism was the high cost of the Tokugawa system of governance. The elite of samurai, *daimyo* and the shogunate absorbed nearly a quarter of GDP. Their official function was to provide administrative and military services. But the way this fossilised elite functioned was extremely wasteful and put increasing strain on the economy. The apparatus of government was a system of checks and balances — an armed truce whose original rationale had been to end the civil wars which lasted from the mid–fifteenth to the mid–sixteenth century.

My overall assessment (see Table B–21) is that from 1500 to 1820 Japanese GDP per capita rose by a third. This was enough to raise its level above that of China and most of the rest of Asia.

Other Asia

Other Asia is a miscellaneous conglomerate of countries with about 12.5 per cent of Asia's population and about 12 per cent of GDP in 1820. For most of them, there is not much hard evidence for assessing their GDP performance from 1500 to 1820.

Indonesia is the largest of these countries. The estimates in Tables 2–21c and 2–22 show that most of the modest rise in per capita income from 1700 to 1820 accrued to European and Chinese trading interests. Boomgaard (1993) pp. 208–210 came to a similar conclusion for 1500–1835. He found that the “Dutch and Chinese introduced new technologies, organisational skills and capital, which strengthened the non–agricultural sectors, and led to the introduction of some cash crops (coffee and sugar). However, they also pushed the Javanese out of the more rewarding economic activities and increased the burden of taxation and corvee levies”.

Korea was the second biggest of the “other Asia” countries. Until the 1870s, it was a hermit kingdom with only exiguous contact with the outside world except China. Its social organisation and technology were very close to the Chinese model, and there is reason to suppose that its economic performance was similar to that of China, i.e. stagnant per capita income at a level above the Asian norm. The major disturbances to Korean development because of the Mongol and Japanese invasions happened before 1500.

The Indochinese states were also Chinese tributaries. They were more open to foreign trade than Korea, but there do not seem to be grounds for supposing that per capita income changed much in the period under consideration.

In 1500, the Ottoman Empire had control over a large part of Western Asia and the Balkans. In 1517 it took control of Syria and Egypt and suzerainty of Arabia. The Empire had widespread trading interests in Asia. By the eighteenth century, it had entered a long period of decline, and its trading interests in Asia had been taken over by Europeans. Although estimates of per capita income are not available, there is enough evidence (see Inalcik (1994) and Faroqui *et al.*, 1994) to suggest that it was lower in 1820 than in 1500. In Iran; the second biggest country in West Asia, it also seems very unlikely that per capita income in 1820 was as high as in the heyday of the Safavid dynasty in the sixteenth and seventeenth centuries.

Africa

I assumed that African per capita income did not change from 1500 to 1700.

GDP AND GDP PER CAPITA FROM FIRST CENTURY TO 1000 A.D.

Before 1500, the element of conjecture in the estimates is very large indeed. The derivation of per capita GDP levels for China and Europe are explained in Maddison (1998a), and the conjectures for other areas are explained below. In all cases GDP is derived by multiplying the per capita levels by the independently estimated levels of population.

Maddison (1998a) contained estimates of Chinese economic performance from the first century onwards. The evidence suggested that per capita GDP in the first century (in the Han dynasty) was above subsistence levels — about \$450 in our numeraire (1990 international dollars), but did not change significantly until the end of the 10th century.

During the Sung dynasty (960 — 1280) Chinese per capita income increased significantly, by about a third, and population growth accelerated. The main reason for this advance was a major transformation in agriculture. Until the Sung dynasty, large parts of South China had been relatively underdeveloped. Primitive slash and burn agriculture and moving cultivation had been practiced, but the climate and accessibility of water gave great potential for intensive rice cultivation. The Sung rulers developed this potential by introducing quick ripening strains of rice imported from Indochina. They exploited new opportunities to diffuse knowledge of agricultural technology by printing handbooks of best practice in farming. As a result there was a major switch in the centre of gravity, with a substantial rise in the proportion of people in rice growing south of the Yangtse, and a sharp drop in the proportionate importance of the dry farming area (millet and wheat) of North China. Increased density of settlement in the South gave a boost to internal trade, a rise in the proportion of farm output which was marketed, productivity gains from increased specialisation of agricultural production in response to higher living standards. The introduction of paper money facilitated the growth of commerce, and raised the proportion of state income in cash from negligible proportions to more than half.

For most of the rest of Asia, it seemed reasonable here to assume that the level of per capita income was similar to that in China and showed no great change from the first century to the year 1000. The \$450 level of per capita income assumed here is sufficiently above subsistence to maintain the governing elite in some degree of luxury and to sustain a relatively elaborate system of governance. Japan was a rather special case. In the first century, it was a subsistence economy in course of transition to agriculture from hunting and gathering, and from wooden to metal tools. By the year 1000, it had made some progress but lagged well behind China.

In Maddison (1998a), pp. 25, 37–38, it was assumed that European per capita income levels in the first century were similar to those in China. Goldsmith (1984) provided a comprehensive assessment of economic performance for the Roman Empire as a whole, and also provided a temporal link, suggesting that Roman levels were about two fifths of Gregory King's estimate of English income for 1688.

The West Asian and North African parts of the Roman Empire were at least as prosperous and urbanised as the European component, which warrants the assumption of similar levels of income there.

Between the first century and the year 1000, there was a collapse in living standards in Western Europe. Urbanisation ratios provide the strongest evidence that the year 1000 was a nadir. The urban ratio of Roman Europe was around 5 per cent in the first century. This compares with zero in the year 1000, when there were only 4 towns with more than 10 000 population (see Maddison, 1998a, p. 35). The urban collapse and other signs of decline warrant the assumption of a relapse more or less to subsistence levels (\$400 per capita) in the year 1000.

For the Americas, Australasia, Africa south of the Sahara, Eastern Europe and the area of the former USSR, I have assumed that more or less subsistence levels of income (\$400 per capita) prevailed from the first century to the end of the first millennium.