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# **The State And The Industrious Revolution in Tokugawa Japan**

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According to Patrick O'Brien, Smithian growth is a label which includes the formation and integration of markets for land, labour and capital as well as institutional frameworks for the discovery and diffusion of useful and reliable knowledge. The growth is expected to raise the standard of living, and is often supported by the efficient state (O'Brien 2003).

This is certainly not a definition which comes to mind when we reflect on the economic development of Tokugawa Japan. There was little or no formation of land and capital markets; labour was essentially tied to land, and there was an occupational division between farmers, artisans and merchants, in addition to the strict caste-like division between them and the ruling samurai class. The seclusion policy prohibited travelling abroad, and severely limited human contacts with foreigners, if not trade itself.

On the other hand, the California School, including Bin Wong and especially Kenneth Pomeranz, has used the term Smithian growth in a more embracing way (Wong 1997; Pomeranz 2000). They argue that Smithian growth was seen in the core regions of Japan, China, India and Western Europe between the sixteenth and the eighteenth centuries, very roughly achieving similar levels of standards of living. The criteria for Smithian growth are the growth of the market based on commercialisation of agriculture and proto-industrialisation, but not the growth of factor markets. Furthermore, no specific type of institutions, such as the sovereign state and private property rights, are assumed. Rather, various institutions, from the agrarian empire of China (which is fundamentally anti-Westphalian in the sense that it assumes and insists on the authority and power of the centre in the political and economic system), via intermediate organisations such as guilds and merchant networks, to the micro-units of the family or household and the village community, are evaluated according to its market-enhancing capacity. The efficiency of institutions is

determined by the degree to which transaction costs are reduced, not by the way they are reduced.

By this measure, Tokugawa Japan fares much better. The Tokugawa state assumed strong political and military control over Japan from the early seventeenth century to mid-nineteenth century, and the economy did grow slowly but steadily over this period. The growth of the national market, commercialisation of agriculture and proto-industrialisation were all present, and helped the improvement of the standard of living. In terms of human development index (which takes literacy and longevity as seriously as per capita output), Japan at the end of the Tokugawa period is comfortably par with the core regions of Western Europe, although there was no sign of technological development which could lead to the industrial revolution (Sugihara 2003).

This paper follows the definition of Smithian growth by the California School, and attempts to suggest a way in which to characterise Tokugawa Japan, as compared with the core regions of the world. It hopes to help create the typology of technological and institutional paths which supported Smithian Growth.

## **Two types of agricultural development**

We begin with Figure 1 and Figure 2, which show the standard estimates of cultivated land per capita in China and Japan. During the seventeenth and eighteenth centuries, Japan was much more land-scarce than China as a whole (but perhaps the most developed regions of China were just as land-scarce as Japan), and both countries, whether the core region or the periphery, were altogether far more land-scarce than Western Europe. Figure 3 (supplied as hand-out: a map from Buck 1937b, 120) shows the smallness of farm size in China around 1930; The average crop area per farm in eight regions ranged from 0.9 hectare to 3 hectares. Putting these data together with Figure 1 would suggest that a similar size was probably prevalent in the earlier period, as the land-labour ratio appears to have remained stable between the late-eighteenth century and 1930.

Another observation is that Buck, responsible for the survey on which Figure 3 is based, suggests that in China, less than 5 per cent of land was used for pasture and virtually no land designated for pasture was reported in Japan, while 57 per cent of land was used for pasture in Britain, 17 per cent for Germany and 20 per cent for Italy (and these figures should be compared with the share of cultivated land: 23 per cent for Britain, 44 per cent for Germany and 45 per cent for Italy) (Buck 1937a: 172). Even if these figures cannot be expected to be precise, it seems clear that there was a substantial difference between East Asia and Western Europe in terms of land use. And in any case there was virtually no “rotation” with pasture in the cultivated area in East Asia.

This can be interpreted as follows (see Figure 4). The developmental path the two regions followed was different from each other. The crop-pasture path, pursued in much of the core regions of Western Europe, sought to produce a product mix of grain, wool, dairy products and meat in varying proportions, utilising animal power in the process. The land-labour ratio varied substantially, depending on the phase of Malthusian cycle and the specificity of local environment, but the norm was to adjust the ratio by pursuing better agricultural technologies along the crop-pasture path.

The rotation involving both pasture and crop production diffused widely in Western Europe. The typical farm size of the crop-pasture path was about 30 hectares. According to Van Bath, medieval manors might have had five to 22 hectares of land. Since then, in the boom period when population grew, the farm size shrank, while in the depression period when population contracted, it tended to increase. The norm for newly irrigated land in Holland was 15 to 30 hectares (Van Bath 1963: 44-45, 124-25, 152). Since the second half of the eighteenth century, with the rise of grain prices, there was a tendency for the subdivision of land in Ireland, Sweden, Belgium, Holland, Scotland and France. Even so, the average farm size of the medium-scale farmer was 20 to 60 hectares, or typically 30 hectares (Van Bath 1963: 20). The English landlords had a much bigger unit of land for agricultural labourers to work. It is true that the cottagers had a small plot of land, size-wise similar to that of East Asia, but

it was never meant to be self-sufficient, and they usually earned their living by working for other people's land or engaging in proto-industrial work. The average size of farms in England rose substantially in the eighteenth century; For example, the average open field farm, obtained from surveys in south Midlands, was 24 hectares in the early seventeenth century and 26 hectares in the early eighteenth, but rose to 59 hectares by c.1800 (Allen 1991: 244). The developmental path was governed by the concern for raising labour productivity within the framework of crop-pasture path, be it capitalist agriculture or peasant agriculture.

The main outcome of this path was better rotation, more fences, more clovers, more diverse crops, and the diffusion of thinking of agriculture in terms of at least a few years, investing in fixed capital (especially animals) and managing the farm in relation to capital as well as to land and labour. The crop-pasture path encouraged fixed capital formation, and made depreciation concerns (such as the prevention of animal diseases) a major part of its economic calculations.

Sometimes this path resulted in extreme long hours of hard work, even by the East Asian standard. The Danish revolution testifies this (Kjaergaard 1994). On the whole, however, it never shifted to the crop-crop path even in times of severe land scarcity. In England there were "arable farms" and "pasture farms", suggesting specialisation, but most farms were not only aware of the advantage of rotation involving both crop production and pasture, but were actually engaged in it, even if they were relatively specialised in either of them. From the East Asian perspective, there was a plenty of land that could be brought into cultivation with a greater amount of employment in Western Europe, as long as the technology was following the crop-pasture path. This is the case even in the boom period, and with its peasant part of agriculture.

Meanwhile, the East Asian agriculture fell into crop-crop path even more uniformly than the Western European path converged to the crop-pasture path, with a much smaller farm size of less than three hectares. Figure 1 to 3 suggest that in the rice growing region of China it was more like one to two hectares,

and in Japan often less than one hectare. According to a record for the revenue collection in 1734, the “typical” Japanese village consisted of 120 people, 24 households, five horses and the arable land, half wet and half dry field, which could produce 200 koku (capacity measure; 1 koku is about 180 litres) of rice. Both horses and oxen were used as draught animals, but their usage as sources of meat, dairy products and leather products was very limited.

Before the nineteenth century, double cropping cannot be said to have been the “norm” as such, but it was widely recognised, and was increasingly practiced in the core regions of East Asia. It was often a combination of rice and other cash crops. A high degree of labour absorption of the members of the peasant household was successfully attempted. Without a full growth of the labour market and the establishment of the “wage” category, motivated labour with managerial skills, sensitive to both production technology and market signals, emerged. The basic mind-set was the year-long management of agriculture and its successful repetition. The management involved a combination of land, labour and circulating capital, not fixed capital. The long-term consideration was more on the reproduction of labour and the household to support it.

Under such circumstances, there was not much room for investing in animals for any other purpose than as draught animals, as the crucial concern was to raise land productivity and pasture was unlikely to achieve it. Culture and ideology reinforced the emphasis on labour-intensive methods suited for rice production, and the land tax system strongly encouraged the focus on land productivity.

The result of the intensive use of land can be soil depletion and deforestation (as in nineteenth century China), but can also be the increased use of natural (commercial) fertiliser and re-forestry (as in eighteenth century Japan). But the development of woollen industry and the consumption of meat and dairy products were comparatively limited even in north China. In spite of very different institutional frameworks, a strong similarity existed among the core regions of China and Japan in terms of the development of labour-

intensive technology and labour-absorbing institutions. In this respect the difference between East Asia and Western Europe was quite marked, and probably became more marked during the seventeenth, the eighteenth and much of the nineteenth centuries.

If pasture was not so important in the earlier period in England either (see Clark 1991: 230-34), the starting point of the two paths may well have been similar from the very long-run perspective, and we need to trace the ways in which they diverged. But the two paths were already on a different course by the seventeenth century, and there was no tendency for convergence of the two paths in the period under review.

### **The industrious revolution**

Pomeranz acknowledges that capital accumulation and the scientific revolution were both necessary conditions for the industrial revolution, but argues that Smithian dynamic was operating in all the core regions of the world, including Western Europe. Far from escaping from the Malthusian trap, Western Europe after 1750 was heading towards the vicious circle of population growth, diminishing returns from land and the tendency towards labour-intensive technology, in the same way as East Asia had been. Thus Western Europe was only to be rescued by the contingent factors (coal and the New World).

I substantially agree with his emphasis on the “great divergence”, but wish to retain my emphasis on the important differences in agricultural technology between the core regions of East Asia and those of Western Europe before 1800 (See Pomeranz 2000: 16-17 for his comments on my work). I also wish to maintain that the typology of the industrious revolution (for an original conceptualisation, see Hayami 1967 or Hayami 1986 and 1992 for brief English summaries) should be first and foremost related to the supply-side differences in factor endowments.

The core regions of Western Europe never experienced the type of land scarcity seen in eighteenth century Japan, and it was in Japan (and the core region of China) that land productivity rose to the extreme. The Chinese ideas

were imported to Japan in book form during the seventeenth century, and were localised and elaborated throughout the Tokugawa period. Thus the development of seed varieties, especially the introduction of middle to late ripening rice varieties in wet land, paved the way to double cropping and the evening of seasonal labour input. Later, the diffusion of dry field-horse ploughing facilitated it through the combination of wet rice cultivation and dry winter crop. The provision of good drainage made proper ploughing possible, which in turn ensured the recovery of soil. The engineering and social techniques of village-based water control were crucial here. The main cash crops involved ranged from rice and wheat to rapeseed, cotton and sugar. That rice was both a subsistence crop and a commercial crop was an important feature of East Asian agriculture. The tendency for the “dual economy” where only the commercialised sector benefited from technological progress seldom occurred as a result.

These improvements were accompanied by greater inputs of manure (dried fish, oil cakes and night soil), as well as by the promotion of “deep digging”. There was also a remarkable development of a variety of agricultural tools, to ease tilling and weeding and to enable women and children to participate in agricultural work. Agricultural manuals were widely read by the end of the seventeenth century, suggesting that there was usually at least one literate person interested in agriculture in each village.

In all of these, the development of labour-intensive technology required the injection of (usually a small amount of) capital. But the combination of land, labour and capital was made, basically to raise land productivity. The labour-saving technology was adopted, only if it served this purpose. Hence technology choice did not always lead to the rise of labour productivity. Although there are differences in important details, the core region of China followed and developed essentially the same path as Japan did in this respect (Li 1990).

The family system and the perception of work were systematically moulded around labour-intensive technology. In Japan the ideology emphasised

the maintenance of *ie*, an idea of the family backed by the concept of a family line but not necessarily by blood. It also advocated the maintenance of land and graveyard belonging to *ie*. The work ethic encouraged filial piety, loyalty, hard-working spirit and the ability to cooperate and manage production. By the eighteenth century there was relatively little in the way to prevent the adoption of new seed varieties and new crop patterns. The crucial point was that the head of the peasant household was substantially the manager of production, as well as consumption. Members of the household were likely to gain from the increased production derived from hard work, efficient allocation of labour and innovative production methods. It was easy for them to see the linkage between work and reward. In the core region of China the family system was based much more on kinship, and commercialisation of agriculture and the land market were better developed, but it nevertheless shared this linkage as the core of Smithian growth.

In East Asia, therefore, the industrious revolution occurred, as a result of the virtuous circle of hard work and greater reward within the context of the development of labour-intensive technology and labour-absorbing institutions. This is not to deny that consumption, for example a desire for a silk kimono for dowry, provided a strong incentive for an industrious culture. Nor does it suggest that market-mindedness was unimportant. The point is rather that the industrious revolution was led by the supply-side efficiency growth. An active involvement in the market was certainly essential to this growth, but there is no reason to assume that the growth of the market would automatically generate efficiency growth.

It is crucial to formulate the typology of the industrious revolution on the basis of the two different paths of agricultural technology. It is surely possible to plot both the European experience of the industrious revolution (for a conceptualisation of the European experience with emphasis on demand-side changes, see de Vries 1993, 1994) and the East Asian experience of capital accumulation (see Pomeranz 2000: ch.4) in the broadly Smithian-Malthusian comparative perspective suggested by Pomeranz (see also Wong 1997),

without denying the notable divergences in developmental path in East Asia and Western Europe.

The above discussion has so far centred on agriculture. It is now necessary to relate it to proto-industrialisation, in order to link the argument to the typology of Smithian growth. Proto-industrialisation in Tokugawa Japan starts in the second half of the eighteenth century in full force, and proto-industry, especially cotton and silk textiles, shifted its location from high-wage urban/suburban areas to low-wage rural economies during the second half of the eighteenth and the first half of the nineteenth centuries (Saito 1985). It therefore developed a geographical division of labour. The pattern is similar to Western Europe in this respect.

At the same time, a variety of division of labour within the household clearly increased in rural growth economies. Commercial crops, weaving, and temporary migration to serve for the urban service sector, could have been attempted all at the same time by a single household, carefully scheduling the labour allocation of the members of the household, in accordance with fluctuating labour demands of the paddy field. A typical farmer in the first half of the nineteenth century Japan often had more than one job, some of them looking “managerial”. Coordination skills within the household, as well as within the village, became increasingly important. In-house/in-area sophistication, rather than geographical specialisation, was the heart of East Asia’s proto-industrialisation.

It was in the periphery where both commercialisation of agriculture and proto-industrialisation took place together that population started to grow. As a result of the availability of proto-industrial work for women, the previously biased sex ratio was corrected, and a high level of labour absorption took root. The household as a whole had a clear incentive for more income, partly for consumption and education, but also partly for further search for local diversification of economic activities. The advantage of in-house or in-area linkages between proto-industry and the crop-crop path through the efficient labour and other resource allocation was clear to them.

I have already touched on the different commodity mix the two paths generated, but the absence of pasture, or especially the absence of sheep, meant the predominance of cotton, and to a lesser extent silk, for East Asia's proto-industrialisation. The specificity of cotton (its soil- and climate-demanding location, combined with its remarkably flexible usage – sweat-absorbing in the summer, warm in winter, and relatively durable and flexible as working cloth –) certainly mattered to the East Asian developmental path, in the same way as the specificity of rice (its high nutritional value, its land- and labour-intensive, and water-demanding nature etc.) did. Both rice and cotton (and their processed goods) were increasingly transported to remote places. The cultivation zones of both crops were slowly widened towards the north, as new seeds were introduced and water control improved.

The East Asian international commodity mix thus centred around rice, silk, cotton, tea and sugar. Between the sixteenth and eighteenth centuries, the consumption of these commodities increasingly became common throughout the region, transcending vast climatic and topological differences. Along with the diffusion, the commodities associated with rice-based diet and silk-cotton clothing culture developed with local, national and regional identities. Judging from the size of the textile industry in East Asia, and its competitiveness before the industrial revolution (and to some extent even after that), it should be possible to argue that the proto-industrial aspect of the concept of the industrious revolution (for example, the gender division of labour within the household where men were the main worker in the paddy field while women span and wove: see Saito 1983) should also be formulated on the basis of East Asian experiences of cotton textile industry. This focus on the cotton-silk nexus of the industrious revolution would also highlight important differences between East Asia and India.

Thus the different paths did not necessarily converge, simply because proto-industrialisation absorbed labour and eased the constraints on land to some extent. While this still leaves room for abstracting a common pattern of Smithian growth, it also leaves room for tracing different outcomes deriving from

different paths. The two paths faced the same kind of constraints on land and other resources, and they responded to them differently. Meanwhile, the persistence of very different commodity mix between East Asia and Western Europe was to affect the course of East Asia's integration into the West-dominated international economy in the nineteenth century.

### **Institutional foundations of Smithian growth in Japan**

So far I have focused on the contrast between East Asia and Western Europe, and left the question of comparing Japan with China open, because I believe that there were common regional elements the two countries shared, and some of them were reinforced by the international contacts within the region (such as the transfer of agricultural knowledge from China to Japan). However, unlike in Western Europe (Epstein 2000), the institutional convergence did not occur in East Asia during the period under review. In a number of respects, Tokugawa Japan established its own institutions, which were much more regulatory than China's. We attempt to describe the distinctive features of the Japanese experience below.

Before proceeding, it should be noted that the conscious use of core regions as units of analysis by the California School has opened up a new mode of Japan - China comparison. Traditionally Japan has been compared with China as a whole, in spite of the large difference in size. This makes sense, for example, when we assess the capacity of the state to respond to Western impact in the nineteenth century, in the context of the opium wars, the opening of ports to foreign trade and the Meiji Restoration. At the same time, the comparison between the Lower Yangzi with 37 million people and Japan with 33 million would also make sense, if we wish to study the nature of Smithian growth. While this would allow us to compare the most developed regions of the country of a similar size, such a comparison would simultaneously highlight the difference in institutional framework between the two core regions. It also makes clear that Tokugawa Japan, which had imported labour-intensive

technology from China, especially in the late sixteenth and the seventeenth centuries, had no political model of a similar size to emulate.

The main route for Smithian growth in Tokugawa Japan was set by the strong central state initiatives. The establishment of the baku-han system where a number of han (domain) was given semi-autonomy as long as they remained loyal to the Tokugawa house, created a large administrative ruling class of samurai (a few per cent of the total population). The separation of samurai from land generated the demand for rice and other consumer goods in large cities and castle towns. This was met by the collection of feudal dues in the form of rice. Thus the rice market centred around Osaka became the first fully integrated national market, with futures function built in already by the end of the seventeenth century (Miyamoto 19??). The alternate attendance system where the family of the domainal lords were hostaged in the city of Edo and domainal rulers had to spend huge resources for travelling to and from Edo, was another device with important economic implications. The national network of roads and inns were created, the local produce was freely exchanged in Edo, and a variety of service activities were generated (Nakamura 19??).

Although the transport of silver, copper and other produce for exports to the port of Nagasaki in south-western Japan (and carrying imported goods to Osaka and Edo from there) was yet another point which stimulated domestic commerce, its linkage effect was not as great as the taxation system and the alternate attendance system. It was the state-induced commerce as a whole that acted as a substitute for long-distance trade.

This system was supported by the merchant guilds centred in Osaka and Edo, with extensive networks of local merchants. The behaviour of the merchant guilds has been much discussed, and there is a general consensus that the Tokugawa shogunate hardly intervened in their economic organisation. Tetsuji Okazaki recently applied the historical institutional analysis approach to argue that the increased efficiency of merchant guilds (and its decline at the end of the Tokugawa period) partly accounts for the market performance of the Tokugawa economy (Okazaki 1999).

Furthermore, the state-promoted growth of the national market provided a framework for the growth of proto-industry at the periphery. As is stated before, from the mid-eighteenth century proto-industrialisation in rural Japan quickened its pace, while urban population declined. However, there was a linkage with the earlier, state-promoted development, in the forms of artisanal transfer, diffusion of accounting methods, and the diffusion of mercantilist policy among the han. And these transfers and initiatives encouraged the household and the village community to come up with a “competitive” local produce for the wider market. Thus the Japanese institutions relevant to Smithian growth should be understood as a nested organisation with multiple levels of state, han, towns and villages and the household. It was one of the most highly regulated economies that achieved impressive Smithian growth. From the Japanese perspective, the Chinese case looks as if the market was far less regulated almost at all levels. Looking at the institutional foundations of Smithian growth from this perspective, Japan and Continental Europe appear to have been more regulated than China and England (see Figures 5).

To recapitulate the regulatory framework within which Smithian growth occurred, let me reiterate the significance of two sets of institutional innovations that the Tokugawa regime established in the seventeenth century. The first was the establishment of the village as an autonomous administrative unit. Since the late sixteenth century the newly emerged centralised power attempted to transform multilayered ownerships and holdings of land into the single ownership of either the shogunate or han, while the villagers were given the administrative autonomy, as long as they paid feudal dues in the form of rice. The warlords and landed class were given the choice of either moving into the castle town to become a samurai class separated from land, or remaining in a village. If they chose the latter, however, village boundaries were fairly strictly observed, so that they could accumulate land in their village only. This severely limited the development of land market and capital accumulation.

On the other hand, the samurai class and tax collectors as a rule did not interfere with village affairs, and kept peace and stability of the village for most

of the two and half centuries of Tokugawa era. The identification of the independent peasant household as the basic production unit gave farmers the strongest possible incentive for the management of land and labour. The work ethic associated with the industrious revolution path had survived the more recent institutional changes of the Meiji Restoration and the Postwar Reform. The emergence of independent small farmers marked a major watershed of Japanese history.

The second decision was to put contacts with foreigners under strict control. The three decrees were issued in the 1630s under which trade was prohibited except for licensed Dutch and Chinese vessels arriving at the port of Nagasaki, and foreign travel by the Japanese was strictly forbidden. This has been traditionally interpreted as a response to the fear that Christianity might spread further and threaten its power, and also as an attempt by the shogunate to monopolise profits from trade. More recently, it has been argued that the seclusion policy was part of the shogunate efforts to establish its own political legitimacy both at home and in the context of China-centred East Asian world order. Rather than trying to isolate itself from the world, the policy was designed to relate to other parts of East Asia through the establishment of tributary relations with Korea and Ryukyu Islands, and through the communication with China on a more equal footing.

In fact the Japanese attempt to gain a relative autonomy from the China-centred tributary trade system became part of that system, to the extent that its principle was a copy of the Chinese model. On the other hand, it created something closer to the Westphalian system of international relations in the seventeenth century, in that China no longer controlled Japan in the same way it did the tributary states. In this sense the East Asian order became an international order, without the full control of the centre. Under the new system a great deal of trade was peacefully conducted, especially during the seventeenth century.

## **Human-capital channel to economic development**

Compared to the core region of China, the degree of Japan's involvement in trade with other countries (or regions) was limited, if we take the entire period and compare them. Japan certainly did not import bean cake from the north and buffaloes from the south through long-distance trade, as the core region of China did. The seclusion policy did mean the tight control of international contacts, which suggests that Japan decided not to take full advantage of the gains from international trade. Japan's internal periphery did catch up with the advanced regions since the second half of the eighteenth century, but the unit of competition on which the Japanese path was based was much smaller than the Chinese path.

Internally too, the highly regulated structure limited the opportunities for trade, and severely restricted the growth of factor markets. The division of labour was not only limited by the size of the market, but by the regulatory framework.

On the other hand, the virtuous circle of hard work and greater rewards was made visible to farmers, and they strove to improve their land and their ability to manage production. While the private property rights were not particularly well established, the level of trust among the people was high, and peace and stability reduced the transaction costs substantially. Perhaps Tokugawa Japan opted for the "human-capital channel" conducive to efficiency growth rather than the "property-rights channel" conducive to market growth (For the use of these terms, see Lindert 2003. But Lindert refers to "human-capital channel" mainly in the context of formal schooling, and does not refer to East Asia specifically as a region with strong historical "human-capital channel". So, this is substantially my own interpretation).

One question often raised about Smithian growth is what it achieved, apart from the standard of living, if it was not directly linked to the industrial revolution and most core regions of the world were entering into the Malthusian cul-de-sac by 1800. The Western European path came up with the science-based technology and the establishment of private property rights to encourage

it. This however was more like a result of Schumpeterian growth with fundamental institutional change. And Schumpeterian growth was to enable Western dominance through the diffusion of industrialisation during the nineteenth century.

If there is anything that could be said about what the Japanese path achieved, it was the accumulation of human capital. In terms of the literacy rate, hard working spirit and managerial skills, Japan in the middle of the nineteenth century was probably at the level comparable to Western Europe. Thanks to the relatively peaceful international order in East Asia and as a result of the establishment of a strong centralised state, Japan acquired the “human-capital channel” to economic development. For the Tokugawa state, the ultimate “Schumpeterian” project was to push this channel further than the other core regions, especially of China, without a heavy dependence on capital accumulation through violent means, which they vaguely imagined was taking place in Western Europe.

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Figure Population and Cultivated Land in China, 1500-1930

population (million) and cultivated land (million hectares)

cultivated land per capita (hectares)

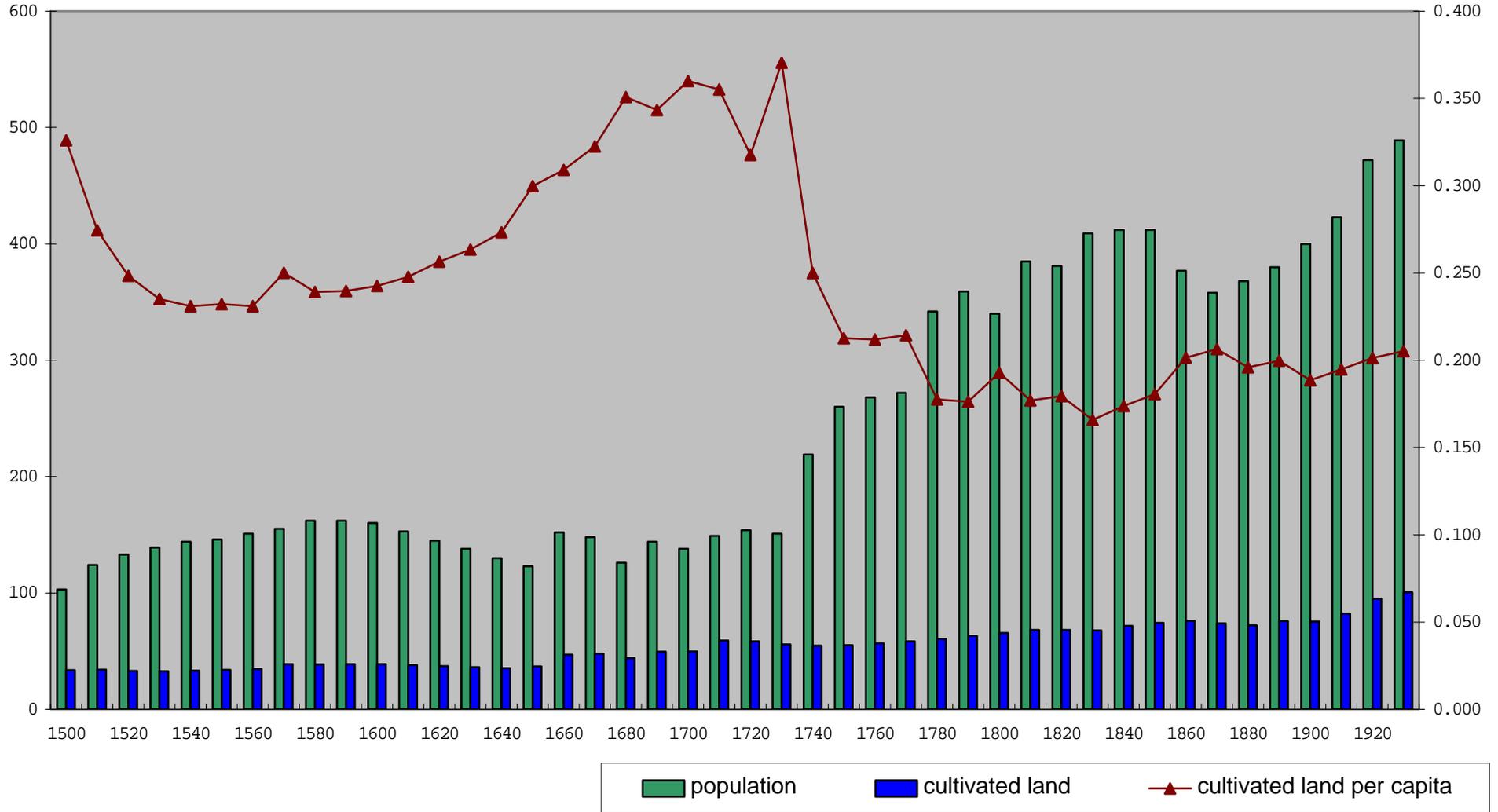


Figure 2 Population and Cultivated Land in Japan, 1660-1872

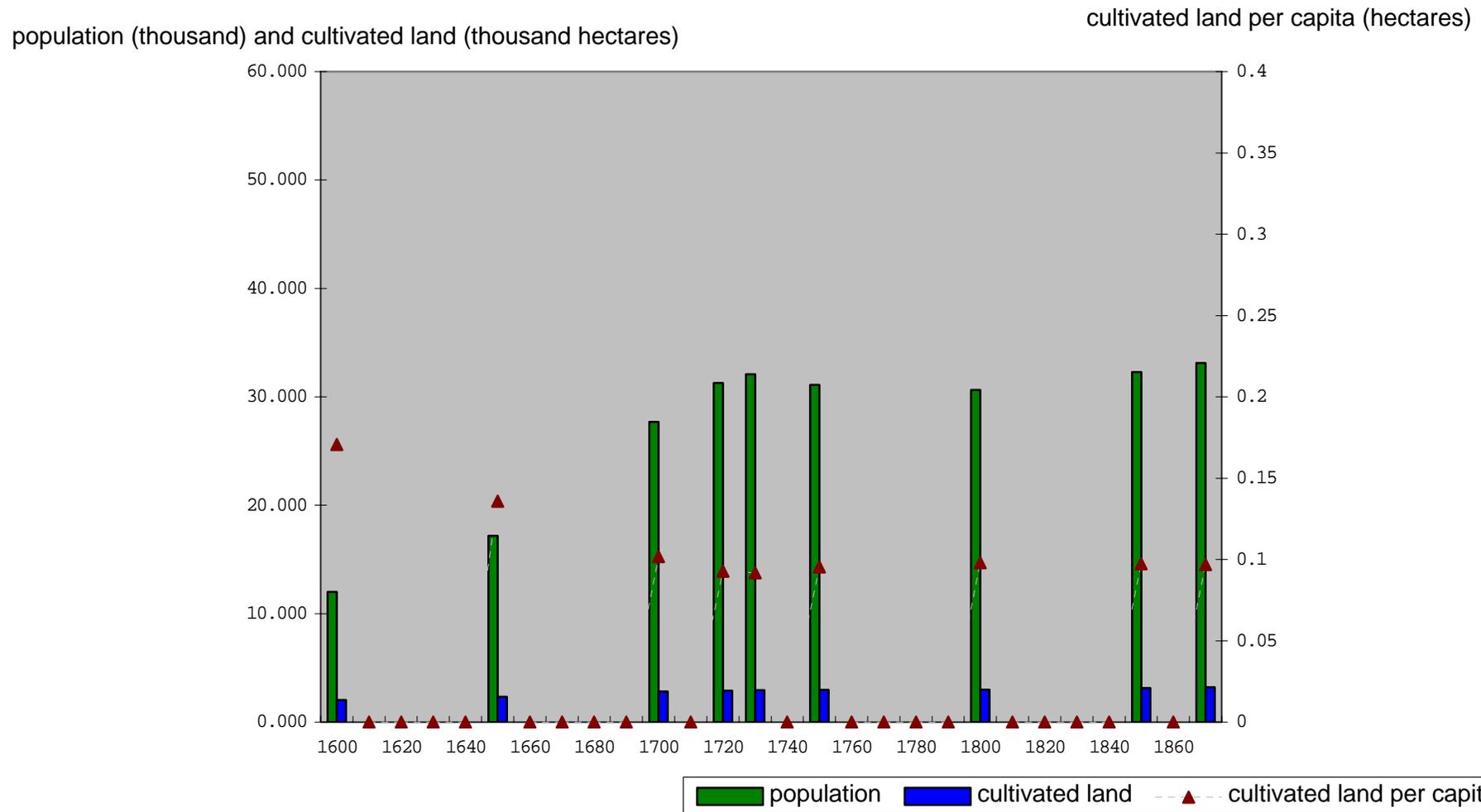


Figure 4 Developmental Path in Agriculture

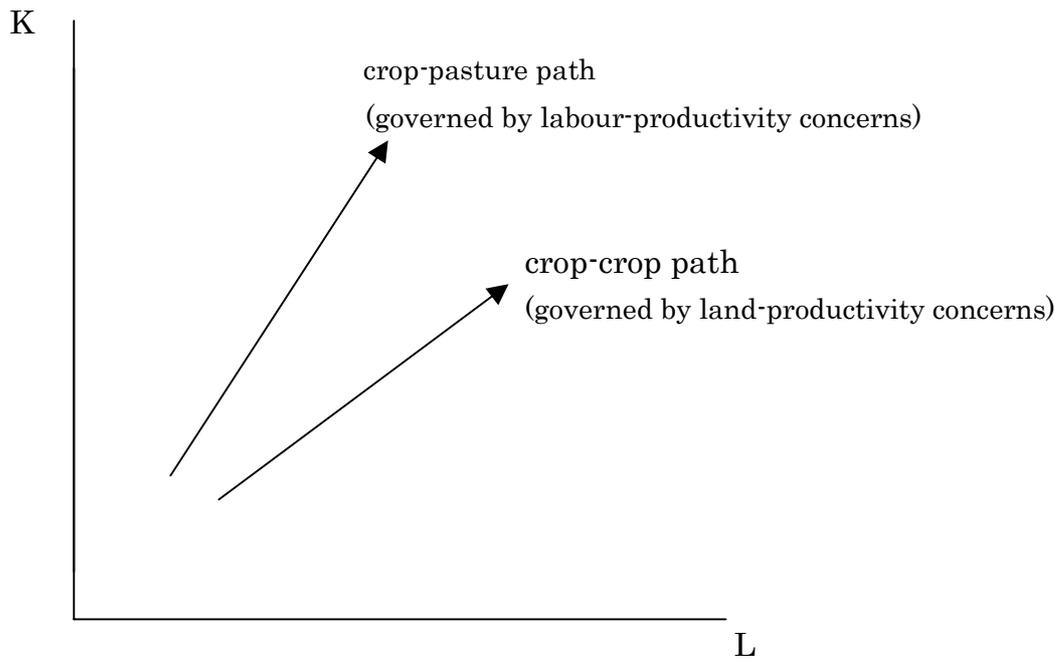


Figure 5 Patterns of Smithian Growth

	crop-pasture path	crop-crop path
regulated	Continental Europe	Japan
unregulated	England	China