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**Japan's alternating phases of growth and  
outlook for the future**

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**Japan's alternating phases of growth and outlook for the future**

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Japan's economic history since the Meiji Restoration of 1868 is characterised by alternating phases of less conspicuous growth performance in pre-war times, phenomenal growth of the 1955-73 period, and marked deceleration thereafter. The first two phases are the period of industrialisation and the third was that of rapid de-industrialisation and a rise of the service economy. This paper reviews issues and evidence concerning her growth performance in the century-long period of industrialisation, and places the recent decades of slowdown and the prospect for the future in the long-term historical context. The issues to be examined may be grouped under the following five headings: the Gerschenkronian effects (which include not only the transplanting of the factory and other western systems in early stages but also technology transfer through FDI and licensing in later periods), changing international environments (in both commodity and capital markets, which in turn were influenced by changing global power balances), the role of industrial and economic policies, investment in infrastructure and human capital, and the distinct mode of skill formation. The paper identifies a set of factors that contributed to enhancing productivity of the manufacturing sector in the industrialisation period (placing greater emphasis on saving ratios, human capital investment and a distinct mode of skill formation within the firm, than on government policies), and then asks if a new regime of productivity growth has emerged in the rapidly expanding service economy.

## 1. Gerschenkronian situations

When Japan opened the country in 1859, she found herself in typical Gerschenkronian situations. Compared with the West, Japan was materially and institutionally 'backward'. Meiji statesmen, government officials and intellectuals, who saw Britain and other Western countries at first hand, realised that their country was lagging behind the West where unprecedented progress was made since the industrial revolution. In the words of a contemporary who was on a mission to the USA and European countries in the early 1870s,

'It is since 1800 that Europe has attained its present wealth; and it is *only* in the last forty years that it has achieved the truly remarkable level of prosperity we now see'.<sup>1</sup>

This remark is interesting because the author, having gauged the degree of his country's backwardness, thought that they would probably be able to catch up. Judging from this and other writings, what Meiji leaders saw was 'iron and coal' being the material base of the wealth of the West. It implies that the lack of the factory system and its energy base in the manufacturing sector was the real cause of Japanese backwardness, and the view was shared by many contemporaries, ranging from statesmen like Tochimichi Okubo, who was a vice ambassador of the Iwakura mission, to liberal-minded intellectuals such as Yukichi Fukuzawa, the prominent Meiji enlightenment leader. As Alexander Gerschenkron argues, such components of the West's material culture are *transferable*. This often led to emphasise on state-led import substitution and on heavy rather than light industry as the policy's target industry, and such efforts may well have resulted in a sudden but unstable 'big spurt'.<sup>2</sup> Thus, the conventional wisdom has been that the more backward, the larger the role of the state and the higher the rate of initial growth. Japan has often been regarded as a typical case in which the state played a substantial role in promoting successful industrialisation.

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<sup>1</sup> Kume, K., compiler, *The Iwakura Embassy, 1871-73. A True Account of the Ambassador Extraordinary & Plenipotentiary's Journey of Observation through the United States of America and Europe*. vol.II: *Britain*, trans. G. Healey (Richmond, Surrey: Curzon Press, 2002), p.57. Emphasis added.

<sup>2</sup> A. Gerschenkron, *Economic Backwardness in Historical Perspective* (Cambridge, Mass.: Berknap Press, 1962). The idea of 'big spurt' is also shared by W.W. Rostow, *The Stages of Economic Growth* (Cambridge: Cambridge University Press, 1960), although Gerschenkron was critical of Rostow's stage theoretic approach. See "A postscript" to *Economic Backwardness*.

Let us first look at Japan's actual performance in the nineteenth and early twentieth centuries, by placing it in global perspective. If we chart Angus Maddison's per-capita GDP estimates for Japan, together with those for China, western Europe and the world in one diagram (figure 1), it is evident that Japan's growth performance was never spectacular in the period before the 1950s. Until 1950, Japan's loci did not deviate from those of the world, which were well below the west European curve. It was in the very short period of the third quarter of the twentieth century, the era of 'high economic growth', when Japan changed the affiliation from the world's average to the advanced countries' group. This implies, on the one hand, that Japan did not fail to keep up with the others, which should be contrasted with trouble-ridden China of the late imperial and republican period. It should also be noted, on the other hand, that Japan was never a high performer during the pre-war period—nothing but one of average countries of the world. Kazushi Ohkawa once characterised the pattern of Japanese economic growth as 'trend acceleration'.<sup>3</sup> Their intention was that Japan's growth did not begin by a big spurt as Gerschenkron predicted. What he and his associates found instead is that the estimated rate of economic growth increased since the end of the nineteenth century. It is true that the slope of the trend line was gentler in the period before the First World War, when the growth process was steady and balanced, than in the inter-war period, during which the process became uneven and unbalanced.<sup>4</sup> Also true is, as Arthur Lewis pointed out as early as 1949,<sup>5</sup> that the impact of the Great Depression on the Japanese economy in the 1930s was less severe with a swifter recovery than in the advanced countries of the West. But, we all know what followed in the late 1930s and the early 40s. And, if comparison is made, as in figure 1, in terms of the relative distance from the top group of the world, it is probably more appropriate to say that Japan's catch-up did not take place until 1950. In Japan, a 'big spurt' came as late as the 1950s and 60s.

Turning to the 'role of the state' question, there are several reasons to believe that the direct role of the government was not great until the late 1930s. First, despite the early Meiji government's well-known emphasis on state-financed Westernisation projects, a close look at what the Meiji state actually did reveals that the proportion of government

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<sup>3</sup> K. Ohkawa and H. Rosovsky, *Japanese Economic Growth: Trend Acceleration in the Twentieth Century* (Stanford: Stanford University Press, 1973), and K. Ohkawa and M. Shinohara, eds., *Patterns of Japanese Economic development: A Quantitative Appraisal* (New Haven, Conn.: Yale University Press, 1979), ch.1.

<sup>4</sup> T. Nakamura, *Economic Growth in Prewar Japan* (New Haven, Conn.: Yale University Press, 1983).

<sup>5</sup> W.A. Lewis, *Economic Survey 1919-1939* (London: Allen and Unwin, 1949).

money spent on industrial promotion in the form of model factories was relatively small, and that much of the funds mobilised in the early Meiji years went to infrastructure building, i.e. railways. And, second, even this policy of industrial promotion was abandoned as early as the late 1870s in favour of export promotion. As is well known, the export commodities—raw silk and tea—came from the traditional, cottage-industry sector. Third, all the government-run model factories were sold off later to private firms, and the first industrial take-off in the 1890s was due completely to private initiatives. Fourth, although the late Meiji government launched a state-owned iron and steel company, the share of government investment in fixed capital formation and the proportion of government expenditure to GDP were never high as far as the period before 1930 is concerned (see tables 1 and 2).

Indeed, a recent synthesis is that the modern Japanese economy in the period up to the 1930s was in a more or less non-interventionist regime.<sup>6</sup> Thus, direct intervention by the government was very much limited in the process of Japan's industrialisation, with the notable exception of 1938-45, in which the state geared economic management to a command economy model. All this of course does not necessarily mean that the state did not want to get involved in the business of promoting industry. Rather, despite the Meiji statesmen's firm belief in the slogan, 'rich nation, strong army', i.e. that the nation's development should be guided by the government, the menu of means of intervention was limited for the government. The trade treaties with the Western superpowers signed at the time of the opening of the nation did not allow the government to raise customs, and the terms of trade under that trade regime were generally unfavourable. On the other hand, government staff did not have expertise to run factories and companies; nor did they have enough revenue to subsidise all the strategic industries. Some verbal intervention was made in the areas of maritime shipping and shipbuilding, which, one may argue, foresaw industrial policy of the post-war period. The role of the government was most prominent in the areas of science and technology transfer from overseas. Although they were gradually replaced by newly educated Japanese, many science professors and engineers were invited from abroad and employed by the government at extremely high salary in the early Meiji period. In 1889, however, Japan started to permit inward FDI in return to the revision of commerce treaty and joined the

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<sup>6</sup> T. Okazaki and M. Okuno-Fujiwara, "Japan's present-day economic system and its historical origins", Okazaki and Okuno-Fujiwara, eds., *The Japanese Economic System and its Historical Origins* (Oxford: Oxford University Press, 1999), ch.1; and Juro Teranishi, *Evolution of the Economic System in Japan* (Cheltenham, Glos.: Edward Elgar, 2005).

Paris Convention Treaty for the Protection of Industrial Property in the same year. Since then, inward FDI and licensing agreements, in addition to reverse engineering and imports of advanced capital goods, became more important as a channel of technology transfer.<sup>7</sup> Otherwise, it was only the military sector that the state always cared for. The state-owned Yawata Steel came into existence because of its strategic importance for defence, but it was not until the 1930s when war against China was launched that a new military-fiscal state replaced the non-interventionist regime of economic management: as table 2 shows, the proportion of the government's capital formation increased from 5 % in 1920 to 12 % in 1938 and that of government expenditure to GDE from 16 % to 36 %.

In infrastructure and education, the government played a larger role. As noted above, early Meiji effort to introduce railways was financed by the government but the further development in the construction of rail networks was made under a dual system of state and private initiatives. While the share of capital formation by railways was higher in earlier periods, total operational mileage increased four-fold between 1900 and 1940 (although the balance between the public and private sectors alternated from period to period).<sup>8</sup> In postal service too, the whole system was transplanted from the West, and remained in the public sector until very recently. However, the Meiji government allowed local notables to run village post offices on their own premises as if the office business were a family asset. This mobilisation of de facto private resources enabled the postal network to spread far and wide in fairly early stages of its development. In other areas of transport and communication, the role of the central government is found in allocating subsidies to local government bodies. In road building, for example, much of the actual financial cost was shouldered by local governments. Subsidies became a means of leading local people to accept a national plan, and 'pork barrel' politics adopted by political parties intensified this tendency.

Education is said to have been one of the areas in which the pre-war government was committed to invest. Compulsory education was introduced as early as 1886; the years required was extended from four to six in 1907, but the overall rate of enrolment reached 98 per cent by 1910. Over the period up to 1920, the proportion of students in

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<sup>7</sup> A. Goto and H. Odagiri, eds., *Technology and Industrial Development in Japan: Building Capabilities by Learning, Innovation, and Public Policy* (Oxford: Oxford University Press, 1996).

<sup>8</sup> R. Minami, *The Economic Development of Japan: A Quantitative Study* (London: Macmillan, 1986), pp.115-122.

primary, secondary and higher education to the total population rose to 19 per cent, which meant that although still behind the USA, Japan overtook the record of England and Wales.<sup>9</sup> Two additional points may be made, however. One is that despite this progress in pre-war education, human capital embodied in the workforce increased at a moderate pace since it took several decades for a new better-educated generation to replace the elder, poorly-educated generation. Y. Godo and Y. Hayami have recently estimated average schooling for the period since 1880, which measures a number of schooling years averaged over all the age groups of the working population in a given year.<sup>10</sup> According to their estimates (see figure 7 below), average schooling was only 1.9 years for men and 0.6 years for women in 1890. Both male and female years multiplied by 1940, but the averages did not reach eight years. The other point is that not the whole system of education in both pre-war and post-war periods is state-financed. There are private schools at all levels but in secondary and higher education especially, much of the progress has been made by private initiatives. Just as in the area of infrastructure building, therefore, educational attainment was made in a relatively inexpensive manner.

## 2. The era of high economic growth: 1955-73

Japan's full-fledge drive to industrialisation started in the inter-war period. One favourable factor had been laid out with Japan's adoption of the gold standard in 1897. Since the gold had long been stronger than the silver, it changed the trade environment: while it was a blow to export-oriented traditional industries, the import of machinery and other goods necessary to build the modern, heavy and chemical industry became less costly. Then, unexpectedly, the outbreak of the First World War created a trade vacuum in the South and South-east Asian markets. The opportunities were seized by Japanese merchants, shipping agents and producers. The overseas demand was so strong that windfall profits were ploughed back: new firms were set up and further investment made in plant and equipment with license contracts from abroad. Many of such firms went bankrupt when the boom collapsed in 1920; yet a substantial number of new manufacturing enterprises that survived this and subsequent recessions laid the foundation for post-war industrial build-up.

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<sup>9</sup> Ibid. p.19.

<sup>10</sup> Y. Godo and Y. Hayami, "Catching up in education in the economic catch-up of Japan with the United States, 1890-1990", *Economic Development and Cultural Change*, vol.50 (2002), pp.961-978.

## 2.1 The international environment and the domestic economy

However, Japan's take-off into full-fledged industrialisation occurred in an international environment characterised by great instability. The collapse of the *pax Britannica* was followed by the creation of trade blocs and growing exchange rates volatility, leading many countries including Japan to adopt a regime of command economy-type of economic management. Having learnt a lesson from this experience, post-war leaders of the West set up an international economic regime aimed at enhancing free international trade and stable exchange rates. Many IMF member countries chose an adjustable-peg currency system until 1973. Except in the case of Article XIV countries, Article VIII of the IMF agreement prohibits member countries to restrict the convertibility of their currency for current international transactions. Several successful multilateral trade negotiations and the most favoured nation principle of GATT promoted international trade, especially in manufactured products. These international developments contributed to the economic growth of newly industrialising countries such as Japan, poorly endowed with natural resources and hence depending on processing trade.

One defect of the post-war international economic regime was the lack of a sufficient system for the promotion of international capital flows. For example, the IMF agreement does not prohibit restrictions on capital transactions. The OECD played an important role in the liberalisation of capital controls, but only for member countries. Because of the end of gunboat diplomacy and the difficulty of providing collateral for sovereign debt, borrower countries are tempted to default on their debt. The risk of repudiations, the disappearance of plantations, and capital controls by developed and developing countries substantially reduced international capital flows from the rich countries to the developing world after the Second World War. Figures 2 and 3 compare the net capital outflow-GDP ratios of the developed country group in the pre-war and post-war period.<sup>11</sup> It is evident that in comparison with the pre-war period, and especially the period before the First World War, the post-war period saw limited international capital flows from the developed country group.

Yet, this defect in the post-war international regime did not act as a constraint on Japan's development, since she never attempted a growth-cum-debt policy and strictly

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<sup>11</sup> Developed countries here are those whose per capita GDP in 1990 Geary-Khamis dollars is greater than 50% of the US level.



regulated direct and indirect international capital flows until the end of the 1970s. Even in the pre-war period, Japan financed capital formation from her own savings: her saving rates in the pre-war period appear to have been modest except in the period of 1885-1900 and during the First World War boom period (figure 5). Much of the overseas investment by Britain and other advanced countries went to the Americas and the British colonies, such as India and South Africa, not to Japan. And, as figure 4 shows, Japan's current account was generally balanced except in several short deficit periods, such as the period after the Sino-Japanese War of 1894-95 (the current account deficit was financed by reparations), during the Russo-Japanese War of 1904-5, and the period after the Kanto Earthquake of 1923. Figure 4 also shows that after the Second World War, Japan's gross saving rate increased considerably. The high saving ratio after the Second World War, the highest of all developed countries except Luxemburg (Figure 6), must have contributed to Japan's high economic growth in this period. According to a growth accounting analysis by Jorgenson and Nomura, out of Japan's aggregate labour productivity growth of 7.58% for the period of 1960-1973, 4.00% was accounted for by capital deepening.<sup>12</sup>

The very high saving ratios in the 1950s and 60s resulted in high capital accumulation, which increased national income, but at the same time made the prices of consumption goods, especially durable consumer goods such as washing machines, refrigerators, TV sets, and cars, increasingly cheaper. With increasing urbanisation, this virtuous circle enlarged the domestic market, which in turn called for further investment in manufacturing.<sup>13</sup> Thus, the era of high economic growth was accompanied by accelerating industrialisation and saw the country joining the club of developed countries, until the domestic market reached a saturation point and the economy was hit by the oil crisis of 1973-4. However, this did not mark the end of growth through industrialisation. Japan's response to the energy crisis in the subsequent decade was impressive and she was able to outperform most of the developed countries up until the beginning of the 1990s. As table 3 below shows, the rate of THP growth in the manufacturing sector remained well above the level of 1 per cent per annum until 1990.

Much attention has been paid to industrial policy of the government, especially those

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<sup>12</sup> D. W. Jorgenson and K. Nomura, "The Industry Origins of Japanese Economic Growth," *Journal of the Japanese and International Economies*, vol. 19 (2005) pp.482-542.

<sup>13</sup> H. Yoshikawa, *Macroeconomics and the Japanese Economy* (Oxford: Oxford University Press, 1995).

formulated by the Ministry of International Trade and Industry (MITI) in relation to the phenomenal growth of this period. According to the proponents of this view, it was the government ministries who prescribed which industries should be promoted, protected, or phased out, and the prescriptions were dispensed through guidance with a small amount of subsidies.<sup>14</sup> There is some suggestion that the MITI played a certain role in the early stage of the computer industry, and that a disproportionately large amount of subsidies given to coal mining, textiles and other declining industries made their phase-out socially less costly.<sup>15</sup> Given the empirical evidence, however, the role of the state in this period seems to have been exaggerated. The principal player of the era of high growth was the manufacturing industries who made large amounts of investment in plant and equipment on their own initiative.

## 2.2 The Japanese system of employment and skill formation

This era also saw the rise of manufacturing firms on the international scene. Toyota, Toshiba, Sonny—to name but a few—became internationally known since then. All these, as well as other giant but less colourful firms in steel and shipbuilding, made heavy investment in introducing the most advanced packages of technology of the day. This represented a move towards mass production and, at the shop floor level, the installation of conveyor systems which, eventually, led the way to automation. Indeed, the 1950s and 60s was a period of Americanisation. A number of business missions were sent to the USA. It is interesting to note that missions organised by such bodies as the Japan Productivity Center included even union representatives as members. And the packages imported were not just about technologies but also workplace and other plant management techniques.

However, this drive for mass production did not necessarily result in de-skilling of the workforce. In US manufacturing, historically, all sorts of management practices aimed at mass production, culminated in the Ford system, have tended to take skills away from the shop floor. Whenever a new scheme was introduced, as William Lazonick notes, steps were taken ‘to ensure that new skills would be in the possession of those who were part of the managerial team rather than those who labored for wages on the shop

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<sup>14</sup> See for example Chalmers Johnson, *MITI and the Japanese Miracle: The Growth of Industrial Policy 1925-1975* (Stanford: Stanford University Press, 1983).

<sup>15</sup> R. Beason and D.E. Weinstein, “Growth, economies of scale, and targeting in Japan (1955-1990)”, *Review of Economics and Statistics*, vol.78, no.2 (1996), pp. 286-295.

floor'.<sup>16</sup> As a result, engineers and other types of salaried employees grew over the decades of the twentieth century, while the conveyor system degraded shop-floor workers into 'interchangeable parts'. Japanese manufacturing firms of the 1950s and 60s were fully aware that mass production would bring in economies of scale, but at the same time, they did not see workers as 'interchangeable parts'; they did not want the workers to become totally de-skilled.

First of all, a steady increase in human capital formation through the pre-war expansion of primary schooling bore fruit in this post-war period, especially in the era of high economic growth, 1955-70. Compulsory schooling became nine years by a post-war reform. As figure 7 shows, men's average schooling, i.e. average schooling years of the whole male workforce, reached that level before 1960 and women's during the 1960s. Post-war firms must have benefited a great deal from public investment made by education authorities in the pre-war period.

More significant, however, is the fact that Japanese managers did not follow the American prescription in the area of skill management. As Lazonick puts it, 'Like the British, Japanese managers have left considerable skill on the shop floor'.<sup>17</sup> Japanese firms invested in raising workers' *firm-specific* skills. A case in point is a system developed by Toyota, the car manufacturing giant. The Toyota production system, originated probably from post-war 'Quality Control' movements, gives more importance to factory workers than its pre-war predecessor, the Ford system. It attaches prime importance to work teams, not just as a coordination unit, but also as a monitoring unit for any stoppage in the production line, mechanical breakdowns and any other unusual events at the workplace, and also as a source of workplace improvements and innovations. Workers are encouraged to judge and act as a team beyond what is stated in work manuals. To put differently, they are encouraged to accumulate firm-specific skills over an extended period, and this attitude towards shop-floor skills is not confined to the auto industry. Indeed, it is commonplace for most manufacturing companies to train workers on the job and to allow them to broaden and enrich their knowledge and skills, mostly firm-specific, by working for the same firm over their work career. Japanese management has thus integrated shop-floor workers into the long-term

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<sup>16</sup> W. Lazonick, *Competitive Advantage on the Shop Floor* (Cambridge, Mass.: Harvard University Press, 1990), p.229.

<sup>17</sup> Lazonick, *op.cit.* p.23. In British manufacturing, both skill training and the organisation of labour were practically in the hands of trade unions.

evolution of the manufacturing industry.<sup>18</sup>

Such workplace practices are closely related to the internal wage structure. A seniority-based wage scheme, adopted by a majority of Japanese firms, reflects the way in which skills are formed in Japanese manufacturing. Under the seniority wage system, the length of service is a crucial, but not the only, factor determining the wage level. For promotion, however, personal achievement is also important and, since it is likely to be associated with acquired skills over the past years, the system encourages workers to exert themselves to accumulate more and to stay on in the same firm, leading to longer-term employment. It is debatable if the firms of the period in question really made a decision to guarantee life-long employment, but it seems likely that both management and unions preferred stable employment to fluctuating wages.<sup>19</sup> However, *Asia's New Giant*, a Brookings Institution publication of the mid-1970s, went further to proclaim that it was

‘a completely rational policy in terms of costs and profits for large Japanese employers, and that although workers welcomed the job security that it brought, ... the main reason for its survival has been economic *efficiency*’.<sup>20</sup>

The ‘efficiency’ is also guaranteed by the use of temporary employees and subcontracting. And it is these subcontractors who constitute the lower tiers of the so-called dual structure, which has long characterised Japan’s industrialisation process since the 1920s. According to *Asia's New Giant*, ‘one of their functions is to bear the initial shock of fluctuation in demand, reducing the burden of the employment commitment borne by the major producers’.<sup>21</sup> This diagnosis is not incorrect, as many such subcontractors are small in size, much less capital intensive, and hence low in wage rates, with no commitment in life-long employment. What the authors did not see at that time, however, is that it was part of the hierarchically structured relationships between manufactures/assemblers and suppliers, under which technological knowledge tends to flow from the large to the small and medium. Also important is that they too are skill intensive in a different manner from what large manufacturing firms have been practising. Most of such small and medium-sized enterprises take school leavers as

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<sup>18</sup> For the concept of ‘skill’ described here, see K. Koike, *The Economics of Work in Japan* (Tokyo: LTCB International Library Foundation, 1995), especially ch.1.

<sup>19</sup> K. Odaka, “‘Japanese-style’ labour relations”, Okazaki and Okuno-Fujiwara, *op.cit.* ch.5.

<sup>20</sup> W. Galenson and K. Odaka, “The Japanese labor market”, in H. Patrick and H. Rosovsky, eds., *Asia's New Giant: How the Japanese Economy Works* (Washington, D.C., The Brookings Institution, 1976), p.619. Emphasis added.

<sup>21</sup> *Ibid.* p.621.

de facto factory apprentices. They too acquire skills on the job, which are more specialised and complementary skills—some firm-specific, some not; and levels of such workers have turned out to be extremely high. This, together with active networking within the industrial cluster (or Marshall’s ‘industrial district’), has made the small and medium sector a vital component of Japan’s whole industrial system.

All this seems to suggest, therefore, that the whole system, formed in the era of industrialisation by integrating the labour-intensive and skill-intensive segments into the capital-intensive and skill-using mode of production, was not just efficient but also conducive to productivity growth in Japanese manufacturing.

### 3. The era of deceleration: 1973-2006

From the mid-1970s on, Japan’s economic growth decelerated. The average annual rate of growth in real GDP was 9.3% for 1955-73, 3.8% for 1973-91, and 1.1% for 1991-2005. Various factors caused the deceleration. First, by the early 1970s, the level of total factor productivity (TFP) in the machinery, chemical and metal industries had almost reached the US level and the technological catch-up process in the manufacturing sector slowed down.<sup>22</sup> Second, after the 1960s, by which the baby boomer generation had entered the workforce, the growth of the population in the working age of 15-64 declined quickly (figure 8). In fact, while the working age population grew by an average of 1.7% annually between 1955 and 1973 and was still 0.7% between 1973 and 1995, since then it has actually been shrinking at an average annual rate of 0.3%. As we have already seen, capital deepening was a factor that accounted for much of Japan’s rapid economic growth. Usually, the marginal productivity of capital and the rate of return to capital will decline as capital deepening continues, so that, as is well known, countries cannot maintain rapid growth by capital deepening forever. In the Japanese case, however, thanks to her still high saving rates, capital deepening continued even in this era of deceleration. At the same time, it should be noted that she also suffered a serious decline in the rate of return to capital (figure 9) with private sector investment weakened (figure 11).<sup>23</sup> In the case of the manufacturing sector, especially, capital

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<sup>22</sup> D. Jorgenson, M. Kuroda and M. Nishimizu, “Japan-U.S. industry-level productivity comparisons, 1969-1979”, *Journal of the Japanese and International Economies*, vol. 1, no. 1, pp. 1-30 (1987).

<sup>23</sup> It is worth reporting here that among OCED countries only Japan and Korea experienced very rapid capital deepening and a swift decline in the rate of return to

formation became so small that the net real capital stock recorded a decline in the period of 2000-02.<sup>24</sup>

The negative effects of the above-listed factors on Japan's economic growth can be shown by decomposing growth into its components in a growth accounting exercise. Table 3 indicates that all three factors contributed to the decline: labour service input growth (both in man-hours and in labour quality), capital service input growth, and TFP growth all slowed down or turned negative. Among the three factors, the decline in capital service input growth is the largest and appears to be the main cause of Japan's deceleration. But it should be remembered that capital accumulation is endogenously determined and the slowdown in labour service input growth and TFP growth reduced the rate of return to capital and brought about a rapid decline in capital accumulation. Table 3 also shows that in the 1970s and 80s, the manufacturing sector enjoyed higher TFP growth than the non-manufacturing sector, but that in the 1990s and early 2000s, TFP growth in the manufacturing sector also stagnated. The swift decline in TFP growth in the manufacturing sector can be partly explained by the idling of capital stock, which was caused by the recession in this period. However, even taking account of the decline in the capacity utilization rate of capital, we obtain a similarly rapid declining trend in TFP growth in the manufacturing sector.

Manufacturing industries usually enjoy higher TFP growth and are generally more capital intensive than the other sectors. De-industrialization, therefore, will lower a country's rate of TFP growth and of capital deepening, thus decreasing the overall rate of economic growth. Like other developed countries, Japan experienced continuous de-industrialization and an expansion of the service sector. As figure 11 shows, the period after 1970 saw de-industrialization accelerated twice. The first acceleration occurred after the first oil shock and the second after the burst of the "bubble economy" in 1992. The second acceleration in de-industrialization seems to have been caused by a decline in the domestic demand for investment goods as well as Japan's direct investment abroad. In the 1990s, Japanese firms relocated production to other Asian countries (primarily the ASEAN countries and China) in order to lower wage and other production costs. In the case of the electrical machinery industry, especially, there was a sharp increase in overseas production and a decline in domestic production and net

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capital. See H. K. Pyo and K. H. Nam, "A test of the convergence hypothesis by rates of return to capital: evidence from OECD countries", mimeo. (Seoul: Seoul National University, 1999).

<sup>24</sup> JIP Database (<http://www.rieti.go.jp/database/d04.html>).

exports in the period 1990-2003. Since it is mainly large productive firms that invested abroad, this relocation of production may well have led to the closure of productive establishments in Japan. Many establishments could not survive in the period 1990-2003. Only 44% of all the establishments which existed in 1990 survived until 2003 and not many new establishments were opened during this period. As a result, the number of establishments declined by 33%. It is important to note that the survival rate is not high even in the case of establishments in the top labour-productivity group in each manufacturing sectors. From 1990 to 2003, only 47% of establishments survived by 2003, of all those ranked in the top three deciles in each of the 50 manufacturing sectors at the time of 1990.<sup>25</sup>

In addition to the supply-side factors, which we listed above, there was a demand-side factor that further decelerated Japan's economic growth in the 1980s and 90s, namely, Japan's excess saving problem. Although private (gross) investment declined in the 1980s and 90s, the private (gross) saving rate remained at a high level (figure 11). This growing saving-investment balance created an excess supply of domestic product and kept Japan at a continuous risk of recession. There were three ways in which the excess saving was used. In the early 1980s, Japan used the excess saving for the accumulation of foreign assets. In figure 11, this is reflected as a huge current account surplus. But trade imbalance with the US caused serious trade frictions, which resulted in a realignment of yen-dollar rates after the Plaza Accord of 1985. Frightened by unprecedented yen appreciation and pushed by pressure from the US government, Japan's monetary authority excessively relaxed its monetary policy, thus causing "bubble" phenomena in the late 80s economy. In the "bubble" years, Japan's excess saving was used for fixed capital formation (figure 11), especially in the real estate sector. As a result of the burst of the bubble in 1992 brought on by excessively tight monetary policy, Japan was left with a huge unproductive capital stock and mountains of non-performing loans. In order to mitigate deflation, the Japanese government substantially expanded fiscal expenditure. The excess saving was thus used to finance government debt (figure 11). Although the major uses of the excess saving successively changed during the 1980s and '90s, Japan always faced the problem of a scarcity of final demand during this period and suffered economic stagnation except during the "bubble economy" of the late 80s.

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<sup>25</sup> K. Fukao, Y. G. Kim and H. U. Kwon, "Plant Turnover and TFP Dynamics in Japanese Manufacturing", Hi-Stat Discussion Paper Series, no.180, (Tokyo, Hitotsubashi University, 2006).

#### 4. Outlook for the future

Having had a quick look at the history of Japan's economic development and recent trends, we are now in a position to speculate on the outlook for Japan's future. Most of the factors which have led to the deceleration of economic growth are likely to continue for a long while. Japan's working age population is expected to shrink at an average annual rate of 0.8% in the next twenty years. There are no signs that the slowdown in the rise in schooling years will be reversed in the near future. Although Japan experienced a rapid decline in private investment in the last decade, her capital-labour ratio is still at the global top and we can expect no further substantial capital deepening. As the baby boomers retire, the ageing and shrinking of the population will create social friction and pose an economic burden in near future. Many economists expect a continuous decline in the saving rate and a shrinking of the current account surplus. The shrinking of the current account surplus will accelerate Japan's de-industrialization.

There are a couple of positive exceptions in this long list of negative trends. One is that the ageing of Japan's population will rid the economy of the excess saving problem. More important, perhaps, is the other sign which concerns the way in which production skills are utilised, the linchpin of the 'high growth era' regime. Despite the recent fuss about 'new Anglo-American models' of employment practices, the so-called Japanese system will continue to be used by major manufacturing firms such as Toyota and Canon. A telling example is that in recent years a growing number of manufacturing companies started employing a new production system called 'cell production'. This involves a small team of skilled workers (usually two to five) performing multiple production tasks, placing more emphasis on workers' skills rather than line structures and, thus, reversing the previous trend towards automation and conveyor systems.<sup>26</sup> Although it is premature to predict that this would become *the* new model for Japanese manufacturing in the twenty-first century, the evidence suggests that Japanese manufacturing firms are determined to respond to the prolonged stagnation after the 'bubble' years and to improve manufacturing efficiency by adopting a new model which

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<sup>26</sup> K. Isa and T. Tsuru, "Cell production and workplace innovation in Japan: toward a new model for Japanese manufacturing?", *Industrial Relations*, vol.41, no.4 (2002), pp.548-578.



is indeed a variant of the traditional system centred on human skills.

Whatever the trend in manufacturing, however, its share is shrinking. Thus, productivity growth in the non-manufacturing sector will be a key for a prosperous future. Are Japanese non-manufacturing industries productive? Do they have as good a record as manufacturing industries? How do their productivity levels fare if compared with other countries'?

The Japan Industry Productivity (JIP) Database tells us that TFP growth in the non-manufacturing sector has been sluggish for the 1970-2002 period. Figure 12 shows that even in this period of de-industrialisation the rate of productivity growth was unmistakably higher in the manufacturing sector than in the non-manufacturing sector. This is a finding which casts doubt upon the conventional interpretation that structural change is a consequence of changing differentials in productivity and earnings. In the Japanese case, it is likely that the on-going growth of the service economy is not a result of any surge in productivity growth within the sector. Admittedly a close look at figure 12 reveals that in the most recent period of 2000-2002 the gap between the sectors narrowed, but it is hazardous to make a prediction from this short-term change. Moreover, a recent work by Baily and Solow on industry-level TFP and labour productivity of major developed countries in the 1990s offers us a similarly depressing picture.<sup>27</sup> According to table 4, the TFP and labour productivity levels of Japan's manufacturing industries are very high (except in the case of food processing). In contrast, the labour productivity levels in non-manufacturing industries such as retail and construction, are well below the levels in the US and major EU countries. Of course, the tendency for non-manufacturing's productivity growth lags behind manufacturing *per se* is no surprise, but what the Baily and Solow paper has revealed is that in Japan the productivity gap between the two sectors is unusually wide.

This can be a legacy from the past. Although it is not easy to conduct international comparisons for the past century, it is possible to show how Japan's sectoral differentials in labour productivity changed over the period before 1960. Kuznets's classic work on *Economic Growth of Nations* contains tables showing changing shares of sectors in national product and workforce in various countries.<sup>28</sup> Although few has

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<sup>27</sup> M.N. Baily and R.M. Solow, "International productivity comparison built from the firm level", *Journal of Economic Perspectives*, vol. 15, no. 3 (2001), pp. 151-172.

<sup>28</sup> S. Kuznets, *Economic Growth of Nations: Total Output and Production Structure* (Cambridge, Mass.: Harvard University Press, 1971). Although those data were revised

ventured so far, it is tempting to calculate from those data changing sectoral differences in average labour productivity for the countries concerned. For example, percentage figures for Japan are: in 1872, the share of primary employment was 85% who, according to statistics of 1880, produced 63% of total output, while secondary and tertiary workers, 6% and 9% of the total workforce, produced 16% and 21% of the national product respectively; in 1950, the distribution of employment between the primary, secondary and tertiary sectors became 48%, 27% and 25% while the shares in national product were 26%, 39% and 35% respectively. All this seems to suggest that productivity differentials between the primary and the non-primary sector were substantial in the initial stage, and that the differentials narrowed over time.

Figure 13 sets out changing productivity differentials relative to the primary sector, implied by the percentage figures in the Kuznets tables, as Path I. They do indicate that in the 1870s average labour productivity in manufacturing and services was more than three times as high as that of the primary sector, and that the general trends thereafter were on the decrease although the differential for manufacturing turned sharply up from 1950 to 1960. Intuitively, the result is against what we know as Petty's Law. According to Petty's observations made more than three hundred years ago, and also to Colin Clark's painstaking work done in the early twentieth century, the centre of gravity in economic activity will shift from agriculture to manufacturing, and then to services, as labour productivity rises accordingly, but what Path I shows is exactly the opposite. This is because the employment data Kuznets relied on are compiled according to the worker's principal occupation: no allowance was made with respect to his or her subsidiary occupation. Indeed, as Thomas Smith and other economic historians have argued,<sup>29</sup> by-employment was widespread in Tokugawa and Meiji society where more than 80% of the working-age population were classified as 'farmers'. But the term 'farmer' was so omnibus that it is difficult to know to what extent such by-employments were hidden from ordinary occupation tables. Fortunately, there is a pilot census for one province called Kai (present-day Yamanashi prefecture) taken in 1879, in which not just principal but subsidiary occupations were enumerated. Table 5 summarises occupational interrelationships between the sectors in a matrix form. On the face of it,

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by Ohkawa and his associates, it is still worth using the Kuznets tables since the LTES volumes do not include series before 1885.

<sup>29</sup> T.C. Smith, *Native Sources of Japanese Industrialization, 1750-1920* (Berkeley: University of California Press, 1988), ch.3, and O. Saito, "Pre-modern economic growth: Japan and the West", GEHN Working Paper series, no.16 (Department of Economic History, LSE, 2005). A revised version of the latter is available upon request.

the sectoral inter-exchange of labour in the form of by-employment was not particularly extensive; in reality, however, since the size of the agricultural sector was overwhelming, 11% of the 194,000 'farmers' who were by-employed in industry represented a substantially large proportion of the workforce of the manufacturing sector. Based on this Kai evidence, and on the assumption that any by-employed person devoted 50% of his or her labour to one sector and the rest to another, re-calculation is made for the 1870s. Then an additional assumption is made that by 1925 any workers in the secondary and tertiary sectors ceased to have subsidiary occupation, while still 10% of the primary workers had non-primary by-employment (with two-thirds to the secondary and one-third to the tertiary sector); and no adjustment is made for the post-war benchmark years of 1950 and 1960.

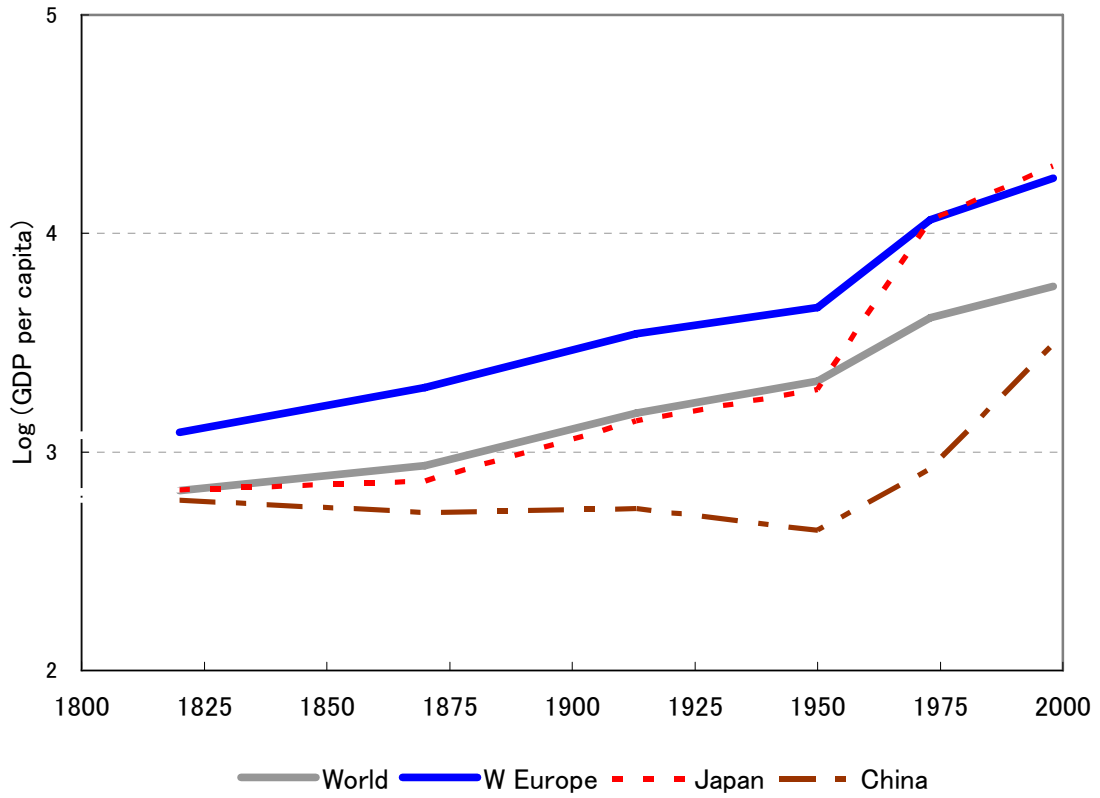
The results are shown in figure 13 as Path II. Crude as this exercise may be, the revealed pattern of productivity differentials appears more reasonable. First, the initial levels of productivity in manufacturing and services relative to agriculture's were far lower than previously thought. Second, the differentials increased as industrialisation proceeded. Third, there was virtually no rise in the differentials during the period between 1925 and 1950, but it should be explained by disturbing effects of war in the period of 1940-45. More interesting in this context, however, is the relationships between the manufacturing and service sectors. The manufacturing-services differential increased gradually as industrialisation took off in the early twentieth century, which is a finding consistent with Colin Clark's observation based on nineteenth- and early twentieth-century data.<sup>30</sup> Then, the productivity differentials between the two sectors unmistakably widened with the phenomenal growth of the manufacturing sector since 1950. In other words, it is likely that the unusually wide productivity gap Baily and Solow found for Japan in the 1990s can be traced back to the beginning of the high growth period. In manufacturing, as we have seen, unprecedented capital deepening was accompanied by the establishment of a very Japanese mode of skill formation at the shop floor level. In contrast, commerce and services seem to have remained relatively labour intensive. Of course, the sector is diverse and the ways in which value added is created are very different from those in manufacturing. Some of the trades in the sector are skill intensive as well as labour intensive, but even in those

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<sup>30</sup> C. Clark, *The Conditions of Economic Progress*, 2nd edn (London: Macmillan, 1951), ch.vii. One exception the author noted is Britain between 1837 and the 1860s. During that period, the rise in productivity of tertiary industry was swifter than that of manufacturing industry, which he thought, must have been 'due no doubt to the introduction of railway and steamship transport' (p.315).

skill-oriented areas it seems that there emerged no organisational innovation comparable to the Toyota production system in manufacturing. Unless a new, promising regime of productivity growth would emerge in the expanding service sector, therefore, Japan's outlook for the early twenty-first century would not be very bright.

Figure 1. Japan's GDP per capita in the global context, 1820-1998



Source: A. Maddison, *The World Economy: A Millennial Perspective* (Paris: OECD Development Centre, 2001), table B-21.

Table 1. Capital formation ratios in the private and state sectors

Year	Percentage of GNE		
	Overall	Private	State
1888	9.2	7.6	1.6
1900	11.7	7.7	4.0
1910	15.1	9.7	5.4
1920	19.3	13.1	6.2
1930	17.0	9.1	7.9
1938	26.2	14.5	11.7

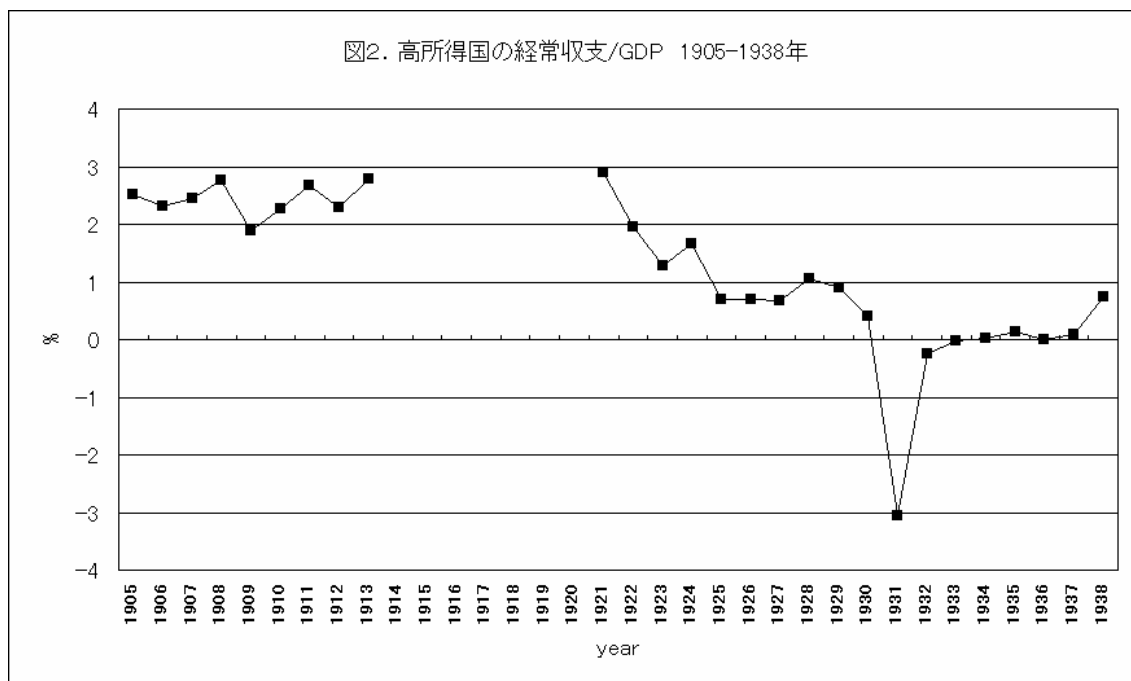
Source: R. Minami, *The Economic Development of Japan: A Quantitative Study* (London: Macmillan, 1986), pp.174-75. Percentages of real GNE.

Table 2. Government expenditure as a percentage of GNE/GDP: Japan and UK

Japan		UK	
Year	%	Period	%
1888	12	1861-1880	7
1900	17	1881-1900	9
1910	22	1901-1920	19
1920	18	1921-1938	15
1930	26		
1938	37		

Source: Minami, *op.cit.* pp.333, 337. Japanese figures are percentages of GNE while British figures are those of GDP.

Figure 2. Current account surplus-GDP ratio of the developed country group (countries whose per capita GDP in 1990 Geary-Khamis dollars is greater than 50% of the US level): 1905-1938

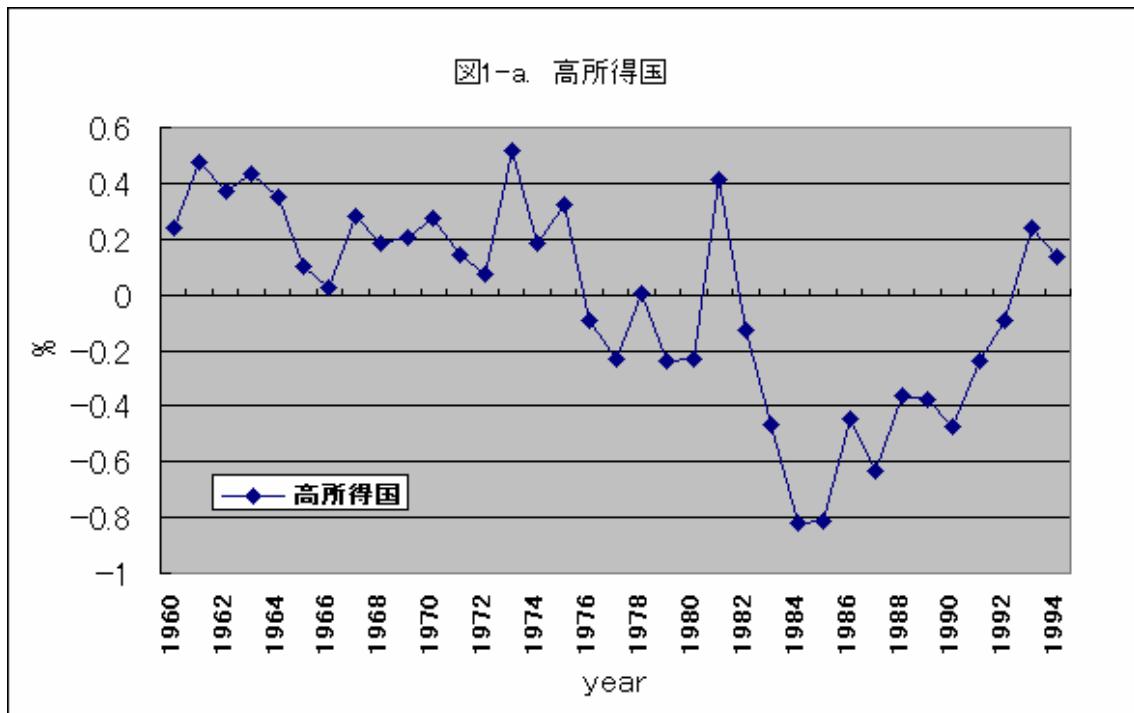


Source:

Per capita GDP: A. Maddison, *The World Economy: A Millennial Perspective* (Paris: OECD Development Centre, 2001)

Current account surplus-GDP ratio: B. R. Mitchell, *International Historical Statistics: Europe, 1750-1988*, (New York: Stockton Press, 1992), *International Historical Statistics: The Americas, 1750-1988, Second Edition* (New York: Stockton Press, 1993), *International Historical Statistics: Africa, Asia and Oceania, 1750-1988, Second Revised Edition* (New York: Stockton Press, 1995).

Figure 3. Current account surplus-GDP Ratio of the developed country group (countries whose per capita GDP in 1990 Geary-Khamis dollars is greater than 50% of the US level): 1960-1994

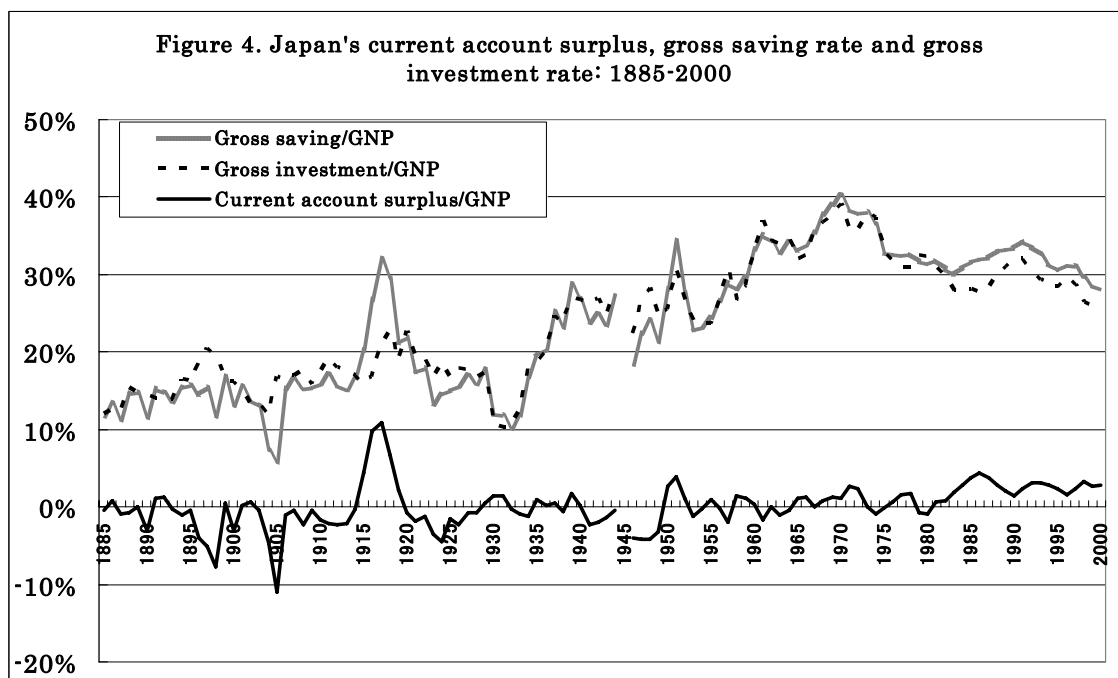


Source:

Per capita GDP: A. Maddison, *The World Economy: A Millennial Perspective* (Paris: OECD Development Centre, 2001)

Current account surplus-GDP ratio: IMF, *International Financial Statistics*, various issues.



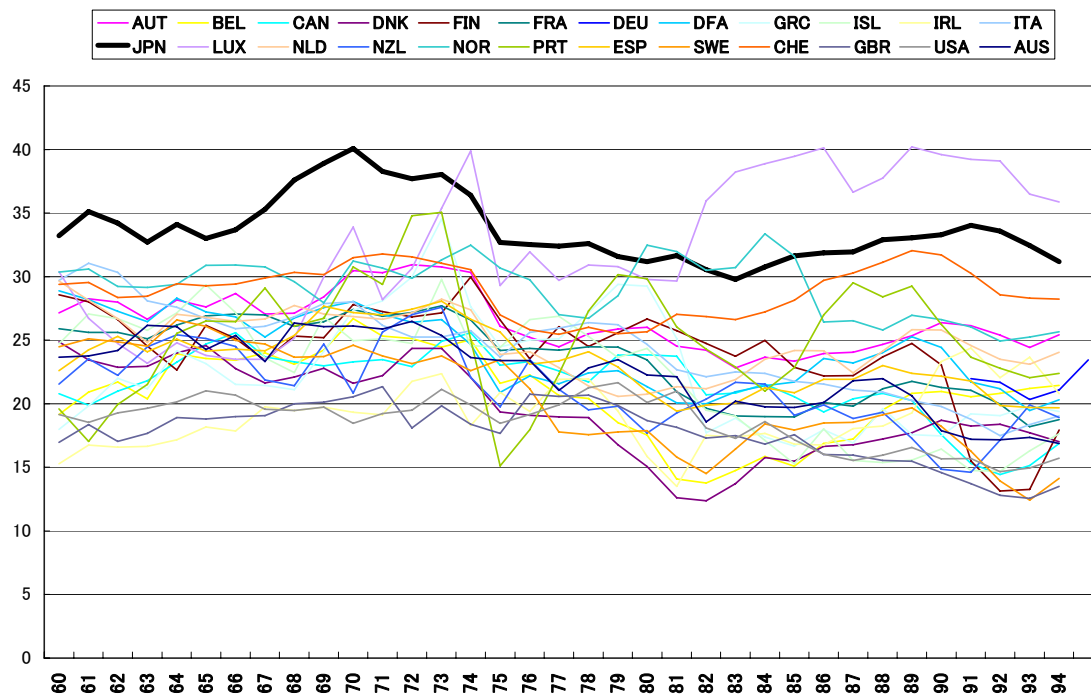


Sources: Data for 1885-1929: K. Ohkawa et al., *Long-Term Economic Statistics of Japan*, Vol. 1: *National Income* (Tokyo: Toyo Keizai Shimpō-sha), p. 178.

Data for 1930-1954: Ohkawa et al., *op.cit.* p. 179.

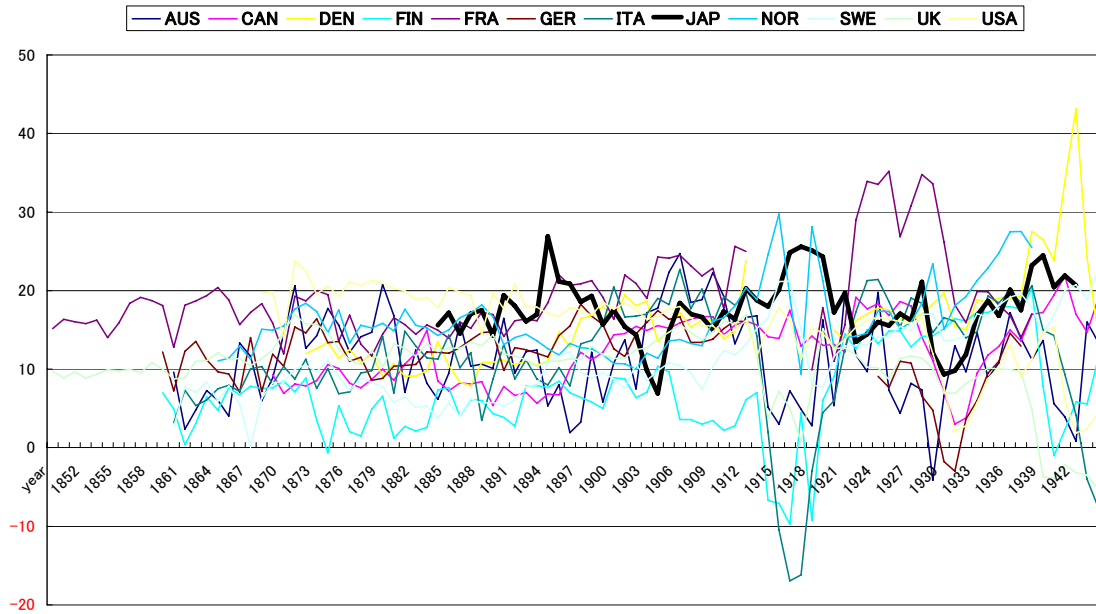
Data for 1955-2000 on 1968 SNA basis: Department of National Accounts, Economic and Social Research Institute, Cabinet Office, Government of Japan, *Annual Report on National Accounts 2006* (Tokyo).

Figure 5. Gross national saving rate [%] of GNP: 1960–1994



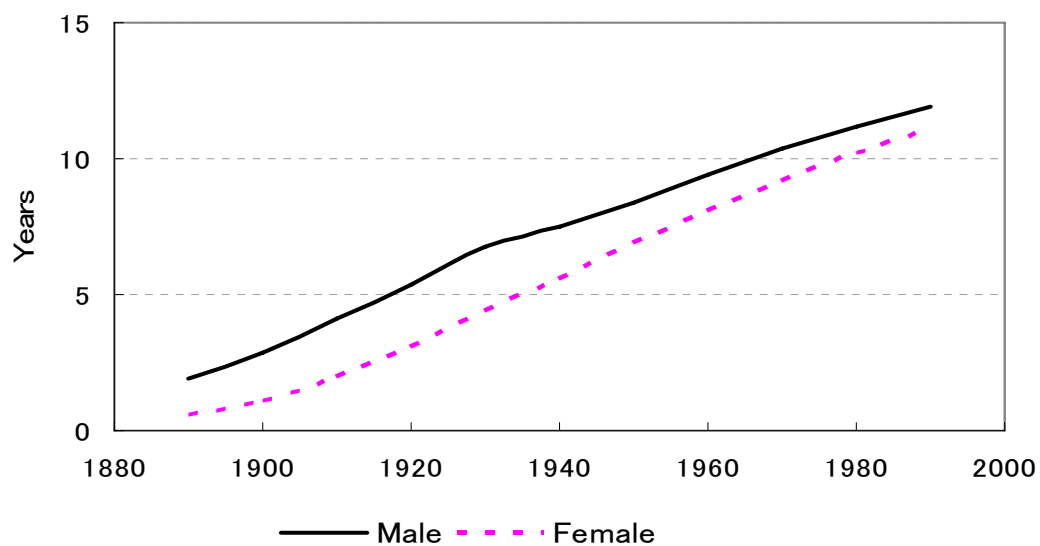
Source: World Bank, "World Bank, World Saving Database".

Figure 6. Gross domestic saving rate [%] of GDP: 1850-1946

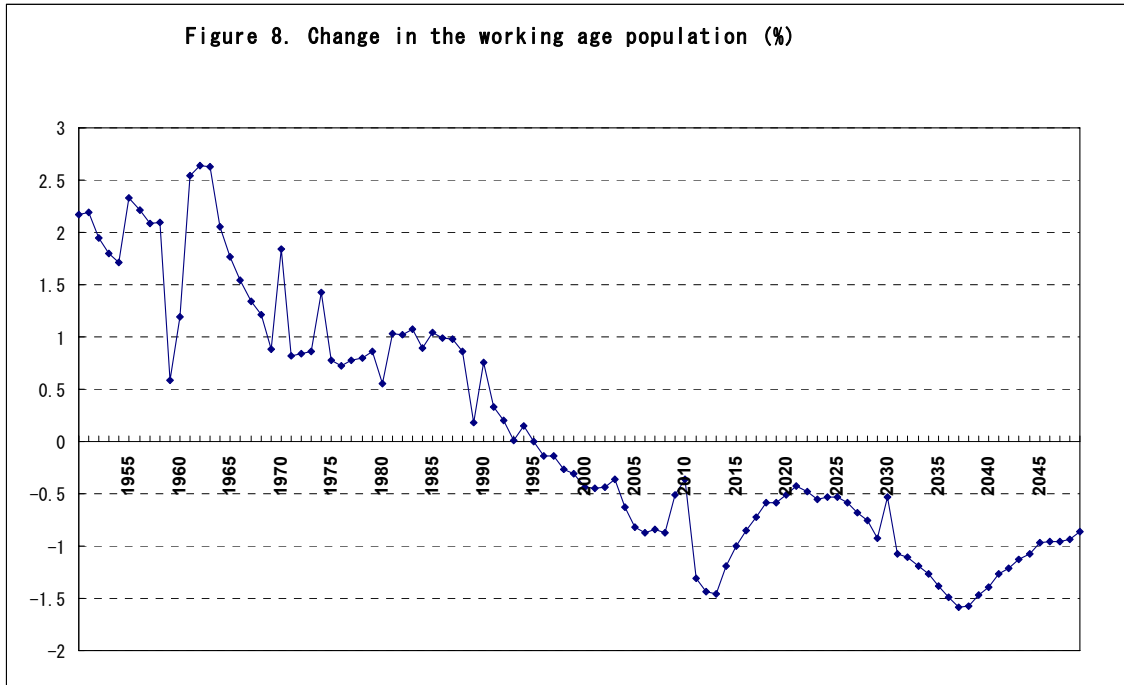


Source: Matthew T. Jones and Maurice Obstfeld, "Saving, Investment, and Gold: A Reassessment of Historical Current Account Data," in *Money, Capital Mobility, and Trade: Essays in Honor of Robert Mundell*, edited by Guillermo A. Calvo, Rudi Dornbusch, and Maurice Obstfeld (Cambridge, MA: MIT Press, 2001).

Figure 7. Changes in average schooling, 1880-1990

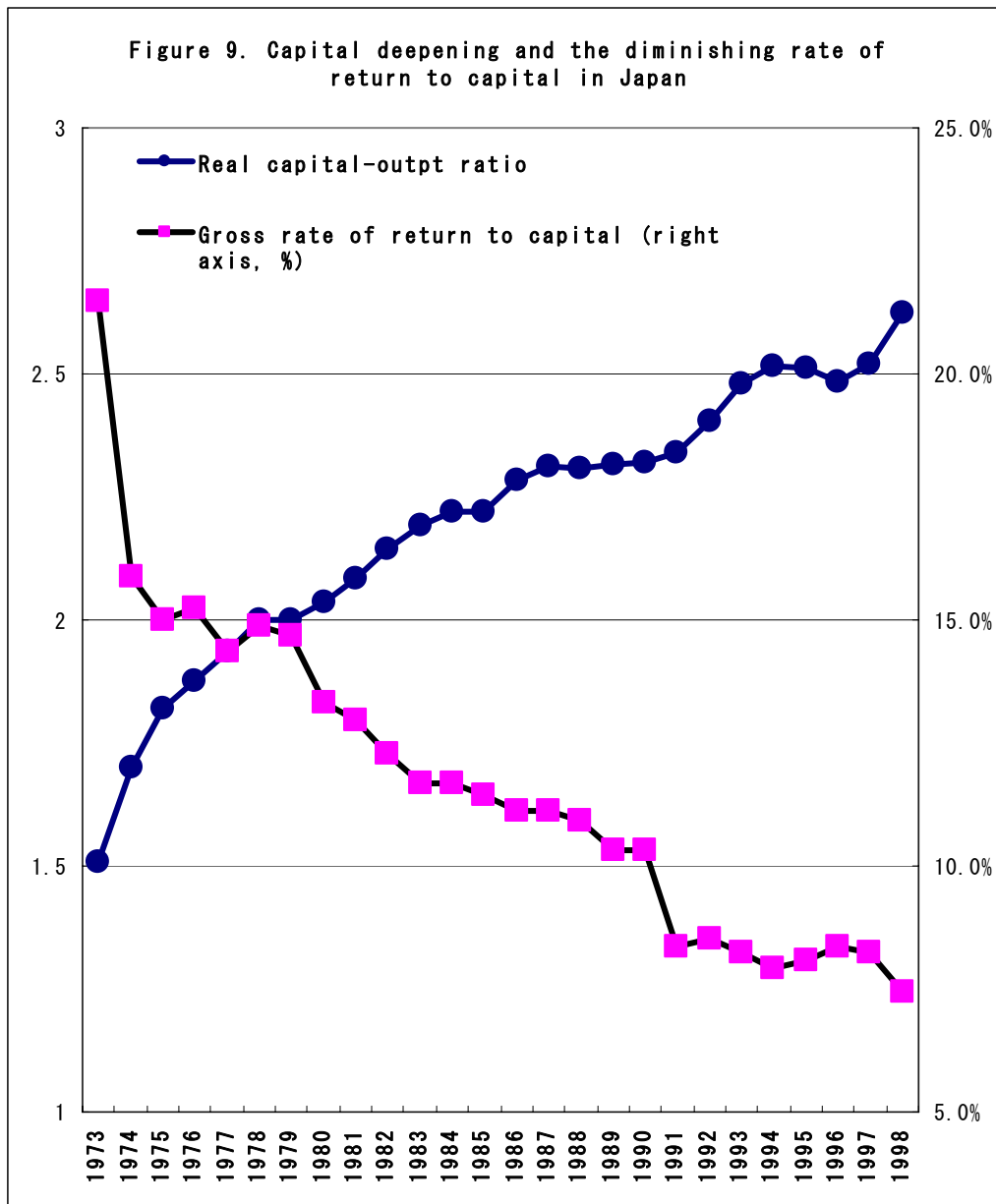


Source: Y. Godo and Y. Hayami, "Catching up in education in the economic catch-up of Japan with the United States, 1890-1990", *Economic Development and Cultural Change*, vol.50 (2002), p. 965.



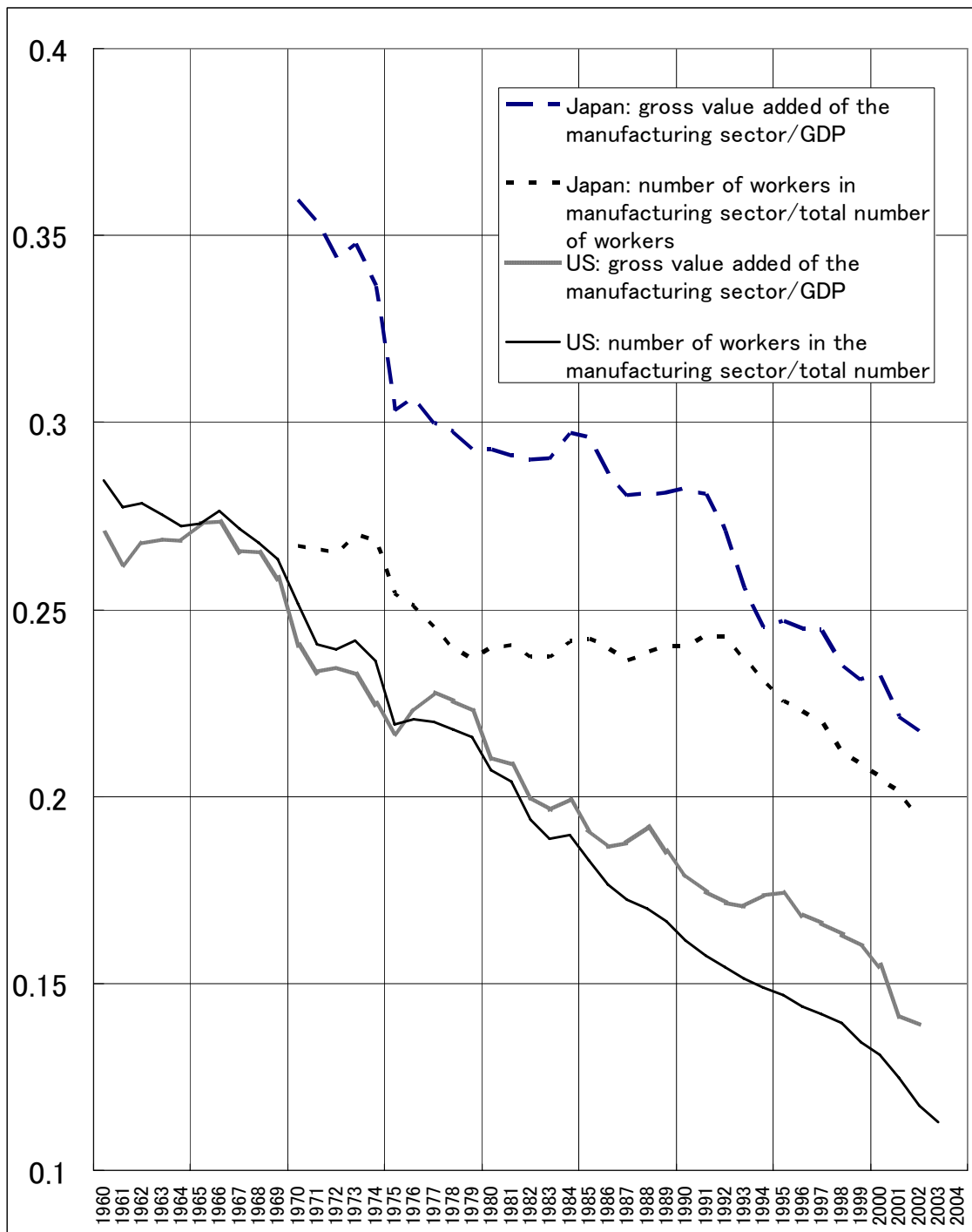
Note: The working age population is defined as those aged between 15 and 64.

Source: National Institute of Population and Social Security Research Database on Japan's Population.



Source: JIP Database (<http://www.rieti.go.jp/jp/database/d04.html>)

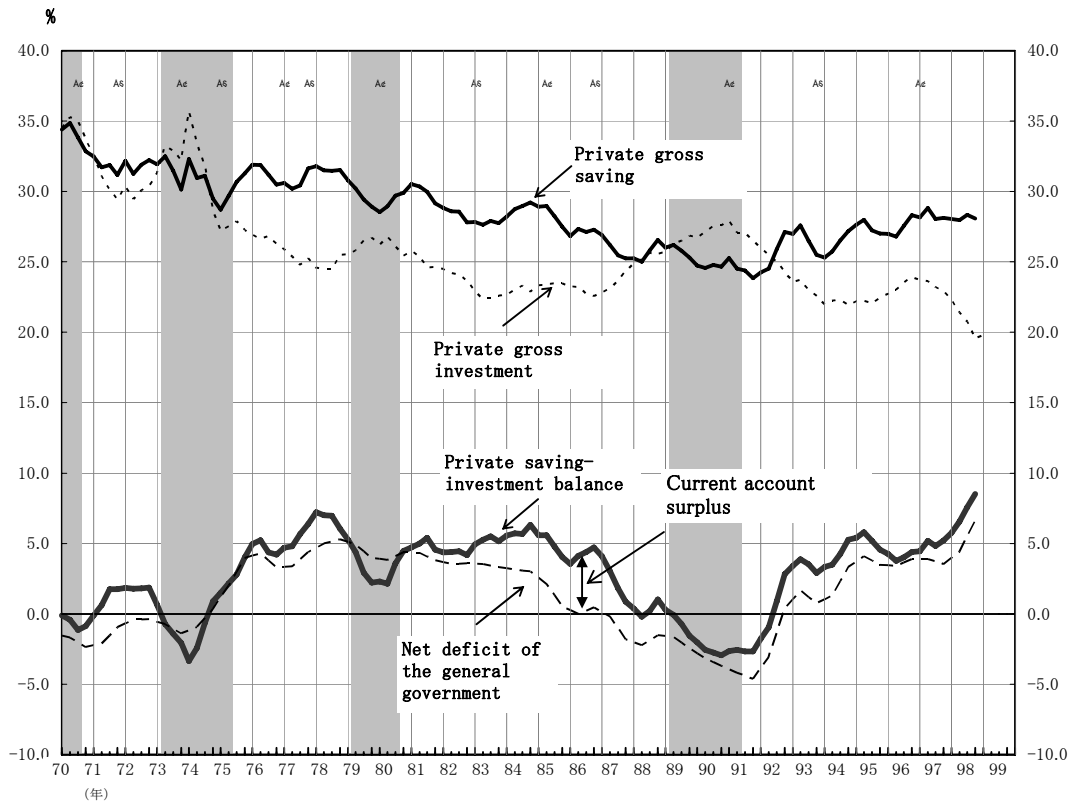
Figure 10. Share of manufacturing in the whole economy: Japan-US comparison



Sources: Department of National Accounts, Economic and Social Research Institute, Cabinet Office, Government of Japan, *Annual Report on National Accounts 2006* (Tokyo).

The Council of Economic Advisers, *Economic Report of the President 2005*.

Figure 11. Japan's saving-investment balance of the private sector and the general Government: 1970-2000 (percent of nominal GDP)



Source: Research and Statistics Division, Bank of Japan, *Major Economic and Financial Data CD-ROM 2000*, (Tokyo, Tokiwa General Service, 200)



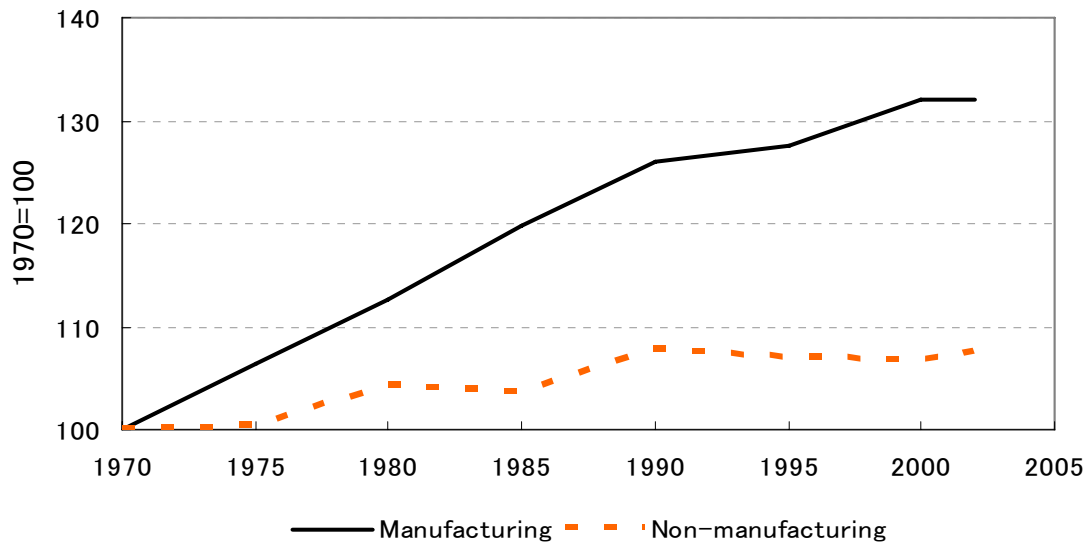
Table 3. GDP growth and its decomposition for the Japanese economy

	1970-75	1975-80	1980-85	1985-90	1990-95	1995-2000	2000-2002
<b>Real GDP Growth</b>	5.47%	5.69%	3.92%	4.91%	1.45%	1.27%	-0.22%
<b>Contribution of Labor Service Input Growth</b>	0.24%	1.35%	0.81%	0.68%	-0.01%	-0.06%	-0.98%
<b>Contribution of Man-hour Growth</b>	-0.42%	0.87%	0.31%	0.38%	-0.41%	-0.42%	-1.03%
<b>Contribution of Labor Quality Growth</b>	0.66%	0.48%	0.51%	0.30%	0.40%	0.36%	0.04%
<b>Contribution of Capital Service Input Growth</b>	3.59%	1.98%	2.12%	2.46%	1.41%	0.92%	0.37%
<b>Contribution of Capital Quantity Growth</b>	2.94%	2.06%	1.72%	1.87%	1.35%	0.79%	0.31%
<b>Contribution of Capital Quality Growth</b>	0.65%	-0.08%	0.40%	0.59%	0.05%	0.13%	0.06%
<b>TFP Growth of the Whole Economy</b>	1.64%	2.37%	0.98%	1.77%	0.04%	0.41%	0.39%
<b>TFP Growth of the Manufacturing Sector</b>	1.25%	1.13%	1.25%	1.01%	0.27%	0.68%	-0.03%
<b>TFP Growth of the Non-manufacturing Sector</b>	0.09%	0.74%	-0.11%	0.80%	-0.17%	-0.02%	0.30%

Note: Value-added growth rates are calculated by Laspeyres-type chain-linked index; the figures above therefore do not match those of the government SNA statistics. TFP growth rates of the manufacturing sector and that in the non-manufacturing sector are gross output base. TFP growth rates of the whole economy is value added base. Because of this difference, TFP growth rates of the whole economy are usually higher than weighted average of the TFP growth rates of the two sectors.

Source: K. Fukao, S. Hamagata, T. Inui, K. Ito, H. U. Kwon, T. Makino, T. Miyagawa, Y. Nakanishi, and J. Tokui, "Estimation Procedures and TFP Analysis of the JIP Database 2006 Provisional Version," paper presented at the 3rd Meeting of the EU KLEMS Consortium, May 17-9, 2006, Valencia.

Figure 12. Total factor productivity growth in the manufacturing and non-manufacturing sectors, 1970-2002



Source: JIP Database. See table 3 above.

Table 4

Panel A  
**Manufacturing Productivity Relative to the United States by Country**

	<i>Auto</i>	<i>Food Processing</i>	<i>Steel</i>	<i>Semiconductors</i>	<i>Computer</i>	<i>Consumer Electronics</i>	<i>Beer</i>	<i>Metalworking</i>	<i>Soap and Detergent</i>
U.S.	100	100	100	100	100	100	100	100	100
Germany	93 <sup>c</sup> (84)	95 <sup>b</sup> (84)	100 <sup>a</sup>	n.a.	89 <sup>a</sup>	62 <sup>a</sup>	44 <sup>a</sup>	100 <sup>a</sup>	88 <sup>a</sup>
Japan	145 <sup>c</sup> (127)	35 <sup>e</sup> (42)	121 <sup>c</sup> (110)	43 <sup>e</sup> (49)	95 <sup>a</sup>	115 <sup>a</sup>	69 <sup>a</sup>	119 <sup>a</sup>	94 <sup>a</sup>

Notes: Figures in parentheses are TFP. <sup>a</sup>1990; <sup>b</sup>1992; <sup>c</sup>1993–95; <sup>d</sup>1994; <sup>e</sup>1995; <sup>f</sup>1996; <sup>g</sup>1991–96.

Panel B  
**Service Sector and Construction Productivity Relative to the United States by Country**

	<i>Food Retail</i>	<i>General Merchandise Retail</i>	<i>Total Retail</i>	<i>Telecom</i>	<i>Retail Banking</i>	<i>Airlines<sup>i</sup></i>	<i>Software</i>	<i>Construction</i>
U.S.	100	100	100	100	100	100	100	100
France	118 <sup>a</sup> (118)	n.a.	96 <sup>b</sup>	51 <sup>a</sup> (49)	100 <sup>b</sup>	66 <sup>a</sup> (75)	53 <sup>b</sup>	80 <sup>b</sup>
Germany	n.a.	96 <sup>c</sup>	96 <sup>b</sup>	51 <sup>a</sup> (42)	85 <sup>b</sup>	66 <sup>a</sup> (75)	65 <sup>b</sup>	70 <sup>b</sup>
Japan	54 <sup>a</sup>	54 <sup>b</sup>	n.a.	82 <sup>a</sup> (51)	n.a.	n.a.	n.a.	45 <sup>d</sup>
Netherlands	n.a.	n.a.	95 <sup>b</sup>	n.a.	154 <sup>a</sup>	66 <sup>a</sup> (75)	59 <sup>b</sup>	100 <sup>a</sup>
U.K.	89 <sup>a</sup> (118)	82 <sup>c</sup>	103 <sup>b</sup>	49 <sup>a</sup> (70)	64 <sup>e</sup>	66 <sup>a</sup> (75)	n.a.	n.a.
Korea	27 <sup>a</sup>	32 <sup>f</sup> (60)	n.a.	83 <sup>a</sup> (58)	76 <sup>g</sup>	100 <sup>a</sup>	n.a.	69 <sup>a</sup>
Brazil	14 <sup>a</sup>	n.a.	n.a.	41 <sup>a</sup> (77)	40 <sup>h</sup>	47 <sup>a</sup> (61)	n.a.	35 <sup>a</sup>

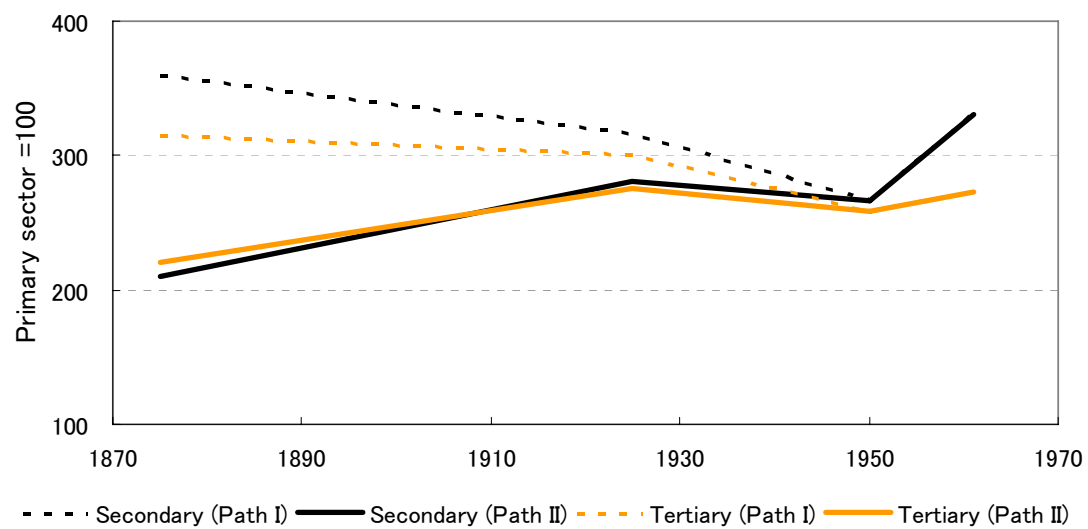
Notes: Figures in parentheses are TFP. <sup>a</sup>1995; <sup>b</sup>1994; <sup>c</sup>1987; <sup>d</sup>1998; <sup>e</sup>1989; <sup>f</sup>1993; <sup>g</sup>1994–95; <sup>h</sup>1996;

<sup>i</sup>Airline productivity for France, Germany,

Netherlands and U.K. are all based on a European average.

Source: M.N. Baily and R.M. Solow, "International productivity comparison built from the firm level," *Journal of Economic Perspectives*, vol. 15, no. 3 (2001), pp. 151-172.

Figure 13. Two hypothetical paths of change in sectoral labour productivity differentials, 1870s-1960



Source: See text.

Table 5. Principal and subsidiary occupations by sector (both sexes combined):  
Kai province, 1879

Principal occupation	Subsidiary occupation (%)			Principal only (%)	Total in thousands (%)
	Primary	Secondary	Tertiary		
Primary	10	11	7	72	194 (100)
Secondary	38	3	1	58	26 (100)
Tertiary	2	1	6	91	14 (100)

Source: Tōkei-in, *Kai no kuni genzai ninbetsu shirabe* [Census of Kai province] (Tokyo: Tōkei-in, 1882).