The Structural Causes of Japan's Lost Decades

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Abstract

Although Japan had largely resolved the problem of non-performing loan by the early 2000s, economic growth hardly accelerated, resulting in what now are "two lost decades." This paper examines the underlying reasons from a long-term and structural perspective using a KLEMS-type database and micro-level data. Major issues examined include the chronic lack of domestic demand since the mid-1970s caused by the long-run decline in capital formation through the slowdown in the growth of the working age population as well as the resulting current account surplus and yen appreciation, and supply-side issues such as slow TFP growth due to Japan's low economic metabolism. A key finding is that while large firms' TFP growth since the mid-1990s has outstripped that in the 1980s as a result of research and development (R&D) and internationalization, the TFP of small firms has stagnated. The analysis further shows that the reason why small firms' TFP growth has lagged behind probably is their sluggish investment in R&D and information and telecommunication technology as well as a decline of technology spillovers from large firms.

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1. Introduction

Since the burst of the "Bubble Economy" in 1991, Japan has experienced sluggish growth in the economy overall as well as in total factor productivity (TFP). The first ten years of this stagnation – the "Lost Decade" – have been the subject of a considerable body of research. Studies have focused on financial problems such as banks' non-performing loans, firms' damaged balance sheets, and deflation as the main causes of Japan's stagnation.[1] By the early 2000s, Japan had largely resolved the non-performing loan problem as well as the problem of damaged balance sheets, but economic growth hardly accelerated, resulting in what now are "Two Lost Decades." The argument put forward in this study is that Japan's Two Lost Decades are not a transient problem of sluggish economic growth as a result of inappropriate fiscal and monetary policies but need to be seen from a more long-term and structural perspective reflecting a chronic lack of demand and a long-term decline in productivity.

It is certainly true that during the past two decades, Japan has persistently suffered from deflation or inflation that has remained below the central bank's target. And there is no question that Japan needs to resolve the problem of deflation and escape from its liquidity trap in order to restore the effectiveness of conventional monetary policy. However, it seems very unlikely that Japan will be able to resolve its structural problems simply by stoking sufficient inflation to keep real interest rates negative or at least extremely low. In fact, maintain very low or negative real interest rates for a prolonged period may give rise to a bubble like those in Japan during the late 1980s or

[1] See, for example, Saxonhouse and Stern (2004) and Ito et al. (2005).

the United States in the 2000s. Moreover, stimulating final demand will not be sufficient to accelerate Japan's productivity growth.

Against this background, the aim of this paper is to examine the causes of Japan's economic stagnation from a long-term, structural perspective and investigate whether it will be possible to resolve the causes of stagnation. Taking a long-term perspective that compares the two decades from the early 1990s onward with the preceding two decades and, at the same time, taking advantage of databases such as the EU KLEMS Database, we will compare Japan's performance with that of the United States and other advanced economies. In addition, we will also use firm-level data to examine underlying structural problems.

The remainder of this study is organized as follows. Section 2 considers the causes of Japan's economic stagnation from a demand perspective. Section 3, using a growth accounting framework, then examines Japan's economy over the past 40 years from the supply side and conducts various comparisons with other developed economies. The section also examines why capital accumulation and increases in labor input – the determinants of supply capacity – came to a standstill. Section 4 then investigates why TFP growth slowed down in the last two decades. The section examines various structural issues such as the TFP of small and medium-sized firms, why the natural selection mechanism as a result of market forces does not seem to be working well, the low level of investment in information and communication technology (ICT), labor market rigidity, and the slowdown in human capital accumulation.

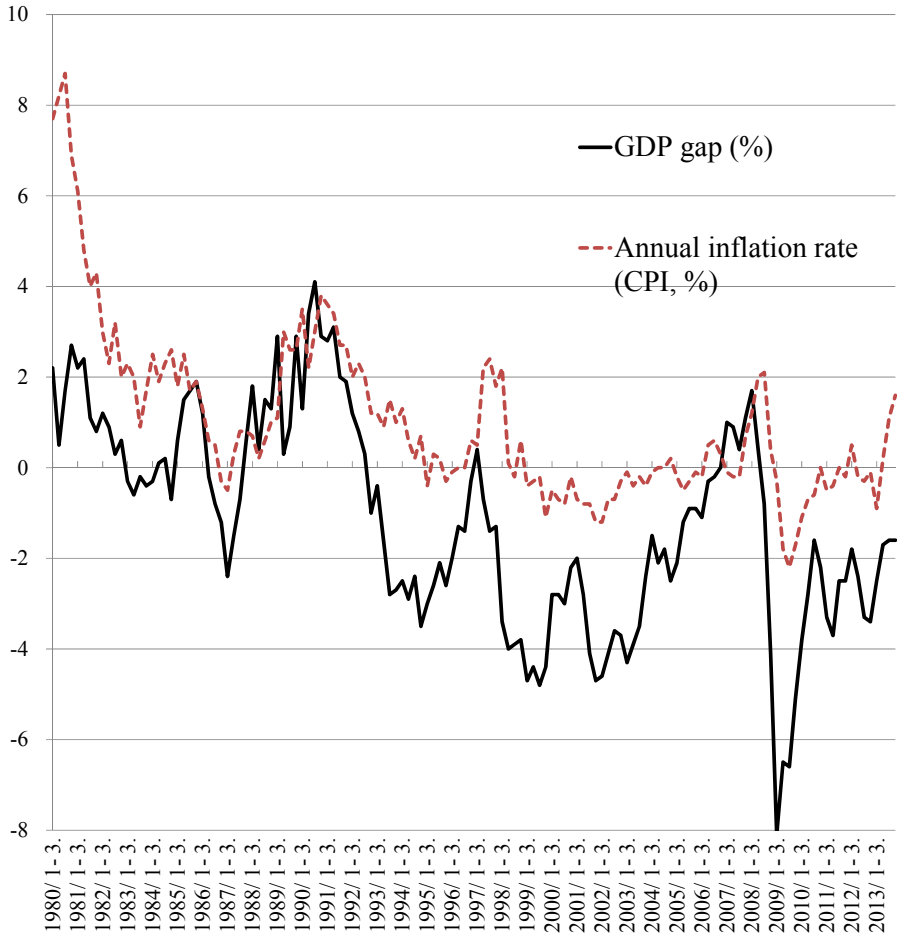
Finally, Section 5, based on the analysis in the preceding sections, examines what kind of research and policies are necessary to find a solution to Japan's long-term economic stagnation.

2. Insufficient Demand

Like most developed economies, Japan experienced a severe drop in final demand in the wake of the global financial crisis that started in autumn 2008. Unlike most other economies, however, Japan was already suffering from a lack of demand even before the crisis. Figure 1 shows the trend in Japan's estimated GDP gap ((Actual GDP–Potential GDP)/Potential GDP) and inflation rate (in terms of the consumer price

index). The figure indicates that in the wake of the global financial crisis Japan experienced a huge negative GDP gap of minus 8%. However, even in 1993–95 and 1998–2003 it also experienced a GDP gap of more than minus 2%. Moreover, these were periods during which Japan also experienced deflation.

Figure 1. Japan's GDP Gap ((Actual GDP–Potential GDP)/Potential GDP) and Inflation Rate (%): 1980Q1-2013Q4



Sources: Cabinet Office and CPI Statistics
Notes: A consumption tax of 3% was introduced on April 1, 1989. It was raised to 5% on April 1, 1997, and was raised to 8% on April 1, 2014.

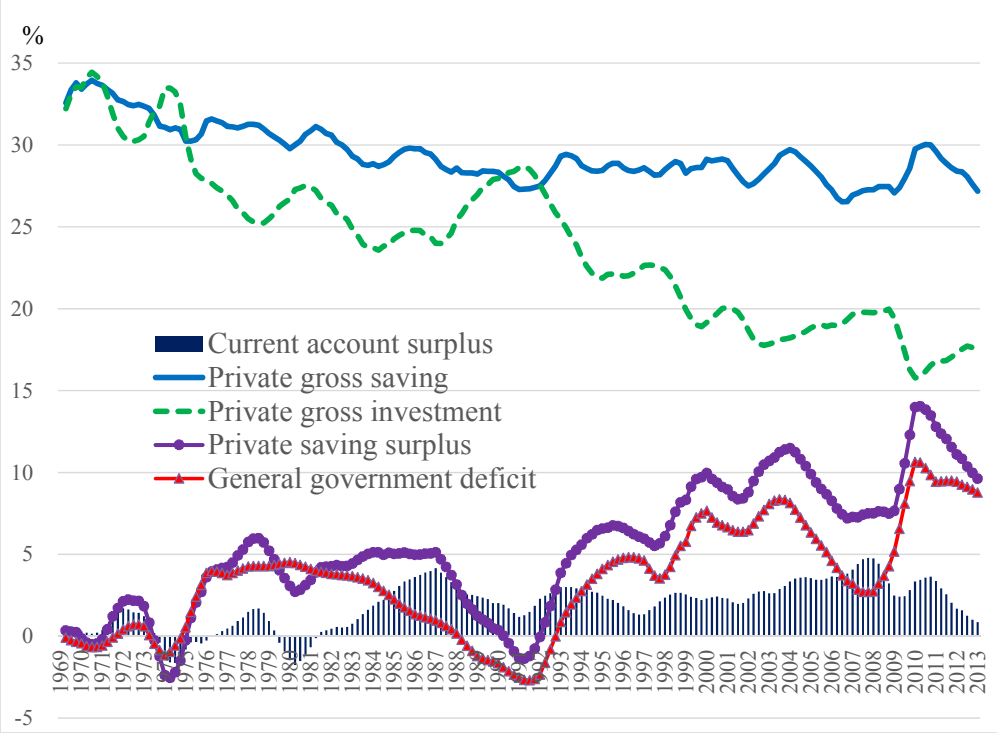
Japan's excess saving problem

Reasons for the insufficient effective demand in the 1990s include not only temporary factors such as a decline in investment due to a decline in the appetite for investment as a result of deflation (Hamada and Horiuchi 2004), the disruption of financial intermediation (Bayoumi 2001, Horie 2002), damaged corporate balance

sheets (Koo 2003, Ogawa 2011), a downturn in consumption based on asset effects and precautionary motives (Ishii 2009, Iwaisako and Okada 2009), or the downturn in exports as a result of the yen appreciation of 1994–95, etc., but also due to the problem of chronic excess saving since the 1980s, as pointed out by Krugman (1998) and Fukao (2001).

Despite Japan's exceptionally high private gross saving rate when compared with other advanced economies, it did not experience any excess saving until the 1970 due to extremely high investment during the high speed growth era. However, as can be seen in Figure 2, from the beginning of the 1970s, Japan's economy started to experience chronic excess savings.[2] This is due to the large decline in private investment, for which there are the following reasons.

Figure 2. Japan's Saving-Investment Balance: Relative to Nominal GDP (Four-quarter Moving Average)



Note: The data were compiled by Mr. Ryutaro Kono of BNP Paribas Japan. The original data source is the SNA Statistics published by the Cabinet Office.

[2] It should be noted that the saving-investment balance depends not only on structural factors but also on the business cycle. However, the basic picture given by Figure 2 does not change much when adjusting for the business cycle. See Cabinet Office (2009) for more details.

First, after the 1960, when the first baby boomer generation reached adulthood, the growth rate of the working age population slowed considerably. Looking at the average growth rate of the working age population (those aged 15–64) by decade, we find a steady decline in the growth rate from 1.9% in the 1950s to 1.8% in the 1960s, 1.0% in the 1970s, 0.9% in the 1980s, 0.0% in the 1990s, and －0.6% in the 2000s (Statistics Bureau, Ministry of Internal Affairs and Communications 2014). The decline in the growth rate of the working age population reduced the need to invest in capital equipment for new workers, thus exerting a negative impact on capital investment.

Second, the process of catching up with manufacturing technologies in the United States and Europe and increases in TFP driven by this process had more or less run their course by the early 1970s,[3] and probably as a result of this, TFP growth started to slow down from the 1970s onward. Kuroda and Nomura (1999), for example, estimate that the TFP growth rate in 1972–1992 was 2.8 percentage points lower than in 1960–1972. This decline in TFP growth, by lowering the rate of return on capital, likely reduced private investment.

These two structural factors explain the largest part of the decline in private investment. For example, assuming balanced growth and Harrod-neutral (labor-saving) technical change in a Solow-type neoclassical growth model, and, further assuming a capital-GDP ratio of 3 and a labor and capital cost share ratio of 2 to 1, a 2 percentage point decline in the growth rate of the working age population and a 2 percentage point decline in TFP growth reduce Japan's economic growth rate by 2 and 3 percentage points respectively (for a total of 5 percentage points) and lower the investment-GDP ratio by 6 and 9 percentage points (for a total of 15 percentage points) respectively.[4] In addition to these two factors, as will be discussed in detail in Section 3, while in the immediate postwar period Japan was able to achieve high speed growth by raising the capital stock per worker, the increase in the capital ratio lowered the rate of return on capital through the accumulation of excess capital, likely making the reduction in investment more severe than otherwise would have been the case.

[3] For a long-term comparison of TFP levels by industry between Japan and the United States, see Jorgenson et al. (1987).

[4] Hayashi and Prescott (2002), like the analysis here, use a neoclassical growth model and point out that it is very likely that the decline in the TFP growth rate and in labor input from the 1990s onward reduced capital investment.

The saving-investment balance of the private sector (private saving surplus) will be either invested abroad (current account surplus) or borrowed by the government (general government deficit). Moreover, according to Keynesian economics, if the intended private saving is greater than the intended current account surplus plus the intended government deficit, there arises an excess supply of goods. In this case, a reduction in GDP, through reducing excess private saving, restores balance in the goods market.

The lower part of Figure 2 shows how much of the private saving surplus was used for investment abroad (current account surplus) or for financing of the government (general government deficit). The figures shows that during most of the period the largest part of excess savings went to the government deficit. The only exceptions are the mid-1980s, when Japan recorded large current account surpluses as a result of "Reaganomics," the late 1980s to early 1990s, when there was active private investment during the "bubble economy," and the export-driven boom during 2006–08.

The equilibrium exchange rate and trade friction

Open economy macroeconomics (see, e.g., Obstfeld and Rogoff 1996), suggests that when there is a large private saving excess in an economy with free international capital flows, then – assuming neoclassical adjustment mechanisms where goods and factor prices as well as the real exchange rate adjust flexibly to achieve full-employment equilibrium – the excess supply of domestic goods should be resolved through a large depreciation of the domestic currency and an increase in the current account surplus. In this situation, the exchange rate that achieves full-employment equilibrium can be called the "equilibrium real exchange rate" in the same sense as the "equilibrium real interest rate" is the interest rate that achieves full employment in a closed economy.

However, there are a number of examples in which Japan's current account surplus did not expand sufficiently to bring about such equilibrium during a recession, such as that of the time of the Japan–Germany "locomotive theory" of 1977, the recession brought about by yen appreciation following the 1985 Plaza Accord, and the recession following the collapse of the bubble economy in 1991. Why did the yen not depreciate sufficiently and the current account surplus increase sufficiently to achieve full employment? The following two factors can be pointed out.

First, Japan, which for a long time persistently had the largest current account surplus in the world, did not have sufficient bargaining power vis-à-vis the United States, which for a long time has been the country with the largest current account deficit in the world and which urges surplus countries to expand domestic demand. Compared with China, which has subsequently taken on the role of largest surplus country, the reasons for the lack of bargaining power are that Japan probably was not important as an export base for American firms and Japan's security considerations. Moreover, in contrast with China, which continues with strict controls on capital movements, it was difficult for Japan maintain a weak yen through foreign market interventions, since by the early 1970s, as a result of joining the OECD and acceding to Article 8 status of the IMF in 1964, it had already greatly liberalized international capital transactions. Whenever Japan recorded a large current account surplus in transactions with the United States, protectionism reared its head in the United States as can be seen around the time of the "two locomotive theory" and the Plaza Agreement, pushing Japan to expand domestic demand by increasing government expenditure and to reduce the current account surplus through an appreciation of the yen.

Second, compared with the golden era of the gold standard before World War I, even from the 1980s onward, when international capital liberalization had advanced, international capital movements were not sufficiently smooth to absorb Japan's huge excess savings.

In contrast with the era of the gold standard, in today's environment, in which many countries having adopted a flexible exchange rate regime, international lending and borrowing typically involves exchange rate risk. Because most of the investment in the United States is in bonds denominated in U.S. dollars, institutional and other investors in Japan suffer exchange rate losses as result of a depreciation of the dollar vis-à-vis the yen. If there are fears of exchange risk and there are not sufficient actors willing to shoulder this risk (that is, residents willing to holds foreign currency-denominated assets and non-residents willing to shoulder liabilities denominated in yen), a large current account surplus will sooner or later cause an appreciation of the yen and a reduction in the current account surplus, and foreign investment as a result will fall. This kind of phenomenon could be observed during the strong-yen periods of 1978 and 1995. Moreover, in the golden era of the gold standard, capital flowed mainly from

Great Britain to the New World through the issuance of bonds, and the claims were often preserved through gunboat diplomacy. In contrast, in the case of international borrowing and lending from and to developing countries in the postwar era, it was difficult to seize those assets even if debtor countries renege on repayments. For this reason, debtor countries have an incentive to renege on repayments, making the debt accumulation of developing countries more serious and, at the same time, making new international lending and borrowing difficult.

Meltzer (1999) and Hamada and Okada (2009) argue that in the 1990s the Japanese government should have carried out more determined polices to effect a depreciation of the yen. However, given that the effect of yen-selling interventions not accompanied by an interest rate cut are weak, and that policy interventions to weaken the yen through a cut in real interest rates were difficult because of limitations through deflation and the liquidity trap, it is doubtful that it would have been possible to induce a large yen depreciation. Moreover, even if there had been room to effect large negative real interest rates in Japan in the 1990s, because of trade frictions with the United States, it is highly unlikely that Japan could have continued with yen depreciation and a current account surplus large enough to cancel out the huge savings surplus for a prolonged period. In fact, as seen above, the yen appreciation following the Plaza Agreement and the recession that followed it arose before the deflation period.

The unresolved excess saving problem

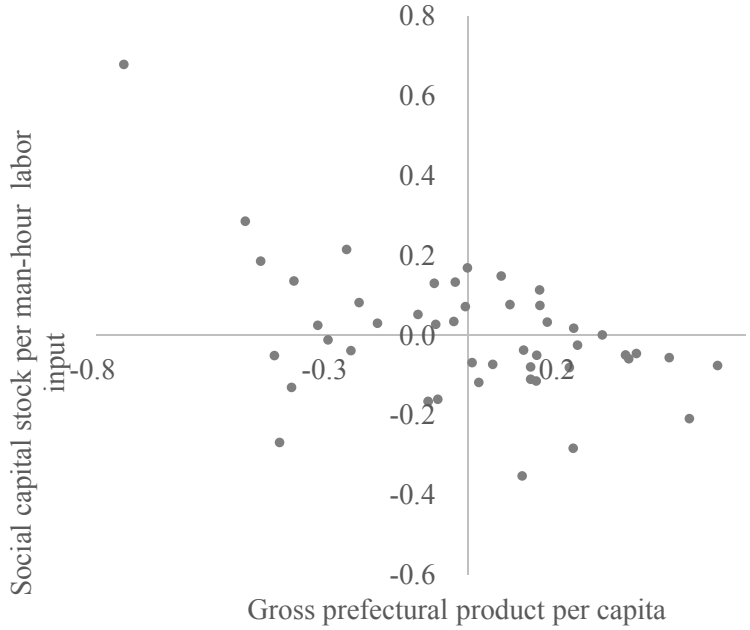
Let us return to considering how Japan's excess savings are used. When a saving surplus country cannot effect sufficient capital exports and a sufficient current account surplus, then, under neoclassical conditions, real interest rates will fall as a result of the excess supply of goods and full employment will be maintained through an expansion of private investment. The policy of monetary easing pursued by the Bank of Japan during the second half of the 1980s gave rise to this kind of situation, but it had the adverse effect of giving rise to the Bubble Economy with negative consequences such as inefficient capital formation, as became clear through the subsequent non-performing loan crisis.

Finally, as already seen, the majority of Japan's private saving excess has been put into compensating for the government deficit, but as the economic measures conducted

by the Obuchi government in the late 1990s typify, government expenditure was not necessarily used for efficient purposes.

For example, public investment by the Japanese government was concentrated in low income regions of Japan. Figure 3 shows the cross-prefectural relationship between per capita gross prefectural product and social capital stock (non-toll roads and bridges, harbor facilities, dikes, etc.) per man-hour labor input in 2008. There is a statistically significant negative correlation (at the 1% level) between the two variables. Japan has been constructed many roads used by no-one and bridges to nowhere.

Figure 3. The Relationship between Per Capita Gross Prefectural Product and Social Capital Stock per Man-Hour Labor Input: 2008



Source: Regional-level Japan Industrial Productivity (R-JIP) Database 2012.
Notes: The horizontal axis shows the log value of per capita gross prefectural product (GPP) minus the national average of the log value of per capita GDP. The variable on the vertical axis is constructed in a similar way.

Many of the researchers arguing that the main cause of Japan's prolonged economic stagnation since the 1990s is insufficient demand argue that the stagnation was caused by the increase in real interest rates as a result of deflation and the liquidity trap, the impairment of financial intermediation as a result of the non-performing loan problem, and impediments to investment due to damaged balance sheets. Certainly, as researchers

such as Ogawa (2003) and Miyao (2004), among others, show, part of the downturn in investment in the 1990s was caused by these factors. However, as Ogawa (2009) also indicates, only part of the downturn in investment can be explained by the impairment of balance sheets.

As seen in Figure 2, from the mid-1970s to the 1980s, when the factors impeding investment such as deflation and the non-performing loan problem did not exist and TFP growth was relatively strong, Japan experienced large excess savings except during the period of the Bubble Economy. As explained earlier, reasons for the decline in investment relative to GDP include not only the above-mentioned temporary factors observed in the 1990s and the 2000s, but also structural factors such as excess capital as a result of demographic trends and the decline in the return on capital due to economic growth relying on capital accumulation. Japan should have eliminated early on the factors impeding investment such as deflation and the non-performing loan problem. However, it would be rather too optimistic to assume that if this had been achieved the chronic lack of demand could have been overcome. If, hypothetically, investment had been stimulated sufficiently through, for example, negative real interest rates,[5] to absorb the huge excess savings, there would have a real danger of another Bubble Economy.

Moreover, as Section 3 will show, in contrast with the United States, where the capital coefficient remained more or less unchanged during the same period, the capital coefficient in Japan increased rapidly from the 1990s onward. Looking at the average of the capital coefficient over the past two decades, it certainly cannot be said that investment has been impeded in Japan; instead, it would be more correct to regard capital accumulation in Japan to have continued apace despite the demographic trends and the decline in the return on capital as a result of a low interest rate policy and loan guarantees by the government.

As we have seen above, any of the three outlets for excess savings, namely, a current account surplus, an acceleration in private investment, or a government deficit would at any rate have given rise to problems. However, if there is no outlet for

[5] Using various methods, Kamata (2009) estimated how the level of real interest rates (equilibrium real interest rate) that would have eliminated the GDP gap through an expansion in investment, would have moved, and finds that in the latter half of the 1990s, when the equilibrium real interest rate was lowest, would have been more or less 0% or around –1%.

intended excess saving, this will cause a recession through insufficient demand. This danger of insufficient demand has been a chronic presence in Japan since the latter half of the 1970s. As also pointed out in Fukao (2001), looking at the period since 1980, we find that Japan experienced a recession in 1982, 1986, 1992, 1997, 2000, and 2008, and many of these recessions coincided with periods in which the outlet for excess savings changed. Put simply, it could be said that when the main outlet for excess savings in a particular period became unsustainable, for example, as a result of changes in the international environment or concerns about the fiscal deficit getting out of became unsustainable and a smooth transition to a new alternative outlet was not possible, the economy dived into a recession. This can be seen by looking at the changes in the main outlet for excess savings, which until 1982 hat been government deficits, followed by current account surpluses until 1986, private investment until 1992, government deficits until 1997, current account surpluses and government deficits until 2000, and current account surpluses again until 2008.

Krugman (1998), examining deflation in Japan in the 1990s, compared Japan's high private savings rate and the United States' extremely low savings rate and similarly pointed out that following the end of Japan's high speed growth Japan was constantly in danger of falling into deflation.

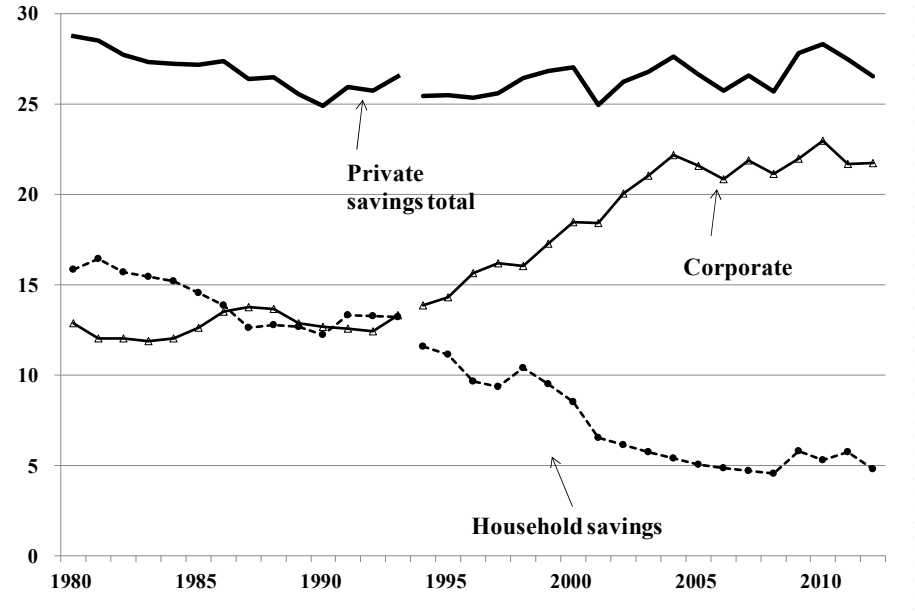
Another way to resolve Japan's excess savings problem would be to increase private consumption or lower the savings rate. The Maekawa Report (The Study Commission on Adjustment of Economic Structure for International Cooperation 1986) published in April 1986 emphasized that desirable policies would be to promote private consumption and housing investment.

Setting aside temporary consumption stimuli as part of antirecession policies, lowering the private savings rate for a prolonged period through government intervention is probably not that easy. However, many economists, based on the life cycle hypothesis, thought that with the aging of the population, Japan's saving rate inevitably would fall rapidly and the excess saving problem would before long be resolved.[6] For example, Horioka (2008), expected that Japan's household savings rate would rapidly fall to zero or even turn negative by around 2010. As can be seen from

[6] However, the experience of the United States indicates that the private savings rate moves in a way that cannot necessarily be explained by changes in demographic structure (Auerbach and Kotlikoff 1989).

Figure 4, the actual household savings rate, more or less in line with Horioka's prediction, has fallen considerably. However, as if to offset that decline, the corporate savings rate has increased rapidly, and as a result the private savings rate has remained unchanged at around 25%. Overall, therefore, it can be said that the problem of excess private savings has still not been resolved.

Figure 4. Household and Corporate Savings Relative to Nominal GDP (%)



Note:
1. Corporate savings are the sum of the savings of non-financial corporate firms and those of financial institutions.
2. The benchmark year for the data before 1994 is 2000. The benchmark year for the data after 1994 is 2005.
Source: Annual Report on National Accounts 2013 and Annual Report on National Accounts of 2009, Economic and Social Research Institute, Cabinet Office.

An important issue regarding Japan's excess savings problem is to what extent household and corporate savings are substitutes for each other and, moreover, to what extent household and government savings are substitutes for each other. A considerable number of studies have examined this issue, including Poterba (1987), Auerbach and Hassett (1989), Iwaisako and Okada (2009), and Matsubayashi (2009), and many of them find that the substitutability between the three types of savings is not very high.

While there are many empirical studies on the determinants of household savings, there has been relatively little research on the determinants of corporate savings. If

household and corporate savings are not close substitutes for each other, more research on why firms in Japan have been saving as much as they have in recent years is necessary. What we do know is that major corporations account for a large part of corporate savings.[7] As will be shown in Sections 3 and 4, given that large corporations – despite their high productivity – do not actively invest domestically, it is likely that they use their surplus funds not for capital investment but for debt repayment (see Schaede 2008 on the rapid deleveraging of corporations) and the accumulation of liquid assets.[8] Whether this kind of corporate saving behavior is desirable, and whether governance in major corporations functions properly, is an important research topic for the future.

3. Examining Japan's Prolonged Stagnation from the Supply Side

As seen in the previous section, in most of the period since 1991, Japan has suffered from a lack of demand. The reason is huge excess savings as a result of structural causes such as a high savings rate and the decline in investment due to demographic change. These huge excess savings have made it difficult to overcome deflation and have produced a situation in which even with very active fiscal policy Japan has continued to register a large negative GDP gap throughout most of the last two decades.

However, even if Japan has suffered from insufficient demand for a long time, this does not necessarily mean that there is no point in analyzing the economy from the supply side. For example, understanding the structural reasons for the decline in investment – such as the increase of the capital coefficient and the decline in the return on capital – and determining whether the decline in investment is a temporary or a structural phenomenon is important for understanding the lack of demand. Moreover,

[7] Approximating firms' gross savings by subtracting corporation and municipal taxes, interim dividends, and dividends from their current profits using data from the *Financial Statements Statistics of Corporations by Industry (Yearbook)*, we find that, in 2008, corporations with 1 billion yen of paid-in capital, which produce 30.3% of value added of all for-profit corporations (excluding finance and insurance), accounted for 41.5% of saving by all corporations. On the other hand, saving by corporations with less than 20 million paid-in capital, which produce 31.4% of value added, only accounted for 13.5% of saving by all corporations.

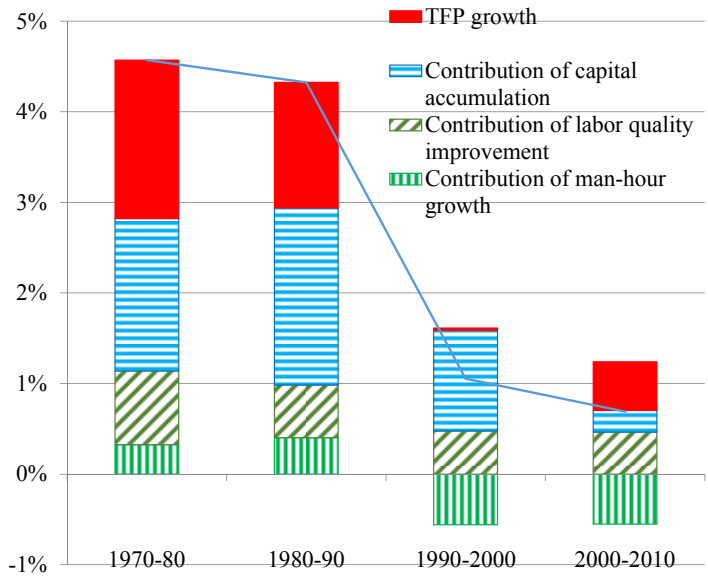
[8] Large corporations are actively expanding employment not within their own company but in domestic subsidiaries (Kwon and Kim 2010) and are engaging in foreign direct investment abroad. It is likely that part of large corporations' saving is used for these purposes.

understanding the impact of population aging and trends in TFP growth is indispensable when considering Japan's future growth prospects.

Supply-side sources of Japan's economic growth

Based on these considerations, this section attempts to look at Japan's prolonged stagnation from the supply side using growth accounting. Figure 5, using the JIP 2013 Database, shows the results of the growth accounting for ten-year intervals.

Figure 5. Decomposition of Japan's GDP Growth (Annual Rate, %)



Source: JIP Database 2013.

Figure 5 shows that the annual average growth rate of Japan's real GDP (shown by the solid line in the figure) fell by 3.6 percentage points from 4.5% in 1970–90 to 0.9% in 1990–2010. Decomposing this 3.6 percentage point decline in the growth rate shows that it is due to a decline in TFP growth from 1.6% to 0.3%,[9] a decline in the contribution of capital accumulation from 1.8% to 0.7%, a decline in the contribution of labor quality improvements from 0.7% to 0.5%, and a reversal in the contribution of man-hour growth from +0.4% to –0.6%. The sum of the contribution of labor quality

[9] Preceding studies on the deceleration in TFP growth from the 1990s onward include Hayashi and Prescott (2003), Jorgensen and Motohashi (2003), and Fukao and Kwon (2006). The estimated decline in TFP growth differs across these studies. An analysis of the reasons for these differences is provided by Inui and Kwon (2005) and Fukao and Kwon (2006).

improvements and of man-hour growth in 1990–2010 was negative (0.5% – 0.6% = –0.1%), meaning that labor service input (man-hour growth plus labor quality improvement) declined in this period.

With regard to TFP, it should be noted that there is the danger that because of labor hoarding and a decline in the capital utilization rate during a recession, the contribution of increases in factor inputs to output may be overestimated and TFP growth as a result underestimated. However, as pointed out by Shioji (2009), the decline in TFP growth from the 1990s onward is so large that it cannot be explained by such temporary factors. Moreover, comparing two points in time such as 1983, 1992, and 2006, when there was no particularly large difference in the GDP gap (Figure 1), we can easily confirm that TFP growth after 1990 was much lower than until 1990.

As seen above, notable characteristics of Japan's prolonged economic stagnation from the 1990s onward include the following: (1) labor service input growth was negative; and (2) TFP growth declined sharply. In addition, (3) the capital labor ratio continued to increase markedly, albeit at a slower pace than in previous decades. The remainder of this section discusses the third and the first of these issues in greater detail, while Section 4 focuses on the deceleration in TFP growth.

The increase in the capital coefficient and the decline in the rate of return on capital

As seen in the growth accounting in the preceding section, the contribution of capital accumulation continued to be positive in the 1990s and the 2000s, although labor service input declined in the 1990s and after. This means that the capital service/labor service input ratio increased substantially during the period 1990–2010.

As a result of such increases, Japan achieved some increases in labor productivity even during the 1990s and after despite very low TFP growth. Annual average labor productivity (real GDP/man-hour) growth from 1990 to 2010 was 1.7%. Using growth accounting, labor productivity growth can be decomposed into the following three factors: increases in the capital input-labor input ratio, improvements in labor quality, and TFP growth. The contribution of each of these to the 1.7% annual average increase in labor productivity from 1990 to 2010 was 0.8, 0.7, and 0.3 percentage points respectively. Thus, labor productivity growth was mainly accomplished by physical and

human capital deepening, not by TFP growth. However, due to the decreasing marginal productivity of capital, economic growth relying on capital accumulation lowers the rate of return on capital and sooner or later reaches a limit. Let us examine this issue in more detail.

Figures 6(a) and 6(b) show the capital coefficient (capital stock/GDP) as well as the gross rate of return on capital for Japan and the United States. Figure 6(a) shows that although it decelerated somewhat from the end of the 1990s, on the whole Japan's capital coefficient rose relatively strongly. Although the increase in the capital coefficient decelerated at the beginning of the 2000s, comparing the periods before and after 1990, we find that whereas in the period 1975–1990 it rose 1.6% per year, in the 1990–2009 period it rose by 2.2% per year, that is, it accelerated from 1990 onward. On the other hand, the gross rate of return on capital fell at a rate of 2.1% per year in the 1990–2009 period.[10]

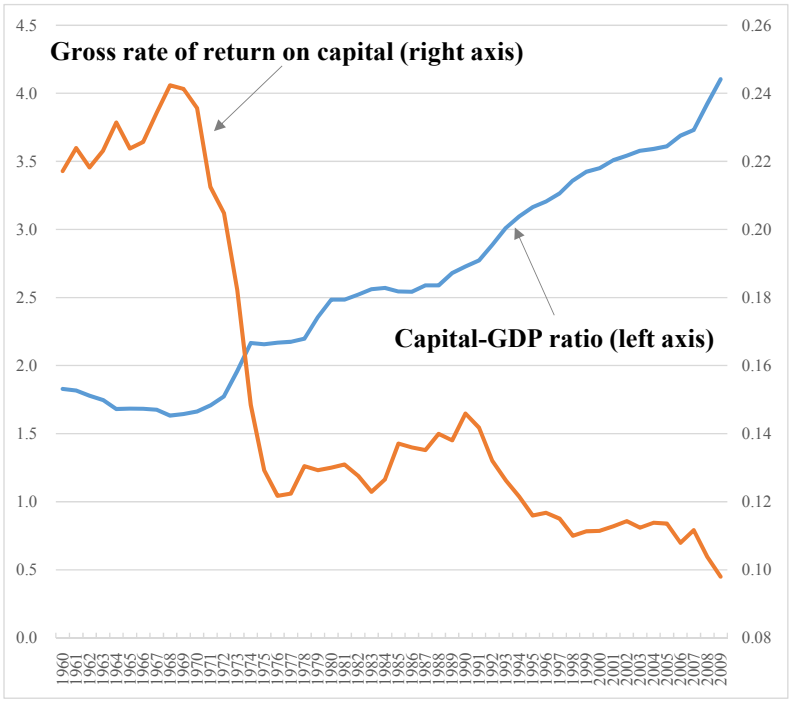
In contrast with Japan, the United States, as shown in Figure 6(a) experienced a substantial decline in the capital coefficient and an increase in the rate of return on capital from the first half of the 1980s onward.[11, 12]

[10] In a country like Japan that imports natural resources and exports manufacturing goods, if the relative price of natural resources rises and the terms of trade deteriorate, the return on capital falls in the relatively short term, in which capital stock does not change much. The fall in the return on capital in the 1970s and the increase in the 1980s to a considerable extent can be understood as the result of these kinds of movements in the terms of trade.

[11] As will be seen in the next section, the information and communication technology (ICT) investment/non-ICT investment ratio in the United States is higher than that in Japan; the capital formation deflator for ICT capital continued to decline; and the depreciation rate of ICT capital and capital losses from ICT capital holdings are larger than those of non-ICT capital. It should be noted that the decline in the capital-GDP ratio and the high rate of return on capital in the United States are probably partly caused by these factors. However, when using the capital-GDP ratio and the rate of return on capital in real terms, that is, Real capital stock/Real GDP, and Gross operating surplus/(GDP deflator × Real capital stock), similar differences between Japan and the United States as in Figures 6(a) and 6(b) can be found.

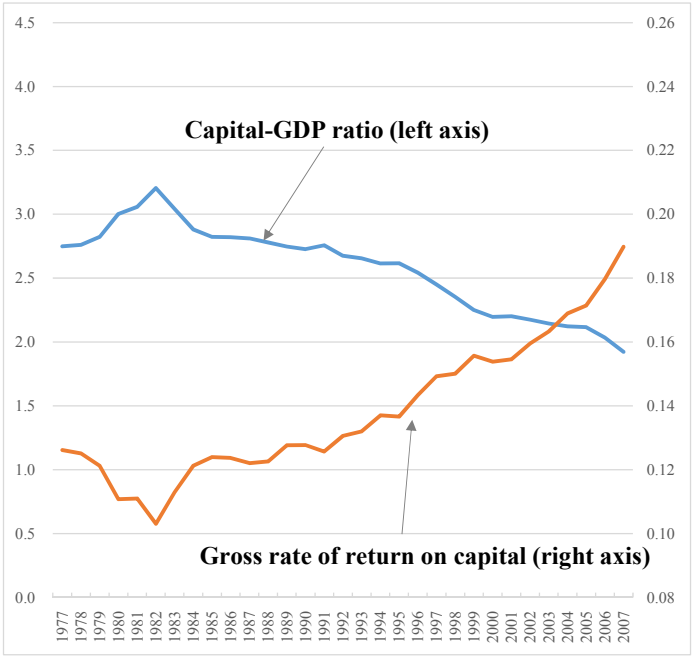
[12] Using the EU KLEMS database, we also constructed a similar figure for Germany after unification. We find that, like the United States, Germany also registered a decline in the capital coefficient for the total economy.

Figure 6(a) Japan's Capital Coefficient and Return on Capital



Source: EU KLEMS ISIC Rev. 4 rolling updates, Nomura (2004), and National Account Statistics.
Notes: Capital-GDP ratio=Gross capital formation deflator×Real capital stock/Nominal GDP. Gross rate of return on capital=Gross operating surplus/(Gross capital formation deflator×Real capital stock).

Figure 6(b) U.S. Capital Coefficient and Return on Capital



Source: EU KLEMS ISIC Rev. 3, March 2011 update.
Notes: See Figure 6(a).

As highlighted by Kaldor in one of his stylized facts (Kaldor, 1957), in advanced economies in a situation of balanced growth where sufficient capital has been accumulated, the capital coefficient does not increase. In contrast with the United States, this rule of thumb does not hold for Japan, particularly in the 1990s. Economic growth relying on capital accumulation is not necessarily bad per se; however, the question is whether it can be sustained. [13]

Reasons why Japan's capital coefficient increased from the 1990s onward despite low returns on capital likely are the prolonged low interest rate policy and active investment in the public sector. However, it is very likely that even with very low interest rates, investment-led growth will reach its limits due to the decline in the return on capital and government deficits. In Japan, the private gross investment/GDP ratio (Figure 2), the contribution of increases in the capital service input to GDP growth (Figure 5) and the speed of the increases in the capital coefficient (Figure 6(a)) have diminished since the early 2000s, signaling that growth driven by capital accumulation may be coming to an end.

As seen above, in Japan, unlike in the United States, the capital coefficient increased greatly, particularly in the 1990s. It should be noted that the return on capital deteriorated during this period and that very likely this was not due to a credit crunch, the disruption of financial intermediation, or a lack of demand, but mainly due to the increase in the capital coefficient. If we assume a Cobb-Douglas production function, we would expect the gross rate of return on capital multiplied by the capital-GDP ratio to be constant overtime. Under this assumption, the 2.2% annual growth in the capital-GDP ratio in the period 1990–2009 is large enough to fully explain the 2.1% annual decline in the gross rate of return on capital during this period.

[13] Ando (2002) and Saito (2008) point out it is possible that protracted inefficient in the corporate sector may have imposed large capital losses on the household sector. Hayashi (2006) and Saito (2008) try to explain Japan's excess investment using a macroeconomic model in which corporate governance does not work well and in which firm, other than making the bare minimum dividend payments, invest all profits and for this reason conduct excess investment above the optimal level determined by households' time preference rate and return on capital. However, as seen in Section 3, from the 2000s, we find huge corporate savings especially by major firms, while capital accumulation by major firms was relatively lacklustre. It is highly likely that major firms used surplus funds not only for investment in plant and equipment (including in subsidiaries at home and abroad), but also for the repayment of liabilities and the accumulation of liquid assets. Therefore, at least with regard to the 2000s, it is difficult to say that firms have been investing all available funds in capital equipment.

The low rate of TFP growth and the low rate of return on capital found above are of considerable relevance in the debate on the policy mix pursued by the present government. Japan has been suffering from a lack of final demand for the last two decades. Despite the recovery from the recession following the global financial crisis, Japan still had a negative GDP gap of 1.6% in 2013 (Figure 1). The government is taking policies to overcome deflation and seems to be aiming to stimulate private investment through a reduction in real interest rates. However, since investment opportunities are limited and the rate of return on capital is very low, extremely low or negative real interest rates are required, but maintaining very low or negative real interest rates, a positive inflation rate, and full employment without causing bubbles is likely to be extremely difficult to achieve. Therefore, for sustainable growth, it is necessary to raise the rate of return on capital through productivity growth and to stimulate private consumption through job creation and higher wage incomes.

Causes of the decline in labor input and future prospects

One of the main causes of the slowdown of Japan's economic growth from the 1990s is the sharp drop in labor service input growth. As we saw in Figure 5, the contribution of labor quality improvements declined from 0.7% in 1970–1990 to 0.5% in 1990–2010, while the contribution of man-hour growth switched from +0.4% to –0.6%.

In this subsection, we examine the causes of this decline in labor input as well as the future prospects. Man-hour growth in the macro economy can be decomposed into the following three factors: changes in the working age population (those aged 15–64), changes in average working hours per worker, and other factors such as changes in the labor force participation rate. Figure 7 shows the results of this decomposition for the period 1970–2010. In addition, the figure shows projections by the National Institute of Population and Social Security Research (2012) for changes in the working age population until 2030.

As Figure 7 shows, the sharp drop in Japan's man-hour input after 1990 was mainly caused by the decline in the working-age population as well as the decline in the average working hours per worker. The shrinking of the working-age population, which is caused by Japan's low birthrate and population aging, is expected to continue in the

2010s and the 2020s. The expected decline of the working-age population is particularly large in the 2010s because of the retirement of the baby boomers.

Regarding the decline in working hours per worker, two factors can be pointed out. Firstly, as highlighted by Hayashi and Prescott (2002), Japan's Labor Standards Act was amended in 1987 and "a 40 hour, five day week" was introduced. Working hours gradually declined until the full implementation of the amendment in 1997. However, even after that, the average working hours of employees continued to decline because of the increase in part-time workers. As shown in Figure 8, if we assume that the percentage of part-time workers had remained constant after 1988, there would have been almost no decline in working hours until the onset of the global financial crisis in 2008.

Next, let us examine why improvements in labor quality have slowed down. Figure 9 decomposes changes in the labor quality index into the contribution of changes in the labor quality of different types of workers, namely full-time workers, the self-employed (including unpaid family workers), and part-time workers. We measure the quality of labor in terms of the wage rate. The wage rates of full-time workers tend to be higher than those of part-time workers and the estimated labor income per hour of the self-employed. Therefore, an increase in the percentage of full-time workers contributes to an improvement in labor quality.

In the 1970s and the 1980s, the contribution of full-time workers takes large positive values, because the percentage of full-time workers in total workers increased, the average education level of full-time workers increased, and the average age of full-time workers increased (older full-time workers tend to earn higher wage than younger workers). However, in the 1990s, the percentage of full-time workers in total workers started to decline, while the other two trends almost came to a halt, so that the contribution of full-time workers became smaller.

The contribution of the self-employed took positive values, because their labor income per hour is low and the percentage of self-employed in total workers declined over time. Finally, the contribution of part-time workers took negative values, because their wage rates are low and the percentage of part-time workers in total workers increased over time.

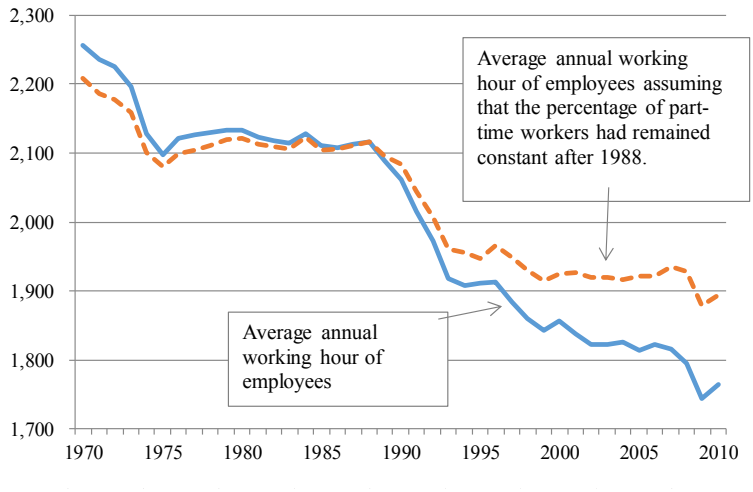
Figure 9 also shows projections of labor quality changes in the 2010s and the 2020s by Kawaguchi et al. (2007). Kawaguchi et al. assumed that the following four sets of values will take the same value as in 2004: (1) the wage rate and working hours per worker by age, education, sex, and employment status; (2) the percentage of each category of education level for each sex among new workers; (3) the percentage of full-time workers, of part-time workers, and of the self-employed in each category (age, sex, and education) of workers; and (4) the labor force participation rate by age, sex, and education. Under these assumption, they estimated how demographic changes will affect Japan's labor quality in the future.

The results indicate that the growth rate of labor quality index will decline substantially in the 2010s as most of the baby boomers retire. Moreover, in the 2020, with the children of the baby boomers reaching their 50s, the growth rate of the labor quality index will decline further, since wage rate no longer increase by age for workers in their 50s.

Figure 7. Decomposition of Japan's Man-Our Growth (%, Annual Rate)

Sources: JIP Database 2013, Labor Force Survey, and National Institute of Population and Social Security Research (2012).

Figure 8. Average Working Hours of Employees



Source: JIP Database 2013.

Figure 9. Decomposition of Growth in the Labor Quality Index by Employment Status

Note: The data for the labor quality index of all workers for the 2010s and 2020s are based on projections by Kawaguchi et al. (2007).
Sources: JIP Database 2013 and Kawaguchi et al. (2007).

The two projections of the working age population (Figure 7) and labor quality (Figure 8) and the increasing share of part-time workers suggest that it will be difficult for Japan to maintain positive labor service input growth (man-hour growth plus labor quality growth) in the 2010s and the 2020s, even if Japanese government were to embark on a full range of policies to address this issue such as raising the labor force participation rates of the elderly and women, raising the education level of new workers, and reducing the share of part-time workers.

TFP growth is indispensable for Japan's sustainable growth

Considering the potential contribution of the three engines of economic growth (labor input growth, capital accumulation, and TFP growth), the discussion above showed that the contribution of labor input growth, if anything, is likely to be negative in Japan. Moreover, as also discussed, for capital accumulation to be sustainable, it is necessary to raise the rate of return on capital through productivity growth and to stimulate private consumption through job creation and higher wage incomes. This means that future economic growth in Japan will have to come mainly from TFP growth. Let us consider Japan's growth prospects in more detail.

The Japanese government now has a target of 2% annual GDP growth. But is this goal realistic? Assume that the production function of the macro-economy is constant returns to scale, technological progress is Harrod-neutral, the economy is in a situation of balanced growth, and the cost share of labor is two thirds. Then, the long run growth rate will be labor input growth plus Harrod-neutral technological change, which is equal to TFP growth times 1.5 under our assumptions. Even if we are optimistic about labor supply and assume that labor service input does not decline, Japan needs annual average TFP growth of 1.33% (2/1.5≒1.33). Under this scenario, 2% GDP growth can be accomplished if TFP growth contributes 1.33%, labor service input growth contributes 0%, and capital accumulation contributes 0.67%. Since this capital accumulation is induced by TFP growth, 2% GDP growth will be sustainable. Thus, whether Japan can achieve sustainable GDP growth in the long run – and hence whether the growth target of 2% is realistic – crucially depends on whether it can substantially accelerate TFP growth from the rates seen since the 1990s.

4. Why Japan's TFP Growth Has Been So Low from the 1990s

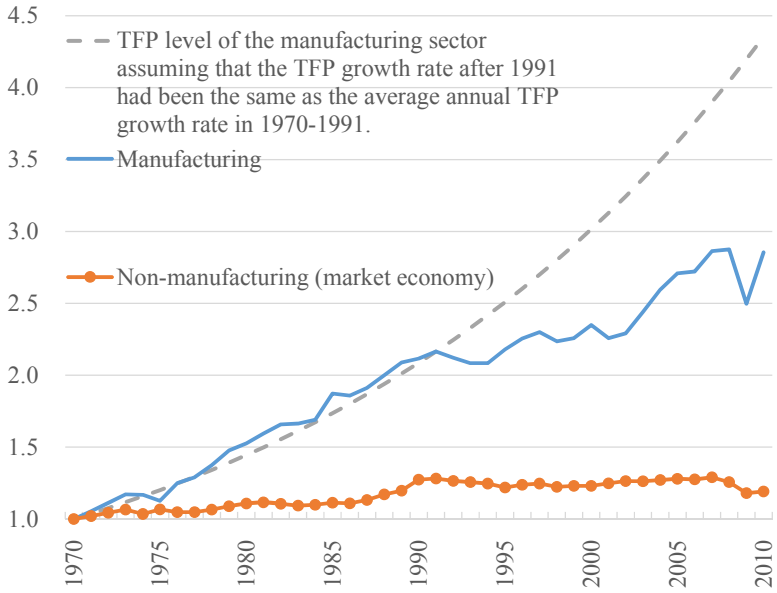
In this section, we study why Japan's TFP growth has slowed down from the 1990s. We examine this issue using two approaches. We start by analyzing Japan's TFP growth from the 1970s using sectoral data and then examine the issue using micro-data of Japanese firms and factories.

TFP growth by sector

Figure 10 shows how TFP (on a value-added basis) in Japan's manufacturing and non-manufacturing sectors changed over time. Since inter-temporal changes in TFP in non-market activities such as public administration, education, and health and social services are difficult to measure, our data for the non-manufacturing sector cover only the market economy.

In the case of the manufacturing sector, TFP growth declined sharply after 1991. The dotted line in the figure shows the TFP level of the manufacturing sector when assuming that the TFP growth rate from 1992 onward had remained the same as the average annual TFP growth rate in 1970–1991. TFP growth in the manufacturing sector accelerated again from 2002 to 2007. However, since the stagnation of TFP growth in the 1990s, the early 2000s, and the late 2000s was so pronounced, there is a huge gap between the trend line based on earlier TFP growth rates and the actual TFP level. If Japan's manufacturing sector had been able to maintain TFP growth as high as that in 1970–1991 after 1991, the manufacturing sector's real value added now would be more than 50% larger (without increasing factor inputs) than the actual current level.

Figure 10. TFP Level of the Manufacturing and the Non-manufacturing Sector (Market Economy), 1970–2010 (1970=1)



Notes: TFP values are on a value-added basis. The non-manufacturing sector (market economy) does not include imputed rent for owner-occupied dwellings.

Source: JIP Database 2013.

In the case of the non-manufacturing sector, TFP growth in Japan, like in other countries, has been much lower than that in the manufacturing sector. Nevertheless, there is also a distinct difference before and after 1991. Until 1991, the non-manufacturing sector achieved slow but steady TFP growth and the TFP level in 1991 was 28% higher than that in 1970. However, after 1991, there was almost no TFP growth in this sector.

Comparing the 1970–1991 period with the 1991–2010 period, average annual TFP growth in the manufacturing sector declined by 2.2 percentage points from 3.7% to 1.5%, while average annual TFP growth in the non-manufacturing sector (market economy) fell by 1.6 percentage points from 1.2% to -0.4%. Since the nominal value-added share of the non-manufacturing sector (market economy) is more than twice as large as that of the manufacturing sector (in 1991, the shares were 54% and 26%, respectively), the contribution of the slowdown of TFP growth in the non-manufacturing sector (market economy) to the slowdown of TFP growth in the macro-economy (approximated by multiplying the TFP growth decline by the value added share) was 50% greater than that of the manufacturing sector. Overall, both the manufacturing and the non-manufacturing sector dragged down macro TFP growth after 1991.

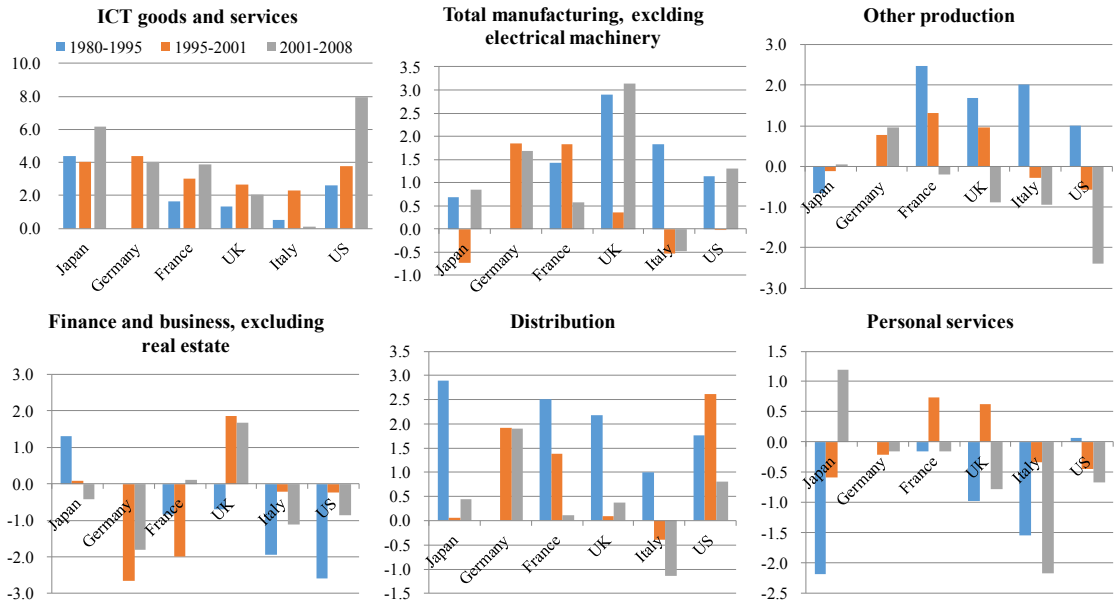
Comparing Japan's TFP growth with that of the United States helps to more clearly understand the stagnation of TFP growth in Japan after 1991. Before 1991, Japan was rapidly catching up with the United States. Partly because of low productivity growth in the United States in the late 1970s and early 1980s, Japan's TFP level relative to that of the United States in 1977–91 increased by 45% in the manufacturing sector and by 24% in the non-manufacturing sector. After 1991, both the slowdown in productivity growth in Japan and the acceleration in productivity growth in the United States reversed this trend. In 1991–2007, Japan's TFP level relative to that of the United States declined by 19% in the manufacturing sector and 8% in the non-manufacturing sector.[14]

Why has TFP growth in the United States accelerated? And why was Japan left behind? One important factor is the ICT revolution in the United States. This can be

[14] This calculation is based on the EU KLEMS Database and the Rolling Updates as well as Inklaar and Timmer (2008).

confirmed by comparing Japan's TFP growth with that of the United States and other developed countries at a more disaggregated level.[15] In Figure 11, the market economy is divided into six sectors and average annual TFP growth rates in each sector before and after 1995 are compared across six major developed economies.

Figure 11. TFP Growth in the Market Sector, by Sector and Country: 1980-1995, 1995-2001, 2001-2008 (Annual Rate, %)



Source: EU KLEMS Database, Rolling Updates.

The figure shows that the United States experienced an acceleration of TFP growth not only in the ICT-producing sector (electrical machinery, post and communication), but also in ICT-using sectors, such as distribution services (retail, wholesale and transportation) and in the rest of the manufacturing sector (i.e., excluding electrical machinery). Japan also experienced relatively high TFP growth in the ICT-producing sector. The problem for Japan, however, is that TFP growth in ICT-using service sectors, such as distribution services and the rest of the manufacturing sector, declined substantially after 1995. Moreover, these ICT-using sectors are much larger than the ICT-producing sector: the average labor input share (hours worked) of the ICT-producing sector in Japan's total labor input in 1995–2007 was only 4.1% (similar

[15] For more details on the industry classification and the ICT intensity of each sector, see Timmer et al. (2007).

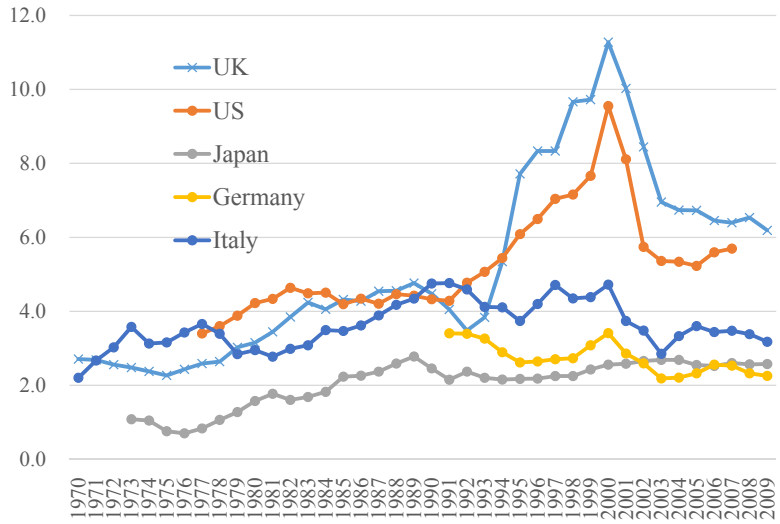
to the corresponding share in the United States of 3.8%). On the other hand, the labor input shares of distribution services and the rest of the manufacturing sector in 1995–2007 were 22.8% and 16.5%, respectively.[16]

ICT investment in Japan

Why did an ICT revolution of the magnitude observed in the United States not occur in Japan and the major European countries? Figures 12 and 13 provide an answer to this question.

In Japan, the ICT investment–GDP ratio in IT-using service sectors, such as distribution services and total manufacturing excluding the electrical machinery sector, is very low in comparison with the United States.[17] It appears that the ICT revolution did not happen in Japan simply because Japan has not accumulated sufficient ICT capital.

Figure 12. ICT Investment–GDP Ratio in Major Developed Economies: Distribution Services

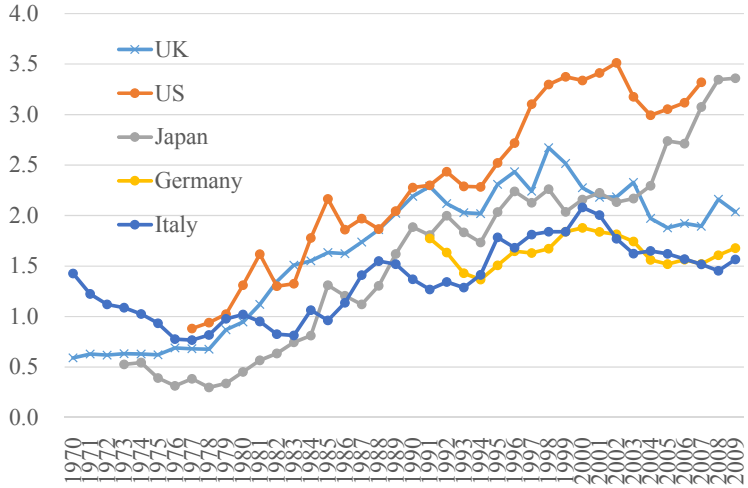


Source: EU KLEMS Database, Rolling Updates.

[16] Basu et al. (2003) find that TFP growth of the retail and wholesale sector accounted for more than 70% of TFP growth of the U.S. total economy during 1995–2003. Miyagawa and Fukao (2008), on the other hand, report that TFP growth of the electrical and optical machinery sector accounted for about 70% of TFP growth of the Japanese total economy during 2000–2005.

[17] As Figure 13 shows, the ICT investment/GDP ratio in the manufacturing sector excluding electric machinery has increased substantially in recent years. An interesting question therefore is whether TFP growth in this sector will accelerate in the near future.

Figure 13. ICT Investment–GDP Ratio in Major Developed Economies: Total Manufacturing, Excluding Electrical Machinery



Source: EU KLEMS Database, Rolling Updates.

The next question that needs to be addressed is why ICT investment in some sectors is so small in Japan. It is interesting to note that Japan's ICT investment in these sectors has been low in comparison with other countries since the 1970s. It therefore cannot be argued that the economic slump after 1991 has been the main cause of Japan's low ICT investment. Several structural impediments to ICT investment in Japan can be pointed out.

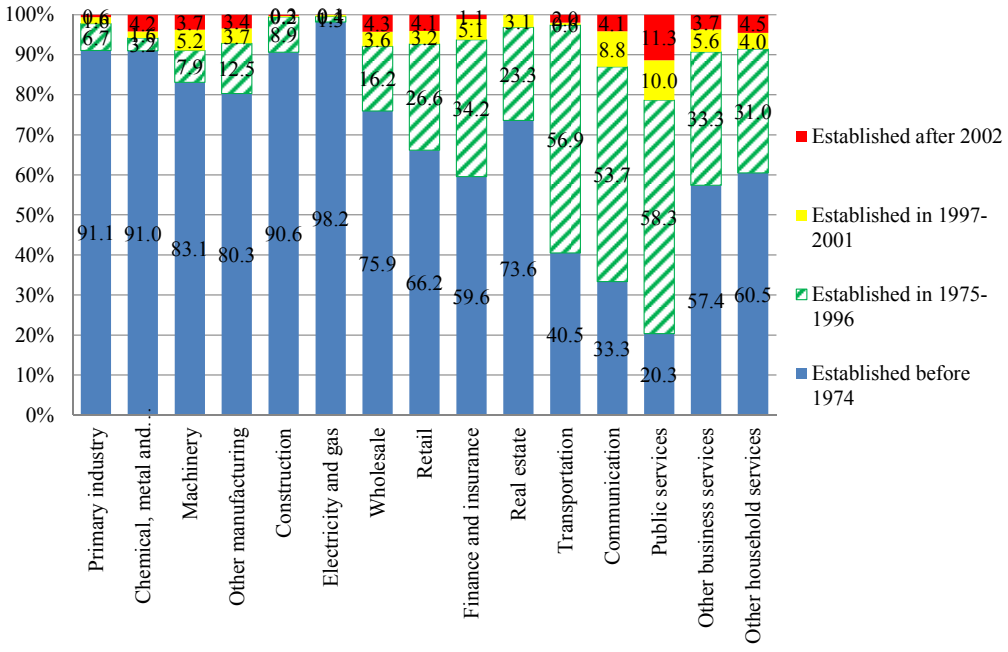
First, one of the main contributions of the introduction of ICT is that it allows firms to save unskilled labor input. However, because of the high job security in Japan, it may be difficult for firms to actually cut jobs.

Second, the benefits from ICT investment seem to be closely related with management practices (Bloom et al. 2012) and corporate strategies. Miyagawa et al. (2014), for example, show that Japanese firms are far behind U.S. firms in terms of their incentive management. Moreover, Motohashi (2010) finds that, unlike U.S. firms, Japanese firms tend to introduce ICT not as strategic tools to enhance firms' total competitiveness but to increase the efficiency of specific divisions. Probably reflecting such weaknesses of Japanese firms, computer network use has a much larger positive impact on firms' performance in the United States than in Japan (Atrostic et al. 2008).

Third, in order to introduce ICT, firms need to incur certain initial fixed costs, such as those associated with the revision of organizational structures and training of workers.

Some of these expenditures are one shot, and it seems that once firms have adjusted their organizational structures to new ICT and have accumulated a certain mass of ICT-literate workers, they can expand their scale later without substantial additional costs. Probably because of this characteristic of ICT technology, younger and growing firms tend to be more active in ICT investment. Using micro data of the *Basic Survey of Japanese Business Structure and Activities* by the Ministry of Economy, Trade and Industry (METI), Fukao et al. (2012) find that, in Japan's non-manufacturing sector, after controlling for firm size, industry, etc., younger firms have a significantly higher software stock/sales ratio. However, because of the low entry and exit rates in Japan, firms that have been around for 45 years or more have a majority of market share in all industries except transportation, communication, and public services (Figure 14). This low metabolism has probably impeded ICT investment in Japan.

Figure 14. Sales Share by Firm Age Group in 2009



Source: Fukao et al. (2012).
Note: The original data are from the *Establishment and Enterprise Census*.

Fourth, Japan's retail sector is characterized by small shops, whereas the U.S. retail sector is characterized large chain stores (Haskel et al. 2007). Moreover, in service sectors, Japanese listed firms are of a much smaller scale on a consolidated basis than

their counterparts in the United States (Fukao and Miyagawa 2010), and these smaller firms in Japan probably have found it more difficult to introduce ICT because of their small scale.

Fifth, Japan's ICT sectors has been suffering from a shortage of software engineers for a considerable time. For example, according to Arora et al. (2011), inflows to the ICT labor pool in the United States in 1995 were 68% greater than those in Japan, and by 2001, inflows in the United States were almost three times larger than in Japan. This slow human capital accumulation may also have hindered ICT investment by Japanese firms.

It is also important to note that in order to avoid changes in corporate structure, employment adjustment, and training of workers, Japanese firms tend to choose custom software rather than packaged software, making ICT investment more expensive and network externality effects smaller, because each firm uses different custom software.

Intangible investment in Japan

The impediments to ICT investment mentioned above may be closely related with intangible investment in Japan. Intangible investment is defined as expenditures by firms for future production and profits and includes training of workers and the revision of firms' organizational structure. ICT capital and intangible assets may be close complements, as preceding studies such as those by Bresnahan et al. (2002) and Crespi et al. (2007) have shown.

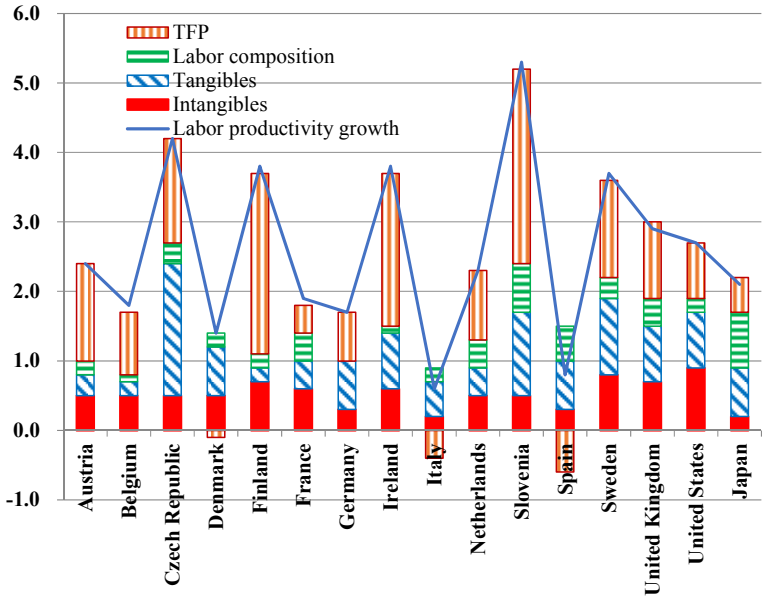
Using the perpetual inventory method and intangible investment data, it is possible to estimate how intangible assets have been accumulated over time. Moreover, using this result, it is possible to conduct a new type of growth accounting in which capital services from intangible assets are treated as one of the factor inputs. In the present system of the national accounts, most categories of intangible investment are still treated as firms' intermediate inputs, not as capital accumulation. Therefore, in this new approach, it is also necessary to estimate a new "GDP," in which goods and services used for intangible investment are regarded as final goods and services, and not as intermediate inputs.

Using this type of framework, which was first proposed by Corrado et al. (2009), new growth accounting has been conducted for many developed countries. Figure 15

presents a comparison of the results across countries. This figure shows that in 1995–2007, the contribution of intangible investment to labor productivity growth in Japan was the lowest among the major developed countries. When conducting growth accounting without taking account of intangible asset accumulation, as in Figure 5, the derived "TFP" growth will contain the contribution of intangible asset accumulation to economic growth. Therefore, the low "TFP" growth in Japan since 1990, which we observed in Figure 5, must have partly been caused by the slow growth of intangible assets in Japan.[18]

Figure 15 shows another interesting point. That is, in the case of the United States, the contribution of intangible asset accumulation to labor productivity growth has been very large. In fact, it has been larger than the contribution of TFP growth in the United States and the largest among all the countries listed. It thus can be said that the "TFP" resurgence of the United States after 1995 seen in Figure 11 was partly caused by active investment in intangibles.[19]

Figure 15. Contributions to the Growth of Output per Hour: Market Economy, 1995 to 2007 (Annual Rate, %)

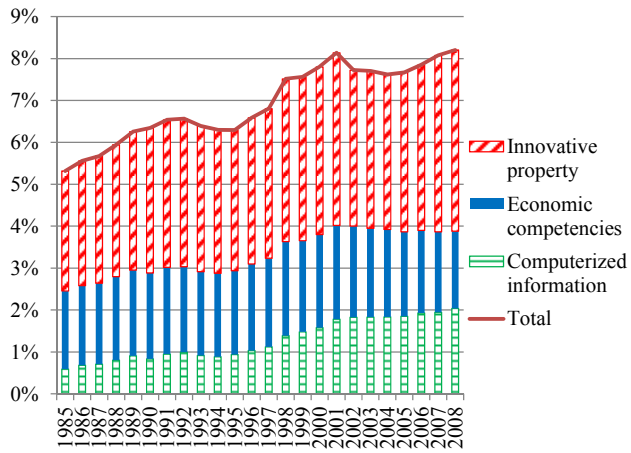


Sources: Corrado et al. (2012) and Miyagawa and Hisa (2012).

[18] For more details on this issue, see Corrado et al. (2009) and Fukao et al. (2009).
[19] It should be noted that both the ICT investment in Figures 12 and 13 and the intangible investment in Figure 15 include software investment.

Why has intangible asset accumulation in Japan been so small? In the framework of Corrado et al. (2009), intangible assets consist of three categories: innovative property (science and engineering R&D, mineral exploitation, copyright and license costs, other product development, design, and research expenses), computerized information (software and databases), and economic competencies (brand equity, firm-specific human capital, organizational structure). Figure 16 shows Japan's intangible investment–GDP ratio for each of the three categories.

Figure 16. Japan's Intangible Investment–GDP Ratio by Category: 1985–2008



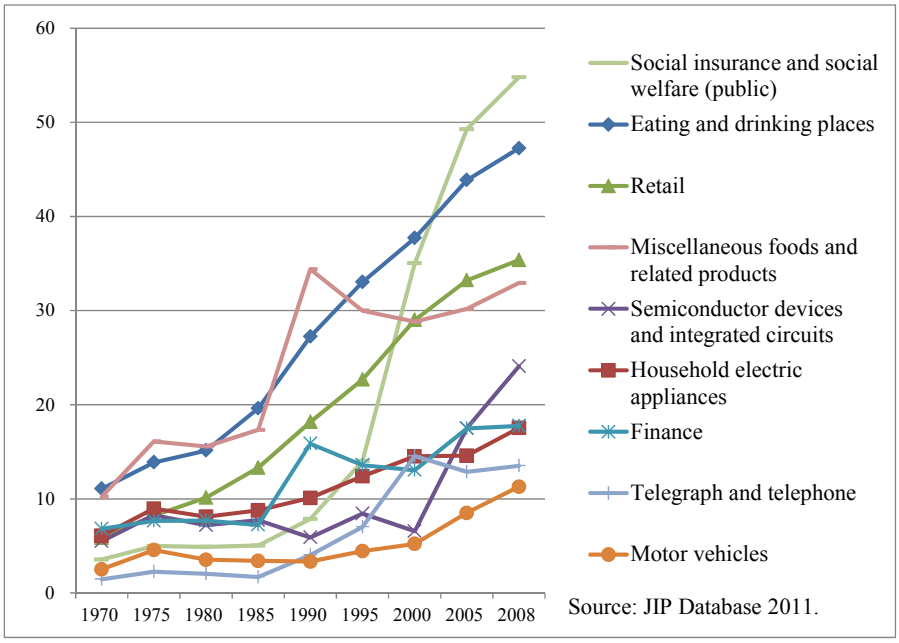
Source: JIP Database 2011.

The figure shows that, reflecting huge R&D expenditures by manufacturing firms, Japan's invests a lot in innovative property but relatively little in economic competencies. Moreover, since around 2000, investment in economic competencies and computerized information has stagnated.

It seems that the decline in the accumulation of economic competencies was caused by the harsh restructuring resulting from the long-term economic stagnation. For example, many firms increased the percentage of part-time workers in total workers (Figure 17) and did not provide intensive training in the case of part-time workers. This change reduced training expenditure substantially.[20]

[20] The estimation of intangible investment used in Figures 15 and 16 does not include on-the-job training, which many Japanese firms regard as important. If on-the-job training were added to intangible investment, the investment in economic competencies shown in Figure 16 would be larger.

Figure 17. Share of Part-Time Workers in Total Workers by Sector: 1970–2008 (in %)



Source: JIP Database 2011.

Why is the percentage of part-time workers increasing so rapidly in many industries in Japan? In sectors where individual proprietorships used to dominate, such as retail and eating and drinking places, one factor is that as individual proprietorships are replaced by corporations, family employees are replaced by part-time workers. However, this explanation does not apply to many other sectors, such as most manufacturing industries.

Another possible factor is that firms are increasing the number of part-time workers in order to maintain the flexibility of employment levels. Given the decline of the working age population and economic stagnation, most firms cannot expect their need for employees to steadily increase, as was the case during the high-speed growth era. At the same time, areas in which individual firms have a competitive advantage over their rivals are changing quickly and Japan's comparative advantage as a whole is

However, since firms invest little in on-the-job training for part-time workers and the percentage of part-time workers in total workers is rapidly increasing, including on-the-job training would not raise the contribution of intangible asset accumulation to Japan's economic growth in Figure 15. On this issue, see Fukao et al. (2009).

also changing over time. Given the high job security provided under traditional employment practices, increasing the reliance on part-time workers is almost the only way for firms to keep both the level and the mix of employment flexible.

Providing a theoretical model to capture these aspects, Matsuura et al. (2011) empirically show that firms which face greater uncertainty in their sales tend to have a higher percentage of part-time workers. They conjecture that globalization and the increase in international competition have raised sales uncertainty for manufacturing firms and that this factor has contributed to the increase of part-time workers in Japan's manufacturing sector.

In order to examine whether firms employ part-time workers simply to take advantage of lower wage rates or to gain more flexibility in their workforce, Fukao et al. (2006) estimated both the marginal productivity of part-time workers in comparison with that of regular workers and the compensation of part-time workers in comparison with that of regular workers, using employer-employee matched data at the factory level. They find that the productivity gap between part-time workers and regular workers is larger than the wage gap between part-time workers and regular workers. This means that firms pay a premium to part-time workers in order to obtain flexibility of employment.

Such behavior by firms is quite rational in the context of slow economic growth and Japan's system of high job security. However, at the same time it may also be creating a huge economic loss by reducing human capital accumulation, and this loss seems to be greater than the observable wage gap between part-time workers and regular workers. In order to resolve this problem, Japan's labor market needs to be reformed.

The natural selection mechanism among firms in Japan

Sector-level TFP growth is equal to the weighted average of the TFP growth of firms or factories in that sector. Since productivity levels differ considerably across firms and factories within each sector, resource allocation across firms and factories is bound to have a large impact on TFP growth. If the economic natural selection mechanism works, more productive firms would be expected to enter and expand and

less productive firms to shrink and exit. The slowdown of Japan's TFP growth may have partly been caused by a deterioration of this mechanism.

Baily et al. (1992) and Foster et al. (2001) have shown that entry, exit, and reallocation effects greatly contributed to TFP growth in the U.S. manufacturing sector. For example, according to Foster et al. (2001), the TFP level of the U.S. manufacturing sector increased at annual average rate of 1.02% during the period 1977– 1987, and out of the 1.02% TFP increase, 0.27 percentage points were due to the reallocation effect among surviving firms, 0.27 percentage points were due to entry and exit effects, and the remaining 0.49 percentage points were due to the within effect. Therefore, more than half of the TFP growth (0.27 plus 0.27 percentage points) in the U.S. manufacturing sector was caused by the natural selection mechanism.

A number of studies have examined this issue for Japan. For example, using data on listed firms, Ahearne and Shinada (2005) and Caballero et al. (2008) have shown that since the 1990s, in bad loan infested sectors, such as real estate and construction, profitless and highly indebted (zombie) firms tended to survive, probably because of continuing support by lender banks. Moreover, using data of the *Basic Survey of Japanese Business Structure and Activities*, which covers not only large firms but also small and medium-sized firms, Nishimura et al. (2005) examined productivity dynamics in the manufacturing and non-manufacturing sectors from the mid-1990s onward and observed negative exit effects (productive firms exit and less productive firms survive) in some industries such as commerce. On the other hand, using factory-level data of METI's *Census of Manufactures* from the beginning of the 1980s onward, Fukao and Kwon (2006) and Fukao, Kim, and Kwon (2008) examined productivity dynamics in the manufacturing sector and found that the market selection mechanism already did not work very well in the 1980s, so that exit effects were negative (productive factories were closed and less productive factories were continued). Moreover, the natural selection mechanism (the sum of the entry effect, the exit effect, and the reallocation effect) made a much smaller contribution to TFP growth than in other countries. They further found that the slowdown in TFP growth in the 1990s was mainly due to a slowdown in TFP growth within factories.

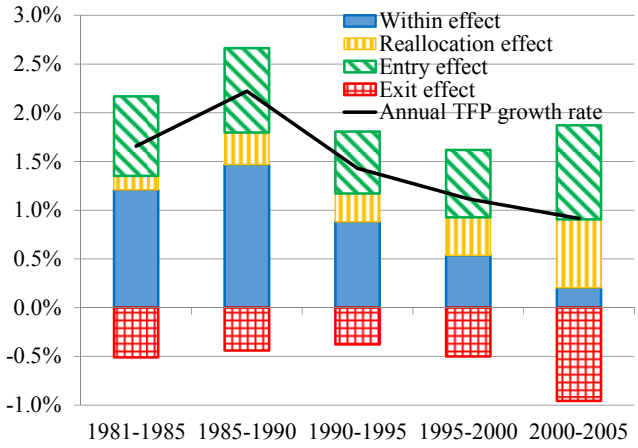
Against this background, in the remainder of this section we take a closer look at productivity dynamics using recent empirical results. In addition, we compare the

results of the analysis of productivity dynamics with our preceding results of the sectoral and macro-level analysis.

In Figure 18, TFP growth (on a gross output basis) in Japan's manufacturing sector is decomposed into entry, exit, reallocation, and within effects. Micro data of the *Census of Manufactures*, which covers all factories with four or more employees, were used. Factories are classified into 54 industries and, following Good et al. (1997) and Aw et al. (2001), within each industry, each plant's TFP level in comparison with the industry average TFP level was measured.

Figure 18 shows that from 1990 onward, the within effect steadily declined and the negative exit effect expanded (that is, productive factories were shut down, while less productive factories remained). Taken together, these two trends reduced TFP growth in the manufacturing sector substantially. On the other hand, the positive entry effect and the reallocation effect expanded and partly offset the decline in the within affect and the growing negative exit effect, thus mitigating the decline in TFP growth.[21]

Figure 18. Decomposition of TFP Growth in the Manufacturing Sector (Annual Rate, %)



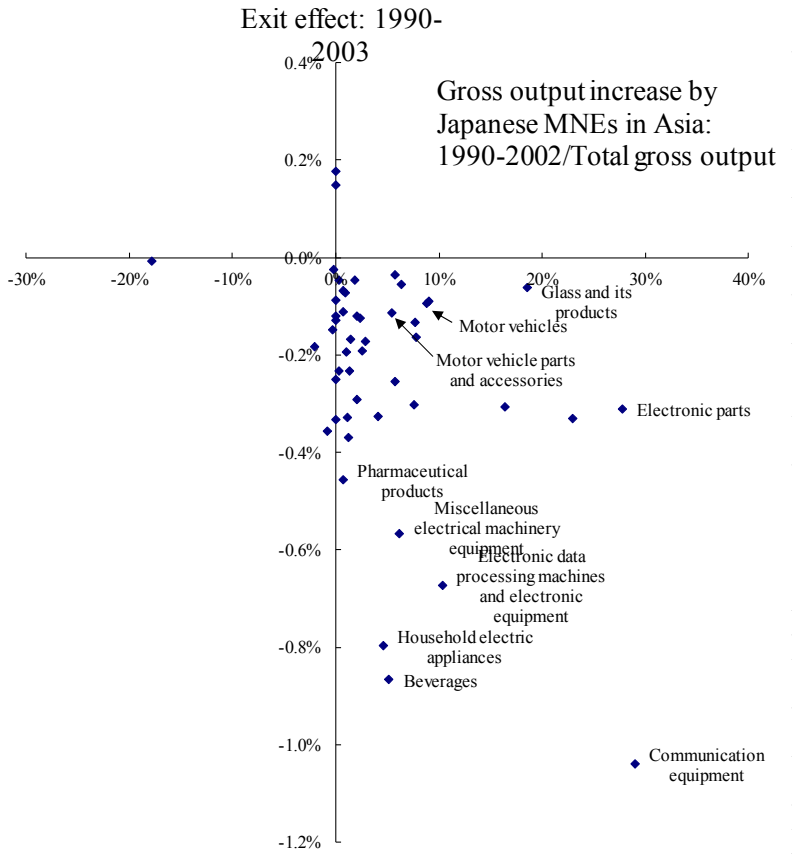
[21] It should be noted that there is some inconsistency between the continuous decline in TFP growth in Figure 18 and the sector-level results in Figure 10, where TFP growth in the manufacturing sector partly recovered after 2002. One possible explanation is that the *Census of Manufactures* does not cover headquarters where no manufacturing activities are conducted. If the efficiency of such headquarter activities improves, TFP growth at the sectoral level can be larger [than that at the micro level, as observed in Figures 10 and 18. There are at least two more potential causes of the difference. First, the TFP data for Figure 18 are on a gross output basis, while those for Figure 10 are on a value added basis. And second, inter-temporal changes in labor quality are not taken into account in the process of deriving the TFP data for Figure 18, but are taken into account in the case of the TFP data for Figure 10.

Why did the negative exit effect increase over time? Comparing the survival rates of factories shows that less productive factories have a higher probability of being shut down. However, some large and productive factories have also been shut down, as a result of which the weighted average of the TFP level of factories that are closed has been higher than the average TFP level of staying factories (Kim et al. 2007).

As Figure 19 shows, there is a statistically significant negative correlation between the industry-level exit effect and industry-level gross output growth by Japanese multinational enterprises (MNEs) in Asia. MNEs have higher productivity than non-MNEs (Fukao 2012) and many of them have relocated, or are relocating, production activities abroad, meaning that, as they reduce production within Japan,[22] only unproductive non-MNEs are left behind. It seems that this is the main cause of the negative exit effect.

[22] As already explained in Section 2, despite ample cash flow, large firms are not (directly) expanding production in Japan. Instead, excess cash is used for debt repayment, portfolio investment, outward FDI, and/or the expansion of the production capacity of their domestic affiliates.

Figure 19. Overseas Production and the Exit Effect at Home



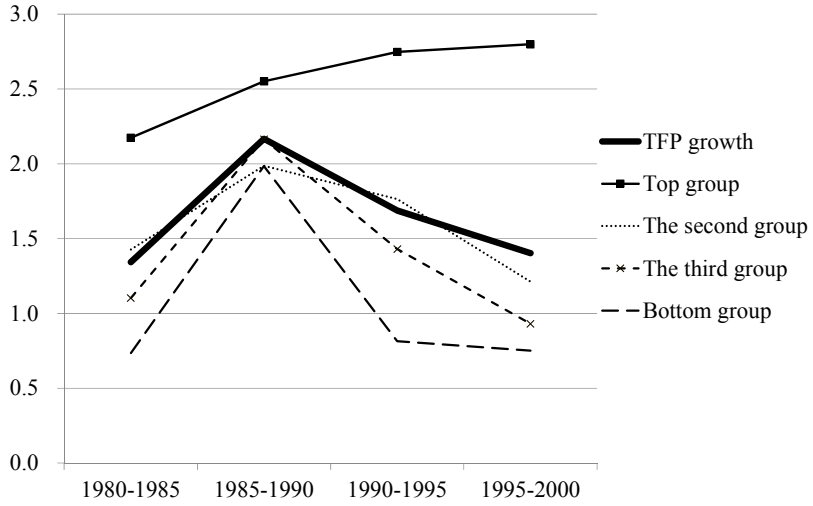
Source: Kim et al. (2007).

Low TFP growth of small and medium-sized firms

Another important fact we can point out from the micro data is that the productivity gap between large firms and small and medium-sized firms (SMEs) has increased in the 1990s and 2000s. Figure 20 shows the results obtained by Kim et al. (2010) on this issue. Employing the data used for Figure 18, they examined the TFP growth of stayers by factory size for five-year intervals from 1980 to 1999 (the final interval is 1995–1999). They subdivided factories into four groups by factory size at the beginning of each period for each industry. The grouping is conducted so that the total sales of each group in each industry are equal to one quarter of the total sales of that industry. They then calculated the weighted average of the TFP growth for each group of factories of different size. They found that in the manufacturing sector, the TFP

growth of large factories, most of which are owned by large firms, actually accelerated in the 1990s, while small and medium-sized factories, most of which are owned by SMEs, were left behind. Thus, there was no lost decade in the case of large manufacturing firms. Using micro data of the Ministry of Finance's *Financial Statements Statistics of Corporations by Industry*, it can be further shown that the TFP gap between large firms and small firms in the manufacturing sector continued to expand in the 2000s (Fukao 2012).

Figure 20. TFP Growth by Factory Size



Source: Kim et al. (2010).

One possible explanation of this divergence is that SMEs were left behind in R&D. In the 1990s and 2000s, the R&D expenditure–gross value added ratio of the Japanese manufacturing sector continued to grow. However, in Japan, R&D expenditure is mainly confined to large firms, which conduct the bulk of R&D. According to the *White Paper on Small and Medium Enterprises in Japan 1999*, the average R&D–sales ratio of Japanese firms is higher than that of U.S. firms in the case of firm groups with 5,000 or more employees, but it is lower in the case of firm groups with less than 5,000 employees. Moreover, according to the *Report on the Survey of Research and Development 2011*, total R&D (including sponsored research) by firm groups with 300 or more employees amounted to 13 trillion yen, while total R&D by firm groups with less than 300 employees was only 1 trillion yen.

Japanese SMEs probably enjoyed R&D spillovers from large firms through tight supplier-purchaser relationships and geographic proximity within Japan before the 1990s. However, as large firms expanded their supply chains globally and relocated their factories and even their R&D activities abroad (Belderbos et al. 2009), spillovers from large firms seem to have declined.

Using matched micro data of the *Census of Manufactures* and the Ministry of Education, Culture and Sports, Science and Technology's *Survey of Research and Development* from 1987 to 2007, Ikeuchi et al. (2013) examine R&D spillover effects through geographic and technological proximity and supplier relationships. They find that R&D spillover effects have declined since the 1990s, partly because of a decline of geographic proximity through the closure of factories in industrial districts by R&D intensive firms. Although SMEs have started to become more active in R&D in recent years (Fukao et al. 2012), probably in order to respond to this decline of spillover inflows, it will take some time for SMEs to catch up.

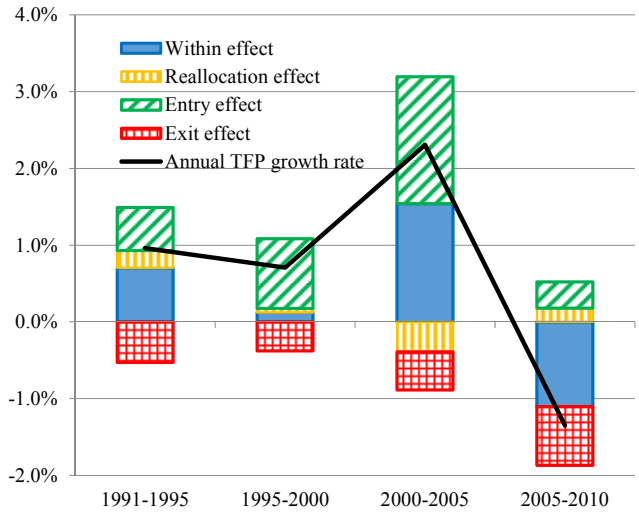
It should further be noted that only a limited part of the decline in SMEs' TFP growth shown in Figure 20 can be explained by the weakening of spillover effects (Kwon et al. 2013). Another factor contributing to the decline in TFP growth probably is the stagnation of investment by SMEs in ICT and intangibles (Fukao et al. 2012). However, further research is needed on this issue.

Next, let us examine the slow TFP growth in the non-manufacturing sector. It is difficult to conduct an analysis that is as detailed and rigorous as that for the manufacturing sector because of a lack of sufficient micro data. That being said, using micro data of METI's *Basic Survey of Japanese Business Structure and Activities*, which covers most non-manufacturing sectors, except the finance, real estate, and construction sectors, it is possible to decompose the TFP growth of listed firms in the non-manufacturing sector. The results are shown in Figure 21. Since the data cover only the period from 1991, we cannot compare the productivity dynamics in the 1990s and 2000s with those in the 1980s.

The figure shows that in the non-manufacturing sector, just as in the manufacturing sector, the exit effect is negative throughout the entire period covered by the data. Moreover, the reallocation effect, depending on the period, is either very small or negative. It thus appears that the natural selection mechanism does not work well also in

the non-manufacturing sector. On the other hand, an encouraging finding from Figure 21 is that the entry effect is positive and relatively large, indicating that there are productive start-up firms in the non-manufacturing sector. It is well known that the percentage of start-up firms in total firms in Japan is much lower than that in the United States. The finding here suggests that promoting the new entry of firms is an important policy measure the government can take to enhance TFP growth in the non-manufacturing sector.

Figure 21. Decomposition of TFP Growth of Non-manufacturing Firms (Annual Growth Rate)



We saw that in the case of the manufacturing sector, small and medium-sized firms had been left behind in terms of their productivity. Can a similar phenomenon be observed in the non-manufacturing sector? To examine the TFP performance of firms in the non-manufacturing sector by firm size, Inui et al. (2011) classified firms within each of the 17 non-manufacturing industries into four groups by firm size and found that the gap between the average TFP level of the group of largest firms and the group of smallest firms was 14% in 1982–1990, 18% in 1991–2000, and 21% in 2001–2007. In other words, the TFP gap between large and small firms has increased substantially over time. According to Fukao and Kwon (2011), larger, older, and more productive firms in the non-manufacturing sector are very slow to increase their capital and labor input. As in the case of the manufacturing sector, it seems that the natural selection mechanism

does not work well in the non-manufacturing sector. More analyses are needed on why the productivity of SMEs in the non-manufacturing sector has fallen behind and why the natural selection mechanism does not seem to work.

5. Conclusion

This paper examined the causes of Japan's economic stagnation from a long-term, structural perspective and investigated whether it will be possible to resolve the causes of stagnation. We took a long-term perspective that compares the two decades from the early 1990s onward with the preceding two decades. In addition, taking advantage of databases such as the EU KLEMS Database, we compared Japan's performance with that of the United States and other advanced economies. Further, we used firm-level data to examine underlying structural problems. The main findings are as follows.

1. Japan has been suffering from a large negative GDP gap since the 1970s. Underlying this large negative GDP gap is an excess saving problem caused by the persistently high private saving rate and the decline in private investment. Moreover, the declining trend in private investment from the 1970s is due not only to temporary financial factors such as banks' non-performing loans, firms' damaged balance sheets, and deflation, but also structural factors such as the slowdown in the growth of the working age population and the decline in TFP growth.
2. The saving-investment balance of the private sector (private saving surplus) can be either invested abroad (current account surplus) or borrowed by the government (general government deficit). If there is no outlet for intended excess saving, this will cause a recession through insufficient demand. This danger of insufficient demand has been a chronic presence in Japan since the latter half of the 1970s.
3. Consistent with the life cycle hypothesis, Japan's household savings rate has fallen considerably with the aging of the population. However, as if to offset that decline, the corporate savings rate has increased rapidly, and as a result the private savings rate has remained unchanged at around 25%.
4. The largest part of Japan's excess private saving has gone toward covering the government deficit, but government expenditure was not necessarily used for efficient

purposes. For example, public investment by the Japanese government was concentrated in low income regions of Japan.

5. Open economy macroeconomics suggests that when there is a large private saving excess in an economy with free international capital flows, the excess supply of domestic goods should be resolved through a large depreciation of the domestic currency and an increase in the current account surplus. However, Japan's current account surplus did not expand sufficiently to bring about such equilibrium because of three factors: trade friction with the United States, insufficiency of international capital movements to absorb Japan's huge excess saving, and deflation, which made it difficult for Japan to reduce real interest rate further. In addition to these factors, excess saving in other Asian countries such as China and major ASEAN members probably also contributed to making it difficult for Japan to expand its current account surplus.

6. Japan's TFP growth declined substantially after 1991 both in the manufacturing and the non-manufacturing sector. Before 1991, Japan's TFP was rapidly catching up with that of the United States, but after 1991, Japan's TFP level relative to that of the United States declined by 19% in the manufacturing sector and 8% in the non-manufacturing sector. It seems that this large and prolonged drop in TFP growth cannot be fully explained by labor hoarding and the idling of capital stock caused by a scarcity of final demand.

7. Japan's capital accumulation continued apace after 1990, especially when taking the slow rate of GDP growth and the decline in the working age population into account. Japan's capital–GDP ratio continued to increase after 1991, and this increase in the capital–GDP ratio must have contributed to the decline in the rate of return on capital in Japan by decreasing the marginal productivity of capital.

8. From 1995, the United States experienced an acceleration of TFP growth in ICT-using sectors such as distribution services and the rest of the manufacturing sector. It appears that a similar ICT revolution did not occur in Japan simply because Japan did not accumulate sufficient ICT capital. Japan's accumulation of intangible capital was also very slow. Since ICT capital and intangible assets may be close complements, it seems that the stagnation of these two types of investment mutually reinforced each other.

9. The low levels of ICT and intangible investment are closely related with labor market problems. For example, one of the main contributions of the introduction of ICT is that it allows firms to save unskilled labor input. However, because of the high job security in Japan, it may be difficult for firms to actually cut jobs. Moreover, many firms have increased the percentage of part-time workers in total workers and do not provide intensive training in the case of part-time workers. This change has substantially reduced training expenditure, which is an important part of intangible investment.

10. Large firms enjoyed an acceleration in TFP growth in recent years and the productivity gap between large firms and small and medium-sized firms (SMEs) increased in the 1990s and 2000s. It seems that Japanese SMEs were left behind in the accumulation of ICT capital and intangible investment. Furthermore, as large firms expanded their supply chains globally and relocated their factories and even their R&D activities abroad, R&D spillovers from large firms to SMEs seem to have declined.

11. The natural selection mechanism does not work well both in the manufacturing and the non-manufacturing sector. In the case of manufacturing, this is partly because large productive firms have been relocating production abroad.

The above findings yield the following policy implications for Japan.

First, the present government is taking policies to overcome deflation and appears to be aiming to stimulate private investment through a reduction in real interest rates. However, since investment opportunities are limited and the rate of return on capital is very low, extremely low or negative real interest rates are required, but maintaining very low or negative real interest rates, a positive inflation rate, and full employment without causing bubbles is likely to be extremely difficult to achieve. Therefore, for sustainable growth, it is necessary to raise the rate of return on capital through productivity growth.

Second, more empirical research is needed to judge for certain whether Japan's low growth rates of ICT capital and intangible assets are sub-optimal. However, if it is indeed desirable to enhance ICT and intangible investment, labor market reforms (such as improving the social safety net, enhancing labor market flexibility, and reducing the unfair gap between regular and part-time workers) and support for ICT and intangible investment by SMEs will be important issues. Labor market reform is also important

from the perspective of human capital accumulation. Firms pay a premium to part-time workers in order to obtain flexibility of employment. Such behavior by firms is quite rational in the context of slow economic growth and Japan's system of high job security. However, at the same time it may also be creating a huge economic loss by reducing human capital accumulation.

Third, to raise TFP growth, the natural selection mechanism of the economy needs to be enhanced. To achieve this in the case of the manufacturing sector, it is important to enhance the start-up of domestic establishments by Japanese and foreign multinationals through the improvement of regional logistics, the establishment of free trade agreements, the reduction of corporate taxes, etc. As for the non-manufacturing sector, this is still overregulated and regulatory reforms are required. For example, the government could relax regulations preventing the entry of private firms in agriculture and medical services. It could also revise the Large-scale Retail Stores Law and facilitate the entry of large retail stores. When the government supports SMEs, it should restrain from supporting all SMEs uniformly. Such support harms the market selection mechanism. Instead, the government needs to introduce a scheme which enhances the growth of promising small firms. For example, the government could promote the diffusion of technology to innovative SMEs by revising the Japanese version of the Bayh-Dole Act (Article 30 of the Law on Special Measures for Industrial Revitalization and Innovation). The government could also increase its procurements from SMEs. Labor market reform is another important element to enhance the natural selection mechanism, because the expected high closure cost of firms decreases the incentives for entrepreneurs and investors to set up new businesses. In sum, there is a wide range of steps the government could take to address the fundamental cause of Japan's economic stagnation – low TFP growth – and boost the economy's growth potential.

Since the outbreak of the global financial crisis, most developed economies have suffered from insufficient final demand. According to recent estimates by the IMF, the combined negative GDP gap of 36 developed economies in 2014 is expected to be about $1.1 trillion (2.2% of their GDP). In a world characterized by "secular stagnation" (Summers 2013), what lessons can we derive from Japan's experience of the lost decades?

First, although it is important not to fall into the deflation trap, keeping real interest rates very low or negative through a zero nominal interest rate plus moderate inflation will not be sufficient for solving the fundamental problems. It is probably possible for economies to keep on growing by maintain high investment rates through low real interest rates. However, as capital accumulation continues, the rate of return on capital will decline, so that extremely low or even negative real interest rates will be required. Yet, maintaining very low or negative real interest rates, a positive inflation rate, and full employment carries the danger of leading to new bubbles. Therefore, for growth to be sustainable, it is necessary to raise the rate of return on capital through productivity growth. Japan's fundamental structural problem was not its deflation but the continuation of capital accumulation under a zero interest rate policy and the lack of political will or courage to introduce policies to bring about structural change to accelerate TFP growth.

Second, at least in the case of Japan, the TFP slowdown seems to be caused not by an exogenous drying up of innovation (on this issue, see Gordon 2013), but by structural factors of the economy such as low intangible and ICT investment by small and medium-sized firms, an inflexible labor market, the relocation of production by productive firms, the inefficient use of public investment, the increase in part-time workers, etc., most of which could have been fixed through sensible policies. In other words, it appears that productivity growth in Japan slowed as a result of impediments that could have been removed, and most other developed economies probably are similarly characterized by obstacles to productivity growth that can be overcome if the necessary will is there. We need sensible and courageous policy makers, not fatalists.

Third, in the case of Japan, the decline in household saving was cancelled out by an increase in saving by large corporations. Large corporations – despite their high productivity – do not actively invest domestically and use their surplus funds not for capital investment or paying dividends but for debt repayment and the accumulation of liquid assets. Whether this kind of corporate saving behavior is desirable, and whether governance in major corporations functions properly, is an important research topic for the future.

Fourth, some countries, such as China and Germany, seem to be enjoying low real exchange rates and huge current account surpluses, and other economies suffer from

that. On the other hand, many low-income economies still want capital inflows. We need a fundamental reform of the international monetary system which will mitigate the scarcity of final demand in developed economies.

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