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### Abstract

Although Japan had largely resolved the problem of non-performing loans by the early 2000s, economic growth hardly accelerated, resulting in the “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 total factor productivity (TFP) growth due to Japan's low information and communications technology (ICT) investment.

*Keywords:* Total factor productivity, Secular stagnation, Information and communications technology, Japan's lost decades

*JEL classification:* D24, N15, O47, L86, O32

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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.<sup>1</sup> 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, maintaining very low or negative real interest rates for a prolonged period may give rise to bubbles like those in Japan during the late 1980s or 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 JIP Database<sup>2</sup> and the

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<sup>1</sup> See, for example, Saxonhouse and Stern (2004) and Ito et al. (2005).

<sup>2</sup> The JIP Database has been compiled by us (the six authors of this paper) and other scholars of Gakushuin, Keio, and other universities as a part of a joint project of RIETI (Research Institute of Economy, Trade and Industry) and Hitotsubashi University. The most recent version of the database (JIP 2014) contains annual information on 108 sectors from 1970 to 2011. These sectors cover the whole

EU KLEMS Database, we will compare Japan's performance with that of the United States and other advanced economies.

The remainder of this study is organized as follows. Section 2 considers the causes of Japan's economic stagnation from a demand perspective. Next, Section 3, using a growth accounting framework, 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 mainly focuses on the low level of investment in information and communication technology (ICT) 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 real GDP, estimated 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 already experienced a GDP gap of more than minus 2%. Moreover, these were periods during which Japan also experienced deflation.

**Figure 1. Japan's Real GDP Gap, Potential GDP, and Inflation Rate (%):  
1980Q1-2014Q4**

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Japanese economy. The database includes detailed information on factor inputs, annual nominal and real input-output tables, and some additional statistics, such as intangible asset, Japan's international trade by trade partner, inward and outward FDI, etc. at the detailed sectoral level. An Excel file version of the JIP 2014 is available at < <http://www.rieti.go.jp/en/database/JIP2014/index.html>>.



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.

Despite the Bank of Japan's massive stimulus measures and various fiscal policy measures undertaken by the government, Japan still had a GDP gap of minus 2.3% in the fourth quarter of 2014 and suffers from very low inflation rates (when excluding the impact of the consumption tax hike).

### 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).

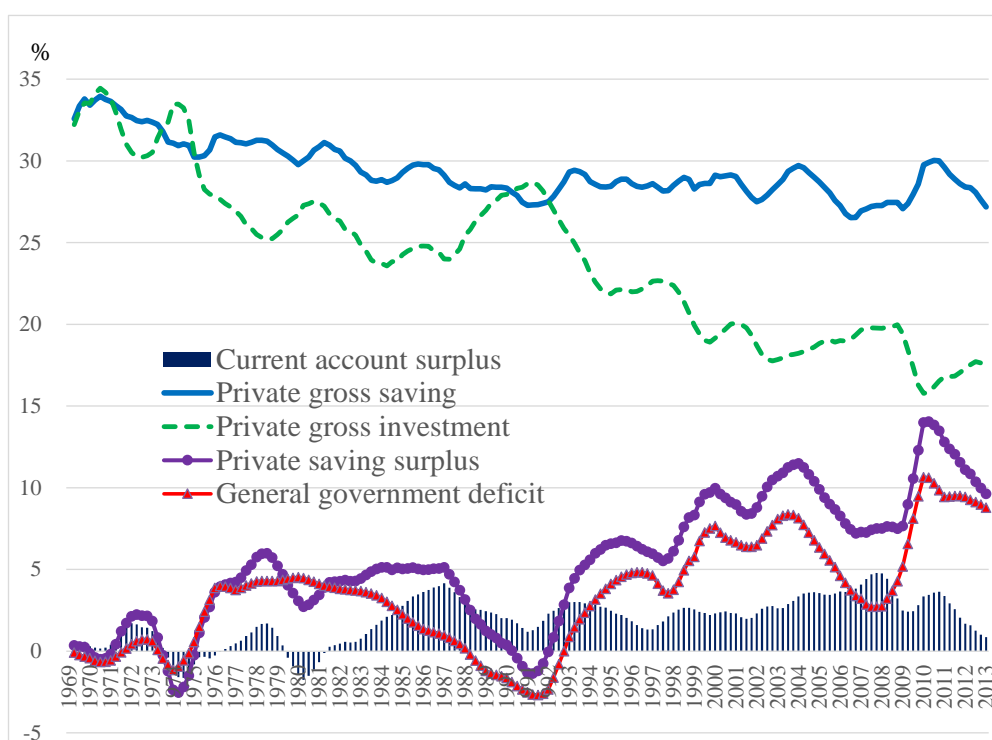
Despite Japan's exceptionally high private gross saving rate when compared with other advanced economies, it did not experience any excess saving until the 1970 due to extremely high investment during the high speed growth era. However, as can be seen in Figure 2, from the beginning of the 1970s, Japan's economy started to experience chronic excess saving.<sup>3</sup> This is due to the large decline in private investment, for which there are the following reasons.

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.

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

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<sup>3</sup> 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.



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.

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,<sup>4</sup> 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

<sup>4</sup> For a long-term comparison of TFP levels by industry between Japan and the United States, see Jorgenson et al. (1987) and Jorgenson et al. (2015). Jorgenson et al. (2015) is based on a KLEMS-type database for the United States and Japan. Compared with the JIP Database, the industry classification of their database is more aggregated (about 35 sectors). There are many other differences in the estimation procedure employed by us (for the JIP Database) and Jorgenson et al. (2015). They explicitly treat land as a production factor, while we omitted land input. The inclusion of land lowers the cost share of other inputs. This difference usually makes their estimate of TFP growth higher than ours. They also include consumer durables in capital input, which we did not.

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.<sup>5</sup> 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.

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 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 a reduction in 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 figure shows that during most of the period the largest part of excess saving 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

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<sup>5</sup> 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.



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 that 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 Agreement, 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 “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 rate risk and there are not sufficient actors willing to shoulder this risk (that is, residents willing to hold 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 policies to effect a depreciation of the yen.<sup>6</sup> 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

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<sup>6</sup> On this issue, also see Jorgenson et al. (2015).

fact, as seen above, the yen appreciation following the Plaza Agreement and the recession that followed it arose before the deflation period.

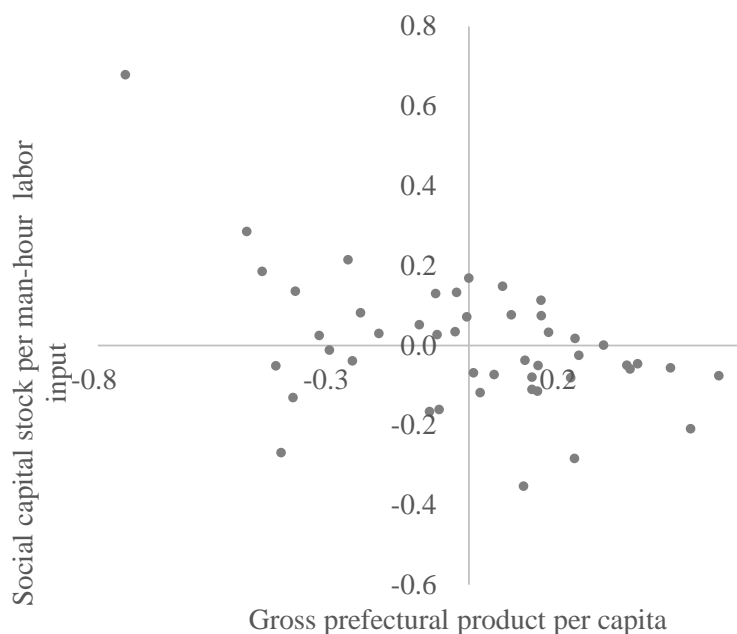
### **The unresolved excess saving problem**

Let us return to considering how Japan's excess savings are used. When a saving surplus country cannot achieve 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 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 assert 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 saving 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<sup>7</sup> to absorb the huge excess savings, there would have been 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 as having 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 saving, 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 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 saving changed. Put simply, it could be said that when the main outlet for excess saving 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 hand – 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

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<sup>7</sup> Using various methods, Kamata (2009) estimated how the level of the 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, it would have been more or less 0% or around -1%.

saving, which until 1982 had 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 saving rate and the United States' extremely low saving rate and similarly pointed out that following the end of Japan's high speed growth Japan was constantly in danger of falling into deflation.

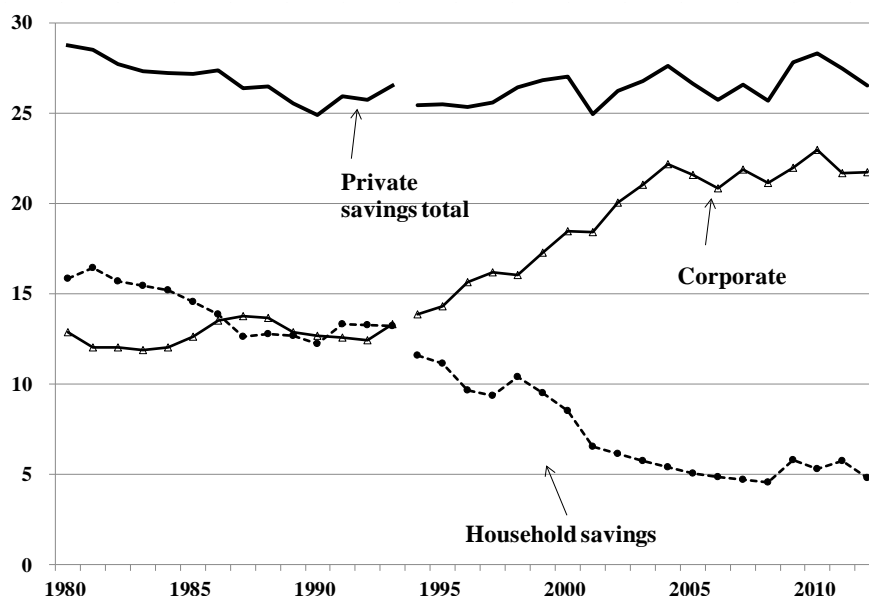
Another way to resolve Japan's excess saving problem would be to increase private consumption or lower the saving rate. The Maekawa Report (The Study Commission on Adjustment of Economic Structure for International Cooperation 1986) published in April 1986 emphasized that desirable policies would be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

Setting aside temporary consumption stimuli as part of antirecession policies, lowering the private saving 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.<sup>8</sup> For example, Horioka (2008) expected that Japan's household saving rate would rapidly fall to zero or even turn negative by around 2010. As can be seen from Figure 4, the actual household saving rate, more or less in line with Horioka's prediction, has fallen considerably. However, as if to offset that decline, the corporate saving rate has increased rapidly, and as a result the private saving rate has remained unchanged at around 25%. Overall, therefore, it can be said that the problem of excess private saving has still not been resolved.

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<sup>8</sup> However, the experience of the United States indicates that the private saving rate moves in a way that cannot necessarily be explained by changes in demographic structure (Auerbach and Kotlikoff 1989).

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



Note:

1. Corporate saving is the sum of the saving of non-financial corporate firms and that 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 saving problem is to what extent household and corporate saving are substitutes for each other and, moreover, to what extent household and government saving 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 saving is not very high.

While there are many empirical studies on the determinants of household saving, there has been relatively little research on the determinants of corporate saving. If household and corporate saving 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 saving.<sup>9</sup> As will be shown in Sections 3 and 4, given that large corporations –

<sup>9</sup> Approximating firms' gross saving by subtracting corporation and municipal taxes, interim dividends, and dividends from their current profits using data from the *Financial Statements Statistics of*

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 Schaefer 2008 on the rapid deleveraging of corporations) and the accumulation of liquid assets.<sup>10</sup> 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.<sup>11</sup>

### **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 saving as a result of structural causes such as a high saving rate and the decline in investment due to demographic change. This huge excess saving has made it difficult to overcome deflation and has 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, understanding the impact of population aging and trends on the macroeconomy is indispensable when considering Japan's future growth prospects.

#### **Supply-side sources of Japan's economic growth**

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*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.

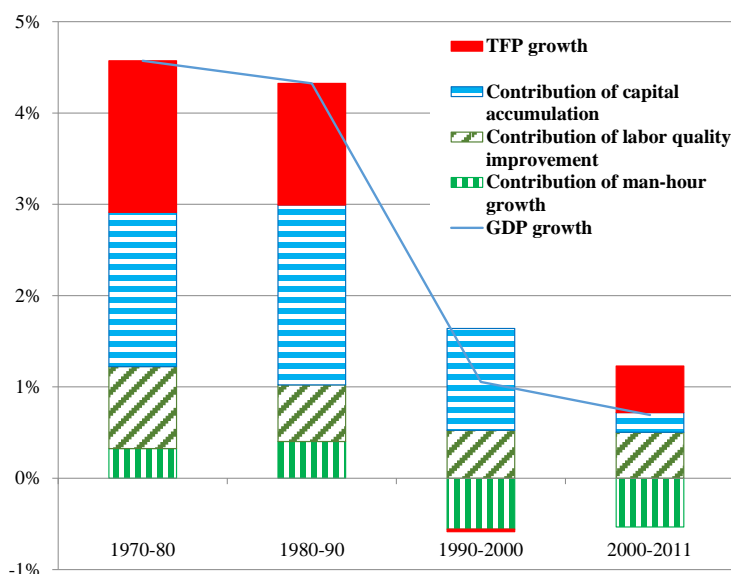
<sup>10</sup> Large corporations are actively expanding employment not within their own company but in domestic subsidiaries (Kwon and Kim 2010) and are engaging in foreign direct investment abroad. It is likely that part of large corporations' saving is used for these purposes.

<sup>11</sup> Recently, the Japanese government introduced new policies to reform Japan's corporate governance (Benes 2015). This reform might change corporate saving behavior in the future.



Based on these considerations, this section attempts to look at Japan's prolonged stagnation from the supply side using growth accounting.<sup>12</sup> Figure 5, using the JIP 2014 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 2014.

Figure 5 shows that the annual average growth rate of Japan's real GDP (shown by the solid line in the figure) fell by 3.5 percentage points from 4.4% in 1970–90 to 0.9% in 1990–2011. Decomposing this 3.5 percentage point decline in the growth rate shows that it is due to a decline in TFP growth from 1.5% to 0.2%,<sup>13</sup> a decline in the contribution of capital accumulation from 1.8% to 0.7%, a decline in the contribution of labor quality improvements from 0.8% to 0.5%, and a reversal in the contribution of man-hour growth from +0.4% to –0.5%. The sum of the contribution of labor quality improvements and of man-hour growth in 1990–2011 was almost zero (0.5% – 0.5% = 0.0%), meaning that labor service input (man-hour growth plus labor quality improvement) did not increase in this period.

<sup>12</sup> The productivity analyses in this section and in Section 4 are partly based on Fukao (2014).

<sup>13</sup> 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).

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 different points in time when the GDP gap was very similar, such as 1983, 1992, and 2006 (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) capital accumulation became markedly slower after 2000. 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**

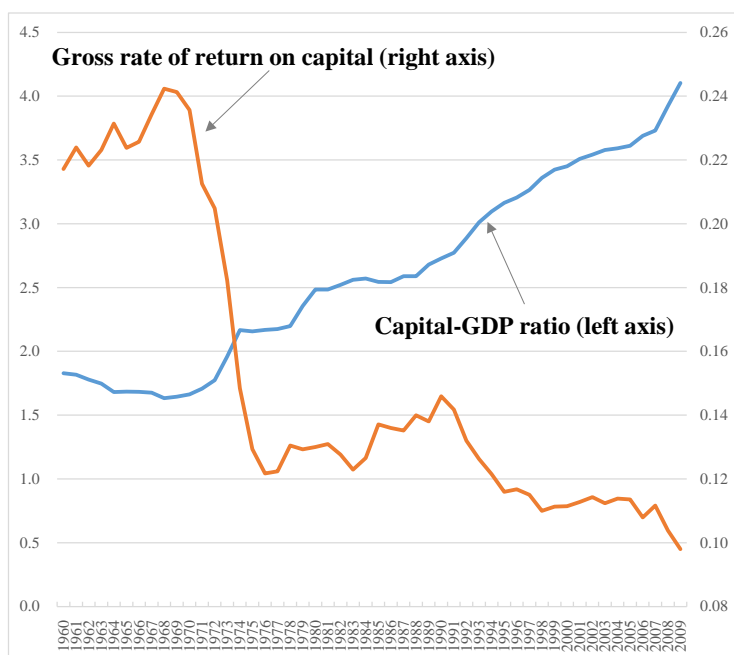
As seen in the growth accounting in the preceding subsection, the contribution of capital accumulation continued to be positive in the 1990s and the 2000s, although labor service input did not increase in the 1990s and after. This means that the capital service/labor service input ratio rose substantially during the period 1990–2011.

As a result of this rise, 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 2011 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 0.9, 0.5, 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 the increase in Japan's capital coefficient decelerated somewhat from the end of the 1990s, on the whole it continued to rise relatively strongly. Comparing the periods before and after 1990, we find that between 1975 and 1990, the capital coefficient rose at an average annual rate of 1.6%. However, between 1990 and 2009, the rate of increase then accelerated to 2.2% per year, while, at the same time, the gross rate of return on capital fell at a rate of 2.1% per year.<sup>14</sup>

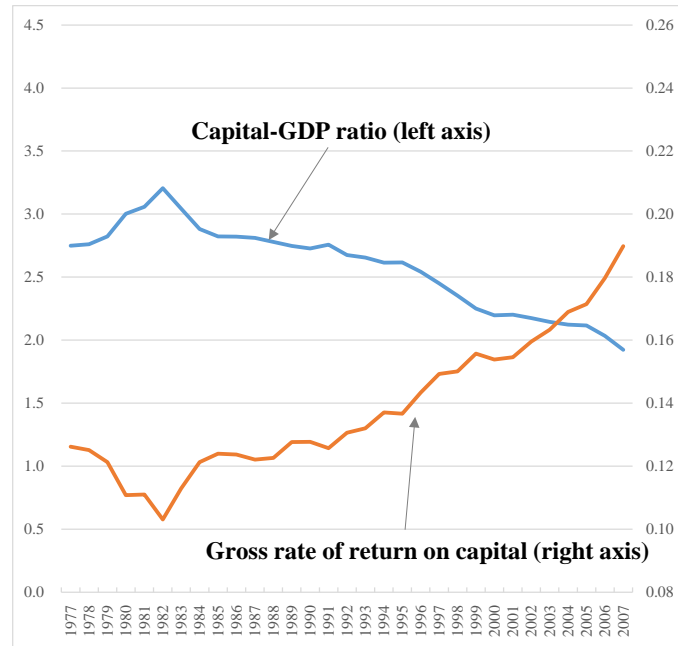
**Figure 6(a) Japan's Capital Coefficient and Return on Capital**



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).

<sup>14</sup> 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.

**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).

In contrast with Japan, the United States, as shown in Figure 6(b), 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.<sup>15, 16</sup>

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

<sup>15</sup> 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.

<sup>16</sup> 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.

relying on capital accumulation is not necessarily bad per se; however, the question is whether it can be sustained.<sup>17</sup>

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,<sup>18</sup> 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 substantially, particularly in the 1990s. At the same time, the return on capital deteriorated and it is very likely that 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 over time. 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.

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

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<sup>17</sup> Ando (2002) and Saito (2008) point out that it is possible that protracted inefficient investment 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 saving 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.

<sup>18</sup> Although Figure 6(a) suggests that the speed of increase in the capital coefficient accelerated between 2007 and 2009, this is due not to substantial changes in the rate of capital accumulation but to the considerable decline in the numerator (GDP) as a result of the global financial crisis. It is therefore likely that, with the recovery in GDP, the capital coefficient has fallen since 2009.

decades. Despite the recovery from the recession following the global financial crisis, Japan still had a negative GDP gap of 2.3% in the fourth quarter of 2014 (Figure 1). The government is pursuing 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 0.8% in 1970–1990 to 0.5% in 1990–2011, while the contribution of man-hour growth switched from +0.4% to –0.5%.

In this subsection, we examine the causes of this decline in labor input as well as the future prospects. Man-hour growth in the macroeconomy 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 can be seen in Figure 7, 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 this and the next decade. The expected decline of the working-age population is particularly large in this decade because of the retirement of the baby boomers.

Regarding the decline in working hours per worker, the following can be pointed out. 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 wages 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.

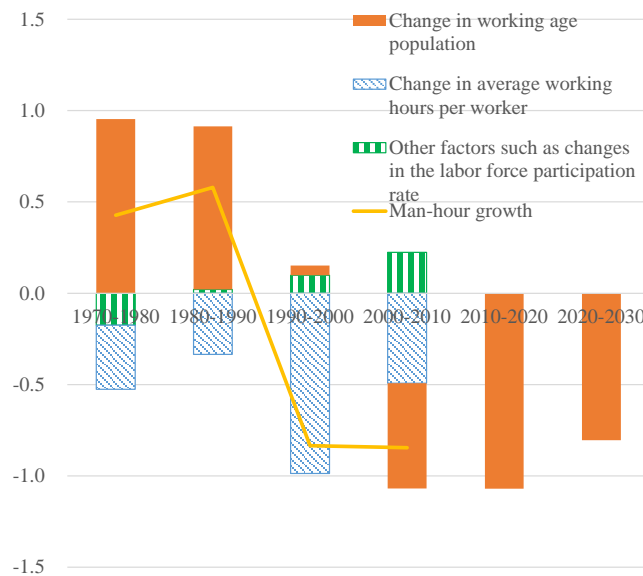
The contribution of the self-employed took positive values, because their labor income per hour is low and the percentage of self-employed in total workers declined over time. Finally, the contribution of part-time workers took negative values, because their wage rates are low and the percentage of part-time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

Figure 9 also shows projections of labor quality changes in this and the next decade by Kawaguchi et al. (2007). They assume 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 assumptions, they estimated how demographic changes will affect Japan's labor quality in the future.

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

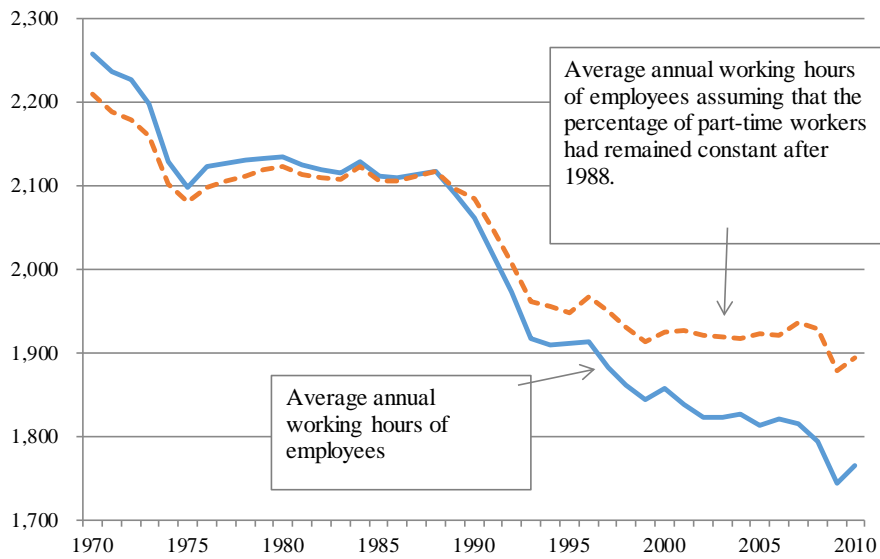
**Figure 7. Decomposition of Japan's Man-Our Growth (% Annual Rate)**



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

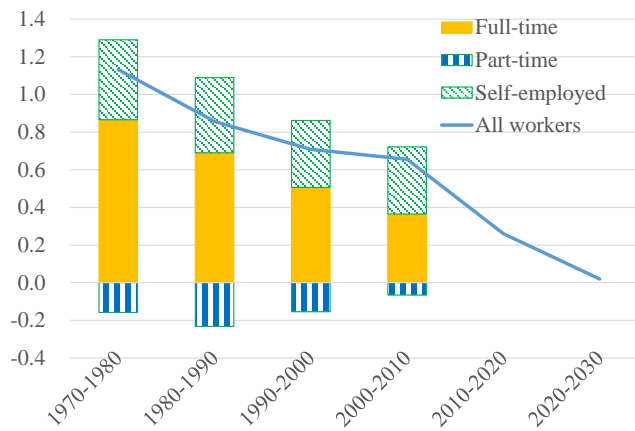


**Figure 8. Average Working Hours of Employees**



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 this and the next decade, even if the 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 sustainable growth of Japan's economy**

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 macroeconomy 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**

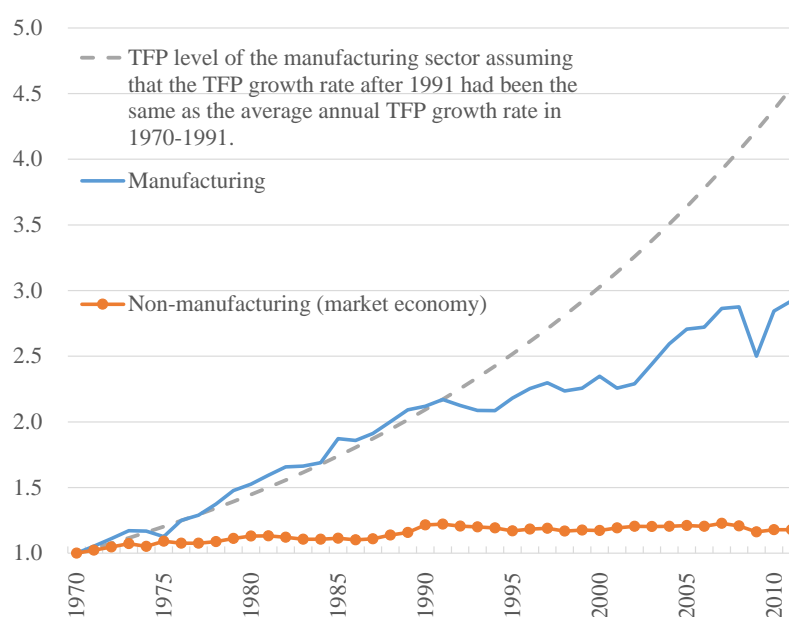
In this section, we study why Japan's TFP growth has slowed down from the 1990s onward. We examine this issue using two approaches. We start by analyzing Japan's TFP growth from the 1970s using sectoral data.

### 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% higher (without increasing factor inputs) than the actual current level.

**Figure 10. TFP Level of the Manufacturing and the Non-manufacturing Sector (Market Economy), 1970–2011 (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 2014.

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 27% higher than that in 1970. [However, after 1991, there was almost no TFP growth in this sector. However, after 1991, TFP growth came to a complete halt and – depending on the period examined – even turned slightly negative.

Comparing the 1970–1991 period with the 1991–2011 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 1.4 percentage points from 1.1% to -0.2%. 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 macroeconomy (approximated by multiplying the TFP growth decline by the value added share) was 30% 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.<sup>19</sup>

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 confirmed by comparing Japan’s TFP growth with that of the United States and other developed countries at a more disaggregated level.<sup>20</sup> 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.

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 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.<sup>21</sup>

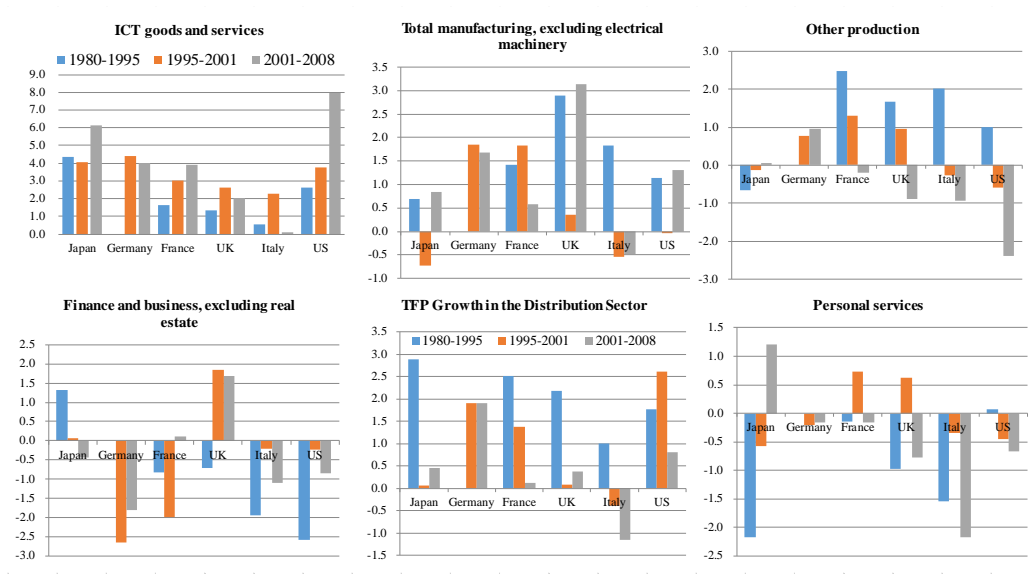
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<sup>19</sup> This calculation is based on the EU KLEMS Database and the Rolling Updates as well as Inklaar and Timmer (2008). On this issue, also see Jorgenson et al. (2015).

<sup>20</sup> For more details on the industry classification and the ICT intensity of each sector, see Timmer et al. (2007).

<sup>21</sup> 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.

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

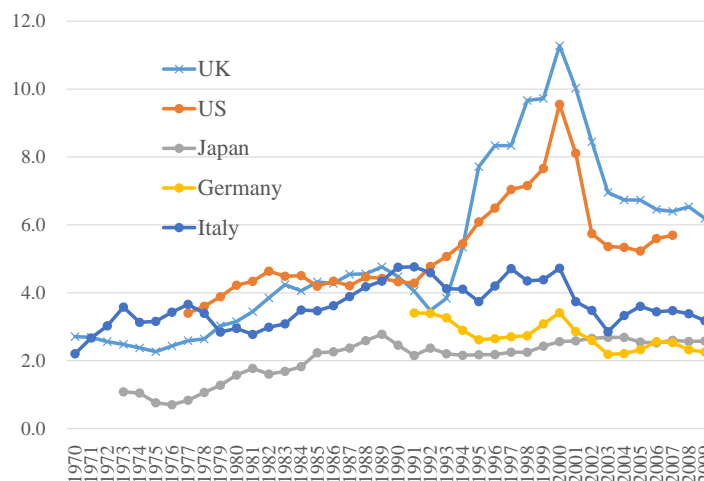


Source: EU KLEMS Database, Rolling Updates.

### ICT investment in Japan

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

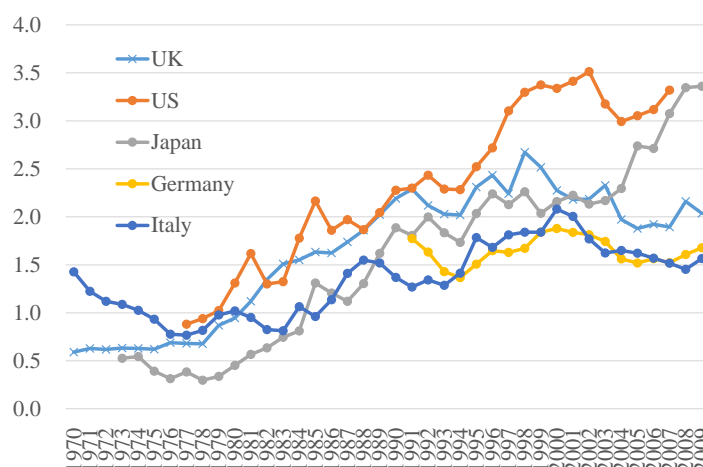
**Figure 12. ICT Investment–GDP Ratio in Major Developed Economies: Distribution Services**



Source: EU KLEMS Database, Rolling Updates.

**Figure 13. ICT Investment–GDP Ratio in Major Developed Economies:**

**Total Manufacturing, Excluding Electrical Machinery**



Source: EU KLEMS Database, Rolling Updates.

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.<sup>22</sup> It appears that the ICT revolution did not happen in Japan simply because Japan has not accumulated sufficient ICT capital.

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, preventing them from introducing ICT in the first place.

Second, the benefits from ICT investment seem to be closely related with management practices (Bloom et al. 2012) and corporate strategies. Miyagawa et al.

<sup>22</sup> 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.

(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 smaller positive impact on firms' performance in Japan than in the United States (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. This low metabolism has probably impeded ICT investment in Japan.

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 sector 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.



Sixth, since it is too costly for small firms to have their own ICT service division providing a full range of ICT services, having access to efficient vendors of ICT services is a key factor for procuring ICT inputs at a reasonable price; however, in Japan, the market for business process outsourcing (BPO), which includes outsourcing of ICT processes, is not well developed (Fukao et al. 2015). The underdevelopment of the BPO market in Japan is closely related with the rigidity of the labor market. Since it is difficult for firms to lay off workers, firms hesitate to restructure costly internal business processing divisions. Moreover, even when they restructure such divisions, they often relocate workers in such divisions to affiliates or firms in the same business group and procure business process services from the firms to which they transferred former employees. Because of these constraints, Japanese firms cannot procure business services from the most productive vendors, reducing the benefit of BPO and keeping the BPO market underdeveloped.

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.

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 to economic competencies and computerized information has stagnated (Fukao et al. 2009). 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 and did not provide intensive training in the case of part-time workers. This change reduced training expenditure substantially (Fukao 2013).

## **5. Conclusion**

This study 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 JIP Database and the EU KLEMS Database, we compared Japan's performance with that of the United States and other advanced economies. 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 saving rate has fallen considerably with the aging of the population. However, as if to offset that decline, the corporate saving rate has increased rapidly, so that the private saving 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, insufficient international capital movements to absorb Japan's huge excess saving, and deflation, which made it difficult

for Japan to reduce real interest rates 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 for part-time workers. This change has substantially reduced training expenditure, which is an important part of intangible investment.

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.

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 37 developed economies in 2014 was about 1.9% of their GDP (IMF World Economic Outlook Database April 2015). 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 a deflationary trap, keeping real interest rates very low or negative through a zero nominal interest rate plus moderate inflation is not sufficient to resolve the underlying fundamental problems. It is probably possible for economies to keep on growing by maintaining high investment rates through low real interest rates. However, as capital accumulation continues, the rate of return on capital will eventually 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 such as low intangible and ICT investment by small and medium-sized firms, an inflexible labor market, the overseas relocation of production by productive firms (Fukao 2013), 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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