Declining Potential Growth in Korea

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Abstract

Korea's potential growth has declined since the 1990s. Given the current demography and capital deepening, it is projected to decline further for the next two to three decades unless overall efficiency (or TFP) is substantially enhanced. It is also noted that Korea's economic fundamentals resemble those of Japan 20 years ago in many respects. Although the real estate market appears less vulnerable than that of Japan prior to the bubble bust in the 1990s, the weakening fundamentals will likely drive down the natural interest rate of Korea. Simulation exercises based on an overlapping generations model estimate that the changes in fundamentals such as mortality rate and fertility rate have lowered the natural interest rate by more than 4%p during the 1990 to 2015 period and will continue to operate in the same direction for the next decades, increasing the probability of nominal interest rate hitting the 'zero lower bound.' In order to reverse this gloomy trend (or, to be more realistic, to mitigate the trend of decline), bold structural reforms in the labor, financial, and product markets are warranted. Successful reforms to enhance market efficiency would boost TFP, which could raise the natural interest rate as well as potential growth and thereby reduce the danger of Korea falling into the deflation trap that Japan has experienced.

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1. Introduction

Since the global financial crisis in 2008, 'secular stagnation' has become a catchword for the economic conditions of advanced countries.[1] Recovery from the crisis has been slow, while inflation has remained low despite unprecedentedly aggressive monetary policies. Asia, though it has maintained relatively rapid growth, has not shown as strong momentum as before. While Japan is struggling to escape from a deflation trap, China is suffering from the aftereffects of over-investment pushed to counter the negative shocks from the global financial crisis.

The economic performance of Korea, the third largest economy of East Asia, has also not been encouraging. The average rate of growth over the past five years was less than 3 percent, the lowest since the 1960s. It must be true that Korea has been adversely affected by the unfavorable global environment, but it should be noted as well that its growth rate has been showing a secular decline since the 1990s, far prior to the global crisis. Upon the weakening of its growth momentum, concerns are rising about the possibility of Korea's following Japan's footsteps into 'lost decades.'

What are the factors underlying the secular decline of Korea's growth? What policies are needed to reverse, or, to at least mitigate, the trend? This article seeks some clues to answer these questions. The next section introduces the results of growth accounting and speculates on the likely future path of the Korean economy based on the recent empirical evidence regarding total factor productivity (TFP). Section 3 then touches upon the possibility of Korea's 'Japanization,' by briefly comparing Korea of today with Japan two decades ago. Section 4 discusses the decline in the natural interest rate, a result of the decline in potential growth rate, and its implications for monetary policy. Section 5 concludes with some comments.

1 See Summers (2014), among many others.

2. Growth Trend of Korea

2.1 Growth Accounting

[Figure 1] shows the growth rate of Korea, along with that of the global economy. The positive correlation between the two variables suggests that Korea's slow growth in recent years is attributable to some extent to the stagnation of the global economy. Looking at the whole picture, however, it is clear that Korea's growth has been on a secular decline since the 1990s, while global growth has, if any, been accelerating. In other words, the recent slowdown of the Korean economy can hardly be explained by the deterioration in external conditions alone.

[Figure 1] Growth Trends: Korea and the World

A standard growth accounting exercise provides a starting point for understanding the secular decline in Korea's growth. According to the results of Kwon (2017A), all three components in growth accounting — labor, capital, and total factor productivity (TFP) — have decelerated. (Table 1) First, an extremely low fertility rate has led to a continuing decrease in the absolute number of workers entering the labor market, causing the pace of labor force expansion to decelerate and the age profile to become older.[2] (Figure 2) The capital accumulation rate, too, has slowed visibly as the capital-to-output ratio approaches those of advanced countries or a steady state level after a decades-long capital deepening process. (Figure 3) In addition, the TFP progress rate is slowing as well, perhaps as the technology gap between Korea and the global frontier narrows.

[Table 1] Growth Accounting of Korea

[Figure 2] Fertility Rates: Korea and Select Countries

2. Korea's fertility rate has fluctuated at around 1.3 since 2000, lower than those in Japan and Germany.

[Figure 3] Capital-to-Output Ratios: Korea and Select Countries

Looking ahead, the trend of decline in Korea's potential growth is likely to continue for the next two decades. (Table 1) The size of the working-age population will begin to decline from 2017, and given the current age structure the pace of its decline is projected to accelerate.[3] The shrinking of the working-age population will eventually reduce the aggregate labor force, although the rise in female participation rate can mitigate the downward trend for a while.[4] Inasmuch as growth in output slows due to a labor contraction, the pace of aggregate capital accumulation will also decline, assuming that Korea has reached a steady state level of its capital-to-output ratio.

This argument can be concisely explained using the standard growth accounting formula:

$$\Delta Y/Y = \Delta A/A + \alpha \Delta L/L + (1-\alpha)\Delta K/K,$$

where Y, A, L, K and α denote output, technology, labor, capital and the labor income share, respectively. A steady state output-to-capital ratio implies $\Delta K/K = \Delta Y/Y$, simplifying the formula to

$$\Delta Y/Y = (1/\alpha)\ \Delta A/A + \Delta L/L \quad \text{or} \quad \Delta y/y = (1/\alpha)\ \Delta A/A,$$

where y denotes income per labor. Therefore, if L is exogenously given by demography and the capital-to-output ratio remains the same, the growth rate of Korea will decrease in line with the contraction of labor force, unless TFP improves sufficiently rapidly.

3. It is sometimes argued that full-scale immigration or reunification with North Korea can substantially change the demographic projection of Korea, but this paper does not consider such cases of slim likelihood.
4. The projection in [Table 1] takes this factor into account.

2.2. Resource Allocation Efficiency

Given the demography and capital deepening process, progress in TFP will become the only source of growth left for Korea. Unfortunately, however, the TFP progress rate is measured to have declined until recently and its future prospects do not seem rosy either. There may be thousands of factors that could presumably affect the TFP progress, but few are likely to work in Korea's favor.

As major factors that should boost a country's TFP progress, the literature commonly emphasizes institutions to ensure efficient resource allocation, the technology gap (or income gap) vis-a-vis the frontier, a young demographic structure, and so forth. Among these, Korea's technology gap against the frontier will narrow as long as Korea's growth rate (per capita) converges to those of advanced countries.[5] Korea's demography will age over the next several decades, which will additionally hamper TFP progress.[6] Perhaps the improvement of institutions to achieve more efficient resource allocation is the key factor that Korea should rely on.

However, recent empirical results on the efficiency of Korea's resource allocation using micro data are not encouraging. For example, Kwon and Kim (2014) find that labor mobility in response to industry-specific demand shocks has fallen significantly in the manufacturing sector. (Panel A of Table 2) This implies that declining industries do not flexibly lay workers off while rising industries do not hire sufficient numbers of workers. With respect to demand shocks, firms instead tend to respond by adjusting their investment and the wages of their incumbent workers.

5. Since Barro (1991) and Mankiw et. al. (1992), the convergence argument, that lower income countries tend to grow faster than higher income countries conditional on their fundamentals, has become a standard notion in the empirical growth literature.

6. The negative effects of population aging on TFP have been found over a wide range of data. For European countries, for example, Aiyar et. al. (2016) project that the current age structure could lead to a reduction in TFP growth by an average of 0.2%p every year over the next two decades. Using Japan's prefectural data between 1990 and 2007, Liu and Westelius (2016) also find that aging of the working-age population has had a significant negative impact on total factor productivity.

Kwon and Kim (2014) further present evidence that the low mobility is attributable largely to excessive protections for regular workers who toss the burdens of employment adjustment onto non-regular workers. (Panel B of Table 2) This dual labor market structure not only hampers resource allocation efficiency but also intensifies social conflicts between the two groups of workers.

[Table 2] Inter-Industry Labor Mobility with respect to Demand Shocks

As for the financial markets, efficiency has been eroded by the continued supply of credits to 'zombie' firms (i.e., firms that would be unable to survive without preferential financial support from either the government or financial institutions). Based on their empirical results for Japan, Caballero et. al. (2008) argue that the increase in bank lending to zombies worked as a major cause of the chronic recession in the 1990s after the bursting of the economic bubble. Similarly, Jeong (2014) measures credits to zombies in Korea's financial market, and finds that their portion has increased since the global financial crisis owing to wide-ranging public support such as credit guarantees, loans through public financial institutions, and so on. (Figure 4) Based on cross-section regression results, he also contends that zombies work as a hindrance to investments and employment of sound firms in the same industries.

[Figure 4] Portion of Credit Supplied to Zombie Firms

Regarding its product markets, Korea is one of the most heavily regulated countries in OECD.[7] Yet entry barriers are being heightened to protect incumbent and 'weak' firms. An interesting research related to this issue is Oh (2017). Applying the methodology of Hsieh and Klenow (2009) and Oberfield (2013) to data on approximately 50,000 establishments in the manufacturing sector, she finds that

7. According to the 2013 product market regulation index of the OECD (2014), Korea is ranked 30th out of the 33 member countries.

overall product market efficiency has been declining since the mid-2000s. (Figure 5) She also computes the deviation of the actual from the theoretically computed 'optimal' level of production for each firm, arguing that the distortion by firm size ('over-production' of small firms and 'under-production' of large firms) is especially serious. (Figure 6)

[Figure 5] Allocative Efficiency of the Manufacturing Sector

[Figure 6] Ratios of Actual to Optimal Production, by Firm Size

These research results, among others, consistently suggest that the efficiency of resource allocation in Korea has not been improving in recent years. While these findings are discouraging, they may also imply that there still exists ample room for improvement in Korea's TFP. The question is how to implement the relevant reforms to enhance efficiency, which will of course inevitably provoke resistance from vested interest groups. Apart from the question of political feasibility, these findings do help to explicitly identify where reforms need to aim in order to boost Korea's TFP.

3. Japanization of Korea? : Similarities and Differences

The weakening dynamism of the Korean economy invokes concerns that Korea may be heading for a prolonged recession accompanied by deflation pressures as Japan did in the 1990s. This concern is reinforced by observing some fundamentals of Korea that are similar to those of Japan 20 years ago. Above all, Korea's demography is following Japan's with a lag of approximately 20 years in almost every dimension. The total population of Korea is projected to decrease from around 2030, which occurred in 2010 in Japan, and the aged dependency ratio of Korea will also follow that of Japan. (Figure 7)

[Figure 7] Demography: Korea and Japan

It is not only its demography that Korea resembles Japan. As a result of efforts to emulate its neighbor country's success, the economic structure of Korea has become similar to that of Japan in many respects. For example, at the hearts of both economies are export-oriented manufacturing industries such as electronics, automobiles, and shipbuilding. All of these are included in SITC industry 7 of [Figure 8], where Korea's comparative advantages look just like those of Japan. And as Japan has been caught up with by Korea in some of these industries over the past two to three decades, Korea is now being fiercely pursued by China. Jung (2017) closely examines the competition and catch-up processes among Japan, Korea and China in the export markets, and argues that the pace of China's catching-up with Korea is accelerating.

[Figure 8] Revealed Comparative Advantages: Korea and Select Countries

Besides its population and industrial structures, Korea's income per capita also trails Japan's by 20 years. Panel A of [Figure 9] overlaps the (HP-filtered) trend of Korea's nominal GDP growth rate with that of Japan with a 20-year lag, where the two lines are almost indistinguishable. After a similar pace of rapid growth for several decades, in 2010 Korea attained approximately 30,000 US dollars (2011 constant prices), the level Japan reached in 1990.

[Figure 9] Trends in Nominal GDP Growth Rates: Korea and Japan

Insofar as its demography, industrial structure, and level of per capita income are the crucial determinants of a country's social and economic landscape, it seems natural to refer to the traces of Japan in order to draw a picture of Korea's future. In doing so, an issue of utmost interest is probably whether Korea too will fall into chronic deflation as seen in Japan. Panel B of [Figure 9], which extends the data span up to 2016 for Korea, appears to send a relieving signal. Unlike in Panel A, Korea's

trend growth in nominal GDP began deviating from that of Japan in the 2010s, implying that Korea is not replicating Japan's misfortune of deflation. Korea's inflation rate has fallen to a worrisome level since 2013, but the pace of disinflation has been milder than what Japan faced after the bursting of its bubble in the 1990s. (Figure 10)

[Figure 10] CPI Inflation Rates: Korea and Japan

The dissemblance between the two economies in terms of inflation/deflation seems to stem from the difference in their real estate market situations. Entering the 1990s, Japan's real estate market was in a big bubble, whose bursting triggered a deflation spiral too abrupt for the Bank of Japan to properly counteract.[8] Korea's real estate market, in contrast, does not appear to have accumulated serious bubbles in the sense that housing prices have risen roughly in accordance with other general prices for the past two decades.[9] (Figure 11) Perhaps for this reason, Korea has not gone through any major corrections in asset prices, and the Bank of Korea has had relatively sufficient time to adjust its policy stance to the disinflationary pressures.[10]

[Figure 11] Real Estate Price and CPI: Korea and Japan

8. For the debate on the monetary policy of Japan in the 1990s, see Hayami (2000), Kuttner and Posen (2001), and Ito and Mishkin (2004), among many others.
9. As for additional discussions on Korea's housing prices, Cho (2017) extracts the market's capital gains expectations from the data on the very unique rental system of Korea, called *chonsei*, which cannot be assessed as 'excessive' compared to macroeconomic variables such as inflation and interest rates.
10. Cho (2017) compares Korea's monetary policy with Japan's, and argues that the Bank of Korea has also responded passively to inflation/deflation pressures.

4. Declining Natural Interest Rate and Monetary Policy

Despite their similarities in underlying fundamentals, insofar as inflation/deflation is a monetary phenomenon, there is no a priori reason to believe that Korea should follow Japan into deflation.[11] Yet the changes in real sector fundamentals do carry important implications on monetary policy. The most important example may be the decline in the 'natural interest rate,' which could greatly complicate monetary policy by increasing the probability of nominal interest rate hitting the 'zero lower bound.'

In the context of the recent debate on secular stagnation, the literature on the effects of fundamental variables on the natural interest rate is growing.[12] Yet this sort of study may be more relevant to Korea, a country experiencing drastic structural changes, than to relatively stable advanced countries. Korea's nominal interest rate has in fact been declining rapidly, from double-digit levels in the 1990s to low single-digits in the 2010s, and the long-term rates finally fell to the levels similar to those in the United States. (Figure 12) In real terms as well, interest rate has fallen by more than 5%p since 1990 in Korea, compared to its fall by 1~2%p during the same period in advanced countries.[13]

[Figure 12] Interest Rates of Korea

In order to assess how much of this decline in (real) interest rates is attributable to the changes in real-sector fundamentals, we conducted experiments similar to those in Eggertsson et. al. (2017) by utilizing the overlapping generations

11. The effect of population aging on inflation is not as clear as its negative impact on growth, since aging should reduce both aggregate demand and supply at the same time. The empirical results are also mixed. For example, while Yoon et. al. (2014) and Liu and Westelius (2016) at the IMF presents evidence from various data sets that aging operates as a disinflationary factor, Juselius and Takáts (2015) at the BIS find from a larger data set that population aging is inflationary.
12. See Laubach and Williams (2003) and Eggertsson et. al. (2017), among others.
13. See Williams (2017).

model of Kwon (2017B) for Korea.[14] [Table 3] summarizes the effects of the counterfactual scenarios that (1) the mortality rate, (2) the fertility rate, (3) the rate of TFP progress, and (4) the relative price of capital goods have not changed since 1990. Out of the 4.3%p decline in the natural interest rate generated by the model between 1990 and 2015, 3.1%p is attributed to the changes in these four fundamental variables: 1.2%p to the lowered mortality rate; 1.0%p to the TFP slowdown; 0.5%p to the reduced fertility rate; and 0.4%p to the decreased capital goods price. The remaining 1.2%p decline ('others' in [Table 3]) is due to the prolonged effects of the changes in the fundamentals that occurred before 1990.

[Table 3] Changes in Simulated Natural Interest Rate

In fact, [Figure 13] shows that it takes an extremely long time before the effects of demographical changes are fully realized. For example, the effect of the fertility rate begins to show up after 10 years, but becomes larger and larger until it attains its maximum level after almost half a century. In other words, while the changes in the fertility rate since 1990 have lowered the real interest rate by 0.5%p through 2015, an additional impact of 1.3%p is waiting to kick in by 2040. Similarly, the decrease in the mortality rate can bring about another 0.8%p of decline in the real interest rate over the next two decades. Altogether, the simulation result in [Table 3] indicates that the natural interest rate will further decline by 1.6%p during the 2015 to 2040 period, despite the stabilization of the lagged effects ('others').

[Figure 13] Effects of Changes in Fundamental Variables

This magnitude of 1.6%p is indeed sizable, considering the current level of

14. This model is composed of 80 overlapping generations from ages 20 to 99 in any calendar year, reflecting the entire demographic changes of the past and the projected future. Since there is no money in the model, the (real) interest rate is determined by the marginal productivity of capital. See Kwon (2017B) for details.

natural interest rate measured in terms of the overnight interbank call rate — the target rate of monetary policy in Korea. Although the estimates are substantially different depending upon model specifications and econometric methodologies, most studies on Korea's natural interest rate find that it has fallen below 1.0%.[15] In other words, Korea's natural interest rate may well fall below zero in the not-so-distant future, as in Japan of today,[16] which implies that the probability of nominal interest rate hitting the zero lower bound will increase and thus monetary policy buffer to counter negative shocks will be further squeezed. Therefore, it is becoming more important for the monetary authority to keep inflation expectations from falling below the target level (currently 2% per year). It is also advisable that emergency policy measures for cases of large negative shocks be prepared, including unconventional ones that have been experimented with in advanced countries. However, the most desirable policy would be to improve TFP, which would alleviate the decline in the natural interest rate.

5. Concluding Remarks

Korea's potential growth has declined since the 1990s. Given the current demography and capital deepening, it is projected to decline further for the next two to three decades unless overall efficiency (or TFP) is substantially enhanced. In order to reverse this gloomy trend (or, to be more realistic, to mitigate the trend of decline), bold structural reforms in the labor, financial, and product markets are warranted. Successful reforms to enhance market efficiency would boost TFP, which could raise the natural interest rate as well as potential growth and thereby reduce the danger of Korea falling into the deflation trap that Japan has experienced. Yet reforms always

15. See Kim and Park (2013), among others, who estimated the natural interest rate of Korea using various versions of the Laubach-Williams (2003) methodology.
16. According to Wynne and Zang's (2017) estimates, Japan's natural interest rate crisis had fluctuated around zero since early 1990s and finally fell significantly below zero after the global financial crisis.

touch off the resistance of vested interest groups. The real policy task may then be to convince people of the pressing need for reforms, so as to gain political momentum for them.

[Table 1] Growth Accounting of Korea

	GDP (A+B+C)	Capital (A)	Employment (B)	TFP (C)
1981~1990	9.9	4.1	1.7	3.6
1991~2000	7.0	3.8	1.0	1.9
2001~2005	4.7	2.1	1.0	1.5
2006~2010	4.1	1.8	0.5	1.8
2011~2015	3.0	1.4	1.0	0.5
2016~2020	1.7+?	1.1	0.6	?
2021~2025	1.3+??	1.0	0.3	??
2026~2030	0.7+???	0.8	-0.1	???
2031~2035	0.2+????	0.6	-0.4	????
2036~2040	0.0+?????	0.5	-0.5	?????

Source: Kwon (2017A)

[Table 2] Inter-Industry Labor Mobility with respect to Demand Shocks

A. Total Labor Mobility over Time

Effect on	1973, 1978~90	1991~2006	2005~2012
Employment	0.431 (0.086)***	0.467 (0.080)***	0.033 (0.074)
All Tangible Assets	0.561 (0.111)***	0.713 (0.077)***	1.001 (0.336)***
Tangible Assets per Worker	0.281 (0.092)***	0.246 (0.047)***	0.969 (0.326)***

B. Regular vs. Non-Regular Workers for the 2005~2012 Period

Effect on	Total	Regular	Non-Regular
Employment	0.033 (0.074)	0.004 (0.090)	1.370 (0.600)*
Wage	0.130 (0.045)***	0.133 (0.047)***	-0.069 (0.280)

Note: *, **, and *** indicate statistical significances of 10%, 5%, and 1%, respectively.

Source: Kwon and Kim (2014)

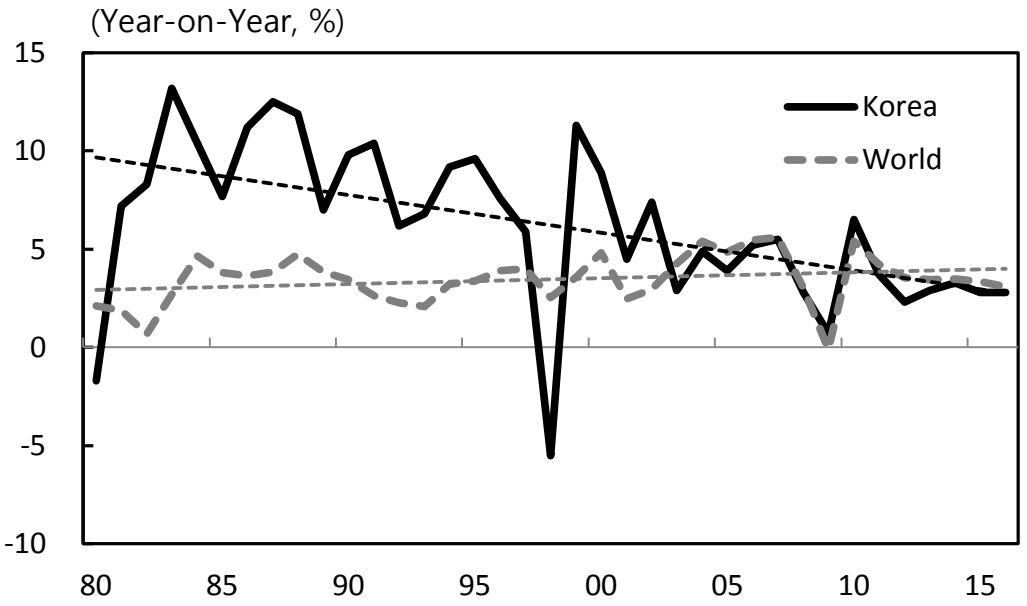
[Table 3] Changes in Simulated Natural Interest Rate

(%P)

	1990~2015 (A)	1990~2040 (B)	2015~2040 (B-A)
Change in Natural Interest Rate	-4.3	-5.9	-1.6
(1) Mortality Rate	-1.2	-2.0	-0.8
(2) Fertility Rate	-0.5	-1.8	-1.3
(3) TFP Progress Rate	-1.0	-1.2	-0.2
(4) Relative Price	-0.4	-0.5	-0.1
(5) Others	-1.2	-0.4	+0.8

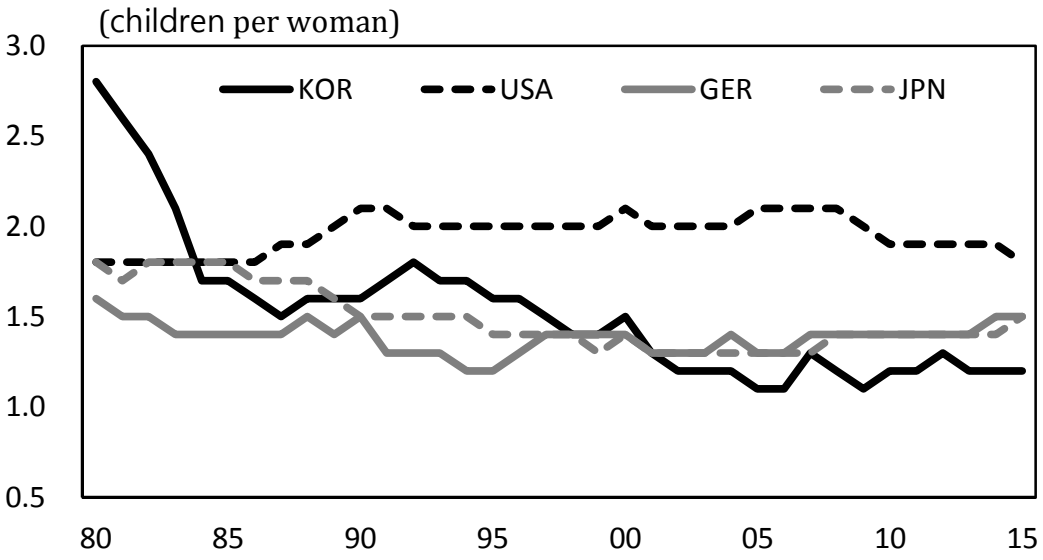
Note: The underlying simulation model is based on Kwon (2017B), which has 80 generations from ages 20 to 99. Each row measures the difference between the baseline interest rate and the counterfactual rate that would have been realized if the respective parameter had not changed since 1990. “Others” indicates the endogenously generated decline in the interest rate as a result of lagged effects of the changes in parameters that took place before 1990.

[Figure 1] Growth Trends: Korea and the World



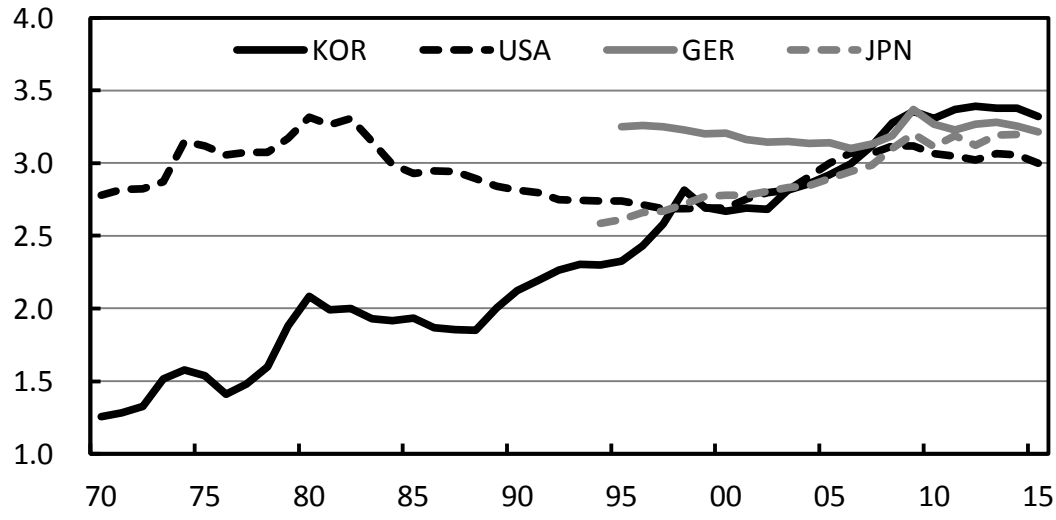
Source: The Bank of Korea, IMF.

[Figure 2] Fertility Rates: Korea and Select Countries



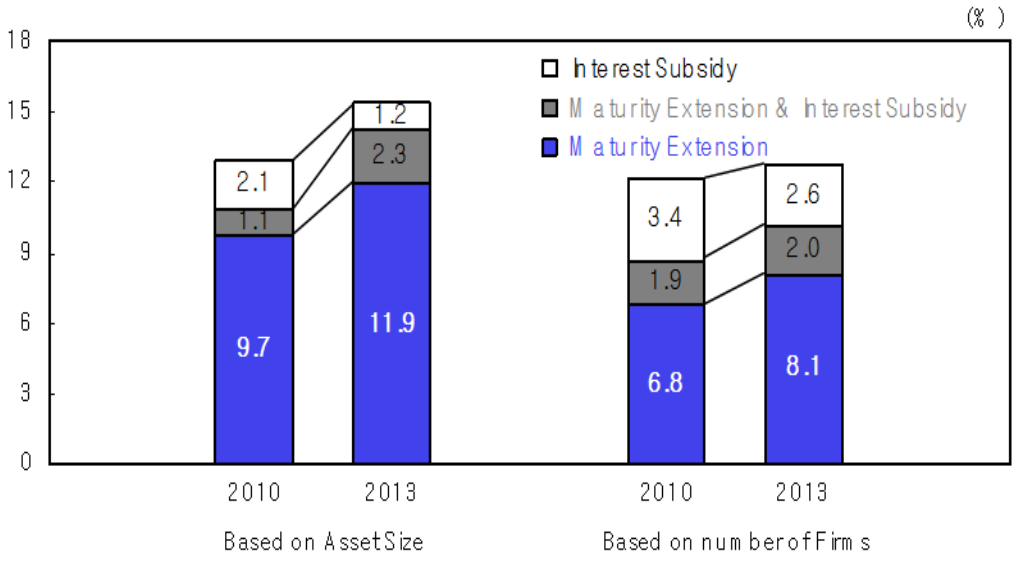
Source: OECD.

[Figure 3] Capital to Output Ratios: Korea and Select Countries



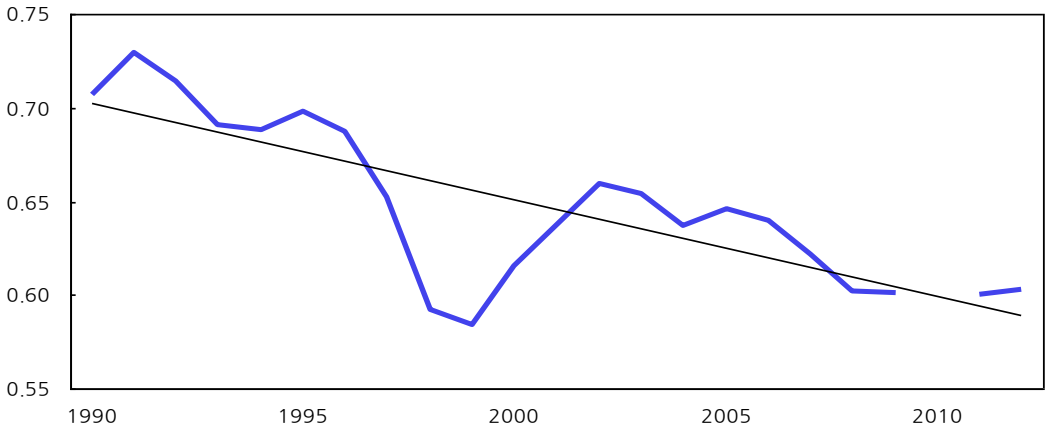
Source: OECD.

[Figure 4] Portions of Credit Supplied to Zombie Firms



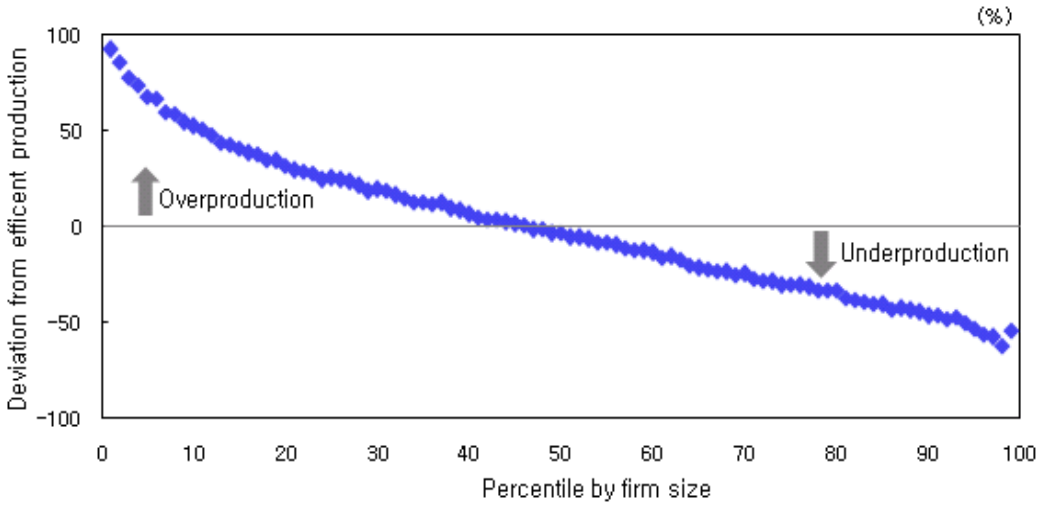
Source: Jeong (2014)

[Figure 5] Allocative Efficiency of the Manufacturing Sector



Source: Oh (2017)

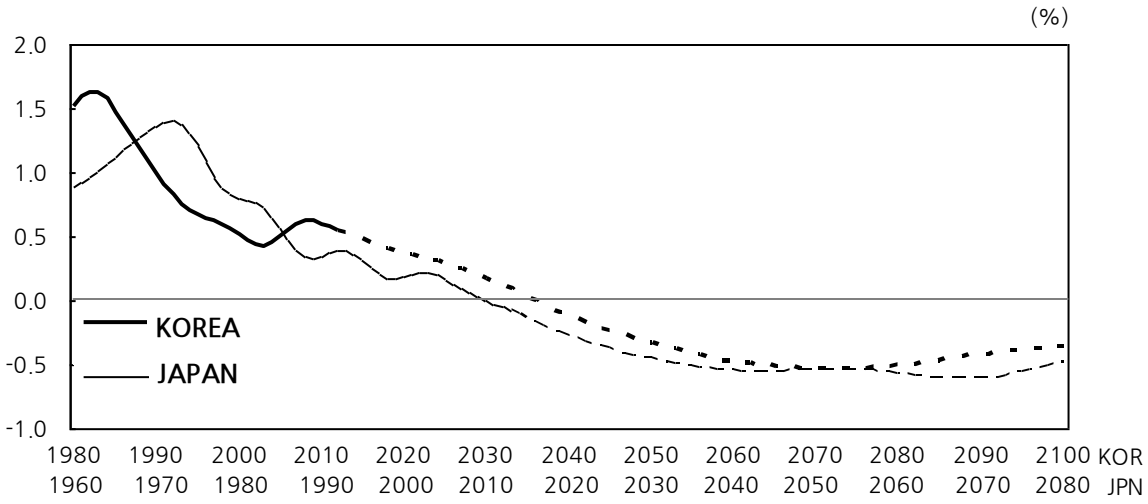
[Figure 6] Ratios of Actual to Optimal Production, by Firm Size



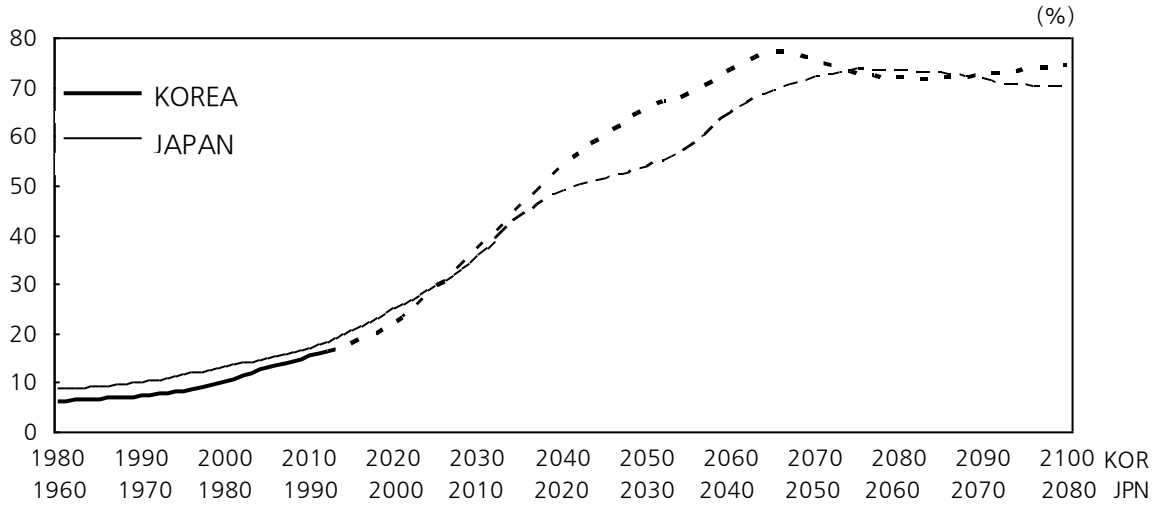
Source: Oh (2017)

[Figure 7] Demography: Korea and Japan

A. Total Population Growth Rates

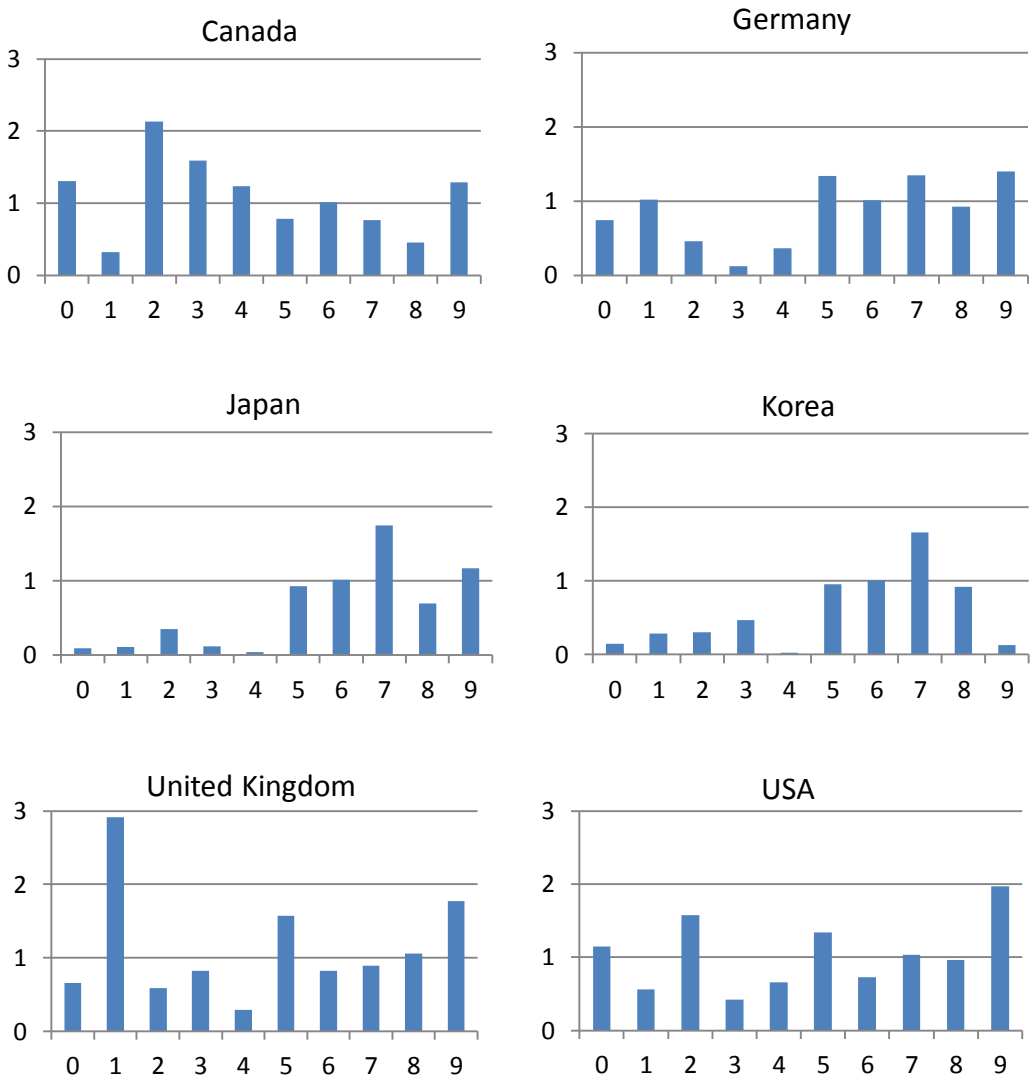


B. Aged Dependency Ratios



Source: Kwon (2017A)

[Figure 8] Revealed Comparative Advantages: Korea and Select Countries



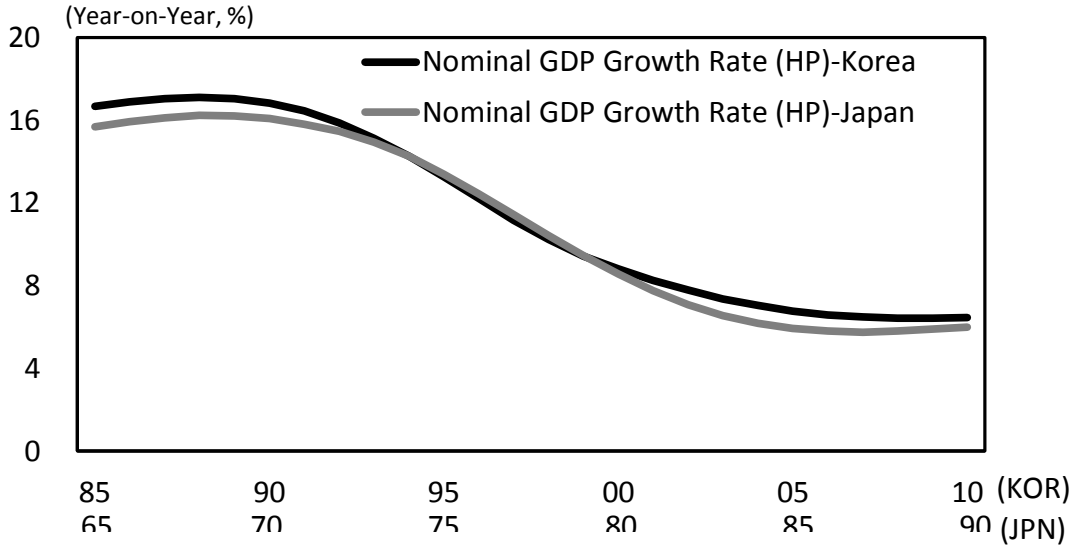
Note: The revealed comparative advantage is defined as the ratio of the share of the item in the country's exports to its share in world exports.

The 1-digit SITC descriptions are as follows. 0: Food and live animals, 1: Beverages and tobacco, 2: Crude materials, inedible, except fuels, 3: Mineral fuels, lubricants and related materials, 4: Animal and vegetable oils, fats and waxes, 5: Chemicals and related products, n.e.s., 6: Manufactured goods classified chiefly by material, 7: Machinery and transport equipment, 8: Miscellaneous manufactured articles, 9: Commodities and transactions not classified elsewhere in the SITC.

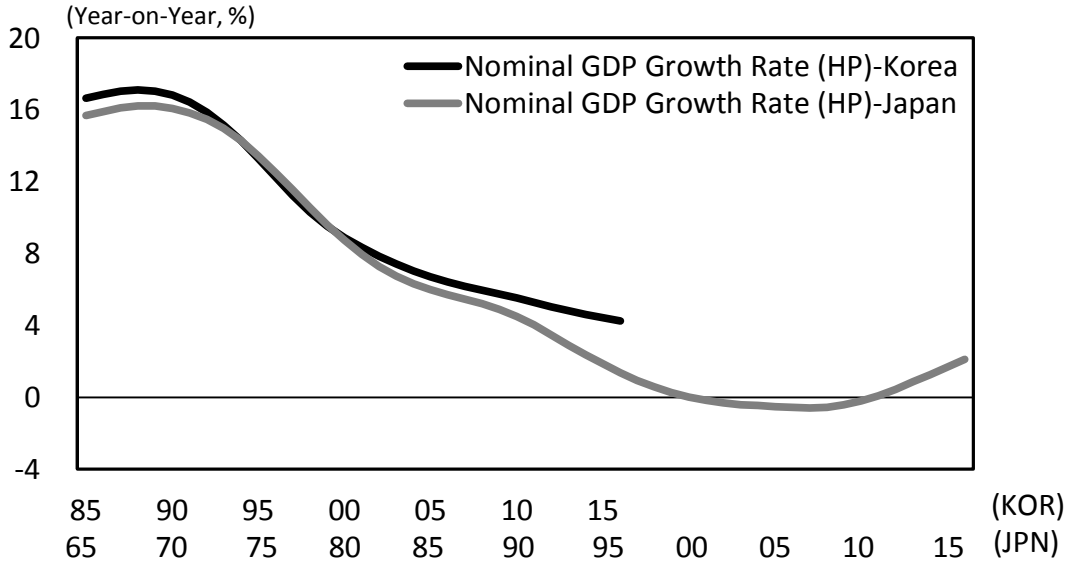
Source: UN Comtrade Database

[Figure 9] Trends in Nominal GDP Growth Rates: Korea and Japan

A. Up to 2010 for Korea

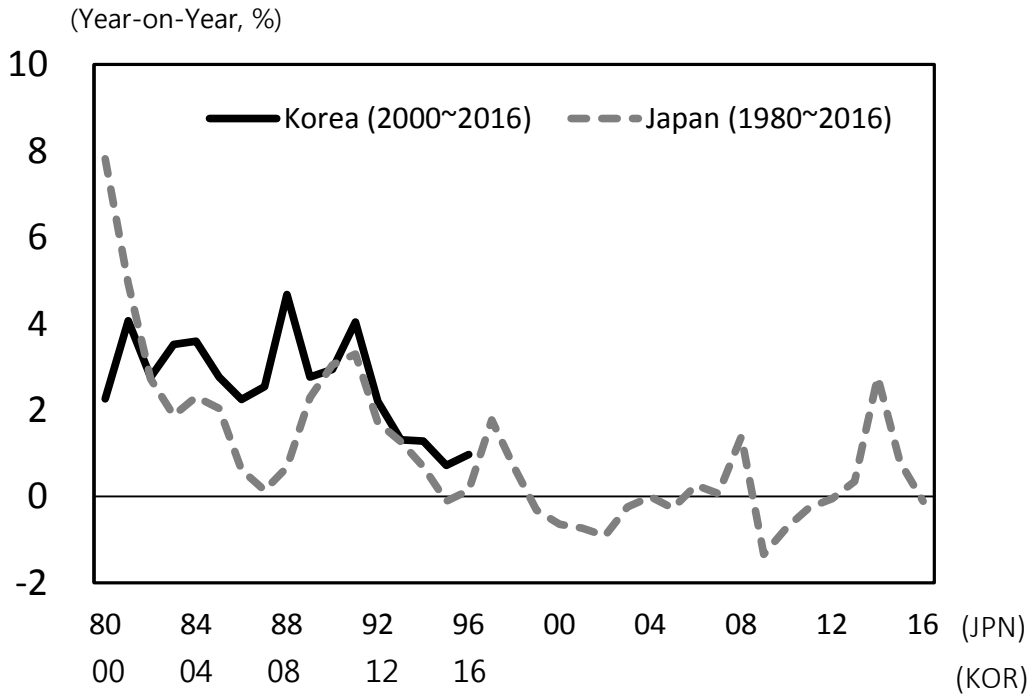


B. Up to 2016 for Korea



Sources: The Bank of Korea; Cabinet Office of Japan: reproduced from Cho and Kwon (2014).

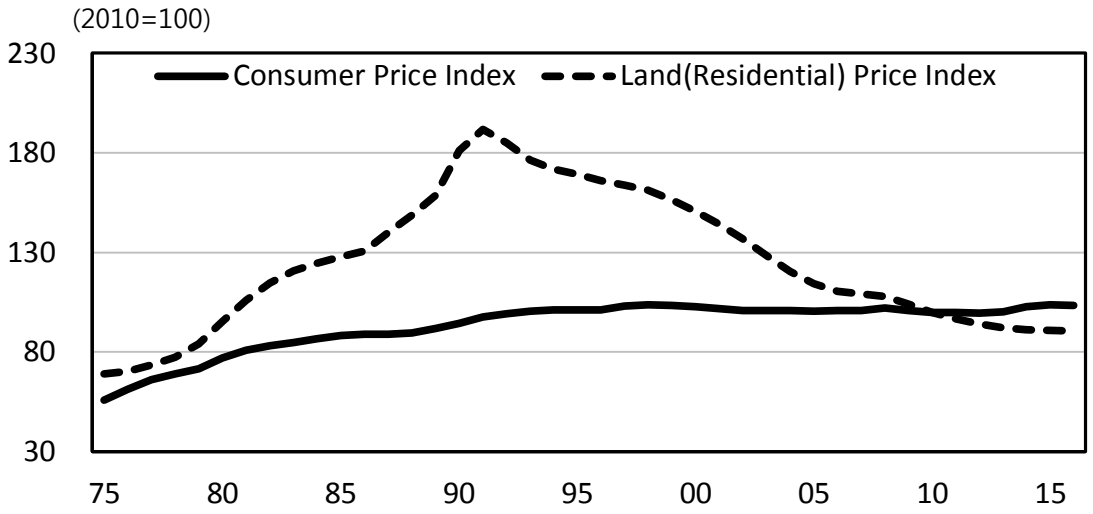
[Figure 10] CPI Inflation Rates: Korea and Japan



Sources: Statistics Korea, Ministry of Internal Affairs and Communications of Japan.

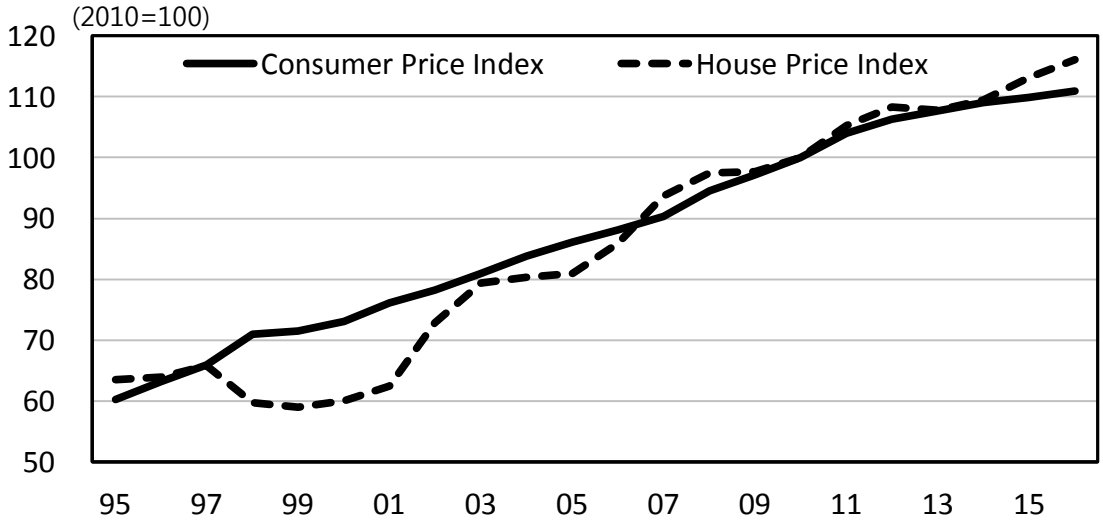
[Figure 11] Real Estate Price and CPI: Korea and Japan

A. Japan



Sources: Ministry of Internal Affairs and Communications of Japan, JREI.

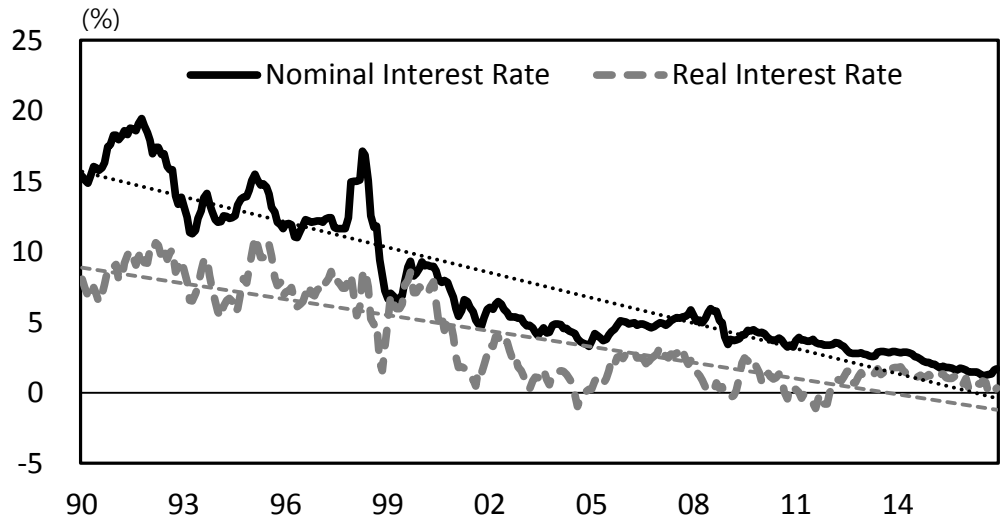
B. Korea



Sources: Statistics Korea, Kookmin Bank.

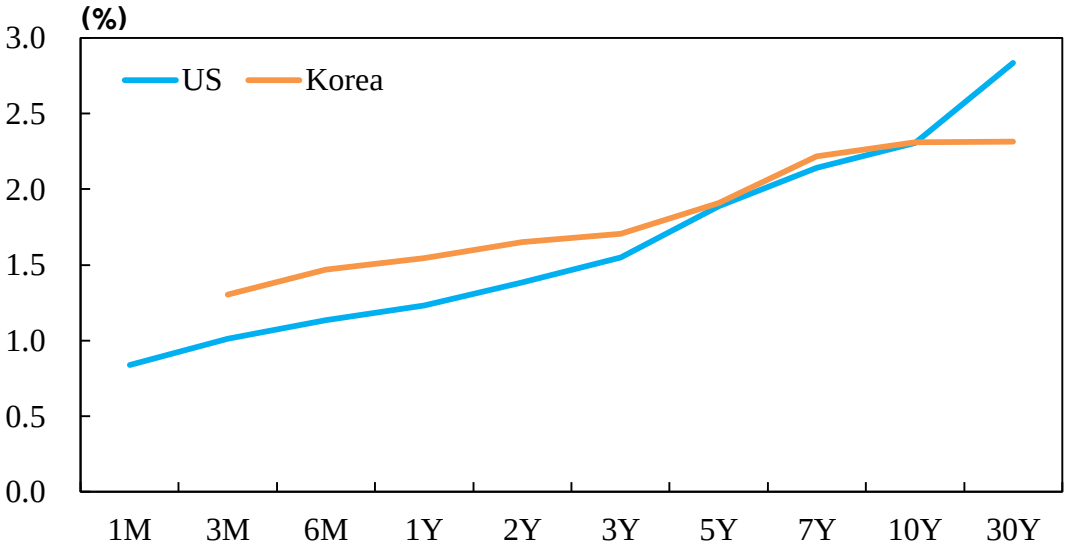
[Figure 12] Interest Rates of Korea

A. Nominal and Real Interest Rates of Korea (3-Year Government Bond)



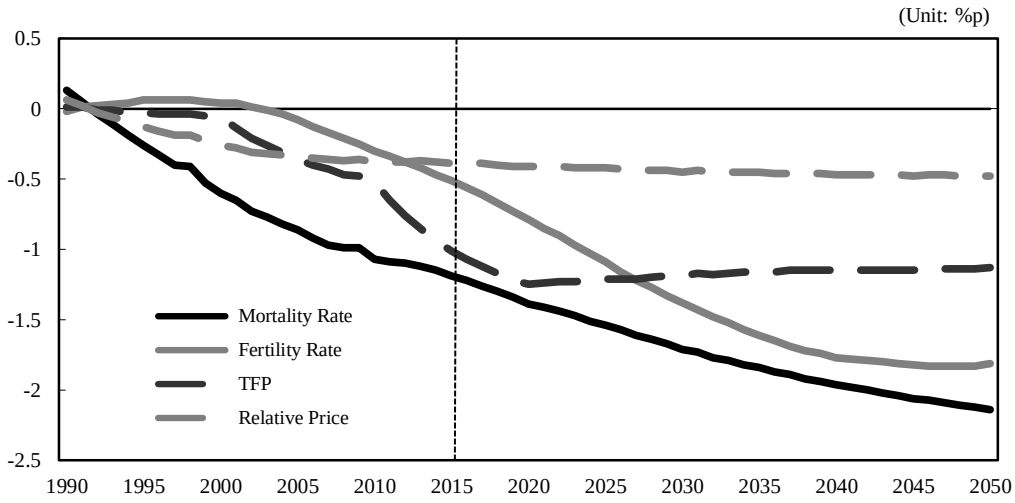
Note: The real interest rate is computed by subtracting the year-on-year CPI inflation rate from the nominal rate. For the period of 1990.1~1995.4, the 3-year government bond rate is not available and thus the rate for 3-year bonds issued by the Industrial Bank of Korea (under government guarantee) is used.

B. Yield Curve (as of June 30, 2017)



Source: Bloomberg.

[Figure 13] Effects of Changes in Fundamental Variables



Note: See footnote of [Table 3].

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