Kiyohiko G Nishimura: Population ageing, macroeconomic crisis and policy challenges

Speech by Mr Kiyohiko G Nishimura, Deputy Governor of the Bank of Japan, at the 75th Anniversary Conference of Keynes' General Theory, University of Cambridge, Cambridge, 20 June 2011.

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1. Introduction: macroeconomic crisis and long-run fundamentals

I am honored and thrilled to participate in this conference commemorating the 75th anniversary of the publication of Keynes' General Theory. In particular, being an academic-turned-central banker, the opportunity to participate in this panel on policy responses to macroeconomic crisis, is a great privilege. The task before me, as a central banker, is to describe the responses of central banks to the macroeconomic crisis of 2008, especially their "unconventional policies". In addition, I hope to add some color to our discussion on the consequences of the financial crisis by drawing on the Japanese experience, which suggests a long and winding road in the post-crisis period.

Having set the parameters of my presentation, I would like to start my presentation by expressing my uneasiness over the smugness that I sense among commentators on macro theory and policy. Very often, I hear that the worldwide asset market bubbles and resulting macroeconomic crisis of 2008 was due to financial excess, and therefore macroeconomic fundamentals have not changed, either before the crisis, or since. Financial excesses in the bubble years accumulate on the balance sheets of those who leverage heavily, and the prevalence of such problems may become a drag on economic recovery for some time, but eventually time will heal the wounds and everything will be back to normal. In other words, the issue at stake is maintaining financial stability, and all that is required of economic theory and policy is to supplement their theoretical and policy toolkits by adding measures to check financial excess before it builds up and to control systemic damage when bubbles burst.

Lord Keynes, who laid the foundations of macro theory and policy three-quarters of a century ago would most certainly have challenged such a view, if he were attending this conference. In fact, just one year after the publication of the General Theory, in a speech whose theme still resonates today, he has alluded to the issue at the root of my uneasiness[1]. So let me stand on his shoulders and explain.

There is a remarkable correlation between asset market bubbles that cause macroeconomic crisis and demographical changes. In Figures 1.1 and 1.2, I show Japan, the United States, Spain and Ireland as examples of countries affected by the financial crisis[2]. In these countries, the formation of bubbles in asset markets seems to coincide with a growing inverse dependency ratio, which is the ratio of the working population to the non-working (dependent) population. Meanwhile, busts in asset markets seem to happen when the inverse dependency ratio declines noticeably.

Moreover, there also seems to exist a relation between asset market bubbles and demographical changes at the international level, which, borrowing from Lord Keynes, could be described as the demographic consequences of globalization. In the past decades, once

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[1] Keynes, J. M., "Some Economic Consequences of Declining Population," *Eugenics Review*, Vol.19, April 1937, pp.13–17.

[2] I presented this correlation elsewhere some time ago (see Nishimura, K. G., "This Time May Truly Be Different: Balance Sheet Adjustment under Population Ageing," a speech presented at the 2011 AEA Annual Meeting, Denver, January 7, 2011). Appendix updates and expands the figures, showing this correlation using newly available data on world population prospects.

non-market economies such as Russia and China were folded into the global market economy. As a consequence, the working population of the "market-economy world," which once consisted largely of the so-called industrialized economies, has expanded dramatically, since the aggregate working population of China and others is much larger than that of the industrialized economies. Against this background, we witnessed a truly global asset market boom, synchronously involving many regions, and which culminated in the crisis of 2008. Real property prices across a wide area of the globe surged nearly threefold within a decade.

The significant point for us here is that the bubble we have experienced coincided closely with the turning point in demographic trends. Such demographic perspective casts serious doubts on the view that little has changed in the fundamental character of the global economy even after the crisis of 2008. It will form the core of my argument in this presentation. The perspective directs us to recognize the fact that we are in the midst of a balance sheet adjustment process after the worldwide financial bubble burst, at a time when the population is ageing. This is not the balance sheet adjustment of the past, which took place when the population was young and growing. This is a balance sheet adjustment when the demography is rapidly tilting toward the old. With the change (though gradual) in demography, which is one of the long-run macroeconomic fundamentals, between the pre-crisis and the post-crisis era, macroeconomic policy challenges are also likely to have changed accordingly.

In Section 2, I consider the acute impact of demography on asset prices. Assets such as residential property and company shares are stores of value enabling the transfer of purchasing power from one period to the next, as well as productive resources creating goods and services. I concentrate on the former characteristic of assets, namely, their role as stores of value. A simple, rather mechanical overlapping generation model suggests a correlation between residential property prices and the inverse dependency ratio, which is in fact found in many of the countries suffering financial crisis. When applied to the market-economy world as a whole, this simple model also suggests that globalization of the scale we have experienced over the past decades is likely to produce unprecedented increases in asset prices. Moreover, the example also suggests that the go-go age of asset booms has passed, and ageing populations imply that the rate of return on assets will be substantially smaller in the post-globalization era than in the globalization era. In fact, it will be even smaller than in the pre-globalization era.

In Section 3, I begin by examining the process of balance sheet adjustment after the bursting of a bubble and when the population is ageing, juxtaposing Japan in the 1990s and the United States in the 2000s. Then, I summarize the consequences of severe, prolonged balance sheet adjustment under population ageing. I identify the multi-faceted challenges central banks may face as a consequence of carrying out balance sheet adjustments under population ageing. There I explain unconventional policies to tackle these problems, taking the Bank of Japan's efforts as an example. In the final section, I will give some thoughts on the population issue in the tradition of Cambridge, especially with respect to technological innovation.

2. Background of financial crisis: population ageing and globalization

Population growth and longevity after 1955

Let me first examine the changing characteristics of population dynamics. Table 2.1 shows population growth estimates for selected countries in selected years, based on the most recent United Nations population figures. As an illustration, I take the United States, United Kingdom, Germany, France, Italy and Japan to comprise the *Developed* area of the market-economy world. I take China and Russia to represent the former communist countries that have become incorporated into the market-economy world. In this table, they represent the

Emerging area of the market-economy world. Table 2.2 depicts population longevity for the same countries.

These tables illustrate three facts. First, looking at each country's population growth and longevity, we see simultaneous declining population growth and increasing longevity. This implies that many countries face a sizable increase in working-age population up to a certain point in time, when the population then begins to age rapidly, with no exception, at least for the countries in this table.

Second, if you compare the size of the *Emerging* population with that of the *Developed*, the huge impact of globalization is immediately apparent. In 2005, the *Emerging* area was more than twice as populous as the *Developed*. This table illustrates a big jump in the "market-economy world population" when the *Emerging* is incorporated into the market-economy world. As is apparent, it is the China factor that drives these dynamics.

Third, however, the incorporation of the *Emerging* area through globalization does not help halt the population ageing of the market-economy world. Population growth in the *Emerging* area is actually expected to be lower than that in the *Developed* area.

Conceptual framework: simple overlapping-generation model with pure store of value

Although ageing populations may have a sizable effect on the economy, current sophisticated mainstream models are not particularly suited to examining the impact of the brute force of demographic factors, globalization and ageing, on asset prices as stores of value.[3] To tackle demographic factors squarely, I take the other extreme of simplicity. Specifically, I use a skeleton form of an overlapping generation model, in which there is only one type of asset of no intrinsic value, and this serves as a pure store of value.

As in familiar overlapping generation models in introductory economic theory, I assume people live in two periods, and that there are the Young and the Old at any point in time. The Young produce one unit of non-storable consumption goods, which are the sole goods in this world. There is only one type of asset, called Pure-Store-of-Value (PSV) assets. They yield nothing and thus have no intrinsic value, but they are the only stores of value in this world. That is, PSV assets are the only means to save, or to transfer purchasing power from one period to the next. The quantity of PSV assets is fixed and constant over time. People accumulate PSV assets in exchange for the consumption goods they produce when they are young, and trade them for consumption goods when they are old.

To make the analysis even more transparent and mechanical, I make the extreme assumption that *the Young are constrained not to consume but to save*. Thus, unlike usual overlapping generation models, there is no utility maximization of the Young: the Young produce the consumption goods, trade them with the Old to get PSV assets, and save them for the next period.

In this economy, there is only one market, in which the consumption goods produced by the Young are traded for PSV assets possessed by the Old. The supply of consumption goods is equal to the number of young people, since one young person produces one unit of the consumption goods and, by assumption, she does not consume it. The supply of PSV assets

[3] These sophisticated models (*e.g.*, dynamic stochastic general equilibrium models), which are now the popular workhorses of macroeconomic analysis, typically assume life-long utility-maximizing representative agents who live infinitely (or in more sophisticated settings, decease probabilistically with a constant proportion) and are endowed with ability to form true-model-consistent own macro econometric models in an economy with the rest of the world as exogenously given. Because of these settings, it is not easy to analyze the effects of the unexpected incorporation into the market-economy world of former communist countries with huge populations, and the subsequent rapid ageing of the market-world population, that is, the increase in the Old as a proportion of the population.

possessed by old people is fixed by definition. Thus, the purchasing power of PSV assets, or the price of PSV assets in terms of the consumption goods is:

Price of the PSV Asset = (Number of the Young) divided by (Quantity of the Assets)

Since the quantity of PSV assets is fixed, the change in the number of the Young determines the change in the price of PSV assets. Consequently, the PSV asset price inflation rate is:

PSV Asset Price Inflation Rate = (Ratio of the Young to the Old Population) – 1

This model is admittedly simplistic: specifically, it is stripped of consumption and saving decisions (optimization), capital stocks (including human capital), and technological progress. More realistic models may bring smoother generational consumption/ rate-of-return paths through capital stock formation, and so on[4]. However, the demographic factors explained in this simple example are brute and forceful, and it seems unlikely that incorporation of inter-temporal optimization and other adjustment processes would completely undermine the basic results.

Closed economy: inverse dependency ratio and "boom and bust" in property markets

Let me now apply this model to the real world. Assets such as residential and commercial property, equities and even art objects are essentially all "long-term stores of value," that is, means of transferring purchasing power from the present to the immediate as well as distant future. And among these long-term stores of value, residential property is usually the most popular in many countries for various reasons including preferential tax treatment. So if the model has a reasonable explanatory power, we expect movement in real residential property prices[5] to coincide with that of the inverse dependency ratio (i.e., ratio of working-age (15–60) population to the rest), which corresponds to the ratio of the young working population to the old non-working dependent population in the simple OLG model, abstracting from child-age population.

Figure 2.1 shows real land prices in Japan (national average, for all purposes) juxtaposed with the inverse dependency ratio from 1955 to date. This figure shows, firstly, that the relative abundance of young people coincided with sharply higher property prices. Secondly, in contrast, the relative abundance of old people seems to be leading to lower property prices. It should be noted here that declining property prices greatly aggravated the balance sheet adjustments of Japanese corporations, as will be explained later. The US case is illustrated in Figure 2.2. In the United States also, an increasing inverse dependency ratio seems to have coincided with the property bubble. After the bubble burst of 2007, property prices seem to have followed the long run movement of the inverse dependency ratio, although it would be premature to draw any conclusions from this at the moment.

How about the European experience? Figure 2.3 shows the situation in Ireland. A sharp ascent in property prices coincided with an increase in the inverse dependency ratio, and then we see a free fall. This free fall suggests a painful adjustment is coming. Spain is shown in Figure 2.4. Again, a sharp increase in property prices coincided with an increase in the inverse dependency ratio, and then prices declined. Germany, having no bubble in 2008, is

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[4] If the Young are not constrained to save, they then face inter-temporal optimization of consumption allocation. Introductory economic theory tells us that in such a case there may be multiple equilibria. However, the thrust of the following argument is generic and likely to be carried over to *each* of these multiple equilibria.

[5] More precisely speaking, the model implies that generation-to-generation real asset price inflation is determined by the inverse dependency ratio. This means that current generation-period real asset prices are higher than previous if the inverse dependency ratio is increased from the previous generation-period. Typically, one generation-period is considered as 25 years or longer. Thus, in order for this relationship to hold within this long generation-period, we expect a positive correlation between real property prices and the slow-moving inverse dependency ratio.

shown in Figure 2.5, where property price movement is depicted after 1995, when data are available. In contrast with Ireland and Spain, property prices in Germany had already begun to decline in 2010, coinciding with the population ageing that the country has experienced for some time. Recovery of property markets to the previous peak seems far away in an ageing society.

Globalization: from exuberance to stagnation in global asset markets

Let me now consider the effects on asset prices of globalization, in particular marketization[6] of former communist countries into the market-economy world. To do this, we apply the simple overlapping generation model just described, as if the market-economy world were one big economy. Thus, I ignore productivity differences between regions, immigration and emigration, uncertainty, and in particular, exchange rate adjustments.

I illustrate the possible impact of globalization by using the numerical example of Table 2.3, which is based on the United Nations population estimates of Table 2.1. To make the analysis as simple as possible, I take 25 years as a one-generation period postulated in the overlapping generation model described before. We will consider three periods: the Cold War (Period 1, represented by 1955), pre-globalization (Period 2, by 1980), and globalization (Period 3, by 2005). Also, to simplify the analysis but to add a realistic flavor, we take population numbers of respective years in Table 2.1 as those of the young population.[7] These two assumptions lead to the figures in Table 2.3. I also assume that the quantity of PSV assets is fixed at, say, 100 million in the market-economy world.

Suppose that in the Cold War and pre-globalization periods (Periods 1 and 2), the market-economy world consists solely of the *Developed* area of six industrialized economies, as shown in Table 2.1. Then, in Period 1, the market-economy-world Young population is the same as that of the *Developed* area, about 473 million. The Old population in the Cold War period is that of the *Developed* area, and as a whole they possess 100 million PSV assets. The Young population trades 473 million units of consumption goods for 100 million PSV assets that the Old population possesses. Consequently, the price of PSV assets is about 4.73 units of consumption goods in Period 1. A similar situation holds true in the pre-globalization period, where the price of PSV assets is about 5.90 units of consumption goods. Consequently, the asset price inflation rate in the pre-globalization period is 0.89% per annum.

Then, consider globalization. The *Emerging* area (that is, Russia and China) is incorporated into the market-economy world in the globalization period (Period 3). I assume throughout a fixed exchange rate between the Developed area and the Emerging one. Thus, there is *one free worldwide market of consumption goods traded for PSV assets*. Like the Young in the *Developed* area, the Young in the *Emerging* area produce one unit of consumption goods, and sell it to the Old to obtain PSV assets for their retirement. The Old only exist in the *Developed* area in the worldwide consumption goods market, since the Old in the *Emerging* area have no PSV assets and cannot buy consumption goods in the worldwide market. The Old in the *Emerging* area are therefore ignored in the following analysis. (They are assumed to be outside of the market-economy world.)

The Young population of the market-economy world is then the sum of that of the *Developed* and of the *Emerging* area, about 2.14 billion. The Young populations of both regions want to trade their consumption goods of about 2.14 billion units for 100 million of PSV assets.

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[6] Merriam-Webster's Online Dictionary defines marketization as "the act or process of entering into, participating in, or introducing a free market economy."

[7] This simplifying assumption overstates the actual young population, but it does not qualitatively affect the following analysis.

Consequently, the price of PSV assets is about 21.4 units of consumption goods in the globalization period (Period 3), a huge increase from 5.90 in the previous period. The price of PSV assets is nearly four times higher in the globalization period (Period 3) than in the pre-globalization period (Period 2), leading to asset price inflation of 5.28% per annum.

The number of young people in the market-economy world, who are saving for future retirement, increases substantially in the period of globalization. Thus, we have a global "savings glut," which leads to *substantial asset price inflation* globally. In the example of Table 2.3, the asset price inflation rate accelerated substantially, from 0.89% to 5.28% annually for twenty-five years.

What will happen once the boom is over? Let me extend Table 2.3 to include the post-globalization period, in Table 2.4. Here the post-globalization period is represented by 2030, and all population figures are the United Nations population estimates given in Table 2.1.

If we look at Period 4, the post-globalization period, we see that the market-economy world population will grow by only 0.28% annually from 2005 to 2030. Under my simplified assumption, the young population in the market-economy world will produce about 2.29 billion units of consumption goods, while there will be 100 million PSV assets. This means the price of the assets will be about 22.9 units of consumption goods in the post-globalization period, meaning that asset price inflation decelerates quite sharply. The asset price inflation of the post-globalization period is a mere 0.28%. In fact, the rate is lower even than the 0.89% of the pre-globalization period.

Summing up

So far, I have suggested that the brute force of compositional change in population might be in the background of asset market bubbles and their subsequent bust, especially those which caused the global macroeconomic crisis of 2008 and after. To close this section, I would like to draw two observations from this exercise.

First, I am not suggesting this demographic factor is *the* cause of the crisis, but pointing out that this favorable demographic background (increasing inverse dependency ratio) might have been fertile ground for the excessive optimism that led many economic agents to take a highly leveraged position to multiply their returns. By the same token, the eventual sharp reversal of the ratio made resolution of accumulated financial excesses particularly difficult, resulting in the prolonged, severe balance-sheet adjustment that followed the crisis, and which is still under way.

Second, the aftermath of globalization is likely to imply a substantial slowdown in asset price inflation, and ultimately in the rate of return on these assets. Moreover, the post-globalization-period rate of return is noticeably lower even than that in the *pre*-globalization period, because of increased population ageing.

3. Post-crisis world: multifaceted challenges and unconventional policy

Severe and prolonged balance sheet adjustment under population ageing

Let me now consider the post-crisis world. In order to determine the effect of balance sheet adjustments after the bursting of a bubble, I first clarify who leveraged during the bubble periods. In Japan, it was the corporate sector, especially small to medium-sized firms, which for the first time gained access to large banks after the so-called financial liberalization. The corporate sector's loan-to-GDP ratio increased by 29 percentage points in the ten years before the bubble burst in 1991. In the United States, it was the household sector that leveraged, especially in housing. The household sector's housing loans-to-disposable

income ratio jumped by 39 percentage points in the ten years before the bubble burst in 2007.[8]

These sectors were interest-sensitive and thus constituted the "transmission gears" of the ordinary monetary transmission mechanism in the periods before the bubbles burst. That is, these leveraged sectors had been sensitive to policy rate reduction in business cycles. However, after the bubbles burst, these leveraged sectors became insensitive to policy rate reduction, because of the acute balance sheet adjustments. Large legacy shortfalls must be compensated for by current profit or income, period by period, and this process is slow and painful. This leads at least to a breakdown in the ordinary monetary transmission mechanism of policy rate change.

What then are the long-term consequences of severe and prolonged balance sheet adjustment under population ageing? Three adverse consequences can be identified.

Long-term consequence 1: declining mobility/flexibility

First, mobility declines, or in other words, the economy becomes "inflexible". Since de-leveraging firms or households have to pay back all their debts before "moving" from their current position, they are often stuck with an "underwater" property. Population ageing strengthens this tendency. In the case of Japan, de-leveraging took place in the corporate sector, and thus firms became less mobile between industries and regions. In the United States, the household sector is de-leveraging, and thus household mobility has been reduced.

Figure 3.1 depicts declining entrepreneurial mobility in Japan. This figure shows the creation and destruction of enterprises between pre-bubble (1981–1986), bubble (1987–1991), and post-bubble (1992–1996). It can be seen in this figure that the creation of new enterprises was sharply reduced after the bubble burst of 1991. In contrast, the increase in the rate of destruction was relatively mild. These two imply a "sticky industry structure," a tendency to hang on to the past.

Declining mobility is found in the household sector in the United States. Figure 3.2 shows changes in the householder mobility rate between 2005 and 2009. A sharp decline is found across all age groups. Since there is no such change in renters, this sharp decline suggests that the housing crash reduced householder mobility rates.[9]

Long-term consequence 2: loss of non-tangible/human capital

The second consequence of severe and prolonged balance sheet adjustment is the loss of non-tangible or human capital. De-leveraging firms and households suffering long under-utilization or under-employment tend to lose their non-tangible or human capital. In Japan, this has been observed especially in small to medium-sized enterprises: loss of entrepreneurship, loss of human networks in skilled manufacturing, and loss of access to technological advances. In the United States, the long-term unemployed or underemployed risk losing their human capital.

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[8] See Figures 2.1 and 2.2 in: Nishimura, K. G., "This Time May Truly Be Different: Balance Sheet Adjustment under Population Ageing," a speech prepared for the Panel "The Future of Monetary Policy" at the 2011 American Economic Association Annual Meeting, Denver, January 7, 2011.

[9] It has been debated recently whether the negative equity of some homeowners significantly influences their mobility in the United States. (See, for example, Schulhofer-Wohl, S., "Negative Equity Does Not Reduce Homeowners' Mobility," Working Paper 682. December 2010, Federal Reserve Bank of Minneapolis.) However, the results based on past data are not yet conclusive, since in the past, negative equity was a relatively rare, idiosyncratic phenomenon. New data including the period after 2008 are needed to answer this question.

Long-term consequence 3: problems in financial intermediation

The third consequence of severe and prolonged balance sheet adjustment is the deterioration in financial institutions' efficient functioning as financial intermediaries. This was most acutely observed in Japan during the several years after the bubble burst: a pile-up of non-performing loans seemed to lead to a breakdown in the "market selection mechanism" around 1997.

Figure 3.3 shows the result of a large-scale panel analysis of Japanese firms, in which the total factor productivity of exiting and surviving firms is compared. Survival of the fittest is a basic premise of the natural selection mechanism. Thus, if the market mechanism works well, the productivity of successful and surviving firms should be higher than that of failing and hence exiting firms, at least on the average.

In this figure, the shaded areas show cases where the productivity of failing and thus exiting firms is higher than that of surviving firms, which is an anomaly. In fact, the shaded areas are rather exceptional most of the time. However, if we look at the period 1996–97, the period of the financial crisis, we see many shaded areas indicating that more productive firms were exiting in many industries. This strongly suggests a breakdown in the natural selection mechanism.

Post-crisis reality

So, what will the post-crisis reality look like once the consequences of acute balance sheet adjustment under population ageing have taken effect? Some of the post-crisis reality can be seen in the Japanese situation in the 2000s.

(1) Decline in prospects for growth and investment returns

First, growth prospects decline. Average real GDP growth in Japan fell from 5% to 4 % in the 70s and 80s, to around 1% in the 90s and 2000s. This implies the expected rate of return on investment in the 2000s is low, especially for those small to medium-sized firms that depend on domestic demand. In contrast, money (bank deposits) becomes relatively attractive as a store of value, given the price-stability pledge of the central bank. Ironically, this leads to an apparent breakdown of the historically-proven quantity-theoretic relationship between real activity and money stock.[10] Moreover, not only is the policy rate very low, but so too are longer risk-free rates, judged by historical standards. Conventional monetary policy through the overnight policy rate is not as effective as before, and this means the economy is more vulnerable to a downside shock.

The change is not only macroeconomic but also microeconomic and structural. The demand structure shifts from homogenous, mass markets for the young, to more segmented and heterogeneous markets for the old. Thus, continued focus on the young may entail ever-declining demand and overcapacity, and could miss the opportunity of exploiting the potential demand of the old. Here the microeconomic and structural failure of firms and banks to accommodate new demand may have macroeconomic consequence as well.

In many discussions over the past two decades, this dramatic decline in growth and investment prospects has often be attributed to the supposedly unique nature of the Japanese economy, whatever that may be. However, if the demographic factors outlined in the previous section do indeed shape the future, then declining prospects for growth and investment returns may have more global relevance.

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[10] The quantity-theoretic relationship presupposes that non-interest-bearing money is dominated by other positive rate-of-returns assets as a store of value. However, when price is stable and expected risk-adjusted return on investment is very low, the clear rate dominance of the other assets over money may no longer hold.

(2) Coordination failure in the financial system

Second, there are signs of coordination failure. Banks' lending is sluggish, partly because of their inadequate functioning as expert relationship bankers. Here a vicious circle seems to be working. To begin with, banks lack the expertise to assess investment in new fields, suffering as they are from problems with non-performing loans and under-investment in their loan officers' human capital. Consequently banks do not lend. This means that new investments and new enterprises cannot get funding, and thus new markets falter. Then, banks miss the opportunities to accumulate new expertise, bringing them right back to the starting point of this vicious circle.

Another coordination failure is found in capital markets, in the form of excessive risk aversion. Fearing unknown unknowns, investors shun investing in riskier securities. Their market then becomes thin and vulnerable to non-fundamental shocks. This means they themselves become prone to turning into unknown unknowns, thus the original fear is self-fulfilling. These two types of coordination failure in financial markets result in an apparent lack of "animal spirits".

(3) Piling-up of public debt

Third, we see a piling-up of government debt. This is partly the result of the substitution of public debt for private debt in the process of balance sheet adjustment, and partly due to the substitution of public demand for private demand during this period of declining growth. According to the OECD's Economic Outlook, Japan's General Government Gross Financial Liability-to-GDP Ratio in 2010 was 198%, compared with 93% in the United States. However, it should also be noted that, because of low long-term rates, the Government Net Debt Interest Payments-to-GDP is 1.2% in Japan, compared with 1.7% in the United States.

Three challenges and unconventional policy

Let me now examine the challenges that central banks face in the post-crisis world.

The first challenge is that of "cycle stabilization": ensuring a return to sustainable growth with price stability, when the policy rate is near zero and longer-term risk-free rates are also very low compared with their historical average.

The second challenge is to enhance the growth trend, or strengthen the foundations for growth. In other words, the challenge is to raise long-term growth prospects, especially in domestically-oriented growth. This should be done by solving the coordination failure in banking and capital markets described above.

The third challenge is to avoid causing problems in national debt management. We should design and execute carefully measures to cope with the first and the second challenge, taking appropriate account of the current national debt situation as explained before, as well as general economic conditions.

To tackle the first and second challenges, many central banks have introduced unconventional policies, which differ from region to region depending on the particular problems they face. Here as an example, I will explain the Bank of Japan's recent attempts at unconventional policies, namely, the Comprehensive Monetary Easing (CME) in October 2010, and the Growth Foundation Strengthening Facility (GFSF) in June of the same year.

To meet the challenge of cycle stabilization, the first part of the CME changed the guidance for the policy rate from 0.1% to the range between 0 and 0.1%, making clear the Bank's Virtually Zero-Interest Rate Policy (VZIRP). For the second part of the CME, the Bank clarified its policy duration commitment: the Bank will continue its VZIRP until it judges price stability to be in sight on the basis of the Policy Board members' understanding of price stability. With Policy Board members' announced forecasts for two years ahead, this is similar to "forecast targeting" though not specific in numbers.

The third part of the CME is the Asset Purchase Program, which is also designed to meet the cycle stabilization challenge. The first half of the Asset Purchase Program aims to influence downward longer-term risk-free rates. That is, the outright purchase of JGBs with remaining maturity of 1–2 years and T-bills is to reduce the term-premiums of risk-free rates. The scheme to provide 3- and 6-month funds at the overnight rate already instituted was aimed at lowering rates longer than the overnight rate, and has been continued and included in this program. These are unconventional, but can be considered as a natural extension of conventional monetary policy through policy rate changes.

However, the second half of the Asset Purchase Program is truly unconventional, in that the Bank purchases riskier assets than it bought before: BBB-rated corporate bonds, and a-2 CPs. It also purchases ETFs and J-REITs directly from the market. The purchase is designed to act as a catalyst to induce investment in riskier assets, and thus help solve the coordination failure I described earlier. In other words, it is aimed at breaking another vicious circle in capital markets, that caused by excessive risk aversion.

When there is grave anxiety about the future of the economy, as when there is so-called Knightian uncertainty, there is a tendency that aversion to risky assets such as stocks and real estate becomes "excessive" and demand for those assets declines, resulting in the risk premiums of those assets remaining high.[11] This excessive "flight to quality" may greatly impede economic activity.[12] Meanwhile, there is the possibility that as Knightian uncertainty increases, demand concentrates on assets whose risks are considered to be simple and small, thereby lowering the risk premiums of those assets. This is known as the "flight to simplicity," which is different from the flight to quality. Whatever name it has, excessive flight to simplicity also distorts the market. In these cases, there is a possibility that the central bank's purchase of risky assets will lead to it playing the role of "catalyst" to alleviate the tendency to excessive flight to quality and to simplicity.

To tackle the second, "trend-enhancement" challenge, or to strengthen growth potential, the Bank of Japan instituted its Growth Foundation Strengthening Facility (GFSF) in the form of preferential fund-provisioning to support financial institutions' own initiatives in lending and investing in new growth areas.

It should be made clear here that it is not the Bank of Japan but participating financial institutions that determine which investment projects should be funded using this GFSF. Thus, the GFSF is designed to be a catalyst to induce banks to find new firms or new investment projects in their perceived growth areas. In this way, the GFSF is targeted at solving the coordination failure in the financial system mentioned earlier, by breaking the vicious circle of no lending resulting in no new markets and thus no demand for lending to start with.

Recently the Bank of Japan expanded the GFSF to include the new function of promoting more effective lending methods. Banks in Japan play a central role in financial intermediation, and small companies in particular rely on banks for most of their funding. In the high growth era, Japanese banks responded to strong demand for funds, using their "expert eye" to monitor closely the business performance of companies and examine their ability to meet repayment obligations. However, through the hard process of disposing of

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[11] Here, in order to facilitate understanding, I intentionally and informally use the term "excessive" risk aversion as representing "(Knightian) uncertainty aversion" or "ambiguity aversion" over and above conventional risk aversion. For a survey of this literature of Knightian uncertainty/ambiguity, see Gilboa, I., and M. Marinacci, "Ambiguity and the Bayesian Paradigm", mimeo., April 12, 2011.

[12] For reference, please see (1) Nishimura, K.G., and H. Ozaki, "Search and Knightian Uncertainty", *Journal of Economic Theory*, 119 (2004), 299–333.and (2) Nishimura, K.G., and H. Ozaki, "Irreversible Investment and Knightian Uncertainty," *Journal of Economic Theory*, 136 (2007), 668–694.

non-performing loans in the 1990s, banks began to rely more heavily on credit protection measures in the form of real estate collateral and personal guarantees.

Unfortunately, this increased reliance on real estate collateral and personal guarantees weakened banks' ability to monitor client firms. The value of real estate and personal assets pledged to banks as collateral bears no direct relation to changes in the client firm's business cash flow. Thus, there is a risk that financial institutions may overlook changes in the cash flow of a borrower's core business and suddenly be faced with its business failure. Moreover, too great an emphasis on protection by real estate or personal asset collateral makes loan officers focus on loans to companies with a long business history and abundant assets, rather than providing funds for new companies and new business areas. Taking these problems into consideration, the Bank of Japan decided to use this GFSF facility to promote lending methods that do not rely on real estate collateral and personal guarantees.

When implementing these measures to cope with cycle stability and trend-enhancing challenges, it is very important to take appropriate account of the third challenge, that of avoiding causing problems in national debt management. Specifically, it is crucial to avoid creating an impression of the "monetization" of government debt. Otherwise, the large scale purchase of JGBs may lead to a substantial and lasting ratcheting up of long-term rates, which would pose a serious problem for economic recovery and the financial position of the government. Taking this point into consideration, the Bank of Japan has already purchased about 22 trillion yen in JGBs annually, beside the Asset Purchase Program. By the same token, we should be very careful about the possibility that asset purchases may lead to capital losses, which could tarnish the credibility of the central bank.

4. Concluding remarks: Keynes, population ageing and innovation

Let me return to where I started this presentation. As I mentioned in the Introduction, it was Keynes who, in his *Eugenics Review* speech, placed population once again at center stage of macroeconomic policy in the framework of his General Theory. While in the Malthusian tradition, *growing* populations and inadequate food production to feed them are the major issue, Keynes was concerned with *declining* populations and inadequate capital investment for full employment. Life expectancy was not particularly long in the time of both Keynes and Malthus, and so population ageing was not an issue at all. Moreover, rapid technological innovation has at least partially solved the problems they had faced for some time.

The problem we now face stems from population change, but with a different twist. Here *composition* of population has changed, inducing a large swing in asset prices as a store of value. With this in the background, we have witnessed asset prices bubble and then collapse spectacularly in some countries, leaving us with severe balance-sheet problems and diminished expectations on investment returns.

One may then ask the question: Can our problems also be solved by technological innovation, as they were for Keynes and Malthus? If so, we need not be particularly worried about the present stagnation.

I do not have an answer, but I would like to make three remarks about the possibilities presented by technological innovation.

First, the ageing society might impose unique challenges on technological innovation. When the population is growing rapidly, as it was in the past, the demands of the young always dominate those of the old. Thus, successful technological progress has a tendency to be youth-oriented and quantity-oriented. In contrast, when the population is ageing rapidly, the demands of the old dominate the market. The characteristics of technology demanded by the old may differ substantially from those demanded by the young, and current youth-oriented technological progress may prove to be not as value creating as before.

Second, if the ageing world implies a substantial fall in asset returns, it would induce curtailment of new investment, leading to a worsening of economic conditions. To prevent investment shrinking further, we might need a new source of investment, which is not based on high private returns. It should be noted that there are many socially desirable projects that carry a low private rate of return, such as urban renewal projects, which might have been crowded out in the age of high private returns. To counter possible shortfalls in private investment, we might be obliged to adopt some form of public-private partnership to mobilize these innovation-based projects.[13]

Third, in an ageing world, the financial needs of an older population are often very different from the risk and return profiles of existing assets. We would then need financial innovation, as one form of technological innovation. Specifically, securitization might be helpful in tailoring financial products to the particular needs of an older population. However, recent experience in securitized products markets has shown the need for care in the design of such securitization, to ensure the necessary regulations and adequate oversight for prospective practitioners of these schemes.

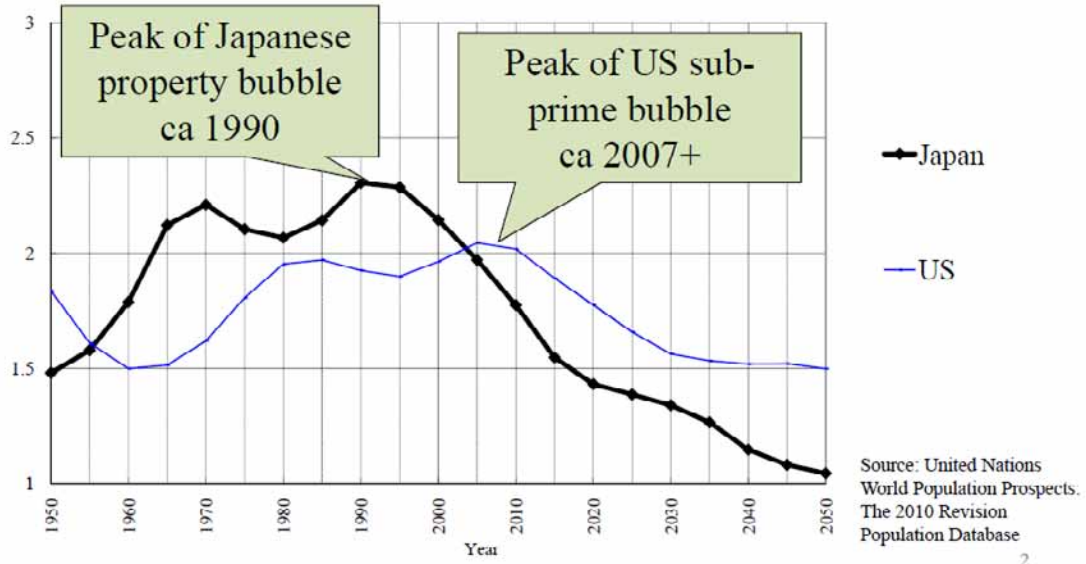
Now it is time for me to stop here. Thank you for your kind attention.

[13] Some years ago, I proposed a scheme elsewhere for this purpose called Socially-Oriented Investment Trusts. See: Nishimura, K. G., and M. Saito, "On Alternatives to Aggregate Demand Policy to Revitalize the Japanese Economy", *Asian Economic Papers* 2:2 (2003), 87–126.

(Figure 1.1)
Population Change and Bubble: Japan and US

Inverse Dependency Ratio: Ratio of Working-Age Population to the Rest

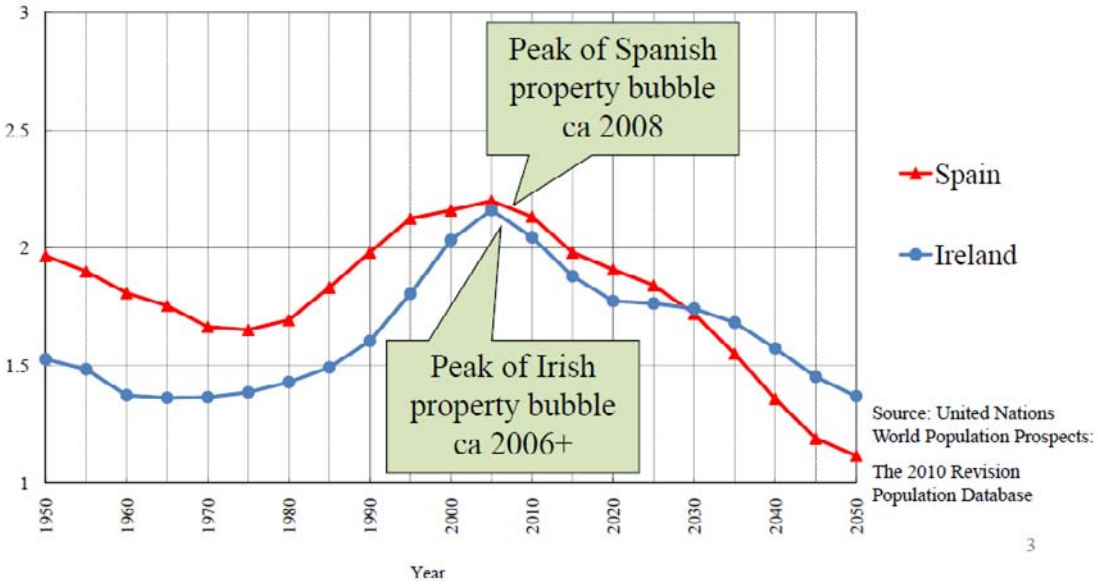
= How many people of working age have to provide for one dependent person?



(Figure 1.2)
Population Change and Bubble: Spain and Ireland

Inverse Dependency Ratio: Ratio of Working-Age Population to the Rest

= How many people of working age have to provide for one dependent person?



(Table 2.1)
Population Growth: Selected Countries

Estimated Population as of July 1 (in thousands)

Year	Developed	Market Economy						Emerging	Non-Market => Market	
		Japan	USA	Germany	France	Italy	UK		Russia	China
1955	472,617	88,390	171,151	70,325	43,434	48,131	51,186	719,760	111,401	608,359
1980	590,434	115,916	229,826	78,289	53,879	56,220	56,304	1,121,824	138,653	983,171
2005	685,627	126,394	296,820	82,540	60,999	58,672	60,202	1,451,435	143,842	1,307,593
2030	759,998	120,217	361,679	79,469	68,468	60,852	69,313	1,529,506	136,431	1,393,075

Estimated Population Growth

Period	Developed	Market Economy						Emerging	Non-Market => Market	
		Japan	USA	Germany	France	Italy	UK		Russia	China
1955-1980	0.89%	1.09%	1.19%	0.43%	0.87%	0.62%	0.38%	1.79%	0.88%	1.94%
1980-2005	0.60%	0.35%	1.03%	0.21%	0.50%	0.17%	0.27%	1.04%	0.15%	1.15%
2005-2030	0.41%	-0.20%	0.79%	-0.15%	0.46%	0.15%	0.57%	0.21%	-0.21%	0.25%

- Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision, http://esa.un.org/unpd/wpp/index.htm, May 30, 2011

4

(Table 2.2)
Life Expectancy: Selected Countries

Estimated Life Expectancy at birth (years)

Year	Market Economy						Non-Market => Market	
	Japan	USA	Germany	France	Italy	UK	Russia	China
1950-1955	62	69	68	67	66	69	65	45
1975-1980	75	73	73	74	73	73	68	66
2000-2005	82	77	79	80	80	78	65	72
2025-2030	85	81	83	84	84	82	72	76

- Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision, http://esa.un.org/unpd/wpp/index.htm, Jun 8, 2011

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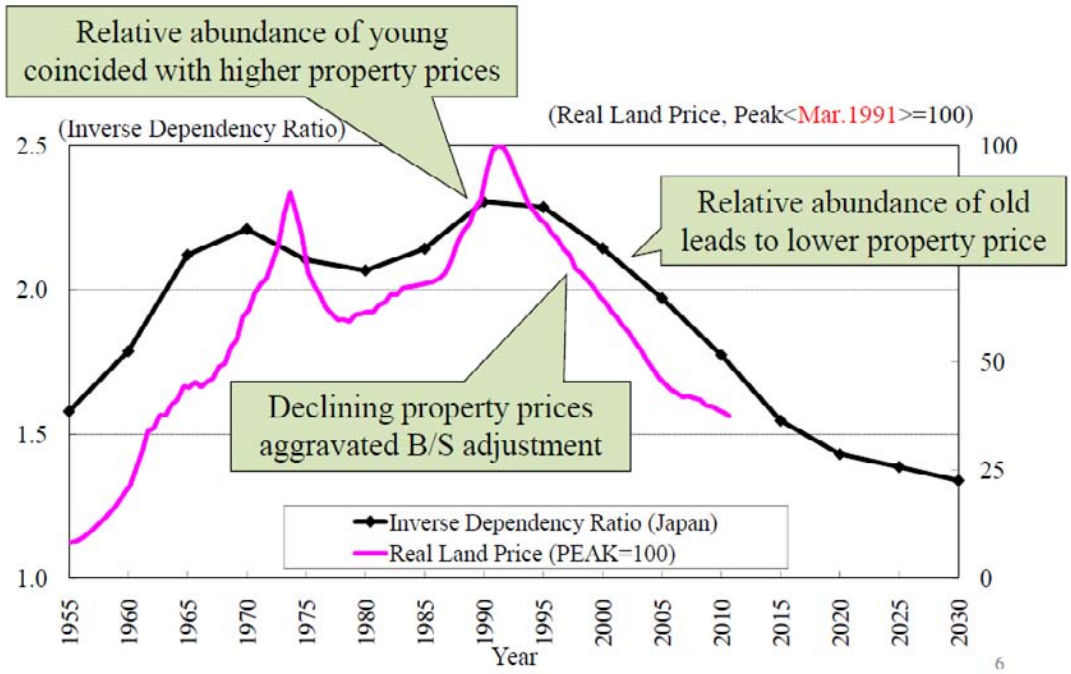
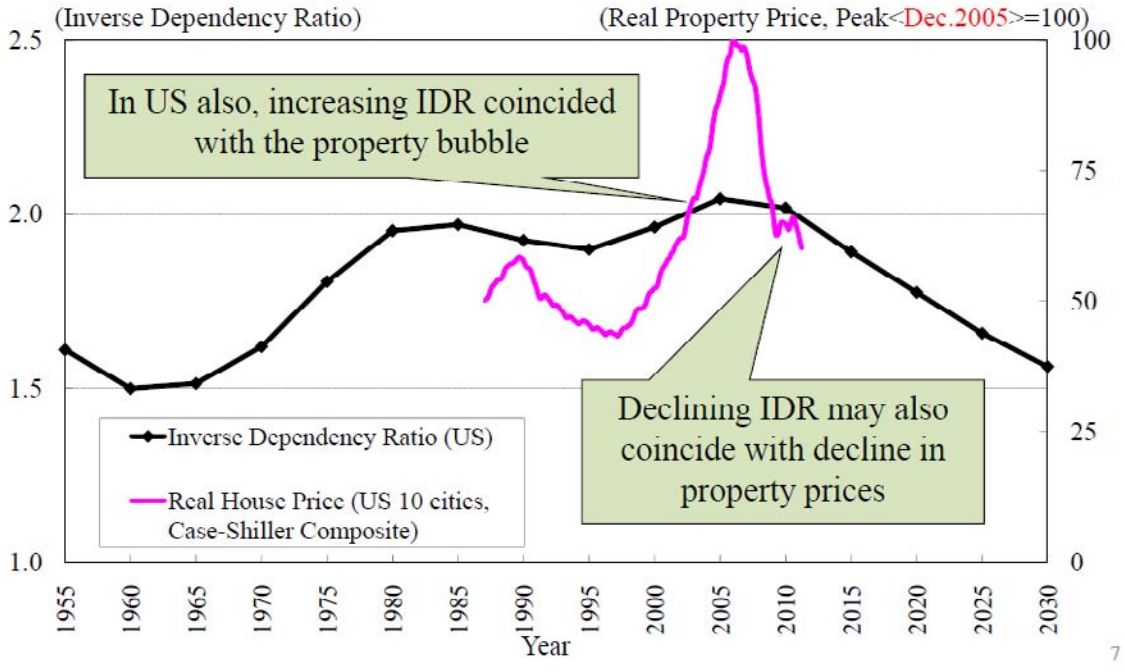
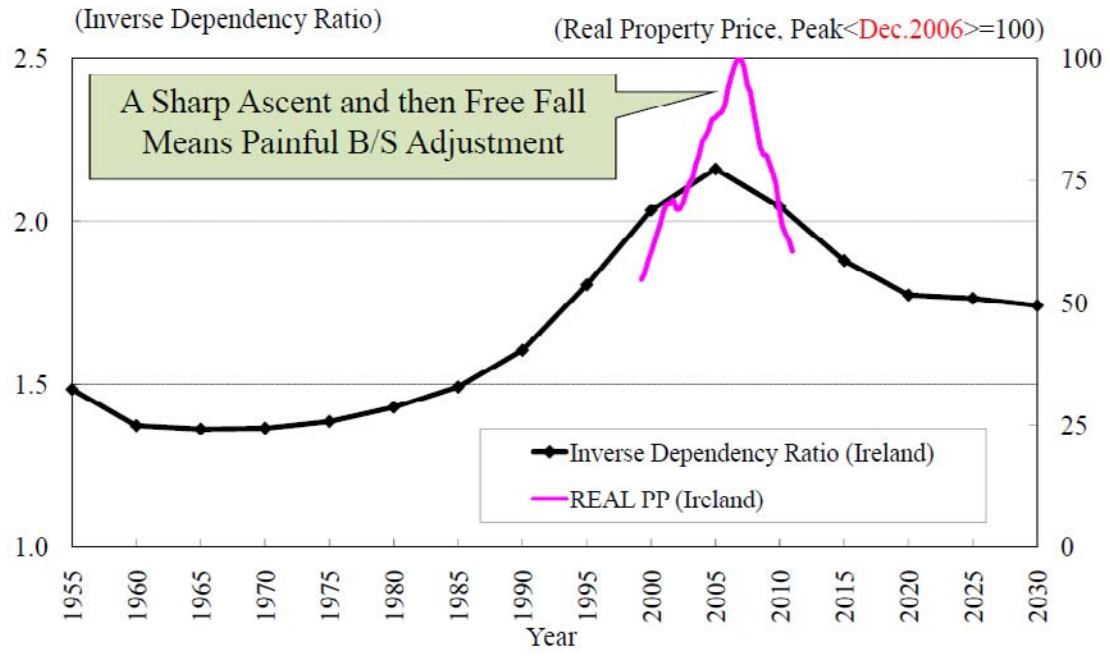
(Figure 2.1)
Ageing Population and Property Prices: Japan



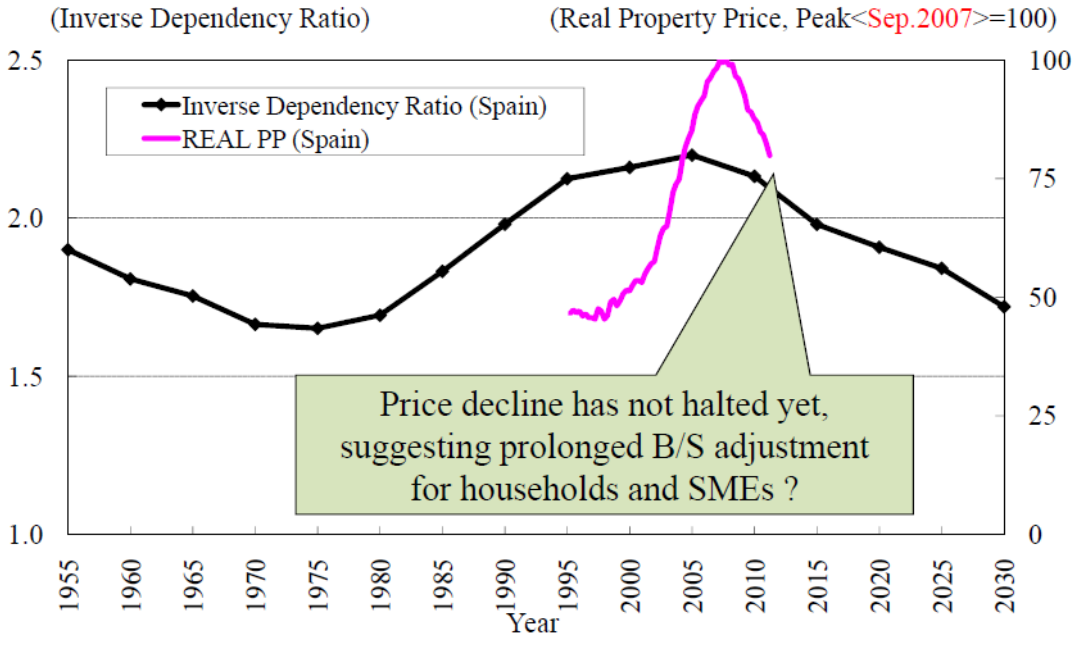
(Figure 2.2)
Ageing Population and Property Prices: US



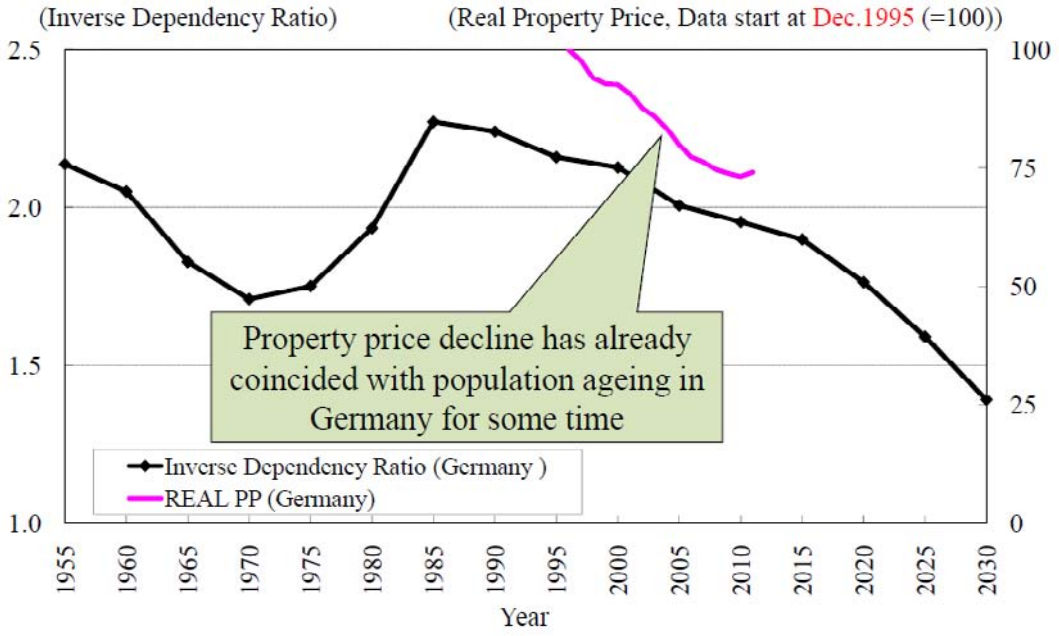
(Figure 2.3)
Ageing Population and Property Prices: Ireland



(Figure 2.4)
Ageing Population and Property Prices: Spain



(Figure 2.5)
Ageing Population and Property Prices: Germany



(Table 2.3)
Impact of Globalization
Numerical Example Based on UN Population Estimates

	Young Population			Asset Price Inflation Rate
Period	Developed	Emerging	Market World	
	unit = thousands			per annum
1: Cold War (1955)	472,617		472,617	
2: Pre-Globalization (1980)	590,434		590,434	0.89%
3: Globalization (2005)	**685,627**	**1,451,435**	**2,137,062**	**5.28%**

11

<Note: Fixed Exchange Rate Between Regions in Period 3>

(Table 2.4)
Aftermath of Globalization

Period	Young Population			Asset Price Inflation Rate
	Developed	Emerging	Market World	
	unit − thousands			per annum
1: Cold War (1955)	472,617		472,617	
2: Pre-Globalization (1980)	590,434		590,434	0.89%
3: Globalization (2005)	685,627	1,451,435	2,137,062	5.28%
4: Post-Globalization (2030)	**759,998**	**1,529,506**	**2,289,504**	**0.28%**

(Figure 3.1)
Declining Mobility: Japan

<Enterprise Creation and Destruction>

After the bubble burst, creation of enterprises is sharply reduced.

In contrast, relatively mild increase in destruction.

Year	All industries (%)							
					tail de	Eating and drinking places	Services	Miscellaneous
Post-World War II Era[b]								
Rate of net increase								
1981–1986	2.31	3.1	1.18	1.97	1.49	1.23	5.31	3.08
1987–1991	3.25					3	6.04	4.72
1992–1996	1.41	92				1	2.87	1.42
Rate of creation (estimated)								
1981–1986	3.52	5.46				0	6.10	4.11
1987–1991	3.76	5.98				0	6.39	5.28
1992–1996	2.12	4.90				5	3.40	2.19
Rate of destruction (bankruptcy rate)								
1981–1986	1.33	2.58	1.12	1.72	0.82	0.70	0.97	1.16
1987–1991	0.57	0.88	0.48	0.88	0.33	0.33	0.44	0.68
1992–1996	0.75	1.14	0.73	1.07	0.38	0.35	0.59	0.82

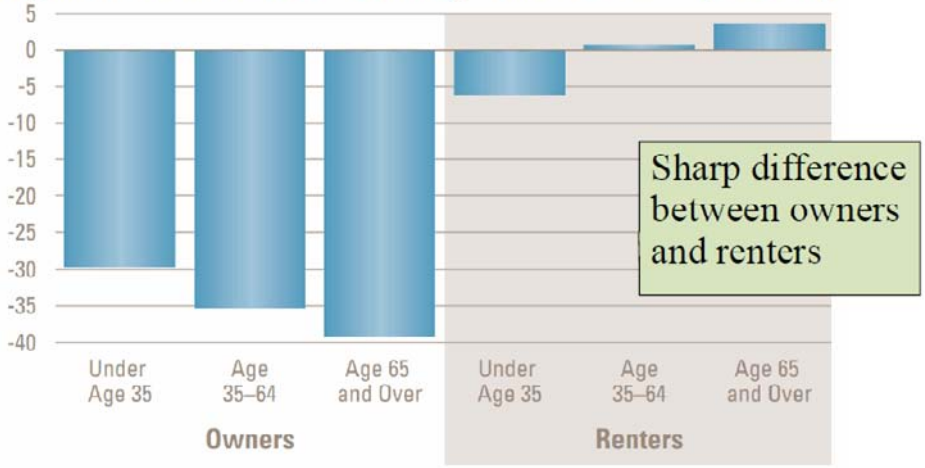
Source: Nishimura and Kawamoto (2003). "Why Does the Problem Persist?: "Rational Rigidity" and the Plight of Japanese Banks," *The World Economy*, 26 (2003), 301-324

--"Sticky industry structure," hanging on to the past

13

(Figure 3.2)
Declining Mobility: US

<Changes in Householder Mobility Rate, 2005–9 (Percent)>



Note: Mobility rate is defined as the share of householders who reported having moved in the previous 12 months.

Source: JCHS tabulations of US Census Bureau, 2005 and 2009 Current Population Surveys.

Figure 13, *The State of the Nation's Housing* 2010, Joint Center of Housing Studies of Harvard University

--The housing crash reduced mobility rates.

14

(Figure 3.3)
Breakdown of Natural Selection Mechanism in Japanese Financial Crisis of 1997

TFP of surviving and exiting firms

	1994–95		1995–96		1996–97		1997–98	
	Survive	Exit	Survive	Exit	Survive	Exit	Survive	Exit
Food products and beverages								
Livestock products	1.71	1.00	1.67	1.05	1.68	1.94	2.18	1.28
Seafood products	1.42	0.86	1.58	1.06	1.66	0.94	1.28	1.11
Flour and grain mill products	2.35	0.69	3.83	1.05	4.00	1.21	4.27	2.33
Miscellaneous foods and related products	1.43	3.15	1.52	1.26	1.49	1.61	1.60	0.98
Soft drinks, carbonated water, alcoholic	4.12	1.49	4.59	1.63	4.56	1.60	4.53	5.26
Pr					2.96	3.89	3.64	1.24
Chem								
Cl					1.84	3.69	3.36	2.22
In					2.84	3.21	2.91	7.49
Chemical fibers	1.73			1.74	2.38	0.95	2.06	n.a.
Oil and fat products, soaps, synthetic detergents, surface-active agents and paints	1.72	1.91	1.97		2.18	1.98	2.50	1.69
Drugs and medicines	2.10	1.60	2.26	1.76	2.49	2.43	2.63	1.67
Miscellaneous chemical and allied products	2.55	1.59	2.15	3.91	2.73	1.87	2.97	1.18
Retail trade								
Retail trade, general merchandise								
[illegible] goods, apparel and	1.15	1.07	1.25	1.14	1.36	1.18	1.28	1.10
Retail trade (food and beverage)	0.84	0.71	0.98	0.71	0.93	1.01	0.99	1.78
Retail trade (motor vehicles and bicycles)	0.84	0.74	0.92	0.92	0.96	0.89	0.88	0.83
Retail trade (furniture, household utensil and household appliance)	1.05	1.04	1.04	1.13	1.18	0.92	1.30	0.69
Household appliance stores	1.00	0.92	1.27	1.03	1.20	1.42	0.93	0.99
Drug and toiletry stores	4.16	0.78	2.33	0.84	2.54	0.87	0.82	0.73
Fuel stores	0.94	0.86	0.88	1.04	0.87	0.94	0.92	0.92
Miscellaneous retail trade	1.12	1.51	1.15	1.12	1.18	1.31	1.06	0.98

1997: many industries saw more productive firms exiting.→ Breakdown of natural selection

Shaded: exiting firms are more productive than surviving firms

Notes: (1) Shaded areas indicate weighted mean of TFP of exiting firms is greater than that of surviving firms. (2) "Survive" include "switch" firms.

Nishimura, Nakajima, Kiyota (2005) "Does Natural Selection Mechanism Still Work in Severe Recessions? –Examination of the Japanese Economy in the 1990s- " *Journal of Economic Behavior and Organization*, 58:1 (2005), 53-78

Appendix:
Financial crisis and inverse dependency ratio – an update

In a speech in January 2011,[14] I presented some telling figures on the correlation of financial crisis, or so-called bubbles, and the inverse dependency ratio in Japan, United States, Greece, Portugal, Spain, Ireland and China. The figures were based on the 2008 revision of the United Nations World Population Prospects. Since then, the United Nations has published its 2010 revision. This appendix updates these figures and expands on them by including more European and Asian countries.

The Japanese inverse dependency ratio peaked around 1990, and it was in the very next year, 1991, that the Japanese Bubble peaked. The peak of the US ratio was between 2005 and 2010, and the peak of the US Subprime Bubble was 2007 (Figure A.1 [same as Figure 1.1]). The economically troubled countries of the eurozone present a similar pattern to Japan and the United States. The ratios for Greece, Portugal and Spain have almost the same time profile, and all of them peaked around 2000–2005. The peak of the Spanish property boom was just after the ratio's peak, and the financial problems of Greece also started at the same time. A particularly interesting case is Ireland, which showed a sharp rise in the ratio until around 2005. The bursting of the country's property market bubble was just a few years around the corner (Figure A.2).

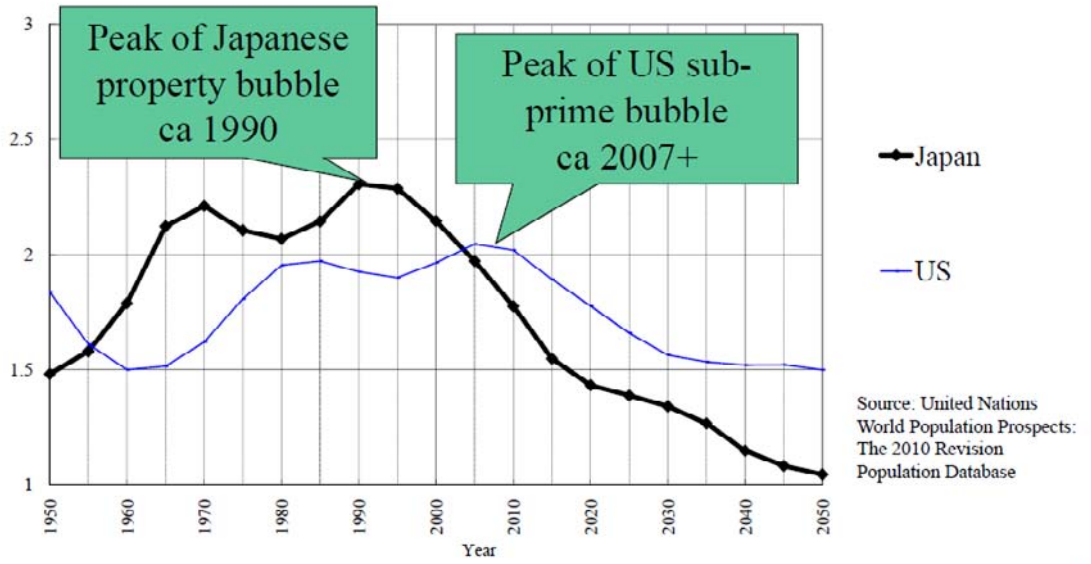
How about other European countries? The so-called Core Europe, Germany, France and Italy, passed the peak 10+ years ago, and seemingly, did not have any particularly alarming property bubbles around 2010 (Figure A.3). However, new and potential members of the eurozone show similar patterns to Greece, Spain, Portugal, and Ireland (Figure A.4). Their ratios peaked around 2005–2010, and some have their own problems.

In contrast to advanced countries, emerging Asia has shown remarkable resilience against the financial crisis of 2008. In fact, their inverse dependency ratio is still rising, as exemplified by China's ratio (Figure A.5). The inverse dependency ratios of many other Asian countries have a quite similar time profile to that of China (Figure A.6). However, their ascent will be checked in a relatively short period, and the peak will be around 2010–15 in many of these countries. After that, the ratio will fall as rapidly as it is now rising.

[14] See footnote 2.

(Figure A.1[same as Figure 1.1])
Population Change and Bubble: Japan and US

Inverse Dependency Ratio: Ratio of Working-Age Population to the Rest
= How many people of working age have to provide for one dependent person?

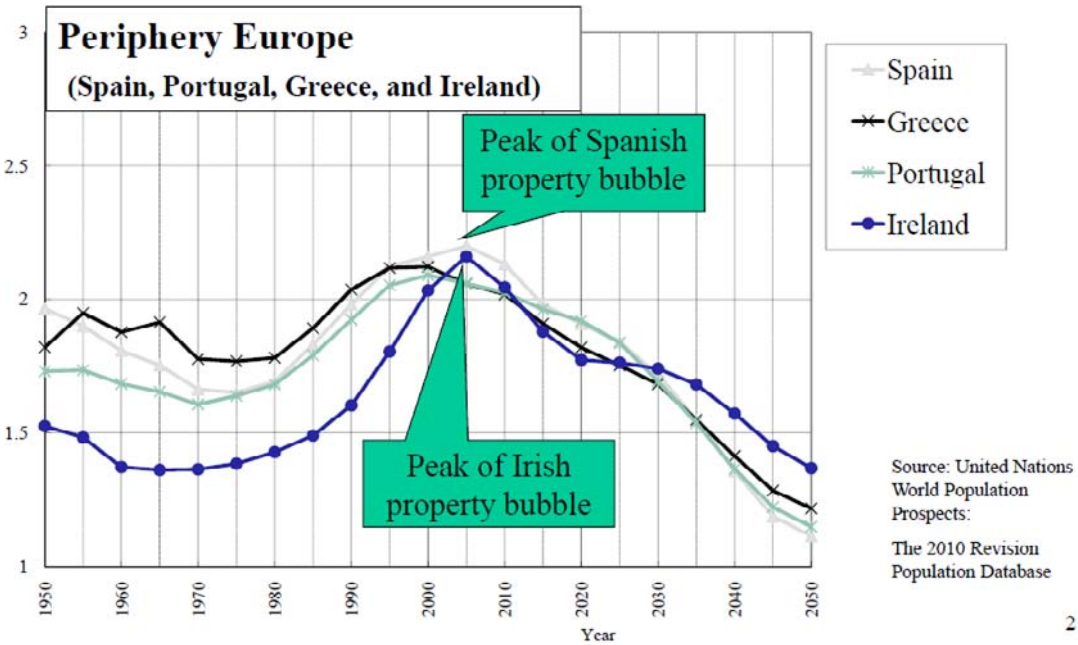


Source. United Nations World Population Prospects: The 2010 Revision Population Database

1

(Figure A.2)
Population Change and Bubble: Periphery Europe

Inverse Dependency Ratio: Ratio of Working-Age Population to the Rest
= How many people of working age have to provide for one dependent person?



Source: United Nations World Population Prospects:

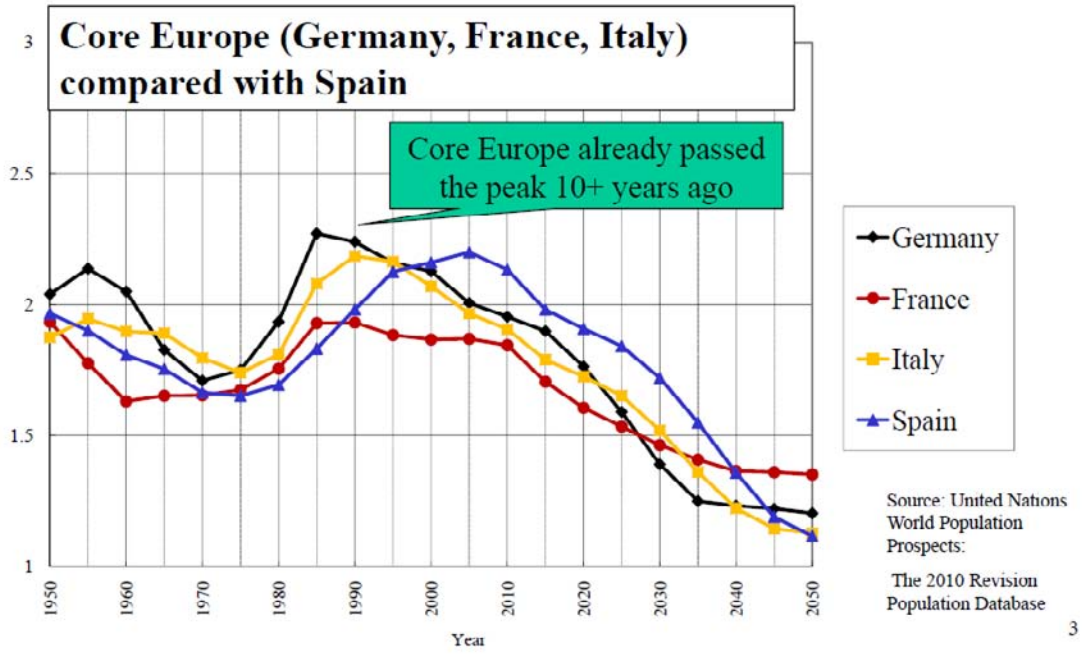
The 2010 Revision Population Database

2

(Figure A.3)
Core Europe compared with Periphery Europe

Inverse Dependency Ratio: Ratio of Working-Age Population to the Rest

= How many people of working age have to provide for one dependent person?



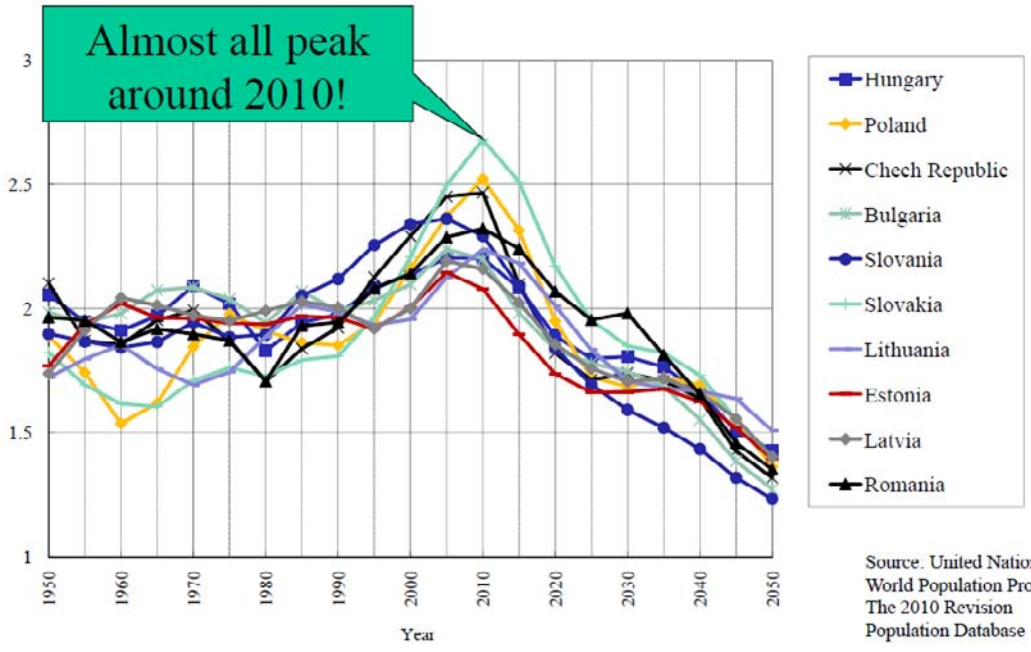
Source: United Nations World Population Prospects: The 2010 Revision Population Database

3

(Figure A.4)
New and Potential Members of EU

Inverse Dependency Ratio: Ratio of Working-Age Population to the Rest

= How many people of working age have to provide for one dependent person?



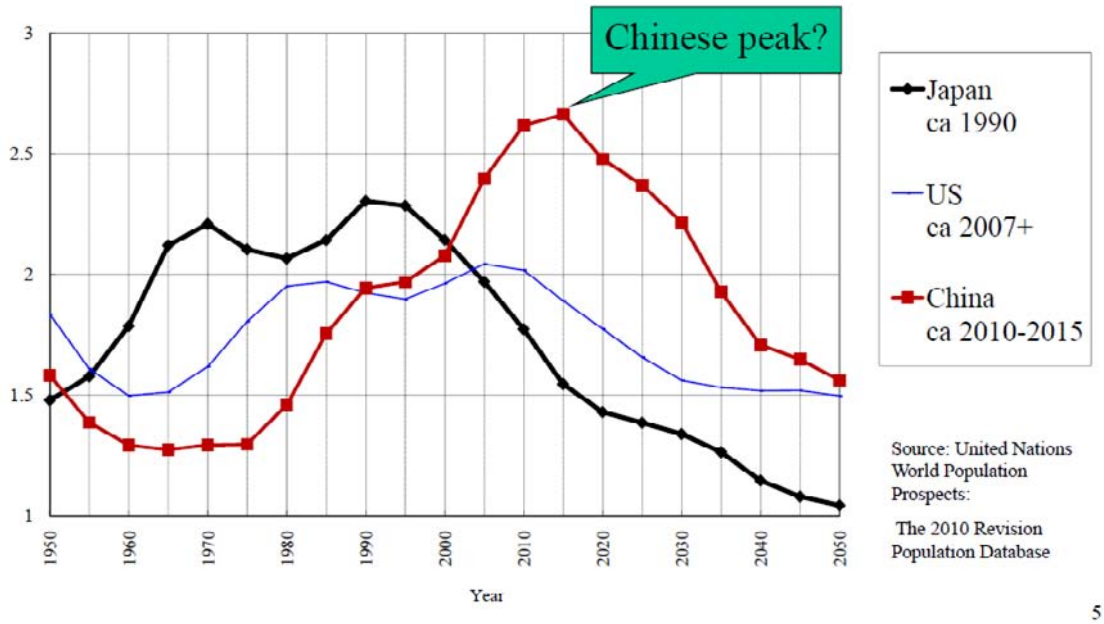
Source: United Nations World Population Prospects: The 2010 Revision Population Database

4

(Figure A.5)
China compared with Japan and US

Inverse Dependency Ratio: Ratio of Working-Age Population to the Rest

= How many people of working age have to provide for one dependent person?



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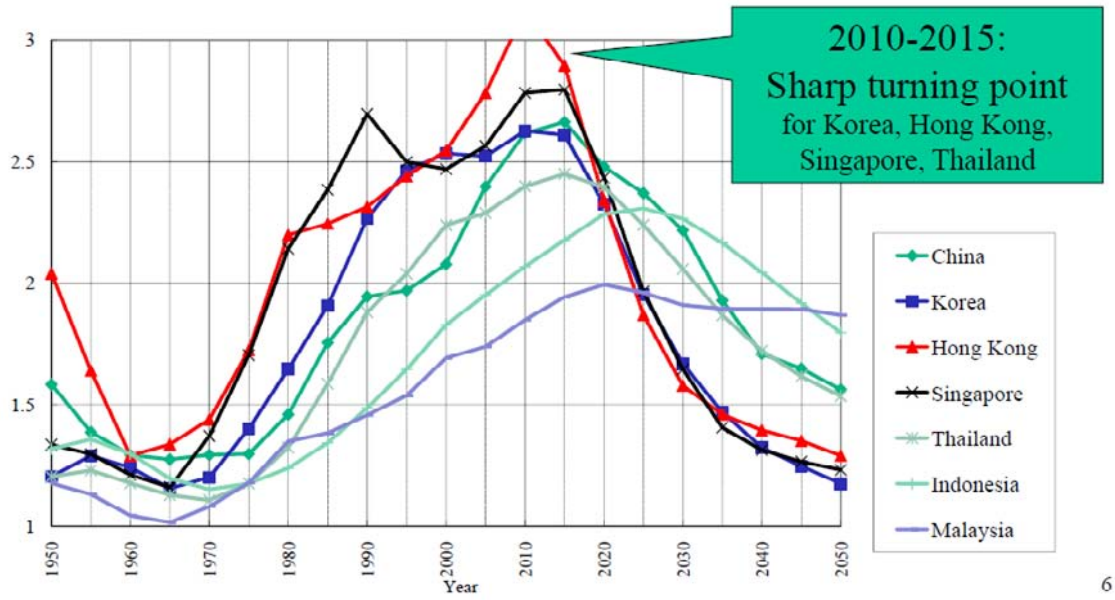
(Figure A.6)
Asia: Some Will See a Sharper Turn

Inverse Dependency Ratio: Ratio of Working-Age Population to the Rest

= How many people of working age have to provide for one dependent person?



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