

# Bubbles, Demographic Change and Natural Disasters

## Opening Speech

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### I. Introduction

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Good morning. I am very pleased to address the Bank of Japan Annual International Conference. On behalf of my colleagues at the Bank of Japan, I welcome all the participants from central banks, international organizations, and academia.

Japan was hit by an unprecedented earthquake and tsunami on March 11, the day that was etched into our memory. The scars are yet to heal in the quake-stricken regions. In the aftermath of the disaster, however, we Japanese were not in a hopeless situation. We have received lots of support and numerous warm messages from our friends abroad. I express my sincere gratitude to those whose hearts and thoughts have been with us since that day.

The title of this year's conference is "Real and Financial Linkage and Monetary Policy." Conventional macroeconomics has analyzed macroeconomic dynamics through the two lenses, trend growth and business cycles. While the two lenses remain important, over the past quarter-century the need to incorporate a third lens—rare but large events including financial crises—was increasingly recognized, by policymakers and academics alike. I myself already addressed the issue of bubbles and financial crises in the opening remarks at the previous year's conference.<sup>1</sup> This year, through this third lens, I find myself left with no choice but to refer to the repercussions of a natural disaster. At the other extreme compared with sharp, unanticipated shocks like financial crises and natural disasters, I also recognize the fully anticipated development, demographic change, which the Japanese economy is undergoing, as the paramount issue. Today, I will pick three issues, bubbles and resulting financial crises, demographic changes, and natural disasters, as the factors driving economic dynamics and call for further research on them.

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1. See Shirakawa (2010).

## II. A Retrospective View of the Japanese Economy in the Past Quarter-Century and Research Agenda Going Forward

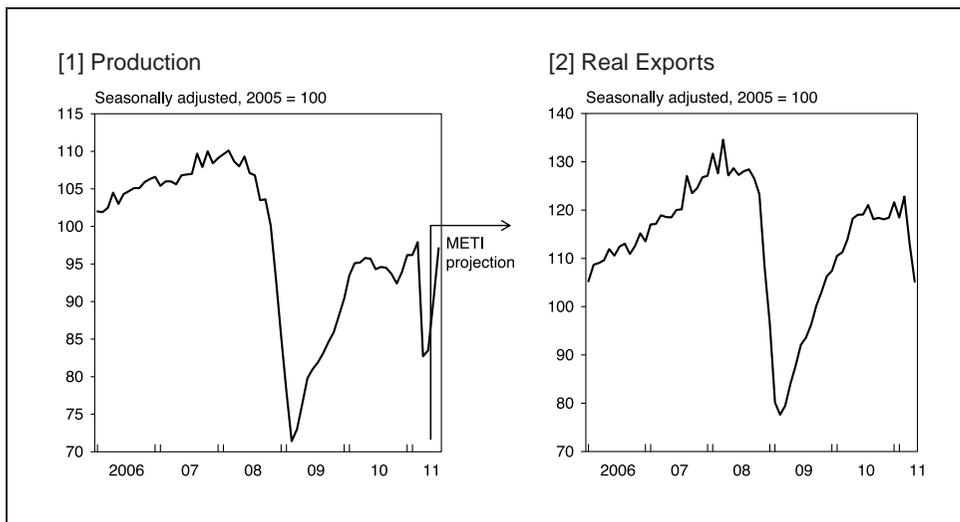
### A. The Day after the Great East Japan Earthquake

Before we move on, I will brief you on how matters stand in the Japanese economy. In the aftermath of the earthquake, production has declined very sharply due to supply constraints caused primarily by the destruction of capital stock, disruptions in supply chains, and a shortage of electric power (Figure 1). As a result, exports have decreased substantially, and domestic private demand has also been weak, partly accentuated by deterioration in business and household sentiment. Those constraints are, however, being relaxed more quickly than expected initially as a result of strenuous efforts by firms. Looking ahead, for the time being, Japan's economy is likely to continue to be under strong downward pressure, mainly on the production side. However, as supply-side constraints ease and production regains traction, the economy is expected to return to the moderate recovery path from the second half of fiscal 2011, backed by an increase in exports reflecting the high growth of the global economy and by a rise in demand for restoring capital stock.

### B. The Japanese Economy in the Past Quarter-Century

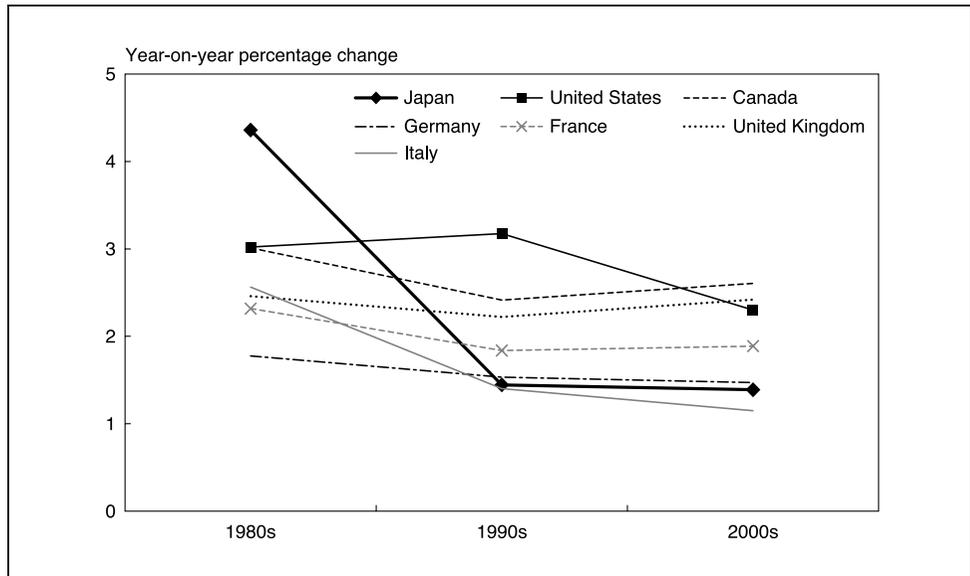
Beyond the horizons of a short-term economic outlook, the paramount issue for the Japanese economy lies in the medium- to long-term growth prospects. In this regard, a review of the economy over the past quarter-century could benefit us. With this aim in mind, we need to underscore the following five facts.

Figure 1 Downturn in the Japanese Economy



Sources: Ministry of Economy, Trade and Industry, "Indices of Industrial Production"; Bank of Japan, "Real Exports and Real Imports."

**Figure 2 Real GDP in the G7 Countries**



- Notes: 1. To eliminate the effect of the financial crisis, the figures for the 2000s are the average from 2000 to 2008.  
 2. The figure for Germany for the 1980s is that for West Germany, and that for the 1990s is the average from 1992 to 1999.

Source: Datastream.

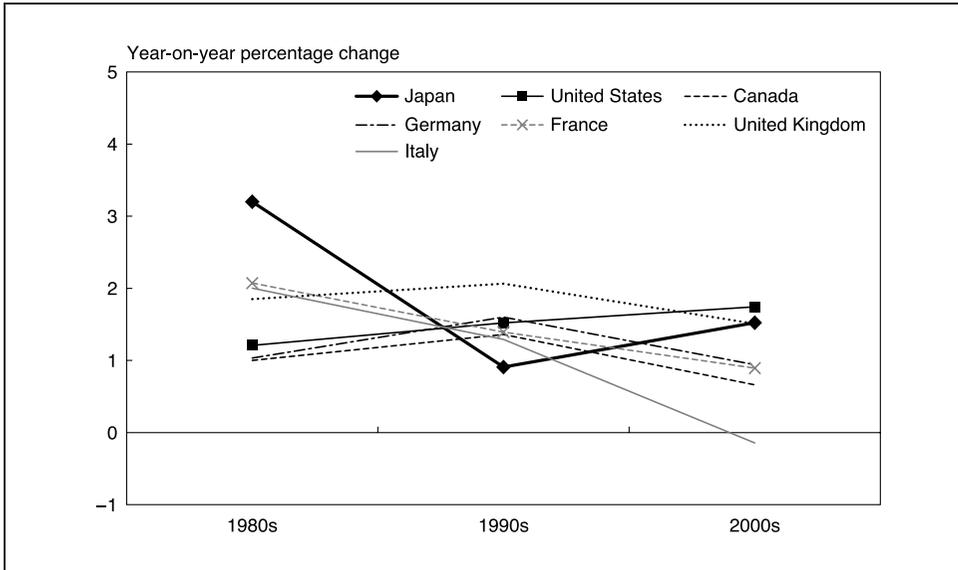
First, Japan’s real GDP growth rate has steadily decreased. Back in the 1980s, Japan was a frontrunner in terms of GDP growth among G7 countries, while it continued to lose momentum during the 1990s and remained in the most lackluster subgroup in the 2000s (Figure 2).

Second, Japan’s per capita GDP continued to grow at a high pace comparable to other G7 economies in the 2000s, although significantly slowed compared with the 1980s. Japan’s per-worker GDP growth, in particular, remained in the top subgroup, and in fact it was only slightly less than that of the United States (Figure 3).

Third, after the burst of the bubble, the Japanese economy took a long time to resume its expansion (Figure 4). The protracted period of economic underperformance is now known as the “lost decade.” The Japanese economy resumed its expansion finally in 2004. Incidentally, it could be noted that after the burst of the bubble in the 1990s, the decline in Japan’s growth rate was relatively moderate compared with the declines experienced by the United States and European countries after the collapse of the global credit bubbles in the mid-2000s.

Fourth, the Japanese economy was precipitated into a sharp contraction in the wake of instabilities in financial systems. One occasion was the failure of Yamaichi Securities in 1997, and the other was the Lehman shock. In the latter case, the contraction was more acute than the first case (Figure 5).

**Figure 3 Real GDP per Worker in the G7 Countries**

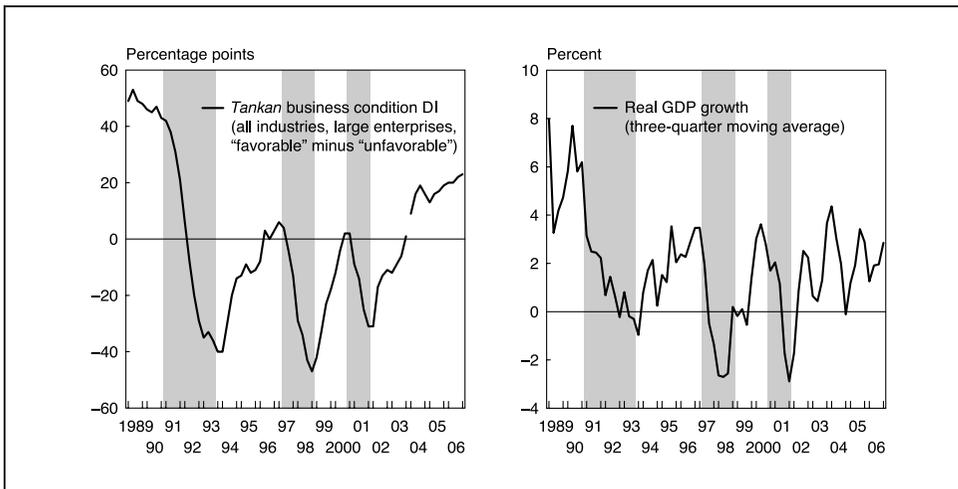


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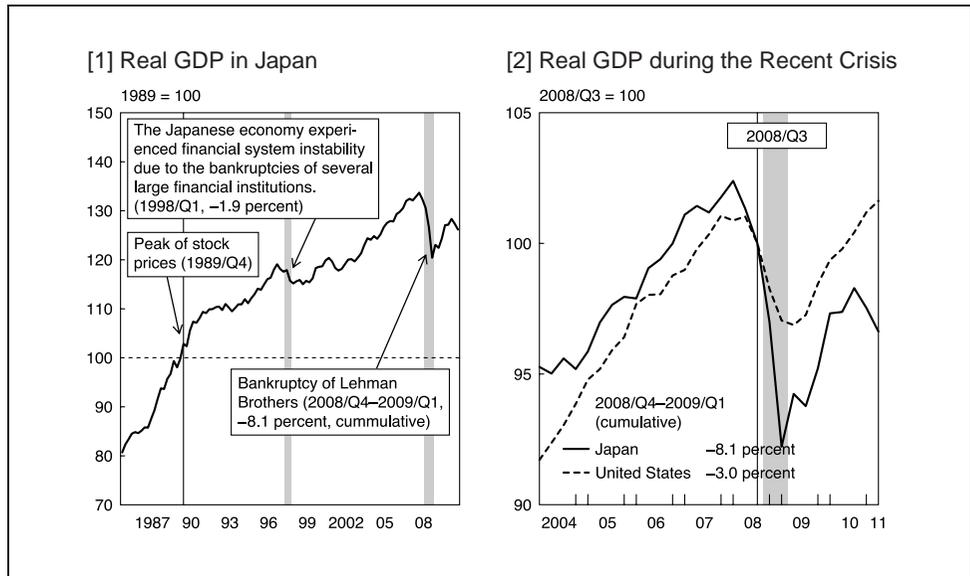
Source: Datastream.

**Figure 4 Economic Underperformance in Japan**



Note: Shaded areas indicate periods of recession.

Sources: Bank of Japan, "Short-Term Economic Survey of Enterprises in Japan"; Cabinet Office, "National Accounts."

**Figure 5 Contraction in Economic Activity**

Sources: Cabinet Office, “National Accounts”; U.S. Department of Commerce.

Fifth, Japan is facing another sharp decline in economic activity triggered by the Great East Japan Earthquake.

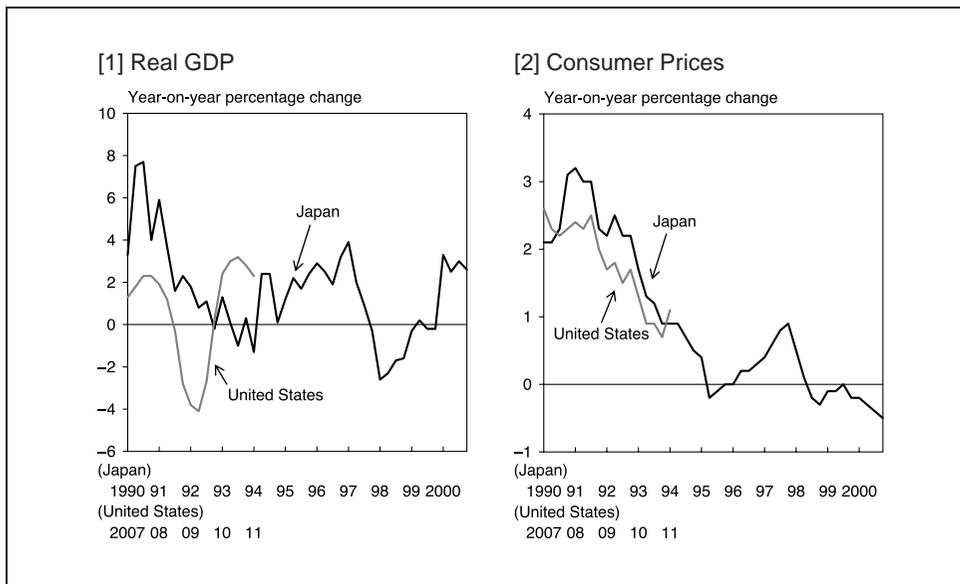
### C. Research Agenda Going Forward

Admittedly, the global financial crisis in the late 2000s together with the aforementioned five facts left us with no choice but to realize how little we knew about macroeconomic dynamics. Against the backdrop, I put a bubble and a resultant financial crisis at the top of the research agenda. Beyond a variety of discussions prompted by the global financial crises, we need to make further progress on this front. The second issue is economic and social consequences of sizeable demographic changes, such as a declining population and ageing. The third issue is repercussions of natural disasters on economic activity. The second and third issues may look remote from financial systems and monetary policy, but that is a *prima facie* impression, as I will flesh out later. A declining population gives rise to an outright reduction in the natural rate of interest and this could constrain monetary policy via the zero lower bound. If the guaranteed return of pension policies did not adequately reflect the anticipated decline in the natural rate of interest due to a decline in the population, the misalignment could spur the search for yield, which would sow the seeds of a bubble.

## III. Bubbles and Financial Crises

I will start with the first issue on the agenda, that is, bubbles and financial crises. We have commonly observed across countries that economic contractions following the

**Figure 6 Real GDP Growth and Inflation (Japan and the United States)**



Note: Consumer prices are core CPI. The core CPI in Japan is computed by excluding perishables from headline CPI.

Sources: Cabinet Office, “National Accounts”; U.S. Department of Commerce; Ministry of Internal Affairs and Communications, “Consumer Price Index”; U.S. Department of Labor.

burst of a bubble tend to be protracted, and subsequently the economies are hobbled at an early phase of recovery.<sup>2</sup> In the aftermath of the two bubbles, namely, one in the United States in the late 2000s and the other in Japan in the 1990s, both the GDP growth rate and inflation show similar trajectories across the two cases (Figure 6).

The crippled balance sheets can be detected as the primary factors that impede the economic recoveries, while we also need to underscore the linkage of low productivity growth and the inefficient resource allocations resultant from the malfunctioning credit intermediation. In fact, to promote economic growth, it is crucially important to maintain the economic metabolism by smoothly reallocating economic resources toward the sectors with higher growth potential. In this regard, economists at the Bank of Japan estimated that the distortion in factor markets can account for one-seventh of the total 3.6 percent decline in the GDP growth rate during the six years in the aftermath of the bursting of the bubble.<sup>3</sup> More research would be called for in an attempt to further elaborate on the effects of the deterioration of banks’ balance sheets and the protracted zero interest rates on the efficiency of the resource allocations.

In this context, I would highlight the subtle distinction between money and credit in a period of deflation. Professor Milton Friedman once noted that inflation is always

2. See Reinhart and Reinhart (2010).

3. See Nakakuki, Otani, and Shiratsuka (2004).

and everywhere a monetary phenomenon, Friedman's well-known proposition on inflation.<sup>4</sup> Given my respect for Friedman, whose last class I took at the University of Chicago, I would suggest asking whether the proposition holds if we replace the term "inflation" by "deflation" in the proposition. Elaborating on the validity of this seemingly symmetrical proposition would provide a clue to better understanding how a financial crisis interacts with deflation. You may argue that replacing inflation by deflation would simply flip a plus to a minus, but the issue is not as simple as it appears. Whether this deflation version of Friedman's proposition holds or not would depend on how we interpret it.

The proposition holds if the proposition means that destabilized financial systems shrink money stock noticeably, thereby resulting in deflation. In retrospect, we can reaffirm that severe deflation was accompanied by financial crises.<sup>5</sup> Friedman pointed out in his own work, *A Monetary History of the United States*, that during the period of 1929–33, money stock shrank by 31 percent and the price level declined by 25 percent primarily because the Fed failed to act as the lender of last resort. In sharp contrast to the U.S. experience in the 1930s, helped by such lessons from history, the Bank of Japan acted very aggressively as the lender of last resort. As a result, contraction of money stock was forestalled and the price level dipped by only 0.5 percent per annum at the maximum. It could also be noted that since 1998, the price level has dropped slightly larger than 3 percent, which is quite different from the U.S. experience in the 1930s (Figure 7). In sum, the experiences of the United States and Japan confirm that the proposition holds in line with the aforementioned interpretation.

On the other hand, if we interpret the proposition in a way such that central banks can raise the price level at will by flooding the economy with the monetary base, the proposition is, at least, not compatible with the recent experiences in Japan as well as in the United States. In Japan, between 1997 and 2010, the monetary base soared by 90 percent while money stock increased by 30 percent. Likewise, the U.S. experience between 2008 and 2010 clearly shows that the monetary base soared by 140 percent while, by contrast, money stock increased by only 10 percent. Despite the flooding monetary base, Japan's consumer price level dipped by 3.7 percent in the 13 years by the end of 2010. The U.S. core CPI inflation rate has decreased by more than 1 percent despite the increase in the monetary base. To sum up, significant increases in the monetary base gave rise to neither an equally significant rise in money stock nor inflation, let alone proportional increases. Financial systems would provide a key to better understanding the proposition. In light of the Japanese experiences, I agree with Chairman Bernanke on his remark in his scholarly work, "I doubt that it [money] completely explains the financial sector-aggregate output connection."<sup>6</sup> Without more in-depth understanding of the subtle intricacy underlying financial systems and credit markets, we would remain less informed of macroeconomy and transmission channels of monetary policy. Against the backdrop, I am hoping for more research to proceed on this front.

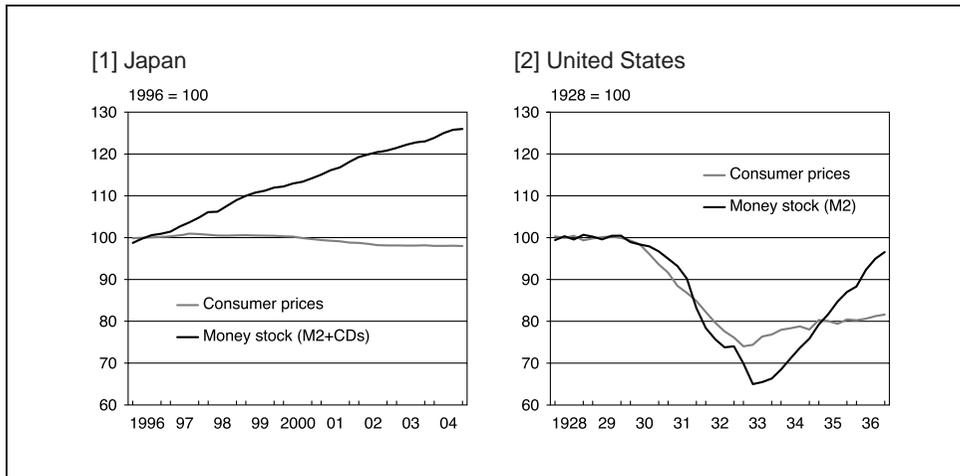
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4. See Friedman (1970).

5. See Bordo and Filardo (2005).

6. See Bernanke (1983).

**Figure 7 The Need for Central Banks to Take Aggressive Policy Actions**



Note: Figures for Japan are adjusted for the changes in the consumption tax rate from 3 percent to 5 percent in April 1997.

Sources: Ministry of Internal Affairs and Communications, “Consumer Price Index”; U.S. Department of Labor; Bank of Japan, “Money Stock,” “Monetary Base”; Balke and Gordon (1986).

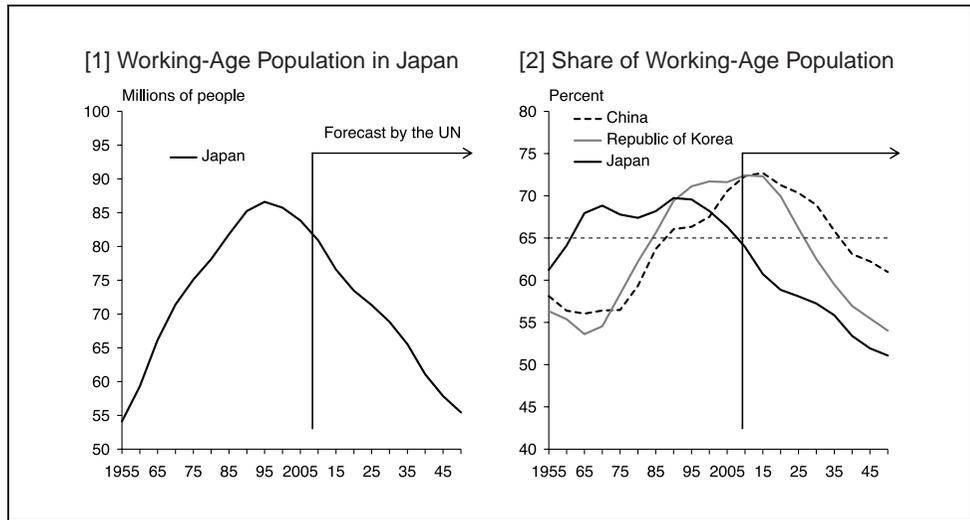
## IV. Demographic Changes and Policy Response

### A. Keynes’ Perspective

We move on to the second issue on the agenda, demographic changes. In 1937, John Maynard Keynes gave a lecture titled “Some Economic Consequences of a Declining Population.” He noted that “in an era of a declining population, . . . demand tends to be below what was expected and a state of over-supply is less easily corrected. Thus a pessimistic atmosphere may ensue.”<sup>7</sup> By suggesting these views, he questioned the traditional Malthusian view that warns against a population explosion. Neoclassical growth theories tend to focus on per capita economic variables, such as per capita GDP and per capita capital stock. This means that the very challenges that Japan is currently faced with are left outside the scope of their analysis at the outset. Looking ahead, Japan is heading into a demographic vortex, by which I mean rapid ageing and a declining working-age population. To deal with the present and forthcoming challenges for Japan, we may need to rely more on the perspective offered by Keynes, who tried to elaborate on the size of population itself and changes in its composition. It is fairly certain that not only advanced economies, but also a number of emerging economies are, sooner or later, expected to face a similar challenge as we proceed down the road (Figure 8).<sup>8</sup>

7. See Keynes (1937).

8. See Shirakawa (2011).

**Figure 8 Working-Age Population**

Note: The working age is from 15 to 64 years old.

Source: United Nations, "World Population Prospects: The 2010 Revision."

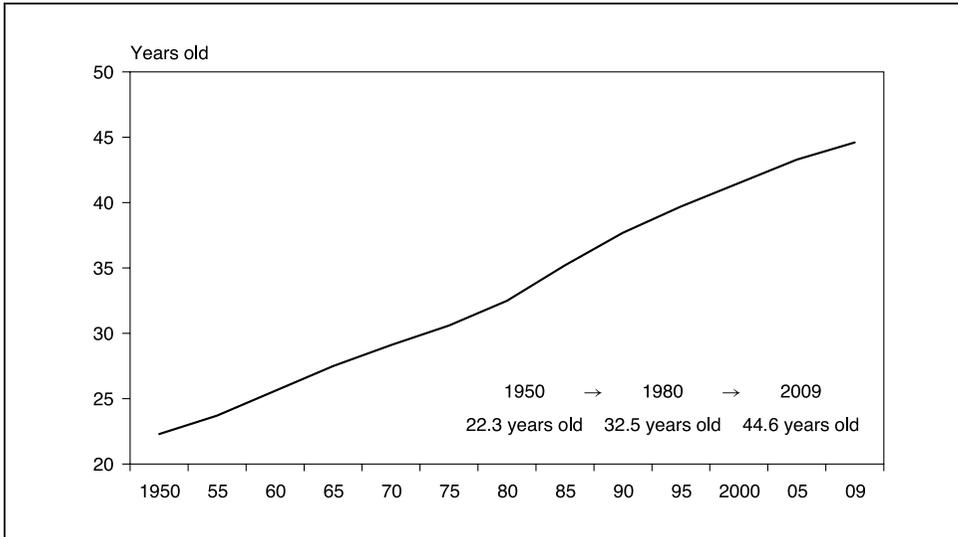
## B. Demography and Aggregate Demand

Demographic changes affect economic growth through a variety of channels. To start with, in a country facing a diminishing population, like Japan, a declining working-age population would rein in growth momentum on the supply side. Admittedly, because we need to take demographic factors as given for the time being, we should pursue higher labor force participation rates of female workers and the aged people. On top of this, attempts to enhance the quality of the labor force by improving education and vocational training systems are warranted as well.

We may need to recognize the complex fallout of a demographic vortex on aggregate demand. A shrinking working-age population could be an outright factor that reduces aggregate consumption. On the other hand, the life-cycle model of consumption predicts that the ageing of society would spur the consumption of the elderly as they reduce their savings. In fact, a common observation across economies is that, as a general pattern, the elderly tend to cut their spending on durable goods while they increase demand for services to maintain their quality of life, such as medical and nursing services. We may need to bear in mind, however, that provision of these services tends to be subject to intensive government regulations. If the supply that can meet the demand of aged people would be hampered by misaligned regulations that do not reflect the changes in society and technology progress, potential consumption demand would not materialize.

The foregoing argument reaffirms the importance of the flexibility of the social and economic systems that can ensure their own sustainability in the face of a demographic vortex. We could also bear in mind how the ageing of voters affects the social choices reflecting their preferences (Figure 9).

**Figure 9 Median Age in Japan**



Source: National Institute of Population and Social Security Research.

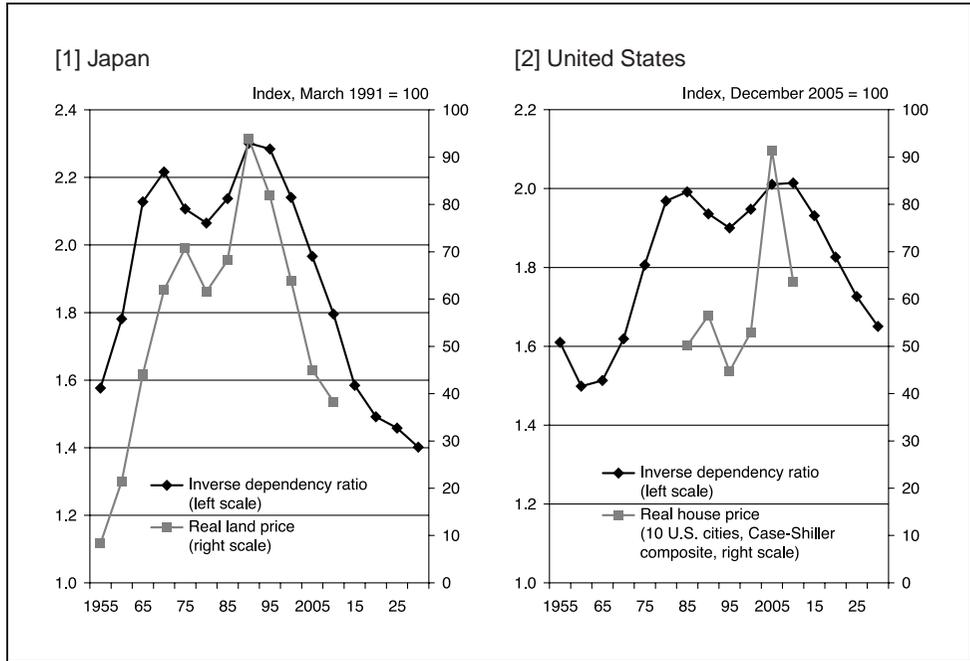
### **C. Demography and Business Cycles**

As I mentioned at the outset, the third lens suggests that boom-bust cycles and demographic changes could interact with each other. For example, the spending wave hypothesis suggests a possible linkage between the two. This simple-looking hypothesis argues that peaks of business cycle and asset market booms tend to coincide with the years when baby boomers pass their peak spending years, presuming that their consumption reaches its highest in their late 40s. As my colleague, Deputy Governor Nishimura, points out, the inverse dependency ratio, which indicates workers per non-working population, appears to be positively correlated with real estate market fluctuations both in the United States and in Japan<sup>9</sup> (Figure 10). Similar studies predict that real estate booms could be driven by increasing young generations when they come into markets as home buyers.<sup>10</sup> All those arguments suggest that demographic factors should not be taken lightly in analyzing bubbles and financial crises.

9. See Nishimura (2011).

10. See Sterling and Waite (1998).

**Figure 10 Inverse Dependency Ratio and Real Estate Market Fluctuations**



Note: The inverse dependency ratio is the ratio of workers to non-workers.

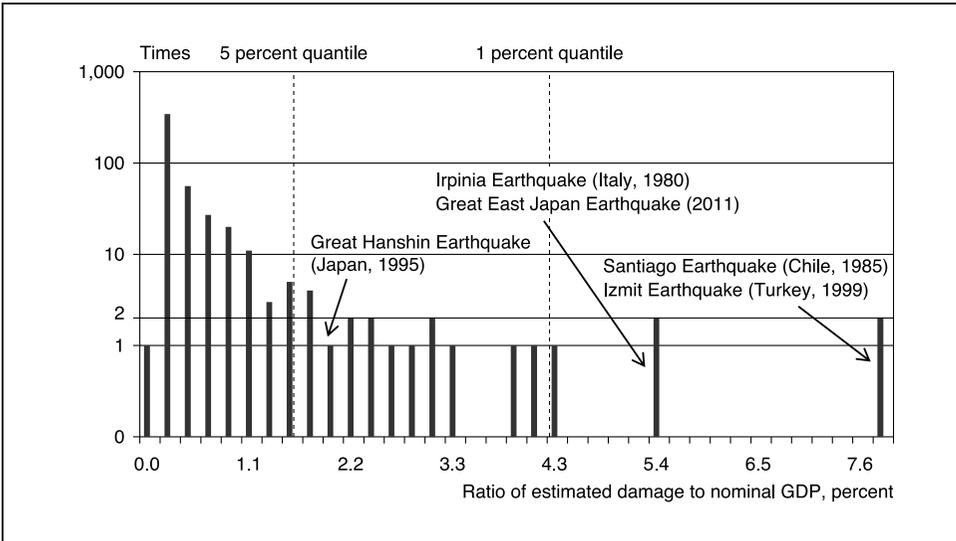
Sources: Nishimura (2011).

## V. Managing Disaster Risks

Finally, I take up the last issue in the agenda, management of natural disaster risk in the context of economic activity. Natural disasters are universal risks against which human beings have been fighting since the dawn of history (Figure 11). The tangible capital stock lost in the Great East Japan Earthquake is estimated at 5 percent of GDP by the Japanese government.

I will highlight, *inter alia*, specific aspects of the issue, that is, how much extra cost firms should bear to forestall a vast disruption in production. To this end, two issues immediately come to mind, inventory management and risk concentration. The Japanese manufacturing firms have been enhancing their competitiveness through constant efforts to minimize inventory of intermediate goods, by developing the sophisticated logistics network known as the just-in-time system. The efforts can be confirmed by the downward trend of the inventory-to-GDP ratio (Figure 12). Being faced with disruptions in the production process precipitated by the natural disaster, firms with a minimum level of intermediate goods inventory were left with no choice but to sharply scale back their production. In the wake of the earthquake, as discussed earlier, the ensuing disruption of the supply-chain revealed the risk of the reduced inventory, which may be described as a dilemma, namely, just-in-time versus just-in-case.

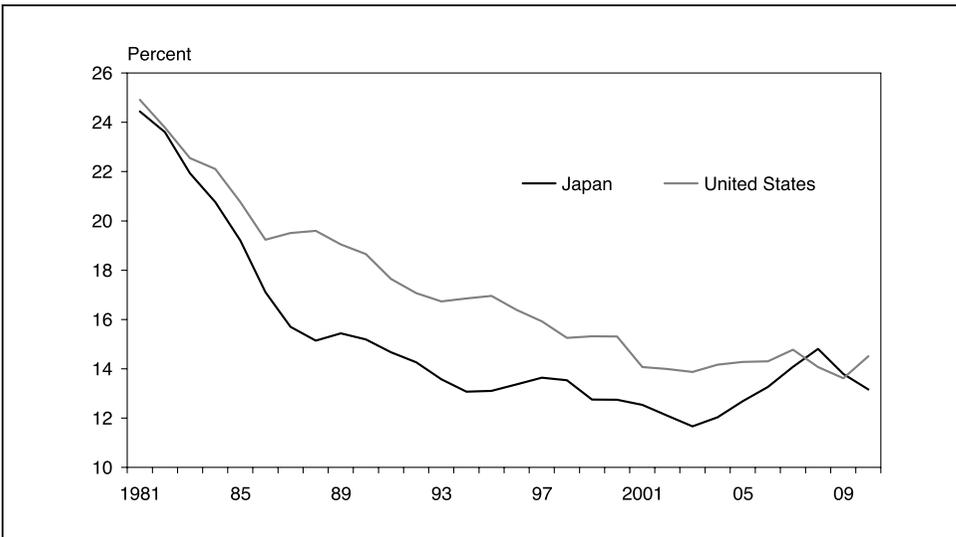
**Figure 11 Frequency of National Disasters**



- Notes: 1. The damage caused by the Great East Japan Earthquake is estimated by the Cabinet Office. It is converted into U.S. dollars at the exchange rate at the end of March 2011 (US\$1 = ¥82.84).  
 2. Damage includes the damage to infrastructure, agricultural crops, and buildings.

Source: Center for Research on the Epidemiology of Disasters, Université Catholique de Louvain, "Emergency Events Database (EM-DAT)."

**Figure 12 Ratio of Inventory to GDP**



Sources: Cabinet Office, "National Accounts"; U.S. Department of Commerce.

While the level of inventory should remain as an important issue, the earthquake uncovered concentration risks as the linchpin for further assessment. The concentration risks that have been deeply buried under the complicated supply chain were due to overreliance on particular plants located in the particular regions.

There is no free lunch: you need to bear some additional cost in either case, to raise inventory or to diversify procurement. In a related context, Professor Barro pointed out in his paper that the insurance premium that households need to bear at normal times to compensate for the disaster risks would be considerably high.<sup>11</sup> This question regarding the disaster risks needs to be considered at a national level as well as a firm level. For instance, over-concentration of a nation's business activities in particular plants located in a particular region would run a significant risk while its cost of such over-concentration could be hardly internalized by highly competitive markets. As a result, tail risks may be inadvertently elevated. In sum, economists, together with practitioners and policymakers, need to strive for a better design of broadly defined public risk-sharing systems against disaster risks.

## **VI. Concluding Remarks**

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So far, I have discussed the challenges that the Japanese economy is faced with. I would call for further research on tail risks, such as financial crises and natural disasters, which have been given relatively short shrift in the existing macroeconomics. The consequences of demographic changes are yet to be explored. We could make a stronger case to revamp the present social and economic systems. Those outdated systems, which are not in line with the ongoing demographic changes, could sow the seeds of another bubble because, for example, they could prompt the search for yield under the low natural rate of interest. Now is the time to explore all these issues. With that perspective in mind, I am convinced that this year's conference will catalyze dialogues between policymakers and academics. Thank you.

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11. See Barro (2009).

## References

- Balke, N. S., and R. J. Gordon, "The Estimation of Prewar GNP Volatility, 1869–1938," NBER Working Paper No. 1999, National Bureau of Economic Research, 1986.
- Barro, R. J., "Rare Disasters, Asset Prices, and Welfare Costs," *American Economic Review*, 99 (1), 2009, pp. 243–264.
- Bernanke, B. S., "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression," *American Economic Review*, 73 (3), 1983, pp. 257–276.
- Bordo, M., and A. Filardo, "Deflation in a Historical Perspective," BIS Working Paper No. 186, Bank for International Settlements, 2005.
- Friedman, M., "The Counter-Revolution in Monetary Theory: First Wincott Memorial Lecture, Delivered at Senate House, University of London, 16 September, 1970," Institute of Economic Affairs Occasional Paper No. 33, 1970.
- Keynes, J. M., "Some Economic Consequences of a Declining Population," *Eugenics Review*, 29 (1), 1937, pp. 13–17.
- Nakakuki, M., A. Otani, and S. Shiratsuka, "Distortions in Factor Markets and Structural Adjustments in the Economy," *Monetary and Economic Studies*, 22 (2), Institute for Monetary and Economic Studies, Bank of Japan, 2004, pp. 71–99.
- Nishimura, K. G., "This Time May Truly Be Different: Balance Sheet Adjustment under Population Ageing," remarks at the 2011 American Economic Association Annual Meeting in Denver, Colorado on January 7, 2011.
- Reinhart, C. M., and V. R. Reinhart, "After the Fall," paper presented at the Federal Reserve Bank of Kansas City Economic Policy Symposium 2010 on August 26–28, 2010.
- Shirakawa, M., "Future of Central Banks and Central Banking," *Monetary and Economic Studies*, 28, Institute for Monetary and Economic Studies, Bank of Japan, 2010, pp. 17–26.
- , "The Transition from High Growth to Stable Growth: Japan's Experience and Implications for Emerging Economies," remarks at the Bank of Finland 200th Anniversary Conference on May 5, 2011.
- Sterling, W. P., and S. R. Waite, *Boomernomics*, Ballantine Books, 1998.