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The Economy, Corporate Management and Public Policy in a Society with an Aging Population

Joint research by
Brookings Institution
and
Mizuho Research Institute

Mizuho Research Institute

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Preface

The total population of Japan has started to shrink in 2005. The decline is expected to continue, pushing down the current population of 130 million to less than 100 million in 2050. At the same time, Japan faces the prospects of a faster pace of population aging and birth rate decline. Japan's economy and society, thus far designed on the premise that its population will continue to increase, now faces the challenge of coping with such massive shifts. There are various views on population decline, ranging from the optimistic that the per capita standard of living will improve to the pessimistic that the economy will shrink, leading to heated discussions on how the government and businesses should cope with the trend.

The aging of the population and decline of the birth rate is a phenomenon common to all leading industrialized countries of the world, with more countries set to face a shrinking population. Given its fast pace of population aging and birth rate decline, Japan will experience a shrinking population ahead of other countries. Given these circumstances, the ways in which Japan responds to such demographic shifts is gathering attention from overseas. Even though there have been periods of population decline in the long history of mankind, it is the first time that modern society will face a continuous decline of its population. The question of how to maintain a stable economy and society – appropriate public policy management and design of institutional systems – with an aging population and declining birth rate is a major challenge in the 21st century faced by all leading industrialized countries of the world.

Based upon the foregoing understanding, the Mizuho Research Institute (MHRI) has engaged in a year–long research project to reconfirm the actual state of demographic shifts and to discuss the necessary responses. Furthermore, to capture the impact of population decline from a wider perspective, MHRI has engaged in a joint study with the Brookings Institution. We have compiled the essence of the study in the form of Mizuho Research Paper No. 17

(MRP#17).

MRP#17 is comprised of the following sections. Section I is a summary of two research papers by the Brookings Institution; one authored by Barry Bosworth and one co–authored by Barry Bosworth and Gabriel Chodorow–Reich. This section provides (1) a review of existing literature on the macroeconomic consequences of population aging and (2) an analysis of data on leading industrialized countries including Japan and the US and the countries of Asia regarding the macroeconomic impact of population decline. Section II is a summary of an overview on the link between demographics and economic activity by MHRI. Here, we have provided a review of the measures taken by the government and the corporate sector and as well as an outlook toward the future to discern matters which must be addressed. Section III provides summaries of four papers, also written by MHRI, that investigate the key issues in a society facing an aging population. These are: (1) employment conditions necessary to secure an adequate labor force, (2) the direction of reforms to maintain the social security system, (3) the actual state of inter–regional migration, and (4) the impact of population aging upon the financial market.

Population aging and birth rate decline is one of the most important issues which must be addressed not only by Japan but all countries of the world. We hope that this paper will contribute to discussions on this issue.

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I. Research and analysis on the macroeconomic impact of demographic change

1. The macroeconomic consequences of population aging: a review

Barry Bosworth
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1. Population aging and its social and economic implications are currently attracting widespread attention. The following is a summary of a recent paper which reviews the major research efforts focusing on the macroeconomic implications of population aging and the interactions among national economies.

2. One important area of current research involves the development of a conceptual framework both at the level of an individual economy and within a multi–country context. Over their lifecycle, individuals will experience a hump–shaped pattern of labor earnings, rising as they gain skills and experience and declining as they begin to move into retirement. Using the same perspective, individuals are expected to smooth their consumption over their lifetime, saving in the peak earning years to finance consumption in retirement. According to this life–cycle perspective, saving declines as an increasing portion of the population becomes old and retired. Reduced birth rates and an aging population also imply a slower growth of the labor force and reduced investment opportunities. The implications of both reduced saving and investment were explored in an important 1990 study by David Cutler and others within the context of a closed–economy model where saving could only be invested domestically.

Attanasio and Violante (2000) examined the implications of demographic change in an open global economy with full capital mobility. They concluded that the disparities in demographic trends

create substantial opportunities for joint gains because the ability to move capital to a developing region slows the decline in its return within the developed region. Continued integration of the global economy on both goods and financial markets suggests that a global perspective will be of critical importance in future years.

3. Another major research effort has focused on differences across countries in the economic effects of population aging and the interactions among national economies. The issue of the influence of demographic change on saving has been a particularly active area of research studies that have attempted to evaluate the relevance of the life–cycle hypothesis.

Higgins (1998), Bosworth and Keys (2004), and Bosworth and Chodorow–Reich (2006) consistently found a significant hump–shaped effect of changes in the age distribution on national and private saving rates. The age structure had a strong effect for saving, pushing aged societies toward substantial current account deficits while the age structure also had a similar though smaller effect on investment by altering the rate of growth of the labor force and thus the return to investment. Bloom, Canning, and Graham (2002) argue that gains in life expectancy have played a particularly large role in Asia where the increase in the length of expected retirement raised the saving rate for all age groups. They also confirmed the standard finding of strong influences of demographic change on saving within Asia.

Presently, the predominant finding from the macroeconomic studies is a substantial confirmation of the humped age profile for saving as hypothesized by the life–cycle model. A similar but weaker relationship is found for investment. Several studies, however, express concern about the extent to which rates of saving and investment can be viewed as independent of one another at the national level.

4. There are still areas of great uncertainty where more research is needed. The agenda for future research on the interaction between

saving and demographic change is dominated by two basic concerns. First, panel surveys that follow the same households over time are needed to reconcile national saving data and microeconomic household surveys. Previous studies have shown that there are serious problems with attempts to measure the age–saving profile by comparing the saving rates of households of different ages at a specific point in time. Second, a large data set extending over several decades is also required to clarify why there is such a large difference in the relative strength of the correlation between saving and demographic change in Asia with respect to other regions. Some studies state that, in contrast to the high–income countries, the emerging Asian economies imply very large declines in saving and large current account deficits over the next several decades. It is possible that incentives to save for retirement are severely eroded by the extensive array of public programs that have developed to meet the income and services needs of the aged population in high–income countries.

Policy issues such as how to finance costs of countries' major pension and health care programs and how to face other problems ranging from increased rates of immigration to population aging are also in need of further exploration.

5. Research on the economic effects of population has made considerable progress over the past several decades. On balance, the results have been reassuring in that they have scaled back some of the initial concerns about global saving shortages and unmanageable fiscal burdens. The exploration of the cross–border dimensions has also highlighted the opportunities to mitigate some of the economic pressures through changing external balances. There are, however, issues of substantial uncertainty, as outlined in the prior section, which will be the focus of ongoing research.

2. Saving, investment and demographic change: the global dimension

Barry Bosworth and Gabriel Chodorow–Reich
The Brookings Institution

A decade ago, research on the impact of population aging on public and private sector saving generated widespread concern about a growing scarcity of saving in the global economy, with its attendant pressures for rising real interest rates (note 1). Institutions such as the World Bank and the OECD issued reports focused on what they perceived to be a looming crisis. Today, the attention of government policymakers has turned to the notion of a glut of global saving (Bernanke, 2005). Such a shift of emphasis seems particularly surprising from a U.S. perspective where the public discussion has focused on an ongoing decline of private saving and the re–emergence of large budget deficits. Certainly, the United States is not plagued by an oversupply of saving. The absence of saving in the United States, in conjunction with strong domestic investment opportunities, has created a current account deficit of unprecedented size — $800 billion in 2005, and still growing. The U.S. has emerged as the world's largest debtor nation by a wide margin.

However, while one can be astounded by the size of the U.S. deficit, the ease with which it has been financed at the global level is equally surprising. Thus, there are two perspectives on the global saving imbalance: Why is there a large saving shortfall in the United States, and why is there such a large excess in the rest of the world? Furthermore, given that this has all occurred against the backdrop of low real interest rates around the globe, it can be asserted, as Ben Bernanke did, that the greater puzzle is the excess saving in the rest of the world. Bernanke went on to attribute the saving surplus to demographic change, or more accurately the anticipation of future population aging and its attendant retirement costs, in the other industrial countries. In this view, high saving today results from the early phase of a demographic change that will impose a cycle of surplus followed by a substantial decline in saving at the global level.

This paper examines recent changes in the balance of saving and investment from a global perspective and examines the link between the changes in the balance across major regions and demographic changes in the age structure of the population. The following is a brief outline of our empirical strategies and summary of our main conclusions.

Global Patterns of Saving and Investment

The dichotomy in the world economy between the external position of the United States and everyone else is highlighted in **Chart 1**, which shows the current account balances for major regions of the world economy over the period of 1980–2005, providing a simple summary of the magnitude and distribution of the saving–investment imbalances. The United States clearly stands out for the size of its recent deficit, which is matched by surpluses in all other regions of the globe. At the same time, Europe's surplus has declined since the mid–1990s, and Japan's surplus has remained basically unchanged for nearly a quarter of a century. Similarly, little has changed in Latin America. The offsets to the increased U.S. deficit are the appearance of large surpluses in the emerging economies of Asia and the oil–producing economies of the Middle East (note 2).

Chart 1: Current Account, Selected Regions and Years

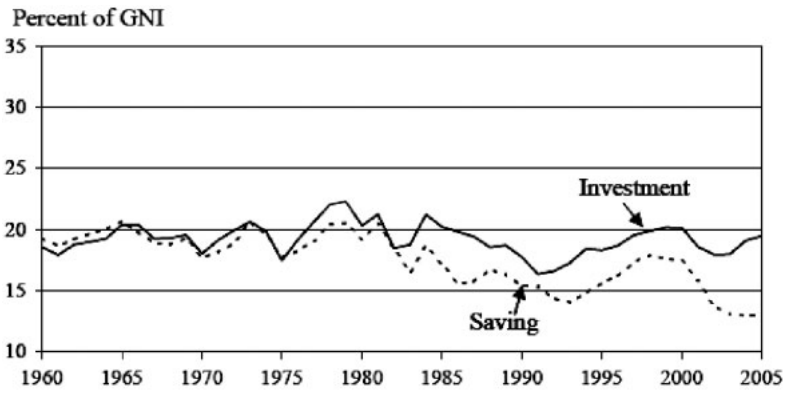
Percent of World GDP

Region	1980-89	1990-94	1995-99	2000-04	2005p
U.S.	-0.45	-0.22	-0.51	-1.37	-1.81
Japan	0.26	0.40	0.34	0.35	0.39
Europe	-0.04	-0.13	0.28	0.17	0.16
Emerging Asia	0.02	0.01	0.14	0.38	0.55
Emerging Latin America	-0.11	-0.11	-0.17	-0.04	0.08
Middle East	0.08	-0.09	0.01	0.17	0.44

Source: Calculated on the basis of data released by the IMF and OECD and others.

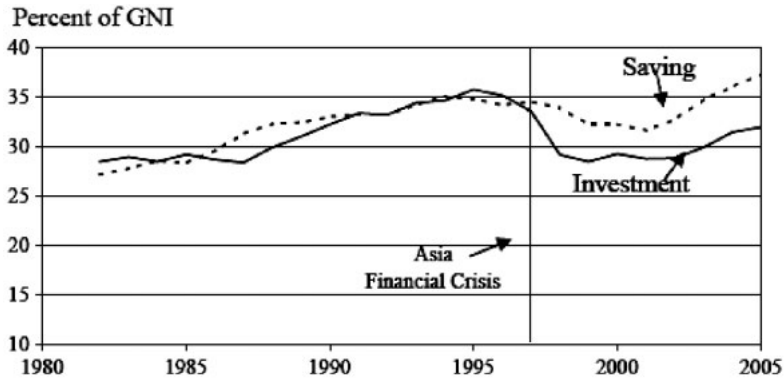
The U.S. balance is dominated by an ongoing decline in the national saving rate that began in the early 1980s (**Chart 2**). Bernanke argued that the low U.S. saving has been offset by an increase in global saving, including that of other industrial countries, and he emphasized demographic changes as a primary source of the increase. However, rates of both saving and investment have steadily fallen in the industrial countries, excluding the United States. More importantly, the most striking change in the S–I balance is in emerging Asia, and the shift in the S–I balance within Asia can be traced primarily to changes on the investment side (**Chart 3**). The 1997 financial crisis had its greatest impact on investment spending, which fell precipitously; and, although these economies have recovered to a large extent, the rate of investment has not been restored to pre–crisis levels, even after the passage of nearly 10 years.

Chart 2: Saving and Investment, United States, 1960–2005



Source: Calculated on the basis of data released by the IMF and OECD and others.

Chart 3: Saving and Investment, Emerging Asia, 1982–2005



Source: Calculated on the basis of data released by the IMF and OECD and others.

Overall, the surprise at the global level is that the story appears to be one of weak investment, rather than the rise in saving hypothesized by Bernanke. Also, this initial presentation does not seem supportive of a view of demographic change as a major factor in the recent developments, given the general declining pattern within the industrial countries, which should be preparing for large retirement cost increases in the near future. This paper explores this aspect in a more systematic fashion.

Modeling Demographic Change

Most of the world's societies are in the midst of substantial demographic transitions induced by sharply lower rates of fertility and mortality. The result is a sharply declining proportion of children in the population and a rising share of the elderly. However, there is a great diversity across countries and regions. Within the high–income economies, the decline in birth rates began more than half a century ago, and the transition to a lower child–dependency rate (the population below aged 15 divided by the population age 15–64) is largely complete. In contrast, the developing countries will

experience further declines in the child–dependency rate over the next half century that are expected to offset the growth in the aged–dependency rate (the population above age 64 divided by the population age 15–64), and the overall (child plus aged) dependency rate is projected to fall between now and 2050. Because the economic effects differ at various stages of the process, demographic change has widely varying economic and social consequences to these two regions.

Against this background, the empirical aspects of the linkage between demographic change and the balance of national rates of saving and investment have been explored in several studies (note 3). We have based our analysis on the empirical methodology employed by Higgins (1998), which has many antecedents in the literature. The basic postulate is that rates of saving and investment are explained by a set of country–specific economic factors that change over time (X), factors that are largely time–invariant but vary across countries (C), and the age structure of the population (P):

(1) $Sit = F_1 (Xit , Ci , Pit) + uit$

(2) $Iit = F_2 (Xit , Ci , Pit) + vit$

For saving, the cross–national research has identified two primary economic determinants; the level and rate of growth of income per capita. We also include life expectancy as a proxy for the length of the planned retirement period. The age structure of the population is represented by the proportions in each 5–year age bracket. We also estimated the relationship using two simple categorical variables that represented the ratio of those under age 15 to those of age 15–64, and the ratio of those age 65 and over to those of age 15–64 (aged–dependency rate).

For investment, the neoclassical model emphasizes a long–term expansion of the capital stock paralleling the growth of output. Output growth is, in turn, a function of the growth in the labor force and labor–augmenting technological change. Therefore, the slowing of labor force growth accompanying the aging of the population would be expected to slow the rate of investment. The age profile of the population is included as a predictor of future labor force

participation; but it also yields a regression structure that parallels that of saving, making it easy to focus on the impact of demographic change on net external flows.

Our data set incorporates information on 85 countries, extending over the period 1960 to 2004. We converted all of the data to 5–year averages to avoid a focus on high frequency variation. Thus we have a maximum of 9 observations per country. The saving and investment data are not available prior to the 1970s for many developing countries and we included a lagged measure of income change, eliminating the 1960–64 period from the regressions. As a result, we have a maximum of 562 observations on saving and 622 for investment. Rates of saving and investment are reported as percentages of Gross National Income (GNI). Growth rates are also in percentage change form, but the demographic measures are recorded as proportions.

Empirical Results

Because the data set has a significant time dimension (8 observations), we can explore differences across both countries and time. In the time dimension we control for the influence of some country–specific socio–economic factors by using fixed–effects estimation. That is, the intercept is allowed to vary for every country, but they have common slope coefficients. We also estimate a version with fixed time effects in which differences in the X's and the age distribution are assumed to account for the cross–national differences in rates of saving and investment. Surprisingly, the estimated age profiles from the cross–national estimation are virtually identical to those reported for the times–series. Therefore, we only report the time series estimates for national saving and investment rates here (**Chart 4**).

Chart 4: Saving and Investment Regressions by Major Region, Country Fixed Effects

Variable	All Countries	Industrial Countries	Latin America	Asia	Other	All Countries minus Asia
			Saving			
GDP Growth	0.62	0.84	0.62	0.57	0.55	0.63
	(7.6)	(6.2)	(3.7)	(2.2)	(4.0)	(7.6)
Lagged GDP Growth	0.59	0.57	0.75	0.39	0.44	0.6
	(7.5)	(4.3)	(4.8)	(1.7)	(3.4)	(7.4)
Aged dependency	-0.54	-0.15	-0.85	-1.2	0.16	-0.64
	(4.3)	(1.3)	(2.1)	(2.4)	(0.2)	(4.7)
Youth dependency	-0.19	0.06	-0.17	-0.45	-0.12	-0.12
	(8.4)	(1.4)	(4.2)	(8.3)	(2.5)	(4.9)
Constant	0.33	0.2	0.31	0.57	0.2	0.29
	(14.4)	(5.5)	(6.5)	(8.5)	(3.6)	(11.6)
Adjusted R-Squared	0.79	0.75	0.59	0.81	0.78	0.76
Countries	85	22	22	13	28	71
Observations	562	172	152	91	147	463
			Investment			
GDP Growth	0.52	0.51	0.38	0.66	0.62	0.5
	(7.5)	(3.9)	(2.8)	(2.7)	(5.9)	(7.0)
Lagged GDP Growth	0.54	0.53	0.1	1.02	0.66	0.45
	(8.3)	(4.2)	(0.7)	(5.5)	(6.6)	(6.5)
Aged dependency	-0.58	-0.14	-1.04	-1.97	-0.26	-0.59
	(5.0)	(1.2)	(3.0)	(4.2)	(0.5)	(4.6)
Youth dependency	-0.11	0.12	-0.11	-0.34	-0.01	-0.06
	(5.8)	(2.8)	(3.4)	(7.7)	(0.2)	(2.8)
Constant	0.32	0.19	0.36	0.51	0.18	0.29
	(15.9)	(5.6)	(9.3)	(8.5)	(4.2)	(13.1)
Adjusted R-Squared	0.63	0.68	0.43	0.79	0.64	0.56
Countries	85	22	22	13	28	71
Observations	622	172	169	98	183	516

Note: T-statistics are in parentheses.

Source: Calculated on the basis of data released by the IMF and OECD and others.

As reported in column (1) of **Chart 4**, reductions in youth and aged–dependency both raise the rate of saving and investment for all 85 countries; but changes in the aged–dependency rate have much larger effects. Hence, we can identify significant demographic effects on the rates of saving and investment at the national level (note 4). The demographically–induced fall in saving will be less disruptive than often assumed because of a similar offsetting decline in investment requirements. Nevertheless, the effects on saving are stronger than those for investment, implying that most aging economies will

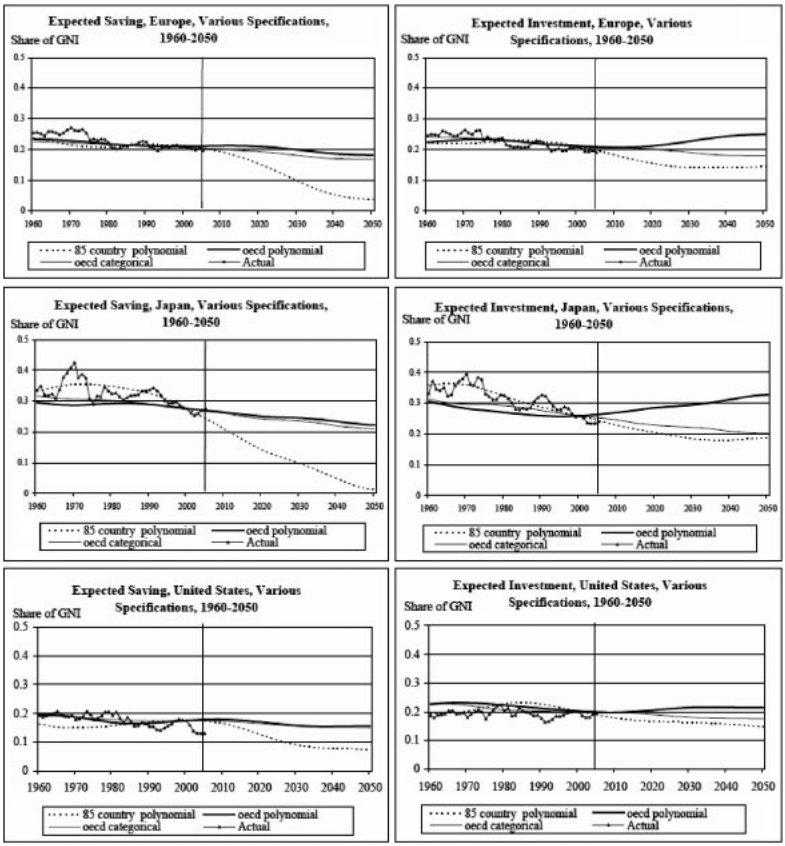
ultimately be pushed in the direction of current account deficits.

Note that the significance of the demographic effects varies across regions. Both demographic variables are not statistically significant at the 0.05 level for the industrial countries, and the effect of the aged–dependency rate is empirically small. In contrast, the terms are large and highly significant for the Asian economies. The results for Latin America are intermediate between the industrial and Asian economies. The correlations are even weaker for the residual group consisting mostly of African countries. In sum, the impact in industrial countries appears rather weak, while Asia exhibits extremely large effects.

Individual Country Implications

The age coefficients that we obtained from the regressions can be used to construct time–series indexes of the implied change in rates of saving and investment for individual countries. Such indexes, calibrated to rates of saving in 2000, are presented for Europe, Japan, and the United States in **Chart 5**. Over the historical period of 1960–2005, the implied demographic–induced change in saving is broadly consistent with the secular decline in rates of saving and investment within Europe. Similarly, for Japan the implied change using the coefficients from the 85–country sample is very compatible with the decline in rates of saving and investment that has occurred over the past 30 years. Thus, contrary to the expectations expressed by Bernanke (2005) and some other discussions, we find that demographic change is already exerting downward pressures on saving in the high–income economies. As examined above, the current evidence of a global saving glut is related more to the weakness of investment – particularly in Asia – and the high short–run saving of the oil producing countries.

Chart 5: Effects of Changes in the Age Structure on Saving and Investment in Selected Industrial Countries, 1960–2050



Source: Calculated on the basis of data released by the IMF and OECD and others.

Chart 5 also highlights the important fact that, except for Japan, demographic changes have not yet had a major influence on national rates of saving and investment. Rather, it is a process whose implications are still largely in the future. For the United States, the demographic profile suggests that saving rates will fall still further from what is currently a very low level. The projected changes in saving rates far exceed those of the past. To date, the influence of

demographic change on both saving and investment has been very modest. Thus, its effects have been overwhelmed by other developments in the global economy. In particular, it is not a significant factor behind the recent emergence of global saving–investment imbalances.

Conclusion

Overall, the empirical analysis yields considerable evidence of important demographic effects on rates of national saving, investment and the current account. The results are surprisingly similar in our panel data set when viewed from either the time or cross–national perspective. The influence of demographics is also evident in measures of both public and private saving. However, the analysis is also invariant in implying that the quantitative magnitude of the effects are small for the industrial countries, particularly in contrast with the strong demographic influences that we found for the Asian economies. Contrary to the expectations expressed by Bernanke (2005), we do not find evidence that demographic change is currently exerting a major positive influence on saving in the industrial countries. Instead, population aging has proceeded already to the point where it is and will continue to be a negative influence on saving. Finally, we would emphasize that, while we do find evidence that the age structure of the population is an important long–run determinant of national saving, it changes very slowly, and in the short run its effects are easily overwhelmed by other factors.

II. Will Japan be able to keep growing with an aging population and declining birth rate?

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1. The agenda

Japan's high economic growth in the post–War period after World War II is often attributed to the existence of abundant young workers during the high growth era, and its high savings rate backed by the young population structure, which in turn stimulated the accumulation of capital. Today, however, Japan faces the prospects of a faster pace of population aging and declining birth rate. The population factor is no longer serving as a stimulant of economic growth but as continuous restraints upon growth.

Faced with these prospects, the government of Japan is taking an optimistic outlook that "Japan's economic growth is possible through productivity gains even in an era of population aging and declining birth rate." However, demographic shifts affect the growth of the economy through complex channels not limited only to the decline of the labor force population. This paper will take into consideration the various routes through which demographic shifts affect the Japanese economy and argue that it will not necessarily be easy for the Japanese economy to keep growing. In the final analysis, this paper will indicate the necessity for the government to discuss with the public the grim state of affairs faced by the Japanese economy in order to share a "balanced sense of crisis."

2. Japan's future population projections

In 2005, for the first time in post–War history, the total population of Japan declined (by approximately 20,000) from the previous year, falling to 127.77 million. Even though Japan's total fertility rate (TFR) rose to 1.32 in 2006, rising above the previous year (1.26), the TFR

has remained below the population replacement level for the past 30 years. Moreover, the percentage of the population aged 65 and over has continued to rise from 4.8% in 1947 to 20.2% in 2005.

Japan's population aging and declining birth rate is predicted to persist. According to the *Population Projections for Japan* (projections as of December 2006) (hereafter, the "New Population Projections"), the total population of Japan is predicted to reach 115.22 million in 2030 and 89.93 million in 2055 (note 5). In contrast to the child population (aged under 15) falling from 17.59 million (13.8% of the total population) in 2005 to 7.52 million (8.4%) in 2055, the population aged 65 and over will increase from 25.76 million (20.2%) in 2005 to 36.46 million (40.5%) in 2055. As a result, the working–age population (15 to 64), the core population bearing the burden of socioeconomic activities, will shrink sharply from 84.42 million (66.1%) in 2005 to 45.95 million (51.1%) in 2055 (**Chart 6**).

Chart 6: Population forecast and shifts in age structure

	Population (1,000)				(%)		
	Total	0～14	15～64	65 and over	0～14	15～64	65 and over
2005	127,768	17,585	84,422	25,761	13.8	66.1	20.2
2015	125,430	14,841	76,807	33,781	11.8	61.2	26.9
2025	119,270	11,956	70,960	36,354	10.0	59.5	30.5
2035	110,679	10,512	62,919	37,249	9.5	56.8	33.7
2045	100,443	9,036	53,000	38,407	9.0	52.8	38.2
2055	89,930	7,516	45,951	36,463	8.4	51.1	40.5

Source: National Institute of Population and Social Security Research, *Population Projections for Japan (December 2006).*

3. The macroeconomic consequences of population aging and declining birth rate upon the Japanese economy

Japan's drastic demographic shifts are expected to affect Japan's economic growth through various channels. One such channel is the impact through the decline of labor input. Assuming that the labor force participation rate in terms of age and gender remains

unchanged from 2005, the labor force population would fall from 66.83 million in 2005 to 55.84 million in 2030. In very simplified terms, the rate of economic growth may be broken down into labor input growth and labor productivity growth. In other words, if the labor hours and labor productivity per worker are held constant, the negative growth of the labor force population would equal the magnitude of negative pressures upon potential economic growth.

Of course, macroeconomic growth would still be possible in the event there is an adequate rise of labor productivity. However, demographic shifts may affect labor productivity. Since the decline of the labor force population raises the capital stock per worker and stimulates laborsaving innovations, it may serve to raise labor productivity (Cabinet Office (2005a)). That said, a different point of view holds that labor productivity growth would be stymied because (1) the absolute volume of human resources capable of engaging in intellectual creation would diminish, (2) opportunities for intellectual exchange would decrease, (3) population aging would have a negative effect upon the fluidity of the labor market and hinder the mobility of labor from low–productivity to high–productivity sectors (note 6). Furthermore, in the event the saving rate declines as a result of population aging (note 7), it may also serve as impediments against capital accumulation through the rise of capital cost (Yashiro (1999)). Since labor productivity growth is affected by technological progress (total factor productivity (TFP)) and per–unit labor input, a delay in accumulation of capital would also lead to a slowdown of labor productivity growth.

The rise of the national burden rate due to the expansion of social security benefit expenditures may also have an impact upon Japan's future economic growth rate. Given Japan's aging population, social security benefit expenditures are predicted to grow along with the rise of the national burden rate (note 8). The rise of the national burden rate has the potential to dampen the vitality of the economy as a result of (1) the decline of incentive to hire workers among businesses and the incentive to work among individuals as a result of the rise of labor compensation, and (2) restraints upon savings and

capital accumulation in the private sector as a result of the decline of corporate and household income. (Cabinet Office (2003), Kato (2006)) (note 9). Furthermore, in the event Japan neglects its efforts toward fiscal rehabilitation and social security reform, there are concerns that it may suppress private investment and lead to the rise of future burdens through (1) the surge of government bond prices (the surge of long–term interest rates), (2) the loss of confidence in the yen and (3) capital flight overseas (Cabinet Office (2005b)) (note 10).

Considering the impact of demographic shifts upon Japan's economic growth, note that quite a few assert that Japan's economic growth will fall into negative territory as explained above (**Chart 7**). For example, Kouzu et al (2003) indicate that macroeconomic growth would gradually decline and turn negative from the 2020s as a result of the fall of labor input and contraction of capital accumulation. The Japan Association of Corporate Executives (2006) warns that in a case where the trends in various socioeconomic factors fails to rise sharply, the decline of labor input, sluggish TFP and decline of capital stock will drive the potential rate of growth into negative territory in the first half of the 2010s to the second half of the 2020s. In the discussion of the consequences of demographic shifts upon Japan's future economic growth, it is necessary to take heed of the fact that it will have a negative impact through multiple channels such as capital accumulation and technological progress.

Chart 7: The impact of population aging upon economic growth – analyses considering its impact through multiple channels

	Premises and methods of analysis	Outlook
Kouzu et al (2003)	• Total factor productivity (TFP) growth is set at the average during the past 10 years, keeping other variables (other than demographic shifts) unchanged. • The rate of growth is estimated by applying labor input (taking into consideration demographic shifts) and trends in real capital investment (as a percentage of real GDP) in a simultaneous equation with real GDP and real capital stock as endogenous variables.	• **The rate of economic growth will gradually decline and turn negative in 2020 due to the fall in volume of labor input and the decline of capital accumulation.** • The negative pressures stemming from demographic shifts upon growth will reach -1% pt from the 2010s. Labor productivity growth will also slow down. • It will be difficult to neutralize the impact even by setting extreme conditions regarding the employment rate of the aged and female population, immigration and fertility rate. • The fall of economic growth may be avoided if the rate of TFP growth rises 1% pt above expectations.
Matsutani (2004)	• Labor input will shrink to two-thirds of its original volume in 30 years. Assuming that the rate of technological progress will remain at the level since the 1980s, capital stock will continue to rise for a while but start to shrink after peaking in 2021. • Based upon such capital stock, capital investment will remain more or less unchanged until 2006 and start to decline from then onward.	· **Given a rapid pace of population aging and population decline, economy will shrink even when assuming a high rate of technological progress.** · Growth model analysis (placing restraints upon investment in the Harrod-Domar growth model) predicts that the rate of economic growth will fall at faster pace from -0.2% in 2010 to -1.1% in 2020 and -1.7% in 2030. · Demand will also contract given the decline of total wages due to the shrinking labor force.
KEIZAI-DOYUKAI Japan Association of Corporate Executives (2006)	· Simulations on multiple scenarios varying conditions such as the labor force participation rate, TFP, revenues & expenditures.	· **In cases where the relevant socio-economic factors do not follow a sharp upward curve, the potential rate of economic growth will drop into negative territory some time during the period from the mid-2010s to the second half of the 2020s because of the decline of the labor force, the sluggish rise of TFP growth and the fall of capital stock.** · Even in the case where the reforms are effective, the potential rate of economic growth will turn negative in the 2030s.

Source: MHRI, based upon relevant literature.

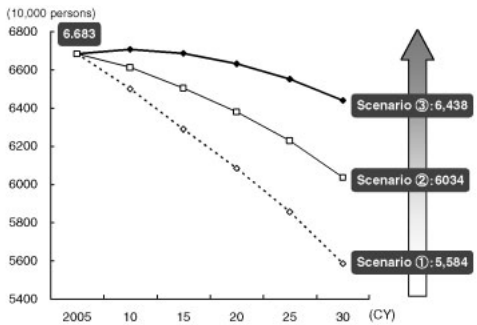
4. Will Japan be able to keep growing with an aging population and declining birth rate?

In this section, we shall use a simple method to provide an estimation of the impact of the future decline of labor input. On the basis of such estimation, and in consideration of other impacts stemming from the demographic shift, we shall discuss whether the Japanese economy will be able to keep growing.

Firstly, we shall estimate Japan's labor supply capacity up to 2030 in three forecast scenarios. In scenario ①, we assume that the labor force participation rate by age structure will remain constant from 2005. In this case, the labor force population will fall by 10 million in

25 years from 66.83 million in 2005 to 55.84 million in 2030. In scenario ②, we assume a gradual rise of the labor force participation rate of the aged, female and youth) population. Even in this case, the labor force population would fall to 60.34 million in 2030, declining by more than 6 million from 2005. In scenario ③, we assume that the labor force participation rate of the aged and female population rises dramatically by 2030 by following the best practices of the countries of Europe and the US. In this case, the labor force population would stand at 64.38 million in 2030, narrowing the breadth of the population decline to 2.45 million (**Chart 8**). Give a significant boost by the utilization of the female labor force, the labor force population would rise by 4.2 million in comparison with scenario ①.

Chart 8: Outlook on Japan's labor force population



Notes: 1. The preconditions in scenarios ①, ② and ③ are as follows:

Scenario ①: the gender-specific and age structure-specific labor force participation rate remains unchanged from 2005

Scenario ②: the labor force participation rate of men and women in their early 60s rises to the labor force participation rate of those in the late 50s in 2005, the labor force participation rate of men and women in their late 60s rises to the labor force participation rate of those in their early 60s (transition period: 2005~2055). The labor force participation rates of women in all age brackets rise to the potential labor force participation rate (labor force population/nonlabor force population with the potential desire to work)(transition period: 2005~2030). The age structure-specific labor force participation rate of the population aged 15~34 rises to the potential labor force participation rate

Scenario ③: the labor force participation rate of men and women in their early 60s rises to the labor force participation rate of those in the late 50s in 2005, the labor force participation rate of men and women in the late 60s rises to the labor force participation rate of those in the early 60s in 2005 (transition period: 2005~2030). The labor force participation rates of women in all age brackets rise to "best practice" levels among leading industrialized countries (transition period: 2005~2030). The age structure-specific labor force participation rate of the 15~34 age bracket rises to the potential labor force participation rate (transition period: 2005~2030)

2. Based upon the Population Projections for Japan (medium variants for both fertility and death rates)

Sources: National Institute of Population and Social Security Research, *Population Projections for Japan (December 2006)*, Ministry of Internal Affairs and Communications, *Labor Force Statistics*, OECD, *Labor Force Statistics*.

Next, we shall estimate the impact of the decline of labor input (no. of employed persons × per capita labor hours) upon economic growth in scenarios ① and ② which are thought to be most likely. In the estimates of labor input, we factored in the impact of the rise of the labor force participation rate of the aged and female population whose working hours tend to be short, in consideration of the trends in labor hours by gender and age structure during past decade (note 11). In scenario ①, the downward pressures stemming from the decline of labor input (no. of employed persons × per capita labor hours) would grow from –0.8% per annum during the period from 2005 to 2010 to –1.2% per annum during the period from 2025 to 2030. Meanwhile, in scenario ② which assumes a gradual rise of the labor force participation rate of the aged, female and youth population, the downward pressures would be –0.9% per annum during the period from 2025 to 2030 (**Chart 9**).

Chart 9: The decline of labor input and labor productivity gains necessary for growth

Fall of labor input (annual average, %)

	2005～10	2010～15	2015～20	2020～25	2025～30
Scenario ①	-0.8	-0.9	-0.9	-1.0	-1.2
Scenario ②	-0.5	-0.6	-0.7	-0.7	-0.9

Labor productivity gains necessary for 0% growth (annual average, %)

	2005～10	2010～15	2015～20	2020～25	2025～30
Scenario ①	0.8	0.9	0.9	1.0	1.2
Scenario ②	0.5	0.6	0.7	0.7	0.9

Labor productivity gains necessary for 1% growth (annual average, %)

	2005～10	2010～15	2015～20	2020～25	2025～30
Scenario ①	1.8	1.9	1.9	2.0	2.2
Scenario ②	1.5	1.6	1.7	1.7	1.9

Labor productivity gains necessary for 2% growth (annual average, %)

	2005～10	2010～15	2015～20	2020～25	2025～30
Scenario ①	2.8	2.9	2.9	3.0	3.2
Scenario ②	2.5	2.6	2.7	2.7	2.9

Sources: Ministry of Internal Affairs and Communications, *Labor Force Statistics*, National Institute of Population and Social Security Research, *Population Projections for Japan (December 2006)*, Ministry of Health, Labor and Welfare, *Basic Survey on Wage Structure*, OECD, *Labor Force Statistics*.

In view of the fact that the decline of labor input alone would push down growth during the period from 2025 to 2030 by approximately 1% per annum, sustainable growth as envisaged by the Japanese government would not necessarily be an easy task. According to the Cabinet Office (2005), the Japanese economy is predicted to keep growing around 2% per annum during the period from 2013 to 2020 and around 1.5% per annum during the period from 2021 to 2030 based upon the assumption that the aged population who wish to work and labor productivity will continue to grow at a steady pace. Furthermore, the economy is projected to grow around 2.4% per annum up to 2015 in the event the objectives in the *New Economic Growth Strategy* (2006) by the Ministry of Economic Trade and Industry are achieved. However, for the achievement of these projections, Japan's labor productivity would have to rise at an annual average rate of approximately 2.5% to 3.5%. Considering that labor productivity per unit labor input rose at an annual average rate of approximately 1.5% during the period from 1996 to 2005 (note 12), labor productivity growth would have to accelerate sharply in order to achieve the government's projections.

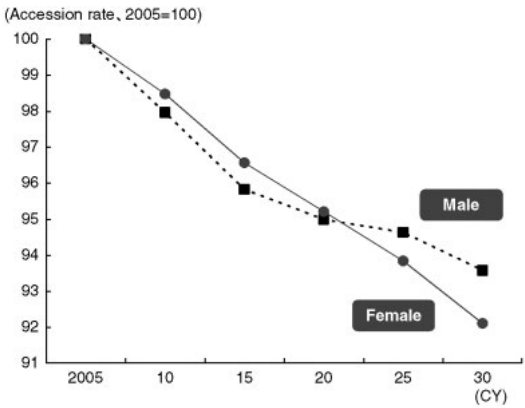
A source of concern is that the demographic shifts are expected to serve as restraints upon economic growth through various channels as explained in the previous section. In general, the difficulty to memorize and respond to new matters progresses along with the aging process (note 13). As mentioned in the previous section, it is necessary to take note that the aging of the population and declining birthrate may lead to the shortage of human resources to engage in the development of new technology and the increase of workers who face difficulties in fitting into production processes incorporating new technology.

Furthermore, if the current circumstances are left as they are, there are the risks that the aging population will make it difficult to upgrade the quality of the labor force. According to an analysis on the productivity of manufacturing–sector workers (full–time male workers) corresponding to their length (years) of work experience by the Ministry of Economy, Trade and Industry (2006), projections

on labor input in consideration of the change in age structure reveals that from 2025~2030, the volume of labor input in consideration of quality will contract at a faster pace than the volume of labor input on a man hour basis (labor force × labor hours).

Furthermore, given the current state of the labor market, the odds are high that population aging will hamper the appropriate distribution of human resources because of the rigidity of the labor market. **Chart 10** depicts how shifts in age structure of workers affect labor market mobility. In this chart, the macroeconomic accession rate is used as an indicator of labor market mobility. The accession rate (2005 =100) with respect to both male and female workers declines every year, reaching 94 for male workers and 92 for female workers in 2030.

Chart 10: Population aging and labor force mobility



Note: Male and female accession rates are calculated by applying the gender-specific and age structure-specific accession rates in 2005 as a fixed weight to the gender-specific and age-specific structures of the labor force population up to 2030. The labor force population is calculated on the basis of the New Population Projections as of December 2006 on the assumption that the gender-specific and age structure-specific labor force participation rates will remain unchanged.

Source: National Institute of Population and Social Security Research, *Population Projections for Japan (December 2006)*

Considering the possibility that demographic shifts may serve as impediments to economic growth through multiple channels, the

hurdles which must be cleared by the Japanese economy in order to remain on a sustainable growth path are not as easy as the government's assumptions.

To clear these high hurdles, it is necessary to stimulate the utilization of a diverse range of human resources and to take steps to raise the level of per capita productivity. More specifically, labor market reforms are necessary to facilitate the labor market participation, stable employment and skill development of women, the elderly and young part–time workers (so–called "freeters") who have not been fully utilized in the Japanese economy. Furthermore, given the future decline of Japan's youth population – who are most adaptable to new technology – and rise of the middle age and aged population – who find it relatively difficult to move to new organizations and industries in Japan – , it will be necessary to minimize the foreseeable negative impacts by, for example, (1) developing human resources capable of innovations, (2) the maintenance and development of an environment conducive to technological innovations such as regulatory reforms, (3) the reinforcement of public and private labor market adjustment functions such as job placement agencies, and (4) reconstruction of mechanisms to support the development of professional skills. As for the fall of Japan's domestic savings, it is necessary to raise Japan's return on capital to global levels and to improve commercial practices and complicated procedures serving as impediments to inward direct investment.

Faced with these challenges, the government has taken measures such as the following to address Japan's aging population and declining birth rate: (1) employment support toward women, the elderly and young part–time workers, (2) long–term measures for the stimulation of innovation, and (3) the opening of Japan's markets. However, the reforms have not necessarily progressed in many of the areas, such as the ongoing difficulty for women to keep working and to return to the work force after the child–rearing phase of their life cycles (note 14) and the reluctance in some sectors toward the opening of Japan's markets.

One plausible factor behind the lag in reforms is that the unfounded optimism that "the Japanese economy can keep growing through labor productivity gains" is hampering the consensus necessary to support painful reforms among both businesses and individuals. Assuming a case where the Japanese economy slides into negative growth due to the lag in reforms, the negative impact stemming from demographic shifts upon the economy would grow even larger through a further rise of burdens upon workers and businesses in Japan which has a massive accumulated debt burden. The time is ripe for Japan's government to engage in candid exchange of views with the public on the grim state of affairs faced by the Japanese economy in order to build a "balanced sense of crisis."

III. Japan's aging population and declining birth rate : specific issues

1. The diversification of working styles in a society with an aging population and declining birth rate

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Facing the full–fledged onset of an aging population and declining birth rate, Japan must raise its labor force participation rate by providing an environment in which all individuals wishing to work can be employed. One of the reasons hampering the employment of persons wishing to work is the shortage of diverse working styles matching individual needs.

Despite the diversification of employment patterns and the surge of the ratio of part–time workers from the second half of the 1990s, there is a large gap between the wages of full–time and part–time workers. A comparison of the wage levels of full–time and part–time

workers by converting the amount of annual wages (including bonus payments) into an hourly basis reveals that the wage level of part–time workers is only 58.4% and temporary workers 75.5% in contrast to 100% for full–time workers. Furthermore, while full–time worker wages rise along with the worker's length of employment, the rise of part–time worker wages tends to be limited. Therefore, in terms of workers employed for a longer term, the wage gap tends to be wider. While wage gaps stemming from differences in the nature of work duties and responsibilities would not pose a problem, in many cases, there are no rational reasons for the existence of wages gaps. As for full–time workers, even though some companies have initiated systems providing various working styles, many companies only provide rigid working styles requiring long hours. Thus, in general, employment conditions are bipolarized between full–time workers who enjoy a high level of job security but are bound by long working hours and part–time workers who enjoy flexible work styles but are subject to less–favorable work conditions.

Thus, there is the possibility that potential workers with the incentive to work are opting out of the labor market because the hours required as a full–time worker makes it difficult to maintain a work–life balance and work conditions as a part–time worker are not attractive enough. These are individuals who wish to allot more of their time for purposes other than work because of reasons such as child–rearing and nursing care. If more flexible working style options other than the two extreme cases were provided and if fair work conditions corresponding to work duties and responsibilities were achieved, Japan's labor market may look forward to the entry of individuals who chose to stay out of the work force even though they possessed the desire to work.

Note that businesses are starting to hire more workers and are changing the status of their part–time workers to full–time workers along with the improvement of labor market conditions. In the event the conversion of part–time workers to full–time workers develops into a larger trend, it would become easier for individuals who initially chose to work as a part–time worker because of their

work–life balance to convert to a full–time worker when lifestyle changes allow them to do so.

The promotion of diverse and flexible working styles in a society with an aging population and declining birthrate would lead not only to the rise of the labor force participation rate but also contribute to corporate performance through a higher level of employee satisfaction and productivity gains. The cost–cutting efforts by businesses – restraints upon the hiring of full–time workers and the increase of part–time workers requiring relatively lower labor costs – have thus far created negative side–effects such as, (1) long working hours for full–time workers, (2) job instability of the young generation through the increase of part–time workers with less–favorable work conditions, and (3) the exodus of the population unable to work on a full–time basis from the labor market. Looking forward, one way to improve the labor market in a society with an aging population and declining birth rate would be to create an environment which makes it easier for workers to remain in the work force through the establishment of more flexible working styles by providing more options other than high–paying but rigid full–time workers and flexible but low–paying part–time workers and to raise the mobility between full–time and part–time workers.

2. Necessary perspectives for social security reform in a society with an aging population and declining birth rate

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Pension benefits, healthcare and nursing care, constituting 90% of social security benefit costs, are supported by an intergenerational system where the premiums paid by the current generation serve as the pension resources for the aged generation. As a result, pension finances deteriorate along with the aging of the population and declining birth rate. Despite the implementation of successive reforms comprised mainly of the increase of burdens and reduction of benefits, the intergenerational pension system may not be turned

around completely through such piecemeal reforms. More fundamental reforms are necessary. The reforms to maintain the social security system share a common perspective even though the finer details with respect to each system may differ.

A necessary perspective for social security system reform is the maintenance of stable economic growth. For example, the premium rate of the Employees' Pension Insurance (salaried workers of private sectors) has been raised substantially during the past thirty years. This was possible because take–home wages continued to grow despite the rise of pension premium burdens since wage levels continued to rise along with the growth of the economy. Even though a dramatic rise of economic growth is unlikely going forward, the implementation of appropriate economic measures is essential for the maintenance of the social security system.

The second perspective necessary in order to build a sustainable social security system is to define the extent to which the aged population should be supported by the social security system. Given the decrease of the current generation and the increase of the aged generation, it will not be possible to provide for post–retirement income security solely by the social security system. Therefore, it will be necessary to restrain the overall level of social security benefits (to be used to secure minimum post–retirement living expenses), to resort to self–support with respect to living costs which may not be covered by social security benefits, and to consider the implementation of measures to facilitate the aged population's capability to support themselves.

The third perspective is intra–generational support. The aged generation is characterized by exceptionally large gaps in terms of income and assets. Therefore, in order to maintain an intergenerational social security system amid the progress of population aging and declining birth rate, it will be necessary to limit the payment of public benefits only to those who genuinely need such benefits and to allocate the social security burdens among the aged in accordance to their capabilities to bear the burdens. This, in other words, is a shift to a system of intra–generational support.

Fourthly, it will also be necessary to review the financial resources of the social security system. While the social security system is financed primarily by premiums and public expenditures, note the recent focus of attention upon delinquencies in pension premium payments among individuals and the avoidance of pension system coverage among businesses. The payers of pension premiums are left to bear the brunt of such delinquencies and avoidances. A possible solution worthy of future discussion is to increase the percentage of public expenditures in the social security finances. By using the consumption tax to finance the social security system, the burden would be spread evenly throughout all generations and avoid an excessive concentration of the burdens in a certain period in one's life cycle. Moreover, in comparison to general revenues, the consumption tax is relatively immune to economic fluctuations and thus leads to the stability of tax revenues and ensures a certain level of fairness by avoiding inequalities in income supplementation depending upon occupations.

The final perspective is the expansion of those who support the social security system. If the labor force participation rate may be raised amid an aging population and declining birthrate, it would serve as a factor to improve Japan's social security finances by increasing the number of insured persons who support the social security system. Faced with the task of raising the labor force participation rate, the main challenges are how to raise the labor force participation rates of the female population who are of child–bearing and child–rearing age and the population aged 60 and over. Even though the necessary legal support is already in place to a certain extent, an environment conducive to more flexible working hours for full–time workers would facilitate the rise of the labor force participation rate among these segments of the population who have strong potential incentives to join the work force. Furthermore, the rise of employment among the population aged 60 and over would serve to reduce the public pension expenditures because part of the pension benefits would be paid by for by a total of wages and pensions.

Social security system reform accompanying the aging of the population and declining birth rate is a challenge common to leading industrialized countries. Japan is at the forefront of this issue, characterized by the fastest pace of population aging and declining birth rate and the highest level of population aging in the future. To build a sustainable social security system, it is necessary to go beyond the mere tweaking of burdens and benefits and to implement fundamental reforms to change the social security system more suited for a society with an aging population and declining birth rate.

3. The recent growth of the population in the Tokyo metropolitan area : the plausible factors – women of reproductive age are increasing in the Tokyo metropolitan area

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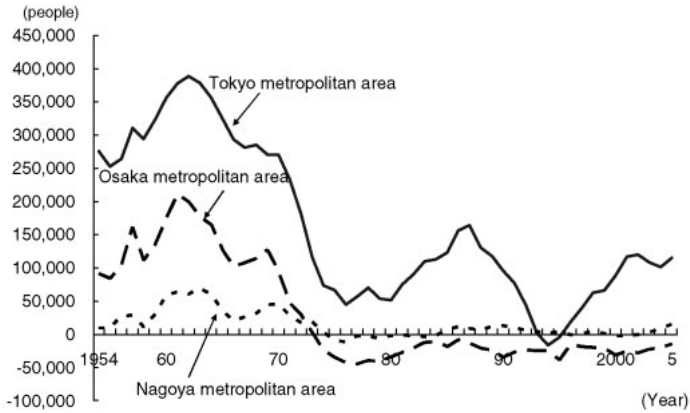
Since the mid–1990s, the population in the Tokyo metropolitan area (the prefectures of Tokyo, Kanagawa, China and Saitama) has been rising in contrast to the population decline in other prefectures. The population growth in the Tokyo metropolitan area is a result of entries surpassing exits. A look back at past trends in net migrations (entries minus exits) in the three major metropolitan areas of Japan (Tokyo, Nagoya and Osaka) reveals similar patterns of entries outpacing exits during the period of high economic growth in the 1960s in all metropolitan areas. However, such movements are largely absent in the Osaka and Nagoya metropolitan areas, with dynamic movements observed only in the Tokyo metropolitan area, since the days of Japan's "bubble economy" in the second half of the 1980s. The Tokyo metropolitan area recorded massive net migrations during the "bubble era". Even though the movement cooled temporarily during the economic slump subsequent to the collapse of the bubble, net migrations have grown substantially since the second half of the 1990s, leading to an excessive concentration in the Tokyo metropolitan areas (**Chart 11**).

Chart 11: Trends in net migrations in the three major metropolitan areas



Source: Ministry of Internal Affairs and Communications, *Report on Internal Migration in Japan.*

Thus far, it has been believed that net migrations have a high degree of correlation with regional economic trends. Note however, that net migrations of the scale comparable to the Tokyo metropolitan area are not apparent in the Nagoya metropolitan area despite its booming economy (said to surpass the Tokyo metropolitan area) and the concentration of Toyota Motor Company and its affiliates in the Nagoya metropolitan area. To explore the reasons for the difference, we looked closer at the demographic trends in terms of age structure, gender and educational backgrounds. As a result, we found a substantial increase of women in their 20s and 30s having high educational backgrounds in the Tokyo metropolitan area from the mid 1990s. This stems from the concentration of service and government careers which are attractive to women with high educational attainments.

The 20s and 30s are said to be the childbearing years for women. Areas which lose women in this age bracket are losing not only their female population but also their future generation of children. Since the trend toward higher educational attainment among the female population will continue, Tokyo will continue to attract

highly–educated women in search of attractive job opportunities. While the aging of the population and declining birth rate is a growing challenge faced by many local governments, the current measures place emphasis upon efforts to improve the environment for childrearing and raise the fertility rate. However, given the exit and reduction of the female population of reproductive age, the measures aimed at raising the birth rate would not have much effect. To encourage women of reproductive age to remain in the area, local governments facing an aging population and declining birth rate should place more emphasis upon securing attractive job opportunities for highly educated women.

4. The impact of the aging population upon financial markets: a survey on the asset–market meltdown hypothesis

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The impact of the aging population and declining birth rate upon the Japanese economy will affect not only economic growth and the social security system but also the financial market. This is an issue which has received little attention in Japan, and therefore short of existing studies. In contrast, there is a substantial volume of research in the U.S. that examine the relationship between fluctuations in asset prices such as those of stocks and the so–called baby–boom generation born during the period between 1946 and 1964. It has been widely argued that the surge of asset prices such as those of stocks in the 1990s is caused by the fact that the baby–boom generation had moved into their prime saving years in preparation for retirement – that the rise of savings by the baby–boomers had led to the increase of demand for stocks and hence the rise of stock prices. Moreover, there are concerns that the baby–boomers reaching retirement age from now on will start to dissave and thereby cause a sharp fall of asset prices (the asset–market meltdown hypothesis). This paper surveys existing literature in the U.S. on the link between demographics and asset prices and explore

the implications upon Japan which is beset by an aging population and declining birthrate and also faces the mass retirement of its own baby boom generation (those born during 1947 and 1949) of workers.

Existing literature in the U.S. on the link between demographics and asset prices may be categorized broadly into (1) theoretical works that simulate the impact of demographic shifts upon asset prices and (2) empirical works based upon econometric exercises. Much of the literature falling into the former category predicts that even though return on assets (asset prices) will fall due to population aging and birthrate decline, the fall will not be so large to be labeled a meltdown. Meanwhile, empirical works based upon macroeconomic aggregate data have not yet reached a consensus on the quantitative impact of demographic shifts upon asset prices since they reach different conclusions depending upon the country and time span they investigate, and the type of financial assets and demographic variables they choose. Furthermore, several empirical works based upon household survey data arrive at conclusions which run counter to the asset–market meltdown hypothesis that individuals run down their financial assets and avoid holding risky assets such as stocks in retirement. Therefore, even if the retirement of the US baby boom generation negatively affects stock and bond prices, the odds are high that the impact will not be as large as the concerns expressed in the asset–market meltdown hypothesis.

In a discussion on the impact of demographic shifts upon asset prices in Japan in view of existing literature in the U.S., it is necessary to take note that Japan differs from the U.S. with respect to several basic preconditions. Firstly in terms of shifts in demographic structure, while the population will age and the birth rate will decline at a faster pace than in the U.S., Japan's second–generation baby–boomers (the children of the baby boom generation) will enter their prime saving years. Thus, the impact upon asset prices will be limited at least for the time being even if the life–cycle hypothesis on savings holds true.

Secondly, existing literature in Japan is even more dismissive

than those in the U.S. with respect to the asset–market meltdown hypothesis that the elderly run down their financial assets and are risk–averse in asset allocation (Cabinet Office, 2005: Iwaisako, 2006). In Japan, the higher the age of the household head, the larger the value of financial asset holdings held by the household (**Chart 12**). Note also that the percentage of stocks (which are risky assets) in total asset holdings increases as an individual ages in Japan. Meanwhile, given the absence of a major change in the percentage of bond holdings (which are safe assets) as an individual grows older, the age–wise peak in risk asset holdings is very late in life.

Chart 12: Financial asset holdings and asset allocations by age of heads of households

(JPY10,000, %)

	Financial assets	Deposits & savings	Insurance etc	Private pensions	Bonds	Stocks	Investment trusts	Trusts etc
20s	171	127	30	2	3	5	4	0
	[100.0]	[74.3]	[17.5]	[1.2]	[1.8]	[2.9]	[2.3]	[0.0]
30s	455	298	87	21	7	20	18	4
	[100.0]	[65.5]	[19.1]	[4.6]	[1.5]	[4.4]	[4.0]	[0.9]
40s	812	457	205	43	19	59	24	5
	[100.0]	[56.3]	[25.2]	[5.3]	[2.3]	[7.3]	[3.0]	[0.6]
50s	1,154	653	270	70	15	87	45	14
	[100.0]	[56.6]	[23.4]	[6.1]	[1.3]	[7.5]	[3.9]	[1.2]
60s	1,601	918	294	77	45	152	95	20
	[100.0]	[57.3]	[18.4]	[4.8]	[2.8]	[9.5]	[5.9]	[1.2]
70 and over	1,432	830	208	30	30	212	93	29
	[100.0]	[58.0]	[14.5]	[2.1]	[2.1]	[14.8]	[6.5]	[2.0]

Note: 1. Includes respondents without savings. Figures in the upper row are actual amounts (JPY10,000) and the figures in [ ] in the lower row are shares to total assets (%)
2. "Savings & deposits" include postal savings.
3. "Insurance etc" refers to the total of life insurance, postal life insurance and non-life insurance
4. "Trust etc" refers to the total of money trusts, loan trusts and other financial products

Source: The Central Council for Financial Services Information, *Public Opinion Survey on Household Financial Assets and Liabilities (2006).*

Therefore, the tentative conclusion of this paper is that the possibility of population aging and birth rate decline leading to a sharp fall of asset prices is smaller in Japan's case than in the U.S. More empirical works need to be done in the future in order to gauge the precise impact of demographic changes upon households' financial assets allocation and the financial market in Japan.

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Saving, investment and demographic change: the global dimension

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Notes:

1 See for example, OECD (1996), McKinsey Global Institute (1994), and Qureshi (1995).

2 Emerging Asia is a broad definition that includes the Newly Industrialized Economies (Hong Kong, Singapore, South Korea and Taiwan) as well as developing economies such as China and India.

3 The most recent studies that use international data are those of Higgins and Williamson (1997), Higgins (1998), Bloom and Williamson (1998), Bloom and others (1999), Schultz (2004), Bosworth and Keys (2004), and IMF (2005).

4 In the original paper, we also find evidence of demographic effects on both the public and private components of national saving.

5 Population projections based upon the new population projections are all based upon medium variant projections for fertility rates and death rates.

6 For example, Kuznets (1960) indicates that a larger population breeds more innovators and hence speeds up the pace of technological progress. Furthermore, Makino (2006) points out that a sharp decline of the labor force would lead to an inevitable decline in the pace of technological progress since it implies a fall in number of employees in intellectually creative sectors. Obuchi (1997) indicates that population aging serves as major obstacle to labor mobility and that this hampers the necessary transformation of the industrial structure, thus restraining the necessary improvement of productivity.

7 The so–called "life–cycle hypothesis" assumes that individuals determine their current level of consumption not upon their current income level but in consideration of their income over their entire life time. Thus, the hypotheses presumes that the current generation saves part of their income while the aged generation dissaves to maintain their living. According to this hypothesis, the percentage of the aged

population with a relatively low saving rate would rise along with the aging of the population and hence push down the nationwide saving rate. Despite the existence of divergent opinions in Japan on the relevance of the life–cycle hypothesis (Nakagawa & Sugo (2000) and others), the consensus view is that Japan's saving rate will decline over the long term, judging from the increase of unemployed elderly households with low saving rates, and in particular, prospects that the single elderly (many of whom are unemployed) will increase.

8 The Ministry of Finance (2005) predicts that the progress of population aging will lead to a further expansion of social security benefits and that the potential national burden rate (the percentage of taxes, social security and fiscal deficit in national income) will rise approximately by 10 percentage points from 47.7% in FY2006 to 55.5% in 2025.

9 However, there are objections to the argument that the rise of the national burden rate will lower economic activity. For example, (1) a discussion emphasizing only the burdens would be imbalanced since various public services and social security benefits are provided in consideration of taxes and social security burdens, and (2) undue emphasis only of the problems accompanying income redistribution would not be appropriate since public income redistribution serves an important role from the perspective of social fairness (Cabinet Office (2003)).

10 In addition, there are some who point out that demographic shifts will limit the growth of the Japanese economy from the side of demand. Even if the potential growth rate rises as a result of technological advances and other factors, actual economic growth will inevitably fall below potential since the domestic market will shrink as a result of population aging and declining birth rate (Obuchi (1997), Nukaga (2005) and others).

11 The working hours in terms of gender and age structure are weighted averages derived by weighting (1) gender–specific and age structure–specific working hours of full–time workers (workers other than part–time workers) (assuming that the trend toward shorter gender–specific and age structure–specific working hours during the period from 1995 to 2005 will continue) and (2) gender–specific and age structure–specific working hours of part–time workers (assuming that working hours are unchanged from actual counts in 2005) by the gender–specific and age structure–specific weights for full–time workers and part–time workers in 2005. As a result, even if the labor participation rate of women in their child–rearing stages of life (characterized by a high percentage of workers with short working hours) rises, the increase of workers with short working hours will limit the increase of labor input.

12 Labor productivity growth (man–hour basis) during the period from 1996 to 2005 calculated on the basis of the rate of real GDP growth (Cabinet Office, *National Accounts*), number of employed persons (Ministry of Internal Affairs and Communications, *Labor Force Survey*) and per capita working hours (Ministry of Health, Labor and Welfare, *Monthly Labor Survey*) would be 1.6% (annual average).

13 Fluid intelligence – the capacity to memorize and adapt to new matters – is said to

follow a gradual decline after peaking in the 30s. In contrast, crystallized intelligence – the capacity to utilized knowledge accumulated through past experience – is said to rise until around 60 and will not be subject to substantial declines thereafter (Ministry of Health, Labor and Welfare (1997)).

14 A comparison of women in terms of the year in which they gave birth to their first child, based upon the *Shussho doko kihon chosa (basic survey on birth trends)* of the National Institute of Population and Social Security Research, revealed that only 25% of women giving birth to their first child during the period from 1985 to 1989 continued to work. The percentage of women continuing to work after birth of their first child during the period from 2000 to 2004 was also 26%, revealing that the percentage has remained virtually unchanged during the past 20 years. Furthermore, according to the *Labor Force Survey* of the Ministry of Internal Affairs and Communications, the number of women currently not engaged in job–seeking activities but possess potential hopes to work reached 3.5 million in 2006.

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