

DISCUSSION GUIDE FOR “POPULATION AGING IN JAPAN AND IMPLICATIONS FOR PUBLIC FINANCE”

A DISCUSSION WITH DR. KAREN EGGLESTON

Organizing Questions

- What factors are causing Japan’s shift towards a much older age structure?
- What are the social and economic implications of Japan’s demographic changes?
- What are the implications of population aging for public finance?

Introduction

In recent decades Japan has gone through major epidemiologic and demographic transitions. As a result of longer life expectancy due to better control of infectious disease, better nutrition, and other factors, paired with very low fertility rates, Japan is leading the world in terms of population aging. Japan’s aging and declining population poses a few major challenges for the country. This lesson looks at the social and economic implications of Japan’s demographic changes, with an emphasis on what this means for the country’s vaunted health care system.

Objectives

In this lesson, students will

- gain an understanding of the demographic changes Japan is undergoing and its resulting age structure;
- gain an understanding of the causes and consequences of Japan’s current age structure;
- gain an understanding of the broader implications of population aging for society; and
- practice the ability to absorb and process readings and a scholarly lecture, and draw upon this information to answer and discuss questions.

Materials

Video Lecture, “*Population Aging in Japan and Implications for Public Finance*,” online at <http://spice.fsi.stanford.edu/multimedia/population-aging-japan-and-implications-public-finance>

Handout 1, *Understanding Figures and Tables*, 30 copies

Handout 2, *Video Lecture Prompts*, 30 copies

Handout 3, *Demographic Trends in Other Countries*, 30 copies

Handout 4, *Assessment Criteria for Presentation*, 30 copies

Answer Key 1, *Understanding Figures and Tables*

Answer Key 2, *Video Lecture Prompts*

Teacher Information, *Video Lecture Transcript*

Equipment	Computer with Internet access and a Flash-enabled or HTML5-supported web browser Computer projector and screen Computer speakers
Teacher Preparation	<p>Instructions and materials are based on a class size of 30 students. Adjust accordingly for different class sizes.</p> <ol style="list-style-type: none">1. Make the appropriate number of copies of handouts.2. View Video Lecture, “Population Aging in Japan and Implications for Public Finance,” by Dr. Karen Eggleston.3. Become familiar with the content of handouts, answer keys, and teacher information.4. Set up and test computer, projector, speakers, and streaming video lecture. Confirm that you are able to play the video lecture and project sound audibly to students.
Time	One 50-minute class period
Procedures	<ol style="list-style-type: none">1. Explain to students that today’s lesson will cover Japan’s recent demographic shifts and their impact on public finance. Distribute Handout 1, <i>Understanding Figures and Tables</i>, to each student, and ask students to record their answers on a separate piece of paper. Then go over the questions and provide the correct answers, using Answer Key 1, <i>Understanding Figures and Tables</i>, as a guide.2. Inform students that they will view a video lecture by Stanford researcher Dr. Karen Eggleston. Distribute one copy of Handout 2, <i>Video Lecture Prompts</i>, to each student and instruct them to read through the handout and questions before playing the video.3. Begin viewing Video Lecture, “Population Aging in Japan and Implications for Public Finance.” If necessary, pause the lecture at key points to allow students to complete the prompts on Handout 2.4. Give students an appropriate amount of time to answer the questions on the handout before reviewing them as a class. Use Answer Key 2, <i>Video Lecture Prompts</i>, as a guide when providing the correct answers.5. Inform the class that they will now be participating in an activity that involves researching demographic trends in other Asian countries. Divide the class into three groups and distribute one copy of Handout 3, <i>Demographic Trends in Other Countries</i>, to each group. These groups are:<ul style="list-style-type: none">• Group 1—China• Group 2—India• Group 3—South Korea

6. In Handout 3, students are asked to research demographic trends in their assigned country. Inform students that they will have 20 minutes to research and prepare a presentation. At the end of this allotted time, they will give a two-minute presentation on their country.
7. Distribute one copy of Handout 4, *Assessment Criteria for Presentation*, to each student and inform students that their presentations will be assessed on these criteria.
8. Allow each group to present for up to two minutes. Allow for a three- to four- minute question-and-answer session after each presentation. Other students in the class should ask the presenting group to elaborate on particular points or challenge certain claims. Each group presentation should take 5–6 minutes in total. Use Handout 4, *Assessment Criteria for Presentation*, to assess each group as it presents.
9. After all groups have presented, use the following questions to quickly debrief the lesson and allow students the opportunity to reflect and informally evaluate their learning.
 - What insights have you gained regarding Japan’s demographic transitions and their implications for public finance?
 - What topics interested you the most? The least? About which topics or issues would you like to gain a deeper understanding?

Assessment The following are suggestions for assessing student work in this lesson:

1. Evaluate student responses to questions on Handout 2, *Video Lecture Prompts*, based on Answer Key 2, *Video Lecture Prompts*.
2. Evaluate student presentations in response to Handout 3, *Demographic Trends in Other Countries*, based on Handout 4, *Assessment Criteria for Presentation*.
3. Assess student participation in group and class discussions, evaluating students’ ability to
 - clearly state their opinions, questions and/or answers;
 - provide thoughtful answers;
 - exhibit sensitivity toward different cultures and ideas;
 - respect and acknowledge other students’ comments; and
 - ask relevant and insightful questions.
4. Assess student preparation and performance in the class activity based on:
 - ability to work with peers in small groups;
 - ability to use specific information in making a point; and
 - clarity and effectiveness of argument.

UNDERSTANDING FIGURES AND TABLES

Consider the following figures and table. For each, write one or two sentences to explain what the figure/table shows and the significance of Japan in the figure/table.

Figure 1.

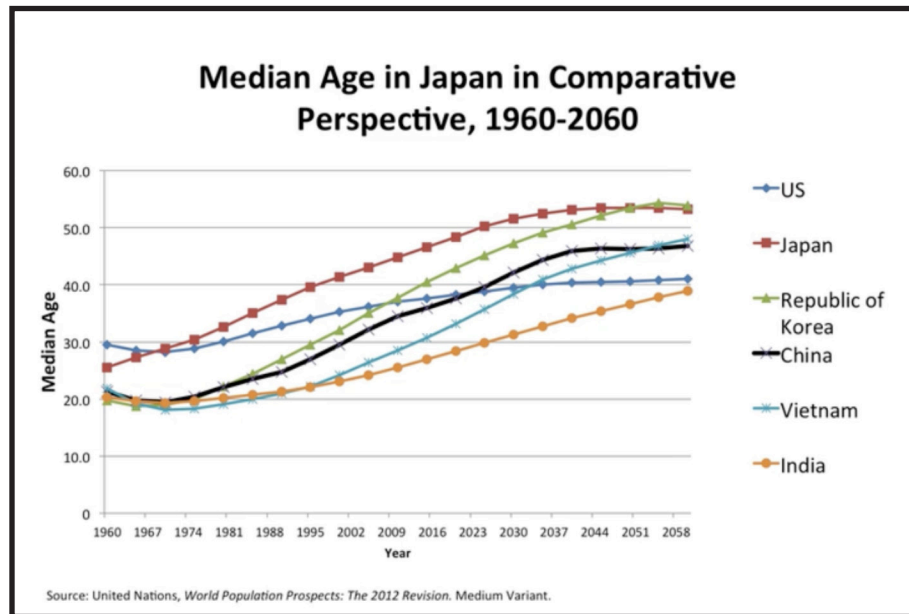
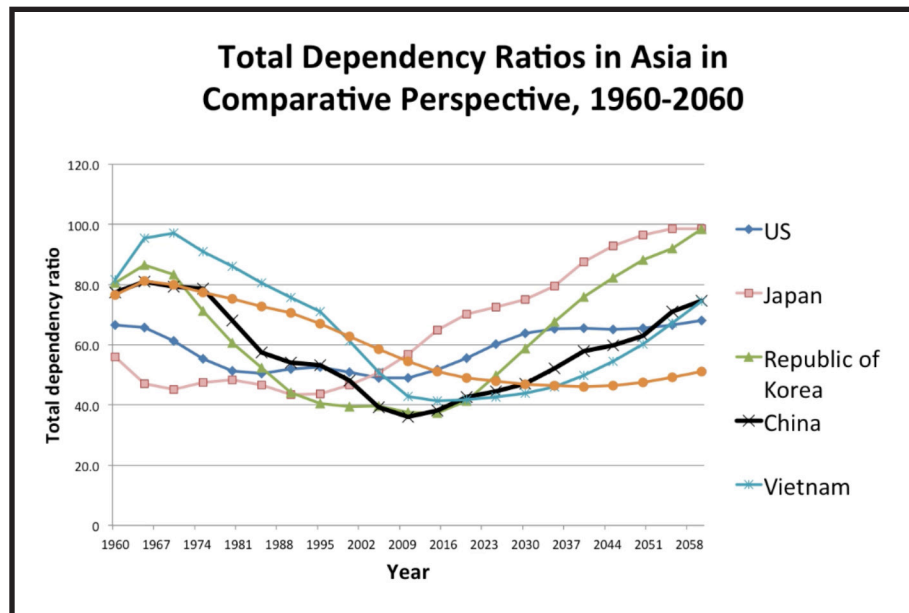


Figure 2.



Total dependency ratio is a measure showing the number of dependents (those ages zero to 14 and over the age of 65) to the number of people in their typical working years (ages 15 to 64). A ratio of 100.0 implies that there is one dependent for every worker.

Figure 3.

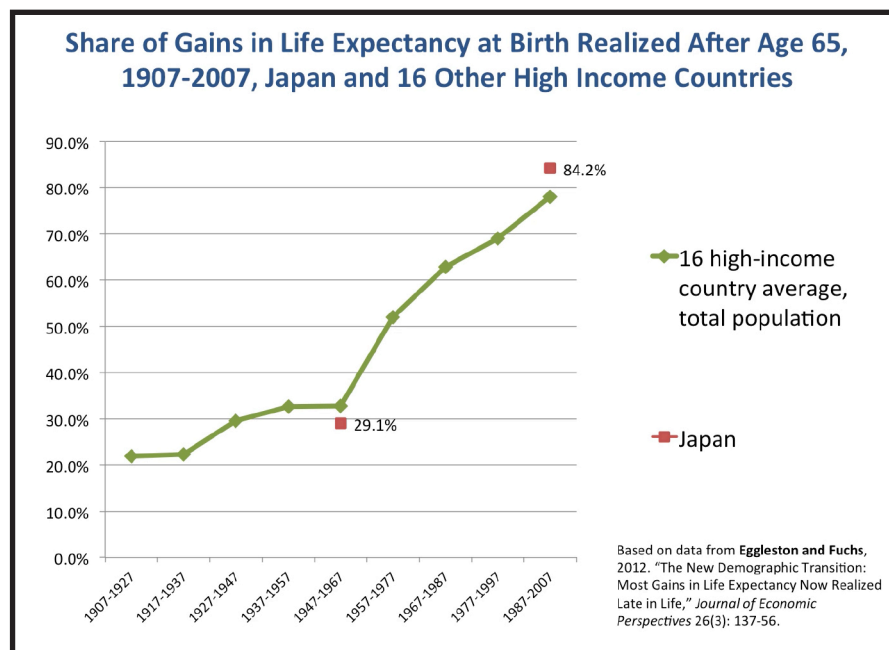


Table 1.

The “Longevity Transition” in Asia and Select Developing Countries		
Country (Years)	Change in years lived past 65 as a percentage of change in life expectancy at birth, 1990-2010	Male XFLP/LE, 2007 (Illustrative)
Japan	Males 72.7%, Females 87.0%	54.1%
South Korea	Males 45.4%, Females 57.1%	52.0%
China	Males 51.9%, Females 40.6%	57.6%
Philippines	Males 26.2%, Females 36.0%	59.6%
Indonesia	Males 26.1%, Females 35.7%	64.5%
Brazil	Males 34.2%, Females 35.0%	59.1%
Vietnam	Males 32.5%, Females 34.7%	54.6%
India	Males 23.6%, Females 25.8%	60.0%
Bangladesh	Males 20.7%, Females 25.4%	60.9%

Eggleston and Fuchs 2012

XFLP/LE is “expected labor force participation” (XFLP), defined as the total years an individual is expected to participate in the labor force and calculated based on “life expectancy” (LE).

VIDEO LECTURE PROMPTS

Lecture Title: “**Population Aging in Japan and Implications for Public Finance**”

Lecturer: **Dr. Karen Eggleston**

Dr. Karen Eggleston is the Director of the Asia Health Policy Program, recent Deputy Director of the Shorenstein Asia-Pacific Research Center at Stanford University, a fellow at Stanford’s Center of Health Policy/Primary Care and Outcomes Research, and a Faculty Research Fellow of the National Bureau of Economic Research. Dr. Eggleston teaches through Stanford’s Center for East Asian Studies and International Policy Studies and is also affiliated with Stanford’s Public Policy Program. Her research focuses on comparative healthcare systems and health reform in Asia, government and market roles in the health sector, payment incentives, healthcare productivity, and the economics of the demographic transition.

Questions

Please keep the following questions in mind as you listen to the lecture. After the lecture, please answer these questions on a separate sheet of paper.

1. What major demographic change is Japan currently undergoing?
2. In what ways might an aging population be problematic for a society?
3. In what ways might a declining population be beneficial for a society?
4. Although Japan’s case is extreme, almost all high-income nations are experiencing decreasing fertility rates. Suggest an explanation for this trend.
5. What kind of solutions might ensure Japan’s sustained economic growth in the face of continued population aging/decline?

Defined Terms:

longevity—long life

replacement fertility—the birth rate at which the population level remains constant, taking into account the mortality rate and other factors

mortality rate—a measure of the number of deaths in a particular population, typically expressed in units of deaths per 1000 individuals per year

fertility rate—the number of children born per woman

life expectancy—a statistical measure of the average time a person is expected to live

GDP per capita—a measure of average income per person in a country. GDP (gross domestic product) is a measure of national income/national output and national expenditure

demographic dividend—the accelerated economic growth that may result from a decline in a country’s birth and death rates and the subsequent change in the age structure of the population

baby boomer—a person born in the years following World War II, when there was a temporary marked increase in the birth rate

social protection systems—policies and programs designed to reduce poverty and vulnerability by promoting efficient labor markets, diminishing people’s exposure to risks, and enhancing their capacity to manage economic and social risks, such as unemployment, exclusion, sickness, disability, and old age

human capital—a collection of resources—all knowledge, talents, skills, abilities, experience, intelligence, training, judgment, and wisdom possessed individually and collectively by individuals in a population

health care in Japan—health care in Japan is under a social insurance system, which, along with health insurance, also provides social pension, nursing insurance added for people between 40 to 65 years old, and child upbringing. Social insurance tax is deducted from employee salary, and matched by the company (with the exception of the Children Upbringing tax which is paid solely by the company). Through this system, Japanese citizens are given universal coverage (or alternatively referred to as also universal health care or universe health coverage). This means that health care and financial protection are available to all Japanese citizens, and with a Social Insurance Card, Japanese citizens are able to go to any medical facility in Japan and pay only 30 percent of the medical fees.

health insurance premiums—the amount the policy-holder or their sponsor pays to the health plan to purchase health coverage

DEMOGRAPHIC TRENDS IN OTHER COUNTRIES

In this exercise you will be asked to consider demographic changes in **China, India, and South Korea**.

You will be divided into the following groups:

Group 1—China

Group 2—India

Group 3—South Korea

As a group, you will have 20 minutes to research and prepare a short (two-minute) presentation on your country. This presentation should address the following questions:

- In brief, what is the demographic landscape of your country (e.g., age composition, gender composition, ethnic composition)?
- Have there been any significant demographic changes in the past 50 years? If so, what are they?
- What are the causes and consequences of these shifts? What are their larger social / international implications?
- How do the demographic changes in your country compare to global demographic trends?

At the end of your presentation there will be a three- to four-minute question-and-answer session in which you should be prepared to clarify and elaborate on any claims that you have made.

Your group's presentation will be assessed based on the criteria specified in Handout 4, *Assessment Criteria for Presentation*.

ASSESSMENT CRITERIA FOR PRESENTATION

Scoring Criteria	Score and Rationale	Score Descriptions
Organization and Clarity: The presentation and responses are clearly and orderly. Responses clearly address all questions.		1—Unclear in most parts, missing most of the required components 2—Clear in some parts but not overall, missing some of the required components 3—Mostly clear and orderly 4—Completely clear and orderly presentation, covers all required components
Presentation Style: Tone of voice, use of gestures, and level of enthusiasm are convincing to audience.		1—Few style features were used, but not convincingly 2—Few style features were used convincingly 3—All style features were used, most convincingly 4—All style features were used convincingly
Use of Facts: Facts are given to support claims.		1—Few or no relevant supporting facts 2—Some relevant facts given 3—Many facts given, most relevant 4—Many relevant supporting facts given
Group Cohesiveness: All members of the group contribute during discussion, and the presentation represents work as a group.		1—Few members contribute to group discussion and presentation 2—Some members contribute to group discussion and presentation 3—Most members contribute to group discussion and presentation 4—All members contribute to group discussion and presentation

UNDERSTANDING FIGURES AND TABLES

Figure 1.

Figure 1 shows the actual and projected change in median age in the United States, Japan, Republic of Korea, China, Vietnam, and India from 1960 to 2060. The graph shows that the global median age has been steadily increasing, and Japan's median age has consistently remained higher than the rest. High median age is an indicator of increased longevity (a higher population of the elderly) and decreased fertility rates (a smaller percentage of very young people).

Figure 2.

Figure 2 shows the actual and projected change for total dependency ratios in the United States, Japan, the Republic of Korea, China, and Vietnam from 1960 to 2060. The graph shows that the total dependency ratio for Japan has steadily increased throughout the years, is currently the highest out of all of the countries, and is projected to remain this way. Right now in Japan, there are about 1.6 workers (those in the labor force) per dependent (those aged zero to 14, and 65 and older), and the graph shows that by 2050 the ratio will be about one worker to one dependent. As the ratio gets closer to 1:1, there is an increased financial burden on the productive population to try to support children and the elderly.

Figure 3.

Figure 3 shows the share of gains in life expectancy realized not in young ages or working ages, but after the traditional retirement age for Japan and 16 high-income countries. As the graph shows, people are living much longer in these high-income countries. Japan leads the way in this longevity transition. Increases in longevity have implications for work lives and financing social protection systems.

Table 1.

Table 1 summarizes the longevity transition in Japan, and we can see that Japan leads the world in terms of gains in life expectancy. Of particular significance is the last column, which shows that as Japanese men (in this case) live longer lives, they are only spending around half of their lives in the workforce.

VIDEO LECTURE PROMPTS

1. What major demographic change is Japan currently undergoing?

Japan has been shifting towards a much older age structure and leads the world in terms of population aging. This transition is a result of low mortality and low fertility rates. A gradual control of infectious disease and better nutrition among other factors has meant that people are living much longer lives than ever before. Simultaneously, Japan has a very low fertility rate. The combination of these two factors has led to an aging and declining population.

2. In what ways might an aging population be problematic for a society?

An aging and declining total population means that the working age population is declining, which can hobble economic growth and create many economic issues. Japan's total dependency ratio is rapidly approaching one dependent to one worker. This is daunting considering the fact that only about half of the population will be financing the country's social institutions. In Japan's case, the majority of this dependent population are those aged 65 and older, a population prone to chronic disease and illnesses, and therefore costly in terms of healthcare. The aging population may be a major financial burden.

3. In what ways might a declining population be beneficial for a society?

Although Japan's rapidly aging population has caused alarm, some experts have argued that it might not all be bad news, at least in the short term. Some positive consequences include a demographic dividend, which is a one-time boost in GDP per capita or living standards when you have a large working age share of the population. If productively employed, this can boost GDP, and when paired with better nutrition, better education, and skills per child, the demographic dividend can help sustain economic growth over a longer time period. Furthermore, depending on how pensions, healthcare, and long term care are financed, population aging may spur additional savings and lead to a second demographic dividend. Fewer children also mean more resources for this population and overall less money spent on education, and in other areas. A declining population can also mean more space and arable land for Japanese citizens, which can translate to a higher quality of life.¹

4. Although Japan's case is extreme, almost all high-income nations are experiencing decreasing fertility rates. Suggest an explanation for this trend.

Students may mention a number of potential explanations:

Japan's low fertility rate reflects a greater global trend for developed countries. Across the globe, men and women are delaying marriage and starting families in order to pursue education and careers. A major reason for the decline in birth rate in Japan seems to be the decline of marriage. Fewer people are opting to wed, and those who do are getting married later in life. Furthermore, nowadays women in Japan (and again, globally) are pursuing higher levels of education and focusing on careers. Many Japanese companies offer few feasible options for working mothers, forcing many women to choose between child rearing and pursuing careers. As a result, ambitious women avoid marriage altogether to avoid strong social expectancies that women should stay at home. Finally, for those who do start families, the rising cost

¹ Fred Pearce, "Japan's ageing population could actually be good news," *New Scientist*, 7 January 2014, <https://www.newscientist.com/article/dn24822-japans-ageing-population-could-actually-be-good-news>.

of raising children discourages many families from having as many children as in previous generations.

5. What kinds of solutions might ensure Japan's sustained economic growth in the face of continued population aging/ decline?

There are many ways in which this question can be answered, including the following:

It is important to increase labor force participation for sustained economic growth in Japan. This can be done several ways. Increasing women's labor force participation, raising the age of retirement, and making Japan's immigration policy less restrictive (although highly contested) have been some suggestions.

Technology can also help in several ways. Advances in technology might enable longer working lives through improved health care or through machines that augment workers and thus extend working life. The use of artificial intelligence and robots for care of the elderly is another possibility.

Japan also provides incentives for families to have more children, such as providing easier access to childcare and tax incentives.

Japan may also need to reconsider the structure and financing for its health care system as a larger proportion of its population will require medical services and long-term care.

VIDEO LECTURE TRANSCRIPT**Dr. Karen Eggleston**

Director, Asia Health Policy Program, Shorenstein Asia-Pacific Research Center

Japan has a large issue with its health and health system that is world renowned now because it is leading the world in a couple of transitions that have to do with population aging, demographic change, and change in health. As we know, they have a large population, 127 million, but now declining because of these changes in world-leading longevity, but also below-replacement fertility, which are the two proximate causes of a shift towards a much older age structure in the overall population. So about one-quarter of the Japanese are age 65 and older, so it is already a very old age structure, compared to most of the world. And in a sense, this is a triumph of longevity and success at controlling infectious disease, but also it has to do with changes for the whole social and economic structure going forward that Japan will have to adjust to, and maybe help teach the rest of the world about how to adjust to an age of longer and hopefully healthier lives.

So the transition I was referring to was the epidemiologic and the demographic transition. So, epidemiologically, Japan and other countries around the world are going through a transition where infectious and communicable disease was a large burden of health challenges for the society, and that is still true in many parts of the world. But gradual control of infectious disease and better nutrition and many other factors mean that you have much lower infant mortality and child mortality—people living longer lives. And, related to that is a demographic transition, where you go from high and fluctuating birth rates and death rates to low mortality and low fertility. And Japan has gone through this transition much more quickly than many of the other high income countries in the world, particularly in Europe, and is now, as I mentioned, leading the world in terms of population aging.

So if you can see the figure, I show median age in Japan in comparative perspective, and you can see that since around the seventies, Japan's median age of the whole population has been greater than 30, and in the next decade or so it's going to be higher than 50. So it's been higher than the U.S. for many decades now, and leading the world. Other economies that are rapidly aging in the region, such as Korea, are quickly catching up and can learn something from Japan's experience as well.

So one of the factors that leads to population aging as mentioned is not only longer life expectancy, but also very low fertility. And there was a dramatic reduction in the total fertility rate in Japan, which is the average number of children born per women, in the post war period—from four to two in just about one decade. So, it has been below two since around the 1970s. So since around two is replacing the parents, that's a below replacement fertility rate, currently around 1.4 and change. So the policy to try to increase total fertility rate back towards two is something that is very important for thinking about long-term demographic trends. But Japan is not alone in having below replacement fertility. It's a long term issue that is changing the structure of the population along with longer lives. And without a change in total fertility, Japan's population will continue to decline.

So there are many social and economic implications of these population changes. Many people talk about the demographic dividend, which is a one-time boost in GDP per capita or living

standards when you have a large working age share of the population. And if it is productively employed, that boosts your GDP. And this, combined with better nutrition, better education and skills per child can help to sustain economic growth over a longer time period, in combination with urbanization, industrialization, catch up and technology, all of these things that Japan and other economies have gone through, particularly in the 20th century and after World War II, very quickly in Japan. But depending on the social institutions, and particularly how you finance pensions and healthcare and long term care, population aging may or may not be able to spur additional savings that contribute to what has been called a second demographic dividend. So we are still figuring out whether that will apply in Japan.

But there are many challenges associated with population aging, and you hear that discussed a lot. So it is pretty straightforward: when your total population is declining, your working age population is declining, and that can create many issues economically. So currently in Japan, about 1.6 worker per dependent, that's children and the elderly. By 2050, about one to one. One worker per dependent. So that is a very formidable ratio to try to support all of the children, and particularly the elderly, with fewer workers financing that.

And as can be shown in the figure that I am showing here, total dependency ratios in Asia in comparative perspective, you can see that at first it tends to decline because you have fewer children per worker and not as dramatic a growth in retirees per worker. But for Japan, ever since this period in the seventies, it's going back up again and leading the world in terms of having a total dependency ratio that is high and increasing. Much higher, for example, than in the U.S., although we talk about the challenges of financing the baby boomers' retirement.

So in some recent work with my colleague Victor Fuchs here at Stanford, we looked at new demographic transition and gains in life expectancy that are realized late in life, and one metric to show this, Japan in comparative perspective, is using the share of increases in life expectancy that are realized not in young ages or working ages, but in traditional retirement ages. We used after age 65. And in this, research shows that that share of increases that are realized late in life was quite low at the beginning of the previous century, but is now very high. And Japan is leading the way. So it used to be around 20%. It is going up over 80% and is continuing to increase.

So as I show in this figure, it shows this metric of the share of gains in life expectancy at birth that are realized after age 65, going back to 1907 up to recent period. And you can see an average of 16 high income countries and how that ratio has increased dramatically 20 to 80%. But the two red dots that show Japan, you can see that in the post war period they went from below that average to higher than that average. So, dramatic change where a lot of the increases in longevity are now being realized in the traditional retirement years.

And what does this mean? That means that it shapes work lives and financing of social protection systems. If originally your improvements in health and longevity were saving children so they could live into the workforce and enjoy a full life, we are continuing to have that improvement, but much more of our health gains are coming older in life, which is a triumph of longevity and something to be embraced, but we maybe need to adjust our social institutions to this new longer, and hopefully healthier lives, particularly in thinking about sustainable financing for health insurance and long term care, which is something Japan is looking at.

So, in the table here, I summarize this longevity transition in Japan, compared to other countries in Asia. In particular, you can see that Japan leads the world in terms of this metric. And also, if you think about what are the implications of the percentage of your whole life expectancy that you plan to be in the workforce, and you can see that in Japan around 54%. So if we're

getting longer lives and we're only spending around half of it in the workforce, maybe we need to rethink that. You can see, in lower income countries it is more like 60%. And their longevity gains are still what you see currently in Japan, is much higher in those countries, like India and Bangladesh. It is what you would see in the current high income countries a century ago. Still a lot of infant and child mortality to show the disparity in the world.

So, what are the implications for a Japan population from this? You could think that maybe people, if they are very enlightened, foreseeing their living longer lives, they might choose to work longer life, plan for a longer work life, save more for their retirement knowing they are going to have a chunk of leisure towards the end of their lives, invest in human capital in sufficient amounts and creative ways to spur new kinds of innovation. But it remains to be seen to what extent Japan and other economies will do so.

And in thinking about this, I like to quote a beloved mentor here who has now passed away, Masahiko Aoki, and he wrote on the 70th anniversary of the end of World War II about how Japan needs to embrace the economic implications of demographic challenges that it is facing and think about the importance of human capital investments and shifting institutions. Particularly, he talks about increased labor force participation and productivity are needed for sustained economic growth in Japan and elsewhere.

And one important factor of that in Japan, as people may know and embraced by policy makers now, is to increase women's labor force participation in Japan. Also to extend work lives and maybe to raise the legal or customary retirement age. Although, Japan has a higher proportion of older people working than many other countries, such as in Europe. So they are already going in that direction.

Also, it is very important to promote innovation and raise multi-factor productivity, although much easier said than done. And perhaps to think about immigration policy. We know only about 1% in Japan percentage of foreign workers; whereas, in Germany, closer to 9, 10%; U.S. more than 15%. That's a touchy issue.

But with the embrace of, say, women's labor force participation increasing, that also has implications for the broader social and economic structure, because to enable the career embracing attitudes towards women in the labor force, you need to have quality affordable childcare and long term care for the elderly, and maybe a shift in attitudes that a career woman can be just as loving and supportive mother as a father who is a career person. So a lot of those social changes are implied in this broader demographic change.

And I wanted to talk briefly about the public finance implications from the field I am most familiar with, which is healthcare. Japan has had universal coverage for decades now, under a social insurance system, but there are many challenges from this population aging. And you can think about financing that is currently in Japan from health insurance premiums and taxes and out-of-pocket payment is pretty low. On top of that, a long term care insurance system that has been developed, and think about how sustainable that financing is going forward when you have a much higher proportion of the elderly using a lot of medical care services and needing long term care.

And we did some research thinking about projecting healthcare spending and the health needs of the older population in Japan. We know that some of the determinants of healthcare spending growth are simply when living standards go up, a higher proportion of your money tends to go to medical care – that's a trend. Longer lives of course means the spread of insurance and dynamic moral hazard kinds of effects, relative increase in the price of labor. But probably at

base is technological change. And we just have much more capabilities of medicine to replace every organ in the body, to extend lives, make people live healthier, and that—unlike, perhaps, pension policy where you can adjust a few parameters here and there—no policymaker in Japan is going to say well, we can't afford this new kind of medical treatment. It is something that people expect, of course, and need to find a sustainable way to finance that.

In work jointly with Jay Bhattacharya and other colleagues, we have predicted a future elderly model for Japan, and that, in a figure I show here, is a microsimulation model that tracks individuals over time, and this can help to figure out what are the health needs of the future, older adults in Japan, age 50 and older. And what we find of course is not only there is a much higher proportion of 80 year olds and older among this older adult population, but they are going to have more health needs and more disabilities. Over 27% who think limitations in instrumental activities of daily living, which are like managing their own finances, almost 1 in 4 with basic activities of daily living, such as eating, bathing, dressing themselves. Not surprising if you have many more 80 year olds and 90 year olds in your population, but then your institutions need to adjust to serve this population.

So I have some figures here that show some of those trends. You can see increases in chronic disease like heart disease, diabetes, and so on. Not so much for cancer because it continues to be a fatal disease. But you can use these kind of microstimulations to say, what if we could effectively treat some kinds of cancer? Or what if we could get Japanese men in particular to stop smoking? What would the health needs in the future look like based on that technology?

So in conclusion, I wanted to say that population aging, as we know, will lead to much higher prevalence of chronic disease and disability in Japan. And although they have enjoyed healthy aging to a considerable extent, and leading the world in that respect, there will be many challenges regarding sustainable healthcare spending and long term care spending, and many issues that they can try to address with that, such as issues more in pensions having to do with funding, a pay as you go. But technology enabling longer working lives is very important also in terms of medical care, innovations, and prevention, and for health systems to think about rewarding better value for money in the way we structure our medical care.