**Demography and the Economy: Speeding to a Cliff**

*This is a final draft with citations of a presentation made by Jessica Einhorn, resident Senior Adviser at RockCreek, on October 12, 2018.*

Demography is destiny, or so they say. The meaning implied is that demographic trends unfold like big waves in the ocean. They start far out on the horizon and then they crash and shake the ground as they break at the end.

The subject of our discussion today is Demography and the Economy, with an emphasis on the United States. But note is taken of the more extreme trends in other developed countries, and the strikingly similar challenges arising in many emerging markets.

While my bibliography includes National Bureau of Economic Research (NBER) working papers and various World Bank publications and presentations, I was fortunate that Jim Poterba (President of the NBER) pointed me in the direction of a major report published by the National Research Council, which at the behest of Congress was asked to produce the report entitled *Aging and the Macroeconomy, Long Term Implications of an Older Population*.[1] Much of this presentation today will be based on that superb work. I will not be citing quotes as I speak but a written version of my remarks provides sources and pages.

**I. How do we project Demographic Trends?**

Long run projections in demography seek to foretell the way in which an economy will be affected by changes in a few crucial factors relating to births and deaths. Key items include life expectancy, the rising numbers of what are called "oldest old," trends in fertility amongst the child bearing population, net immigration, and dependency ratios which express the changing numerators and denominators in those who need to be supported (0-14 and 65+) divided by those who are presently of working age (15-64).

The aging of the U.S. population, for example, is the result of both people living longer and lower birth rates among the fertile population. Fifty years ago average life expectancy in the United States was 67 and 73 for males and females, respectively. The numbers now are 76 and 81. At the same time, people are **choosing** to have fewer births and have their children later in life, so birth rates are lower. In the wake of WWII, the fertility rate was 3.7 births per woman; by the 21st century it is less than 2.1.[2] With these trends unmitigated, it would be certain that the population of the U.S. would age.

[1] National Research Council. (2012). *Aging and the Macroeconomy. Long-Term Implications of an Older Population*. Committee on the Long-run Macroeconomic Effects of the Aging U.S. Population. Board on Mathematical Sciences and Their Applications, Division on Engineering and Physical Sciences, and Committee on Population, Division of Behavioral and Social Sciences and Education. Washington, D.C.: The National Academies Press.
[2] National Research Council, p. 1

Projections to the year 2050 are possible because everyone who will reach age 65 by 2050 is already born, including the young people who will be in the workforce by then.[3] Expressed another way, in the developed world the median age has risen from 29 years in 1950 to 39 in 2010 and is projected to reach 48 by 2050.[4]

**II. Degrees of Uncertainty**

Demographers use four different methods to assess the degree of uncertainty. The first is scenarios, which rely on experts for high and low estimates of fertility, mortality, and immigration. But there are statistical problems with the assumptions of continuity from year to year and how to combine births and age of death. A second approach tries to estimate uncertainty by looking at how successful past forecasts have been. A third approach relies on probability distributions for future paths. And a fourth is "time series analysis" which combines the methods with statistics to model not only trends but patterns and persistence in the trends.[5]

One other factor weighing on the trends are the bulges in demographics caused first by the baby boomers, who are in retirement now, and then the millennials, who are starting to outnumber the boomers.

> "Millennials are on the cusp of surpassing Baby Boomers as the nation's largest living adult generation, according to population projections from the U.S. Census Bureau. As of July 1, 2016 (the latest date for which population estimates are available), Millennials, whom we define as ages 20 to 35 in 2016, numbered 71 million, and Boomers (ages 52 to 70) numbered 74 million. Millennials are expected to overtake Boomers in population in 2019 as their numbers swell to 73 million and Boomers decline to 72 million."[6]

Demographers also need to be aware of the overall health and level of disability in both the working age and elderly populations. "Functional status" is the term that refers to the ability of the retirement age population to continue to work. The ratio is also affected by those requiring disability payments even before a stipulated retirement age. When it comes to the macro impact of demographic trends, "Current and likely future disability rates in the so-called 'young-old,' those aged 65-74, are of special interest, because the future workforce may well include many individuals in this age group working part time or in flexible arrangements as a response to the later onset of social security benefits and increased workforce demands."[7] The disabled would diminish this number. And, of course, Medicare costs are greatly impacted by the wellness of the elderly population.

[3] Ibid., p. 16
[4] Ibid., p. 14
[5] Ibid., pp. 57-58
[6] Fry, Richard. (2018). "Millennials projected to overtake Baby Boomers as America's largest Generation." Pew Research Center. (http://www.pewresearch.org/fact-tank/2018/03/01/millennials-overtake-baby-boomers/)
[7] National Research Council, pp. 62-63

From the 1980s to 2000s, there was a happy trend of **significant progressive reduction** in functional impairment in older Americans. This area is complex to summarize because of cross currents in socio economic groups. There are well documented correlations between more education as well as the cessation of smoking with greater functional capacity. Poverty leads to declines in function. "Poverty is related to not only the onset but also the course of disability, leading to the widely accepted view that poor may age as much as a decade sooner than those who are well off."[8]

While those benefits in function continue for the oldest amongst us, the progression has stopped for now. "The current prevailing view is that the period of declining …disability in older persons ended in the beginning of the last decade."[9]

And there seem to be increases in disability in the working age population, which is a whole separate topic for discussion. But bottom line: there is lots of uncertainty about where these trends are going.

**III. Retirement Age**

One of the most potent ways of reducing the financial and fiscal stress of aging populations in any nation is to leverage the gains in functional status by increasing the employment rate of older people. Until the mid-1990s the trend was the opposite. "In the United States, the median number of years in retirement for men increased nearly 50 percent between 1965 and 2003, from 13 to almost 19 years."[10] The gains were roughly split between gains in life expectancy and earlier retirement. In other industrialized countries, those trends have been more extreme.[11]

The gains from prolonging labor force participation are extensive. You increase production, which increases potential tax revenue. Personal savings may also increase. If public and private savings increase, deficits can come down and more resources can be freed up to support education of the young to lengthen their retirement age in a virtuous circle. In the view of the Commissioners, two key "ingredients" would facilitate longer working lives. Penalties, such as exist in state and local defined benefit plans, which induce retirement at a certain age, must be eliminated. And the false belief that there are a fixed number of jobs and, thus, an elder staying on displaces a younger person looking for a job, should be eliminated.[12] If social security benefits were indexed to longevity changes, the systems we rely upon would become sustainable. But, of course, the distributional impact would fall more heavily on the poor who have a shorter life expectancy.[13]

[8] Ibid., p. 68
[9] Ibid., pp. 72-73
[10] Ibid., p. 104
[11] Ibid., p. 104, Figure 5-16
[12] Ibid., p. 105
[13] Ibid., p. 105

Looking abroad, the OECD reported in 2009 that 13 out of 30 OECD countries had linked pension benefits to life expectancy in the public systems. Germany maintains a DB system but bases benefits on sustainability.[14]

III. Aging, Productivity and Wealth

The links between demographics and productivity are complicated. Surprisingly, using only the nominal age, the impact of the **aging** population does not change the long-term numbers by much. But demographers have widened the lens to include the determinants of productivity and found further links. It is important work because "improvements in productivity play a central role in the growth of long-run living standards, and… small changes in productivity growth will lead to large improvements in living standards over time."[15]

You would think that an aging population, especially with lengthened life expectancy, would diminish productivity through a reduced proportion of workers in the economy. Here is how the numbers work:

Productivity defined as **net national product per person** grew at 1.56% per year over the 50 years of 1960-2010. Workers as a fraction of the population **grew** at .31%, thanks to demographics and women joining the workforce in greater numbers. Growth in output per capita measured 1.88% per year.[16]

But the outlook is changed for the two decades following, that is from 2010-2030. The workforce is expected to **decline** by .24% per year, as the baby boomers retire. That is a swing of .55% in the percentage of the population that is in the workforce.

Assuming that productivity just continues its growth at a rate of 1.56% per year until 2030, this would produce growth in income per capita of 1.32% per year, instead of 1.88%. "So population aging will tend to slow the growth in income per capita by about .55 percentage points per year over the next two decades relative to past growth since 1960." Not trivial but not headline grabbing either.[17]

This straightforward calculation reflects only the aging factor. It does not reflect subtler effects, like the increased skills and experience of a workforce that is maturing, nor the rise in their consumption. The adjustments are captured in what is called the "weighted support ratio," which is equal to the "hypothetical labor supplied by the population divided by the consumption by the population." After making these calculations, the committee concludes that "average living

[14] Ibid., p. 105
[15] Ibid., p. 106
[16] Ibid., p. 19
[17] Ibid., p. 19

standards will continue to rise over the coming decades, but that population aging will make the rise somewhat slower than would otherwise be expected."[18]

Now bear with me for further complication. Demographers explain that there are several factors than can amplify or offset the decline we spoke of. Those factors could include changes in productivity, in labor force behavior, and in government policies. For example, Medicare and Medicaid are consumer goods and when the government offers more (or under Trump, less) of them it counts as increased consumption. In that sense, the elderly population is also consuming more.

Drilling down into the determinants of labor productivity growth is essential to forecasting the macro impact of demographic trends. Inputs include private and public capital, net ownership of foreign assets, as well as education and training. For those with an interest, Chapter 6 ("Aging, Productivity, and Innovation") of *Aging and the Macroeconomy* provides a guide to the determinants of productivity including "those generated by increases in the quantity and quality of inputs and those generated by technological change and other improvements in efficiency."[19]

How aging affects wealth is another large topic in the demographic field. Once again, calculations of the impact are intricate. Let me quote an example:

> "One important…factor in a nation's total wealth holding is government debt. Private households that buy government bonds view them as part of their wealth holdings, and these bonds may inhibit or crowd out holdings of capital and other assets in their portfolios. To the extent that households in aggregate do not raise their saving to prepare for the increased taxes that are required to pay the interest, government debt can crowd out national wealth. Over the period 2006-2011, the debt-output ratio in the United States rose by over 30 percentage points. [Author's note: not including Medicare and Social Security implied liabilities.] If the rising debt reduced capital and other wealth, then national income would be lower by this amount times the rate of return on wealth."[20]

**IV. What are the Options?**

Despite all the uncertainty, the Committee on the Long-run Macroeconomic Effects of the Aging U.S. Population rose to the challenge posed by Congress and concluded its report with a range of options for adapting to the demographic changes facing the U.S. in this decade and beyond.

Old age dependency is virtually certain to rise in the U.S., with attendant fiscal imbalances. The Committee lays out the four ways the country can **adapt** to the demographic demands:

(i) Workers can save more and prepare for retirement;

[18] Ibid., pp. 19-20
[19] Ibid., p. 21
[20] Ibid., p. 22

(ii) Living standards of the elderly could be reduced;
(iii) Retirement could come at an older age;
(iv) Today's workers could make larger transfers to the elderly.[21]

The options rest on some notion that people would behave more "rationally" if there were less uncertainty. Households "might change their life-cycle consumption patterns if they fully anticipate the need to build a nest egg to sustain them over a longer retirement period."[22] But even if households behave well, there is still the problem of resolving the overhang of insolvency for Social Security and Medicare and the inadequacy of the safety net because of low savings.

In August, the *Wall Street Journal* reported that the rate of bankruptcy for Americans older than 65 has tripled since 1991. The size of the aging population only rose a small percent but the combined impact of eliminating defined benefit pensions and reductions in the safety net have had their impact. The median debt for bankrupt seniors is $101,600, while the median net worths for those in bankruptcy is negative $17,390![23]

Working longer is an important and feasible alternative. There has been little adaptation in retirement age, despite the improved health and lengthened life expectancy. As discussed above, "the potential for work is much greater than is reflected by the proportions of elderly actually working."[24]

Reducing the benefits of the elderly so as to align them with current tax and saving rates is politically fraught. The best known of the opponents is AARP (which stands for American Association of Retired Persons), which both lobbies the politicians and provides the elderly advice to activate their efforts. *Aging and the Macroeconomy* was written prior to the Trump tax reform and deficits, but the new fiscal context only exacerbates the huge mismatch between our entitlement programs and government revenue.

**V. Assets in Retirement**

Boomers won the lottery all the way to the grave. As many of you know, in the old days, many workers in both the public and private sectors could look forward to early retirement ages with defined benefits; capital market risk was shouldered by the plan sponsors.

With the evolution to defined contribution (DC) plans, arguably financial stability increased as corporations could cap their exposure to benefit payouts. Instead of a lifetime annuity, retirees would receive a lump sum with a complex decision to make regarding annuities or investments. DC plans did not create incentives to retire, and the National Academies Commissioners opine

[21] Ibid., p. 24
[22] Ibid., p. 25
[23] Tergesen, Anne. (August 7, 2018). "Bankruptcy Filings Surge Among Older Americans." *The Wall Street Journal*. (https://www.wsj.com/articles/bankruptcy-filings-surge-among-older-americans-1533641401)
[24] National Research Council, p. 25

"the increased prevalence of DC plans is, perhaps, the main reason for the increase in the labor force participation rate of older workers since the mid-1990s."[25]

Chapter 8 ("Capital Markets and Rates of Return") of *Aging and the Macroeconomy* examines the issues around aging and asset returns and prices. It is the one chapter I recommend for reading by RockCreek colleagues. A sad irony is that the rates of return available in the future will have little impact on the finances of retirees as a whole because they saved so little![26] But aging of the **working** population will lead to higher wealth per capita, which could drive down average returns of capital. For the two-handed economists, population aging will raise returns to the extent they are financed by increased government debt—thank you, Donald Trump.

These trends are similar around the world, where the cross currents of economic and political events dwarf the effects of aging on capital market returns. "Globalization of financial markets implies that broader forces—particularly the overall macroeconomic environment, the business cycle, shifts in global savings and investment patterns, and the rise of high savings countries such as China—are likely to dominate the pattern of capital market returns in the coming years."[27]

**VI. Going Global**

In 2012, the World Bank hosted a conference on International Insurance, which included a presentation on "Global Demographics: How it Affects GDP Growth, Inflation, Capital Flows & Asset Allocation."[28] The speaker was Dr. Amlan Roy, who was head of Global Demographics and Pension Research at Credit Suisse, at the time. He has since moved to State Street.

Roy argues that there are three popular misconceptions about demographics. It is "incomplete and misleading" to think that the field is only about **long-term** impacts, which are **predictable** and **age related**. Instead, he stresses that it is about people of all ages and how they behave as consumers and workers. This is just the point of the National Academies study, but Roy takes a global focus, not centered on the U.S.[29]

He presents the global demographic transition in five unfolding stages.[30] *Stage 1* is historic, with high and fluctuating death and birth rates and a stable population. *Stage 2* has falling death rates but high birth rates with large increases in population. Examples are India, Indonesia and Mexico. *Stage 3* has falling death and birth rates and stable population, and this group includes the U.S., UK, China, and Brazil. In *Stage 4*, illustrated by Italy and Russia, the low birth and death rates again lead to stable population. Finally, comes *Stage 5*, with very low birth rates, death rates

[25] Ibid., p. 27
[26] Ibid., p. 27
[27] Ibid., pp. 27-28
[28] Roy, Amlan. (October 15, 2012). "Global Demographics: How it Affects GDP Growth, Inflation, Capital Flows & Asset Allocation?" 2012 World Bank International Insurance Symposium.
[29] Roy, p. 2
[30] Ibid., p. 6

higher than birth rates resulting in a declining and aging population, perhaps the future for Germany and Japan.

The macro economic impact of these demographic trends is not straightforward because **policy matters**. Echoing the Academy, Roy prescribes abolition of mandatory retirement with flexibility to work part time, using technology to facilitate female labor participation, selective immigration, and using outsourcing and offshoring to expand the pool of workers.[31]

Roy calls for asset managers along with pension and insurance fund managers to focus on the need for new solutions to help clients adjust to the present and oncoming claims. There are "statistically strong links between demographic variables and aggregate saving, investment and the current account balance."[32] As an example, he argues that the decline in savings in Japan is greater than the investment decline, and so the current account will turn negative from 2015.[33] Of course, he was spectacularly wrong in 2016, when Japan "attained its second-biggest current account surplus on record," due to cheaper oil, more tourism, and a record return of investments abroad.[34] Just a reminder that short-term demographic forecasts are always at risk from surprises in the macroeconomy!

Roy calls for a "back to basics" approach in managing longevity risk in the low and middle-income countries. Retirement age must be linked to life expectancy, and long-term promises need to allow for resetting when demographic developments unfold in unprojected ways. Both education and enhanced risk sharing amongst participants is required.[35]

Economists are eager to use the demographic lens to look into the future of economic activity. In another example, David Bloom, Mathew McKenna, and Klaus Prettner published an NBER Working Paper this past summer, which estimates the size of the workforce by 2030 to project the number of jobs that will be required in different parts of the world in order to cap unemployment at 4% for adults and 8% for youth.[36] But they are not simply aiming for more jobs; using UN proclamations and Millennium goals, they seek to measure the availability of "decent" jobs in regions of the world.[37] And they add the loss of jobs due to automation.

> "Globally, an estimated 734 million jobs will be required between 2010 and 2030 to accommodate recent and ongoing demographic shifts, account for plausible changes in labour force participation rates and achieve target unemployment rates….Failure to

[31] Ibid., p. 4
[32] Ibid., p. 23
[33] Ibid., p. 24
[34] Kajimoto, Tetsushi. (February 8, 2017). "Japan logs biggest current account surplus since 2007." *Reuters*. (https://www.reuters.com/article/us-japan-economy-current-idUSKBN15N0E1)
[35] Roy, p. 37
[36] Bloom, David E.; Matthew McKenna; Klaus Prettner. (July 2018). "Demography, Unemployment, Automation, and Digitalization: Implications for the Creation of (Decent) Jobs, 2010-2030." *NBER Working Paper Series*. National Bureau of Economic Research.
[37] See Bloom, pp. 13-14, for the economists' definition of "decent" jobs.

> create the jobs that are needed through 2030 would put currently operative social security systems under pressure and undermine efforts to guarantee the national social protection floors (of the UN)."[38]

The nub of the problem lies in the low and lower middle-income countries, especially Sub-Saharan Africa and parts of South Asia, with pockets in other areas. These countries account for more than 80% of job creation in the two decades, with more than 90% of overall global population growth.[39] He concludes with a dose of optimism, so far unwarranted by the facts. A virtuous circle is possible if there are more *decent* jobs for the expanded number of workforce participants. Especially for women, getting a decent job is likely to reduce fertility and expand education for youth; and for the youth, more education yields better jobs as they enter the workforce.[40]

Global poverty has shifted geographically, while "extreme poverty" has declined markedly. Even South Asia—with India, Pakistan, and Bangladesh—has seen the numbers fall from close to half the population in dire straits to slightly above 10% by World Bank count. But in Sub-Saharan Africa, where the poverty rate has fallen from 54% in 1990 to 41%, "population growth has been so rapid that the number of people in extreme poverty has climbed above 400 million from 278 million in 1990."[41]

Japan, of all places, adds one more wrinkle. As reported just this summer, Japanese employers have looked to women and the elderly to meet the workforce demand. In an analysis released in July, the Bank of Japan reported that these new workers required only small wage increases. The cap on wage growth suppressed prices and inflation expectations, which allowed Japan to maintain its extremely low interest rates in the face of low wage growth.[42]

**VII. Conclusion**

In closing, my key message is that Demography has important implications for macroeconomic trends. Each cohort can be seen for its differentiated behavior as consumers, savers, and investors.

The fiscal impact is particularly important and differs across countries or regions depending on both wellness and the size of the safety net provided by government. Both Medicare and Social Security should be seen as enhancing consumption by the elderly. Medicaid enhances consumption by the poor.

[38] Bloom, p. 1 (Abstract)
[39] Ibid., p. 18
[40] Ibid., p. 29
[41] Zumbrun, Josh. (September 19, 2018). "World Poverty Falls Below 750 Million, Report Says." *The Wall Street Journal*. (https://www.wsj.com/articles/world-poverty-falls-below-750-million-report-says-1537366273)
[42] Fujikawa, Megumi. (August 1, 2018). "Women, Seniors to Blame for Keeping a Lid on Japan's Wages." *The Wall Street Journal*. (https://www.wsj.com/articles/japans-senior-moment-keeps-a-lid-on-wages-1533124736)

When government income support and healthcare are financed by current revenue, revenue collection balances out the expenditures of government, so there is no net effect on savings/investment. But deficit financing through government bond markets adds an overlay of macro impact, through its effects on interest rates and its displacement of increased investment in real sectors such as infrastructure, or research to enhance productivity growth. The private sector invests in the government bonds to the detriment of other more productive long-term investments.

The calculations to measure potential impacts from demographic change are long term, intricate and often not straightforward. Demography will not affect your forecasts for the coming quarter or year. But like that wave in the ocean, it is worthwhile to keep an eye out on the horizon and consider each country's demographics when you compare macro outcomes across regions from real world shocks.

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Visit the NBER website (https://www.nber.org/) for Working Papers on demography.

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