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## Comment James M. Poterba

This chapter makes an important contribution to the rapidly-growing literature on the financial market consequences of demographic change. It is both technically sophisticated and substantively important. The technical innovations include the construction of a multicountry overlapping generation (OLG) model that is solved under the assumption of perfect foresight and the careful modeling of uncertainty in the labor income process facing individuals. Allowing such uncertainty induces both precautionary as well as life-cycle motives for individual saving, thereby moving beyond many previous studies that have counterfactually assumed that there are no intergenerational wealth transfers.

The substantively important conclusions in this chapter concern the impact of demographic change on wages, the return to capital, and the pattern of international capital flows. There is broad theoretical consensus on the direction of change in each of these variables that follows from a decline in the birth rate and a corresponding increase in average population age. Yet whether the resulting effects are likely to be large or small is critically important for a range of issues, including the structure of long-term fiscal policy and the appropriate level of saving by households that are preparing for retirement. Simulation models are the best way to develop reliable answers to questions about the magnitude of the effects of population aging, but one always worries that these models may neglect important factors

that are quantitatively significant. The model developed in this chapter addresses a number of concerns that have been raised with earlier simulation studies, and in the process, provides greater confidence about the likely quantitative importance of the financial market consequences and other effects of population aging.

The authors divide the developed world into three “nations”: the United States, the European Union (EU), and the rest of the Organization for Economic Cooperation and Development (OECD). They draw population projections by age from United Nations benchmark forecasts, and they find the transition paths of the three economies over the next forty-five years given the projected age structure. They solve the model to evaluate the “autarky” case for the United States, and they compare this outcome with the result when there are capital flows between the three hypothetical “countries.” They also introduce a stylized Social Security system into each country. Because current tax and benefit structures are not sustainable in many nations, including the United States, the authors consider several ways of restoring balance to the Social Security system, and they evaluate the economic effects of each alternative. One of the key contributions of the analysis is the quantification of the differential effects of restoring Social Security balance by changing the replacement rate for retirees, and restoring balance by increasing tax rates, on wages, rates of return to capital, and cohort-specific welfare.

The baseline findings suggest that the demographic transition that is already underway is likely to reduce the rate of return to capital. While the magnitude of this decline depends on the degree of capital market openness, a decline of 50 basis points appears possible in the next two decades, and 90 basis points in the next half century. There are also important changes in the economywide average real wage, stemming from variation in the capital-labor ratio over time. Comparison of closed-economy results for an economy like the United States, and open-economy results for a hypothetical global economy that combines the United States, the EU, and the rest of the OECD, shows substantial fluctuations in the U.S. capital account as a result of demographic change. In the near term, global demographic pressures encourage the United States to import capital because the rest of the OECD is, on average, older than the United States and, therefore, has a greater domestic capital to labor ratio. One virtue of the simulation model in this chapter is the careful quantification of the importance of capital market openness.

The model begins with hypothetical households that make labor supply and saving decisions and that face wage shocks. Such disaggregate modeling makes it possible to evaluate how population aging will affect hypothetical households of different ages in 2007, as well as households that have, as a result of their past earnings shocks, accumulated different levels

of financial assets. The simulation findings offer detailed evidence on the cohort-specific welfare effects associated with population aging. They quantify the extent to which individuals born into large cohorts, like the baby boomers, suffer from reduced lifetime utility as a result of lower lifetime wages, the consequence of supplying labor when it is plentiful, as well as lower rates of return on their investments. The central findings suggest that while those in large cohorts are less well off than those in smaller cohorts, the adverse effect translates to a reduction in lifetime consumption of less than 1 percent, and, in some cases, less than one-half of 1 percent. Within the cohort that is currently alive and working, the cost of prospective population aging is greatest for those who have substantial wealth holdings. Substantial wealth-holders lose the most from the demography-induced decline in rates of return.

This chapter is among the first to offer insights on the disaggregate patterns within cohorts of the welfare changes associated with population aging. This is an important contribution, and it should spur substantial further work. There is great heterogeneity in wealth holdings, wage rates, and other attributes that affect lifetime utility within cohorts. The differences in the effects of population aging within cohorts may be as large as the differences across cohorts, and this chapter begins the analysis of such differences.

One of the chapter's most important innovations is the introduction of stylized Social Security programs in each nation and the analysis of how changes in Social Security policy might attenuate or reinforce the consequences of population aging. The authors identify a key interaction between the generosity of the publicly provided pay-as-you-go Social Security system and the aggregate effects of population aging on financial market returns. If the Social Security system is reformed in a way that reduces the generosity of the unfunded public program at the same time the demographic shift is increasing the capital-labor ratio in the economy, this will exacerbate the downward pressure on returns associated with population aging. The key assumption underlying this result is the crowd-out of private capital accumulation by the Social Security program. Any Social Security reform that induces more private saving will reinforce the increase in saving associated with population aging. Within cohorts, the households with substantial wealth will be most affected by the changes in wealth accumulation associated with Social Security reform because they have the largest interest in prospective returns.

One of the important conclusions of the Social Security analysis is that demographic changes have a larger effect on welfare in the presence of unfunded retirement income programs than in the absence of such programs. When the population ages in a nation with a pay-as-you-go Social Security system, preserving fiscal stability requires either benefit reductions or higher taxes. Regardless of which alternative policymakers choose, there

will be welfare reductions for some of the households alive at the time of the demographic transition. This chapter traces through the economic effects of each of these alternatives. Within the set of benefit reductions, it distinguishes between a policy of raising the retirement age and one of preserving the retirement age but adopting a lower income replacement rate. The analysis provides valuable evidence on how the alternative policies will affect both the distribution of welfare across cohorts as well as the pattern of lifetime utility levels within cohorts.

By embedding a hypothetical “U.S. economy” in a hypothetical “global” economy, the chapter provides important insights about the economic effects of global aging. The presence of international capital markets makes the rate of return in a given economy a function not only of its own demographic mix, but also of that in other nations. One interesting conclusion for those concerned about population aging in the United States is that international capital flows accentuate, rather than reduce, the downward prospective pressure on rates of return because the rest of the OECD, on average, ages faster and more dramatically than the United States. The chapter nevertheless shows that the welfare consequences of working with a closed-economy rather than an open-economy model are small. This is precisely the type of quantitative evidence that makes this simulation exercise so valuable.

While there is much to applaud about the open-economy modeling in this chapter, this aspect of the analysis also raises questions that require further attention. One potentially important shortcoming of the current model is the omission of developing countries, particularly the BRICs (Brazil, Russia, India, and China). These countries are likely to experience rapid economic growth over the next few decades, and they may emerge as important suppliers of global financial capital by 2050. Even though they account for a relatively small fraction of global capital supply today, their rapid growth and their prospective aging make them important components of any long-term analysis. Thus, while the near-term findings, those for the next ten to twenty years, may not be particularly sensitive to the omission of these countries, the longer-term results could be affected by this modeling assumption.

Considering the role of the BRICs in the current model underscores the uncertainties of any long-horizon projection such as the one developed here. Once one recognizes that the effect of population aging in the developed world on asset returns in 2050 is likely to depend on the intervening growth rate of the BRICs, one realizes that some parameters that are very difficult to predict—such as that growth rate—may be consequential for the modeling exercise. Even in developed countries, there are important uncertainties that should be recognized. The average age at retirement in the United States fell by five years between 1950 and 2000, yet in the cur-

rent model, preferences and public policies are relatively stable, so such a dramatic change would not occur. Yet substantial changes could occur within the forecast horizon, and they could result in substantial divergences from the baseline analysis.

One of the most intriguing possibilities is a link between aggregate population age structure and the rate of productivity growth. Because demographic changes like those considered in this chapter take place over decades, any change in the rate of productivity growth over the simulation period can have large cumulative effects. This draws attention to potential shifts in the rate of productivity growth, which is treated as exogenous in this model. If older workers are more reliable, absent less often, and more committed to their jobs, this may lead to higher productivity growth when the average age in the workforce is higher and, consequently, alter the standard of living for households alive in 2050. Because there is little empirical evidence on the nature of such linkages, it would be premature for the authors to attempt to capture such effects in their modeling. However, recognizing the possibility of such effects suggests that all long-horizon simulation results should be viewed with some caution. This warning does not diminish the importance of using simulation tools to evaluate how various policy interventions or other shocks might affect the evolution of the economy.

Another potential extension of the model, like including the BRICs, which again flows naturally from the open-economy setting, is the analysis of immigration policy. The current model takes age structure as given, so it implicitly adopts the immigration and emigration rates assumed by the United Nations. One way OECD countries may expand the number of young workers and blunt the potential effects of population aging is by opening their borders to immigrants to a greater extent than they have in the recent past. There may be important differences across nations in the capacity to make such adjustments, and a model like the one developed here could be used to address the resulting impact on economic circumstances. The treatment of immigration may be particularly important for the analysis of Social Security programs and their impact on different cohorts. Institutional details matter in this context because the net effect of greater immigration on the financial status of Social Security depends on whether the immigrants are legal or illegal and on whether benefits are paid to individuals who return to their home country in retirement.

Another concern with this model, which could be addressed in future work, involves the costs of raising children and the divergence between the treatment of young and old dependents. While elderly dependents are explicitly recognized in the model because they receive Social Security benefits and draw down their wealth holdings, there are no children. Economic agents are born at age twenty, fully educated and ready to enter the labor force. In practice, countries with high birth rates usually incur substantial costs in raising children. These costs include direct outlays for schooling,

health care, and other essentials, as well as reductions in labor force activity of parents. The model does not recognize that a decline in birth rates that underlies the demographic transition of the next half century is likely to result in reduced outlays for child-raising. Adding this effect would potentially raise the level of per-adult output during part of the period when the population is aging. There are also potential effects on government budgets because governments are most directly involved in providing services to the young and the old. An analysis that focuses only on Social Security, but neglects school spending, overstates the fiscal effects of population aging.

These suggestions for enhancing the model to tackle additional issues, or to add realism on some dimensions, do not detract from the substantial and valuable contributions of the current analysis. The authors have made great strides in developing a realistic and insightful multicountry model that can be used to study a wide range of different issues relating to population aging. I expect that this powerful new tool, which has already generated important findings in the current chapter, will in the future yield further discoveries on a variety of other issues.