Seven U.S. Economic Models Project Rapid Growth of Federal Debt

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On May 16, 2019, PWBM participated in a session at the National Tax Association (NTA) 49th Annual Spring Symposium. The session compared overlapping-generations (OLG) models from Penn Wharton Budget Model (PWBM), the Congressional Budget Office (CBO),[1] the U.S. Senate Joint Committee on Taxation (JCT),[2] EY QUEST,[3] Diamond-Zodrow (DZ)[4] from the Rice University, Texas, Overlapping Generations USA (OGUSA)[5] and the Global Gaidar Model (GGM).[6]

This NTA session constituted the second round of the OLG modeling meetings organized by the CBO. The goal of these meetings is to learn about the implications of alternative modeling choices for projecting U.S. economic outcomes under pre-specified changes in U.S. fiscal policy. CBO's presentation is available here. All of the models were executed under very simplified policy and economic assumptions to ensure comparability across models. Besides only focusing on a simple benefit cut, the analysis only reported percent changes in key macroeconomic variables (e.g., percent changes in GDP) rather than levels (e.g., actual GDP) and budgetary impacts (e.g., changes in program costs), consistent with an actual score.

Projections differ across models because of alternative ways in which they are constructed and calibrated, especially on the sensitivity of individuals' choices of how much to work and earn and how much to consume or save over time. PWBM's projections of macroeconomic variables turned out to be quite close to the CBO's results in key macroeconomic variables.

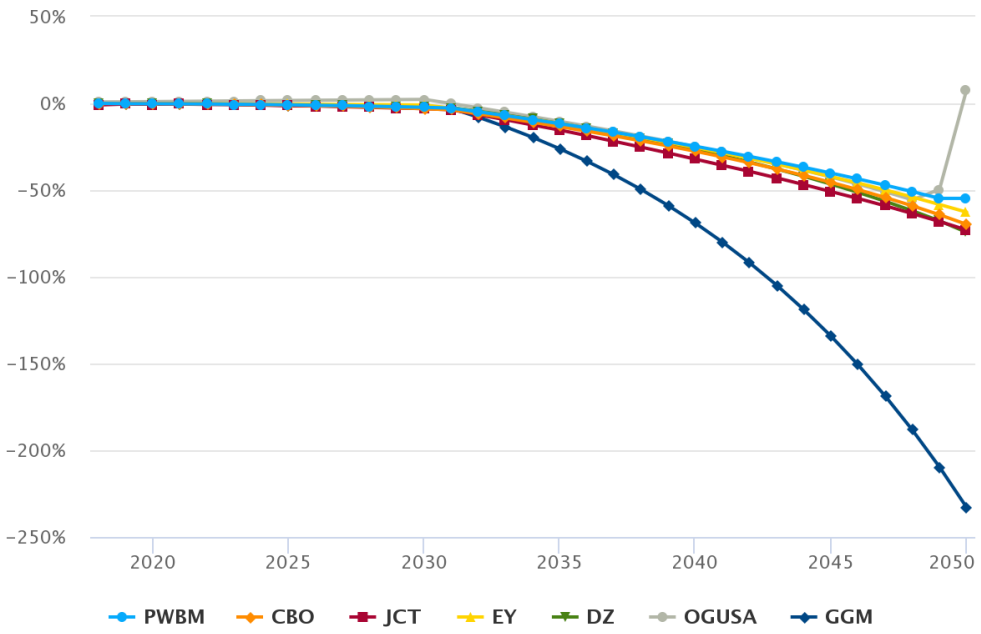
Each modeling group reports how the economy's path changes under the alternative policy of a preannounced Old-Age and Survivors Insurance (OASI) benefit cut of one-third beginning in 2031. This simplified and stylized policy change was chosen to fit within the capabilities of all the models. PWBM can model highly complex Social Security reform proposals. In fact, PWBM has modeled the Social Security 2100 Act and options for return Social Security to financial balance. In addition, our Social Security simulator shows the effects of 648 policy combinations.

The model comparison metric for each macroeconomic outcome variable is the change in the variable's time path under the new policy relative to the path projected under current policy. Although the results presented at the symposium were limited to changes in variables, models that are supported by a microsimulation, such as PWBM's and CBO's, can also analyze levels of economic indicators. A critical assumption underlying outcome differences across models is how open the U.S. economy is to international capital flows.

Comparing Model Projections

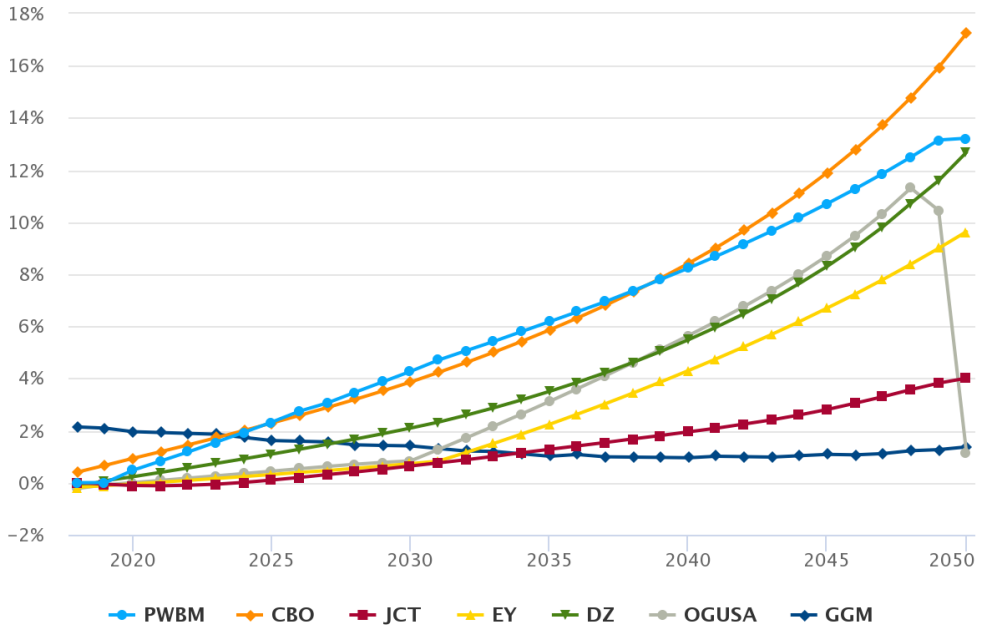
Figure 1 shows that all except one of the models show that the OASI benefit cut in 2031 reduces the debt-to-GDP ratio by between 55-75 percentage points approaching mid-century. Under PWBM's model (light blue line in Figure 1), this ratio declines by 55 percentage points (from 285 percent to 230 percent) whereas the decline projected by the CBO (orange line in Figure 1) is 59 percentage points.

Figure 1: Change in the Debt-to-GDP Ratio



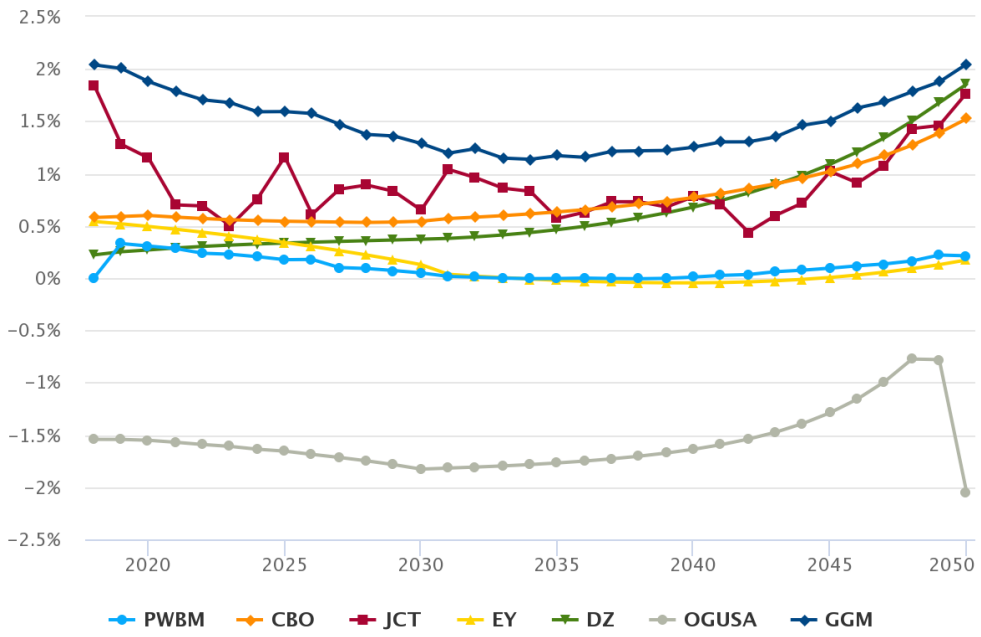
Projections of growth in the capital stock differ significantly across models are seen in Figure 2. The differences mostly arise from alternative international capital flows assumed by different models. The OASI cut policy induces model individuals to consume less and work more, thus generating additional national saving. The more closed the economy is to foreign capital flows, the greater the share of increased saving that is retained within the United States. PWBM assumes that foreigners purchase 40 percent of new debt issued by the federal government each year and provide 40 percent of capital flows needed to equilibrate U.S. interest rates to the world rate. The CBO's openness assumption is similar to PWBM's as reflected in similar projection outcomes for growth in the U.S. capital stock.

Figure 2: Change in Capital Stocks



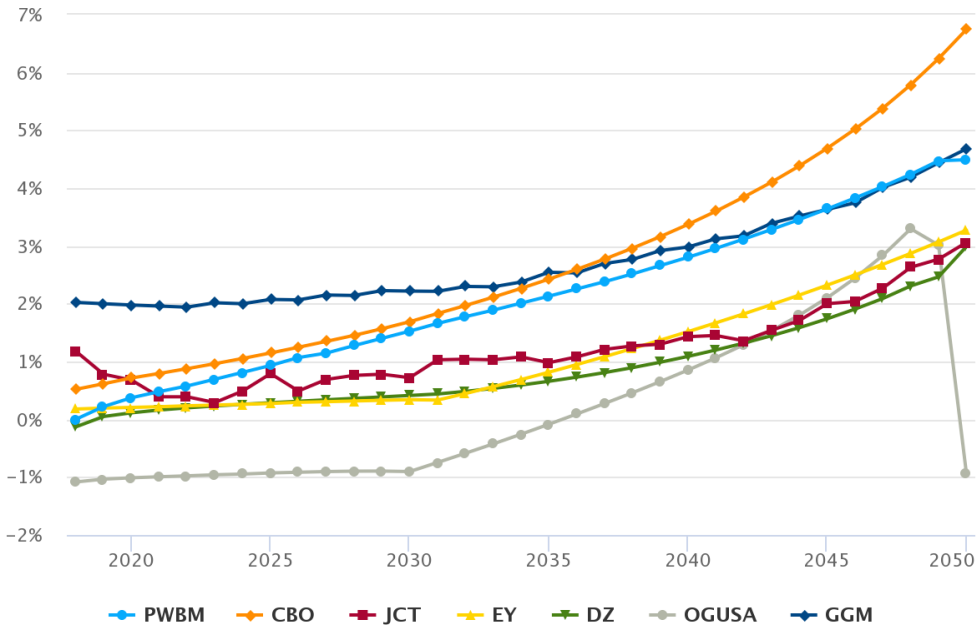
As seen in Figure 3, different models assume different sensitivities of labor supply by individuals in response to the OASI cut policy. In addition, higher retention of capital within the economy increases wages and thereby elicits a stronger labor supply response to the OASI cut policy. PWBM's projection of the labor supply response is in the middle of the range of model outcomes. It is smaller than that of the CBO, especially over the long term.

Figure 3: Change in Labor Supply



Output growth projections follow from labor and capital growth. More capital and a stronger labor response make for a larger increase in output over time in response to the OASI benefit cut policy. PWBM's projected output growth is less than that of CBO because of our lower projections of growth in the capital stock and labor supply.

Figure 4: Change in GDP



The NTA session brought forth three critical conclusions:

1. According to all model runs, under current fiscal policies, the U.S. economy appears to be fiscally unsustainable primarily because of rapid increases in national debt projected within the models.
2. Even significant policy adjustments such as an OASI benefit cut by one third after 2031 still leaves the U.S. with sizable debt relative to GDP by mid-century.
3. Projections of how such a policy alters the paths of key macroeconomic variables agree on the direction but not on the magnitudes of outcomes.

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Peter B. Dixon and Dale W. Jorgensen, eds., Handbook of Computable General Equilibrium Modeling (Elsevier, 2013), vol. 1, pp. 743–813, https://doi.org/10.1016/B978-0-444-59568-3.00011-0. ↩

5. OG-USA Model: Richard W. Evans and Jason DeBacker, "OG-USA: Documentation for the Large-Scale Dynamic General Equilibrium Overlapping Generations Model for U.S. Policy Analysis" (November 2018), https://tinyurl.com/y694ljom (PDF, 1.6 MB). ↩

6. Global Gaidar Model, developed by Seth Benzell, Maria Kasakova, Laurence Kotlikoff, Guillermo Lagarda, Kristina Nesterova, Victor Ye, and Andrey Zubarev: Seth G. Benzell, Laurence J. Kotlikoff, and Guillermo LaGarda, Simulating Business Cash Flow Taxation: An Illustration Based on the "Better Way" Corporate Tax Reform, Working Paper 23675 (National Bureau of Economic Research, August 2017), https://www.nber.org/papers/w23675. ↩