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## Comment on Chapters 1 and 2 Douglas W. Elmendorf

I am pleased to have the opportunity to discuss these two terrific chapters. The chapters are wonderful examples of treating data with care and using smart empirical techniques, all in the service of addressing a crucial economic issue. It is preaching to the choir at the Conference on Research in Income and Wealth (CRIW), but still worth emphasizing, that this sort of research is incredibly valuable to both the economics profession and the broader world.

These authors are the perfect people to do this sort of analysis. Dale Jorgenson and Zvi Griliches wrote the seminal paper on human capital and economic growth in the late 1960s, and Dale has been a leader through his whole career in thinking hard about the data needed to do rigorous, quantitative analyses of economic growth and productivity, and then inducing those data to be collected by him and his coauthors and government statistical agencies around the world. Dale's coauthors today—Mun Ho and Jon Samuels—and the outstanding team of authors for the other chapter I will discuss—Canyon Bosler, Mary Daly, John Fernald, and Bart Hobijn—have made important contributions to our understanding of economic growth, and these chapters are another significant step forward.

I am grateful for the authors' work on labor quality and economic growth. I will not have much to say about the details of their empirical approaches. Instead, my aim is to provide some context about how the sorts of projections provided in these chapters matter for economic policy making.

As the director of the Congressional Budget Office (CBO) for six years ending this past March, I will focus on how CBO constructs and uses projections of output growth. The CBO's budget projections depend on its economic projections, and vice versa. The CBO formulates projections of potential output, and then projects that actual output will converge back toward potential output, usually within a few years. And CBO builds up its projections of potential output using projections of labor, capital, and productivity. Therefore, projections of faster or slower growth of labor quality have a direct impact on projected deficits and debt.

Currently, CBO projects that real gross domestic product (GDP) will increase by an average of 2.3 percent per year during the next ten years.

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That figure stems from CBO's estimates that GDP is currently a little below potential and that potential GDP will increase by an average of 2.1 percent per year. Looking further out, CBO projects that real GDP will increase by about 2.1 percent per year in the eleventh through twenty-fifth years of its long-term outlook.

Suppose that GDP increased one-half percentage point per year more slowly than CBO now projects. That would leave output after ten years 5 percent lower than projected, and after twenty-five years 12 percent lower than projected. Using the agency's published rules of thumb for assessing the impact on the budget of different economic outcomes over the next decade, that lower path for GDP would make the deficit ten years from now \$345 billion larger than in the baseline projection and the cumulative deficit over the next ten years \$1.5 trillion larger. Using the agency's alternative long-term projections based on different projections of key economic factors, that lower path for GDP would make federal debt twenty-five years from now 125 percent of GDP rather than the 107 percent in the basic projections. The effect is not even larger because slower GDP growth tends to lower health-care-spending growth, future Social Security benefits, and interest rates.

In fact, CBO has revised down its estimate for future GDP quite significantly in recent years. Since 2007, the agency has lowered its projection for potential output in 2017 by about 9 percent, which is equivalent to lowering average annual growth by nearly 1 percentage point. That downward revision widened the projected budget deficit in 2017, all else equal, by more than \$500 billion. All else is not equal, because if the budget outlook had looked that much better three or four years ago, the policy actions that were taken probably would not have been taken. Still, it is clear that the budget outlook that drives so much debate depends very importantly on the agency's projections of output.

As I mentioned, CBO's projection of output over a decade varies one-for-one with its projection of potential output. That projection of potential output comes from a version of the growth accounting that these chapters do. However, in the agency's projections, changes in total factor productivity (TFP) include both changes in labor quality and changes in true TFP. Historically, improvements in labor quality have accounted for between a quarter and a third of growth in TFP as defined by CBO.

The CBO currently projects that growth of potential TFP over the coming decade will be close to the average growth of TFP over the past half century. In other words, CBO does not appear to be including any noticeable slowdown in the growth of labor quality. In CBO's long-term outlook, the agency projects a slight slowdown in TFP growth beyond the coming decade, attributing it to a slower rate of increase in educational attainment and other factors.

Of course, CBO is aware of the data suggesting a slowdown in the rate of improvement in educational attainment and thereby in labor quality.

My colleagues and I became concerned that we had not made a sufficient adjustment for a deceleration in labor quality in part because our approach did not address labor quality in a systematic way. Therefore, we launched an effort to model labor quality explicitly so we could break it out of TFP.

Now let me turn to the chapters. As the authors have explained, their work is a very careful application of growth accounting to understand how labor quality has evolved in the past and is likely to evolve in the future. Both chapters do a tremendous amount of detailed work with the data, and both chapters present alternative projections based on different assumptions so that readers can evaluate the robustness of the results. The central analytic issue is how well differences in wages across age-education groups and others capture differences in marginal products—that is, labor quality. I will come back to that issue in a minute.

What if wage differences do not reflect only differences in marginal products? Wage differences probably reflect differences in marginal products for the most part, but wage differences also reflect other factors, which may be important for correctly interpreting the results in these chapters.

For example, what if wages rise faster with age than marginal products do? I am paid more now than I was a decade ago, maybe not because I am more productive but because I am climbing a wage ladder. Under this view, the economy may have gained less from the increase in experience as baby boomers aged than it appears from this sort of analysis. Therefore, we will lose less as baby boomers retire, and we can be more optimistic about the future.

As another example, what if wages reflect marginal products better now than they did in the past? Social customs may have restrained wage dispersion a few decades ago more than they do today. Under this view, labor quality may have increased less over time than it appears from this sort of analysis. Therefore, the compositional shifts studied here have been less important, TFP growth has been more important, and we can be more optimistic about the future.

The studies present a wealth of interesting information, but the key findings are the following:

- *Growth of labor quality did not diminish during the past decade as had been expected.* One key reason is that employment losses during the Great Recession were concentrated among low-wage workers. That disproportionate job loss pushed up the average wage among people who remained employed.
- *Growth of labor quality will probably slow significantly in the coming decade.* The extent of the slowdown will depend on the extent to which low-wage workers return to the labor force and employment, with more returning workers implying a greater slowdown. From my perspective, the scenarios in which employment-population ratios or labor force participation rates return to their precrisis levels seem quite unlikely,

because so far employment-population ratios and labor force participation rates show only very partial bounce-backs. Instead, it seems much more likely that those ratios and rates will stay close to their current levels. In that case, the chapters suggest that we will see a slowdown in labor-quality growth of a few tenths of a percentage point per year.

Let me mention three other points. One is that a return of low-wage workers to employment would raise aggregate output and the income of these workers, even though it would depress growth in labor quality. I do not think there is any ambiguity about the effects on the economy and on these workers: they will only be paid if their marginal products are positive, and they will only come back if their wages exceed their opportunity costs, so their return would increase overall output and workers' income.

The second point is that policies to support advances in educational attainment would raise aggregate output and those workers' income. It concerns me a great deal that under the current caps on annual appropriations, federal investments—including in education—will soon fall to their lowest share of GDP in at least fifty years.

My third point is that policies to encourage greater labor force participation would raise aggregate output and could increase or decrease the well-being of those workers. Here is why. One can encourage more participation either by improving what one gets *in* the labor force or by diminishing what one gets *outside* the labor force. An expansion of the earned income tax credit is in the former category; it would raise aggregate output and increase the well-being of those workers. Repealing the health care subsidies under the Affordable Care Act is in the latter category; it would raise aggregate output and diminish the well-being of those workers. We need to think carefully about what sorts of policies to encourage labor force participation we want to pursue.

Let me conclude by thanking Dale, Mun, Jon, Canyon, Mary, John, and Bart again for their terrific work.