Using Subjective Conditional Expectations to Estimate the Effect of Health on Retirement

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The future solvency of the U.S. Social Security program is threatened by projected costs exceeding revenues. The feasibility and effectiveness of increasing the retirement age hinges on workers' ability to work longer, which in turn depends crucially on how workers' health evolves as they age.

Our paper provides a novel strategy for quantifying the causal relationship between the health and labor supply of older workers and for simulating the effects of hypothetical changes to the health distribution of the target population on the population's labor supply forecasts at specified horizons. In particular, our paper addresses the following research questions of interest to the Social Security Administration:

1. Will currently healthy older workers have the health capacity to work in two years? In four years?
2. Will currently healthy older workers work longer in two years? In four years?
3. How does working longer depend on health? What is the distribution of these causal effects of health on work for these workers?
4. How would population-level forecasts of labor supply at two and four years change if the probability of entering low health at those horizons were reduced?

We address these questions with novel survey data on the labor supply and health expectations of a sample of healthy older workers participating in the *Vanguard Research Initiative* (VRI). In the 2014 wave of the VRI, these respondents were asked to report the likelihood (on a 0-100 percent chance scale) that they will be working to specified horizons (two and four years) under alternative health scenarios ("high" and "low" health). They also reported their unconditional likelihoods of working to those horizons and of entering those health states.

To answer Question 1, we analyze respondents' expectations about their health in two and four years. The mean of the distribution of respondents' health expectations can be interpreted as a population-level forecast of the proportion of currently healthy and working older individuals who will be in high vs. low health. These forecasts, which are shown in Figure 1, provide population-level estimates of current workers' capacity to work at the specified horizons.

For Question 2, we analyze respondents' unconditional expectations of working in two and four years. Once again, the mean of the distributions of respondents' working expectations yields a population forecast of the labor supply at the specified horizons. These forecasts, which are shown in Figure 2, represent population-level estimates of the proportions of currently healthy older workers who are predicted to work at the specified horizons.

For Question 3, we analyze respondents' expectations of working in two and four years where they turn out to be in high health or, alternatively, in low health. The mean of the distribution of subjective working expectations *conditional* on remaining in high health in two (four) years is an estimate of the *hypothetical* or *counterfactual* proportion of current workers who would work in two (four) years if all of them happened to remain in high health in two (four) years. The mean of the distribution of subjective working expectations, conditional on entering low health, has a symmetric interpretation. The difference between these two hypothetical or counterfactual quantities yields the subjective *ex ante* treatment effect (SATE) of health on work at the individual level. Figure 3 shows population estimates of the (absolute value of the) average SATE (ASATE) at two and four years.

For question 4, we use our SATE estimates to simulate the effect of reducing in half each person's baseline likelihood of entering low health in two and four years on the population labor supply forecasts at those horizons. We find that these hypothetical changes in the chances of entering low health increase the estimates of the proportion of individuals predicted to work in two years by 2 percentage points and in four years by 3 percentage points. Figure 4 shows the four-year estimates.

Figure 1: *2- and 4- Year Ahead Health Forecasts*

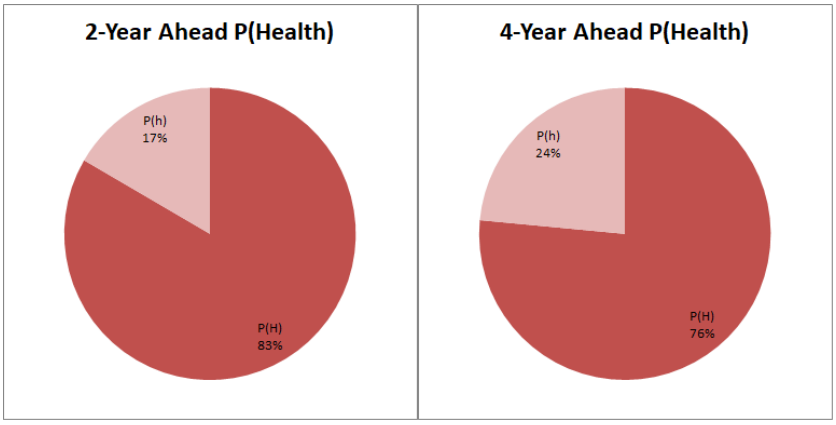

Figure 2: *2- and 4-Year Ahead Labor Supply Forecasts*

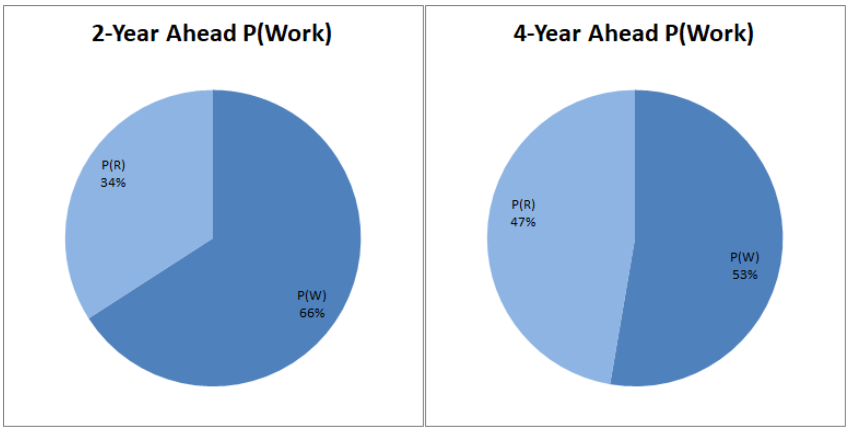

Figure 3: *2- and 4-Year Ahead Aggregate SATE*

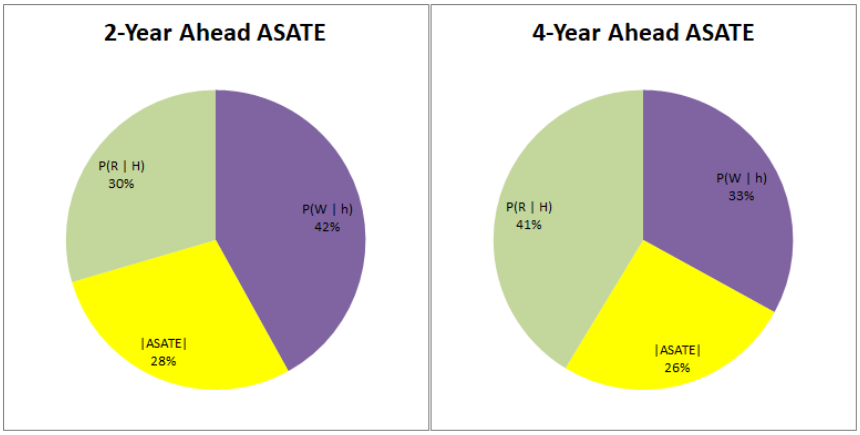

Figure 4: *4-Year Ahead Labor Supply Forecasts, Survey vs. Simulation with* $\tilde{P}(h) = P(h)/2$