Understanding Earnings, Labor Supply, and Retirement Decisions

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Understanding retirement behavior is fundamental to analyzing the impact that policy changes will have on the well-being of older Americans. How important are health shocks in triggering retirement? What are the effects of extending Social Security's Full Retirement Age (FRA) on the labor force participation rate of older workers? To what extent would the elimination of the payroll tax above the FRA induce people to stay in the workforce longer? These are important questions, and we seek to answer them in a framework in which retirement and earnings profiles are endogenous.

The retirement literature typically takes the wage process as given and estimates the date of retirement. One typically sees wages fall substantially before retirement. Raw wages for individuals who work fall over 25 percent between ages 55 and 65. In the retirement literature, this trend is extremely important for explaining retirement behavior. If workers do not earn much, it is privately optimal for them to retire. A policy such as extending the FRA to 70 could have negative consequences for workers who have low wages at this point in their lives. Life-cycle human capital models provide a different perspective. They take the retirement date as given, but model the formation of wages. Young workers optimally choose to invest in their human capital, which results in wage growth. Wages then level off in mid-career. As workers approach retirement, they optimally stop investing and allow their skills to depreciate. This behavior leads to a fall in wages right before retirement. These models have very different predictions about changes in the retirement age. In the first type of model, workers will see substantial declines in their wages, and we may be forcing workers to work at very low wages. By contrast, in the human capital model, investment will adjust. If the retirement age is extended to 70, workers will invest in human capital until a later age. Thus, rather than see wages start to fall at age 55, this decline would likely be delayed until the early 60s. Endogenizing the wage process could lead to very different welfare effects when extending the retirement age.

Quite surprisingly, aside from the seminal work in Heckman (1976), there has been little effort integrating these two important paradigms. This paper attempts to fill this void by estimating a life-cycle model wherein the wage, labor supply, and retirement choices are rationalized in one unified setting. After endogenizing both labor supply and human capital, this model is rich enough to explain the life-cycle patterns of both wages and labor supply, with a focus on wage patterns and retirement at the end of working life.

Specifically, we develop and estimate a human capital model in which workers undertake consumption, human capital investment, and labor supply decisions. We estimate the model using indirect inference, matching the wage and hours profiles of male high school graduates from the *Survey of Income and Program Participation* (SIPP). With a parsimonious life-cycle model in which none of the parameters explicitly depend upon age or experience, we are able to replicate the main features of the data. In particular, we match the large increase in wages and very small increase in labor supply at the beginning of the life-cycle, as well as the small decrease in wages but very large decrease in labor supply at the end of the life-cycle.

While our baseline model does not incorporate health, we estimate a specification that allows the taste for leisure to depend on health and for this effect to increase with age. Surprisingly, such an "enhanced" model does not significantly improve the fit of the life-cycle patterns of wage and labor supply of the SIPP data. We also show that even within this model that allows a direct and flexible effect of health on labor supply, health plays a relatively minor role in the decline in labor supply late in life.

We use the estimated model to simulate the impacts of various Social Security policy changes. Much serious work has been developed to quantitatively estimate the economic consequences of an aging population and evaluate the remedy policies. This previous research models retirement as a result of combinations of declining wages, increasing actuarial unfairness of the Social Security and pension systems, and increasing tastes for leisure. However, there is a notable difference between our model and the several papers in the literature. Prior work typically takes the wage process as given and focuses on the retirement decision itself. For example, when conducting the counterfactual experiment of reducing the Social Security benefit by 20 percent, the previous literature takes the same age-wage profile as in the baseline model and re-estimates the retirement behavior under the new environment. Since the wage had already been declining significantly and exogenously approaching the retirement age, working is, under the new policy, still less likely to be attractive for many workers.

However, as we show in our model, less generous Social Security benefits result in higher labor supply later in the life-cycle, so workers adjust their investment over the life-cycle, which results in a higher human capital level, as well as higher labor supply earlier. On average, the observed wage levels are 5 percent higher between 65 and 80. Over the whole life-cycle, observed average yearly wages, total labor income, and total labor force participation rates

increase by 1.5 percent, 2.17 percent, and 1.57 percent, respectively. By contrast, in the model with exogenous human capital, the percentage increases in yearly wages, total labor income, and total labor supply are less significant: 0.2 percent, 1.26 percent, and 1.31 percent, respectively. The differences are more dramatic in the experiments in which we remove the Social Security system, with the exogenous model underestimating most effects.

First, we remove the Social Security earnings test, which is effective between ages 62 and 70 in the baseline model. In the second, we delay the FRA by two years: the new FRA is 67 in this counterfactual experiment, while it is age 65 in the baseline model. In the third, we reduce the Social Security benefit proportionally by 20 percent. Removing the Social Security earnings test between ages 62 and 70 has a smaller effect on all variables; delaying the FRA by two years has a slightly larger impact; reducing the generosity of the Social Security benefit has the largest effect among these three. These policies increase labor force participation by 4.5, 5, and 7.5 months, respectively. In almost every policy counterfactual, the increase in the endogenously determined wage levels is substantial. This is especially true at old ages: 6 percent when removing the earnings test or reducing the Social Security benefit, 3 percent when delaying the FRA by two years, and over 10 percent when removing the Social Security benefit or the entire system. These are caused by increases in the human capital levels as a result of higher investment. For this reason, it is likely that ignoring the human capital investment channel would generate bias in terms of predicting the labor force participation rate at old ages in similar experiments.