A life-cycle model of unemployment and disability insurance

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ABSTRACT

A general equilibrium life-cycle model is developed, in which individuals choose a sequence of saving and labor supply faced with search frictions and uncertainty in longevity, health status and medical expenditures. Unemployed individuals decide whether to apply for disability insurance (DI) benefits if eligible. We investigate the effects of cash transfer and in-kind Medicare component of the DI system on the life-cycle employment. Without Medicare benefits, DI coverage could fall significantly. We also study how DI interacts with reforms of Social Security and Medicare and find that DI enrollment amplifies the effects of reforms.

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1. Introduction

According to the Social Security Administration (SSA), more than 8 million individuals received disability insurance (DI) benefits in 2011.[1] The likelihood of receiving DI benefits rises in age and more than 1 in 7 individuals at age 60–64 are DI recipients. Most, if not all, DI recipients are out of labor force and constitute a large fraction of non-employed population before the retirement age. To understand the pattern of labor force participation over the life-cycle, it is important to identify the roles played by DI in the context of risks individuals face, and the work incentives associated with this public insurance program.

This paper builds a structural life-cycle model of heterogeneous agents to study consumption, saving and labor supply decisions focusing on the roles of DI. Understanding the effects of public insurance requires a model that captures key risks individuals observe over the life-cycle and other insurance opportunities available to them, both privately and through the government. In our model, individuals face risks in longevity, employment, health status and medical expenditures. Markets are incomplete without state-contingent assets to insure away the risks, but individuals can engage in precautionary saving. The government provides partial insurance through transfer programs including unemployment insurance, disability insurance, means-tested welfare programs and Social Security. Individuals optimally choose allocations given the incentives embedded in the transfer system.

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[1] The figure is for disabled workers only and recipients of the federal Social Security Disability Insurance (SSDI), based on the SSA's Annual Statistical Supplement 2011. The total number including disabled widow(er)s and children is 10.3 million in 2010, according to the Annual Statistical Supplement to the Social Security Bulletin, 2011.

Employed individuals in our model can be separated from a job either exogenously or endogenously by quitting. Unemployed individuals choose search intensity, which affects the likelihood of finding a job. Once an individual is unemployed for a given period, he can apply for DI benefits if eligibility conditions are met. Individuals who have received DI benefits for two years automatically become entitled to Medicare benefits. Upon reaching the retirement age, individuals start to receive both Social Security benefits and the Medicare coverage.

The model is calibrated to key features of the U.S. economy using micro databases including the Medical Expenditure Panel Survey (MEPS) and the Panel Study of Income Dynamics (PSID). We use the model to address two questions. First, how do the cash and in-kind Medicare benefits of the DI system affect employment status over the life-cycle? Second, how do reforms of other transfer programs, including Social Security and Medicare, interact with DI enrollment?

Experiments show that both cash and in-kind benefits through Medicare are important in explaining patterns of employment and DI coverage. Eliminating the Medicare benefit for DI recipients can lower DI coverage by more than one-third and the employment rate can be higher by 1.3 percentage points. DI coverage is sensitive to the level of cash benefits as well. A 20% reduction of the benefits, for example, can reduce the coverage by a similar magnitude and raise the employment rate by 1.4 percentage points.

We simulate reforms of Social Security, Medicare and unemployment insurance. When a reform affects the incentives to apply for DI, quantitative assessment of a reform can differ from that in a model without DI. When a reform implies a need for more savings for retirement, individuals may choose to stay in the labor force longer and accumulate more wealth, rather than opting for "early retirement" through DI coverage. For example, when Social Security benefits are reduced by one-third, the employment rate of individuals at age 60–64 rises by 1.5 percentage points, much more than a rise of 0.4 percentage point in a model without DI.

Our model is an extension of incomplete market models pioneered by Bewley (1986), Huggett (1993) and Aiyagari (1994) in a life-cycle framework of Auerbach and Kotlikoff (1987), augmented with labor market frictions, stochastic health and medical expenditures and disability insurance. There have been recent papers that incorporate health shocks over the life cycle in this class of models to evaluate the roles of health status, medical expenditures and insurance arrangements. French (2005) estimates a life-cycle model of employment with stochastic health status and explains the pattern of job exits at old ages and the roles of Social Security benefit rules. De Nardi et al. (2010) build a model of retirees to study the effect of longevity risk and health expenditure uncertainty on the savings. French and Jones (2011) analyze labor supply and retirement behavior of old-age individuals, focusing on the roles of employer-based health insurance, Medicare and Social Security. Kopecky and Koreshkova (2014) use a life-cycle model to analyze the effect of nursing home expenses and Medicaid. İmrohoroğlu and Kitao (2012), Attanasio et al. (2011) and Jeske and Kitao (2009) analyze Social Security, Medicare, employer-based health insurance, respectively, in a model with health and medical expenditure uncertainties. Hsu (2013) studies the role of employer based health insurance on the distribution of precautionary savings.

A few recent papers added disability insurance in a structural life-cycle model. Low et al. (2010) build a dynamic model of consumption, labor supply and job mobility, estimate employment and productivity risks and quantify precautionary responses in labor supply and job mobilities. Low and Pistaferri (2011) add disability health shocks to Low et al. (2010) and study the impact of changes in the details of the DI program. Benitez-Sílva et al. (2011) analyze the effect of a policy that would encourage DI recipients to return to work through tax incentives. The three papers abstract from medical expenditures and Medicare benefits are not included in the DI system. To the best of my knowledge, this is the first paper in the line of the literature that builds a life-cycle model of consumption-saving and employment with medical expenditures and health uncertainty, augmented with endogenous DI coverage that consists of cash and Medicare benefits. Of course there are numerous papers that analyze reforms of transfer programs including Social Security and Medicare. The paper also contributes to this vast literature by investigating the interaction of reforms with the DI system.

The rest of the paper is organized as follows. The model economy is described in Section 2. The calibration of the model is discussed in Section 3. Section 4 presents the quantitative findings of the paper. Section 5 concludes.

2. Model

This section presents the model.

2.1. Demographics, preferences and labor market

There is a continuum of individuals with stochastic life-spans. Individuals go through a finite number of age groups stochastically, indexed by $j = 1, 2, \ldots, J$. The probability of transitioning from age j to $j+1$ is denoted by ϕ_j. Individuals face mortality risk and the probability of surviving until the next period is denoted by ρ_j and depends on the age of an individual. Bequests are accidental and they are transferred to the entire population in a lump-sum manner, denoted as x. The size of new entrants to the economy grows at rate n.

Preferences are time-separable and individuals derive utility from consumption c and leisure l according to the function $u(c, l)$. Future utility is discounted by the subjective discount factor β. Assets that are not consumed are rented out and earn the market interest r. Each individual has a unit of time, which can be spent for leisure, market work or job search. Individuals who participate in the labor market lose B_h^e units of disposable time, which can depend on health status h.