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Estimating willingness to pay for medicare using a dynamic life-cycle model of demand for health insurance☆

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ABSTRACT

Medicare is the largest health insurance program in the US. This paper uses a dynamic random utility model of demand for health insurance in a life-cycle human capital framework with endogenous production of health to calculate the individual willingness to pay (WTP) for Medicare. The model accounts for the feature that the demand for health insurance is derived through the demand for health, which is jointly determined with the production of health over the life-cycle. The WTP measure incorporates the effects of Medicare insurance on aggregate consumption through effects on medical expenditures and mortality, and consumption utility of health. The model is estimated using panel data from the Health and Retirement Study. The average WTP or change in lifetime expected utility resulting from delaying the age of eligibility to 67 is found to be $ 24,947 in 1991 dollars ($ 39,435 in 2008 dollars). However, there is considerable variation in the WTP, e.g., in 1991 dollars the WTP of individuals who have less than a high school education and are white is $ 28,347 ($ 44,810 in 2008 dollars), while the WTP of those with at least a college degree and who are neither white nor black is $ 15,584 ($ 24,635 in 2008 dollars). More generally, the less educated have a higher WTP to avoid a policy change that delays availability of Medicare benefits. Additional model simulations imply that the primary benefits of Medicare are insurance against medical expenditures with relatively smaller benefits in terms of improved health status and longevity. Medicare also leads to large increases in medical utilization due to deferring of medical care prior to eligibility.

1. Introduction

Medicare is the largest health insurance program in the US[1] According to the Congressional Budget Office the expenditures on Medicare benefits were $ 212 million in 1999, which was 12.4% of

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[1] Medicare was enacted in 1965 as Title XVIII of the Social Security Act designated "Health Insurance for the Aged and Disabled" and introduced in 1966. It covers individuals who are 65 and older and those with certain disabilities, and consists of three parts. Hospital Insurance or part A is provided automatically and free of premiums to all eligible individuals. Any person or spouse of a person who is 65 or older, a citizen or permanent resident of the US, and has been employed in a Medicare covered job for 10 years is eligible. All individuals who are entitled to part A coverage are eligible to enroll for Supplementary Medical Insurance or part B on a voluntary basis. Part B covers certain physician and medical services not covered under part A. In 1997 under the Balanced Budget Act, Medicare + Choice or part C was established and it provided options for Medicare beneficiaries to enroll in certain private sector health care plans. In 1973 individuals entitled to Social Security or Railroad Retirement disability cash benefits for at least 24 months, and most individuals with end stage renal disease became eligible for Medicare coverage. In 2000 individuals with Amyotrophic Lateral Sclerosis or Lou Gehrig's disease were allowed to waive the 24 month waiting period. On 8th December 2003 the Medicare Prescription Drug, Improvement and Modernization Act was passed by the US Congress. Under this act the Medicare + Choice HMO plans have been renamed Medicare Advantage. Detailed information about benefits is available at www.medicare.gov.

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federal outlays or 2.4% of GDP. In 2000 Medicare covered about 39.9 million or 13.9% of the US population of which about 34.4 million were aged 65 or older. It has been documented that in the absence of health insurance access to medical care, and medical utilization can be severely constrained for some individuals (e.g., (Card et al., 2004; Benitez-Silva et al., 2005)). Hence, Medicare plays an important role in insuring the elderly against medical expenditure risk and improving their access to medical care. This paper uses a dynamic random utility model of demand for health insurance in a life-cycle human capital framework with endogenous production of health to calculate the individual willingness to pay (WTP) for Medicare. The model accounts for the feature that the demand for health insurance is derived through the demand for health. Moreover, individual decisions about health insurance, medical utilization and health related behaviors, and the consequent health outcomes (Grossman, 1972; Phelps, 1973) are inter-related over the life-cycle. Hence the welfare effects of Medicare need to be considered in a dynamic life-cycle framework.

The WTP measure computed in this paper incorporates the effects of Medicare insurance on aggregate consumption through the effects on medical expenditures and mortality, and the consumption utility of health. A life-cycle human capital model of endogenous decisions about health insurance, medical utilization, alcohol consumption, smoking and exercise is estimated using panel data from the Health and Retirement Study (HRS). In order to understand the effects of Medicare on individuals and their willingness to pay for its benefits, simulations from the model are used to infer its effects on medical utilization, out of pocket medical expenditures, and health outcomes by comparing outcomes under its coverage to those in a counter-factual situation in which the age of eligibility is delayed to 67. Given the adverse financial implications of imminent demographic changes[2] this is one particular reform that has been proposed.[3]

There are four important reasons for analyzing the effects of Medicare in a life-cycle framework. First, such a framework helps evaluate the dynamic impact of Medicare. Medicare is a "mortality contingent claim" (Philipson and Becker, 1998) because individuals are entitled to its benefits conditional on survival to age 65.[4] Thus it may alter survival incentives for those under 65 as it alters employment incentives (Rust and Phelan, 1997). Better coverage and thus potentially improved health and higher utility in old age, might induce individuals younger than 65 to on the margin increase behaviors (e.g., exercise) that decrease mortality risk (Philipson and Becker, 1998). Individuals may also defer medical care until they are eligible for Medicare at age 65, e.g., delay expensive treatments like a coronary artery bypass graft. Similarly the anticipated availability of generous coverage for the elderly may induce individuals younger than 65 to on the margin increase behaviors (e.g., smoking) that raise the risk of future medical expenditures and adverse health events. Second, given the life-cycle nature of health production, changes in individual health incentives and behaviors at younger ages may in turn affect health behaviors and outcomes after age 65. Third, the life-cycle nature of health production also implies that there will be dynamic selection (e.g., (Rosenzweig and Wolpin, 1995; Cameron and Heckman, 2001)) in medical utilization, i.e., individuals whose past behaviors raise their current and future health risks will consume relatively more medical care over the life-cycle. In particular mortality will be endogenous to past behaviors causing selection through survivorship. Employing a life-cycle model provides a means to correct for dynamic selection in the empirical analysis in a manner similar to the method proposed by Heckman (1979). Fourth, such an analysis allows for an evaluation of the lifetime welfare effects of the program which for the reasons just outlined is important.

Medicare is administered by the federal government and implemented almost uniformly across the US with little changes in its coverage since its inception. Medicare used to be called a state of the art insurance program for 1965 until December 2003 when the largest expansion of Medicare (Medicare Part D) was enacted. This was done primarily to provide prescription drug benefits as part of the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) that went into effect on January 1, 2006. Using the variation generated by this expansion it is possible to study via reduced form methods the effects of this change in Medicare policy on behaviors and outcomes (e.g., (Duggan and Scott Morton, 2008)). However, such an analysis cannot be used to compute WTP for changes in the Medicare program.[5] Using methods similar to those in this paper, McClellan and Skinner (2006) examine the value of Medicare in completing the missing market for health insurance for the elderly. They compute the parameters of a dynamic model using micro data. Using simulations they evaluate the value of Medicare insurance to its beneficiaries, and also Medicare reforms like progressive premiums and government vouchers. However, they do not analyze its dynamic life-cycle implications. Simulation based methods have also been used to examine the effects of Social Security benefits, e.g., French (2005), and van der Klaauw and Wolpin (2008). The benefits of Medicare are also analyzed by Lakdawalla and Bhattacharya (2005), who conclude in contrast to McClellan and Skinner (2006) that it is a very progressive program.

A small recent literature examines the effects of Medicare on health behaviors and outcomes. Skinner et al. (2001) estimate the effect of intensity of Medicare expenditures on survival.[6] Dow (2001) and Lichtenberg (2002) examine the effects on utilization, morbidity and mortality. Card et al. (2004) analyze the effect on medical utilization, self-reported health, mortality, smoking, exercise and obesity. Decker (2005) examines effects on medical utilization among women, especially mammography and the chances of early detection of breast cancer. Finkelstein and McKnight (2005) examine the effects on mortality and medical expenditures. Though insightful, this literature is limited by its reliance on aggregate or repeated cross section data, e.g., it cannot account for individual-specific unobserved heterogeneity in estimating the effects of Medicare.

This paper extends current research in various ways. In a unified framework using a single source of individual level panel data (i) it accounts for the inter-related life-cycle nature of medical utilization, health related decisions and health outcomes (in particular endogenous mortality) in assessing the effects of Medicare, (ii) it controls for individual-specific unobserved heterogeneity in the analysis, (iii) it examines the role of Medicare in insuring against medical expenditure risk, and (iv) it calculates the lifetime willingness to pay for Medicare.

[2] The Centers for Medicare & Medicaid Services estimates that the Medicare population will nearly double to 77.2 million or 22% of the US population in 2030, with the beneficiaries 65 or older comprising 68.6 million or 19.6% of the population.

[3] The call for Medicare reform goes back to the 1983 National Commission on Social Security Reform, often called the Greenspan Commission. Cutler (2000), Fuchs (2000), McClellan (2000), Reinhardt (2000) and Saving (2000) provide an excellent discussion of the proposed reforms. This idea has also been discussed in the popular press, e.g., "New Retirement Age Is Needed To Head Off Fiscal Train Wreck", Alan Murray, Wall Street Journal, July 8th, 2003.

[4] See footnote 1 for the exceptions.

[5] In principle, the method adopted in this paper can be used to compute specifically the WTP for Medicare Part D or to examine the effects of Medicare Part D on individual behaviors and outcomes, see. e.g., Yang et al. (2009).

[6] Feldstein (1971) also used aggregate pooled data for the period 1st July 1966 – 30th June 1968 to examine the economic efficiency of Medicare.