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Life cycle responses to health insurance status

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ABSTRACT

This paper studies the lifetime effects of exogenous changes in health insurance coverage (e.g. Medicare, PPACA, termination of employer-provided plans) on the dynamic optimal allocation (consumption, leisure, health expenditures), status (health and wealth), and welfare. We solve, simulate, and structurally estimate a parsimonious life cycle model with endogenous exposure to morbidity and mortality risks, and exogenous health insurance. By varying coverage, we identify the marginal effects of insurance when young and/or when old on allocations, statuses, and welfare. Our results highlight positive effects of insurance on health, wealth and welfare, as well as mid-life substitution away from healthy leisure in favor of more health expenses, caused by peaking wages, and accelerating health issues.

1. Introduction

The health insurance status of individuals may change exogenously over the life cycle. For instance, employer-provided insurance often ends at retirement. Moreover, Medicare provides guaranteed and subsidized insurance for elders,[1] whereas the Patient Protection and Affordable Care Act (PPACA, a.k.a. Obamacare) extends other types of health insurance to younger individuals. The purpose of this paper is to analyze the impact of such exogenous and predictable changes in health insurance for the life cycle allocations (i.e. consumption, health expenditures and leisure), status (wealth, and health), as well as for the welfare of households.

Health insurance coverage at any given period of life likely affects decisions at other periods as well. Indeed, because health can be thought of as a durable good, insurance-induced changes in health status when young have lifetime consequences on exposure to mortality and morbidity risks (e.g. the *Long Reach of Childhood* effect; Smith, 1999 and Case and Paxson, 2011). Moreover, a standard backward induction argument makes it clear that young agents should internalize the effects of being insured or not when old, and its consequences for future health and wealth statuses.

Insurance for health expenditures affects dynamic decisions through two main channels: the budget constraint, and the exposure to morbidity and mortality risks. First, disposable resources are reduced by the amount of the insurance premia. The extent of this income effect depends on the public subsidization through Medicare or PPACA, whereas the financing of these programs through distortionary income taxes affects the leisure/labor supply substitution. Moreover, health insurance lowers the effective price of health care once the deductible level has been reached, making health expenditures relatively less costly compared to other means for adjusting health, such as healthy leisure activities. This change in relative price thus alters the leisure/labor supply substitution and consequently the level of disposable resources.

Second, conditional upon sickness, the out-of-pocket (OOP) medical expenditures are reduced by health insurance, thereby lowering the exposure to future health costs and mitigating the incentives for maintaining precautionary wealth balances. Furthermore, to the extent that health status determines the capacity to work and the response to treatment, insurance also reduces the incentives for maintaining precautionary health balances. Moreover, the changes in current health expenditures and healthy leisure induced by insurance will impact future health status, and therefore the likelihood of both sickness and death. If better health lowers the probability of morbidity, this again reduces the incentives for

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[1] See Table 1 for details on Medicare and private insurance coverage and financing.

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Table 1
Medicare and private insurance summary.

Items	Taxes	Co-payment	Deductibles (Y)	Premia (Y)
(a) Medicare				
A – Inpatient care	2.9% payroll	20%	$1156	
B – Outpatient care	Gen. revenues	20%	$140	$1199
D – Drugs	Gen. revenues	25%	$310	$472
(b) Private				
Total premium				$4940
Employee contrib.				$1021
Co-pay doctor visits		22.82$/visit	$1025	
General med. expenses		18.8%		

Notes: Sources: (a) Medicare: Henry J. Kaiser Family Foundation (2012); Medicare.gov (n.d.); OASDI Board of Trustees (2012). Part A payroll taxes shared equally between employers and employees. Parts B and D financed 25% out of premia, 75% out of general tax revenues. When applicable, deductible and premia are averages based on taxable income. (b) Private: MEPS (2010a,b, Tab. I.C.1, I.C.2, I.F.2, I.F.5, I.F.6). Average total single premium per enrolled employee, private-sector establishments that offer health insurance. Average total employee contribution, individual deductible, and co-payment for an office visit to a physician, per enrolled employee for single coverage at private-sector establishments that offer health insurance.

maintaining precautionary wealth and health balances, whereas a longer expected lifetime for healthier individuals justifies more savings for old age in both financial and health capitals.

The timing of the insurance is also important for the dynamic allocation. On the one hand, employer-provided coverage that is expected to end at retirement can lead to a pre-retirement acceleration of health expenses and accumulation of the preventive health and wealth stocks. The resulting health improvements alter expected longevity and exposure to future health-related risks, and will in turn affect the inter-temporal allocation for consumption and leisure. On the other hand, post-retirement health insurance such as Medicare makes it possibly optimal to postpone health care until coverage begins, which may lead to pre-retirement deterioration in the health status. Again, the resulting changes in wealth and health will alter the dynamic allocation over leisure and consumption via its effects on the budget constraint and the exposure to morbidity and mortality risks.

The previous discussion suggests that (i) the timing of health insurance coverage should affect the allocations *throughout* the life cycle, and (ii) the mechanisms through which these effects take place are non trivial, especially when exposure to morbidity and mortality risks is endogenous. The objective of this paper is to analyze these effects and to chart their pathways. Understanding how changes in coverage affect the life cycle allocations is important for several reasons. First, from a Public Finance perspective, the resources spent on compulsory coverage programs such as Medicare are substantial, making it the fourth item on the Federal budget in 2011 (see Table 2). Moreover, these resources will expand as PPACA becomes operational and starts imposing health insurance on large, previously uninsured segments of the US population.[2] Since both involve exogenous changes in insurance statuses, identifying the dynamic effects on consumption, wealth, leisure, health expenditures and levels is warranted for policy evaluation purposes. Second, from a normative aspect, imposing market-provided insurance affects endogenous exposure that can also be adjusted through self-insurance. Moral hazard substitution can take place both across instruments (e.g. health expenditures vs healthy leisure vs precautionary health balances) and across time (e.g. less leisure or expenditures now vs more later). Since these substitutions affect exposure to longevity and sickness risks, the net effect of insurance on welfare is not trivially obtained. Moreover, because longevity is altered, indirect effects of health insurance can be obtained for other programs such as Social Security. Finally, from a General Equilibrium perspective, we can expect non-trivial Macro effects of the resulting changes on savings and leisure through financial and labor markets.

Table 2
Federal budget outlays, 2011.

Item	Budget (B$)	Share (%)
National Defense	768.2	20.1
Social Security	748.4	19.6
Income Security	622.7	16.3
Medicare	494.3	12.9
Health	387.6	10.2
Education	115.1	3.0
⋮	⋮	⋮
Total	3818.1	100.0

Notes: Sources: U.S. Census Bureau (2011b, Tab. 473, p. 312), Federal Budget Outlays by Detailed Function.

In order to characterize how health insurance affects life cycle decisions and outcomes, we propose a stochastic life cycle framework constructed around three main building blocks. First, we model health as an adjustable and depreciable human capital that can be augmented through both health investment (i.e. expenditures) and time (i.e. leisure). The health stock is subject to age-increasing depreciation in order to capture more pressing health problems facing the elders, as well as being subject to stochastic illness shocks that further deplete the health capital. Second, whereas market-provided insurance for health expenditures is exogenously set, we allow for self-insurance against morbidity and mortality risks. More precisely, the likelihood of sickness and of death can be reduced through better health; since the latter is adjustable, morbidity and mortality are thus (partially) endogenous. Third, agents are rational and forward-looking, and therefore fully internalize the endogenous exposure to sickness and death in their dynamic life cycle decisions.

Conditional upon health insurance status when young, and when old, we numerically solve and simulate the model to recover the life cycle allocations (i.e. consumption, leisure, and investment), statuses (i.e. health and financial wealth), and welfare. These theoretical moments can be contrasted with their empirical counterparts to construct a structural Simulated Moments Estimation (SME) of a subset of the deep parameters. Empirical validity is confirmed by a close match of the predicted and observed life cycles. This performance is remarkable given that the theoretical framework is parsimonious.[3] Key to our analysis, the differences in the dynamic allocations and statuses across the insurance and age dimensions can be isolated in order to identify the marginal effects of the health insurance status when young and/or when old. More precisely, conditional on the old agent's status (insured or not), we calculate the marginal lifetime effect of being insured when young. We then invert the procedure by conditioning on the young agent's insured or not status to calculate the marginal lifetime effect of health insurance when old.

Our main findings are threefold. First, our results show that the young insured are noticeably healthier, while durability implies that health remains higher after retirement. Insured elders are also healthier after retirement, but with little evidence of pre-retirement effects. Second, we find that insurance induces a mid-life substitution in leisure and health expenses. In particular, young agents

[2] In 2014, 32 million (16.7%) nonelderly Americans remained uninsured, with uninsurance varying from 5.1% (MA) to 18.8% (TX) (Henry J. Kaiser Family Foundation, 2015).

[3] Indeed, the model is constructed using only six key equations: a law of movement for health, endogenous sickness and death arrival rates, a budget constraint and insurance contract as well as a specification of preferences.