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# A Hidden Welfare Cost of Saving Medicare

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**Abstract**

A popular solution to the looming entitlements crisis in the United States is to increase the eligibility age for Medicare. Using an empirical model of insurance choice with endogenous prices, I find that this would have a modest welfare cost. The losses are concentrated among those who lose Medicare coverage. For the non-elderly, the benefit of lower taxes is mitigated by a higher price for medical insurance.

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# 1 Introduction

Many expect a fiscal crisis created by the growing rolls of retirees eligible for Medicare and Social Security. One popular solution, as suggested by Mankiw (2006), is to increase the eligibility age for benefits from sixty-five to sixty-seven years. This can be thought of as changing the nominal eligibility age, in order to keep the real eligibility age constant. To wit, sixty-seven is the new sixty-five. According to a distinction between real and nominal variables, this seems to be a fair solution to a hard problem.

While this might resolve the fiscal crisis, it could have serious consequences for employer-provided medical insurance. Once off of the Medicare rolls, the un-retired would join the pool of those eligible for private medical insurance, and would almost certainly take it. Since those over the age of sixty-five face a wider array of more serious medical conditions than those under sixty-five, those who choose insurance will increase the average medical expenditure of the insured. Rising medical costs are routinely blamed for the rising price of medical insurance, and thus, a decreased rate of workers with it. Increasing the eligibility age for Medicare would only exacerbate this trend.

Table 1 demonstrates the difference in medical costs across these different groups. Medicare spends almost two and a half times as much per person it insures than does private insurance, while total charges for medical events are over four times as large. The final line of Table 1 looks at the average insurance charges and expenditures for those who would likely be removed from the rolls of Medicare if such policy changes were made—over the age of 64, under the age of 68, and without any physical limitation that would keep them out of the labor force. Even this group, the unimpaired young elderly, while relatively young and inexpensive vis-*à*-vis the elderly population as a whole, is still forty-percent more expensive.

| Group | Mean Insurance Expenditure | Total Charge | Population |
|---|---|---|---|
| Privately Insured, $< 65$ | \$1,831.23 | 4,120.12 | $1.6 \times 10^8$ |
| Medicare recipients, $\geq 65$ | 4,473.78 | 16,971.73 | $2.3 \times 10^7$ |
| Medicare, $< 68$, able | 2,578.29 | 11,199.59 | $4.7 \times 10^6$ |

Table 1: Medical expenditures and charges by group, using weights. Households at or below the poverty line and veterans are removed from the sample.

The balance of this paper is focused on understanding the welfare costs of adding this population to the general privately insured population. Changes in consumer surplus include those due to potential changes in: (1) the private insurance rate, (2) the price of private insurance, and (3) the cost of providing Medicare benefits.

I first construct an empirical model of private medical insurance choice, where the price of insurance is endogenous. I then construct a counterfactual simulation where the unimpaired young elderly are added to the privately insured. I find that there would be a modest welfare cost, concentrated among those who lose Medicare coverage. For the non-elderly, the welfare gains of lower tax rates are mitigated by a higher price for medical insurance. Over half of the population is better off. However, if the medical costs of those losing Medicare coverage are large enough, then the price of insurance rises enough that the policy becomes welfare reducing for those who have medical insurance, and the policy reduces the welfare of a majority of the population.

# 2 Model

The economy described below has a unit measure of non-elderly agents, heterogeneous in their risk. It is assumed that agents' risk types are private information. This assumption is drawn from the many legal mechanisms designed to ensure the privacy of health information. For example, the Health Insurance Portability and Accountability Act (HIPAA) of 1996 mandated federal privacy protections for patients. Further, it is assumed that signaling is not possible.

These assumptions lead to adverse selection into the medical insurance market—the agents who choose medical insurance are those who are most likely to use it.

## 2.1 The Agent's Choice

Consider a static model of insurance choice, where agent $i$ faces medical risk $\widetilde{mx}_i$. This risk is characterized by its pdf and cdf, $h_i$ and $H_i$, respectively. There is a unit measure of agents, with heterogeneity in medical risk: i.e., $h_i \sim G$. A rate of the cost of medical insurance, $s$, is subsidized by the government.

*Ex ante*, before this risk is realized, agents can purchase insurance against this risk, $\iota = 1$, at price $(1-s)\varpi$. After the risk is realized, *ex post*, the agent without insurance receives the medical risk, and consumes it inelastically. All agents earn income $w$ and each makes the ex-ante insurance choice according to:

$$U_I(w, \widetilde{mx}_i; \varpi, \kappa, \tau) = \max_{\iota \in \{0,1\}} \left\{ u(w - (1-s)\varpi - \tau), E\Big[u(w - \tilde{mx}_i - \tau)\Big] \right\}. \tag{1}$$

Agents are taxed a lump sum amount $\tau$.

The insurance market is competitive, so that the price of insurance is equal to the average realized risk of the insured.

## 2.2 Equilibrium

**Definition.** An equilibrium is a price of insurance, $\varpi$, tax level, $\tau$, and insurance decision rule $\iota(\widetilde{mx}_i; \kappa, \tau)$ such that:

- $\iota_i$ solves the agent's insurance choice, according to the discrete maximization problem of (1);
- $\varpi$ is equal to the average realized risk of the insured; and,
- $\tau$ is set to the the cost of insuring Medicare recipients and the tax subsidy of medical insurance.

Specification choices can resolve a variety of technical complications, such as multiple equilibria, while also providing a cross-sectional distribution of medical expenditures that is consistent with the data—a fat tail, while many observations have no medical expenditures.

- Individual $i$'s risk is characterized by the exponential distribution, with parameter $\lambda_i$. If the $\lambda_i$'s are distributed according to the gamma distribution, then the unconditional distribution of realized risk will be a Pareto-type distribution. This identity is derived in Harris (1968).
- Preferences display constant absolute risk aversion (CARA).

Under these assumptions, an agent's willingness to pay for medical insurance is a function of their risk type,$\lambda_i$, parameter of risk aversion,$r$, and upper bound parameter, $\kappa$:

$$\begin{aligned}\pi(\lambda_i;\kappa,r) &= \frac{1}{r}\log(Pr(mx_{\leq}\kappa) * E(e^{-r*\widetilde{mx}_i}) + Pr(mx_i < \kappa)e^{-r\kappa}) \\ &= \frac{1}{r}\log\left(\frac{\lambda_i - re^{-(\lambda_i - r)\kappa}}{\lambda_i - r}\right)\end{aligned}$$

Because of adverse selection, there is a downward-sloping supply curve, along with the usual downward-sloping demand curve. Each equilibrium can be characterized by a marginal agent, type $\lambda_m$, for whom the willingness to pay for insurance is equal to its price. For each choice of parameter values, three cases can occur: two equilibria (see Figure 1), one equilibrium (the supply and demand curves intersect at a tangency point), or no equilibrium (the insurance market collapses—the demand curve lies entirely beneath the supply curve).

I use an equilibrium refinement to choose among equilibria.

**Theorem.** *An equilibrium characterized by its marginal agent $\lambda_m$ is locally stable if for all local $\varepsilon > 0$*

$$\varpi(\lambda_m + \varepsilon) \geq \pi(\lambda_m + \varepsilon; \kappa)$$

*and*

$$\varpi(\lambda_m - \varepsilon) \leq \pi(\lambda_m - \varepsilon; \kappa)$$

The stability refinement is similar to the trembling-hand refinement of Selten (1975), and the stability refinement of Kohlberg and Mertens (1986). This refinement is intuitive—the equilibria in this model are pooling equilibria. Because the movements in insurance rates and prices are steady, it is unlikely that the equilibria we observe is unstable. Figure 1 demonstrates that the equilibrium with more insurance is the stable of the two. Parameter values that lead to a single equilibrium lead to instable equilibria. Further, stable equilibria have produced better fits to the data in initial work that estimates the model. (See Koch (2007).)

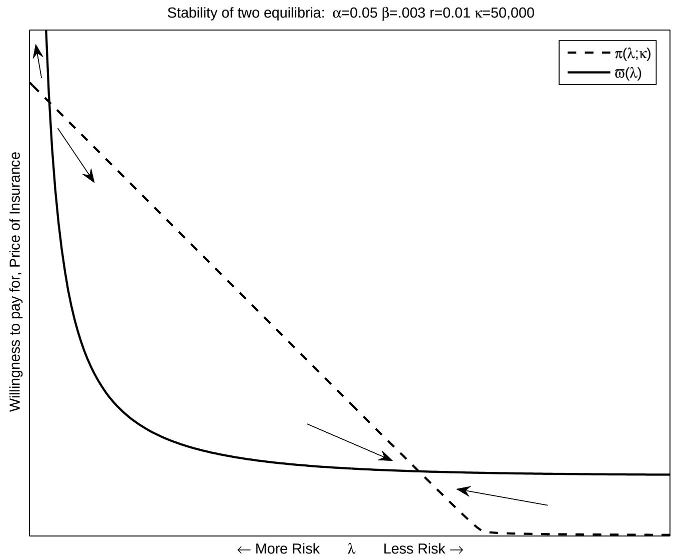


Figure 1: The stability of two equilibria.

# 3 Data

The data come from the Medical Expenditure Panel Survey (MEPS). The MEPS is a series of nationally-representative overlapping panel data on medical expenditures and sources, medical insurance, health information, labor-market outcomes and other demographics. I focus on the observations from 2004—the first half of Panel 9, and the second half of Panel 8. Veterans (VA insurance) and households near or below the poverty line (Medicaid) are removed from the sample.

The distribution of medical risk is derived from the cross-sectional distribution of realized medical risk. The data provide two imperfect candidates for this task. The first candidate is the annual total charges variable. There is a well-established disconnection between what medical-service providers, such as hospitals and clinics, list as charges, and what eventually makes its way back to those providers. The data documentation describes the charges variable as a "sticker price." Insurers routinely negotiate down the price of medical services. Providers will also give discounts from this sticker price for the uninsured.

Because of this negotiation, the expenditures paid for by private insurers is not ideal either. Since insurers buy large quantities of medical services (on behalf of those whom they insure), they are in a stronger bargaining position than the uninsured. Thus, the uninsured would likely face a mark-up from the expenditures paid for by private insurers.

Fortunately, the exponential-gamma specification of risk provides some flexibility and internal coherence in the case of constant mark-ups or -downs. If an agent faces total risk parameterized by $\lambda$, but only a fraction $\rho^{-1}$ of that risk is insurable due to the hidden-action problem faced by insurers, then the cdf of the insurable risk is:

$$P(\rho T < t) = 1 - e^{\lambda \cdot \frac{t}{\rho}},$$

which is equivalent to an exponential risk parameterized by $\frac{\lambda}{\rho}$. Since $\beta$ is a scale parameter, these partially-insurable total risks also work out to

$$\beta_{partial} = \frac{\beta_{full}}{\rho}.$$

Since the $\alpha$ parameter is a shape parameter and lacks units, it does not require any adjustments. *Mutatis mutandis* for $\rho^{-1} > 1$, when individuals face a mark-up in prices from the observed distribution. It is assumed that these negotiation markets are frictionless and competitive, so in equilibrium, all surplus from the negotiation is destroyed. The balance of the paper uses the medical expenditures of the privately insured in order to find the distribution of medical risk.

The first moment of the conditional distribution, the average realized risk of the insured, can be found by integrating the expected realized risk over the types who choose insurance; i.e.,

$$\begin{aligned} E(\tilde{mx}_i | \iota_i = 1) &= \int_0^{\lambda_m} t^{-1} \frac{t^{\alpha} e^{-\frac{t}{\beta}}}{\beta^{\alpha+1}\Gamma(\frac{\lambda_m}{\beta}, \alpha+1)} \\ &= \frac{\Gamma(\frac{\lambda_m}{\beta}, \alpha)}{\beta\Gamma(\frac{\lambda_m}{\beta}, \alpha+1)}. \end{aligned}$$

The average square of realized risk of the insured (i.e., the second non-central conditional

| Parameter | 1 | Matched to fit |
|---|---|---|
| $r$ | 0.001425 | Koch (2007) |
| $\kappa$ | 5,600 | Koch (2007) |
| $\alpha$ | 1.11 | Medical expenditure distribution |
| $\beta$ | $6.0\times10^{-3}$ | |
| $\rho$ | 2.02 | Insurance rate and price |
| $s$ | 0.25 | Saez (2004) |

Table 2: Parameter values for the baseline calibration

moment) is found similarly:

$$\begin{aligned} E(\tilde{mx}_i^2|\iota_i = 1) &= \int_0^{\lambda_m} 2t^{-2} \frac{t^\alpha e^{-\frac{t}{\beta}}}{\beta^{\alpha+1}\Gamma(\frac{\lambda_m}{\beta}, \alpha+1)} \\ &= \frac{2\Gamma(\frac{\lambda_m}{\beta}, \alpha-1)}{\beta^2\Gamma(\frac{\lambda_m}{\beta}, \alpha+1)}. \end{aligned}$$

These are two unique moments that identify the two parameters of the risk distribution, $(\alpha, \beta)$. Using these two parameters, the parameter of mark-up faced by agents if they do not choose insurance, $\rho$, is found by minimum-distance estimation of two other moments—the insurance rate and the price of insurance. These two moments are weighted by the inverse of their variances. The model fits the price of insurance better than the insurance rate. Since the welfare changes are due primarily to changes in the price of insurance, the model seems well-suited to the task.

The parameters of risk aversion is from Koch (2007), which estimates this model to similar data. It is adjusted down by the rate $1-s$. Increasing the tax subsidy and decreasing the parameter of risk aversion are similar. The adjustment is made because Koch (2007) estimated the parameter of risk aversion without accounting for the tax subsidy. The rate of subsidy is taken to be the average marginal federal income tax rate. The number is taken from Saez (2004), which computes the average marginal federal income tax rate for the 1990s. While the data cover a year outside of their sample, the rate is stable for most of the recent period.

Koch (2007) also estimated a value of $\kappa$, and the value used here is similar.

## 3.1 Policy Experiments

Johnson (2003) and Waidman (1998) find that a large majority of those losing eligibility under related proposals would have access to insurance at the workplace. In order to measure the consequences of changing Medicare eligibility, I assume that those who lose eligibility for Medicare pick up private medical insurance. Thus, their cost increases the price of insurance by the margin:

$$\frac{\text{cost of insuring the newly insured}}{\text{insurance rate}}$$

The welfare analysis focuses on equivalent variations for the policy change. Equivalent variations vary across the population, and correspond to four sub-populations: those losing Medicare, those who keep insurance even after the policy, those who switch out of insurance, and those who remain uninsured. The first group bears the brunt of the policy, in that they now must pay for their insurance. The second group faces the extra burden of increased insurance prices. The third group escapes this burden, but loses the surplus of medical insurance in the process. The uninsured reap the greatest benefit of this plan, in that they pay lower taxes; the changing price of insurance is of no consequence for them. The results described below can be found in Tables 3 and 4.

Using expenditures paid for by Medicare may not reflect the risk faced by households, or the costs to private insurers. Since these private insurers ostensibly lack the bargaining power of the federal government, intuition suggests that Medicare pays less than private insurance. The assumption for the analysis below is that the rates are the same for Medicare as they are for private insurance. However, if Medicare's rates in fact reflect more bargaining power, the analysis below will understate the consequences of increasing the eligibility age for Medicare.[1]

The equivalent variation for those who keep insurance is the change in the price of insurance, less the decrease in taxes. The total price increase is \$83, while taxes fall by \$107 for the non-elderly. Note that the insurance rate among the non-elderly falls by less than three-quarters of one percent. Taxes are lower, as the young and able elderly are removed from the Medicare rolls. However, the government now subsidizes their purchase of private

[1] Some evidence in favor of such a differential can be found in Hogan (2003).

| Moment | Data | Baseline | Experiment |
|---|---|---|---|
| Insurance rate, non-elderly | 0.78 | 0.785 | 0.773 |
| Price of insurance | 3708 | 3,704 | 3,787 |
| Relative Tax | – | 0 | -107.2 |
| Average EV | – | 0 | -22 |

Table 3: Moments from the data, baseline and policy experiment

medical insurance at the same rate—the cost of the latter is about one-tenth of the benefit of the former. For those who drop insurance after the change in Medicare eligibility, the equivalent variation is the surplus from medical insurance when insured, less the decrease in taxes. Because they substitute out of insurance, their per-agent equivalent variation is larger than that of those who keep insurance. Due to the small change in insurance rate, the aggregate equivalent variation for this population is small.

As previously mentioned, after accounting for the heterogeneity, the average equivalent variation for the non-elderly associated with changing Medicare eligibility is $59.2, or 2.1 tenths of percent of consumption. However, the equivalent variation for those losing Medicare, and now paying for their medical insurance, is $3,570, or 12.8 percent of consumption. This leads to a deadweight loss of $24, or 0.09 percent of consumption.[2] This deadweight loss is incurred from the changing price of private medical insurance, and its increased incidence on those formerly on Medicare.

This welfare result is not general, though. For example, if the cost of those losing Medicare were to double, then the price of insurance rises to over $4,000. Even though taxes fall substantially, agents with insurance are worse off, and the welfare cost associated with adjusting Medicare grows.

# 4 Final Remarks

This paper has explored how changing Medicare eligibility has consequences for private medical insurance. It suggests a broader relationship between insurance markets and government action, both hidden and obvious. Medicare and Medicaid are thought to lower the demand

[2] Per capita consumption is found using data available in the St. Louis Federal Reserve's FRED database: total consumption in the US in 2004 was $8.196 trillion, consumed by a total population of 292.7 million Americans.

| Agents who . . . | Proportion | EV | Why? |
|---|---|---|---|
| Keep Insurance | 0.773 | +$45.6 | pay more for insurance, less tax |
| Drop Insurance | 0.012 | +76.38 | lose surplus from insurance |
| No Insurance | 0.215 | +107.2 | lower taxes |
| Lose Medicare | 0.023 | -3,570 | now pay for insurance |
| All | 1.023 | -24.7 | |

Table 4: Equivalent Variation Per Person, by Population

for private insurance. However, the response of prices, and their subsequent effect on insurance choices, has remained a larger challenge. The full cost of a policy includes the changing of and consequences of prices.

Those arguing in favor of fixing Social Security and Medicare argue that there is no "free lunch"—the cost of these programs, when projected with the nation's changing demographics, grow dramatically, and with it, the deadweight loss associated with the taxes to fund them. While there is an intuitive fairness to increasing the eligibility age for Medicare, there is still no free lunch—the medical bills for the newly ineligible must be paid by someone.

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