

Labor Supply Incentives of Medicaid

Svetlana Pashchenko*

Uppsala University

Ponpoje Porapakkarm†

University of Macau

February 15, 2013

Abstract

The employment rate among Medicaid beneficiaries is much lower than the employment rate among the rest of the population. To what extent this difference is due to the incentives created by Medicaid? We use general equilibrium heterogeneous agents model to evaluate labor supply distortions created by Medicaid eligibility rules and quantify its welfare effects. Using Medical Expenditure Panel Survey Dataset we calibrate the model to replicate the life-cycle patterns of employment and insurance take-up behavior as well as the key aggregate statistics for the US. We use the model to estimate potential labor income of people whom we do not observe working in the data. We find that around 23% of Medicaid enrollees will lose their eligibility if they start working. More than half of these people will choose to work if they are able to keep public insurance. These distortions are costly for the economy: if Medicaid eligibility could be linked to (unobservable) exogenous productivity the resulting ex-ante welfare gains are equivalent to 1% of the annual consumption. We explore several policy reforms and show that the best outcome is achieved if only *workers* can enroll in Medicaid through the categorical eligibility channel while *non-workers* enroll through the Medically Needy channel.

Keywords: health insurance, Medicaid, labor supply, risk sharing, general equilibrium

JEL Classification Codes: D52, D91, E21, E65, I10

*Email: sap9v@virginia.edu

†Email: ponpojep@umac.mo

1 Introduction

Medicaid is one of the largest means-tested programs in the US. This program is an important source of health insurance coverage for the non-elderly poor. An important observation from the data is that employment rates among Medicaid enrollees are substantially lower than employment rates among the rest of the population (see Figure 1): on average only 44% of people on Medicaid work while the employment rate among uninsured is 94% and among privately insured - 98%. To what extent this difference in employment is due to the incentives embedded in the Medicaid program? Medicaid eligibility depends on labor income and this can induce some people who need health insurance (particularly, those who are unhealthy) to stop working in order to become eligible. Our goal in this paper is to quantify the the distorting effects of Medicaid and to evaluate its welfare implications.

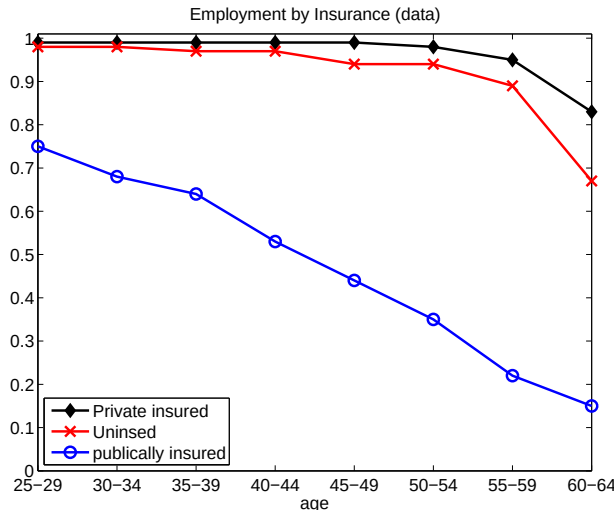


Figure 1: Labor force participation by insurance status (source: MEPS)

To do this we construct a quantitative general equilibrium model with the following key features. First, we allow for heterogeneity of individuals along the dimensions of health, productivity and medical expense shocks. This allows us to capture the insurance role of Medicaid for people with bad health, large medical shocks and/or low productivity. Second, we let health to affect productivity, available time and opportunity to access employer-based insurance which allows us to model the selection effect into Medicaid of people with low attachment to the labor force.¹ Third, people in our model have several options to insure against medical shocks: self-insurance, public health insurance

¹In the data, 47% of Medicaid beneficiaries are unhealthy while the fraction of unhealthy among privately insured and uninsured are only 10% and 17% correspondingly. In addition, unhealthy people are less likely to access employer-based health insurance. Only 43% of the unhealthy are covered by the employer-based health insurance comparing to 69% among the healthy.

and private health insurance (employer-based and individual). However, private health insurance may be not easily accessible for two reasons. First, employer-based insurance is only available for a subset of population working in firms that offer this type of insurance. Second, the individual market is risk-rated meaning that unhealthy people face high prices. People who want to obtain public insurance have to meet income test and asset test. Because labor income is endogenous, Medicaid beneficiaries in the model include those whose earnings ability is low, and those whose earning ability is relatively high but who choose not to work in order to be eligible. Finally, we allow for other non-Medicaid government means-tested programs to adequately represent the public safety net existing in the economy.

We calibrate the model using Medical Expenditure Panel Survey (MEPS) dataset. More specifically, we require the model to reproduce the following key patterns of the data: i) life-cycle profiles of insurance take-up by health, ii) life-cycle profiles of employment by health and insurance status, iii) average labor income profiles by health among all workers and workers covered by employer-sponsored health insurance (ESHI). An essential feature of our calibration is that we use our model to estimate the potential labor income of people whom we do not observe working in the data and their chances to access ESHI. Since more than half of Medicaid beneficiaries do not work it is important to know their potential labor income and their opportunities to get ESHI in order to understand how Medicaid affect their labor supply decisions.

Our findings are as follows. First, around 23% of the current Medicaid enrollees will not be eligible for Medicaid if they start working because their potential labor income is too high. The majority of this group is unhealthy and their medical costs are higher on average than the costs of other Medicaid enrollees (\$8,482 vs \$5,525). At the same time, comparing to other Medicaid beneficiaries this group has significantly more assets. Around half of the people who are eligible only while not working (or 12.5% of all Medicaid enrollees) will start working if they were able to keep their access to public insurance.

Second, these distortions are important in welfare terms. If it was possible to link Medicaid eligibility to (unobservable) exogenous productivity as opposed to (observable) endogenous labor income while keeping the welfare budget fixed, it would result in ex-ante welfare gains equivalent to 1% of the annual consumption.

Third, we study three policies that can reduce Medicaid distortions in the environment where exogenous productivity is unobservable. First, we explore the role of asset test and show that very tight asset test (\$2,000) can completely eliminate non-workers with relatively high potential labor income from Medicaid beneficiaries. However, the reduction in labor supply distortions achieved by the asset test comes at a cost of increasing distortions on saving decisions and this substantially decrease welfare gains of this policy. Second, we explore the policy that conditions the Medicaid eligibility on the

average lifetime labor income as opposed to the current labor income and show that this policy can achieve better results than asset test but still not as good as in the case when productivity is observable. Finally, we show that a more effective tool to reduce labor supply distortions is to introduce work requirement for the general Medicaid program while allowing non-workers to enroll through the Medically Needy pathway. This policy achieves the outcome that is very close to the outcome of the 'ideal' case of observable exogenous productivity.

The paper is organized as follows. Section 2 reviews the related literature. Section 3 introduces the model. Section 4 explains our calibration. Section 5 compares the performance of the model with the data. Section 6 presents the results. Section 7 discusses policy implications Section 8 concludes.

2 Related literature

Our question is motivated by a large literature studying labor supply effects of public means-tested programs (for a review see Moffit, 2002). A subset of this literature studies the incentives for labor supply embedded in the Medicaid program. Most of these studies use data prior to 1996 when adult eligibility for Medicaid had been tied to the eligibility for another welfare program, Aid for Families with Dependent Children (AFDC).² The close link between the two programs made it difficult to separately identify the effect of Medicaid on labor supply and different identification strategies were used. Moffit and Wolfe (1992) explore a variation in the valuation of Medicaid benefits and showed that Medicaid has a significant negative impact on labor force participation. Blank (1989), Winkler (1991) and Montgomery and Navin (2000) use variation in the generosity of Medicaid by state to evaluate its effect on labor supply. The first study finds no effect while the last two find small effects of Medicaid generosity on labor force participation. Yellowitz (1995) exploits Medicaid expansion in the late 1980s and finds that this expansion had a positive effect on labor force participation. Decker (1993) and Strumpf (2011) examine the effect of the introduction of the Medicaid program in the late 1960s and early 1970s. Both studies find no effect on labor force participation. Overall, the literature based on pre-1996 data provides mixed evidence on the effect of Medicaid on labor supply.³ However, there is some evidence that the decision to participate in welfare programs was noticeably affected by the availability of health insurance (Ellwood and Adams, 1990; Moffit and Wolfe, 1992; Decker, 1993).

After the welfare reform of 1996 Medicaid and AFDC were separated and states were allowed to change their Medicaid eligibility criteria. To our knowledge Pohl (2011) is

²Currently this program is substituted by the Temporary Assistance for Needy Families (TANF).

³For a more detailed review of this literature see Gruber and Madrian, 2004.

the only study examining the effect of Medicaid on labor supply using the data after the welfare reform of 1996. He estimates a structural model using variation in Medicaid policies across states and finds that some group of population are significantly less likely to work in order to be eligible for Medicaid. Our paper also addresses this question in a structural framework and using post-1996 data. Unlike Pohl (2011) our approach allows for the coexistence of self-insurance, several types of private health insurance and public insurance. In addition, the general equilibrium framework allows us to quantify the welfare effects of the Medicaid distortions while controlling for the size of the welfare budget.

Methodologically we relate to the two groups of studies. First are models of incomplete labor markets augmented by health and medical expenses uncertainty and by explicit modeling of health insurance markets (Kitao and Jeske (2009), Hansen et al (2011), Hsu (2012)). Second are life-cycle structural models featuring health uncertainty (Capatina (2011), De Nardi, French, Jones, 2010, French, 2005, Nakajima and Telyukova (2011)). As the first group of studies we use general equilibrium framework meaning that all aggregate variables (the ESHI premium, taxes) are endogenous. At the same time we follow the second group of studies by allowing for the rich heterogeneity and imposing strict discipline on the model by requiring it to reproduce the behavior of each subgroup of agents as in the data.

3 Baseline Model

3.1 Households

3.1.1 Demographics and preferences

The economy is populated by overlapping generations of individuals. An individual lives to a maximum of N periods. During the first $R - 1$ periods of life an individual can choose whether to work or not; at age R all individuals retire.

At age t , an agent's health condition h_t can be either good ($h_t = 1$) or bad ($h_t = 0$). His health condition evolves according to an age-dependent Markov process, $\mathcal{H}_t(h_t|h_{t-1})$. Health affects available time, productivity, survival probability and medical expenses.

An individual is endowed with one unit of time that can be used for either leisure or work. Labor supply (l_t) is indivisible: $l_t \in \{0, \bar{l}\}$.⁴ Working brings disutility modeled as a fixed costs of leisure ϕ_w . People in bad health incur time loss due to sickness, ϕ_t^{UH} , which is a non-decreasing function of age. We assume Cobb-Douglas specification for

⁴We assume indivisible labor supply since in the data the difference in labor supply between the healthy and the unhealthy is more pronounced along the extensive margin.

preferences over consumption and leisure:

$$u(c_t, l_t, h_t) = \frac{\left(c_t^\chi (1 - l_t - \phi_w \mathbf{1}_{\{l_t > 0\}} - \phi_t^{UH} \mathbf{1}_{\{h_t = 0\}})^{1-\chi} \right)^{1-\sigma}}{1 - \sigma}.$$

where $\mathbf{1}_{\{\cdot\}}$ is an indicator function mapping to one if its argument is true. Here χ is a parameter determining the relative weight of consumption, and σ is the risk-aversion over the consumption-leisure composite.

Agents discount the future at the rate β and survive till the next period with conditional probability ζ_t , which depends on age and health. We assume that the savings of households who do not survive are equally distributed among all survived agents. The population grows at the rate η .

3.1.2 Medical expenditures and health insurance

Each period an agent faces a stochastic medical expenditure shock x_t^h which depends on his age and health condition. Medical expenditure shocks evolve according to a Markov process $\mathcal{G}_t(x_t^h | x_{t-1}^h)$. Every individual of working age can buy health insurance against a medical shock in the individual health insurance market. The price of health insurance in the individual market is a function of an individual's age, and health condition and medical shock realized last period. We denote the individual market price as $p_I(h_{t-1}, x_{t-1}^h)$.

Every period a working age individual gets an offer to buy employer-sponsored health insurance (ESHI) with probability $Prob_t$ that depends on age, income and health.⁵ The variable g_t characterizes the status of the offer: $g_t = 1$ if an individual gets an offer, and $g_t = 0$ if he does not. All participants of the employer-based pool are charged the same premium p regardless of their health and age. Since an employer who offers ESHI pays a fraction ψ of this premium, a worker who chooses to buy group insurance only pays $\bar{p}$ where:

$$\bar{p} = (1 - \psi) p.$$

Low-income individuals of working age can obtain their health insurance from Medicaid for free. There are two pathways to qualify for Medicaid. First, an individual is eligible if his total income is below the threshold y^{cat} and his assets are less than the limit k^{cat} . We call this pathway "categorical eligibility". Second, an individual can become eligible through the Medically Needy program. This happens if his total income minus out-of-pocket medical expenses is below the threshold y^{MN} and his assets are less than the limit k^{MN} . We call this pathway "eligibility based on medical need".

⁵This assumption is used to replicate the empirical fact that healthy and high income people are much more likely to be covered by ESHI.

All types of insurance contracts - group, individual, and public - provide only partial insurance against medical expenditure shocks. We denote by $q(x_t^h, i_t)$ the fraction of medical expenditures covered by the insurance contract. This fraction is a function of medical expenditures and the insurance choice (i_t).

All retired households are enrolled in the Medicare program. The Medicare program charges a fixed premium p_{MCR} and covers a fraction q_{MCR} of medical costs.

3.1.3 Labor income

Households earnings are equal to $\tilde{w}z_t^h l_t$, where $\tilde{w}$ is wage and z_t^h is the idiosyncratic productivity that depends on age (t). In addition, we allow a household's productivity to be affected by his health condition realized at the end of last period (h_{t-1}). This modeling assumption is motivated by the observation that in the data the average labor income of unhealthy workers is lower than the average labor income of healthy workers.

3.1.4 Taxation and social transfers

All households pay income taxes $\mathcal{T}(y_t)$ which consist of two parts: a progressive tax and a proportional tax.⁶ Taxable income y_t is based on both labor and capital income. Working households also pay payroll taxes: Medicare tax (τ_{MCR}) and Social Security tax (τ_{ss}). The Social Security tax rate for earnings above $\bar{y}_{ss}$ is zero. The U.S. tax code allows households to subtract out-of-pocket medical expenditures (including insurance premiums) that exceed 7.5% of their income when calculating their taxable income. In addition, the ESHI premium ($\bar{p}$) is tax-deductible in both income and payroll tax calculations. Consumption is taxed at a proportional rate τ_c .

We also assume a public safety-net program, T_t^{SI} . This program guarantees each household a minimum consumption level equal to $\underline{c}$. This reflects the option available to U.S. households with a bad combination of income and medical shocks to rely on public transfer programs such as food stamps, Supplemental Security Income, and uncompensated care.⁷ Retired households receive Social Security benefits ss .

3.1.5 Timing of the model

The timing of the model is as follows. At the beginning of the period a working-age individual learns his productivity and ESHI offer status. Based on this information an individual decides his labor supply (l_t) and insurance choice (i_t). If he is categorically

⁶The progressive part approximates the actual income tax schedule in the U.S., while the proportional tax represents all other taxes that we do not model explicitly. In this approach we follow Jeske and Kitao (2009).

⁷In 2004 85% of uncompensated care were paid by the government. The major portion is from the disproportionate share hospital (DSH) payment (Kaiser Family Foundation, 2004).

eligible, he can choose to enroll in Medicaid (M). If he is not eligible or decides not to enroll in Medicaid, he can choose to buy individual insurance (I), or employer-based group insurance (G) if offered, or to stay uninsured (U). At the end of the period the new health status (h_t) and medical expenses shock (x_t^h) are realized. At this point an uninsured household can become eligible for the Medically Needy (MN) program after he spends down his income to pay his medical expenses until he reaches the level of the Medically Needy eligibility threshold.⁸ We use a variable i_t^{MN} to indicate whether an uninsured individual becomes eligible for the Medical Needy program after his medical shock is realized: $i_t^{MN} = 1$ if and individual becomes eligible, $i_t^{MN} = 0$ otherwise. After paying the out-of-pocket medical expenses, an individual chooses his consumption (c_t) and savings (k_{t+1}). A retired household only chooses consumption and savings.

3.1.6 Optimization problem

Households of a working age ($t < R$) The state variables for the working age household's optimization problem at the beginning of each period are capital ($k_t \in \mathbb{K} = \mathbb{R}^+ \cup \{0\}$), health and medical cost shock realized at the end of the last period ($h_{t-1} \in \mathbb{H} = \{0, 1\}$; $x_{t-1}^h \in \mathbb{X} = \mathbb{R}^+ \cup \{0\}$), idiosyncratic labor productivity ($z_t^h \in \mathbb{Z} = \mathbb{R}^+$), ESHI offer status ($g_t \in \mathbb{G} = \{0, 1\}$), and age ($t \in \mathbb{T} = \{1, 2, \dots, R-1\}$).

The value function of a working-age individual can be written as follows:

$$V_t(k_t, h_{t-1}, x_{t-1}^h, z_t^h, g_t) = \max_{l_t, i_H} \sum_{h_t, x_t^h} \mathcal{H}_t(h_t | h_{t-1}) \mathcal{G}_t(x_t^h | x_{t-1}^h) W_t^{\{l_t, i_H\}}(k_t, h_{t-1}, x_{t-1}^h, z_t^h, g_t; h_t, x_t^h) \quad (1)$$

where

$$W_t^{\{l_t, i_H\}}(k_t, h_{t-1}, x_{t-1}^h, z_t^h, g_t; h_t, x_t^h) = \max_{c_t, k_{t+1}} u(c_t, l_t, h_t) + \beta \zeta_t E_t V_{t+1}(k_{t+1}, h_t, x_t^h, z_{t+1}^h, g_{t+1}) \quad (2)$$

subject to

$$(Beq + k_t)(1 + r) + \tilde{w} z_t^h l_t + T^{SI} = k_{t+1} + (1 + \tau_c) c_t + Tax + P_t + X_t \quad (3)$$

$$\tilde{w} = \begin{cases} w & ; \quad \text{if } g_t = 0 \\ (w - c_E) & ; \quad \text{if } g_t = 1 \end{cases} \quad (4)$$

⁸The Medically Needy program also allows insured people with high out-of-pocket medical expenses to be eligible. We rule out this case in our model since we allow only one type of insurance coverage in each period. This is consistent with the way we compute insurance statistics from the data.

$$P_t = \begin{cases} 0 & ; \text{ if } i_t \in \{U, M\} \\ p_I(h_{t-1}, x_{t-1}^h) & ; \text{ if } i_t \in \{I\} \\ \bar{p} & ; \text{ if } i_t \in \{G\} \end{cases} \quad (5)$$

$$T_t^{SI} = \max(0, (1 + \tau_c) \underline{c} + Tax + P_t + X_t - (Beq + k_t)(1 + r) - \tilde{w}z_t^h l_t) \quad (6)$$

$$Tax = \mathcal{T}(y_t) + \tau_{MCR}(\tilde{w}z_t^h l_t - \bar{p}\mathbf{1}_{\{i_t=G\}}) + \tau_{ss} \min(\tilde{w}z_t^h l_t - \bar{p}\mathbf{1}_{\{i_t=G\}}, \bar{y}_{ss}) \quad (7)$$

$$y_t = \max(0, k_t r + \tilde{w}z_t^h l_t - \bar{p}\mathbf{1}_{\{i_t=G\}} - \max(0, X_t + p_I(h_{t-1}, x_{t-1}^h) - 0.075(k_t r + \tilde{w}z_t^h l_t))) \quad (8)$$

$$X_t = \begin{cases} x_t^h (1 - q(x_t^h, i_t)) & \text{if } i_t = \{M, I, G\} \\ x_t^h (1 - q(x_t^h, M)) + \max(0, k_t r + \tilde{w}z_t^h l_t - y^{MN})q(x_t^h, M) & \text{if } i_t = \{U\} \text{ and } i_t^{MN} = 1 \\ x_t^h & \text{if } i_t = \{U\} \text{ and } i_t^{MN} = 0 \end{cases} \quad (9)$$

An individual is eligible for Medicaid if:

$$\begin{aligned} k_t r + \tilde{w}z_t^h l_t &\leq y^{cat} \text{ and } k_t \leq k^{cat} && \text{for categorial eligibility,} \\ k_t r + \tilde{w}z_t^h l_t - x_t^h &\leq y^{MN} \text{ and } k_t \leq k^{MN} && \text{for the Medically Needy program.} \end{aligned} \quad (10)$$

The conditional expectation on the right-hand side of Eq (2) is over $\{z_{t+1}^h, g_{t+1}\}$. Eq (3) is the budget constraint. Beq is an accidental bequest. In Eq (4), w is wage per effective labor unit. If a household has an ESHI offer, his employer pays a part of his insurance premium. We assume that the firm offering ESHI passes the costs of employer's contribution on its workers by deducting an amount c_E from the wage per effective labor unit, as shown in Eq (4). In Eq (7), the first term is income tax and the last two terms are payroll taxes.⁹ Eq (9) describes out-of-pocket medical expenses X_t which depend on insurance status. It takes into account that an uninsured person who becomes eligible for the Medically Needy program has to first spend down his resources before public insurance starts paying for his medical expenses.

Retired households For a retired household ($t \geq R$) the state variables are capital (k_t), health (h_t), medical shock (x_t^h), and age (t). The value function of a retired household is:

⁹In practice, employers contribute 50% of Medicare and Social Security taxes. For simplicity, we assume that employees pay 100% of payroll taxes.

$$V_t(k_t, h_{t-1}, x_{t-1}^h) = \sum_{h_t, x_t} \mathcal{H}_t(h_t|h_{t-1}) \mathcal{G}_t(x_t^h|x_{t-1}^h) W_t(k_t, h_t, x_t^h).$$

where

$$W_t(k_t, h_t, x_t^h) = \max_{c_t, k_{t+1}} u(c, 0, h_t) + \beta \zeta_t V_{t+1}(k_{t+1}, h_t, x_t^h) \quad (11)$$

subject to:

$$(Beq + k_t)(1 + r) + ss + T^{SI} = k_{t+1} + (1 + \tau_c) c_t + \mathcal{T}(y_t) + p_{MCR} + x_t^h (1 - q_{MCR}(x_t^h)) \quad (12)$$

$$T_t^{SI} = \max(0, (1 + \tau_c) \underline{c} + \mathcal{T}(y_t) + p_{MCR} + x_t^h (1 - q_{MCR}) - (Beq + k_t)(1 + r) - ss) \quad (13)$$

$$y_t = (Beq + k_t)r + ss - \max(0, x_t^h (1 - q_{MCR}) - 0.075(k_t r + ss)) \quad (14)$$

Distribution of households To simplify the notation, let $\mathbb{S}$ define the space of a household's state variables at the end of each period; $\mathbb{S} = \mathbb{K} \times \mathbb{H} \times \mathbb{X} \times \mathbb{Z} \times \mathbb{G} \times \mathbb{H} \times \mathbb{X} \times \mathbb{T}$ for working-age households and $\mathbb{S} = \mathbb{K} \times \mathbb{H} \times \mathbb{X} \times \mathbb{T}$ for retired households. Let $\mathbf{s} \in \mathbb{S}$, and denote by $\Gamma(\mathbf{s})$ the distribution of households over the state-space.

3.2 Production sector

There are two stand-in firms which act competitively. Their production functions are Cobb-Douglas, $AK^\alpha L^{1-\alpha}$, where K and L are aggregate capital and aggregate labor and A is the total factor productivity. The first stand-in firm offers ESHI to its workers but the second stand-in firm does not. Under competitive behavior, the second firm pays each employee his marginal product of labor. Since capital is freely allocated between the two firms, the Cobb-Douglas production function implies that the capital-labor ratios of both firms are the same. Consequently, we have

$$w = (1 - \alpha) AK^\alpha L^{-\alpha}, \quad (15)$$

$$r = \alpha AK^{\alpha-1} L^{1-\alpha} - \delta, \quad (16)$$

where δ is the depreciation rate.

The first firm has to partially finance the health insurance premium for its employees. These costs are passed on to its employees through a wage reduction. In specifying this wage reduction, we follow Jeske and Kitao (2009). The first firm subtracts an amount

c_E from the marginal product per effective labor unit. The zero profit condition implies

$$c_E = \frac{\psi p \left(\int \mathbf{1}_{\{i_t=G\}} \Gamma(\mathbf{s}) \right)}{\int l_t z_t^h \mathbf{1}_{\{g_t=1\}} \Gamma(\mathbf{s})}. \quad (17)$$

The numerator is the total contributions towards insurance premiums paid by the first firm. The denominator is the total effective labor in the first firm.

3.3 Insurance sector

Health insurance companies in both private and group markets act competitively but incur administrative costs when issuing an insurance contract. We assume that insurers can observe all state variables that determine future medical expenses of individuals.¹⁰ This assumption, together with zero profit conditions, allows us to write insurance premiums in the following way:

$$p_I(h_{t-1}, x_{t-1}^h) = (1+r)^{-1} \gamma EM_t(h_{t-1}, x_{t-1}^h) + \pi^h \quad (18)$$

for the non-group insurance market and

$$p = (1+r)^{-1} \frac{\gamma \left(\int \mathbf{1}_{\{i_t=G\}} EM_t(h_{t-1}, x_{t-1}^h) \Gamma(\mathbf{s}) \right)}{\int \mathbf{1}_{\{i_t=G\}} \Gamma(\mathbf{s})} \quad (19)$$

for the group insurance market. Here, $EM_t(h_{t-1}, x_{t-1}^h)$ is the expected medical cost to an insurance company for an individual aged t whose last period health condition and medical expense shock are h_{t-1} and x_{t-1}^h respectively:

$$EM_t(h_{t-1}, x_{t-1}^h) = \sum_{h_t, x_t^h} x_t^h q(x_t^h, i_t) \mathcal{G}_t(x_t^h | x_{t-1}^h) \mathcal{H}_t(h_t | h_{t-1}); \quad i_t \in \{I, G\}$$

In Eqs (18) and (19) γ is a markup on prices due to the administrative costs in the individual and group markets; π^h is the health-dependent fixed costs of buying an individual policy.¹¹ The premium in the non-group insurance market is based on the discounted expected medical expenditure of an individual buyer. The premium for group insurance is based on a weighted average of the expected medical costs of those who buy group insurance.

¹⁰Currently most states allow insurance firms to medically underwrite applicants for health insurance.

¹¹Fixed costs capture the difference in overhead costs for individual and group policies. We allow fixed costs to differ by health in order to reflect the fact that unhealthy individuals face additional frictions when buying insurance in the individual market.

3.4 Government constraint

We assume that the government runs a balanced budget. This implies

$$\begin{aligned}
& \int_{t < R} (\tau_{MCR}(\tilde{w}z_t^h l_t - \bar{p}\mathbf{1}_{\{i_t=G\}}) + \tau_{ss} \min(\tilde{w}z_t^h l_t - \bar{p}\mathbf{1}_{\{i_t=G\}}, \bar{y}_{ss})) \Gamma(\mathbf{s}) + \\
& \int_{t \geq R} (\tau_c c_t + \mathcal{T}(y_t)) \Gamma(\mathbf{s}) + \int_{t \geq R} p_{MCR} \Gamma(\mathbf{s}) - Gov = \\
& \int_{t \geq R} T^{SI} \Gamma(\mathbf{s}) + \int_{t \geq R} (x_t^h q_{MCR} + ss) \Gamma(\mathbf{s}) + \int_{t < R} (x_t^h - X_t) \mathbf{1}_{\{i_t=M \text{ or } (i_t=U \ \& \ i_t^{MN}=1)\}} \Gamma(\mathbf{s})
\end{aligned} \tag{20}$$

The left-hand side is the total tax revenue from all households net of the exogenous government expenditures (Gov). The first term on the right-hand side is the costs of guaranteeing the minimum consumption floor for households. The second term is the expenditures on Social Security and Medicare for retired households. The last term is the costs of Medicaid including Medicaid Needy program for working-age households.

3.5 Definition of stationary competitive equilibrium

Given the government programs $\{\mathcal{L}, ss, q_{MCR}, p_{MCR}, y^{cat}, k^{cat}, y^{MN}, k^{MN}, Gov\}$, the fraction of medical costs covered by private insurers and Medicaid $\{q(x_t^h, i_t)\}$, and the employers' contribution (ψ), the competitive equilibrium of this economy consists of the set of time-invariant prices $\{w, r, p, p_I(h_{t-1}, x_{t-1}^h)\}$, wage reduction $\{c_E\}$, households' value functions $\{V_t(\mathbf{s})\}$, decision rules of working-age households $\{k_{t+1}(\mathbf{s}), c_t(\mathbf{s}), l_t(\mathbf{s}), i_t(\mathbf{s})\}$ and retired households $\{c_t(\mathbf{s}), k_{t+1}(\mathbf{s})\}$ and the tax functions $\{\mathcal{T}(y), \tau_{med}, \tau_{ss}, \tau_c\}$ such that the following conditions are satisfied:

1. Given the set of prices and the tax functions, the decision rules solve the households' optimization problems in Eqs (1) and (11).
2. The bequest is derived from aggregating assets of deceased households:

$$Beq = \frac{\int (1 - \zeta_t) k_{t+1} \Gamma(\mathbf{s})}{1 + \eta}$$

3. Wage (w) and rent (r) satisfy Eqs (15) and (16), where

$$\begin{aligned}
K &= \int k_{t+1} \Gamma(\mathbf{s}), \\
L &= \int_{t < R} z_t^h l_t \Gamma(\mathbf{s}).
\end{aligned}$$

4. c_E satisfies Eq (17), thus the firm offering ESHI earns zero profit.
5. The non-group insurance premiums $p_I(h_{t-1}, x_{t-1}^h)$ satisfy Eq (18), and the group insurance premium satisfies Eq (19), so health insurance companies earn zero profit.
6. The tax functions $\{\mathcal{T}(y), \tau_{MCR}, \tau_{ss}, \tau_c\}$ balance the government budget (20).

4 Data and calibration

We calibrate the model using the Medical Expenditure Panel Survey (MEPS) dataset. The MEPS collects detailed records on demographics, income, medical costs and insurance for a nationally representative sample of households. It consists of two-year overlapping panels and covers the period of 1996-2008. For each wave, each person is interviewed five rounds over the two years. We use nine waves of the MEPS (2000-2008). The MEPS links people into one household based on eligibility for coverage under a typical family insurance plan. This Health Insurance Eligibility Unit (HIEU) defined in the MEPS dataset corresponds to our definition of a household. All statistics we use were computed for the head of the HIEU. We define the head as the person with the highest income in the HIEU. We use the cross-sectional weights and longitudinal weights provided by MEPS for the cross-sectional and longitudinal pools correspondingly. Since each wave is a representation of the population in each year, when pooling several years (or waves) together the weight of each individual was divided by the number of years (or waves).

In our sample we include all household heads who are at least 24 years old and have non-negative labor income (to be defined later). The sample size for each wave is presented in Table 1. We use 2004 as the base year. All level variables were normalized to the base year using Consumer Price Index (CPI).

year	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
no. of observations	4,140	8,417	6,184	6,325	6,248	6,069	6,519	4,930

Table 1: Number of observations in eight waves of MEPS (2000-2008)

4.1 Demographics, preferences and technology

In the model, agents are born at age 25 and can live to a maximum age of 99. The model period is one year so the maximum lifespan N is 75. Agents retire at the age of 65, so R is 41. The population growth rate was set to 1.07% to match the fraction of people older than 65 in the data.

In MEPS a person's self-reported health status is coded as 1 for excellent, 2 for very good, 3 for good, 4 for fair and 5 for poor. We define a person in bad health if his average health score over that year is greater than 3. To construct the age-dependent health transition matrix we start by computing the transition matrices for ages 30, 40,...70. In each case we use a sample in a 10-year age bracket. For example, to construct the transition matrix for age 40 we pool individuals ages 35-44. Then we construct the health transition matrix for all the remaining ages by using the polynomial degree two approximation.

To adjust conditional survival probabilities ζ_t for the difference in health we follow Attanasio et al. (2011). In particular, we use Health and Retirement Survey (HRS) to estimate the difference in survival probabilities for people in different health categories and use it to adjust the male life tables from the Social Security Administration. Appendix B explains in more detail how we construct the health transition matrix and how we adjust the survival probability. Figure (2) compares the fraction of the unhealthy that our calibration generates with the one observed in the data.

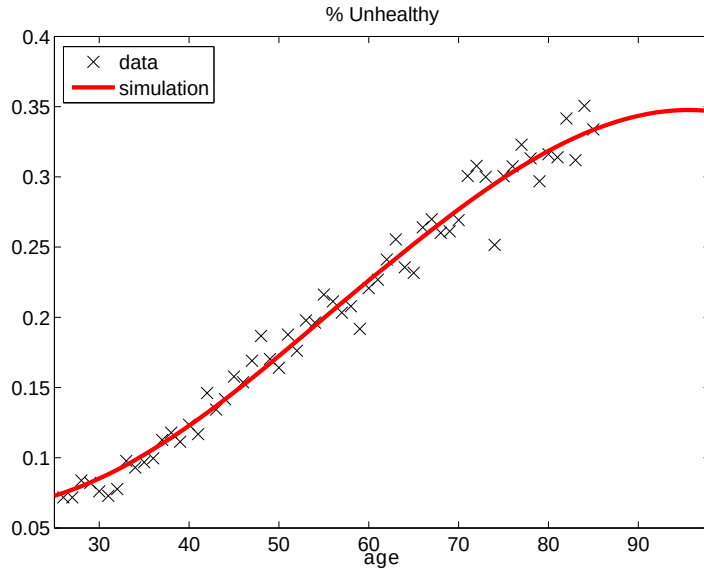


Figure 2: Fraction of the unhealthy by age

We set the consumption share in the utility function χ to 0.6 which is in the range estimated by French (2005).¹² The parameter σ is set to 3.15 in order to match the age profile of the fraction of people with individual insurance. This corresponds to the risk-aversion over consumption equal to 2.3.¹³ The discount factor β is set to 0.996 to match the aggregate capital output ratio of 2.8. We set labor supply of those who choose to work ($\bar{l}$) to 0.4

¹²Given that we have indivisible labor supply we cannot pin down this parameter using a moment in the data.

¹³The relative risk aversion over consumption is given by $-cu_{cc}/u_c = 1 - \chi(1 - \sigma)$.

Fixed leisure costs of work ϕ_w are calibrated to match the employment profiles for healthy people.¹⁴ The loss of time due to bad health ϕ_t^{UH} was calibrated to match the employment profile among the unhealthy.

The Cobb-Douglas function parameter α is set at 0.33, which corresponds to the capital income share in the US. The annual depreciation rate δ is calibrated to achieve an interest rate of 4% in the baseline economy. The total factor productivity A is set such that the total output equals one in the baseline model.

4.2 Government

In specifying the tax function $\mathcal{T}(y)$ we use a nonlinear functional form specified by Gouveia and Strauss (1994) together with a linear income tax τ_y :

$$\mathcal{T}(y) = a_0 [y - (y^{-a_1} + a_2)^{-1/a_1}] + \tau_y y$$

The first term captures the progressive income tax and is commonly used in the quantitative macroeconomic literature (for example, Conesa and Krueger, 2006; Jeske and Kitao, 2009). In this functional form a_0 controls the marginal tax rate faced by the highest income group, a_1 determines the curvature of marginal taxes, and a_2 is a scaling parameter. We set a_0 and a_1 to 0.258 and 0.768 correspondingly as in Gouveia and Strauss (1994). The parameter a_2 is used to balance the government budget in the baseline economy. We set proportional income tax τ_y to 6.4% to match the fact that around 65% of tax revenues comes from progressive income taxes. In the experimental case we use the proportional tax τ_y to balance the government budget.

When calibrating the consumption minimum floor $\underline{c}$ we use the fact that this safety net has an important impact on labor supply decisions especially for the unhealthy and for people with low productivity. We set the minimum consumption floor to \$2,765 to match the employment rate among Medicaid beneficiaries.¹⁵ This number is in line with other estimates based on the life-cycle model with medical expenses (see De Nardi et al. (2010)). The Social Security replacement rate is set to 30%.

The income eligibility threshold for the general Medicaid program (y^{cat}) is set to 81% of FPL and its asset test is set to \$40,000 to match the life-cycle profile of people covered by public health insurance. The income eligibility threshold for the Medically Needy program (y^{MN}) is set to be the same as the threshold for the general Medicaid program

¹⁴We define a person as employed if he works at least 520 hours per year, earns at least \$2678 per year in base year dollars (this corresponds to working at least 10 hours per week and earning a minimum wage of \$5.15 per hour), and does not report being retired or receiving Social Security benefits.

¹⁵The minimum consumption floor also affects the asset accumulation among poor people. Our model captures the asset holding among the poor. The fraction of people with assets below \$1,000 is 12.2% in our model, comparing to 11.0% in the data (Kennickel, 2006).

(y^{cat}) and the asset test for the Medically Needy program is taken from the data and is set to \$2,000. This number is equal to the median asset test in 2009 in the states that have Medically Needy program.¹⁶

The Medicare, Social Security and consumption tax rates were set to 2.9%, 12.4% and 5.67% correspondingly. The maximum taxable income for Social Security is set to \$84,900. The fraction of exogenous government expenses in GDP is 18%.

4.3 Insurance status

In the MEPS the question about the source of insurance coverage is asked retrospectively for each month of the year. We define a person as having employer-based insurance if he reports having ESHI for at least eight months during the year (variables PEGJA-PEGDE). The same criterion is used when defining public insurance (variables PUBJA-PUBDE) and individual insurance status (variables PRIJA-PRIDE). For those few individuals who switch sources of coverage during a year, we use the following definition of insurance status. If a person has both ESHI and individual insurance in one year, and each coverage lasted for less than eight months, but the total duration of coverage lasted for more than eight months, we classify this person as individually insured. Likewise, when a person has a combination of individual and public coverage that altogether lasts for more than eight months, we define that individual as having public insurance.¹⁷

4.4 Medical expenditures and insurance coverage

Medical costs in our model correspond to the total paid medical expenditures in the MEPS dataset (variable TOTEXP). These include not only out-of-pocket medical expenses but also the costs covered by insurers. In our calibration medical expense shock is approximated by a 3-state discrete health and age dependent Markov process. For each age and health, these three states correspond to the average medical expenses of three groups: those with medical expenses below 50th, 50th to 95th, and more than 95th percentiles respectively. To construct the transition matrix we measure the fraction of people who move from one bin to another between two consecutive years separately for people of working age (25-64) and for retirees (older than 64).

We use MEPS to estimate the fraction of medical expenses covered by insurance policies $q(x_t, i_t)$ (we explain more in Appendix C). For retired households we set q_{med} to

¹⁶The reason we do not take the asset test for the general Medicaid program from the data is that it significantly varies by state (some states do not have asset test at all and some states have a tight asset test). In contrast, the asset test for the Medically Needy program do not vary much by state. Our goal in calibration is to capture the overall restrictiveness of the Medicaid eligibility and to reproduce the life-cycle profile of the enrollment in the program.

¹⁷The results do not significantly change if we change the cutoff point to 6 or 12 months.

0.5. The total medical expenses of people older than 64 paid by the Medicare program in our model is 2.23% of GDP, comparing to 2.19% in the data (National Health Expenditure Data, 2004).

4.5 Insurance sector

The share of health insurance premium paid by the firm (ψ) was set to 80% which is in the range of empirical employer's contribution rates (Kaiser Family Foundation, 2009).

We set the proportional load for group and individual insurance policies (γ) to 1.086 to match the fraction of people with individual insurance among the healthy. The fixed costs for an individual policy π_h is set to zero for the healthy and to \$891 for the unhealthy to match the life-cycle profile of individual insurance coverage among the unhealthy.

4.6 ESHI offer rate

We assume that probability of getting an offer of ESHI coverage is a logistic function:

$$Prob_t = \frac{\exp(u_t)}{1 + \exp(u_t)},$$

where the variable u_t is an odds ratio that takes the following form:

$$u_t = \eta_{0,t} + \eta_{1,t} \mathbf{1}_{\{h_{t-1}=0\}} + \eta_{2,t} \log(inc_t) + \eta_{3,t} \log(inc_t) \mathbf{1}_{\{h_{t-1}=0\}} + \eta_4 \mathbf{1}_{\{g_{t-1}=1\}} \mathbf{1}_{\{t>25\}} \quad (21)$$

Here $\eta_{0,t}, \eta_{1,t}, \eta_{2,t}, \eta_{3,t}$ are age-dependent coefficients, and inc_t is individual labor income. This specification allows us to match the life-cycle profile of ESHI coverage and the average labor income of workers with ESHI. We include dummy coefficients for bad health to capture the lower opportunity to access ESHI for the unhealthy.

In general, it is possible to estimate Eq (21) directly from the data since in MEPS the same person is observed for two years consecutively. However, there might be a selection bias problem because people with an ESHI offer are more likely to work than those without an ESHI offer.¹⁸ Thus the direct estimation from the data is likely to overstate the opportunity to get an ESHI offer among groups with low labor force participation such as the unhealthy or people at pre-retirement ages. To avoid this problem we estimate this equation inside the model together with the labor income and this procedure is described in more details in the following subsection.

¹⁸See French and Jones (2010) for an investigation of the effect of employer-based health insurance on decisions to work.

4.7 Labor income

The productivity of individuals takes the following form:

$$z_t^h = \lambda_t^h \exp(v_t) \exp(\xi) \quad (22)$$

where λ_t^h is the deterministic function of age and health. The stochastic component of productivity consists of the persistent shock v_t and a fixed productivity type ξ :

$$v_t = \rho v_{t-1} + \varepsilon_t, \quad \varepsilon_t \sim N(0, \sigma_\varepsilon^2) \quad (23)$$

$$\xi \sim N(0, \sigma_\xi^2)$$

For the persistent shock v_t we set ρ to 0.98 and σ_ε^2 to 0.02 following the incomplete market literature (Storesletten et al (2004); Hubbard et al (1994); French (2005)). We set the variance of the fixed productivity type (σ_ξ^2) to 0.242 as in Storesletten et al (2004). In our computation we discretize v_t and ξ using the method in Floden (2008).¹⁹ To construct the distribution of newborn individuals, we draw v_1 in Eq.(23) from $N(0, 0.352^2)$ distribution following Heathcote et al. (2010).

To estimate the deterministic part of productivity λ_t^h we need to take into account that in the data we only observe labor income of workers and we do not know the potential labor income of non-workers. In addition, as was mentioned in the previous subsection, people who work may face different probability to get an ESHI offer than non-workers. To avoid the selection bias we adapt the method developed by French (2005). We start by estimating the labor income profiles separately for all workers and for workers with ESHI coverage based on the MEPS dataset.²⁰ Then we guess λ_t^h in Eq.(22) and the coefficients $\eta_{0,t}, \eta_{1,t}, \eta_{2,t}, \eta_{3,t}, \eta_4$ in Eq.(21). Next, we feed the resulting productivity and ESHI offer probability into our model. After solving and simulating the model we compute the average labor income profile of all workers and workers with ESHI as well as the ESHI coverage profile in our model and compare them with the profiles from the data. Then we update our guesses and reiterate until i) the labor income profiles generated by our model are the same as in the data for all workers as well as for only workers covered by ESHI for each health group; ii) the profiles of ESHI coverage in the model are the same as in the data for each health group, iii) the probability of being insured by ESHI in the current period conditioning on being insured by ESHI in the previous period is

¹⁹We use 9 gridpoints for v_t and 2 gridpoints for ξ . The grid of v_t is expanding over ages to capture the increasing cross-sectional variance. Our discretized process for v_t generates the autocorrelation of 0.98 and 0.0173 for its innovation variance.

²⁰Household labor income is defined as the sum of wages (variable WAGEP) and 75% of the income from business (variable BUSNP). This definition is the same as the one used in the Panel Study of Income Dynamics Dataset (PSID), which has been commonly used for income calibration in the macroeconomic literature.

the same in the model and in the data.²¹ The advantage of this approach is that we can reconstruct the productivity and the opportunity to access ESHI of individuals *whom we do not observe working in the data*, most of whom are Medicaid enrollees.

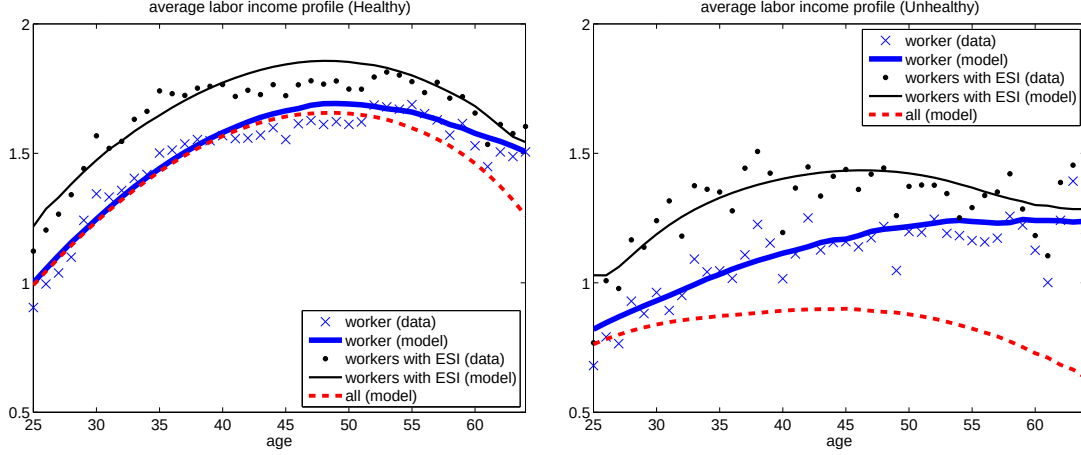


Figure 3: Average labor income of workers (data and model), workers with ESHI coverage (data and model), and of everyone (model). The latter profile takes into account the unobserved productivity of those people who do not work.

Figure (3) plots the labor income profiles of all *workers* and *workers* with ESHI coverage observed in the data and simulated by the model, and compares them with the average potential labor income computed for *everyone* in the model.²² The latter profile takes into account the unobserved productivity of those people who do not work. The average labor income of workers is higher than the average labor income that includes potential income of non-workers because people with low productivity tend to drop out from the employment pool. Our estimates also show that unhealthy people are inherently less productive. The drop in productivity due to bad health depends on age but it can be as high as 40%.

The model parametrization is summarized in Table 12 in Appendix A.

²¹Based on our experiments, for a given set of model parameters there seems to be a unique set of coefficients defining λ_t^h and u_t that can match the profiles in the data. French (2005) provides a discussion of identification of λ_t^h . The identification of u_t is straightforward given that the ESHI take-up rate is 96% in the data (and 98% in our model). The coefficients $\eta_{0,t}, \eta_{1,t}, \eta_{2,t}$ and $\eta_{3,t}$ are pinned down by the profiles of ESHI coverage and the labor income profiles of workers with ESHI, η_4 is used to match the persistence of ESHI coverage.

²²To get the age profile of labor income among workers (and workers with ESHI) in Figure (3) we regress labor income of workers (and workers with ESHI) on dummy variables of age and year, separately for the healthy and for the unhealthy. The average labor income of each age is the resulting coefficient on the corresponding age dummy variable.

5 Baseline model performance

Tables 2 and 3 compare the employment rates and the aggregate health insurance statistics generated by the model with the ones observed in the data. Our model closely tracks all the aggregate statistics including the fraction of the unhealthy in different insurance categories. In addition, our calibration strategy allows the model to match the targeted age profiles of employment by health (top panel of Figure (4)), and the targeted insurance coverage by health (Figures (5)-(6)). The bottom panel of Figure (4) shows the employment rate among people with different health insurance types, including the employment profile of healthy and unhealthy people who are enrolled in public health insurance. These profiles are not targeted in our calibration but our model can closely replicate them.

	Data	Baseline Model
by health status		
all	93.4	94.0
healthy	73.0	73.7
unhealthy	96.5	97.6
by insurance		
private insurance	97.7	99.4
uninsurance	94.4	96.0
public insurance	44.0	44.1

Table 2: Employment rate (data vs baseline model)

	Data				Baseline model			
	ESHI	individual	uninsured	public	ESHI	individual	uninsured	public
all	65.0	8.8	18.6	7.7	64.3	8.6	19.2	7.9
healthy	68.8	8.6	17.9	4.7	67.8	8.3	18.7	5.2
unhealthy	42.7	9.7	22.2	25.4	42.1	10.9	22.2	24.8
% unhealthy by insurance	9.3	15.7	17.1	47.4	8.9	17.3	15.7	42.7

Table 3: Insurance coverage (data vs baseline model)

6 Results

6.1 Characteristics of non-working Medicaid beneficiaries

To understand if the Medicaid program significantly distorts labor supply decisions we start by analyzing the productivity of those Medicaid enrollees who choose not to work.

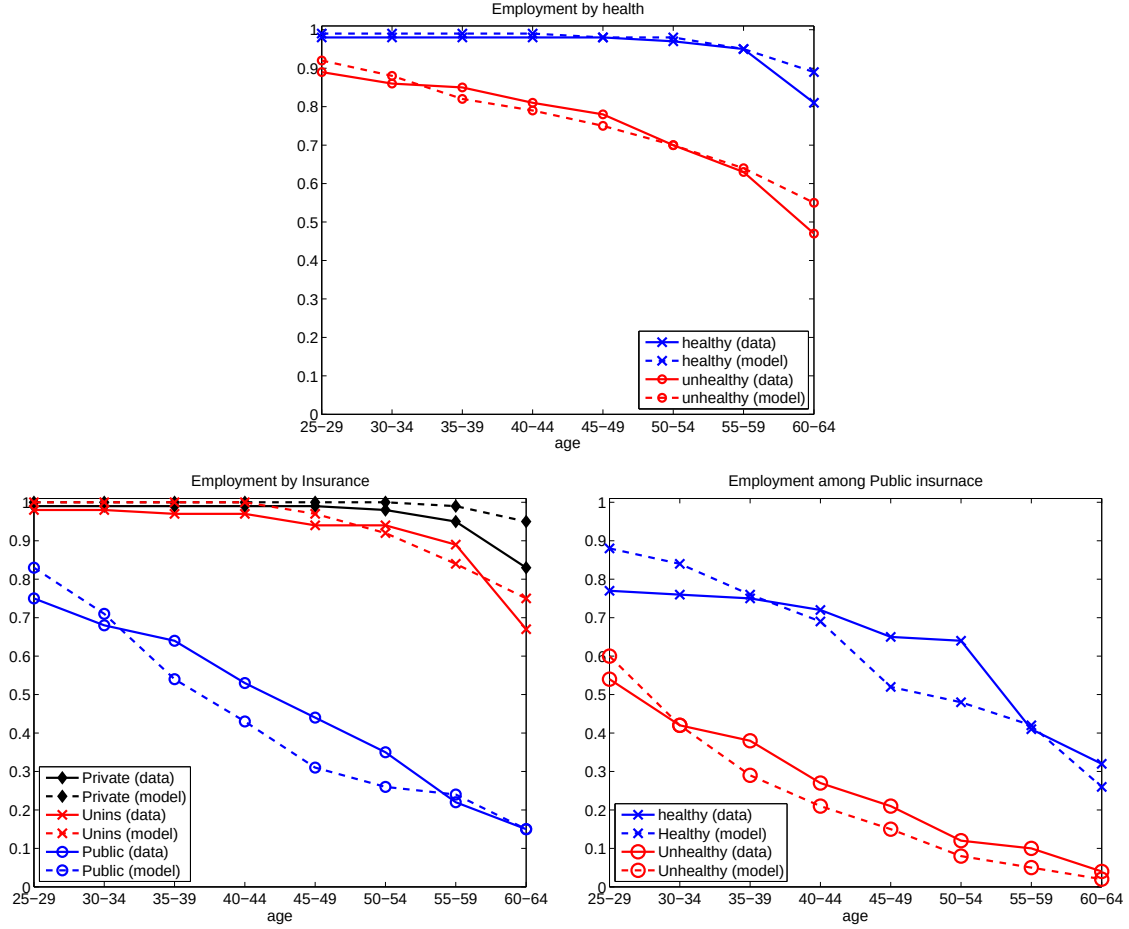


Figure 4: Employment profile (data vs baseline model). Top panel: employment by health. Bottom left panel: employment by insurance status. Bottom right panel: employment by health among people with public insurance

Using our estimates of the unobserved productivity among non-workers we can measure the fraction of Medicaid beneficiaries whose potential labor income is above the income eligibility threshold, i.e. if these people work they will lose Medicaid eligibility. The second row of Table 4 shows that 22.8% of *all* Medicaid beneficiaries will lose eligibility if they start working, and this constitutes around 41% of *non-working* Medicaid beneficiaries. The top panel of Figure (7) plots age profiles of the fraction of all non-working Medicaid enrollees (solid line) and non-workers with potential labor income above the income test limit (dashed line) for each health status. Two observations can be made from Figure (7) and Table 4. First, the fraction of Medicaid beneficiaries who can keep eligibility only while not working increases quickly with age: for the unhealthy it goes up from 4.4% for the age group 25-29 to around 50% among the age group older than 40. Second, the fraction of people whose potential labor income is too high is noticeably higher among the unhealthy: while only 8.2% of healthy enrollees will lose their eligibility

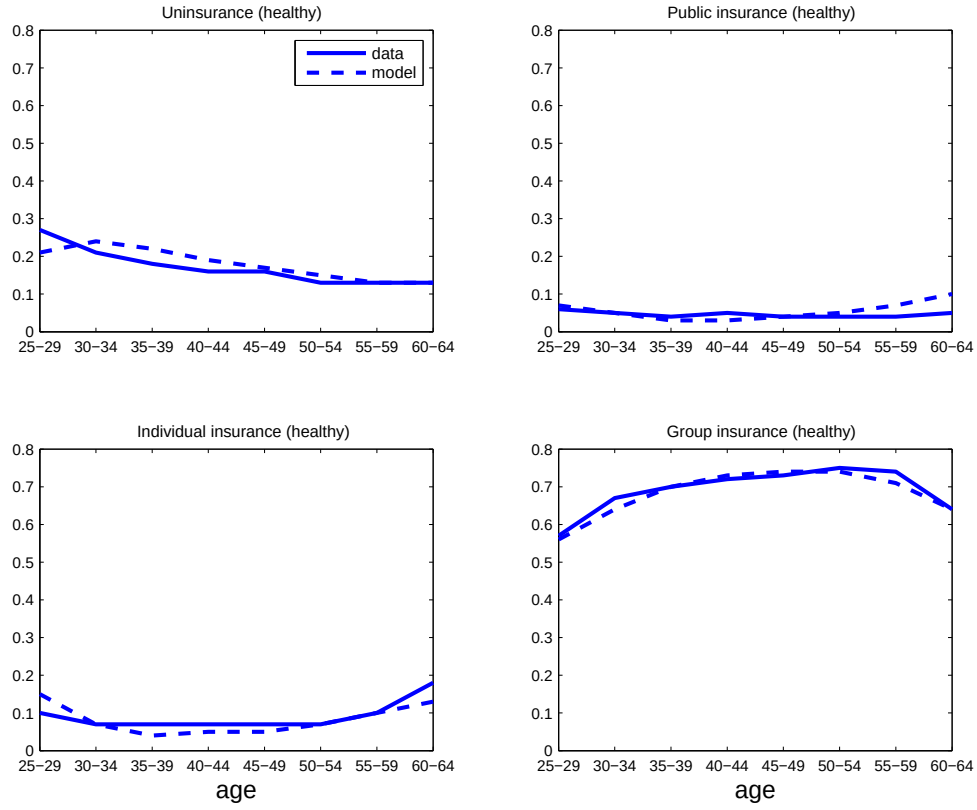


Figure 5: Insurance status among healthy (data vs baseline model))

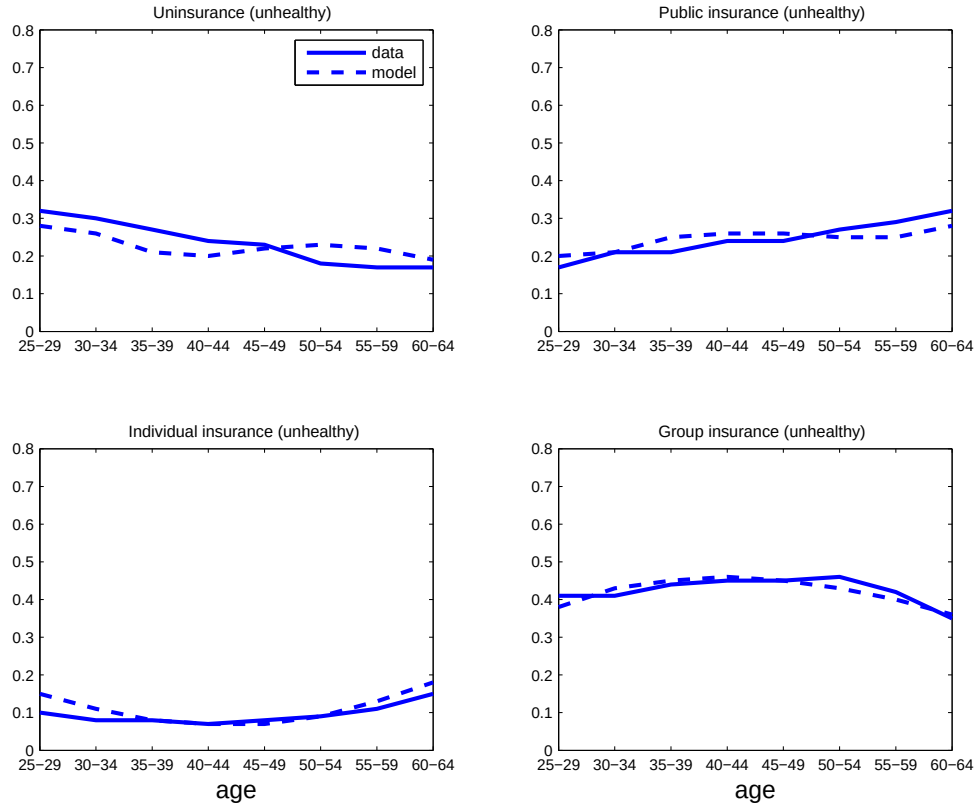


Figure 6: Insurance status among unhealthy (data vs baseline model))

if they start working among the unhealthy this number is 42.5%.

	% of all enrollees	% of healthy enrollees	% of unhealthy enrollees
non-workers (baseline)	55.9	36.5	81.7
enrollees losing eligibility if working	22.8	8.2	42.5
non-workers $\Rightarrow$ workers if not losing eligibility	12.5	2.4	25.9

Table 4: Decomposition of Medicaid beneficiaries

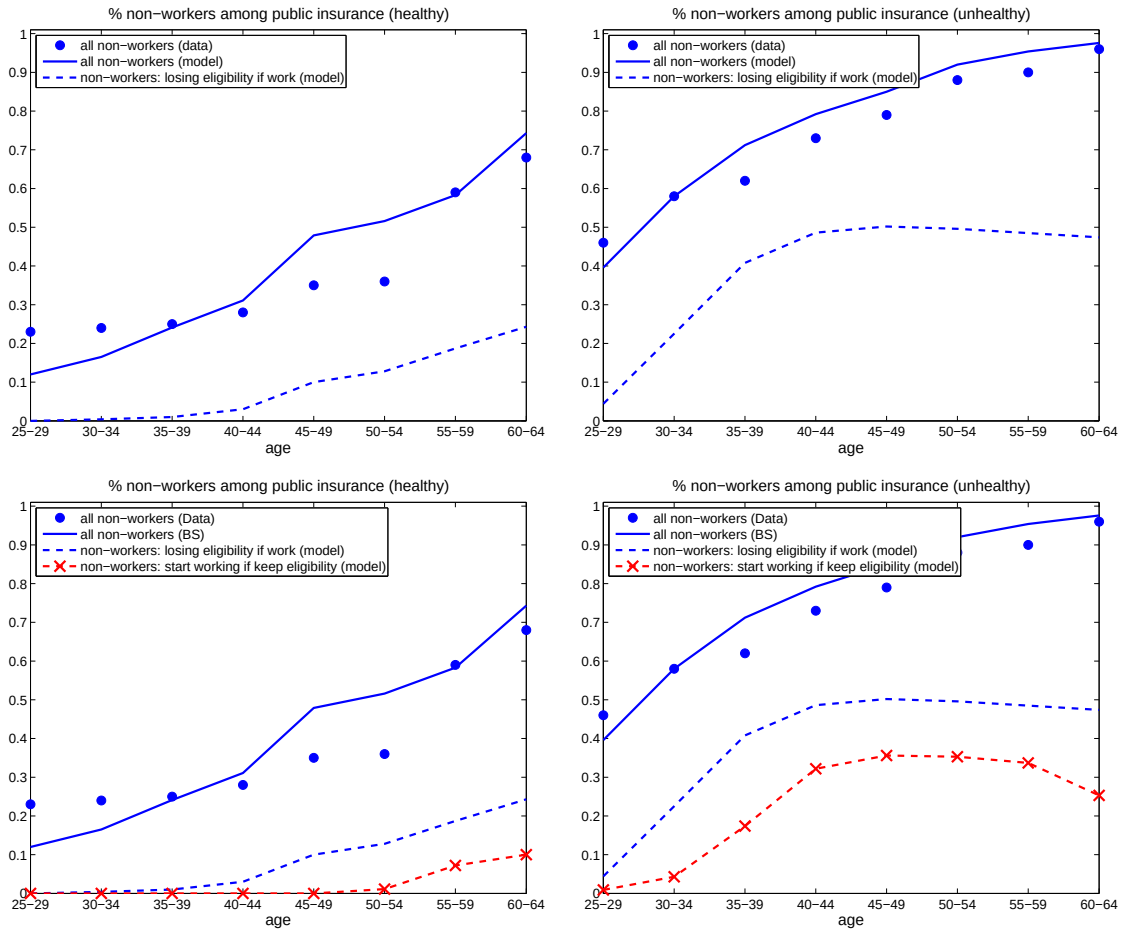


Figure 7: Decomposition of non-workers among public health insurance. The solid lines (dots) are the fraction of non-workers among Medicaid beneficiaries in the baseline model (in the data). The dash lines are the fraction of non-workers who would lose Medicaid eligibility if they start working. In the bottom panel the dash lines with crosses show the fraction of non-workers who would start working if they can keep their current Medicaid eligibility.

To better understand the difference between Medicaid beneficiaries with relatively high potential labor income and other Medicaid beneficiaries, Table 5 compares their medical expenses, potential labor income and assets. The average medical expenses of

people who lose eligibility if working are noticeably higher than the average medical expenses of the rest of Medicaid beneficiaries (\$8,482 vs. \$5,525). At the same time, the former group is significantly more productive - their potential labor income is around 50% higher than the potential labor income of the latter group. Importantly, the group of beneficiaries eligible only while not working, on average, holds much more assets than the rest of Medicaid beneficiaries (\$19,997 vs. \$2,240). As a result, the former group is relatively well self-insured: the average share of their medical expenses in total potential resources (assets plus potential labor income) is much lower than this share for the rest of Medicaid beneficiaries (38.8% vs. 71.9%). To sum up, Medicaid beneficiaries who are eligible only while not working are mostly unhealthy people above middle age with high medical expenses but who have relatively high potential labor income and much more assets comparing to other Medicaid enrollees.

	medical expenses	potential earning	asset	$\frac{\text{medical expense}}{\text{potential cash-on-hand}}$
beneficiaries losing Medicaid if work	\$8,482	\$10,685	\$19,997	38.8%
other Medicaid beneficiaries	\$5,525	\$7,129	\$2,240	71.9%
all Medicaid	\$6,201	\$8,012	\$6,209	72.2%

Table 5: Medicaid enrollees who lose eligibility if working vs. other Medicaid enrollees

Given that a substantial fraction of Medicaid beneficiaries will lose eligibility if they work, an important question is whether Medicaid actually induced them to stop working. On the one hand, our analysis above shows that these people are mostly unhealthy and have high medical expenses, so they value access to free insurance.²³ On the other hand, unhealthy people tend to have lower productivity and incur higher disutility from work; so they may decide to leave the labor force even if there is no Medicaid. To understand to what extent the decision not to work of people with relatively high unobserved productivity is affected by Medicaid, we run the following experiment. We consider a partial equilibrium environment where we allow people who are currently on Medicaid to keep their eligibility for one period regardless of their income. In other words, people who are enrolled in Medicaid in the baseline economy become 'vested' for one period - they cannot lose their eligibility even if their income exceeds the income test. The change in the labor supply behavior of Medicaid enrollees in this experiment allows us to evaluate to which extent the possibility to lose Medicaid eligibility affects their decisions in the baseline case.

The last row of Table 4 shows that slightly more than half of non-working enrollees with potential income above the income test limit (or 12.5% of *all* Medicaid enrollees) will

²³In our model, less than 1% of nonworking Medicaid enrollees with potential income above the income test limit gets an ESHI offer.

start working in this experiment. The crossed dashed line in the bottom panel of Figure (7) shows how this number varies by age and health. The fraction of beneficiaries who change their labor supply decisions in order to get Medicaid is especially high among the unhealthy above age 40. Thus, the distorting effect of Medicaid on labor supply is non-trivial and these distortions disproportionately affect the unhealthy especially in advanced ages.

6.2 Welfare effects

The previous section shows that Medicaid substantially distorts labor supply decisions especially among older and unhealthy people. These distortions can negatively affect welfare for several reasons. First, some people with relatively high productivity do not work. Second, some people receiving public transfers are relatively well self-insured. At the same time, the size of the public transfers received by this group is large because of their high medical expenses. This section evaluates welfare costs of these distortions. An important observation is that the labor supply distortions happen because the Medicaid eligibility depends on labor income which is endogenous. People who want to obtain public insurance but whose labor income is too high have an option to stop working. This type of behavior can be eliminated if the participation in Medicaid is conditioned on exogenous productivity. Thus, to evaluate welfare effects of the distortions we modify the Medicaid eligibility as follows:

$$\begin{aligned} k_t r + \tilde{w} z_t^h \bar{l} &\leq y^{cat} \text{ and } k_t \leq k^{cat} && \text{for categorial eligibility,} \\ k_t r + \tilde{w} z_t^h \bar{l} - x_t^h &\leq y^{MN} \text{ and } k_t \leq k^{MN} && \text{for the Medically Needy program.} \end{aligned} \quad (24)$$

Thus Medicaid eligibility depends on the *potential* labor income of an individual but not on his *current* labor income. This means that even if an individual has zero labor income because he does not work, he will not be eligible if his productivity allows him to earn more than the income test limit. To be consistent, we also determine eligibility for Medically Needy based on the potential labor income. We refer to this experiment as observable productivity case and it will be a benchmark for our policy discussions in the next section.

To evaluate welfare effects from implementing this new eligibility criteria we maintain the total size of the government means-tested transfers as in the baseline economy. To do this we adjust the income eligibility thresholds $\tilde{y}^{cat}$ and $\tilde{y}^{MN}$ until the total spending on Medicaid and the minimum consumption guarantee for the working age population in the experimental case is the same as in the baseline economy.²⁴

²⁴Since households change their labor supply and saving decisions we also slightly adjust the proportional income tax τ_y to balance the government budget. In Appendix D we consider an alternative setup where, instead of adjusting the income eligibility threshold to maintain the size of the public transfers

	Baseline	Observable productivity
Income test: y^{cat}, y^{MN} (%FPL)	0.81	1.02
Income tax: τ_y (%)	6.41	6.20
Employment rate (%)		
all	94.4	96.0
healthy	97.6	98.2
unhealthy	73.7	82.5
% Δ aggregate labor prod-ty	—	0.52%
% Δ aggregate capital	—	0.71%
% Δ aggregate output	—	0.58%
Ex-ante consumption equivalent (%)	—	1.05

Table 6: The effect of removing Medicaid distortions on labor supply

	Baseline				no moral hazard			
	ESHI	individual	uninsured	public	ESHI	individual	uninsured	public
all	64.3	8.6	19.2	7.9	62.9	7.5	19.1	10.5
healthy	67.8	8.3	18.7	5.2	66.2	6.9	18.2	8.7
unhealthy	42.1	10.9	22.2	24.8	41.5	11.6	25.0	21.9
% unhealthy	8.9	17.3	15.7	42.7	9.0	21.1	17.8	28.6

Table 7: Change in insurance coverage

Tables 6 and 7 compare the economy where eligibility is based on productivity with the baseline. After implementing the new eligibility criteria non-workers with relatively high potential labor income have to leave the program. Given that many of these people are unhealthy and have high medical expenses, this significantly decreases the Medicaid spending. To maintain the same level of public transfers this free-up budget is used to cover more poor people: the income test goes up from 81% to 102% of FPL and the percentage of people enrolled in Medicaid increases from 7.9% to 10.5%. Note that the newly eligible people tend to be healthier than those who lose eligibility, thus the fraction of unhealthy Medicaid enrollees decreases from 42.7% to 28.8%.

To measure the welfare of this experiment we use an ex-ante consumption equivalence that captures long-run welfare gains. Eliminating the labor supply distortions results in sizeable welfare gains: a newborn individual in the baseline economy is willing to give up 1.05% of his annual consumption every period in order to be born in the economy where productivity is observable. Note, that the increase in labor supply of people who lose eligibility has only marginal contribution to these welfare gains. Even though the

program, we only adjust τ_y to balance the government budget. The qualitative conclusions in this case stay the same.

employment among the unhealthy increases from 73.7% to 82.4%, the aggregate labor productivity, aggregate employment, aggregate output and capital only slightly increase. Most of the welfare gains come from the more efficient use of Medicaid spending. As was shown in the previous subsection, people who lose their eligibility if their potential labor income is observable are relatively well self-insured due to high earning capacity and ability to accumulate relatively high assets. On the other hand, the new enrollees have less opportunities to self-insure, and private insurance premiums and medical costs constitute a large fraction of their resources. Thus, reallocating public transfers from the former group to the latter improves welfare.²⁵

7 Policy experiments

The previous section shows that if Medicaid transfers are better targeted towards people with low productivity this can substantially improve welfare. In the environment where productivity is unobservable there are two ways to improve the target efficiency. First is to link Medicaid eligibility to some variable that is i) observable, ii) correlated with productivity, iii) less responsive to incentives created by public insurance than labor income. We consider two variables that broadly fit into this category: assets and the average lifetime income. Second way to improve target efficiency is to introduce work requirement for some Medicaid beneficiaries by exploiting the fact that there are two pathways to qualify for Medicaid. This section investigates the effects of each of these three policies.

7.1 Asset test

In the environment where productivity is unobservable one way to separate people with high and low productivity is to use asset test. As the analysis in the previous section shows, non-working Medicaid beneficiaries with relatively high potential labor income hold significantly more assets than other Medicaid enrollees. To illustrate the role of asset test in preventing moral hazard we consider the effects of the complete asset test removal in two cases: i) when productivity is unobservable, ii) when productivity is observable. In other words, in the first economy the eligibility for Medicaid is determined

²⁵In Appendix D we show that in the alternative setup when we only adjust τ_y the welfare gains are equal to 0.26% of annual consumption. The gains are smaller because the savings from withdrawing public transfers from people who can self-insure are allocated to the whole population in terms of reduced taxes as opposed to the relatively poor people as in the benchmark case.

according to the following rule:

$$\begin{aligned} k_t r + \tilde{w} z_t^h l_t &\leq y^{cat} && \text{for categorial eligibility,} \\ k_t r + \tilde{w} z_t^h l_t - x_t^h &\leq y^{MN} \text{ and } k_t \leq k^{MN} && \text{for the Medically Needy program.} \end{aligned}$$

while in the second the eligibility criteria looks as follows:

$$\begin{aligned} k_t r + \tilde{w} z_t^h \bar{l} &\leq y^{cat} && \text{for categorial eligibility,} \\ k_t r + \tilde{w} z_t^h \bar{l} - x_t^h &\leq y^{MN} \text{ and } k_t \leq k^{MN} && \text{for the Medically Needy program.} \end{aligned}$$

In both cases we keep the asset test for Medically Needy program to maintain the role of this program as an ex-post insurance for impoverished people with no resources to pay for their medical costs. As in the benchmark experiment in the previous section we fix the welfare budget by adjusting the income test (y^{cat} and y^{MN}). The results of these experiments are illustrated in the rows 1 and 3 of Tables 8 and 9.

Removing asset test has very different effects depending on whether or not productivity is observable. In the economy where productivity is observable, removing asset test increases welfare gains from 1.05% (the economy with observable productivity and asset test) to 1.22%. This happens because asset test creates distortions on saving decisions and its removal increases wealth accumulation among people with low productivity (see Figure (8)).²⁶ In contrast, if productivity is unobservable, eliminating asset test leads to welfare losses equivalent to -0.83% of the annual consumption. This happens because the distortions on labor supply created by Medicaid become more severe since more people with relatively high productivity and high medical costs who previously cannot enroll in Medicaid because their assets are too high now stop working and become eligible for the program. Given their high medical expenses the strain on public spending increases and since we keep the welfare budget fixed the income eligibility threshold decreases from 81.1% to 24.4% of FPL. The Medicaid coverage decreases from 7.9% to 6.8% but the fraction of beneficiaries who would start working if they can keep eligibility increases almost three times. As a result, even for truly low productive people it becomes difficult to enroll in Medicaid if they work and this leads to large welfare losses. This experiment illustrates the important role that asset test plays in preventing highly productive and well self-insured people to get free public insurance by not working.

In the next set of experiments we gradually decrease the asset test in the baseline economy from \$40,000 to \$2,000 to understand if this can reduce the labor supply distortions and move the economy closer to the benchmark case of observable productivity.

²⁶Gruber and Yelowitz (1999) also find that asset test has a sizeable, negative effect on savings of Medicaid enrollees.

Asset test (k^{CAT})	% enrollees losing eligibility if working	% non-worker⇒worker if not losing eligibility	Ex-ante CEV (%)		
			all	low ξ	high ξ
<i>Productivity is observable</i>					
1. No asset test	—	—	1.225	1.490	0.565
2. \$40000	—	—	1.052	1.282	0.418
<i>Productivity is unobservable</i>					
3. No asset test	98.3	34.9	-0.825	-1.070	-0.147
4. \$40000 (baseline)	22.8	12.5	—	—	—
5. \$30000	13.0	7.3	0.287	0.357	0.093
6. \$20000	5.1	2.4	0.581	0.716	0.211
7. \$10000	2.0	0.8	0.522	0.625	0.238
8. \$5000	0.6	0.2	0.516	0.609	0.259
9. \$2000	0.2	—	0.330	0.372	0.217

Table 8: Welfare effects of asset test: The percentage in the second and third columns is among all Medicaid beneficiaries.

Asset test (k^{CAT})	Income Test (%FPL)	employment (%)		insurance (%)				$k_t < \$1000$ (%)
		unhealthy	healthy	unins	pub	Ind	ESHI	
<i>Productivity is observed</i>								
1. No asset test	102.2	82.4	98.2	19.2	10.5	7.4	62.9	11.8
2. \$40,000	102.2	82.5	98.2	19.1	10.5	7.5	62.9	12.0
<i>Productivity is unobserved</i>								
3. No asset test	24.4	66.5	96.4	18.2	6.8	9.8	65.2	9.2
4. \$40000 (baseline)	81.0	73.8	97.7	19.2	7.9	8.6	64.3	12.2
5. \$30000	88.1	76.4	97.8	18.9	9.1	8.3	63.8	12.4
6. \$20000	96.0	79.5	98.1	19.1	9.9	7.7	63.3	12.4
7. \$10000	99.8	80.8	98.1	19.5	9.9	7.4	63.2	13.4
8. \$5000	102.0	81.6	98.1	19.7	10.0	7.2	63.1	13.8
9. \$2000	100.9	80.9	97.9	20.3	9.7	6.9	63.1	15.8

Table 9: Effects of asset test

As before, in each experiment we fix the size of the welfare budget by adjusting the income eligibility threshold for Medicaid. Tables 8 and 9 show the results of the tightening asset test. Reducing the asset limit from \$40,000 (baseline level) to \$30,000 noticeably decreases the percentage of Medicaid enrollees whose potential labor income is above the eligibility threshold from 22.8% to 13.0%. Setting asset test to \$2,000 almost completely eliminates the moral hazard problem: the percentage of Medicaid enrollees with potential labor income above the income eligibility threshold drops to 0.2%. At the same time, the employment rate among the unhealthy increases from 73.8% to 80.9% which is close to the benchmark economy where productivity is observable (82.4%). However, even though in terms of employment the economy with \$2,000 asset test is close to the benchmark economy with observable productivity, it brings much lower welfare gains: 0.33% of the annual consumption comparing to 1.05% in the benchmark economy. This is because the positive effects of eliminating labor supply distortions are partially offset by the negative

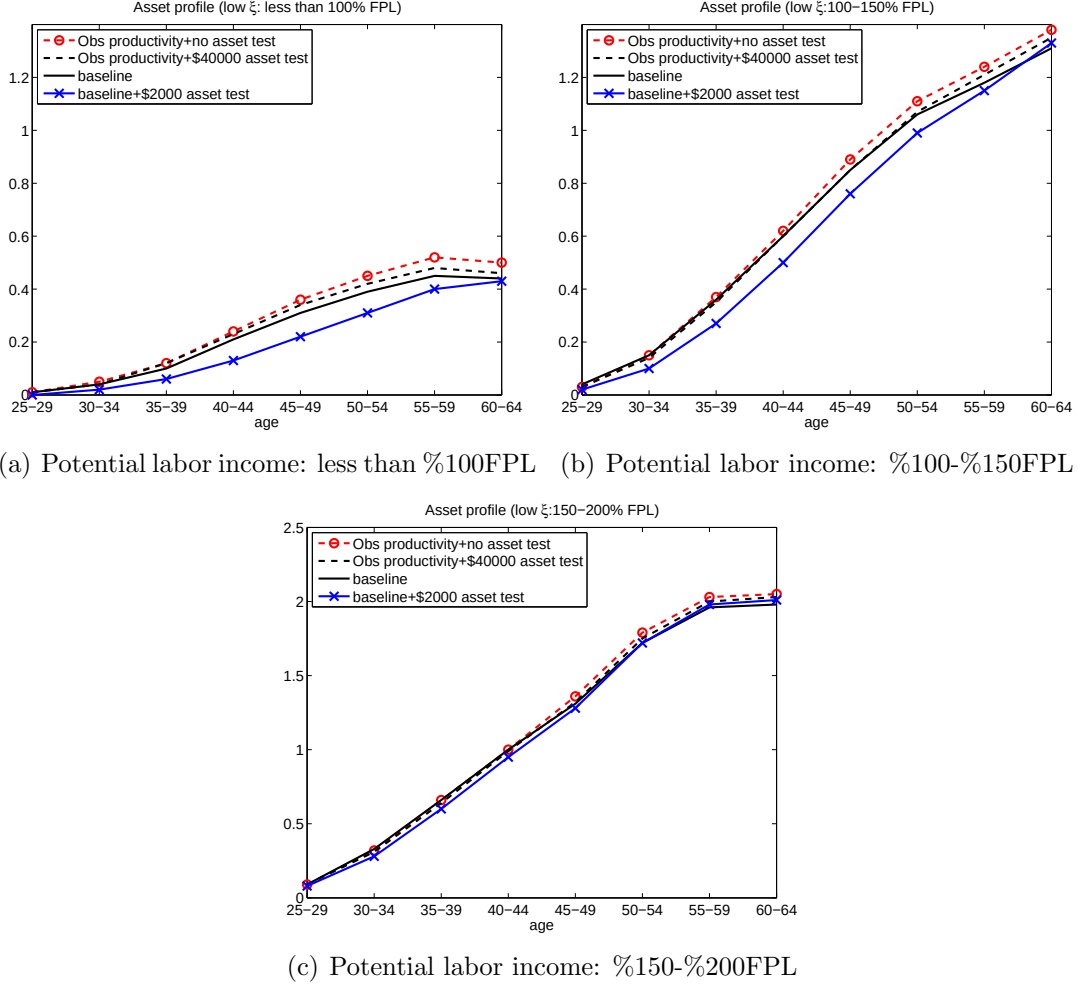


Figure 8: Asset profile of people whose fixed productivity (ξ) is low. The solid lines are from the baseline economy. The dash lines are from the benchmark experiment with observable productivity and \$40,000 asset test while the dash lines with circles are from the economy with observable productivity and no asset test. The solid lines with crosses are from the baseline economy and \$2,000 asset test.

effect of saving distortions created by the tight asset test: many low-income people accumulate less assets in order to meet the eligibility requirements. The last column of Table 9 shows that the percentage of people with assets below \$1,000 increases from 12.2% in the baseline economy to 15.8% in the economy with very tight asset test. Figure (8) illustrates this point further by showing age profiles of asset holdings for people with low fixed productivity type. For people with total potential labor income below 150% of FPL, the tight asset test results in a noticeable decline in wealth accumulation.

The trade-off between labor supply and saving distortions results in non-linear welfare changes when tightening asset test, as reported in the last three columns of Table 8.²⁷ The best results in welfare terms are obtained if asset test is equal to \$20,000. In this

²⁷Notice that the drop in welfare gains when asset test is decreased to \$2,000 is more pronounced among people with low fixed productivity. Since people in this group are more likely to rely on public health insurance, they are affected by asset test more.

case the distortions on labor supply are reduced comparing to the baseline case and the distortions on saving decisions are much smaller than in the case of \$2,000 asset test (Figure (8)). As a result, the welfare gains are higher than both in the baseline and in the \$2,000 asset test economy (0.581% of the annual consumption) but still much smaller than in the case of observable productivity.²⁸

7.2 Average lifetime income test

Another variable that is observable, correlated with productivity, and can be less responsive to the current labor supply decisions is the average lifetime labor income. In the next experiment we consider the effect of linking Medicaid eligibility to the average lifetime labor income as opposed to the current labor income. In other words, the eligibility for Medicaid is determined as follows:

$$\begin{aligned} \tilde{w} \left(\sum_{i=25}^t z_i^h l_i \right) / t &\leq \tilde{y}^{cat} \text{ and } k_t \leq k^{cat} && \text{for general Medicaid} \\ k_t r + \tilde{w} z_t^h l_t - x_t^h &\leq y^{MN} \text{ and } k_t \leq k^{MN} && \text{for the Medically Needy program.} \end{aligned}$$

where $\left(\sum_{i=25}^t z_i^h l_i \right) / t$ is the average lifetime labor income up to the current age t . Since each period individuals have only limited control over their average lifetime income it is harder for highly productive individuals to qualify for Medicaid just by not working in the current period. As before we fix the size of the welfare budget by adjusting y^{cat} and y^{MN} . We keep asset test as in the baseline economy (\$40,000) and we report the results when we remove asset test in Appendix E.

The third row of Tables 10 and 11 report the results of implementing this new eligibility criteria. The lifetime labor income test comes close to eliminating moral hazard behavior among Medicaid beneficiaries: only 0.7% of Medicaid enrollees will start working if they can keep their public insurance.²⁹ Still, the welfare gains from introducing the eligibility criteria based on the average lifetime income are smaller than in the case

²⁸Golosov and Tsyvinski (2006) show that asset test can be an effective screening device in case of disability insurance. Comparing to disability insurance, the negative effect from saving distortions in the context of public health insurance can be much larger. The disability tends to be an absorbing state, thus the public transfers can provide a full insurance in this state. In contrast, the need for public health insurance is less likely to be permanent. So people who get public insurance still need to accumulate assets to self-insure later in life, particularly after retirement.

²⁹Tables 13 and 14 in Appendix E show that the elimination of asset test in case of the average lifetime income test does not lead to a dramatic increase in the moral hazard problem as opposed to the case when eligibility is determined based on the current labor income. This happens because the average lifetime income better reveals productivity than the current labor income and thus reduces the role of asset test.

Experiment	% enrollees losing eligibility if working	% non-worker $\Rightarrow$ worker if not losing eligibility	Ex-ante CEV (%)		
			all	low ξ	high ξ
1. Baseline	22.8	12.5	—	—	—
2. Obs productivity	—	—	1.052	1.282	0.418
3. Avg income test	1.1	0.7	0.757	0.909	0.336
4. Work requirement	—	—	0.963	1.152	0.440

Table 10: Welfare effects of alternative policies to reduce distortions of Medicaid

	Income Test (%FPL)	employment (%)		insurance (%)				$k_t < \$1000$ (%)
		unhealthy	healthy	unins	pub	Ind	ESHI	
1. Baseline	81.0	73.8	97.7	19.2	7.9	8.6	64.3	12.2
2. Obs productivity	102.2	82.5	98.2	19.1	10.5	7.5	62.9	12.0
3. Avg income test	94.5	79.8	98.0	19.9	10.2	7.2	62.8	12.4
4. Work requirement	101.5	85.5	98.3	19.7	9.9	7.5	62.9	12.3

Table 11: Employment and insurance effects of alternative policies to reduce distortions of Medicaid

when productivity is observable: 0.76% comparing to 1.05%. This is because the lifetime income test cannot fully eliminate distortions on labor supply. Table 11 shows that the employment among the unhealthy is lower comparing to the economy where productivity is observable: 79.8% vs. 82.5%. Figure (9) illustrates this further by plotting the employment rate among people with low fixed productivity. For those with potential labor income above 100% of FPL, the employment rate in the economy where Medicaid eligibility is based on the average lifetime income test is almost the same as in the economy where productivity is observable. However, the employment rate among people with potential labor income below 100% FPL is still noticeably lower, especially among younger groups.

7.3 Work requirement

As a final policy experiment we consider the role of work requirement. This experiment is based on the following observation. There are two pathways to qualify for Medicaid: categorical eligibility and eligibility based on medical need. Most of the truly low productive individuals can get Medicaid through the second pathway even if they do not work. For individuals with higher productivity it is much harder to use the second pathway due to its tight asset test so they normally get Medicaid through the categorically needy channel by not working. Using this intuition we consider a policy that introduces work requirement for the general Medicaid program while keeping eligibility for the Medically Needy program the same as in the baseline. The requirements for the categorical eligibility look as follows:

$$k_t r + \tilde{w} z_t^h l_t \leq y^{cat} \text{ and } k_t \leq k^{cat} \text{ and } l_t = \bar{l}$$

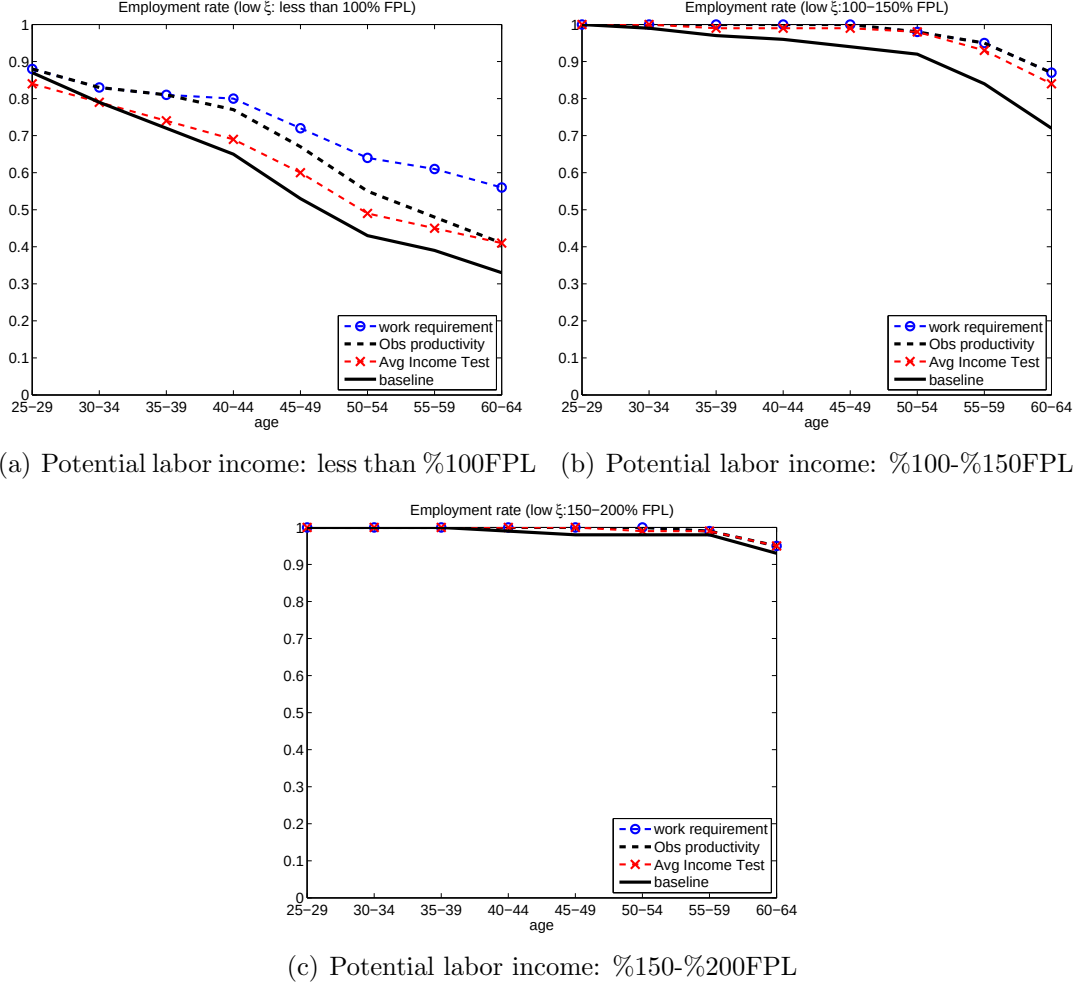


Figure 9: Employment rate of people whose fixed productivity (ξ) is low under alternative policies. The solid lines are from the baseline economy while the dash lines are from the benchmark experiment (observable productivity). The dash lines with crosses are from the average labor income test. The dash lines with circles are from the work requirement case. All experiments have asset test as in the baseline.

As before, we fix the size of the welfare budget and keep the asset test for the general Medicaid program as in the baseline (Appendix E shows the results when asset test is removed).

Row 4 of Table 10 illustrate the effects of this policy. The work requirement increases employment rate among the unhealthy from 73.8% (baseline) to 85.5%. It is worth noting that there is still a significant fraction of Medicaid beneficiaries not working: 16.5% comparing to 55.9% in the baseline and 25.7% in the benchmark experiment with observable productivity. These non-working beneficiaries are truly low productive and they access Medicaid through the Medically Needy pathway. Overall, the fraction of Medicaid beneficiaries enrolled through Medical Needy pathway increases from 21.5% in the baseline to 32.1%.

In terms of welfare, the work requirement results in ex-ante welfare gains close to the

benchmark experiment where productivity is observable, 0.96% vs. 1.05%.³⁰ The welfare gains are lower because the work requirement induces some people with potential income under the income test limit to work in order to be eligible for Medicaid. The panel (a) in Figure (9) shows that the employment rate among older people with productivity below income test limit is noticeably higher than the employment rate in the benchmark experiment with observable productivity. For this group, the work requirement is analogous to ordeals - people who value free public insurance have to work in order to qualify for these transfers. Overall, the employment rate among unhealthy is 3.0% higher than in the benchmark experiment with observable productivity and this represents costs of improved target efficiency. However, these costs are small in welfare terms, and the incentives created by this two-step eligibility requirement closely resembles those existing in the economy where productivity is observable.

8 Conclusion

In this paper we evaluate quantitative importance of the distortions that Medicaid creates for labor supply decisions. The average employment among Medicaid enrollees is more than twice lower than the average employment among the rest of the population and this difference is to a large extent is accounted for by the design of the public insurance program. Medicaid eligibility depends on endogenous labor income meaning that people who do not work can become eligible even if their productivity is relatively high. We find that 23% of Medicaid enrollees will lose eligibility if they start working and 55% of them would choose to work if they can keep public insurance. These distortions result in large welfare losses: if the participation in Medicaid could be conditioned on (unobservable) exogenous productivity the ex-ante gains will be equivalent to 1% of the annual consumption. These gains arise from the better allocation of limited public resources: public transfers get reallocated from well insured by high assets non-workers with relatively high productivity to truly low productive people. We explore three policies that can be used to replicate this outcome: asset test, average lifetime income test and work requirement. We show that each of these policies can reduce labor supply distortions but the last policy results in welfare gains that come closest to the case when productivity is observable.

³⁰As Table 13 in Appendix E illustrates, the welfare gains can be even higher if asset test is removed - in this case the consumption equivalent variation is 1.03%.

References

- [1] Blank, R. M. (1989). The Effect of Medical Need and Medicaid on AFDC Participation. *Journal of Human Resources*, 24(1), 54–87.
- [2] Conesa, J. C., Krueger, D., 2006. On the Optimal Progressivity of the Income Tax Code. *Journal of Monetary Economics* 53(7), 1425-1450.
- [3] Cutler, D., Gruber, J., 1996. Does Public Insurance Crowd Out Private Insurance? *Quarterly Journal of Economics* 111(2), 391-430.
- [4] De Nardi, M., French, E., Jones, J., 2010. Why Do the Elderly Save? *Journal of Political Economy*, 118(1), 39-75.
- [5] Decker, S, Selck, F., 2011. The Effect of the Original Introduction of Medicaid on Welfare Participation and Female Labor Supply. Working paper.
- [6] Ellwood, D., Adams, K., 1990. Medicaid mysteries: Transitional benefits, Medicaid coverage, and welfare exits. *Health Care Financing Review*, 1990 Annual Supplement, 119-131.
- [7] Erosa, A., Fuster, L., Kambourov, G. 2011 Towards a micro-founded theory of aggregate labor supply. IMDEA Working Papers N 2011-13
- [8] Floden, M., 2008. A Note on the Accuracy of Markov-chain Approximations to Highly Persistent AR(1) Processes. *Economic Letters* 99(3), 516-520.
- [9] French, E., 2005. The Effects of Health, Wealth, and Wages on Labor Supply and Retirement Behaviour. *Review of Economic Studies*, 72(2), pages 395-427.
- [10] French, E., Jones, J. 2011. The Effects of Health Insurance and Self-Insurance on Retirement Behavior. *Econometrica*, 79(3), pages 693-732.
- [11] Golosov, M., Tsyvinski, A., 2006. Designing Optimal Disability Insurance: A Case for Asset Testing. *Journal of Political Economy*, Vol 114(2)
- [12] Gruber, J., Madrian, B., 2004. Health Insurance, Labor Supply and Job Mobility: A Critical Review of the Literature. In "Health Policy and the Uninsured", Catherine G. McLaughlin, ed. Washington, DC: Urban Institute Press, pp. 97–178.
- [13] Gruber, J., Yelowitz, A., 1999. Public Health Insurance and Private Saving. *Journal of Political Economy*, 107(6), 1249-74
- [14] Hansen, G., Hsu, M., Lee, J., 2011. Health Insurance Reform: The impact of a Medicare Buy-In. *Mimeo*, GRIPS.
- [15] Heathcote, J., Storesletten, K., Violante, G. 2010 The Macroeconomic Implications of Rising Wage Inequality in the United States. *Journal of Political Economy*, vol. 118(4), pages 681-722.
- [16] Hsu, M., 2011. Health Insurance and Precautionary Saving: a Structural Analysis, *Mimeo*, GRIPS.

- [17] Hubbard, G., Skinner, J., Zeldes, S., 1994. The Importance of Precautionary Motives in Explaining Individual and Aggregate Saving. *Carnegie-Rochester Conference Series on Public Policy* 40(1), 59-125.
- [18] Jeske, K., Kitao, S., 2009. U.S. Tax Policy and Health Insurance Demand: Can a Regressive Policy Improve Welfare? *Journal of Monetary Economics*, 56(2), 210-221.
- [19] Kaiser Family Foundation, 2004. The Cost of Care for the Uninsured. What Do We Spend, Who Pays, and What Would Full Coverage Add to Medical Spending? Available at <http://www.kff.org/uninsured/upload/The-Cost-of-Care-for-the-Uninsured-What-Do-We-Spend-Who-Pays-and-What-Would-Full-Coverage-Add-to-Medical-Spending.pdf>
- [20] Kaiser Family Foundation, 2009. Employer Health Benefits Survey. Available at <http://ehbs.kff.org/2009.html>
- [21] Montgomery, E., Navin, J., 2000. Cross-state variation in Medicaid program and female labor supply. *Economic Inquiry* 38 (3), 402–418.
- [22] Moffit, R. 2002. Economic Effects of Means-Tested Transfers in the U.S. *NBER book: Tax Policy and the Economy* (Volume 16).
- [23] Moffit, R., Wolfe, B. 1992. The Effect of Medicaid Program on Program Participation and Labor supply. *Review of Economics and Statistics*, 74(4), 615–626.
- [24] Nakajima, M., Telyukova, I. 2012. Home Equity in Retirement. *Working paper*, Federal Reserve Bank of Philadelphia.
- [25] Pashchenko, S., Porapakarm, P., 2011. Quantitative Analysis of Health Insurance Reform: Separating Community Rating from Income Redistribution. *Mimeo*, University of Virginia.
- [26] Pohl, V., 2011. Medicaid and the Labor Supply of Single Mothers: Implications for Health Care Reform. *Mimeo*, Yale University.
- [27] Storesletten, K., Telmer, C., Yaron, Y., 2004. Consumption and Risk Sharing Over the Life Cycle. *Journal of Monetary Economics* 51(3), 609-633.
- [28] Strumpf, E., 2011. Medicaid’s Effect on Single Women’s Labor Supply: Evidence From the Introduction of Medicaid. *Journal of Health Economics*, 30(3):531–548.
- [29] Winkler, A. E. (1991). The Incentive Effects of Medicaid on Women’s Labor Supply. *Journal of Human Resources*, 26(2), 308–337.
- [30] Yelowitz, A., 1995. The Medicaid Notch, Labor Supply, and Welfare Participation: Evidence from Eligibility Expansions. *The Quarterly Journal of Economics*, 110(4):909–939.

Appendix

A Summary of the parametrization of the baseline model

Parameter name	Notation	Value	Source
<u>Parameters set outside the model</u>			
Consumption share	$\varkappa$	0.6	French (2005)
Cobb-Douglas parameter	α	0.33	capital share in output
Labor supply	$\bar{l}$	0.4	
Tax function parameters	a_0	0.258	Gouveia and Strauss (1994)
	a_1	0.768	"
Social Security replacement rates	ss	30%	
Medicare premium	p^{med}	\$1,055	total premiums =2.11% of Y
Asset test for Medically Needy	k^{MN}	\$2,000	Data
Employer contribution	ψ	80.0%	
Labor productivity			
- Persistence parameter	ρ	0.98	Storesletten, et al (2000)
- Variance of innovations	σ_ε^2	0.02	"
- Fixed effect	σ_ξ^2	0.24	"
<u>Parameters used to match some targets</u>			
Discount factor	β	0.996	$\frac{K}{Y} = 2.8$
Depreciation rate	δ	0.078	$r = 4\%$
Risk aversion	σ	3.15	age-profile of individually insured
Consumption floor	$\underline{c}$	\$2,765	% employment among public insurance
Population growth	η	1.07%	% people older than 65
Tax function parameter	a_2	0.551	balanced government budget
Proportional tax	τ_y	6.4%	composition of tax revenue
Insurance proportional loads	γ	1.086	% individually insured (healthy)
Insurance fixed load (unhealthy)	π	\$891	% individually insured (unhealthy)
Public insurance program			
- income test	y^{CAT}, y^{MN}	0.81FPL (\$7960)	% publically insured (age 25-35)
- categorial asset test	k^{CAT}	\$40,000	publically insured profile
Fixed costs of work	ϕ_w	0.222	employment profiles (healthy)
Time loss due to unhealthy			
- age 25-40	ϕ_t^{UH}	0.0275	employment profiles (Unhealthy)
- age 64	ϕ_t^{UH}	0.0960	"

Table 12: Parameters in baseline model

B Construction of health transition matrix and survival probabilities

To be completed.

C Medical expenses and insurance coverage

To be completed.

D The model with observed productivity when income tax is adjusted in equilibrium

To be completed.

E Results of implementing the average lifetime income test and work requirement without asset test

Experiment	% enrollees losing eligibility if working	% non-worker $\Rightarrow$ worker if not losing eligibility	Ex-ante CEV (%)		
			all	low ξ	high ξ
1. Baseline	22.8	12.5	—	—	—
2. Obs productivity	—	—	1.225	1.490	0.565
3. Avg income test	1.4	0.8	0.778	0.933	0.348
4. Work requirement	—	—	1.029	1.230	0.474

Table 13: Welfare effects of alternative policies to reduce moral hazard

	Income Test (% <i>FPL</i>)	employment (%)		insurance (%)				$k_t < \$1000$ (%)
		unhealthy	healthy	unins	pub	Ind	ESHI	
1. Baseline	81.0	73.8	97.7	19.2	7.9	8.6	64.3	12.2
2. Obs productivity	102.2	82.4	98.2	19.2	10.5	7.4	62.9	11.8
3. Avg income test	94.3	79.7	97.9	19.9	10.2	7.1	62.8	12.3
4. Employment test	100.9	85.9	98.3	19.8	9.8	7.4	62.9	12.2

Table 14: Employment and insurance effects of alternative policies to reduce moral hazard