Work Incentives of Medicaid Beneficiaries and The Role of Asset Testing *

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Abstract

Having low income is one of the requirements for Medicaid eligibility. Given that earning ability is unobservable, once an individual with high labor income stops working it is impossible to distinguish him from those whose potential labor income is low. This can affect the ability of Medicaid to target the most disadvantageous people given that a large fraction of its beneficiaries do not work. In this paper we ask two questions: 1) Does Medicaid significantly distort work incentives? 2) Can the insurance-incentives trade-off of Medicaid be improved without changing the size of the program? Our tool is a general equilibrium model with heterogeneous agents calibrated using Medical Expenditure Panel Survey Dataset to match the life-cycle patterns of employment and insurance take-up behavior as well as the key aggregate statistics. We find that around 20% of Medicaid enrollees do not work in order to be eligible. These distortions are costly for the economy: if Medicaid eligibility could be linked to (unobservable) productivity the resulting ex-ante welfare gains are equivalent to 1.5% of the annual consumption. We show that asset testing can achieve a similar outcome but only if asset limits are allowed to be different for workers and non-workers.

Keywords: health insurance, Medicaid, labor supply, asset testing, general equilibrium

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1 Introduction

Medicaid is one of the largest means-tested programs in the US and it is an important source of health insurance coverage for the non-elderly poor. Having low income is one of the requirements for Medicaid eligibility: a Medicaid enrollee cannot earn more than a certain limit. This requirement prevents *workers* who have high income to get public transfers but it cannot guarantee that *non-workers* with potential income above the income limit do not enroll. Since earning ability is unobservable, once an individual with high labor income stops working it is impossible to distinguish him from those whose potential labor income is low. This can affect the ability of Medicaid to target the most disadvantageous people given that a large fraction of its beneficiaries do not work. Indeed, the fraction of workers among Medicaid enrolles is substantially lower than this fraction among the rest of the population: on average only 53% of people on Medicaid work while this number among uninsured is 94% and among privately insured - 98% (Figure 1).[1] In this paper we ask two questions: 1) Does Medicaid significantly distort incentives? 2) Can the insurance-incentives trade-off of Medicaid be improved without changing the size of this program? More specifically, our goal in this paper is to quantify the distorting effects of Medicaid on work incentives, assess its welfare implications, and evaluate policies that can mitigate these distortions.

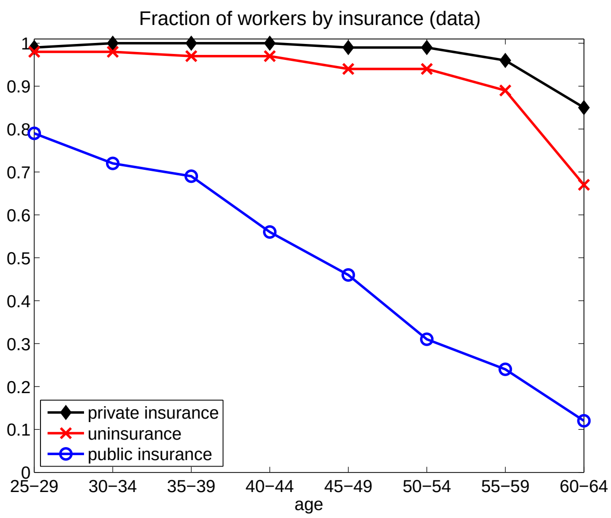


Figure 1: Fraction of workers by insurance status (source: MEPS)

To do this we construct a quantitative general equilibrium model with the following

[1]When constructing these statistics we define a person as non-worker if he/she does not work for the whole year (which is the time period in our model). Our sample includes only the heads of the households where the head is defined as the highest earner in the household. More details on the sample selection are available in Section 4. Appendix B discusses in details the difference in the fraction of workers computed for our sample and the employment rate computed based on the Current Population Survey (CPS).

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.[2] Third, people in our model have several options to insure against medical shocks: self-insurance, public health insurance and private health insurance (employer-based and individual). However, private health insurance is 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 premiums. People who want to obtain public insurance have to meet income test and asset test. Because labor income is endogenous, Medicaid beneficiaries in our model include those who have low earnings ability, and those who have relatively high earning ability but choose not to work in order to be eligible. Finally, we allow for the existence of 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 without 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. This is important for understanding how Medicaid affect labor supply decisions since almost half of Medicaid beneficiaries do not work.

Our findings are as follows. First, around 22% of the current Medicaid enrollees will not be eligible for Medicaid if they work because their potential earnings exceed income test limit. Most of these people (or 20.3% of all Medicaid enrollees) will choose to work if they were able to keep their access to public insurance. The majority of this group is unhealthy, and has higher medical costs and higher assets than other Medicaid enrollees.

Second, these distortions are important in welfare terms. If we keep the size of welfare budget fixed and link Medicaid eligibility to (unobservable) exogenous productivity as opposed to (observable) endogenous labor income, it would result in ex-ante welfare gains equivalent to 1.5% of the annual consumption.

[2]In the data, 43.7% of Medicaid beneficiaries are unhealthy while the fraction of the unhealthy among the privately insured and uninsured are only 9.1% and 16.3% correspondingly. In addition, unhealthy people are less likely to access employer-based health insurance. Only 46% of the unhealthy are covered by the employer-based health insurance comparing to 69% among the healthy.

Third, we study if asset testing currently used to determine Medicaid eligibility can be modified in order to reduce the distortions in the environment where productivity is unobservable. We 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 comes at a cost of creating large distortions on saving decisions and this substantially decreases welfare gains of this policy. On the other hand, if asset limits are allowed to be different for workers and non-workers, asset testing can achieve an outcome that is very close to the outcome of the 'ideal' case of observable productivity. This happens because strict asset testing of non-workers does not let highly productive individuals to use the following strategy: stop working, claim Medicaid and then use their accumulated assets to finance consumption. In contrast, loose asset limits on working beneficiaries do not introduce unnecessary distortions into saving decisions of individuals who do not 'game' Medicaid rules by adjusting their labor supply.[3]

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 the role of asset testing. Section 8 concludes.

2 Related literature

Our paper is related to several strands of literature. Our positive analysis is motivated by a large literature studying labor supply effects of public means-tested programs (for an extensive 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).[4] 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 Montgomety 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

[3]The mechanism behind work-dependent asset-testing is analogous to the effect of labor income-dependent wealth taxation advocated in several studies of optimal taxation (see, for example, Kocherlakota (2005) and Albansei and Sleet (2006)).

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

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.[5] 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 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. We show that the interaction of self-insurance and labor supply distortions is important for our normative analysis.

The normative analysis of our paper is related to the literature studying how to efficiently provide insurance in dynamic economies with private information (this literature is often refereed to as New Dynamic Public Finance (NDPF))[6]. A primary focus of these studies is constrained-efficient allocations that solve the planning problem with incentive compatibility constraints arising from information asymmetry. These allocations imply that marginal decisions of agents should be distorted comparing to the case of full information. In particular, savings should be discouraged by creating a wedge between intertemporal marginal rate of substitution and the aggregate return on capital. This is done to minimize the adverse effect of savings on incentives. Studies that derive how optimal allocations can be implemented show that in certain environment the right wedge on saving decisions can be achieved by wealth taxes that negatively depend on labor income (Kocherlkota, 2005; Albanesi and Sleet, 2006) or by asset testing (Golosov and Tsyvinski, 2006). The latter study shows that introducing asset testing in case of disability insurance results in substantial welfare gains. Building on the intuition of these studies we provide a quantitative exploration of the effect of uniform asset testing and asset testing that depends on labor supply decisions.

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, Pashchenko and Porapakkarm, 2013). Second are life-cycle structural models

[5]For a more detailed review of this literature see Gruber and Madrian, 2004.

[6]Kocherlakota (2010) and Golosov, Tsyvinsky and Werning (2010) provide an extensive review.

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: $l_t \in \{0, \bar{l}\}$.[7] 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 preferences over consumption and leisure:

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

where $\mathbf{1}_{\{.\}}$ 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.

[7] We assume indivisible labor supply since the evidence that low-income earners demonstrate significant response to public policies along the extensive margin is more prevalent than such evidence for the intensive margin response (Saez, 2002, Heckman, 1993). In addition, in the data the difference in labor supply between the healthy and the unhealthy is more pronounced along the extensive margin.

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 $p_I\left(h_{t-1}, x_{t-1}^h, t\right)$.

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.[8] 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 $\overline{p}$ where:

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

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 "categorial 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".

All types of insurance contracts - group, individual, and public - provide only partial insurance against medical expenditure shocks. We denote by $q\left(x_t^h, i_t\right)$ 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 $\widetilde{w}z_t^h l_t$, where $\widetilde{w}$ 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

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

income of unhealthy workers is much 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.[9] 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 $\overline{y}_{ss}$ 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 ($\overline{p}$) 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, disability insurance, and uncompensated care.[10] 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 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.[11] We use a variable i_t^{MN} to indicate whether an uninsured individual becomes eligible for the Medical Needy program after his medical

[9]The 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).

[10]In 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).

[11]The 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.

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 ($k_t \in \mathbb{K} = R^+ \cup \{0\}$), health and medical cost shock realized at the end of the last period ($h_{t-1} \in \mathbb{H} = \{0, 1\}$; $x_{t-1}^h \in \mathbb{X} = R^+ \cup \{0\}$), idiosyncratic labor productivity $\left(z_t^h \in \mathbb{Z} = R^+\right)$, ESHI offer status ($g_t \in \mathbb{G} = \{0, 1\}$), and age ($t \in \mathbb{T} = \{1, 2, ..., R-1\}$).

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

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

where

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

subject to

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

$$\widetilde{w} = \left\{ \begin{array}{lll} w & ; & \text{if } g_t = 0 \\ (w - c_E) & ; & \text{if } g_t = 1 \end{array} \right\} \tag{4}$$

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

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

$$Tax = \mathcal{T}\left(y_t\right) + \tau_{MCR}\left(\widetilde{w} z_t^h l_t - \overline{p}\mathbf{1}_{\{i_t = G\}}\right) + \tau_{ss}\min\left(\widetilde{w} z_t^h l_t - \overline{p}\mathbf{1}_{\{i_t = G\}}, \overline{y}_{ss}\right) \tag{7}$$

$$y_t = \max\left(0, k_t r + \widetilde{w} z_t^h l_t - \overline{p}\mathbf{1}_{\{i_t = G\}} - \max\left(0, X_t + p_I\left(h_{t-1}, x_{t-1}^h, t\right)\mathbf{1}_{\{i_t = I\}} - 0.075(k_t r + \widetilde{w} z_t^h l_t)\right)\right) \tag{8}$$

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

An individual is eligible for Medicaid if:

$$\begin{array}{ll} k_t r + \widetilde{w}\ z_t^h l_t \leq y^{cat} \text{ and } k_t \leq k^{cat} & \text{for categorial eligibility,} \\ k_t r + \widetilde{w}\ z_t^h l_t - x_t^h \leq y^{MN} \text{ and } k_t \leq k^{MN} & \text{for the Medically Needy program.} \end{array} \tag{10}$$

The conditional expectation on the right-hand side of Eq (2) is over $\left\{z_{t+1}^h, g_{t+1}\right\}$. 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.[12] 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 $\left(x_t^h\right)$, and age (t). The value function of a retired household is:

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

where

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

subject to:

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

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

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

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

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

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

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.[13] This assumption, together with zero profit conditions, allows us to write insurance premiums as follows:

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

[13] Currently most states allow insurance firms to medically underwrite applicants for health insurance.

for the non-group insurance market and

$$p = \frac{\gamma \left(\int \mathbf{1}_{\{i_t=G\}} EM_t \left(h_{t-1}, x^h_{t-1} \right) \Gamma \left(\boldsymbol{s} \right) \right)}{\int \mathbf{1}_{\{i_t=G\}} \Gamma \left(\boldsymbol{s} \right)} \tag{19}$$

for the group insurance market. Here, $EM_t \left(h_{t-1}, x^h_{t-1} \right)$ 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^h_{t-1} respectively:

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

In Eq (19) γ is a markup on prices due to the administrative costs in the group market. In Eq (18) γ^h is a health-dependent markup in the individual market, and π^h is the health-dependent fixed costs of buying an individual policy.[14] 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.

3.4 Government constraint

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

$$\begin{aligned} &\int\limits_{t<R} \left(\tau_{MCR} \left(\widetilde{w} z^h_t l_t - \overline{p} \mathbf{1}_{\{i_t=G\}} \right) + \tau_{ss} \min \left(\widetilde{w} z^h_t l_t - \overline{p} \mathbf{1}_{\{i_t=G\}}, \overline{y}_{ss} \right) \right) \Gamma \left(\mathbf{s} \right) + \\ &\int \left(\tau_c c_t + \mathcal{T} \left(y_t \right) \right) \Gamma \left(\mathbf{s} \right) + \int\limits_{t \geq R} p_{MCR} \Gamma \left(\mathbf{s} \right) - Gov = \\ &\int T^{SI} \Gamma \left(\mathbf{s} \right) + \int\limits_{t \geq R} \left(x^h_t q_{MCR} + ss \right) \Gamma \left(\mathbf{s} \right) + \int\limits_{t<R} \left(x^h_t - X_t \right) \mathbf{1}_{\left\{ i_t = M \ or \ (i_t = U \ \& \ i^{MN}_t = 1) \right\}} \Gamma \left(\mathbf{s} \right) \end{aligned} \tag{20}$$

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.

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

3.5 Definition of stationary competitive equilibrium

Given the government programs $\left\{\underline{c}, ss, q_{MCR}, p_{MCR}, y^{cat}, k^{cat}, y^{MN}, k^{MN}, Gov\right\}$, the fraction of medical costs covered by private insurers and Medicaid $\left\{q\left(x_t^h, i_t\right)\right\}$, and the employers' contribution (ψ), the competitive equilibrium of this economy consists of the set of time-invariant prices $\left\{w, r, p, p_I\left(h_{t-1}, x_{t-1}^h, t\right)\right\}$, wage reduction $\{c_E\}$, households' value functions $\{V_t(\boldsymbol{s})\}$, decision rules of working-age households $\{k_{t+1}(\boldsymbol{s}), c_t(\boldsymbol{s}), l_t(\mathrm{s}), i_t(\boldsymbol{s})\}$ and retired households $\{c_t(\boldsymbol{s}), k_{t+1}(\boldsymbol{s})\}$ 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:

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

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

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

4. c_E satisfies Eq (17), thus the firm offering ESHI earns zero profit.

5. The non-group insurance premiums $p_I\left(h_{t-1}, x_{t-1}^h, t\right)$ 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). We use the cross-sectional weights and longitudinal weights provided by MEPS for the cross-sectional and longtitudinal 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). We use 2004 as the base year. All level variables were normalized to the base year using Consumer Price Index (CPI).

4.1 Sample selection

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. In our sample we include only the head of the HIEU. We define the head as the person with the highest income in the HIEU.[15]

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). We exclude individuals who report receiving less than $3,000 from each of possible income sources (labor, financial and other non-financial income) since these individuals are likely to have unreported sources of income.

We also drop 1,513 individuals who report their primary health insurance coverage through TriCare. We drop another 1,968 individuals younger than 65 years old receiving Medicare but not receiving disability payments since Medicare covers non-elderly people only if they are on disability insurance. We exclude another 607 individuals who report being covered by unspecified public health insurance since the eligibility rules of these programs can be different from Medicaid. The resulting sample size for each wave is presented in Table 1. In our sample, among working-age population with public insurance, 86.05% receive only Medicaid, 10.7% receive both Medicaid and Medicare, and 3.25% receive only Medicare.

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 our sample in each wave of MEPS (2000-2008)

4.2 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

[15] If we do not limit our sample to the heads of the households we have to include non-working individuals who receive transfers from a spouse. There are two ways to correctly model the behavior of these individuals: i) consider intrafamily decisions, ii) allow individuals to receive exogenous non-earned income that approximates transfers from a spouse. The first approach will make our computational analysis intractable, and the second approach cannot be taken in a general equilibrium environment.

65, so R is 41. The population growth rate was set to 1.1% 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. Figure (2) compares the fraction of the unhealthy that our calibration generates with the one observed in the data.

To adjust conditional survival probabilities ζ_t for the difference in health we follow Attanasio et al. (2011). In particular, we use the 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 C explains in more detail how we adjust the survival probability.

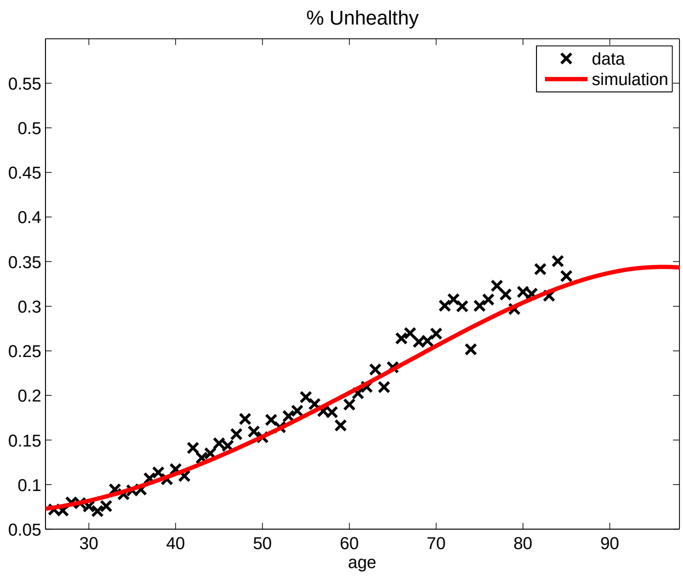


Figure 2: Fraction of the unhealthy by age

We set the consumption share in the utility function χ to 0.6 which is in the range estimated by French (2005).[16] The parameter σ is set to 3.35 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 2.41.[17] The discount factor β is set to 0.9996

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

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

to match the aggregate capital output ratio of 2.7.[18] We set labor supply of those who choose to work ($\bar{l}$) to 0.4

Fixed leisure costs of work ϕ_w are calibrated to match the employment profiles for healthy people.[19] 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.

4.3 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:

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

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 6.77% to match the fact that around 65% of tax revenues comes from progressive income taxes. In all experimental cases we adjust 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 \$2,615 to match the employment rate among Medicaid beneficiaries.[20] 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 35%.

The income eligibility threshold for the general Medicaid program (y^{cat}) is set to

[18] From 2001 to 2011 the ratio of private fixed assets plus consumer durable to GDP is ranging from 2.52 to 2.78 (Bureau of Economic Analysis).

[19] We 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.

[20] The 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 \$2,000 is 11.8% in our model, comparing to 13.1% in the data (Survey of Consumer Finance, 2004-2007).

79.2% of FPL and its asset test is set to $35,000 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 (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.[21]

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%.

4.4 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.[22]

4.5 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

[21] We do not take the asset test for the general Medicaid program from the data because 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.

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

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 $q(x_t, i_t)$. For retired households we set q to 0.5. The total medical expenses of people older than 64 paid by the Medicare program in our model is 2.5% of GDP, comparing to 2.2% in the data (National Health Expenditure Data, 2004). More details on the estimation of medical shock process and the fraction of medical expenses covered by insurance are available in Appendix D.

4.6 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 individual insurance policies (γ^h) to 1.080 for the healthy and 1.135 for the unhealthy. The fixed costs for an individual policy π_h is set to zero for the healthy and to \$790 for the unhealthy. The fixed costs and proportional loads were set to match the life-cycle profile of individual insurance coverage among the unhealthy. We set the proportional load of group insurance to be the same as the load for the healthy in the individual insurance market ($\gamma = \gamma^h$).

4.7 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 without 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.[23] Thus the direct estimation from the data is likely to overstate

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

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.

4.8 Labor income

The productivity of individuals takes the following form:

$$z_t^h = \lambda_t^h \exp(v_t) \exp(\xi) \tag{22}$$

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:

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

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

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).[24] 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 without ESHI coverage based on the MEPS dataset.[25] 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 without ESHI as well as the ESHI coverage profile in our model and compare them with the profiles from

[24] We 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.

[25] Household 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 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 workers not 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 the same in the model and in the data.[26] 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.

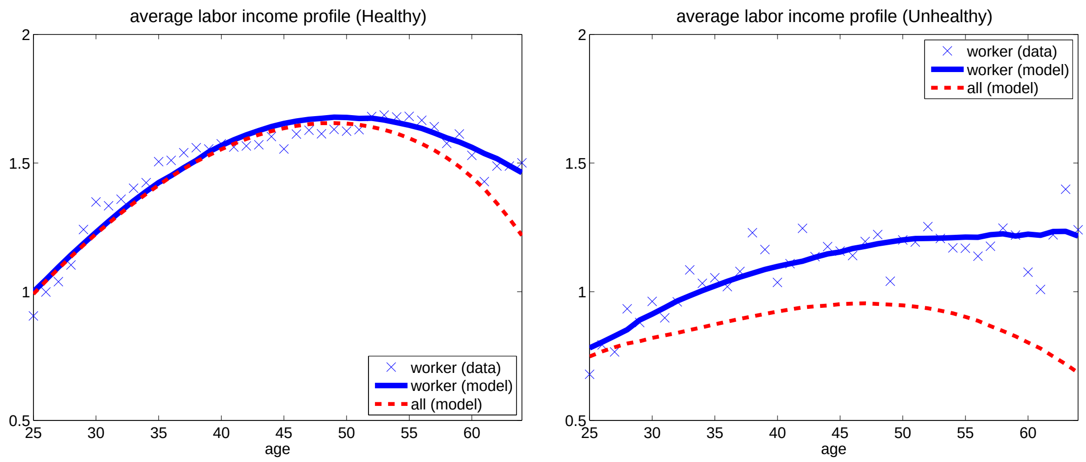


Figure 3: Average labor income of workers (data and model), and of everyone (model). The latter profile takes into account the unobserved productivity of those people who do not work.

Figure (3) plots the labor income profiles of all *workers* observed in the data and simulated by the model, and compares them with the average potential labor income computed for *everyone* in the model.[27] 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%.

Figure (4) compares the average labor income among workers with and without ESHI

[26]Based 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 without ESHI, η_4 is used to match the persistence of ESHI coverage.

[27]To get the age profile of labor income among workers (and workers without ESHI) in Figures (3) and (4) we regress labor income of workers (and workers without 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.

Figure 4: Average labor income of workers with and without ESHI coverage (data and model).

coverage by health. Our model can capture well the empirical fact that people who are not covered by ESHI have much lower income than those who have ESHI coverage.

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

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 (5)), and the targeted insurance coverage by health (Figures (6)-(7)). The bottom panel of Figure (5) shows the fraction of workers among people with different health insurance types, including the fraction of workers among healthy and unhealthy Medicaid enrollees. These profiles are not targeted in our calibration but our model can closely replicate them.

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. Using our estimates of the unobserved productivity among non-workers we can

	Data	Baseline Model
by health status		
all	94.8	95.5
healthy	78.8	78.7
unhealthy	97.1	97.9
by insurance		
private insurance	98.1	99.3
uninsurance	94.5	96.1
public insurance	53.0	53.3

Table 2: Fraction of workers (data vs baseline model)

	Data				Baseline model			
	ESHI	individual	uninsured	public	ESHI	individual	uninsured	public
all	65.7	8.8	19.1	6.4	65.4	8.4	19.2	7.0
healthy	68.8	8.8	18.3	4.1	68.3	8.4	18.3	5.0
unhealthy	46.0	9.3	23.6	21.1	45.5	8.7	24.9	21.0
% unhealthy by insurance	9.1	13.8	16.3	43.7	8.9	13.2	16.6	38.0

Table 3: Insurance coverage (data vs baseline model)

measure the fraction of Medicaid beneficiaries whose potential labor income is above the income test limit, i.e. if these people work they will lose Medicaid eligibility. The second row of Table 4 shows that 22% of *all* Medicaid beneficiaries will lose eligibility if they start working, and this constitutes around 47% of *non-working* Medicaid beneficiaries. The top panel of Figure (8) 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 (8) 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 5.7% 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 above the income test limit is noticeably higher among the unhealthy: while only 10.5% of healthy enrollees will lose their eligibility if they start working among the unhealthy this number is 40.8%.

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, these people are mostly unhealthy, so they value access to free insurance.[28] On the other hand, unhealthy people incur higher disutility from work; so they may decide to leave the employment even if there is no Medicaid. To understand to what extent the decision not to work of people with relatively high productivity is affected

[28]In our model, less than 1% of non-working Medicaid enrollees with potential income above the income test limit gets an ESHI offer.

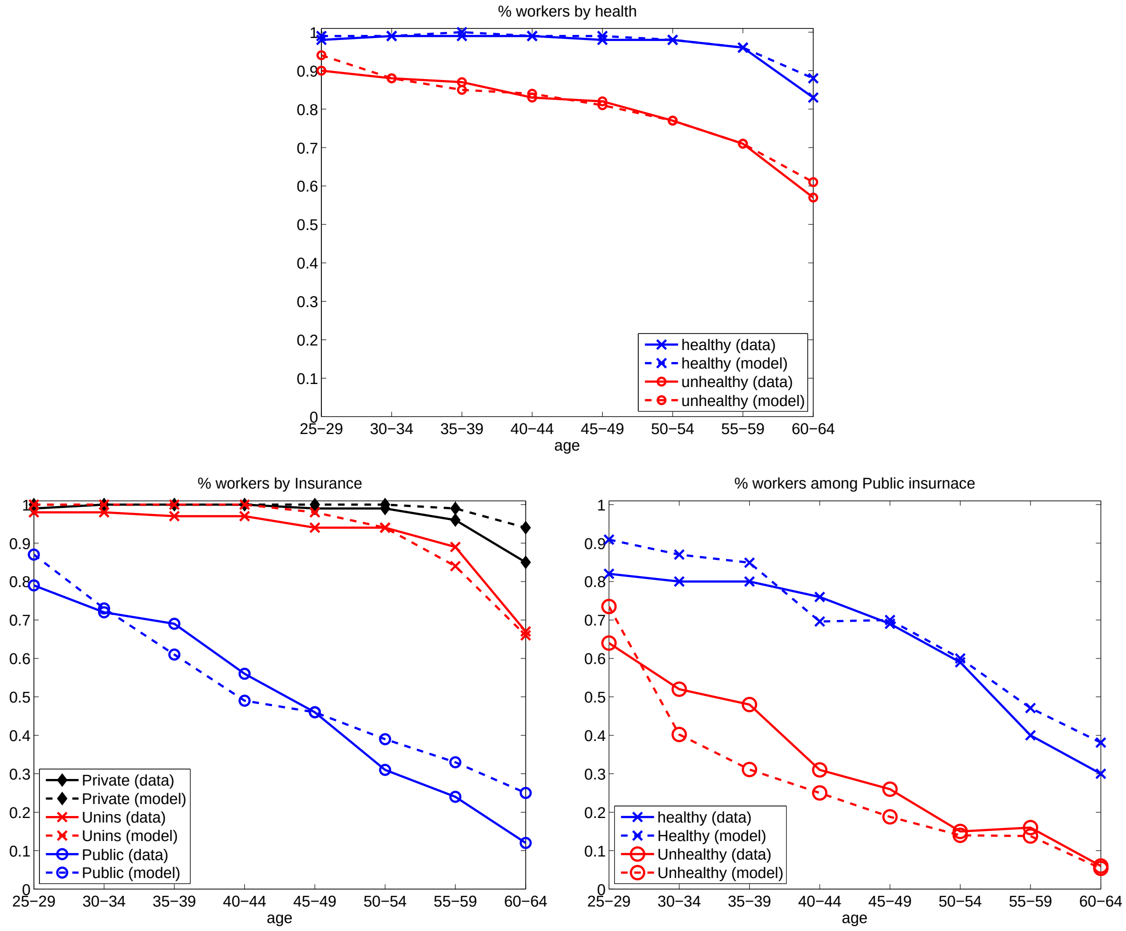


Figure 5: Employment profile (data vs baseline model). Top panel: employment by health. Bottom left panel: employment by insurance status. Bottom right panel: employment by health among people with public insurance

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 more than 90% of non-working enrollees with potential income above the income test limit (or 20.3% of *all* Medicaid enrollees) will choose to work in this experiment. The crossed dashed line in the bottom panel of Figure (8) 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.

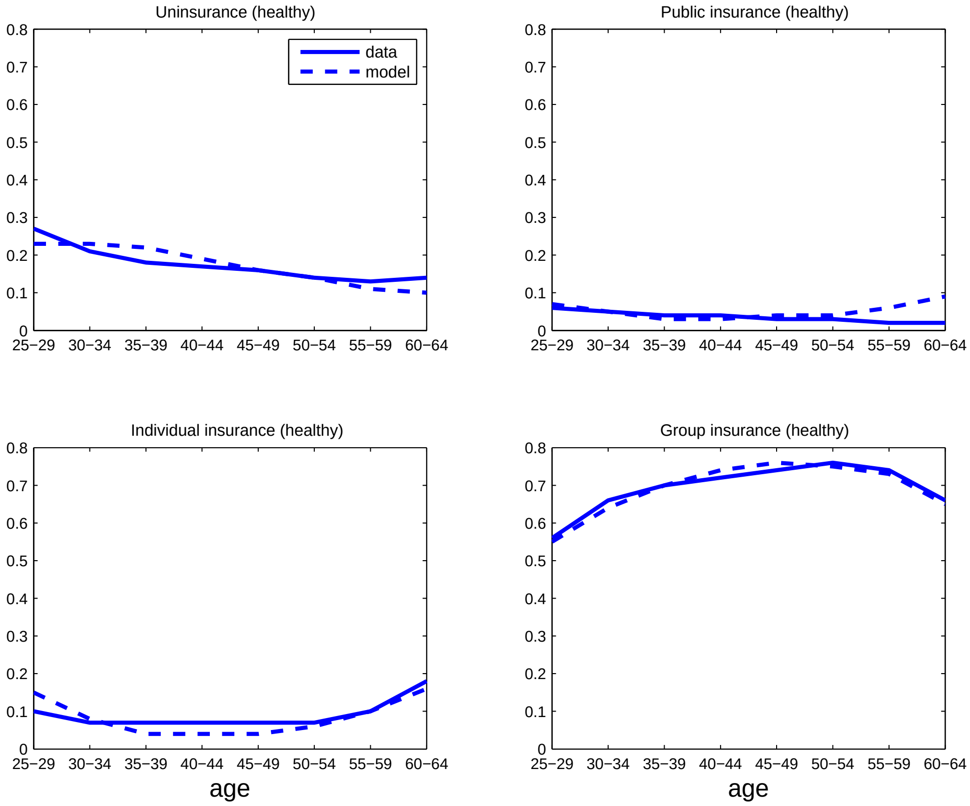


Figure 6: Insurance status among healthy (data vs baseline model))

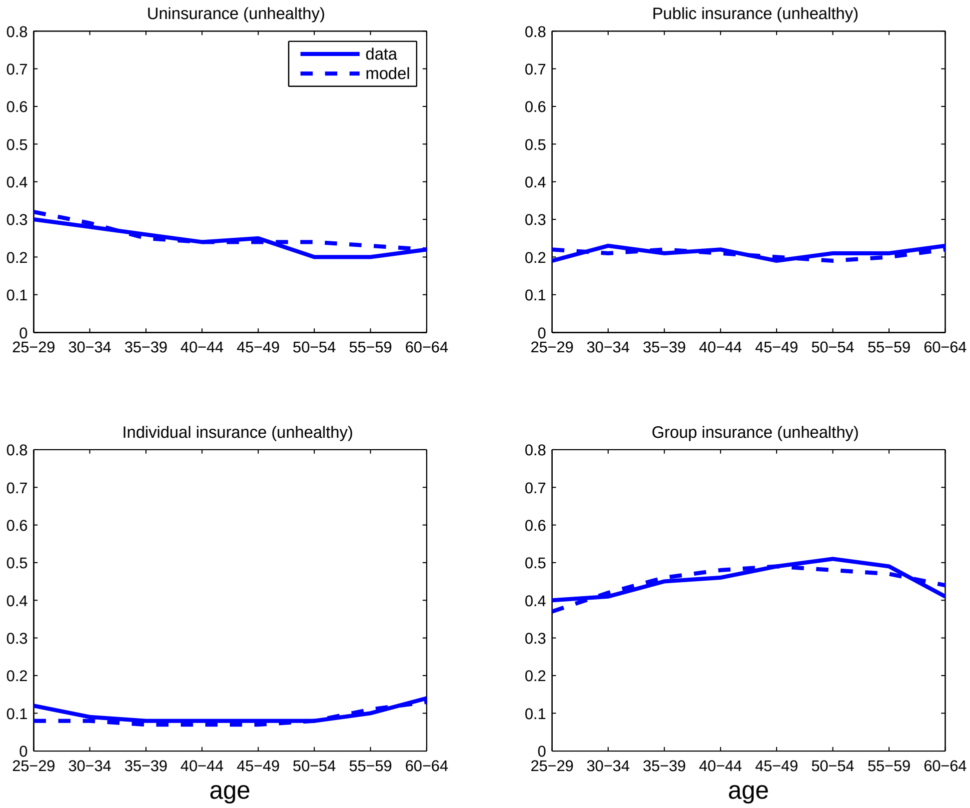


Figure 7: Insurance status among unhealthy (data vs baseline model))

	% of all enrollees	% of healthy enrollees	% of unhealthy enrollees
non-workers (baseline)	47.0	29.5	74.7
enrollees losing eligibility if working	22.0	10.5	40.8
non-workers ⇒ workers if not losing eligibility	20.3	9.8	37.4

Table 4: Decomposition of Medicaid beneficiaries

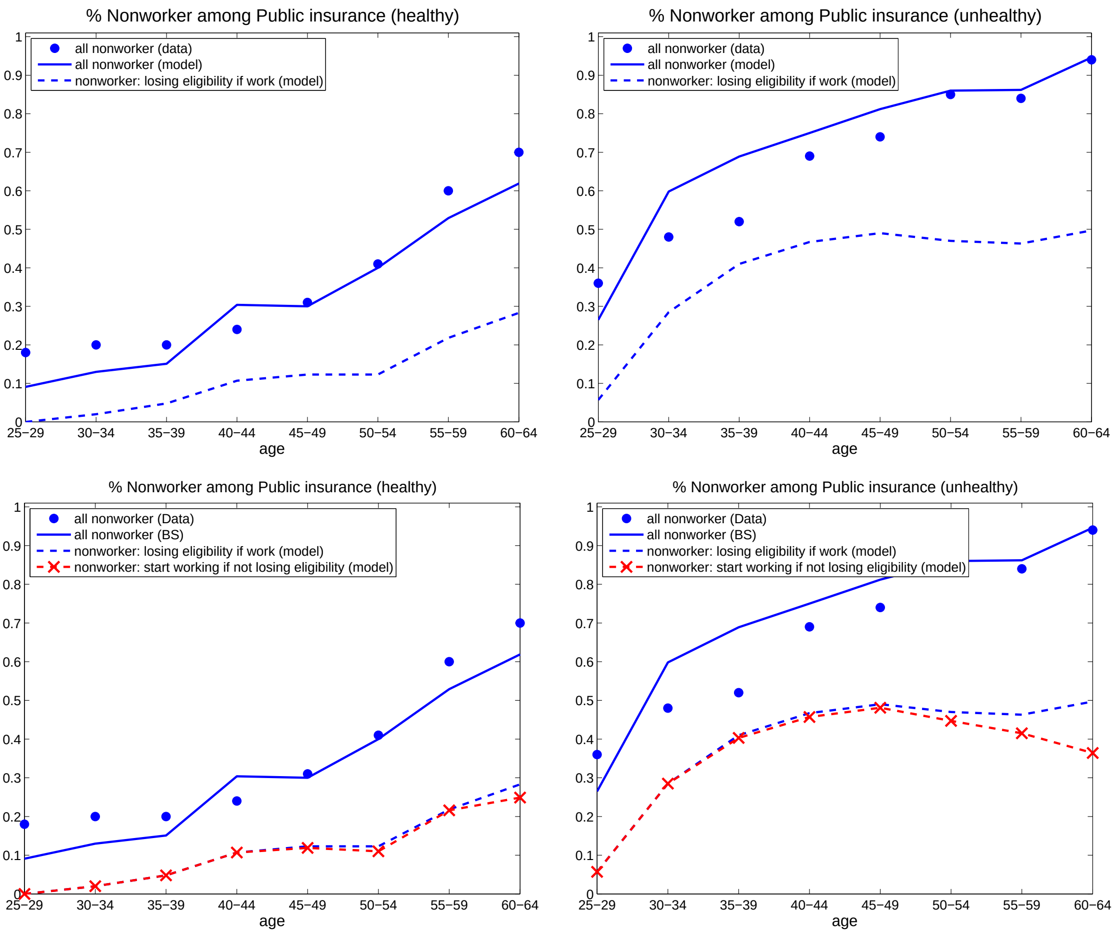


Figure 8: Decomposition of non-workers among public health insurance. The solid lines (dots) are the fraction of non-workers among Medicaid beneficiaries in the baseline model (in the data). The dash lines are the fraction of non-workers who would lose Medicaid eligibility if they start working. In the 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 who stop working in order to gain eligibility and the other Medicaid beneficiaries, Table 5 compares their medical expenses, potential labor income and assets. The average medical expenses of people who do not work in order to become eligible for Medicaid are noticeably higher than the average medical expenses of the rest of Medicaid beneficiaries ($7,578 vs. $5,136). 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 who do not work in order to meet the eligibility criteria, on average, holds much more assets than the rest of Medicaid beneficiaries ($18,523 vs. $2,378).[29] As a result, the former group is better 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 (32.8% vs. 65.1%). To sum up, Medicaid beneficiaries who do not work to get access to public insurance 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 not working to get Medicaid	$7,578	$10,604	$18,523	32.8%
other Medicaid beneficiaries	$5,136	$7,133	$2,378	65.1%
all Medicaid	$5,634	$7,838	$5,659	58.5%

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

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 have good opportunities to self-insure. 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

[29] Benitez-Silva et al (2006) find a similar pattern in case of disability insurance. Non-disabled individuals who get awarded disability insurance have higher net worth than truly disabled beneficiaries of the program ($87,017 vs $73,911).

we modify the Medicaid eligibility as follows:

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

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 $\widetilde{y}^{cat}$ and $\widetilde{y}^{MN}$ 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.[30]

	Baseline	Observable productivity
Income test: y^{cat}, y^{MN} (%FPL)	79.2%	100.5%
Income tax: τ_y	6.77%	6.57%
Employment rate (%)		
all	95.5	97.2
healthy	97.9	98.7
unhealthy	78.7	86.9
%Δ aggregate labor productivity	–	0.49
%Δ aggregate capital	–	0.75
%Δ aggregate output	–	0.58
Ex-ante consumption equivalent (%)	–	1.51

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

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 Medicaid program. Given that many of

[30]Since 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 E we consider an alternative setup where, instead of adjusting the income eligibility threshold to maintain the size of the public transfers program, we only adjust τ_y to balance the government budget. The qualitative conclusions in this case stay the same.

	Baseline				observable productivity			
	ESHI	individual	uninsured	public	ESHI	individual	uninsured	public
all	65.4	8.4	19.2	7.1	64.6	7.7	18.3	9.4
healthy	68.3	8.4	18.3	5.0	67.5	7.9	17.2	7.9
unhealthy	45.5	8.7	24.9	21.0	45.3	9.5	26.0	19.3
% unhealthy	8.9	13.2	16.6	38.0	8.9	15.8	18.1	26.3

Table 7: Change in insurance coverage

these people are unhealthy and have high medical expenses, this significantly decreases 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 79.2% to 100.5% of FPL and the percentage of people enrolled in Medicaid increases from 7.1% to 9.4%.

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 1.51% 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 employment among the unhealthy increases from 78.7% to 86.9%, 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.[31]

7 Policy discussion

The previous section shows that if productivity is observable Medicaid can better target people with low productivity without distorting incentives and this can substantially improve welfare. An important question is how to improve the trade-off between insurance and incentives in the environment where productivity is unobservable. The efficient provision of insurance against unobservable idiosyncratic productivity shocks in dynamic economies has been extensively studies by the New Dynamic Public Finance literature.

[31] In Appendix E we show that in the alternative setup when we only adjust τ_y the welfare gains are equal to 0.32% of the 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.

One important result from this literature is that in order to the correct incentive problem in presence of unobservable productivity shocks, the saving decisions should be distorted. Golosov and Tsyvinski (2006) show that in case of disability insurance the right wedge on savings can be achieved by asset testing. The intuition behind this result is that individuals who plan to falsely claim disability accumulate significant assets beforehand to smooth their consumption when not working and receiving disability transfers. Asset testing makes this strategy unattractive because able individuals with low assets do not find it worth to stop working in order to get disability. Medicaid has a similar insurance-incentives trade-off as disability insurance. It provides transfers to low-income people but it cannot separate truly low-productive individuals from non-workers with high productivity. As Table 5 in the previous section shows, highly productive individuals who plan to get Medicaid by decreasing their labor supply accumulate substantial amount of assets. In this section we explore if asset testing can be an efficient tool to correct incentives in case of the Medicaid program.

We start by investigating the effects of changing the currently existing asset limit in Section 7.1. We show that asset testing creates a trade-off between lower distortions on labor supply and higher saving distortions which does not allow it to achieve the same welfare gains as the benchmark case of observable productivity. In Section 7.2 we take this analysis one step further by exploring the possibility to use different asset limits for workers and non-workers. We show that this policy is as effective in reducing labor supply distortions as uniform asset testing but it does not create unnecessary saving distortions which allows it achieve welfare outcome almost equivalent to the benchmark case of observable productivity.

7.1 Asset testing

To understand if asset testing is important in reducing distortions on labor supply we start by considering 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 according to the following rule:

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

while in the second the eligibility criteria looks as follows:

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

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 productivity is observable or not. In the economy where productivity is observable, removing asset test increases welfare gains from 1.51% (the economy with observable productivity and asset test) to 1.84%. This happens because asset test creates distortions on saving decisions which are not needed in the full information case. The removal of asset testing increases wealth accumulation among people with low productivity (see Figure (9)).[32] In contrast, if productivity is unobservable, eliminating asset test leads to welfare losses equivalent to -1.28% 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 79.2% to 13.1% of FPL. The Medicaid coverage decreases from 7.1% to 5.6% while the fraction of beneficiaries who would start working if they can keep eligibility increases more than three times (to 64.7%). This experiment illustrates the important role that asset testing plays in preventing highly productive and well self-insured people to get free public insurance by not working.

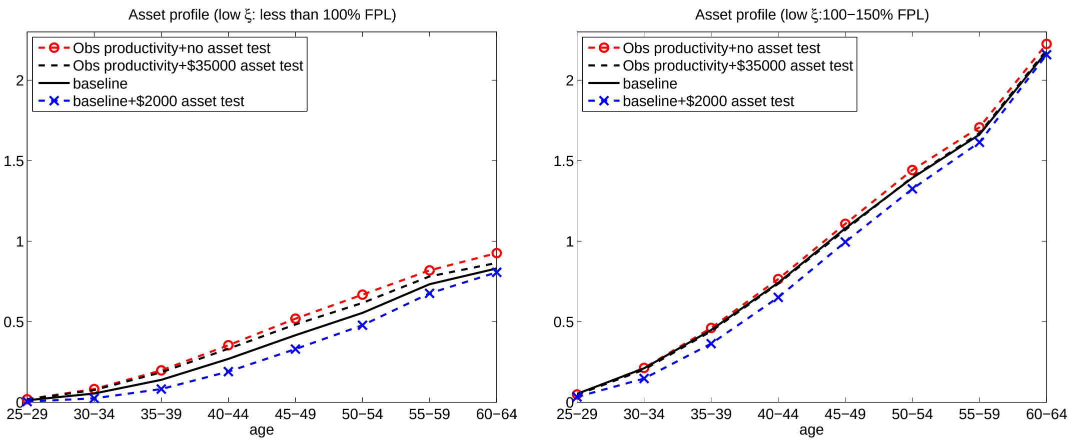
Asset test (k^{CAT})	% enrollees losing eligibility if working	% non-worker⇒worker if not losing eligibility	Ex-ante CEV (%)		
			all	low ξ	high ξ
Productivity is observable					
1. No asset test	–	–	1.845	1.807	0.251
2. \$35000	–	–	1.509	2.212	0.295
Productivity is unobservable					
3. No asset test	97.9	64.7	-1.276	-1.488	-0.379
4. \$35000 (baseline)	22.0	20.3	–	–	–
5. \$25000	12.8	11.8	0.276	0.333	0.036
6. \$15000	5.6	5.3	0.708	0.853	0.095
7. \$5000	1.3	1.2	0.588	0.710	0.074
8. \$2000	0.5	0.4	0.322	0.391	0.033

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

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

Asset test (k^{CAT})	Income Test (%FPL)	employment (%) unhealthy	employment (%) healthy	insurance (%) unins	insurance (%) pub	insurance (%) Ind	insurance (%) ESHI	$k_t <$ \$2000 (%)
Productivity is observed								
1. No asset test	100.6	86.9	98.7	18.3	9.3	7.7	64.7	10.3
2. $35,000	100.5	87.0	98.7	18.3	9.4	7.7	64.6	10.6
Productivity is unobserved								
3. No asset test	13.1	74.1	96.2	19.0	5.6	9.5	65.9	10.1
4. $35,000 (baseline)	79.2	78.7	97.9	19.2	7.1	8.4	65.4	11.8
5. $25,000	84.9	81.0	98.1	18.7	7.9	8.2	65.2	12.2
6. $15,000	92.7	83.6	98.4	18.1	8.6	8.4	64.9	11.6
7. $5,000	95.8	85.1	98.4	18.0	8.6	8.6	64.9	12.7
8. $2,000	93.7	84.2	98.3	19.0	8.3	7.9	64.9	15.4

Table 9: Effects of uniform asset test



(a) Potential labor income: less than %100FPL (b) Potential labor income: %100-%150FPL

Figure 9: 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 $35,000 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 uniform asset test.

In the next set of experiments we gradually decrease the asset limit in the baseline economy from $35,000 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. 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 $35,000 (baseline level) to $25,000 noticeably decreases the percentage of Medicaid enrollees who do not work in order to be eligible for public insurance, from 20.3% to 11.8%. Setting asset test to $2,000 almost completely eliminates the moral hazard problem: the percentage of Medicaid enrollees who do not work in order to get health insurance drops to 0.4%. At the same time, the employment rate among the unhealthy increases from 78.7% to 84.2% which is closer to the benchmark economy where productivity is observable (87.0%). 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: 0.32% of the annual consumption comparing to 1.51% in the benchmark economy. This is because the positive effects of eliminating labor supply distortions are partially offset by the negative effect of large 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 $2,000 increases from 11.8% in the baseline economy to 15.4% in the economy with very tight asset test. Figure (9) 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.[33] The best results in welfare terms are obtained if asset limit is equal to $15,000. In this 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. As a result, the welfare gains are higher than both in the baseline and in the $2,000 asset test economy (0.71% of the annual consumption) but still much smaller than in the case of observable productivity.

7.2 Differentiated asset testing

The previous section shows that strict asset testing can eliminate distortions on labor supply of Medicaid beneficiaries but at a cost of substantially distorting saving decisions. In this section we consider a more flexible asset testing policy which allows asset limits to depend on labor supply decisions. The rational for such policy comes from the finding of the NDPF literature that one way to reduce the negative effect of savings on incentives is to introduce state-dependent wealth taxes (Kocherlakota, 2005, Albanesi and Sleet, 2006). The intuition here is as follows. Highly productive individuals can always mimic low productive individuals by working little. The attractiveness of this behavior increases with assets since wealth can substitute for forgone labor income. To make this behavior less attractive, low-income individuals should face higher marginal taxes on wealth. In

[33]Notice 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.

our case individuals with high and low productivity are observationally equivalent only when they do not work. Thus, the intuition above implies that asset test (which is equivalent to wealth tax) should be stricter for non-workers. In a next set of experiments we allow asset limits to be different for working and non-working Medicaid enrollees. Tables 10 and 11 show the effects of policies that tighten asset test for non-workers from \$35,000 (baseline) to \$2,000 while keeping the asset test for workers unchanged at the baseline level. As before, more strict asset test is effective in reducing the moral hazard behavior among Medicaid beneficiaries: when asset limit is set to \$2,000 only 0.24% of enrollees have potential income above the income eligibility thresholds. Moreover, the welfare gains of the policy that set the asset limit for non-workers to \$2,000 is close to welfare gains in the benchmark case of observable productivity (1.42% in the former case vs. 1.51% in the latter). Because the asset limit for workers is unchanged this policy results in significantly smaller savings distortions comparing to the case when asset test is tightened for everyone.[34] Thus, by allowing working and non-working Medicaid enrollees to face different asset test we can achieve almost the same outcome as in the "ideal" case of conditioning Medicaid eligibility on unobservable productivity.

Asset test (k^{CAT}) for non-workers	% enrollees losing eligibility if working	% non-worker⇒worker if not losing eligibility	Ex-ante CEV (%) all	low ξ	high ξ
1. \$35000 (baseline)	22.0	20.3	–	–	–
2. \$25000	12.26	11.29	0.384	0.462	0.055
3. \$15000	4.56	4.40	1.023	1.228	0.157
4. \$5000	0.74	0.70	1.390	1.661	0.242
5. \$2000	0.24	0.20	1.420	1.697	0.253

Table 10: Welfare effects of tightening asset test only for non-working enrollees. The percentage in the second and third columns is among all Medicaid beneficiaries. In all experiments asset limit for working beneficiaries is fixed at \$35,000 as in the baseline.

Asset test (k^{CAT}) for non-workers	Income Test (%FPL)	employment (%) unhealthy	healthy	insurance (%) unins	pub	Ind	ESHI	$k_t <$ \$2000 (%)
1. \$35,000 (baseline)	79.2	78.7	97.9	19.2	7.1	8.4	65.4	11.8
2. \$25,000	85.9	81.6	98.5	18.7	7.9	8.1	65.2	12.1
3. \$15,000	94.2	85.1	98.7	18.3	8.6	7.9	64.8	11.2
4. \$5,000	99.4	88.2	98.7	18.3	8.6	7.8	64.7	10.9
5. \$2,000	99.9	88.6	98.8	18.3	8.3	7.8	64.7	11.0

Table 11: Effects of tightening asset test only on non-working enrollees.

[34]In Appendix F we show that complete removal of asset testing of workers results in welfare gains which are close to welfare gains in the economy with observable productivity and no asset testing.

8 Conclusion

In this paper we evaluate quantitative importance of the distortions that Medicaid creates for labor supply decisions and discuss policies that can reduce these distortions. The fraction of workers among Medicaid enrollees is more than twice lower than the fraction of workers among the rest of the population and this difference to a significant 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 22% of Medicaid enrollees will lose eligibility if they start working and most 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 1.5% 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 show that strict uniform asset testing can eliminate labor supply distortions created by Medicaid but at a cost of distorting saving decisions. In order to achieve outcome close to the 'ideal' case of observable productivity asset limits should be different for workers and non-workers. This happens because imposing strict asset testing for Medicaid beneficiaries who already work is redundant and just distorts their saving decisions.

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Appendix

A Summary of the parametrization of the baseline model

Parameter name	Notation	Value	Source
Parameters set outside the model			
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	"
Parameters used to match some targets			
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 Comparison of employment statistics in MEPS and CPS

The purpose of this section is to explain the difference between the employment rate in the Current Population Survey (CPS) and in our sample. In 2003 the employment rate among people in the age range 25-64 was 75.3% according to CPS. CPS is a monthly survey and an individual is counted as employed in a particular month if he is employed in a reference week. MEPS has at most 3 rounds of interviews per year which we aggregate into a yearly employment by computing average hours worked and average labor income over the entire year (see Section 4.1 for more details). The employment computed in this way corresponds to long-term employment, i.e. only individuals who do not work for the whole year are counted as non-workers. If we instead compute employment based on hours and labor income in one round of interview for all MEPS respondents aged 25 to 64 years old the resulting number is 75.5%.

In addition, the employment rate in the sample that we select is higher than the employment rate among all MEPS respondents. As explained in more detail in Section 4.1, we only include the heads of households in our sample where the head is defined as the highest earner in a household. In addition, we exclude people who report receiving less than $3,000 from all income sources and most of these individuals do not work. As a result, the employment in our sample is 94.8% while employment rate among all MEPS respondents is 82.1% (both computed on the yearly basis).

C Estimation of survival probabilities

To construct the survival probability by health, we use the HRS data to estimate the survival probability as a function of cubic polynomial of age and gender using a probit model for each health status. Then we compute the *survival premium* - the difference between the estimated survival probabilities of healthy and unhealthy males for each age. From the Social Security Administration life table we know the average survival probability of males. From MEPS we can construct the fraction of people in the two health categories for each age. Using this information we can recover survival probabilities of healthy and unhealthy people for each age. Figure (10) plots the survival probability by health status.

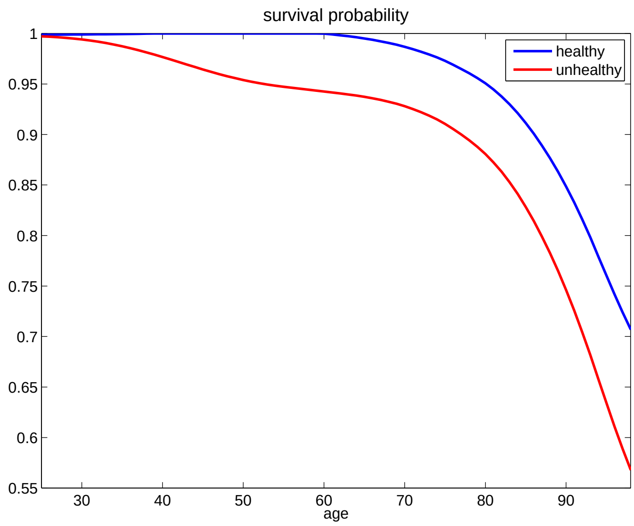

Figure 10: Survival probability (ζ_t)

D Medical expenses and insurance coverage

To calibrate medical expenses we separate our sample into 12 age groups (20-24, 25-29, 30-34, ..., 75+). We assign the age of each group to the mid-point of a corresponding age interval. For example, 22 for 20-24, 27 for 25-29, 32 for 30-34, etc. For each year,we divide medical expenditures into 3 bins, corresponding to the bottom 50th, 50-95th, top 5th percentiles for each health status and age group. To get a value of medical expenses in each bin we run a regression of medical expenses on a set of age-group and year dummies. The coefficients on age dummies in this regression correspond to the average medical expenses for the corresponding age in a particular bin. Then we fit our estimated coefficients with a quadratic function of ages. The MEPS tends to underestimate the aggregate medical expenditures (Sing et al, 2002). To account for this, we multiply our estimated medical expenses by 1.31. This adjustment allows us to match the share of total medical expenses of people of a working-age and elderly people in GDP (11.2%) as in National Health Expenditure Account (2004).

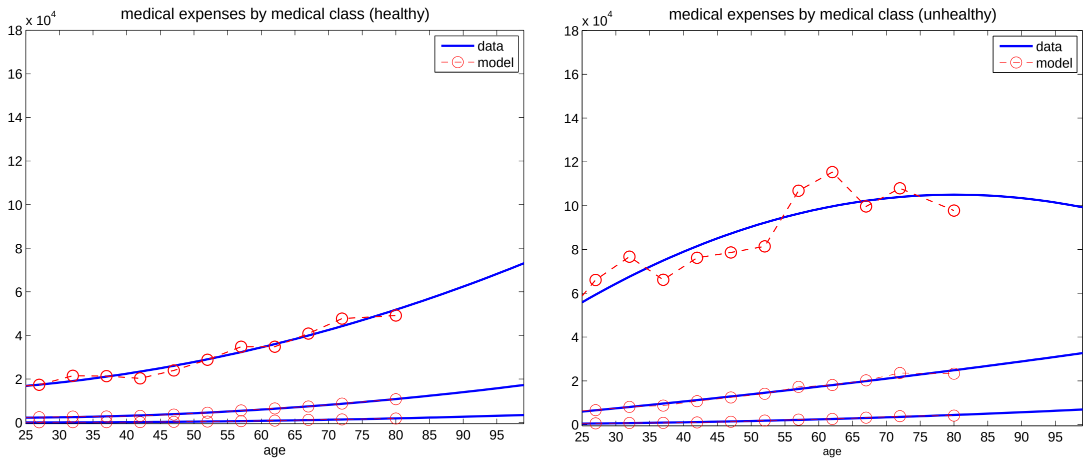

Figure 11: Medical expense grids by health status, x_t^h

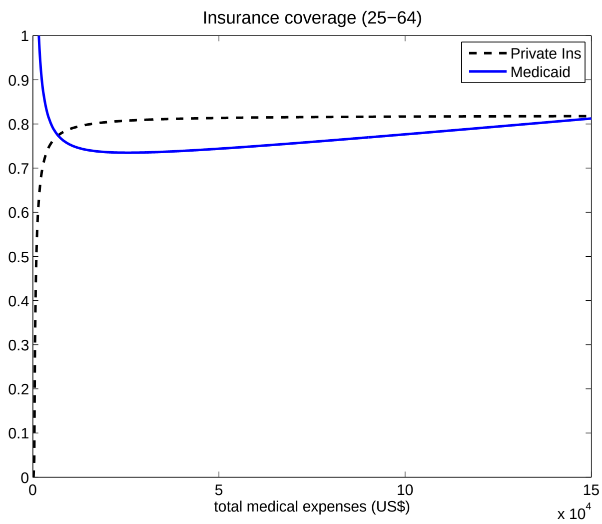

Figure 12: Private insurance and Medicaid coverage, $q(x_t^h, i_t)$

To determine the fraction of medical expenses covered by private insurance and Medicaid $q(x_t, i_t)$, we do the following. For working age households we estimate medical expenditures paid by private insurers (variable TOTPRV) and Medicaid (variable TOTMCD) as a function of total medical expenditures and year dummy variables. We use a linear function of total medical expenditure for private insurance and a quadratic function for Medicaid.[35] Then we convert our estimates into the fraction of expenditures covered by insurers. Figure (12) plots the fraction of medical expenses covered by private insurance and Medicaid.

E Economy with observable productivity when welfare budget is not fixed

In this section, we reevaluate welfare effects of linking Medicaid eligibility to potential labor income as in Section 6.2 (Eq (24)) when total spending on welfare programs (Medicaid and consumption floor) are not held constant. Unlike in Section 6.2 we do not adjust income eligibility threshold to keep welfare budget unchanged but only adjust τ_y to balance the government budget. Table 13 and 14 report the results from this experiment.

As before, there is a welfare gain from implementing this experiment but the size of gains is much smaller, 0.32% of annual consumption comparing to 1.51% in Section 6.2. This happens because the the size of the public transfers through Medicaid decreases. In the experiment in Section 6.2 the free-up budget from Medicaid enrollees with relatively high productivity who lost eligibility is used to enroll more low income people. Now this budget is proportionately distributed to everyone through lower taxes. As a result, the income tax τ_y decreases from 6.77% to 6.41% but Medicaid coverage goes down from 7.1% in the baseline to 5.7%.

	Baseline	Observable productivity
Income test: y^{cat}, y^{MN} (%FPL)	79.2%	79.2%
Income tax: τ_y	6.77%	6.41%
Employment rate (%)		
all	95.5	96.8
healthy	97.9	98.5
unhealthy	78.7	85.1
%Δ aggregate labor productivity	–	0.43
%Δ aggregate capital	–	1.51
%Δ aggregate output	–	0.78
Ex-ante consumption equivalent (%)	–	0.32

Table 13: The effect of removing Medicaid distortions on labor supply (fixed income test)

[35]For both regressions, R^2 is 0.88.

	Baseline				observable productivity			
	ESHI	individual	uninsured	public	ESHI	individual	uninsured	public
all	65.4	8.4	19.2	7.0	65.4	8.5	20.4	5.7
healthy	68.3	8.4	18.3	5.0	68.3	8.3	18.9	4.5
unhealthy	45.5	8.7	24.9	21.0	45.6	10.3	30.3	23.8
% unhealthy	8.9	13.2	16.6	38.0	8.9	15.5	19.0	30.9

Table 14: Change in insurance coverage (fixed income test)

F Removing asset test on workers

In Section 7.2 we show that tight asset testing of non-workers can eliminate moral hazard behavior among Medicaid beneficiaries. In this section we consider the effects of complete elimination of asset testing of workers while maintaining the strict asset limit ($2,000) for non-workers. Rows 3 of Table 15 and 16 report the results of this experiment and compare them with the economy with observable productivity and no asset testing.

Comparing with the results in Table 10, the welfare gains are higher. This is because for working individuals there is no need to use asset testing to induce them to work. Instead, asset testing of working beneficiaries creates unnecessary savings distortions that reduce welfare.

Experiment	% enrollees losing eligibility if working	% non-worker⇒worker if not losing eligibility	Ex-ante CEV (%)		
			all	low ξ	high ξ
1. Baseline	22.0	11.2	–	–	–
2. Obs productivity, no asset test	–	–	1.845	2.212	0.295
3. Asset test only for non-workers	0.22	0.18	1.715	2.049	0.307

Table 15: Welfare effects of policies with complete or partial removal of asset testing

	Income Test	employment (%)		insurance (%)				$k_t <$ \$1000
	(%FPL)	unhealthy	healthy	unins	pub	Ind	ESHI	(%)
1. Baseline	79.2	78.7	97.9	19.2	7.1	8.4	64.3	12.2
2. Obs productivity, no asset test	100.6	87.0	98.7	18.3	9.4	7.7	64.6	10.3
3. Asset test only for non-workers	99.8	89.5	98.8	18.3	9.3	7.8	64.6	10.6

Table 16: Employment and insurance effects of policies with complete or partial removal of asset testing