Towson University
Department of Economics
Working Paper Series

Working Paper No. 2024-10

Medicaid Work Requirements, Labor Market Effects and Welfare

By Juergen Jung and Vinish Shrestha

August 2024

Medicaid Work Requirements, Labor Market Effects and Welfare*

Juergen Jung† Towson University

Vinish Shrestha‡ Towson University

January 4, 2025

Abstract

We use an overlapping generations model with labor supply decisions, health risk, and health insurance choices to investigate the impact of work requirements for Medicaid eligibility. Calibrating the model to US data, we simulate counterfactual experiments comprising a minimum weekly work hours requirement for Medicaid with exceptions for sick individuals. Our partial and general equilibrium results indicate that Medicaid work requirements increase labor force participation, reduce hours worked, and boost output. However, most scenarios result in overall welfare losses that are somewhat mitigated by general equilibrium income effects. The losses are highest among low-income households while high-income households experience welfare gains. Welfare losses become more pronounced if the reform includes work requirements for sick individuals, extending the negative welfare impact to middle-income households as well.

JEL: H51, I13, I14, I38, J21, D58

Keywords: Medicaid reform, Medicaid work requirements, The Patient Protection and Affordable Care Act (ACA), Labor supply, Labor market distortions, Health risk, Section 1115 Medicaid demonstration waivers.

*We would like to thank Mariacristina De Nardi for helpful comments. Juergen Jung received a grant from the Provost Research Fellows Program at Towson University (July–September 2024). Beyond that the authors have no further relevant or material financial interests that relate to the research described in this paper. The content is solely the responsibility of the authors and does not represent the official views of the supporting institutions.

†Corresponding author: Department of Economics, Towson University, *Email:* jjung@towson.edu

‡Department of Economics, Towson University, *Email:* vshrestha@towson.edu

1 Introduction

Medicaid spending has grown to about 3.2 percent of GDP in 2024 due to combination of expansions of eligibility and increases in the cost of medical care.[1] Since Medicaid is financed via a combination of federal and state funds, Medicaid has become the single largest spending component of total state spending by US states.[2] Due to budgetary pressures, some US states have opted for more restrictive Medicaid programs with lower income thresholds and abstained from expanding Medicaid via the Affordable Care Act (ACA) in 2010.[3] In addition, during the first Trump administration thirteen U.S. states attempted to implement Medicaid work requirements for some adult enrollees.[4] Proponents of these measures argue that they promote self-sufficiency and reduce state financial burdens, while opponents worry about the potential harm to vulnerable populations. In this paper we develop a general equilibrium household consumption-savings model with health risk and health insurance choice and assess the short-run and long-run quantitative impact of implementing Medicaid work requirements nationwide. We focus our analysis on the effects on labor markets, insurance markets, public finance and household welfare. As far as we are aware this is the first study that uses a quantitative framework to investigate this issue.

Transfer programs with income thresholds as eligibility criterium, such as Medicaid, entail important economic trade-offs. They are often criticized as providing disincentives to work and self-care and essentially serve as unintended "poverty trap" (Folse, Bridges and DiGiorgio, 2024). However, since Medicaid is also a health insurance program with clearly demonstrated positive effects on health outcomes of very vulnerable individuals[5], any changes to Medicaid introduce interesting incentive/insurance trade-offs that are often difficult to measure using reduced form empirical approaches. For instance, studies that investigate the labor market effects of expanding Medicaid are often inconclusive and contradictory and it is not clear whether an expansion of Medicaid would introduce a strong disincentive to work (e.g., Strumpf 2011; Dave, Decker, Kaestner and Simon 2015; Peng, Guo and Meyerhoefer 2020; Brown, Kowalski and Lurie 2020). Turned on its head, it is therefore also not clear whether a restriction to Medicaid would necessarily increase labor supply significantly and lead to efficiency gains, especially as over 60 percent of non-elderly adults with Medicaid (who did not qualify for that coverage on the basis of disability) are already working full or part-time (Guth, Drake, Rudowitz and Mohamed, 2023).

To understand the potential nationwide impacts of a Medicaid work requirement program, we therefore develop a computational overlapping generations model incorporating labor supply decisions, health risk,

[1] Compare the Medicaid expansion via the Affordable Care Act (ACA) in 2010 or more recently via the continuous enrollment provision of the Families First Coronavirus Response Act of 2020 as detailed in Tolbert and Ammula (2023).

[2] If one considers only the general funds spending Medicaid is the second largest spending component behind K-12 education spending. For details compare: https://medicaiddirectors.org/resource/top-five-medicaid-budget-pressures-for-fiscal-year-2025/

[3] Interactive maps of individuals covered by Medicaid are provided by the Kaiser Family Foundation at: https://www.kff.org/interactive/medicaid-state-fact-sheets/

[4] Most of these programs were blocked by the courts before becoming active. Arkansas is the only case where about 18,000 individuals lost Medicaid coverage in 2018 before the measure was halted by federal courts at the end of that year. (Sommers, Goldman, Blendon, Orav and Epstein, 2019). Currently, Georgia is the only state with Medicaid work requirements in place through its "Pathways to Coverage" demonstration waiver program, effective July 1, 2023.

[5] Compare Sommers, Maylone, Blendon, Orav and Epstein (2017) and Gruber and Sommers (2019) for some recent studies on the longer term effects of Medicaid expansions via the ACA.

and health insurance choice. This model serves as a laboratory to assess the likely effects of Medicaid work requirement reforms on various stakeholders which provides valuable guidance to policymakers at federal and local levels regarding reform ideas that reshape access to Medicaid.

Our framework allows us to conduct counterfactual simulations to (*i*) measure welfare effects for different sub-population, (*ii*) address public finance issues related to tax-funded transfer programs, (*iii*) highlight effects on labor and insurance markets, and (*iv*) quantify aggregate macroeconomic effects in both the short and long run. We proceed in two steps. First, we calibrate the model to U.S. data before the ACA's implementation in 2010. Next, we conduct a counterfactual experiment introducing a minimum weekly hours work requirement for Medicaid eligibility. Finally, we incorporate key features of the ACA such as subsidized private health insurance exchanges and eligibility expansions for Medicaid and repeat the exercise under this modified scenario.

As some of the suggested policy reforms focus work requirements on the able bodied population, we first introduce a counterfactual experiment where only "healthy" people face a Medicaid work requirement. We find that a work requirement of 8 hours a week (or 32 hours a month) significantly decreases Medicaid enrollment by about 4 percentage points and reduces Medicaid payouts by about 26 percent. This policy boosts labor participation by roughly 1.3 percentage points while it slightly reduces the average work hours of active workers. The increase in labor supply and the decrease in taxation—due to freed-up government resources—generates additional household income, which is spent on consumption and savings. Consequently, the capital stock rises which results in higher real wages, output, and overall consumption levels. Despite positive aggregate income effects, the overall welfare impact is negative but ameliorated by general equilibrium effects. Low-income individuals who chose to join the labor market in order to maintain Medicaid eligibility and workers who lose Medicaid insurance are worse off and experience welfare losses that range between 2.9–3.2 percent of compensating equivalent variation (CEV) in lifetime consumption in the short-run (partial equilibrium). In the long-run these losses slightly decrease to a range of 1.9–2.2 percent after general equilibrium price effects are factored in.[6] High-income households, on the other hand, benefit from general equilibrium growth effects and lower taxation.

We next introduce key features of the Affordable Care Act (ACA) such as (*i*) the expansion of the income threshold for Medicaid eligibility, (*ii*) the abolishment of the asset test for individuals younger than 65, (*iii*) the introduction of premium subsidies for individual (private) health insurance (IHI), (*iv*) the discontinuation of premium discrimination by health and age in the IHI market, (*v*) changes in coinsurance rates, and (*vi*) changes in the employer insurance offer rates due to employer mandates. Using this new ACA benchmark we re-introduce the same counter factual experiment of a minimum weekly hours work requirement to maintain Medicaid eligibility for healthy individuals. With the ACA in place, we find that Medicaid work requirements have overall smaller effects on labor markets and macroeconomic aggregates such as capital, output, and consumption. However, the changes in Medicaid and IHI enrollments are more pronounced as a larger group of Medicaid recipients is now affected by the work requirement policy. As individuals are thrown off Medicaid, many enter the subsidized IHI markets. This switch into an alternative health insurance

[6]We describe partial equilibrium results as short-run outcomes because they do not account for price adjustments or changes in taxation due to budget balancing by the government.

contract—that was not available prior to the ACA as IHI markets would simply "price out" low income/high health risk individuals—results in smaller welfare losses for the low income population. However, since IHI subsidies need to be financed by the government, high income individuals do not receive large tax reductions anymore so that overall their welfare gains are smaller than in the pre-ACA scenario. The overall welfare loss across all health and income types is in fact slightly larger at 0.18 percent of CEV compared to 0.07 percent of CEV in the model without the ACA provisions in place. While the results do depend on the the minimum weekly hours imposed, imposing hours beyond 16 hours a week do not significantly move the needle anymore as at that point the number of individuals enrolled in Medicaid does not change anymore.

We finally introduce more aggressive work requirements that includes all working age individuals including the sick. In this case the results lead to larger changes in labor market outcomes as well as macroeconomic aggregates. Medicaid enrollment drops to zero once we enforce a 20 hours a week work requirement while the increase in IHI enrollment is larger. When the ACA is in place, subsidies for IHI grow up to 50 percent compared to an 18 percent increase in the reform that only targets the healthy population. Welfare losses are higher and include the middle income groups.

We proceed as follows. The next section presents a brief literature review and highlights our contribution. Section 3 discusses the institutional background of Medicaid and the various attempts to introduce work requirements via Section 1115 Medicaid demonstration waivers. Section 4 presents the computational model framework while Section 5 discusses the parameterization of the model based on moment matching. Section 6 discusses the results of our simulations and Section 7 concludes. In an Online Appendix we provide additional details about the data we use for calibrating the model, details about the solution algorithm, and additional results in support of our analysis.

2 Literature review

There is a rich empirical literature that investigates the labor market effects of Medicaid. While some studies have found no or even small positive effects on labor supply after the initial introduction of Medicaid in 1965 (Strumpf, 2011), subsequent expansions of Medicaid eligibility in the 1980s have been linked to decreases in the labor supply among the eligible population (e.g., Dave et al. 2015; Peng, Guo and Meyerhoefer 2020). Studies analyzing the long-run effects of Medicaid eligibility have found not only better health outcomes but also higher wages among adults who benefited from Medicaid as children (Brown, Kowalski and Lurie, 2020). Finally, research investigating the effects of reducing the access burden to Medicaid in the 1980s has shown a significant increase in the number of insured individuals as well as improvements in infant health, with especially large positive effects for minority mothers (Rauscher and Burns, 2023). These studies suggest that while work requirements are likely to increase labor supply, they will also lead to worse health outcomes, especially among minorities. Direct research about the short lived implementation of work requirements in Arkansas is scarce but suggests that the policy disproportionately affected African Americans (Sommers et al., 2019). Our research contributes to this literature by providing a framework that allows for a short-run and long-run analysis of a counterfactual nationwide implementation of Medicaid work requirements. Although the federal courts have blocked the implementation of most Medicaid work requirement programs at the State level until now, many States are in the process of reinstating such programs or appealing court decisions (Guth, 2023). Knowing the short- and long-run consequences of these policies—including a nationwide implementation—should therefore be of great interest to policymakers. Our approach also complements the currently empirical research at the State level which suffers from lack of data.

There is a large literature about the effects of the ACA on a wide array of outcomes as summarized in Fang and Krueger (2022). Some closely related studies address access to health care, health and labor market outcomes, crime, education, and marriage (e.g., Wen, Hockenberry and Cummings, 2017; Miller, Johnson and Wherry, 2021; Jung and Shrestha, 2018; Hampton and Lenhart, 2019). More closely related to our study are Frean, Gruber and Sommers (2017) and Courtemanche, Marton, Ukert, Yelowitz and Zapata (2017). These studies highlight that the ACA has reduced the number of uninsured individuals significantly by increasing the take-up of private IHI and Medicaid. For example, Frean, Gruber and Sommers (2017) predict that 60 percent of insurance gains associated with the ACA is driven by Medicaid. While a handful of recently published studies use individual level data to understand the relationship between the ACA and health outcomes using self-reported health measures as a proxy for health outcomes, the findings are inconsistent across studies when focusing on the immediate years following the expansion of Medicaid (Miller and Wherry, 2017; Courtemanche, Marton, Ukert, Yelowitz and Zapata, 2018; Cawley, Soni and Simon, 2018). On the other hand, studies with a longer follow-up period document that the reform improved self-reported health outcomes particularly among sub-populations that experienced larger gains in insurance coverage (Sommers et al., 2017; Gruber and Sommers, 2019).[7] More recent studies are dedicated towards understanding the effects of the ACA's Medicaid expansion on core health outcomes. For instance, Miller, Johnson and Wherry (2021) show that the ACA Medicaid expansion has decreased the mortality rate in expansion states by about 9.4 percent compared to the sample mean.

Our paper contributes to the ACA literature as we contrast the outcome of Medicaid work requirements in a version of the model without the ACA and a version of the model that includes the main provisions of the ACA. This can serve as a proxy for the likely effects of Medicaid work requirements in environments with small Medicaid coverage (i.e., the non-ACA expansion states) vs. the effects of work requirements in environments with large Medicaid coverage (i.e., ACA expansion states).

Our work also contributes to a growing macro-public finance literature that focuses on health shocks and healthcare policy. Early studies usually view health shocks as health expenditure shocks (Palumbo, 1999; Jeske and Kitao, 2009) while more recent studies have endogenized health expenditure (Scholz and Seshadri, 2013a; Jung and Tran, 2016; Yogo, 2016; Cole, Kim and Krueger, 2019; Eslami and Karimi, 2019; Fonseca, Michaud, Galama and Kapteyn, 2021). This literature has also addressed the role of Medicaid and long-term care for the elderly using counter factual policy simulations (e.g., De Nardi, French and Jones, 2016; Barczyk and Kredler, 2018; Achou, 2023; Capatina, Hansen and Hsu, 2024). Our work follows this tradition and uses an incomplete markets macroeconomic framework with heterogeneous agents as pioneered by Bewley (1986) and extended by Hansen and Imrohoroğlu (1992), Huggett (1993) and Aiyagari (1994). We augment the base model with exogenous health- and health spending risk and add the choice for public or private health insurance to the households decision problem. Different from the focus on the older population in prior

[7] A brief review of the ACA's Medicaid expansion on health outcomes can be found in Allen and Sommers (2019).

studies in this macro-health literature, our focus is on the effects of Medicaid on the working age population and more specifically the effects of Medicaid work requirements on labor markets, health insurance markets and household welfare. Our analysis includes the quantitative comparison of the effects of this reform in different insurance environments which highlights the the public finance aspects of health insurance reform in a model with rich institutional details.

Finally, Pashchenko and Porapakkarm (2017) analyze the role of asset testing in Medicaid and to what extent the asset test can be used to reduce distortions to work incentives. While our model also allows for asset testing for Medicaid eligibility, our focus is on simulating the effects of the Section 1115 Medicaid demonstration waivers that experiment with the introduction of work requirements.

3 Institutional background

States in the American South have some of the most restrictive Medicaid programs. The majority of these states not only refrained from expanding Medicaid following the introduction of the ACA in 2010 but also made active efforts to limit access to Medicaid. The Affordable Care Act (ACA) proposed a significant expansion of Medicaid by raising the income eligibility threshold to 138 percent of the federal poverty level in an effort to standardize (and expand) the various state specific income eligibility thresholds. This was a central pillar of the reform, most of which became effective in 2014, and accounted for the main share of the newly insured.[8] However, the majority of Southern states refrained from expanding Medicaid via the ACA and around the same time some of these states began actively exploring limiting access to Medicaid through Section 1115 Medicaid demonstration waivers. These waivers offer states an avenue to test new approaches to run Medicaid that differ from what is required by federal statute.[9]

The first Trump administration has ultimately approved waivers for 13 states who asked to implement Medicaid work requirements for at least some of their adult Medicaid enrollees. In most of these states work requirements were either overturned by the courts or suspended by the state before they took effect so that only five states actually implemented work requirements: Arkansas, Indiana, Michigan, New Hampshire, and Utah (Guth and Musumeci, 2022). Out of these Arkansas was the only state where individuals lost their coverage as a result. According to Sommers, Chen, Blendon, Orav and Epstein, 2020 about 18,000 individuals in Arkansas lost Medicaid health insurance coverage during the short lived implementation in 2018 which, according to Hill and Burroughs (2019) constitutes about 30 percent of the enrollees subject to work requirements at the end of that year. The measure was subsequently blocked by the federal courts at the end of the same year. The **Arkansas version** of the policy implemented a work requirement of 20 hours a week (80 a month) for 30–49 year old individuals with a Medicaid income eligibility of 138 percent

[8] According to data from the Kaiser Family Foundation (https://www.kff.org/other/state-indicator/total-population/?currentTimeframe=12&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D) the fraction of uninsured individuals dropped from 15.2 to 8 percent. The majority of these were insured via the Medicaid expansion. The share of individuals insured via Medicaid increased from 16.1 percent 21.2 percent between 2009 and 2022.

[9] Compare https://www.kff.org/medicaid/issue-brief/status-of-state-medicaid-expansion-decisions-interactive-map/ for details on which States have adopted Medicaid expansions via the ACA and https://www.kff.org/medicaid/issue-brief/medicaid-waiver-tracker-approved-and-pending-section-1115-waivers-by-state/ for an overview of approved and pending Section 1115 Waivers by State.

of the FPL.[10] In the other four states work requirements were not in effect long enough to move people off Medicaid.

As of July 1, 2023 Georgia's "Pathways to Coverage" legislation is the only currently implemented Medicaid work requirement policy in the US (as of this writing in December 2024). Similar to the Arkansas version the **Georgia version** of the policy requires 80 hours a month (or 20 hours a week) for 20–49 year old individuals while it also expands the eligibility threshold of Medicaid from a very low 31 percent to 100 percent of the FPL (compare CMS, 2020). Georgia is one of the ten states that had not yet expanded Medicaid via the ACA.[11] As of October 2023 only 1,343 people were enrolled via "Pathways to Coverage." It is projected to insure 90,000 newly eligible individuals compared to a projected 370,000 individuals that a general expansion without work requirements would cover (Hart, 2023; Mador, 2023).

The implementation of work requirements in Arkansas' Medicaid program has been a contentious issue with significant legal implications. Advocates argue that these requirements encourage self-sufficiency and reduce the financial burden on the state, while opponents raise concerns about the potential harm they may cause to vulnerable populations. The legal debate centers around the tension between state autonomy in designing Medicaid programs and federal statutory requirements that promote access to healthcare for low-income individuals.

The legal issues surrounding work requirements stem from the tension between Section 1115 waivers, which allow states to experiment with their Medicaid programs, and the core objectives of Medicaid, which are to provide essential healthcare services to low-income individuals. Critics argue that work requirements undermine these core objectives by potentially depriving individuals of access to healthcare when they cannot meet the requirements. Furthermore, legal challenges have raised questions about whether the U.S. Department of Health and Human Services (HHS) can grant waivers that are inconsistent with the fundamental goals of Medicaid. Recent court decisions have found such requirements to be legally problematic, and these cases may serve as precedents for similar debates in other states. In conclusion, while the legal issues surrounding Medicaid work requirements in Arkansas remain complex, they underscore the broader tension between state autonomy and federal standards in shaping the future of Medicaid programs nationwide.

Nevertheless, most recently a handful of states have again introduced legislation that ties the ACA Medicaid expansion to work requirements (Hinton, Raphael and Diana, 2024).

4 The quantitative model

We formulate a quantitative model with overlapping generations (OLG) similar to Jung and Tran (2022). The model features incomplete markets with uninsurable idiosyncratic income risk, exogenous health shocks and a fragmented health insurance system based on the institutional setting in the US before the ACA reform in 2010.

[10] Arkansas has expanded the eligibility threshold to 138 percent of the FPL in 2014 as part of the Section 1115 Medicaid demonstration waiver. Also, the work stipulation in Arkansas included exemptions for pregnant women and disabled individuals.

[11] Compare https://www.kff.org/medicaid/issue-brief/status-of-state-medicaid-expansion-decisions-interactive-map/

Since we want to highlight the trade-off between health insurance, consumption insurance, redistribution and allocative efficiency the model exposes utility maximizing households to both exogenous labor productivity shocks as well as exogenous health state and associated health expenditure shocks while limiting access to borrowing but allowing for the provision of partial health insurance. The latter is a choice between buying into private health insurance or becoming eligible for public health insurance. Having insurance will reduce, but not eliminate, the out-of-pocket medical spending of the household. Since the eligibility for public health insurance of the working population depends on an income and asset threshold, working age individuals can trade-off lower income for access to "free" Medicaid. Furthermore, as having insurance does affect the probability of future health shocks, the model also allows for a "partial choice" of health itself as it introduces a trade-off between buying insurance today for not only lower health spending in the future but also a lower probability of bad health draws.[12]

In order to study the long-run efficiency effects of the reform we also introduce a production sector with a profit maximizing firm that produces a final consumption good and a government that provides Social Security, Medicare, Medicaid and consumption insurance while taxing households according to a progressive tax schedule. This allows us to also address the public finance repercussions of changing the access rules to Medicaid and the associated tax implications.

4.1 Demographics, endowments and preferences

Individuals are born and become economically active at the age of 21 and live to a maximum of J periods. Individuals are allowed to work for a maximum of J_W periods. In each period individuals of age j face an exogenous survival probability $\pi_j\left(\varepsilon^h\right)$ that depends on their exogenous health state ε^h. Due to the mortality risk, individuals will leave accidental bequests.

In addition, the population grows exogenously at an annual rate $\mathfrak{n}$. We assume stable demographic patterns, so that age j agents make up a constant fraction μ_j of the entire population at any point in time. The relative sizes of the cohorts alive μ_j and the mass of individuals dying $\tilde{\mu}_j$ in each period (conditional on survival up to the previous period) can be recursively defined as $\mu_j = \sum_{\varepsilon^h} \frac{\pi_j\left(\varepsilon^h\right)}{(1+\mathfrak{n})^{years}} \mu_{j-1}\left(\varepsilon^h\right)$ and $\tilde{\mu}_j = \sum_{\varepsilon^h} \frac{1-\pi_j\left(\varepsilon^h\right)}{(1+\mathfrak{n})^{\text{years}}} \mu_{j-1}\left(\varepsilon^h\right)$, where years denotes the number of years per model period and $\mu_j\left(\varepsilon^h\right)$ is the mass of individuals with health ε^h.

In each period households are endowed with one unit of time that can be used for work ℓ or leisure. Conditional on labor force participation, a household earns before-tax wage income $y_j = w \times e_j\left(\vartheta, \varepsilon^n, \varepsilon^h\right) \times n_j$ at age j, where w is the wage rate, and e_j is a labor productivity endowment that depends on age j, a permanent income group ϑ, an idiosyncratic productivity shock ε^n, and idiosyncratic health state ε^h. Labor shocks follow a Markov process with transition probability matrix Π^n.

The period utility function $u\left(c_j, \ell_j; \omega_{j,\vartheta}; \bar{n}_j\left(\vartheta, \varepsilon^h\right)\right)$ depends on consumption (c), leisure (ℓ), and labor-force participation status which is only equal to one if labor supply is positive. The parameter $\omega_{j,\vartheta}$ is

[12] We wish to clarify that this does not represent a fully endogenized health choice as conceptualized in the health capital literature, beginning with Grossman (1972). As such our model abstracts from ex-ante moral hazard (i.e,. risky behavior and under investment in preventive care because of health insurance) and ex-post moral hazard (i.e., overuse of medical care because of insurance) while it does allow for a limited form of self-protection (i.e., buying insurance directly reduces the probability of bad health in the future).

an equivalence scale capturing changes in household size by age j and permanent income type ϑ while $\bar{n}_j\left(\vartheta, \varepsilon^h\right)$ denotes the fixed cost of working which depends on age, income type, and health status. Individuals value leaving bequests via function $u^{\text{beq}}\left(W_j\right)$ which is increasing in wealth W_j. Individuals use a fixed time discount factor β to discount a future period.

4.2 Health status, expenditure and insurance

Individuals are different in their health status ε^h, which evolves exogenously over their life time. Specifically, health status follows a Markov process that depends on age, the permanent income group, and whether an individual is insured or not as indicated by the indicator function $1_{\text{in}_j>0}$. The conditional transition probabilities of health status are elements of matrix $\Pi^h\left(j, \vartheta, 1_{\text{in}_j>0}\right)$. The insurance state variable in_j denotes the insurance state of working age individuals and can take on the following values:

$$\text{in}_j = \begin{cases} 0 & \text{if not insured,} \\ 1 & \text{if individual health insurance (IHI),} \\ 2 & \text{if group health insurance (GHI),} \\ 3 & \text{if Medicaid (MAid).} \end{cases}$$

A specific level of health expenditures $m\left(j, \vartheta, \varepsilon^h\right)$ is linked directly to health status and fluctuates accordingly. In addition, the permanent income type and age also affect the fluctuation of exogenous health expenditure. It is important to note that in this baseline model health affects consumption and utility indirectly via exogenous shocks to health expenditure and labor productivity in the household budget constraint (i.e., the budget channel) as well as through changes in survival probabilities (i.e., survival channel).

Workers can buy two types of private health insurance policies: a group health insurance plan (GHI) via their employer or an individual health insurance plan (IHI). In the US setting, GHI is not only more strictly regulated than IHI but also subsidized via the US tax system via tax deductible premium payments. This makes GHI a particularly attractive form of health insurance. Agents are required to buy insurance before the realization of their health state and the associated medical expenditures and insurance needs to be renewed each period. GHI can only be bought by workers who receive a GHI offer from their employer. Let ε^{GHI} be a binary random variable that indicates the state of the GHI offer from the employer. The GHI offers follow a Markov process summarized as the 2 state transition matrix $\Pi^{\text{GHI}}(j, \vartheta)$ that depends also on age and an individuals permanent income group. A fraction $\psi \in [0,1]$ of the insurance premium for GHI, $\text{prem}_j^{\text{GHI}}$, is paid for by the employer, the remainder of the premium $\widehat{\text{prem}}_j^{\text{GHI}} = (1-\psi)\,\text{prem}_j^{\text{GHI}}$ is tax deductible and paid by the worker. This premium is group rated so that insurance companies are not allowed to screen workers by health.[13] If a worker is not offered GHI by their employer, the worker can buy IHI. In this case the insurance premium is not tax deductible and the insurance company screens the workers by age and health status, $\text{prem}^{\text{IHI}}\left(j, \varepsilon^h\right)$.[14]

[13] Some age discrimination and discrimination by geographic area is allowed as detailed in Fernandez, Rosso and Forsberg (2018).

[14] This has been changed by the ACA. Post ACA, insurers in the IHI markets are not only allowed to discriminate by age and smoking status but not according to other sociodemographic characteristics.

There are two public health insurance programs in the US health insurance system: Medicaid for poor workers and Medicare for retirees. In order to be eligible for Medicaid, agents are required to pass an income ($y_j^{\text{AGI}} < \bar{y}^{\text{MAid}}$) and asset test ($a_j < \bar{a}^{\text{MAid}}$).[15] The out-of-pocket health expenditure $o_j(m)$ depends on the health insurance status and is expressed as

$$o_j(m) = \begin{cases} m\left(j, \vartheta, \varepsilon^h\right) & \text{if in}_j = 0, \\ \gamma^{\text{in}} \times m\left(j, \vartheta, \varepsilon^h\right) & \text{if in}_j > 0, \end{cases} \tag{1}$$

where $0 \leq \gamma^{\text{in}} \leq 1$ are the coinsurance rates of the different insurance types. After retirement ($j > J_W + 1$) all agents are covered by public health insurance which is a combination of Medicare and Medicaid.

The fact that health state transition probabilities depend on the insurance state via indicator $1_{\text{in}_j > 0}$, partially endogenizes the health state and health spending process as individuals are able to influence their expected health spending by opting in or out of insurance or adjusting their work effort to qualify for Medicaid.[16] Differently from ours, models with fully endogenized health investment processes allow households to directly chose the demand for medical care and the associated buildup of health capital as first introduced in Grossman (1972).[17]

4.3 Insurance companies

We abstain from modeling insurance companies as profit maximizing firms and simply allow for a premium markup ω. Since insurance companies in the individual market screen customers by age and health,[18] we impose separate clearing conditions for each age-health type, so that premiums, $\text{prem}^{\text{IHI}}(j,h)$, adjust to balance

$$\text{prem}^{\text{IHI}}\left(j, \varepsilon^h\right) = \frac{\left(1+\omega^{\text{IHI}}\right)\mu_{j+1} \int \left[1_{\left[\text{in}_{j+1}(x)=1\right]} \left(1-\gamma^{\text{IHI}}\right) m_{j+1}(x) P\left(\varepsilon_{j+1}^h | \varepsilon_j^h\right)\right] d\Lambda\left(x_{j+1,-\varepsilon^h}\right)}{R \times \mu_j \int \left(1_{\left[\text{in}_{j,h}(x)=1\right]}\right) d\Lambda\left(x_{j,-\varepsilon^h}\right)} \tag{2}$$

where $x_{j,-\varepsilon^h}$ is the state vector for cohort age j not containing health state ε^h since we do not want to aggregate over the health state vector ε^h in this case. The clearing condition for the group health insurances

[15]Variable y_j^{AGI} is adjusted gross income which, in our model, is equivalent with taxable income y_j^{T}. For a definition of taxable income of workers and retirees respectively compare equations 11 and 16 in Section 4.6.

[16]We thank Mariacristina de Nardi and an anonymous referee for suggesting to condition the health transition probabilities on the insurance state as this can capture some of the adverse health effects of restricting Medicaid insurance while still maintaining an exogenous health state process.

[17]Compare also Scholz and Seshadri (2013a), Jung and Tran (2016), Yogo (2016), Cole, Kim and Krueger (2019), Eslami and Karimi (2019), and Fonseca et al. (2021) for more recent studies with fully endogenized health capital processes.

[18]Post ACA, only screening by age and smoking status is allowed in subsidized IHI markets.

is simpler as only one price, prem^{GHI}, adjusts to balance

$$
\begin{aligned}
& \left(1+\omega^{\text{GHI}}\right) \sum_{j=2}^{J_1} \mu_j \int \left[1_{\left[\text{in}_j(x)=2\right]} \left(1-\gamma^{\text{GHI}}\right) m_j\left(x\right)\right] d\Lambda\left(x\right) \qquad (3) \\
= \; & R \sum_{j=1}^{J_1-1} \mu_j \int \left(1_{\left[\text{in}_j(x)=2\right]} \text{prem}_j^{\text{GHI}}\right) d\Lambda\left(x\right),
\end{aligned}
$$

where $\omega_{j,h}^{\text{IHI}}$ and ω^{GHI} are markup factors that determine loading costs (fixed costs) and γ^{IHI} and γ^{GHI} are coinsurance rates. The respective left-hand-sides in the above expressions summarize aggregate payments made by insurance companies whereas the right-hand-sides aggregate the premium collections one period prior. Since premiums are invested for one period, they enter the capital stock and we therefore multiply the term with the after tax gross interest rate R.

4.4 Technology and factor prices

The production sector is modeled by a representative firm that uses physical capital K and effective labor services N to produce output. The representative firm solves the following maximization problem

$$
\max_{\{K,\,N\}} \left\{F\left(K,N\right) - q\times K - w\times N\right\}, \qquad (4)
$$

taking the rental rate of capital q and the wage rate w as given. Capital depreciates at rate δ in each period.

Similarly to Jeske and Kitao (2009) we assume that the firm offering GHI to its workers subsidizes a fraction ψ of the premium cost. The firm passes these costs on to its employees by lowering the efficiency wage. To ensure the zero profit condition the firm subtracts the cost c_E from the wage rate, which is just enough to cover the total premium cost of the firm. The effective wage rate received by the household with a GHI offer is therefore $\widehat{w} = \left(w - 1_{\left[\varepsilon^{\text{GHI}}=1\right]} \times c_E\right)$. The zero profit condition implies that the wage reduction equals

$$
c_E = \frac{\psi \times \sum_{j=1}^{J_W} \mu_j \int \left(1_{\left[\text{in}_{j+1}(x)\,=\,2\right]} \times \text{prem}_j^{\text{GHI}}\right) d\Lambda(x)}{\sum_{j=1}^{J_W} \mu_j \int \left(1_{\left[\varepsilon_j^{\text{GHI}}=1\right]} \times e\left(\vartheta, \varepsilon^n, \varepsilon^h\right) \times n_j(x)\right) d\Lambda(x)}.
$$

In this scenario high productivity workers effectively pay higher contributions towards financing the employer contribution to GHI as their wage deductions are larger in absolute terms. The remaining share of the GHI premium $\widehat{\text{prem}}^{\text{GHI}} = (1-\psi) \times \text{prem}^{\text{GHI}}$ is income tax deductible and paid by the worker directly.

4.5 Government and fiscal policy

4.5.1 Expenditures

The government runs five main spending programs: Social Security, Medicare, Medicaid, Social Transfers and general government consumption. Social Security benefits are available only to the retirees after the eligibility age $(j > J_W)$. The benefit payment is determined by the average earnings history of a permanent income type $\bar{y}^{\vartheta}$. Retiring households are also eligible for Medicare after age $j > J_W$ at which point they start paying a Medicare premium $\text{prem}^{\text{mcare}}$ every period. The surplus/deficit of Social Security and Medicare are given by

$$\text{surplus}^{\text{SS}} = \int T^{\text{SS}}\left(y_j^{\text{SS}}(x); \bar{y}^{\text{SS}}\right) d\Lambda(x) - \int_{j>J_W} b^{\text{SS}}\left(\bar{y}_{\vartheta}\right) d\Lambda(x), \tag{5}$$

and

$$\text{surplus}^{\text{MCare}} = \int \left[T^{\text{MCare}}\left(y_j^{\text{SS}}(x)\right) + 1_{[j>J_W]}\text{prem}^{\text{MCare}}\right] d\Lambda(x) - \int_{j>J_W} \left[\gamma^{\text{MCare}} \times m_j(x)\right] d\Lambda(x). \tag{6}$$

Medicaid is a public health insurance program for the poor. Working households are eligible for Medicaid payments if they pass the income and asset tests $y_j < \bar{y}^{\text{MAid}}$ and $a_j < \bar{a}^{\text{MAid}}$, respectively. Social Security, Medicare, and Medicaid are included into the overall government budget constraint.[19] Social Transfers b^{SI} is a social insurance program that targets low income earners to guarantee a minimum consumption level $\underline{c}$. Finally, general government consumption C_G is a residual (unproductive) government spending program.

4.5.2 Taxes

The government raises revenues by imposing various taxes on income, consumption and assets. This includes a progressive income tax $T^y(y_j^{\text{T}})$ on taxable income y_j^{T} which is the sum of labor income and capital interest income net of some deductibles as described in the next section. In addition the government collects payroll taxes $T^{\text{SS}}\left(y_j^{\text{SS}}; \bar{y}^{\text{SS}}\right)$ and $T^{\text{MCare}}\left(y_j^{\text{SS}}\right)$ for Social Security and Medicare respectively. The tax base for these payroll taxes y_j^{SS} is defined as labor income minus GHI premiums. GHI premiums can be deducted from the progressive income tax base as well as the payroll tax base. In addition, the payroll tax for Social Security is proportional but capped at the maximum taxable earnings of $\bar{y}^{\text{SS}}$. Finally, the government taxes consumption at a rate of τ^c and bequests at a rate of τ^{Beq}.

The progressive income tax schedule is modeled via a parametric function $\tilde{\tau}\left(y^{\text{T}}\right) = y^{\text{T}} - \lambda \times \left(y^{\text{T}}\right)^{(1-\tau)}$ used recently in Heathcote, Storesletten and Violante (2017), where $\tilde{\tau}\left(y^{\text{T}}\right)$ denotes tax revenue as a function of taxable income y^{T}, τ is the progressivity parameter (i.e., taxes are progressive if $0 < \tau < 1$), and λ is a scaling factor to match the US income tax revenue.[20] This tax function is flexible and can be used to model the transfer programs. Note that, Heathcote, Storesletten and Violante (2017) abstract from modeling government transfer programs explicitly, but allow negative income taxes to act as implicit government transfers. We instead model the US institutional details of government transfer program explicitly via Social Security, Medicare, Medicaid and Social Transfers. To avoid double counting we impose a non-negative

[19] It is often assumed that Social Security's budget is balanced every period (e.g., Huggett and Ventura 1999; İmrohoroğlu, İmrohoroğlu and Joines 2003; Zhao 2014 and many others) due to disagreement over whether Social Security trust fund assets are "real" and increase national saving.

[20] This tax function has a long tradition in public finance (Musgrave 1959; Kakwani 1977) and was implemented into a dynamic setting by Benabou (2002) and more recently used in Heathcote, Storesletten and Violante (2017).

income tax restriction

$$\tilde{\tau}\left(y^{\mathrm{T}}\right)=\max\left[0, y^{\mathrm{T}}-\lambda\times\left(y^{\mathrm{T}}\right)^{(1-\tau)}\right].$$

This non-negative restriction eliminates all government transfers embedded in the tax function.

4.5.3 Budget balancing

The government budget constraint is given by

$$C_G+\overbrace{\int\left[1_{[\mathrm{MAid}]}\gamma^{\mathrm{MAid}}\times m_j(x)\right]d\Lambda(x)}^{\text{Medicaid Payments}}+\overbrace{\int b^{\mathrm{SI}}(x)\,d\Lambda(x)}^{\text{Social Transfers}}=\int\left[\tau^c\times c(x)+T^y\left(y^{\mathrm{T}}(x)\right)\right]d\Lambda(x)+\tau^{\mathrm{Beq}}B^{\mathrm{Beq}}+\text{surplus}, \tag{7}$$

where surplus $=$ surplus$^{\mathrm{SS}}+$ surplus$^{\mathrm{MCare}}$ is the combined surplus/deficit of Medicare and Social Security. The government adjusts the progressive income tax to balance its budget.

4.6 The household problem

In the model we distinguish between workers and retirees.

Workers. The state vector of a worker at a particular age is defined as $x_j=\left\{\vartheta, a_j, \mathrm{in}_j, \varepsilon_j^n, \varepsilon^h, \varepsilon_j^{\mathrm{GHI}}\right\}\in\{1,2,3\}\times R^+\times\{0,1,2,3\}\times\{1,2,3,4,5\}\times\{1,2,3,4,5\}\times\{0,1\}$, where ϑ denotes the permanent income group of no-high-school, high-school and college types, a_j denotes the beginning-of-period assets, in_j denotes the health insurance state, ε_j^n denotes the labor shock, and ε^h denotes the exogenous health state, and $\varepsilon_j^{\mathrm{GHI}}$ is the employer (with group health insurance) matching shock. After the realization of the state variables, agents simultaneously chose from their choice set

$$\mathscr{C}_j\equiv\left\{(c_j,\ell_j,a_{j+1},\mathrm{in}_{j+1})\in R^+\times[0,1]\times R^+\times\{0,1,2,3\}\right\}$$

where c_j is consumption, ℓ_j is leisure, a_{j+1} are asset holdings for the next period, and in_{j+1} is the health insurance state for next period in order to maximize their lifetime expected utility. All choice variables in the optimization problem are functions of the state vector but we suppress this notation in order to not clutter the exposition. The household problem of the working household can be recursively written as

$$V(x_j)=\max_{\left\{c_j,\ell_j,a_{j+1},\mathrm{in}_{j+1}\right\}}\left\{u(c_j,\ell_j)+\beta\times\pi_j\left(\varepsilon^h\right)\times\mathbb{E}\left[V(x_{j+1})\,|\,x_j\right]\right\}\text{ s.t.} \tag{8}$$

$$\begin{gathered}(1+\tau^c)c_j+a_{j+1}+o_j(m_j)+1_{\left\{\mathrm{in}_{j+1}=1\right\}}\mathrm{prem}^{\mathrm{IHI}}\left(j,\varepsilon^h\right)+1_{\left\{\mathrm{in}_{j+1}=2\right\}}\widehat{\mathrm{prem}}_j^{\mathrm{GHI}}\\=(1+r)a_j+y_j^n+b_j^{\mathrm{SI}}+\left(1-\tau^{\mathrm{Beq}}\right)b^{\mathrm{Beq}}-\mathrm{Tax},\\c\geq\underline{c},\ a_j\geq0,\end{gathered} \tag{9}$$

where β is a time preference factor, $\pi_j\left(\varepsilon^h\right)$ is the age and health state dependent survival probability, r is the interest rate, $o(m_j)$ is out-of-pocket medical spending, prem^{in} is the insurance premium paid. The indicator functions are defined as $1_{[true]} = 1$ and $1_{[false]} = 0$. Accidental bequests b^{Beq} are redistributed to surviving households in a lump-sum fashion.[21] Labor income y_j^n, total taxable income y_j^{T}, and payroll tax eligible income y_j^{ss} are defined as

$$y_j^n = \overbrace{\widehat{w} \times e_j\left(\vartheta, \varepsilon_j^n, \varepsilon^h\right) \times}^{\text{Health-dependent income}} (1-\ell_j), \tag{10}$$

$$y_j^{\text{T}} = y_j^n + r \times a_j - 1_{\{\text{in}_{j+1}=2\}} \widehat{\text{prem}}_j^{\text{GHI}} - \max\left[0, o(m_j) - 0.075 \times \left(y_j^n + r \times a_j\right)\right], \tag{11}$$

$$y_j^{ss} = y_j^n - 1_{\{\text{in}_{j+1}=2\}} \text{prem}_j^{\text{GHI}}, \tag{12}$$

where w is the market wage rate and private GHI premiums are tax deductible as are out-of-pocket health expenses that exceed 7.5 percent of adjusted gross income.[22]

Consumption is taxed with rate τ^c, lump-sum bequests b^{Beq} are taxed at rate τ^{Beq} and the remaining taxes are defined as

$$\begin{aligned} \text{Tax} &= T^y\left(y_j^{\text{T}}\right) + T^{\text{SS}}\left(y_j^{\text{SS}}; \bar{y}^{\text{SS}}\right) + T^{\text{MCare}}\left(y_j^{\text{SS}}\right), \\ T^{ss}\left(y_j^{\text{SS}}; \bar{y}^{\text{SS}}\right) &= \tau^{\text{SS}} \times \min\left[y_j^{\text{SS}}; \bar{y}^{\text{SS}}\right], \\ T^{\text{MCare}}\left(y_j^{\text{SS}}\right) &= \tau^{\text{MCare}} \times y_j^{ss}, \end{aligned} \tag{13}$$

where T^y is a progressive income tax function of taxable household income y_j^{T}, τ^{SS} is the social security payroll tax levied on "social security wages"—essentially wages minus GHI premiums—and an upper contribution limit of $\bar{y}^{\text{SS}}$, and T^{MCare} is a Medicare payroll function with the same tax base but without an upper limit.[23] Social transfers are defined as

$$\begin{aligned} b_j^{\text{SI}} &= \max\left[0, \underline{c} + o(m_j) - y_j^{\text{AT}} - a_j - b^{\text{Beq}}\right], \\ y_j^{\text{AT}} &= y_j^n + r \times a_j - \text{Tax}, \end{aligned}$$

and ensure a minimum consumption floor $\underline{c}$ after medical expenses and taxes are paid for. A household consuming at the lower bound cannot save into the next period or purchase private insurance.

Average past labor earnings for each permanent income group ϑ follow

$$\bar{y}^{\vartheta} = \int_{j \le J_W} y_j^n(x(\vartheta))\, d\Lambda(x(\vartheta))$$

where $x(\vartheta)$ is the mass of households belonging to permanent income group ϑ.

[21] This parsimonious modeling choice of bequest redistribution is standard in this literature (e.g., Jeske and Kitao 2009; İmrohoroğlu and Kitao 2009; Pashchenko and Porapakkarm 2013).

[22] Compare Schedule A (Form 1040), Itemized Deductions at: https://www.irs.gov/forms-pubs/about-schedule-a-form-1040

[23] Employers contribute 50 percent of Medicare and Social Security taxes. For simplicity, we assume that employees pay 100 percent of all payroll taxes.

Retirees. Households can stop working at any time. Households retire at age $j > J_W$ at which point they receive Social Security benefits and qualify for Medicare.[24] The state vector of a retiree at a particular age is defined as $x_j = \left\{\vartheta, a_j, \varepsilon^h\right\} \in \{1,2,3\} \times R^+ \times \{1,2,3,4,5\}$. The household optimization problem reduces to

$$V\left(x_j\right) = \max_{\left\{c_j, a_{j+1}\right\}} \left\{u\left(c_j\right) + \beta \times \pi_j\left(\varepsilon^h\right) \times \mathbb{E}\left[V\left(x_{j+1}\right) | x_j\right]\right\} \tag{14}$$

$$s.t.$$

$$\left(1+\tau^c\right) c_j + a_{j+1} + o_j\left(m_j\right) + \text{prem}^{\text{MCare}} = (1+r)\, a_j + b_j^{\text{SS}} + b_j^{\text{SI}} + \left(1-\tau^{\text{Beq}}\right) b^{\text{Beq}} - T^y\left(y_j^{\text{T}}\right), \tag{15}$$

$$c_j \geq \underline{c},\, a_j \geq 0,$$

where taxable income y_j^{T} is defined as

$$y_j^{\text{T}} = r \times a_j + b_j^{\text{SS}} - \max\left[0, \left(o_j\left(m_j\right) + 1_{[j>J_W]}\text{prem}^{\text{MCare}}\right) - 0.075 \times \left(r \times a_j + b_j^{\text{SS}}\right)\right]. \tag{16}$$

For retirees out-of-pocket expenses plus Medicare premiums that exceed 7.5 percent of gross income are tax deductible.[25] Social insurance transfers are defined as

$$b_j^{\text{SI}} = \max\left[0,\ \underline{c} + o_j\left(m_j\right) + \text{prem}^{\text{MCare}} + T^y\left(y_j^{\text{T}}\right) - (1+r)\, a_j - b_j^{\text{SS}} - b^{\text{Beq}}\right].$$

Since we force every retired individual into the combined Medicare/Medicaid program, the social insurance transfers include the Medicare premium.

Aggregation. We denote $x \equiv \left\{j, x_j\right\}$ as the augmented state vector including age j and $\Lambda(x)$ is the measure of households with state x which incorporates the relative cohort sizes μ_j.

4.7 Competitive equilibrium

The competitive equilibrium of the model with exogenous health spending risk is defined as follows. Given the transition probability matrices $\left\{\Pi_j^n, \Pi_j^h, \Pi_{j,\vartheta}^{\text{GHI}}\right\}_{j=1}^{J}$ for $\vartheta \in \{1,2,3\}$, the survival probabilities $\left\{\pi_j\left(\varepsilon^h\right)\right\}_{j=1}^{J}$ and the exogenous government policies exogenous government policies $\left\{T_j^y, b_j^{\text{SI}}, b_j^{\text{SS}}\right\}_{j=1}^{J}$ and $\left\{\tau^c, \tau^{\text{SS}}, \tau^{\text{MCare}}, \text{prem}^{\text{MCare}}, \gamma^{\text{MCare}}, \gamma^{\text{MAid}}, C_G\right\}$, a competitive equilibrium is a collection of sequences of distributions $\Lambda(x)$ of individual household decisions $\{c(x), \ell(x), a(x), \text{in}(x)\}$, aggregate stocks of physical capital and effective labor services $\{K, N\}$, factor prices $\{w, q, R\}$, and insurance premiums $\left\{\text{prem}^{\text{IHI}}\left(j, \varepsilon^h\right), \text{prem}^{\text{GHI}}\right\}$ such that:

(a) $\{c(x), \ell(x), a(x), in(x)\}$ solves the consumer problem (8,9),

[24] We do not model late retirement i.e., retirement past the age of 65.

[25] Details about the tax deductibility of out-of-pocket expenses and Medicare premiums can be found in IRS (2010).

(b) the firm first order conditions hold

$$
\begin{aligned}
w &= \frac{\partial F(K,N)}{\partial N}, \\
q &= \frac{\partial F(K,N)}{\partial K}, \\
R &= 1+q-\delta = 1+r,
\end{aligned}
$$

(c) markets clear

$$K = \int a(x) + \mathrm{Prem}^{\mathrm{GHI}}(x) + \mathrm{Prem}^{\mathrm{IHI}}(x)\, d\Lambda(x) \tag{17}$$

$$N = \int e(x)\,(1-\ell(x))\, d\Lambda(x). \tag{18}$$

$$B^{\mathrm{Beq}} = \sum_{j=1}^{J} \tilde{\mu}_j \int a_j(x_j)\, d\Lambda(x_j),$$

(d) the aggregate resource constraint holds

$$C_G + \int (c(x) + m(x) + a(x))\, d\Lambda(x) = Y + (1-\delta)K,$$

(e) the government programs clear so that (5), (6), and (7) hold,

(f) the budget conditions of the insurance companies (2) and (3) hold and

(g) the distribution is stationary

$$(\mu_{j+1}, \Lambda(x_{j+1})) = T_{\mu,\Lambda}(\mu_j, \Lambda(x_j)),$$

where $T_{\mu,\Lambda}$ is a one period transition operator on the measure distribution

$$\Lambda(x') = T_{\Lambda}(\Lambda(x)).$$

5 Calibration

We calibrate the model to match pre-ACA data of the U.S. economy from 1999–2009. Alternatively we could have calibrated a model including the main features of the ACA to data from 2014–2018 when most ACA regulations have gone into effect. However, our model is solved for a steady state which ideally requires that a fully implemented ACA reform be in place for some time so that demand and supply side adjustments are fully realized in the data. Since the ACA was only gradually introduced and still amended in the 2014–2018 time frame (i.e., the individual mandate was repealed in late 2017 after a court decision), the ACA has not been in place long enough to argue for a "steady state" in terms of the reform's effects. We therefore calibrate the model (without any ACA features) to pre-ACA data in order to pin down the "deep" parameters of the model. This serves as our first benchmark.

Macroeconomic data moments include capital accumulation, patterns of labor supply and health insurance take-up rates over the life cycle. For the calibration we distinguish between two sets of parameters: (i) *externally selected* parameters and (ii) *internally calibrated* parameters. *Externally selected* parameters are estimated independently from our model and are either based on our own estimates using data from the Medical Expenditure Panel Survey (MEPS) or estimates provided by other studies. The model unit is an individual that we calibrate using information from the male and female heads of Health Insurance Eligibility Units (HIEU) which is a subset of a household in MEPS and comprises 44 percent women.[26]

We summarize these external parameters in Tables 1–3 and Figure 1. *Internally calibrated* parameters are assigned values so that model-generated data match a given set of targets from U.S. data. These parameters and the model moments that they most directly impact together with the targeted data moments are presented in Table 2. Figure 2 summarizes the targeted labor force participation rates by health and income type.

5.1 Demographics, endowments and preferences

Demographics. We model households from age 21 to age 95. One model period is defined as a year, which results in $J = 75$ model periods. A typical individual works for 45 periods and retires for 30 periods. Once the individual enters period $J_{r+1} = 45$, i.e. age 65, she is forced to retire. We set the population annual growth rate to $\mathfrak{n} = 0.01$, and we take the age and health specific survival probabilities $\pi\left(h\left(\varepsilon^h\right)\right)$ from İmrohoroğlu and Kitao (2012) shown panel [8] of Figure 1. For the purpose of survival probabilities we distinguish between healthy and sick individuals. The nature of exogenous health states ε^h is described in Section 4.2.

Endowments. We model the labor income process by assuming that labor productivity at age j is driven by an age, income group, and stochastic health state dependent component $\bar{e}_j\left(\vartheta, h\left(\varepsilon^h\right)\right)$ and a residual stochastic labor shock component ε_j^n

$$e_j\left(\vartheta, \varepsilon^n, \varepsilon^h\right) = \bar{e}_j\left(\vartheta, h\left(\varepsilon^h\right)\right) \times \varepsilon_j^n. \tag{19}$$

The permanent income group is defined as the education level ϑ in the first model period.

Using 1999–2009 MEPS data we construct cohort adjusted and bias corrected wage profiles for each education-health subgroup $\left(\vartheta, h\left(\varepsilon^h\right)\right)$ limiting the sample to heads of health insurance eligibility units (HIEU) with labor incomes larger than \$400.[27] We distinguish between three permanent educational groups

$$\vartheta = \begin{cases} 1 & \text{if less than high school,} \\ 2 & \text{if high school,} \\ 3 & \text{if college graduate or higher,} \end{cases}$$

[26] Appendix A provides more details about MEPS survey data used in this study.

[27] Labor income follows the definition in PSID and comprises wage income (variable WAGEP) and 75 percent of business income (variable BUSNP).

and two health states

$$h\left(\varepsilon^h\right)=\begin{cases}\text{healthy} & \text{if } \varepsilon^h\in\{\text{excellent, very good, good}\},\\ \text{sick} & \text{if } \varepsilon^h\in\{\text{fair, poor}\}.\end{cases} \tag{20}$$

These are standard definitions for healthy and sick in the health macro literature. Panel 3 in Figure 4 depicts the fraction of healthy individuals.

We then deflate hourly wage observations with the urban CPI and remove cohort effects. Following the procedure in Rupert and Zanella (2015) and Casanova (2013) we subsequently estimate a selection model to remove the selection bias that is typically associated with wage observations to get an average wage offer rate for each $\left(\vartheta, h\left(\varepsilon^h\right)\right)$ subgroup. We finally smooth the wage profiles with a second degree polynomial in age.[28]

The stochastic component is modeled as an auto-regressive process so that

$$\ln\left(\varepsilon_j^n\right)=\rho\times\ln\left(\varepsilon_{j-1}^n\right)+\varepsilon, \tag{21}$$

with persistence parameter ρ and a white-noise disturbance $\varepsilon\sim N\left(0,\sigma_\varepsilon^2\right)$. To calibrate the stochastic component ε^n, we use $\rho=0.977$ and $\sigma_\varepsilon^2=0.0141$ based on estimates in French (2005) who uses PSID data and controls for cohort effects and health states. We approximate the joint distribution of the persistent and transitory shocks using a five-state first-order discrete Markov process following Tauchen and Hussey (1991).

Preferences. We specify period utility as

$$u\left(c_j,\ell_j;\omega_{j,\vartheta};\bar{n}_j\left(\vartheta,\varepsilon^h\right)\right)=\frac{\left(\left(\frac{c_j}{\omega_{j,\vartheta}}\right)^{\eta}\times\left[\ell_j-1_{[0<n_j]}\times\bar{n}_j\left(\vartheta,h\left(\varepsilon^h\right)\right)\right]^{1-\eta}\right)^{1-\sigma}}{1-\sigma}.$$

The equivalence weight is calculated using data from the HRS as $\omega_{j,\vartheta}=(\text{adults}_j+0.7\times\text{children}_j)^{0.7}$ following Scholz, Seshadri and Khitatrakun (2006), where adults_j and children_j are the number of adults and children (respectively) in the household associated with a household head of age j. We set the relative risk aversion parameter σ to 3, and the intertemporal discount factor β to 0.99 to match the capital-output ratio target in equilibrium.[29] Labor is chosen from a grid $n\in\{0,n_{\min},\ldots,n_{\max}\}$ where the minimum amount of non-zero labor possible is $n_{\min}=300$ hours per year. The fixed cost of working $\bar{n}_j\left(\vartheta,h\left(\varepsilon^h\right)\right)$ is set to match the average labor participation rate per education status, and per health status from MEPS. Figure 3 shows the labor participation rates by health and permanent income type together with the chosen fixed cost of working values.

The consumption intensity parameter η is 0.272 to match average labor hours of the working population as seen in Panel 2 of Figure 2. The resulting Frisch labor elasticity is state dependent and the average Frisch

[28] Online Appendix A contains more details about the procedures to remove cohort effects and wage biases.

[29] The intertemporal elasticity of substitution (IES) is $\frac{1}{\sigma}$. This is the IES that allows for adjustments in both, consumption and labor/leisure to accommodate a change in the interest rate. It is calculated assuming a steady state and stable wages and follows the discussion in Swanson (2012).

elasticity of age j individuals can be calculated based on individuals that are working as[30]

$$\varepsilon_{\text{Frisch},j} := \frac{\int 1_{\left[0\leq n_j\left(x_j\right)\right]} \times \frac{(1-\eta(1-\sigma))}{\sigma} \times \frac{\left(1-n_j\left(x_j\right)-\bar{n}_j\left(x_j\right)\cdot 1_{\left[0\leq n_j\left(x_j\right)\right]}\right)}{n_j\left(x_j\right)} d\Lambda\left(x_j\right)}{\int 1_{\left[0\leq n_j\left(x_j\right)\right]} d\Lambda\left(x_j\right)}, \tag{22}$$

where $1_{\left[0\leq n_j\left(x_j\right)\right]}$ is an indicator function equal to one if an individual is working. Our calibration results in average Frisch elasticities between 1.19 for younger workers up to 1.51 for older workers.[31]

The warm-glow bequest function is

$$u^{\text{beq}}(a) = \theta_1 \frac{(a+\theta_2)^{(1-\sigma)\eta}}{1-\sigma}.$$

This functional form is similar to the one in French (2005).[32] Parameter θ_1 is a scaling parameter that determines the strength of the bequest motive. It is set to match the asset holdings of retired individuals at age 70 as seen in Panel 3 of Figure 2. Parameter θ_2 is the threshold of wealth at which a household finds it valuable to leave a bequest. Similar to French (2005) we set the bequest parameter θ_2 to $500,000$.

5.2 Health status, health expenditure and insurance

Health status. We use data from MEPS 1999–2009 and group individuals into five health groups $\varepsilon^h \in \{1,2,3,4,5\}$ by self-reported health status: 1. excellent health, 2. very good health, 3. good health, 4. fair health, and 5. poor health. We then estimate an ordered logit model with next year's health state as dependent variable. We regress this on current health state, a 4th order age polynomial, and indicator variables for relationship status, gender, race, schooling type, region, birth cohort, and a variable controlling for household income. We then use these estimates and predict the probability to move between health states by current health, age, and education (all other control variables are evaluated at their average). This results in conditional transition probabilities $\Pr\left(\varepsilon^h_{t+1}|\varepsilon^h_t, j, \vartheta\right)$ following a Markov process where t is the current year and $t+1$ is the future year. We collect these annual transition probabilities into a transition probability matrix $\Pi^h(t,\vartheta)$.[33]

Health expenditure. We next calculate average medical spending of each health state type by age and education level (i.e., no high school, high school, or college and higher) to determine the magnitude of the health spending shocks $m\left(j,\vartheta,\varepsilon^h\right)$ for a model period. Since MEPS only accounts for about 65–70 percent of health care spending in the national accounts (see Sing, Banthing, Selden, Cowan and Keehan 2006; Bernard, Cowan, Selden, Cai, Catling and Heffler 2012) we scale up the medical spending profiles for

[30] The Frisch labor supply elasticity is defined as $\varepsilon_{\text{Frisch}} := u_n \times \left[n \times \left(u_{nn} - \frac{(u_{cn})^2}{u_{cc}}\right)\right]^{-1}$.

[31] These values are well within the Macro estimates based on Fiorito and Zanella (2012) and Peterman (2016) or the recent summary of the empirical literature on labor supply elasticities in Whalen and Reichling (2017).

[32] This warm-glow type bequest motive was first introduced by Andreoni (1989) and used in a general equilibrium model in De Nardi (2004). A more sophisticated form of altruism would require an additional state variable and increase the computational complexity.

[33] The annual transition probabilities between all health states are summarized in Figure A.6.

individuals older than 65 similar to Pashchenko and Porapakkarm (2013). The resulting spending profiles are shown in panels [1]–[4] of Figure 1.[34]

Group health insurance (GHI) offer. We next estimate a Markov process that governs the group insurance offer probability. MEPS contains information about whether individuals have received a GHI offer from their employer i.e. offer shock $\varepsilon^{\text{GHI}} = \{0,1\}$ where 0 indicates no offer and 1 indicates a group insurance offer. Since the probability of a GHI offer $\Pr\left(\varepsilon_{t+1}^{\text{GHI}}|\varepsilon_t^{\text{GHI}}, j, \vartheta\right)$ is highly correlated with income, we construct the group offer transition matrix $\Pi_{j,\vartheta}^{\text{GHI}}$ by education type ϑ based on estimates of a logit model.[35]

Coinsurance rates. We define the coinsurance rate as the fraction of out-of-pocket health expenditures over total health expenditures. The coinsurance rates used in our model therefore include copays and other direct out-of-pocket payments. We use MEPS data from 1999–2009 and calculate the average coinsurance rate of heads of HIEUs (population weighted) by age for all four insurance types represented in the model. Consequently we set the coinsurance rates for the different types of insurance plans to $\gamma^{\text{IHI}} = 0.46$, $\gamma^{\text{GHI}} = 0.31$, $\gamma^{\text{MAid}} = 0.10$, and $\gamma^{\text{MCare}} = 0.30$ respectively.

5.3 Insurance companies

Age and health dependent markups $\omega_{j,\varepsilon^h}^{\text{IHI}}$ in expression (2) are set to zero. The GHI markup ω^{GHI} in expression (3) is set to 6 percent which is below the estimate of loading costs of 11 percent by Kahn, Kronick, Kreger and Gans (2005). IHI premiums $\text{prem}_{j,\varepsilon^h}^{\text{IHI}}$ and GHI premium prem^{GHI} clear the zero-profit conditions (2) and (3) respectively.[36]

5.4 Technology and factor prices

We assume that output is produced using a Cobb-Douglas production function with capital K and labor N inputs so that

$$Y = A \times K^{\alpha} \times N^{(1-\alpha)}, \tag{23}$$

where α is the share of capital in total income. We set the capital share $\alpha = 0.35$ and the annual capital depreciation rate at $\delta = 0.064$ according to new estimates in Koh, Santaeulàlia-Llopis and Zheng (2020). Total factor productivity A is normalized to unity. The fraction $\psi = 0.8$ as in Jeske and Kitao (2009).

[34] Note that our modeling choice of the health spending process has an important limitation as the Markov assumption cannot fully capture the complex health transition dynamics in the real world as recently discussed in Bianco and Moro (2022), Hosseini, Kopecky and Zhao (2022) and De Nardi, Pashchenko and Porapakkarm (2024).

[35] Figure A.8 in Appendix A.7 shows the estimated conditional transition probabilities.

[36] When clearing the GHI market we adjust a base premium prem^{GHI} that is then multiplied by an exogenously imposed age dependent vector that scales up the group premium by age, similar to the age scales pointed out in Fernandez, Rosso and Forsberg (2018) and detailed in `https://www.cms.gov/CCIIO/Programs-and-Initiatives/Health-Insurance-Market-Reforms/state-rating`.

5.5 Government and fiscal policy

5.5.1 Expenditures

The government uses transfers to maintain a minimum level of consumption $\underline{c}$ of \$2,500, which is close to the estimated level from De Nardi, French and Jones (2010). Residual unproductive government consumption C_G of 15 percent of GDP.

In the model, social security transfers are defined as a function of average labor income per skill type $\bar{y}^{\vartheta}$. Let $T^{ss}(\vartheta) = \Psi \times \bar{y}^{\vartheta}$ be type specific pension payments where Ψ is the average replacement rate that determines the size of the pension payments. In the model total pension payments amount to 6 percent of GDP. This is close to the number reported in the budget tables of the Office of Management and Budget (OMB) for 2008 which is close to 5 percent.

Medicare and Medicaid for retirees. According to data from the National Health Expenditure Accounts (NHEA 2020*a*) Medicare spending in 2010 was 3.47 percent of GDP and Medicaid spending (Federal and State) was 2.65 percent of GDP. We use data from CMS (Keehan, Sisko, Truffer, Poisal, Cuckler, Madison, Lizonitz and Smith 2011) and calculate that the share of total Medicaid spending that is spent on individuals older than 65 is about 36 percent. Adding this amount to the total size of Medicare results in a combined total of 4.4 percent of GDP of public health insurance reimbursements for the old while the residual size of the Medicaid program that covers workers is about 1.7 percent of GDP.

Since MEPS only accounts for about 65–70 percent of health care spending in the national accounts (see Sing et al. 2006; Bernard et al. 2012), we would not be able to meet this target of health spending of the elderly. Based on communication with CMS (Office of the Actuary) we therefore scale up the MEPS based health spending shocks to match the adjusted medical spending over income ratios in panel [3] of Figure 4. Given the estimated coinsurance rate of γ^{MCare} from MEPS and the exogenous, scaled up, health expenditure shocks, the size of the combined Medicare/Medicaid program in the model is 5.5 percent of GDP. We fix the premium for Medicare at 2.11 percent of per-capita GDP as in Jeske and Kitao (2009). The Medicare tax τ^{Mcare} is set to 2.9 percent.[37]

Medicaid for workers. According to Kaiser (2013), 16 states have Medicaid eligibility thresholds below 50 percent of the FPL, 17 states have eligibility levels between 50 and 99 percent, and 18 states have eligibility levels that exceed 100 percent of the FPL.[38] In addition, state regulations vary greatly with respect to the asset test of Medicaid. According to MEPS data, 9.2 percent of working age individuals have some form of public health insurance. In the model we therefore calibrate the Medicaid income eligibility level to 70 percent of the FPL ($\bar{y}^{\text{MAid}} = 0.7 \times \text{FPL}$) in order to match the fraction of 20–39 year old individuals on Medicaid. The asset test level is calibrated to $\bar{a}^{\text{MAaid}} = 75,000\text{USD}$ in order to match the fraction of individuals aged 40–64 on Medicaid as shown in panel 6 of Figure 2. As a consequence 6.1 percent of the working age population in the model is enrolled in Medicaid.

[37] Medicare payroll taxes are 2×1.45 percent on all earnings split in employer and employee contributions (e.g., see SSA, 2007).
[38] Compare Remler and Glied (2001) and Aizer (2003) for additional discussions of Medicaid take-up rates.

5.5.2 Taxes

The consumption tax rate, τ_C, is set to 5 percent. The tax progressivity level τ is set to 0.053 based on Guner, Lopez-Daneri and Ventura (2016).[39] We calibrate the tax scaling parameter to match the relative size of the government budget so that $\lambda = 1.017$.

The Social Security system is partly financed via a payroll tax with a contribution limit. The Social Security payroll tax is $\tau^{SS} = 10.6$ percent. The Social Security payroll tax is collected on labor income up to a maximum of $106,800.[40]

The Medicare system is also self-financed via a payroll tax and Medicare premium payments. The Medicare payroll tax is $\tau^{MCare} = 2.9$ percent. It is not restricted by an upper limit (see SSA 2007). Overall, the model results in total income tax revenue of 25.0 percent of GDP, Social Security tax revenue of 8.1 percent of GDP and Medicare tax revenue of 1.9 percent of GDP.

5.6 Model Performance

Tables 3–4 and Figures 4–6 show how well the model performs on non-targeted moments. First, the model is simulated based on an initial (at age 20) distribution of assets, health, and education status. The exogenous shock processes together with the optimal household decisions then generate a model based population that we compare to US data (mostly MEPS 1999-2009). First, Table 3 shows that the cohort sizes of household types by health and education are reproduced closely.

Second the model reproduces the hump shaped pattern of average work hours of all individuals younger than 65 (see panel 1 of Figure 4). The model also tracks the fraction of medical spending as percent of income as well as the fraction of healthy individuals as shown in panels 2 and 3 of Figure 4. In addition, the model reproduces the labor hours of workers by health and education type (Figure 5), the distribution of labor hours of all individuals younger than 65 (Figure 6), as well as the lifecycle patterns of labor income by education group and health state (Figure 7).

Third, Table 4 shows that the model results in medical spending as fraction of GDP of 15.9 percent which is close to the 17.2 percent reported in CMS data for 2010 (NHEA, 2020*b*). The latter includes spending on individuals younger than 20 years which our model does not capture.

The model generates realistic Gini coefficients for medical spending (0.55 in model vs. 0.60 in MEPS data) and labor income (0.45 in model vs. 0.54 in MEPS data). The Frisch labor supply elasticities increase with age and range from 1.19–1.51 which is within the range of estimated macro elasticities from 1.1–1.7 (Fiorito and Zanella, 2012). The interest rate in the model is 6.6 percent which falls within the range of estimated capital returns in Gomme, Ravikumar and Rupert (2011). The size of Medicare (payments) as fraction of GDP is 5.4 percent and the size of Medicaid (payments) 0.7 percent with average payments of USD 7,000.

[39] Others have estimated τ between 0.137 and 0.18 but these estimates usually include transfer payments (e.g., Holter 2015; Bakıs, Kaymak and Poschke 2015; Heathcote, Storesletten and Violante 2017).

[40] Compare contribution bases for Social Security contributions at: `https://www.ssa.gov/oact/cola/cbb.html`

6 Quantitative results

We use the model to simulate different counterfactual versions of Medicaid work requirements following in spirit the reforms in Arkansas and Georgia that we described in Section 3. In order to implement this we impose work requirements on the "active" work population of 20–64 year olds. We start with a work requirement of one-day-a-week (8 hours) or 32 hours a month. Recognizing that introducing work requirements across the entire demographic spectrum can cause large welfare losses for vulnerable groups (e.g., the very sick, the disabled, pregnant women, etc.) the policy proposals usually include exceptions for the disabled and for pregnant women. While our model does not distinguish households by disability status, gender, or pregnancy status, the modeled health state variables do correlate strongly with disability status. In the following experiment we therefore target the reform and exclude individuals in bad health from the work requirements. We then re-solve the household optimization problem and re-aggregate to calculate a post-reform steady state that we then compare to the benchmark steady state.

6.1 Partial equilibrium (short-term results)

The results in this section are based on partial equilibrium analysis which highlights the households' short-run reaction to the reform. In partial equilibrium all prices including premiums do not change, the reaction of the production side of the economy is not factored in and the government does not adjust any tax rates to balance the government budget. Changes in tax revenue are therefore only due to changes in household behavior that determine the aggregate consumption and work levels, both of which form the tax bases for the consumption and income/payroll taxes, respectively. We report the partial equilibrium results of the reform in Table 5.

The first column in this table, denoted Bench., shows the benchmark outcomes we just discussed in Section 5.6. Level variables are normalized to 100 for easy comparison across different reform scenarios. Welfare results are normalized to zero, for the same reason.

The second column in Table 5, denoted **8Hrs**, shows partial equilibrium outcomes based on the 8-hour work requirement for Medicaid eligibility imposed on individuals in good health (i.e., health states of excellent, very good, and good). The column shows that an 8 hour work requirement causes the labor participation rate to increase from 73.2 percent to 74.6 percent. The average weekly hours of all actively working individuals decreases from 37.1 to 36.9 hours. This is obviously a function of some individuals entering the labor market who only work the hours required to stay on Medicaid which reduces the overall average of hours worked. Figure 8 shows the adjustment in labor force participation lifecycle profiles by permanent income group and health type. Panel 1.B and 2.B show that most of the observed increases in labor force participation stem from healthy lower income individuals that are 30 or older.

In terms of health insurance, healthy low income individuals who currently do not work face the following choices: (*i*) remain out of the labor force and lose Medicaid, (*ii*) join the labor force and work the minimum hours required to maintain Medicaid status, or join the labor force and work and either (*iii*) stay without insurance or (*iv*) purchase private health insurance. The Medicaid enrollment of working age adults drops by about about 3.8 percentage points. More specifically Medicaid enrollment drops from 6.1 to 2.3

percent of working age individuals. About 0.2 percent of those purchase IHI, 1.4 percent purchase GHI, and 2.2 percent of working age individuals lose insurance altogether so that overall the fraction of workers with health insurance decreases from 73.7 to 71.5 percent. This can also be seen from Panels 1.C and 2.C in Figure 9.

Aggregate Medicaid payouts therefore decrease by almost 28 percent while the average payout per recipient increases from $7,000$ USD to $13,400$ USD. As healthier individuals either loose access to Medicaid or choose to buy other forms of insurance as they enter the workforce, only sicker types remain in the Medicaid pool. This increases the payout per recipient drastically as they not only have higher health expenditure risk but also higher health expenditure levels.

The fraction of individuals on IHI remains almost constant at around 6.5 percent of the working age population but the fraction of individuals with employer provided GHI increases by about 1.4 percentage points which is a direct reaction to the increase in the labor force participation rate. The first and second columns in Figure 9 highlight this shift as well. The bulk of the newly purchased GHI contracts stem from low income individuals as shown in Panel 1.B.

In addition, the fraction of workers that receive social insurance (SI) payments in order to maintain a minimum consumption floor increases from 1.7 to 2.4 percent which entails an overall increase of SI payments by almost 22 percent. Most of this increase stems from healthy low-income individuals whose population share among SI recipients increases from 47.6 percent to 53.8 percent. Since many of these recipients were the intended target group of the Medicaid work requirements, we can clearly see that the SI program provides partial compensation for the more restrictive Medicaid program. In terms of public finance shifts in the government budget, the SI program increases in size from 0.70 to 0.84 percent of total tax revenue while the decrease from 2.7 to 1.9 percent of the Medicaid program (just the part that targets the working age population) is much larger. This translates into a very limited "compensation" via the SI program.

Due to the increase in overall labor income, aggregate consumption increases by about 0.6 percent. In terms of welfare we observe an overall decrease in welfare (in terms of consumption equivalent variation or CEV) of -0.75 percent. Welfare losses are realized across all agent types but are larger for low income individuals. Individuals without high school degrees who report a sick health state lose about -2.86 percent whereas healthy individuals with college degrees only suffer negligible welfare losses.

Effects of different week hours thresholds. If the work requirement threshold reaches 16 hours per week, the labor force participation rate and the average weekly hours worked stabilize and further increases in weekly work hours requirements have no additional effect. This makes sense as once healthy workers work 16 hours or more their earnings start to exceed the Medicaid income eligibility threshold, so that none of them in the model qualifies for Medicaid anymore, either because their income is too high or because they do not work enough hours. In this environment only sick low income individuals who are exempt from the work requirements are still on Medicaid. Further increases of the work hours threshold do not affect the economy anymore.

At 16 hours the work participation rate increases from 73.2 to 74.5 and the weekly hours worked drop from 37.08 to 36.95. This suggests that most of the adjustments to the policy happen on the extensive (participation) labor margin and not on the intensive (labor hours) margin.

Overall the policy leads to welfare losses in partial equilibrium as sicker individuals are now forced back into the labor market. The welfare losses reach up to 3.15 percent of CEV among the low income workers whereas high income individuals are not affected by this policy.

6.2 General equilibrium (long-term results)

The results from Section 6.1, especially the welfare losses, were based on (short-run) partial equilibrium calculations. This means that price feedback effects are not accounted for nor are tax adjustments in reaction to the downsizing of Medicaid. In partial equilibrium only the effects through payouts to fewer people are accounted for. Shrinking Medicaid, however, would allow the government to reduce taxation without affecting other government programs which by itself can be welfare improving either directly via higher household net incomes but also via fewer tax distortions that can boost the capital accumulation process and together with the expansion of labor supply (although mostly on the "backs" of sicker individuals) lead to increases in output and therefore additional new income that is generated through the production process. Furthermore, as the production side of the economy reacts, prices will adjust to accommodate these changes in the long-run. Whether the overall welfare effects are losses or gains now becomes a quantitative question.

Table 6 shows the same Medicaid work requirement reforms from Section 6.1 but accounts for general equilibrium effects. Prices (i.e., the interest rate, wages, and insurance premiums) therefore fully adjust to clear firm first order conditions as well as the clearing conditions of the insurance companies in expressions (2) and (3). Furthermore, income taxes adjust to balance the government budget in expression (7).[41] The second column in Table 6 denoted **8Hrs** shows the results of an 8 hour work requirement to maintain Medicaid eligibility.

First, the labor participation rate increases very similarly from 73.2 to 74.5 as can be seen from the first two columns in Table 6. Weekly hours worked decrease from 37.1 to 36.9 hours (this is very similar to the partial equilibrium outcome). The fraction of individuals remaining on Medicaid decreases from 6.1 to 2.3 percent. Therefore overall Medicaid payouts "only" decrease by about 26.1 percent (as opposed to 27.7 percent in partial equilibrium as shown in column **8Hrs** of Table 5).

Figure 10a demonstrates the shift in labor participation for an 8 hours (and alternatively a 24 hours) weekly work requirement. It is clear from the graphs that the 8 hours requirement increases the work participation of low income/healthy workers starting at age 35 as shown in Panel 1.B. This is a direct effect of the work requirement for healthy low income workers. Comparing the average hours worked we see that while the policy increases the overall hours worked by 1.3 percent, it decreases the average hours workers of the actively working population from 37.1 to 36.9 hours. Some of the new entrants into the labor market are simply just working enough to pass the work requirement threshold in order to stay on Medicaid. This pulls down the average, especially for the healthy group without high school degrees in Panel 1.B of Figure 11a.

In terms of health insurance, worker enrollment in Medicaid drops by a similar magnitude as in partial equilibrium, however due to general equilibrium price effects, insurance premiums for IHI drop as some

[41] We scale the progressive income tax polynomial to clear equation 7 but leave the level of progressivity unchanged.

of the healthy individuals that previously qualified for Medicaid now purchase IHI. Since IHI discriminates by health state and age (this is the pre-ACA version of the model), these low risk individuals pay lower premiums so that the average IHI premium drops by about 2.5 percent. As a result IHI enrollment increases by 0.7 percent. Similarly, some of the healthy individuals that are thrown off Medicaid purchase GHI, so that GHI enrollment increases by about 1. 4 percent. As a result of this fewer individuals (than in partial equilibrium) end up being without health insurance and the overall number of insured working age individuals drops by only 1.7 percent as opposed to 2.2 percent in partial equilibrium. Figure 12a shows the changes in insurance status in general equilibrium.

The changes in labor supply and the downsizing of Medicaid lead to price and tax adjustments. First, the interest rates decrease slightly. This is a direct reaction to the increase in capital accumulation. The capital stock increases by 1.3 percent due to higher net income (tax revenue drops by 0.20 percent) but also due to expansions in labor supply. Through capital/labor complementarities, real wages increase by about 0.2 percent as workers become more productive (due to higher capital levels). The increase in income allows workers to increase their consumption by 1.1 percent.

The increase in income and consumption in combination with the decrease in leisure leads to small overall welfare losses of 0.05 percent of CEV. These losses are much smaller than the 0.75 percent loss in partial equilibrium. This is a direct result of the general equilibrium income effects. Higher wages and lower taxes enable the households to save more and generate more output and ultimately income. However, due to lower leisure and lost access to Medicaid low income households still experience welfare losses whereas middle and higher income households gain between 0.40–0.60 percent of CEV. It is interesting to see that in partial equilibrium middle income households experienced welfare losses, whereas in general equilibrium they experience welfare gains from the positive income effects of lower taxes and economic growth. The results are again fairly robust to increasing the work requirement to 16, 20 or 24 hours respectively.

6.3 The ACA and Medicaid work requirements

We next introduce important features of the Affordable Care Act (ACA) into our calibrated model. First, we include an overall expansion of the Medicaid income eligibility threshold to 138 percent of the FPL or $y_j^{\text{AGI}} < \bar{y}^{\text{MAid}} \times 1.38$ in the model context. Second, we remove the asset test from Medicaid. Third, we model health insurance subsidie**s** for individual health insurances according to Aizawa and Fu (2024) as:

$$\text{subsidy}_j = \begin{cases} \max\left(0, \text{prem}_j^{\text{IHI}} - 0.02\tilde{y}_j\right) & \text{if } 1.0 \text{ FPL}_{\text{Maid}} \leq \tilde{y}_j < 1.33 \text{ FPL}_{\text{Maid}}, \\ \max\left(0, \text{prem}_j^{\text{IHI}} - 0.025\tilde{y}_j\right) & \text{if } 1.33 \text{ FPL}_{\text{Maid}} \leq \tilde{y}_j < 1.5 \text{ FPL}_{\text{Maid}}, \\ \max\left(0, \text{prem}_j^{\text{IHI}} - 0.0515\tilde{y}_j\right) & \text{if } 1.5 \text{ FPL}_{\text{Maid}} \leq \tilde{y}_j < 2.0 \text{ FPL}_{\text{Maid}}, \\ \max\left(0, \text{prem}_j^{\text{IHI}} - 0.0715\tilde{y}_j\right) & \text{if } 2.0 \text{ FPL}_{\text{Maid}} \leq \tilde{y}_j < 2.5 \text{ FPL}_{\text{Maid}}, \\ \max\left(0, \text{prem}_j^{\text{IHI}} - 0.08775\tilde{y}_j\right) & \text{if } 2.5 \text{ FPL}_{\text{Maid}} \leq \tilde{y}_j < 3.0 \text{ FPL}_{\text{Maid}}, \\ \max\left(0, \text{prem}_j^{\text{IHI}} - 0.095\tilde{y}_j\right) & \text{if } 3.0 \text{ FPL}_{\text{Maid}} \leq \tilde{y}_j < 4.0 \text{ FPL}_{\text{Maid}}, \\ 0 & \text{otherwise}, \end{cases} \tag{24}$$

where $\tilde{y}$ is modified adjusted gross income (MAGI) defined as adjusted gross income (AGI) plus untaxed foreign income, non-taxable Social Security benefits, and tax-exempt interest. In our model this is equivalent with taxable income y_j^{T} from equations 11 and 16 for workers and retirees respectively.[42]

Fourth, the ACA prohibits insurance companies from charging premiums based on health status. In the model premium payments for IHI contracts therefore do not depend on health and age anymore but are simply age group rated according to the standard age curve set by the federal government which allows for a 1:3 ratio of premiums of 20 to 64 year olds.[43]

Fifth, we use MEPS data from 2015–2017 and re-estimate coinsurance rates by insurance type. Coinsurance rates for IHI (via subsidized marketplaces) and GHI are directly affected by new ACA regulations that specify cost sharing reductions for lower income individuals, minimum coverage requirements, as well as out-of-pocket maximums (CMS, 2024; KFF, 2024). While Medicare coinsurance rates are not directly affected by the ACA, the ACA slowed the payments to healthcare providers which reduced the out-of-pocket payments of individual patients. Other provisions such as the closing of the Medicare Part D coverage gap (often referred to as the "donut hole") also contributed to lowering the payments of individual patients.[44] In the model, the coinsurance rates therefore change from $\gamma^{\mathrm{IHI}} = 0.46$, $\gamma^{\mathrm{GHI}} = 0.31$, $\gamma^{\mathrm{MAid}} = 0.10$, and $\gamma^{\mathrm{MCare}} = 0.30$ to the post-ACA coinsurance rates of $\gamma^{\mathrm{IHI}} = 0.35$, $\gamma^{\mathrm{GHI}} = 0.30$, $\gamma^{\mathrm{MAid}} = 0.08$, and $\gamma^{\mathrm{MCare}} = 0.20$.

Sixth, we use MEPS data from 2015–2017 and re-estimate the GHI offer probabilities $\Pr\left(\varepsilon_{t+1}^{\mathrm{GHI}} | \varepsilon_t^{\mathrm{GHI}}, j, \vartheta\right)$ by current GHI status, age, and education type as the ACA has implemented employer mandates that increase the probability of GHI offers. The enforcement of the employer mandates has been delayed twice and partially went into effect in 2015 and then fully in 2016. Using MEPS data from 2015–2017 will therefore capture the change in GHI offer rates.[45]

Finally, we do not model penalties for not having insurance (individual penalties) as the ACA's insurance mandate penalty was repealed in late 2017 and since we abstain from modeling firm heterogeneity we cannot model the employer penalties (for large employers) for not providing health insurance.[46]

The column labeled **ACA-B.** in Table 5 presents the normalized output of the model with the ACA implemented. Before we discuss the results of work requirements in the context of the ACA we want to stress that we are not interested in the overall effects of the ACA in itself but rather in how work requirements for Medicaid impact households differently in a pre vs. post ACA setting.[47] This is an important question because with the introduction of the ACA the government has not only changed the market share of the different types of health insurances but also introduced a new incentive structure using new eligibility criteria as well as subsidies for specific insurance types.

[42] See https://www.healthcare.gov/glossary/modified-adjusted-gross-income-magi/ for details.

[43] Compare CMS (2016) for the per year of age markup. We present effective IHI premiums across different age groups before and after the implementation of the ACA in Online Appendix C.

[44] Blumenthal and Abrams (2020) and Blumenthal, Collins and Fowler (2020) provide a comprehensive discussion of the effects of the ACA 10 years after its implementation.

[45] Online Appendix A.7 shows the overall increase in the GHI offer probability profiles.

[46] Compare Fiedler (2020) and https://www.irs.gov/affordable-care-act/employers for details about the individual and employer mandates, respectively.

[47] Compare Pashchenko and Porapakkarm (2013) and Jung and Tran (2016) for a comprehensive analysis of the ACA using models with exogenous and endogenous health, respectively.

Partial equilibrium. The first observed difference in partial equilibrium outcomes after implementing work requirements in a post-ACA world stems from changes in health insurance take-up rates. Pressuring healthy low income individuals out of Medicaid by having them join the labor market leads to a much larger increase in IHI health insurance take-up—from 10 to 12.2 percent—than in the environment without the ACA where the increase was from 6.5 to 6.7 percent. GHI take-up increases as well but it is a relatively small increase from 59.4 to 59.8 percent.

For many low income individuals who do not qualify for Medicaid anymore (either because they do not work the required hours or their income now income exceeds the eligibility criterion as they work more) subsidized IHI presents itself as a better alternative over GHI. We therefore observe a 2 percent IHI take-up compared to the small 0.4 percent increase in GHI take-up while Medicaid enrollment drops from 6.2 to 2.7 percent of the working age population. Payouts for IHI subsidies increase by about 23.4 percent and welfare losses of -0.32 percent of CEV are realized. These welfare losses are less than half than in the pre-ACA environment where low income individuals were not provided with subsidized IHI and hence enrollment in IHI stagnated at around 6.7 percent. All in all, work requirements for Medicaid are mitigated by the stronger safety net provided by the ACA.

General equilibrium. The general equilibrium outcome, shown in column **ACA-8** in Table 6, includes the fiscal consequences of the reduction of the Medicaid program (which reduces the income tax rate) as well as the expansion of the IHI markets and the subsequent increase in the IHI subsidies (which increases the income tax rate). Overall, we observe a larger IHI enrollment expansion in general equilibrium compared to partial equilibrium (compare columns **ACA-8** in Tables 5 and 6, respectively).

In general equilibrium, subsidized IHI premiums adjust to accommodate new entrants and comply with the non-discrimination rule which prohibits premiums based on health and age. Since the work requirements target healthy individuals that are now more likely to work and join into the IHI and GHI pools, we observe a drop in IHI and GHI insurance premiums. The drop in IHI premiums is almost a 10 percent decrease from the benchmark price. This subsequently generates a feedback loop where, due to the falling premiums, even more individuals are attracted to subsidized IHI markets. The same is true in GHI markets but the magnitude is smaller. The mostly younger individuals that "leave" Medicaid, predominantly join the IHI markets. This is also a function of the age dependent premiums in IHI markets (the ACA limits the discrimination-by-age ratio to 1:3), that make IHI especially attractive for the healthy younger workers.

Furthermore we observe that income tax revenue decreases by only 0.2 while in the pre-ACA scenario tax revenue dropped by about 1.3 percent (compare column **ACA-8** to column **8Hrs** in Table 6). The reason why the drop is much smaller in the ACA scenario than in the pre-ACA scenario is that while the decrease in Medicaid payouts lower the public finance needs of the government and allow for lower taxes, the additional financing needs from increases in IHI subsidy payments act as counter force.

This leads to lower available net funds for consumption and savings so that the overall buildup of capital stock is weaker. Consequently, the 8-hour work requirement leads to an increase of capital stock of 0.4 percent which is smaller than the 1.3 percent increase that was realized in the pre-ACA environment. Subsequently the income effects are smaller (GDP increases by 0.3 percent) as are the overall effects on consumption which increases by 0.4 percent in the ACA model compared to 1.1 percent in the pre-ACA model.

In terms of welfare we observe slightly larger welfare losses (-0.18 percent of CEV) than in the pre-ACA model (-0.05 percent of CEV). The reason is relatively straightforward. Under the ACA Medicaid was expanded and covers a larger share of the working age population in the model. Introducing restrictions to Medicaid now affects a larger group of people than before the expansion of Medicaid under the ACA.

This is especially true for the middle income group as many of those (especially at the lower end of the income distribution) qualify for Medicaid under the ACA but did not do so before. Hence, the work requirement did not affect them in the model with pre-ACA policies. Middle income households therefore are not clear winners of the reform anymore. In the pre-ACA scenario, their welfare gains registered around 0.4 percent of CEV, while in the ACA environment the welfare gains barely register at $0.04 - 0.09$ percent.

Another interesting welfare result concerns the low income group. Their losses from the Medicaid restriction prior to the ACA ranged between $1.9 - 2.16$ percent of CEV, but with the ACA in place, the minimum work requirement for Medicaid lowers their losses to $1.3 - 1.5$ percent of CEV. This appears to be a direct result of the subsidized IHI alternative available under the ACA. Low income individuals that are "thrown off" Medicaid, can buy a subsidized alternative in the IHI markets under the ACA. This option was not available in the pre-ACA model and caused the larger welfare losses.

Finally, even with the ACA in place, imposing work requirements beyond 20 hours do not change the outcomes in a significant way.

6.4 Medicaid work requirements without exceptions for the sick

In this section we discuss a more extreme version of the Medicaid work requirements where we remove the exceptions for sick individuals and impose a work requirement across all health groups. We focus our discussion on general equilibrium outcomes in the pre-ACA and post-ACA scenarios shown in Table 7.[48]

6.4.1 Pre-ACA scenario

Table 7 shows identical reforms of Medicaid work requirements with the same weekly work hours thresholds as in Section 6.2. We again start the discussion with the 8 hour work requirement in the second column of the table denoted **8Hrs**.

First, the labor participation rate increases and average hours worked decrease at larger magnitudes than in the more targeted version of the reform. The increase in the labor participation rate is about one percent larger than in the targeted reform. This implies that some of the sick individuals do decide to join the work force, if staying eligible for Medicaid requires it.

Figure 11a demonstrates the shift in labor participation for an 8 hours (and alternatively a 24 hours) weekly work requirement. The graphs show that the 8 hours requirement increases the work participation of low income/sick workers more (red dotted line) than the 24 hours requirements. This is especially apparent in Panel 1.A which shows the labor participation rate of sick individuals without a high school degree. Some of them are willing to work for 8 hours to keep Medicaid but are not willing to work 24 hours to remain on

[48]The discussion of partial equilibrium outcomes is available in Online Appendix C.

Medicaid. For the other income groups working for 8 vs. 24 hours to keep Medicaid is less relevant due to their higher labor productivity. This gap in labor participation between the 8 vs. 24 hours requirement does not exist in the earlier reform which targeted the healthy population. Panel 1.A. in Figure 10a shows that there is not a large difference in the labor participation by whether 8 or 24 hours are imposed, in fact, it does not show much of a change a t all since sick individuals are protected from the work requirement.

Comparing the average hours worked we see that while the policy increases the overall hours worked by 2.3 percent (see entry for Agg. work hours in column **8Hrs** in Table 7), it decreases the average work hours of the actively working population. Some of the new entrants into the labor market are simply just working enough to pass the work requirement test in order to stay on Medicaid. This pulls the average down as can be seen from Figure 11b. This effect is the strongest for sick individuals without a high school degree in Panel 1.A. In fact, the lower tail of the work hours distribution disappears (i.e., the 10–20 work hours range) and more individuals choose to work 30–40 hours a week.[49]

As before the number of insured individuals decreases, this time slightly more from 73.7 percent to 70.5 percent. By not targeting the reform to healthy individuals an addition 1.5 percent of working age individuals lose health insurance coverage.

Again, the decrease stems mainly from individuals being thrown off Medicaid as they either do not pass the income or asset test or they do not work enough hours. The decrease is quite drastic, as Medicaid coverage of working age individuals drops from 6.1 percent to 0.4 percent with an 8 hours work requirement. We can also see this from the third column in Figure 12b. If we increase the work requirement from 8 to 24 hours, Medicaid enrollment collapses completely. The switch from 8 to 16 hours has only negligible effects on the enrollment numbers in IHI or GHI and further increases in work requirements to 20 or 24 hours have no effect on private health insurance enrollment anymore.

As the reform now targets low income individuals irrespective of their health state, sicker individuals join the ranks of the working and buy into private health insurance. This can lead to increases in insurance premiums of the newly joining workers are carry higher risk and higher expected health spending than the average individuals in the pool. We therefore observe much smaller increases in private HI enrollment from 6.5 to 7.7 percent in IHI and from 61 to 62.5 in GHI and even small increases in average premiums of 3.4 and 3.3. percent, respectively. This is an important difference to the earlier case where the reform that targeted only healthy individuals led to a decrease in average IHI premiums (compare changes in IHI premiums in Table 6).

The changes in labor supply and the downsizing of Medicaid lead to price and tax adjustments. First, the interest rate decreases as more capital is accumulated. Without targeting the reform to healthy individuals, the growth effects become larger. The capital stock increases by 2.8 percent due to higher net income (tax revenue drops by 0.65 percent), expansions in labor supply, and a stronger need for self-insurance of the newly uninsured. Through capital/labor complementarities, real wages increase by about half a percent as workers become more productive (due to higher capital levels). This wage increase is larger than when the reform only targets healthy individuals (compare the smaller wage increase in Table 6). The increase in income allows workers to increase their consumption spending by over 2 percent which is almost twice as

[49] The work hours distribution is available in Online Appendix C.

large as under the targeted reform.

The increase in income and consumption in combination with the decrease in leisure leads to overall welfare losses of 0.3 percent of CEV. These losses are much smaller than the 1.7 percent loss in partial equilibrium but larger than the negligible welfare losses of 0.05 percent when the reform only affects healthy individuals as discussed in Section 6.2.[50] The welfare losses are not restricted to individuals without high school degrees anymore but now also include middle income individuals. However, the magnitude of their welfare losses is much smaller and ranges from 0.3–0.6 percent of CEV compared to welfare losses of 2.8–3.6 percent of CEV for low income individuals. Restricting sick individuals to access public health insurance, drives these observed increases in welfare losses.

6.4.2 ACA and Medicaid work requirements without exceptions for the sick

Similar to Section 6.3 we re-run the reform without exception for the sick in an environment that includes provisions of the ACA. The column labeled **ACA-B.** in Table C.1 presents the normalized output of the model with the ACA implemented. We restrict our discussion to the general equilibrium results.[51]

As before, the more expansive reform that removes exceptions for the sick triggers much larger labor market responses. The decrease in Medicaid enrollment is again compensated for with an increase in subsidized IHI enrollments from 10 to 13.9 percent, compared to 10 to 12.6 percent in the case with exceptions for the sick. Since the reform now also pushes sick individuals out of Medicaid, we observe a large increase of 3.5 percent of GHI premiums compared to stable premiums in the case of the more targeted reform shown in Table 6. As before premiums in the IHI markets drop due to the lack of premium discrimination. However, since now not only healthy individuals enter the IHI pools, the average IHI premium drops by less than the 10 percent drop we observed in the scenario where sick individuals were not affected by the reform. If sick individuals are also forced to work in order to stay on Medicaid, the IHI premiums "only" drop by 7.3 percent. Overall welfare losses of about 0.4 percent of CEV are realized. These losses are larger-–about twice as large—than in the reform where sick individuals are not forced to work (Table 6) as the reform affects a larger share of the population. The welfare losses are now also affecting middle income individuals with high school degrees and range between 1.9 – 2.6 percent of CEV for low income individuals and 0.4 – 0.8 percent of CEV for middle income individuals.

7 Conclusion

This study examines the potential impact of a nationwide Medicaid work requirement reform using a computational overlapping generations model calibrated to pre-ACA US data. After introducing a minimum weekly work requirement in order to maintain Medicaid eligibility, our calculations points to substantial reductions in Medicaid enrollment and payouts, alongside a modest increase in labor participation. Despite the boost in labor supply and the subsequent economic benefits such as higher real wages and increased consumption,

[50] Detailed partial equilibrium results for the reform that includes sick individuals are available in Online Appendix C.

[51] Partial equilibrium outcomes are available in Online Appendix C.

the overall welfare effects are negative. Low-income individuals, in particular, experience significant welfare losses due to being forced into the labor market or out of Medicaid.

When incorporating key features of the Affordable Care Act (ACA), such as expanded Medicaid eligibility, elimination of the asset test for those under 65, and the introduction of premium subsidies for individual health insurance (IHI), the impact of Medicaid work requirements on labor markets and macroeconomic aggregates becomes less pronounced and the resulting growth and income effects are smaller. The switch of Medicaid recipients to subsidized IHI markets results in smaller welfare losses for low-income populations. However, higher-income individuals benefit less from the reform due to increases in IHI subsidies that the government needs to finance with taxes. Their welfare gains are therefore smaller than in the scenario without the ACA provisions. As a result the overall welfare loss across all health and income types is slightly larger under the ACA provisions.

Lastly, we explore the effects of a reform that also targets sick individuals with work requirements. This larger version of the reform results in larger changes in labor market outcomes and macroeconomic aggregates compared to the reform that only targeted healthy individuals. Medicaid enrollment decreases and once work requirements of more than 20 hours per week are established, Medicaid enrollment drops to zero in both pre-ACA and ACA environments. Welfare losses now include middle income individuals and are larger overall.

These findings offer crucial insights for policymakers and highlight the trade-offs and distributional consequences of implementing Medicaid work requirements. The significant welfare losses experienced by low-income individuals underscore the need for careful consideration of the social safety net's design. Policymakers must balance the economic benefits of increased labor participation and reduced Medicaid spending with the adverse effects on vulnerable populations. The differential impacts observed under ACA provisions and health status-based requirements further emphasize the importance of targeted policy design. By understanding these trade-offs, policymakers can make more informed decisions that promote economic efficiency while safeguarding the welfare of at-risk groups.

Some limitations apply to our analysis. First, the literature has shown that past Medicaid expansions have led to changes in the take-up of existing public transfer programs that target the disabled population. Staiger, Helfer and Parys (2024) estimate that the ACA Medicaid expansion in 2014 reduced Supplemental Security Income (SSI) take-up by 10 percent, while it increased Social Security Disability Insurance (SSDI) take-up by 8 percent. While our model does include transfer payments to maintain a minium consumption floor, the model does not allow for contingent payments based on a disability health state and therefore cannot measure the trade-off between Medicaid and SSI/SSDI type programs directly.

A second limitation concerns the exogenous health state process that ignores the potential impact of the reform on health investments and health outcomes overall. While one could reason that introducing work requirements for Medicaid can negatively impact the overall health of individuals who get thrown off insurance and thereby worsen their welfare loss, it is not clear whether the negative welfare effects that we measure in our model would be more severe in a model with endogenous health in a general equilibrium setting. Jung and Tran (2016) demonstrate that endogenizing health introduces a health investment motive where cuts to insurance programs can lead to higher health investments (to "self-insure" against the now uncovered health shocks) and output.[52] Following this logic the restriction of Medicaid access could decrease the welfare loss and even be welfare improving if general equilibrium growth effects overpower the negative effects from lost insurance and lower leisure due to the work requirements.

Third, we do not model human capital accumulation and the associated effects of temporarily dropping out of the labor force on future productivity. While this is in general important, we argue that these type of productivity effects tend to be small for low wage workers that qualify for Medicaid. We therefore leave this question for future research.

[52] More specifically Jung and Tran (2016) show that introducing more insurance via the ACA can lead to welfare losses in a model with endogenous health but welfare gains in a model with very inelastic healthcare demand which approximates models with exogenous health and exogenous medical spending.

References

Achou, Bertrand. 2023. "Housing in Medicaid: Should it Really Change?" *American Economic Journal: Economic Policy* forthcoming. 5

Aiyagari, Rao S. 1994. "Uninsured Idiosyncratic Risk and Aggregate Saving." *The Quarterly Journal of Economics* 109(3):659–684. 5

Aizawa, Naoki and Chao Fu. 2024. "Interaction of the Labor Market and the Health Insurance System: Employer-Sponsored, Individual, and Public Insurance." *Journal of Labor Economics* forthcoming. 26

Aizer, Anna. 2003. "Low Take-Up in Medicaid: Does Outreach Matter and for Whom?" *The American Economic Review* 93(2):238–241. 21

Allen, Heidi and Benjamin D Sommers. 2019. "Medicaid expansion and health: Assessing the evidence after 5 years." *JAMA* 322(13):1253–1254. 5

Andreoni, James. 1989. "Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence." *Journal of Political Economy* 97(6):1447–1458. 19

Bakıs, Ozan, Barıs Kaymak and Markus Poschke. 2015. "Transitional Dynamics and the Optimal Progressivity of Income Redistribution." *Review of Economic Dynamics* 18(3):679–693. 22

Barczyk, Daniel and Matthias Kredler. 2018. "Evaluating Long-Term-Care Policy Options, Taking the Family Seriously." *The Review of Economic Studies* 85(2):766–809. 5

Bell, Felicity C. and Michael L. Miller. 2005. "Life Tables for the United States Social Security Area 1900–2100." Actuarial Study No. 116. Office of the Chief Actuary, Social Security Administration. August. 41

Benabou, Roland. 2002. "Tax and Education Policy in a Heterogeneous Agent Economy: What Levels of Redistribution Maximize Growth and Efficiency?" *Econometrica* 70(2):481–517. 12

Bernard, Didem, Cathy Cowan, Thomas Selden, Lining Cai, Aaron Catling and Stephen Heffler. 2012. "Reconciling Medical Expenditure Estimates from the MEPS and NHEA, 2007." *Medicare & Medicaid Research Review* 2(4):1–19. 19, 21

Bewley, Truman. 1986. Stationary Monetary Equilibrium with a Continuum of Independently Fluctuating Consumers. In *Werner Hildenbrand, Andreu Mas-Colell (Eds.), Contributions to Mathematical Economics in Honor of Gerard Debreu*. North-Holland. 5

Bianco, Chiara Dal and Andrea Moro. 2022. "The Welfare Effects of Nonlinear Health Dynamics." arXiv:2207.03816 [econ.GN]. 20

Blumenthal, David and Melinda Abrams. 2020. "The Affordable Care Act at 10 Years — Payment and Delivery System Reforms." *New England Journal of Medicine* 382(11):1057–1063. 27

Blumenthal, David, Sara R. Collins and Elizabeth J. Fowler. 2020. "The Affordable Care Act at 10 Years — Its Coverage and Access Provisions." *New England Journal of Medicine* 382(10):963–969. 27

Brown, David W, Amanda E Kowalski and Ithai Z Lurie. 2020. "Long-Term Impacts of Childhood Medicaid Expansions on Outcomes in Adulthood." *The Review of Economic Studies* 87(2):792–821. 2, 4

Capatina, Elena, Gary Hansen and Minchung Hsu. 2024. "Long Term Care Risk For Couples and Singles.".

5

Casanova, María. 2013. "Revisiting the Hump-Shaped Wage Profile." mimeo. 18, 61

Cawley, John, Aparna Soni and Kosali Simon. 2018. "Third year of survey data shows continuing benefits of Medicaid expansions for low-income childless adults in the US." *Journal of general internal medicine* 33(9):1495–1497. 5

CMS. 2016. "Insurance Standards Bulletin Series – Information." Centers for Medicare & Medicaid Services, Center for Consumer Information and Insurance Oversight. 27

CMS. 2020. "Georgia Pathways to Coverage." Centers for Medicare & Medicaid Services(October 15). 7

CMS. 2024. "Affordable Care Act Implementation FAQs - Set 18." (Downloaded: December 2, 2024). 27

CMS-OAC. 2010. "2010 Actuarial Report on the Financial Outlook for Medicaid." Office of the Actuary, Centers for Medicare & Medicaid Services, United States Department of Health & Human Services. 54

Cole, Harold L., Soojin Kim and Dirk Krueger. 2019. "Analyzing the Effects of Insuring Health Risks: On the Trade-off between Short Run Insurance Benefits vs. Long Run Incentive Costs." *Review of Economic Studies* 86(3):1123–1169. 5, 10

Courtemanche, Charles, James Marton, Benjamin Ukert, Aaron Yelowitz and Daniela Zapata. 2017. "Early impacts of the Affordable Care Act on health insurance coverage in Medicaid expansion and non-expansion states." *Journal of Policy Analysis and Management* 36(1):178–210. 5

Courtemanche, Charles, James Marton, Benjamin Ukert, Aaron Yelowitz and Daniela Zapata. 2018. "Early effects of the Affordable Care Act on health care access, risky health behaviors, and self-assessed health." *Southern Economic Journal* 84(3):660–691. 5

Dave, Dhaval, Sandra L. Decker, Robert Kaestner and Kosali I. Simon. 2015. "The Effect of Medicaid Expansions in the Late 1980s and Early 1990s on the Labor Supply of Pregnant Women." *American Journal of Health Economics* 1(2):165–193. 2, 4

De Nardi, Mariacristina. 2004. "Wealth Inequality and Intergenerational Links." *Review of Economic Studies* 71:743–768. 19, 53

De Nardi, Mariacristina, Eric French and John Bailey Jones. 2010. "Why Do the Elderly Save? The Role of Medical Expenses." *Journal of Political Economy* 118(1):39–75. 21, 53

De Nardi, Mariacristina, Eric French and John Bailey Jones. 2016. "Medicaid Insurance in Old Age." *American Economic Review* 106(11):34800–3520. 5

De Nardi, Mariacristina and Fang Yang. 2014. "Bequests and heterogeneity in retirement wealth." *European Economic Review* 72:182–196. 53

De Nardi, Mariacristina, Svetlana Pashchenko and Ponpoje Porapakkarm. 2024. "The Lifetime Costs of Bad Health." *The Review of Economic Studies, Forthcoming* . 20

Eslami, Keyvan and Seyed M. Karimi. 2019. "Health Spending: Luxury or Necessity?". 5, 10

Fang, Hanming and Dirk Krueger. 2022. "The Affordable Care Act After a Decade: its Impact on the Labor Market and the Macro Economy." *Annual Review of Economics* 14:453–494. 5

Fernandez, Bernadette, Ryan J. Rosso and Vanessa C. Forsberg. 2018. "Federal Requirements on Private Health Insurance Plans." *Congressional Research Service Report No. 7-5700, R45146, Version 4* . 9, 20

Fiedler, Matthew. 2020. “The ACA’s Individual Mandate In Retrospect: What Did It Do, And Where Do We Go From Here?” *Health Affairs* 39(3):429–435. 27

Fiorito, Riccardo and Giulio Zanella. 2012. “The Anatomy of the Aggregate Labor Supply Elasticity.” *Review of Economic Dynamics* 15(2):171–187. 19, 22, 54

Folse, Michael, James Bridges and Anthony DiGiorgio. 2024. ““How Will Medicaid Work Requirements Affect American Healthcare? A Look at What Past and Present Policy Tells Us”.” *INQUIRY: The Journal of Health Care Organization, Provision, and Financing* 61:00469580241251935. 2

Fonseca, Raquel, Pierre-Carl Michaud, Titus Galama and Arie Kapteyn. 2021. “Accounting for the Rise of Health Spending and Longevity.” *Journal of the European Economic Association* 19(1):536–579. 5, 10

Frean, Molly, Jonathan Gruber and Benjamin D. Sommers. 2017. “Premium Subsidies, the Mandate, and Medicaid Expansion: Coverage Effects of the Affordable Care Act.” *Journal of Health Economics* 53:72–86. 5

French, Eric. 2005. “The Effects of Health, Wealth, and Wages on Labour Supply and Retirement Behaviour.” *The Review of Economic Studies* 72(2):395–427. 18, 19, 53

Gomme, Paul, B. Ravikumar and Peter Rupert. 2011. “The return to capital and the business cycle.” *Review of Economic Dynamics* 14(2):262–278. 22, 54

Grossman, Michael. 1972. “On the Concept of Health Capital and the Demand for Health.” *Journal of Political Economy* 80(2):223–255. 8, 10

Gruber, Jonathan and Benjamin D Sommers. 2019. “The Affordable Care Act’s effects on patients, providers, and the economy: what we’ve learned so far.” *Journal of Policy Analysis and Management* 38(4):1028–1052. 2, 5

Guner, Nezih, Martin Lopez-Daneri and Gustavo Ventura. 2016. “Heterogeneity and Government Revenues: Higher Taxes at the Top?” *Journal of Monetary Economics* 80:69–85. 22, 53

Guth, Madeline. 2023. “Medicaid Work Requirements are Back on the Agenda.” KFF Policy Watch, April 03, 2023. 5

Guth, Madeline and MaryBeth Musumeci. 2022. “An Overview of Medicaid Work Requirements: What Happened Under the Trump and Biden Administrations?” KFF Issue Brief, May 03, 2022. 6

Guth, Madeline, Patrick Drake, Robin Rudowitz and Maiss Mohamed. 2023. “Understanding the Intersection of Medicaid & Work: A Look at What the Data Say.” Kaiser Family Foundation, Issue Brief, April 24. 2

Hampton, Matt and Otto Lenhart. 2019. “The effect of the Affordable Care Act preexisting conditions provision on marriage.” *Health economics* 28(11):1345–1355. 5

Hansen, Gary D. and Ayşe Imrohoroğlu. 1992. “The Role of Unemployment Insurance in an Economy with Liquidity Constraints and Moral Hazard.” *Journal of Political Economy* 100(1):118–142. 5

Hart, Ariel. 2023. “Georgia’s plan to expand Medicaid enrolls fewer than 2,000 so far.” *The Atlanta Journal-Constitution* . 7

Heathcote, Jonathan, Kjetil Storesletten and Giovanni L Violante. 2017. “Optimal Tax Progressivity: An

Analytical Framework." *Quarterly Journal of Economics* 132(4):1693–1754. 12, 22

Hill, Ian and Emily Burroughs. 2019. "Lessons from Launching Medicaid Work Requirements in Arkansas." Research Report, Urban Institute. 6

Hinton, Elizabeth, Jada Raphael and Amaya Diana. 2024. "Medicaid Work Requirements: CurrentWaiver and Legislative Activity." Kaiser Family Foundation, Issue Brief, November 21. 7

Holter, Hans A. 2015. "Accounting for Cross-country Differences in Intergenerational Earnings Persistence: The Impact of Taxation and Public Education Expenditure." *Quantitative Economics* 6(2):385–428. 22

Hosseini, Roozbeh, Karen A. Kopecky and Kai Zhao. 2022. "The Evolution of Health Over the Life Cycle." *Review of Economic Dynamics* 45:237–263. 20

Huggett, Mark. 1993. "The Risk-Free Rate in Heterogeneous-Agent Incomplete-Insurance Economies." *The Journal of Economic Dynamics and Control* 17(5-6):953–969. 5

Huggett, Mark and Gustavo Ventura. 1999. "On the Distributional Effects of Social Security Reform." *Review of Economic Dynamics* 2:498–531. 12

İmrohoroğlu, Ayşe, Selahattin İmrohoroğlu and Douglas H. Joines. 2003. "Time-Inconsistent Preferences and Social Security." *The Quarterly Journal of Economics* 118(2):745–784. 12

İmrohoroğlu, Selahattin and Sagiri Kitao. 2009. "Labor Supply Elasticity and Social Security Reform." *Journal of Public Economics* 93(7–8):867–878. 14

İmrohoroğlu, Selahattin and Sagiri Kitao. 2012. "Social Security Reforms: Benefit Claiming, Labor Force Participation, and Long-run Sustainability." *American Economic Journal: Macroeconomics* 4(3):96–127. 17, 41, 53

IRS. 2010. "Medical and Dental Expenses (including the Health Coverage Tax Credit)." Department of the Treasury, Internal Revenue Service, Publication 502, Cat. No. 15002Q. 15

Jeske, Karsten and Sagiri Kitao. 2009. "U.S. Tax Policy and Health Insurance Demand: Can a Regressive Policy Improve Welfare?" *Journal of Monetary Economics* 56(2):210–221. 5, 11, 14, 20, 21, 53

Jung, Juergen and Chung Tran. 2014. "Medical Consumption Over the Life Cycle: Facts from a U.S. Medical Expenditure Panel Survey." *Empirical Economics* 47(3):927–957. 60

Jung, Juergen and Chung Tran. 2016. "Market Inefficiency, Insurance Mandate and Welfare: U.S. Health Care Reform 2010." *Review of Economic Dynamics* 20:132–159. 5, 10, 27, 32, 33

Jung, Juergen and Chung Tran. 2022. "Social Health Insurance: A Quantitative Exploration." *Journal of Economic Dynamics and Control* 139:104374. 7

Jung, Juergen and Vinish Shrestha. 2018. "The Affordable Care Act and College Enrollment Decisions." *Economic Inquiry* 56(4):1980–2009. 5

Kahn, James G., Richard Kronick, Mary Kreger and David N. Gans. 2005. "The Cost of Health Insurance Administration in California: Estimates for Insurers, Physicians, and Hospitals." *Health Affairs* 24(6):1629–1639. 20

Kaiser. 2013. "Where Are States Today? Medicaid and CHIP Eligibility Levels for Children and Non-Disabled Adults." Kaiser Family Foundation Fact Sheet. 21

Kakwani, Nanak C. 1977. "Measurement of Tax Progressivity: An International Comparison." *The Eco-*

nomic Journal 87(345):71–80. 12

Kaplan, Greg. 2012. "Inequality and the Life Cycle." *Quantitative Economics* 3(3):471–525. 60

Keehan, Sean P., Andrea M. Sisko, Christopher J. Truffer, John A. Poisal, Gigi A. Cuckler, Andrew J. Madison, Joseph M. Lizonitz and Sheila D. Smith. 2011. "National Health Spending Projections Through 2020: Economic Recovery And Reform Drive Faster Spending Growth." *Health Affairs* 30(8):1594–1605. 21

KFF. 2024. "Explaining Health Care Reform: Questions About Health Insurance Subsidies." *Kaiser Family Foundation, Issue Brief* October 25. 27

Koh, Dongya, Raül Santaeulàlia-Llopis and Yu Zheng. 2020. "Labor Share Decline and Intellectual Property Products Capital." *Econometrica* 88(6):2609–2628. 20, 53

Mador, Jess. 2023. "Georgia Pathways work requirement Medicaid expansion sees few enrollees in first quarter." WABE-NPR News. 7

Miller, Sarah and Laura R Wherry. 2017. "Health and access to care during the first 2 years of the ACA Medicaid expansions." *New England Journal of Medicine* 376(10):947–956. 5

Miller, Sarah, Norman Johnson and Laura R Wherry. 2021. "Medicaid and Mortality: New Evidence From Linked Survey and Administrative Data." *The Quarterly Journal of Economics* 136(3):1783–1829. 5

Musgrave, Richard A. 1959. *The Theory of Public Finance: A Study in Public Economy*. New York, McGraw-Hill, 1959. 12

NHEA. 2020*a*. "National Health Expenditures by type of service and source of funds, CY 1960-2020 (ZIP-File)." National Health Expenditure Accounts - Website: https://www.cms.gov/data-research/statistics-trends-and-reports/national-health-expenditure-data/historical. 21, 54

NHEA. 2020*b*. "NHE Summary, including share of GDP, CY 1960-2020 (ZIP)." National Health Expenditure Accounts - Website: https://www.cms.gov/data-research/statistics-trends-and-reports/national-health-expenditure-data/historical. 22, 54

Palumbo, Michael G. 1999. "Uncertain Medical Expenses and Precautionary Saving Near the End of the Life Cycle." *Review of Economic Studies* 66(2):395–421. 5

Pashchenko, Svetlana and Ponpoje Porapakkarm. 2013. "Quantitative Analysis of Health Insurance Reform: Separating Regulation from Redistribution." *Review of Economic Dynamics* 16 (3):383–404. 14, 20, 27

Pashchenko, Svetlana and Ponpoje Porapakkarm. 2017. "Work Incentives of Medicaid Beneficiaries and the Role of Asset Testing." *International Economic Review* 58(4):1117–1154. 6

Peng, Lizhong, Xiaohui (Ronnie) Guo and Chad D. Meyerhoefer. 2020. "The Effects of Medicaid Expansion on Labor Market Outcomes: Evidence from Border Counties." *Health Economics* 29:245–260. 2, 4

Peterman, William B. 2016. "Reconciling Micro and Macro Estimates of the Frisch Labor Supply Elasticity: A Sensitivity Analysis." *Economic Inquiry* 54(1):100–120. 19

Rauscher, Emily and Ailish Burns. 2023. "State Approaches to Simplify Medicaid Eligibility and Implications for Inequality of Infant Health." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 9(4):32–60. 4

Remler, Dahlia K., Jason E. Rachling and Sherry A. Glied. 2001. "What Can the Take-Up of Other Programs

Teach Us About How to Improve Take-Up of Health Insurance Programs?” NBER Working Paper 8185. 21

Rupert, Peter and Giulio Zanella. 2015. “Revisiting wage, earnings, and hours profiles.” *Journal of Monetary Economics* 72:114–130. 18, 61

Scholz, John Karl, Ananth Seshadri and Surachai Khitatrakun. 2006. “Are Americans Saving "Optimally" for Retirement?” *Journal of Political Economy* 114(4):607–643. 18

Scholz, Karl J. and Ananth Seshadri. 2013a. “Health and Wealth in a Lifecycle Model.” Working Paper. 5, 10

Sing, Merrile, Jessica Banthing, Thomas Selden, Cathy Cowan and Sean Keehan. 2006. “Reconciling Medical Expenditure Estimates from the MEPS and NHEA, 2002.” *Health Care Financing Review* 28(1):25–40. 19, 21

Sommers, Benjamin D., Anna L. Goldman, Robert J. Blendon, E. John Orav and Arnold M. Epstein. 2019. “Medicaid Work Requirements — Results from the First Year in Arkansas.” *New England Journal of Medicine* 381(11):1073–1082. 2, 4

Sommers, Benjamin D, Bethany Maylone, Robert J Blendon, E John Orav and Arnold M Epstein. 2017. “Three-year impacts of the Affordable Care Act: improved medical care and health among low-income adults.” *Health Affairs* 36(6):1119–1128. 2, 5

Sommers, Benjamin D., Lucy Chen, Robert J. Blendon, E. John Orav and Arnold M. Epstein. 2020. “Medicaid Work Requirements In Arkansas: Two-Year Impacts On Coverage, Employment, And Affordability Of Care.” *Health Affairs* 39(9):1522–1530. 6

SSA. 2007. “Social Security Update 2007.” SSA Publication No. 05-10003. 21, 22, 53

SSA. 2010. “The 2010 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds.” Social Security Administration. 53

Staiger, Becky, Madeline Helfer and Jessica Van Parys. 2024. “The effect of Medicaid expansion on the take-up of disability benefits by race and ethnicity.” *Health Economics* 33(3):526–540. 32

Strumpf, Erin. 2011. “Medicaid's effect on single women's labor supply: Evidence from the introduction of Medicaid.” *Journal of Health Economics* 30(3):531–548. 2, 4

Swanson, Eric T. 2012. “Risk Aversion and the Labor Margin in Dynamic Equilibrium Models.” *The American Economic Review* 102(4):1663–1691. 18

Tauchen, George and Robert Hussey. 1991. “Quadrature-Based Methods for Obtaining Approximate Solutions to Nonlinear Asset Pricing Models.” *Econometrica* 59(2):371–396. 18

Tolbert, Jennifer and Meghana Ammula. 2023. “10 Things to Know About the Unwinding of the Medicaid Continuous Enrollment Provision.” Kaiser Family Foundation, Issue Brief, June 9. 2

Wen, Hefei, Jason M Hockenberry and Janet R Cummings. 2017. “The effect of Medicaid expansion on crime reduction: Evidence from HIFA-waiver expansions.” *Journal of Public Economics* 154:67–94. 5

Whalen, Charles and Felix Reichling. 2017. “Estimates of the Frisch Elasticity of Labor Supply: A Review.” *Eastern Economic Journal* 43(1):37–42. 19

Wooldridge, Jeffrey M. 1995. “Selection Corrections for Panel Data Models under Conditional Mean Independence Assumptions." *Journal of Econometrics* 68(1):115–132. 61

Yogo, Motohiro. 2016. "Portfolio Choice in Retirement: Health Risk and the Demand for Annuities, Housing and Risky Assets." *Journal of Monetary Economics* 80:17–34. 5, 10

Zhao, Kai. 2014. "Social Security and the Rise in Health Spending." *Journal of Monetary Economics* 64:21–37. 12

Figures

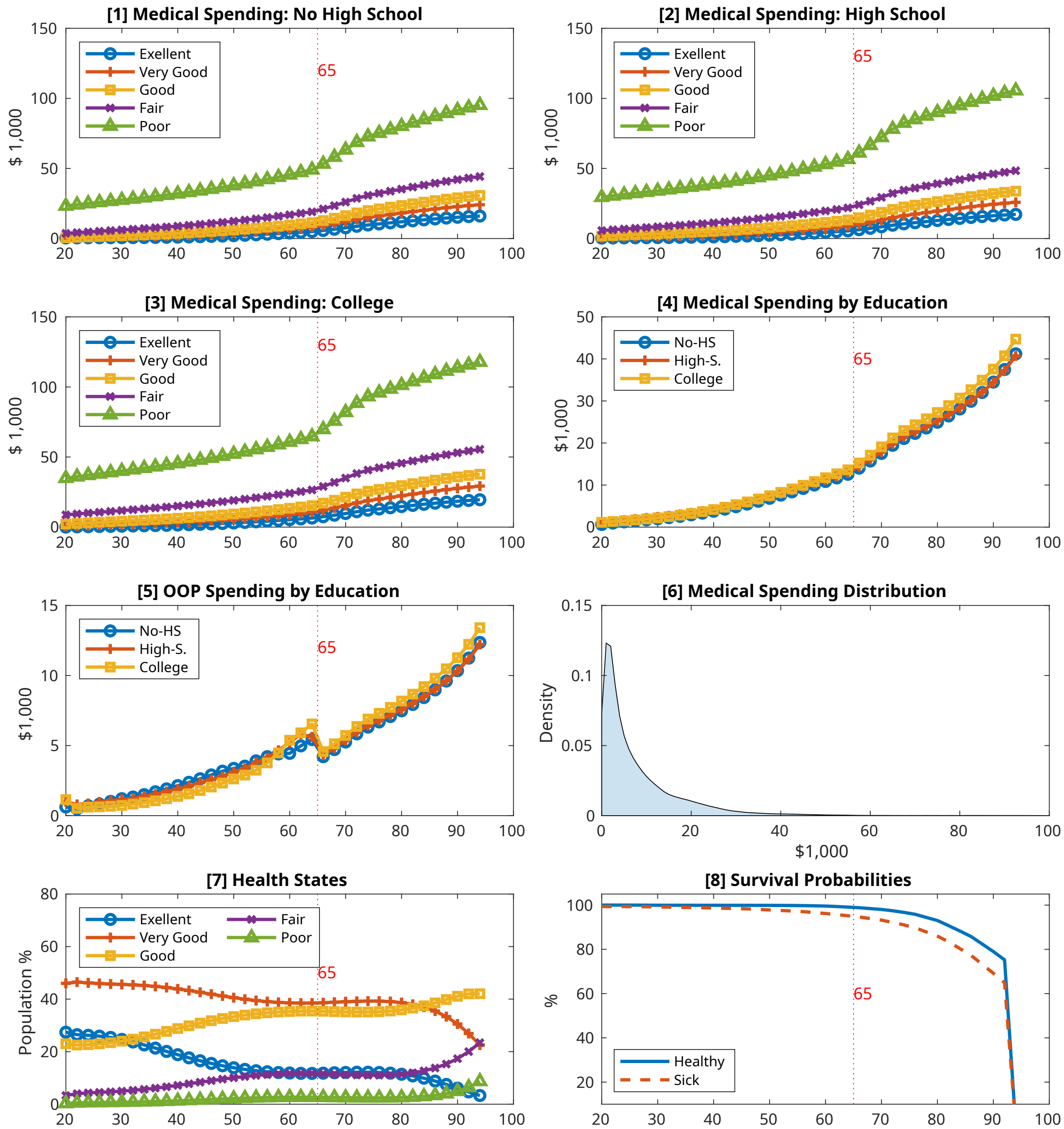


Figure 1: **Data Input: Exogenous health state process and health spending**

Notes: Healthy is defined as an individual reporting either Excellent, Very Good, or Good health. Sick is defined as Fair or Poor health. Panels 1–3 show the average medical spending by age, self-reported health status, and permanent income group (no high school, high school, or college and higher). Panel [4] shows average medical spending by age and permanent income type. Panel [5] shows the average out-of-pocket health expenditures by age and permanent income type. Panel [6] shows the medical spending distribution in the model. Panel [7] shows the self-reported health states by age group in the model. The survival probabilities in panel [8] are from İmrohoroğlu and Kitao (2012) who base their estimates on data from the Health and Retirement Study and life table estimates in Bell and Miller (2005). Data source is MEPS 1999–2009. The observational unit is the head of a Health Insurance Eligibility Unit (HIEU) which is a subset of a household. We apply population weights. All dollar values are expressed in 2009 USD.

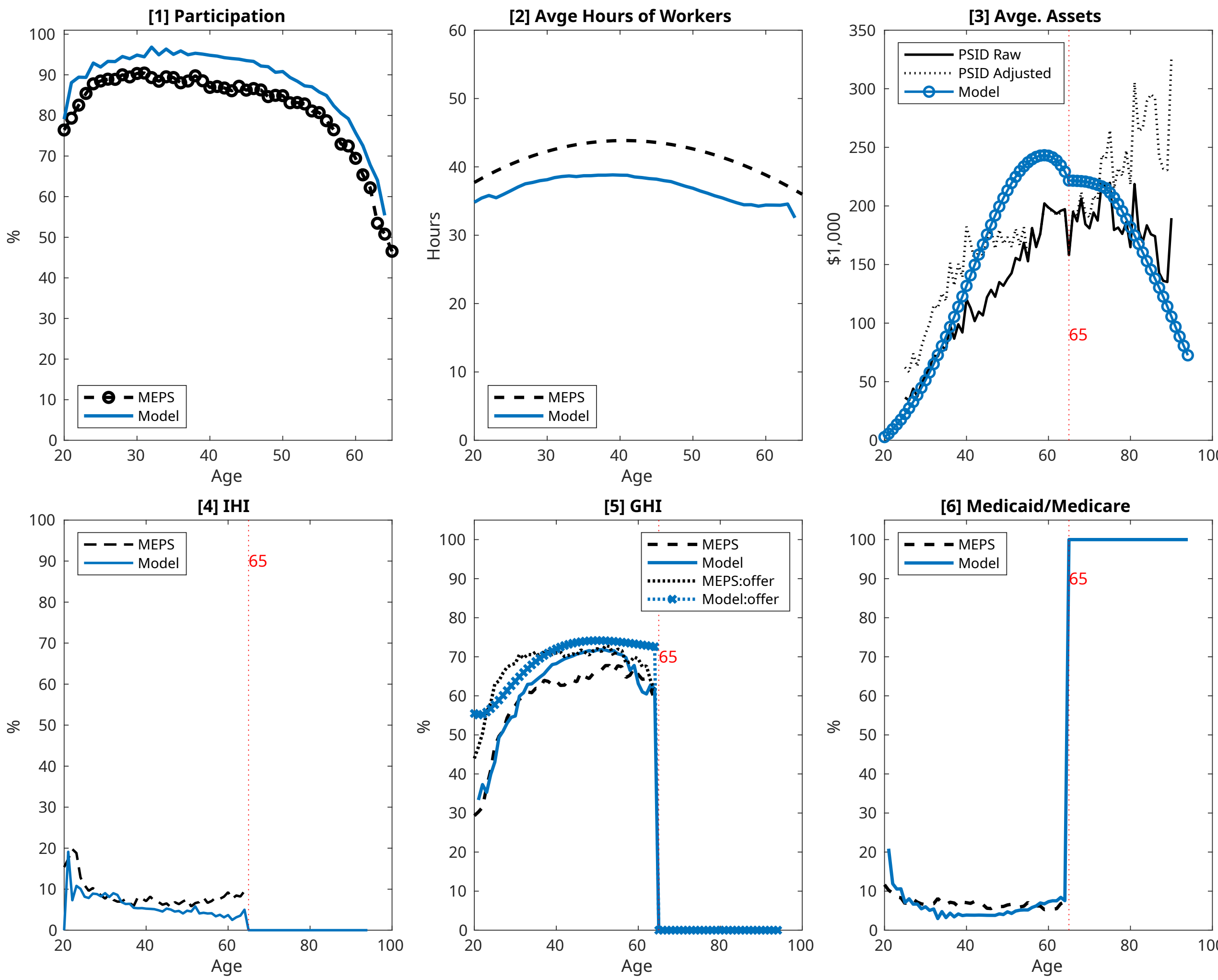


Figure 2: **Calibration Targets: Labor market and insurance percentages**

Notes: Labor participation (5-year averages) in Panel [1] and average work hours in Panel [2] are calibration targets that determine the fixed cost of labor participation as well as the consumption vs. leisure weight in the utility function. Panels [3]–[6] show the fraction of individuals with individual health insurance (IHI), employer provided group health insurance (GHI), as well as the recipients of Medicaid and Medicare. Data sources are **MEPS 1999–2009**, heads of HIEU, population weighted and heads of households in **PSID 1999–2009**. All dollar values are in 2009 USD.

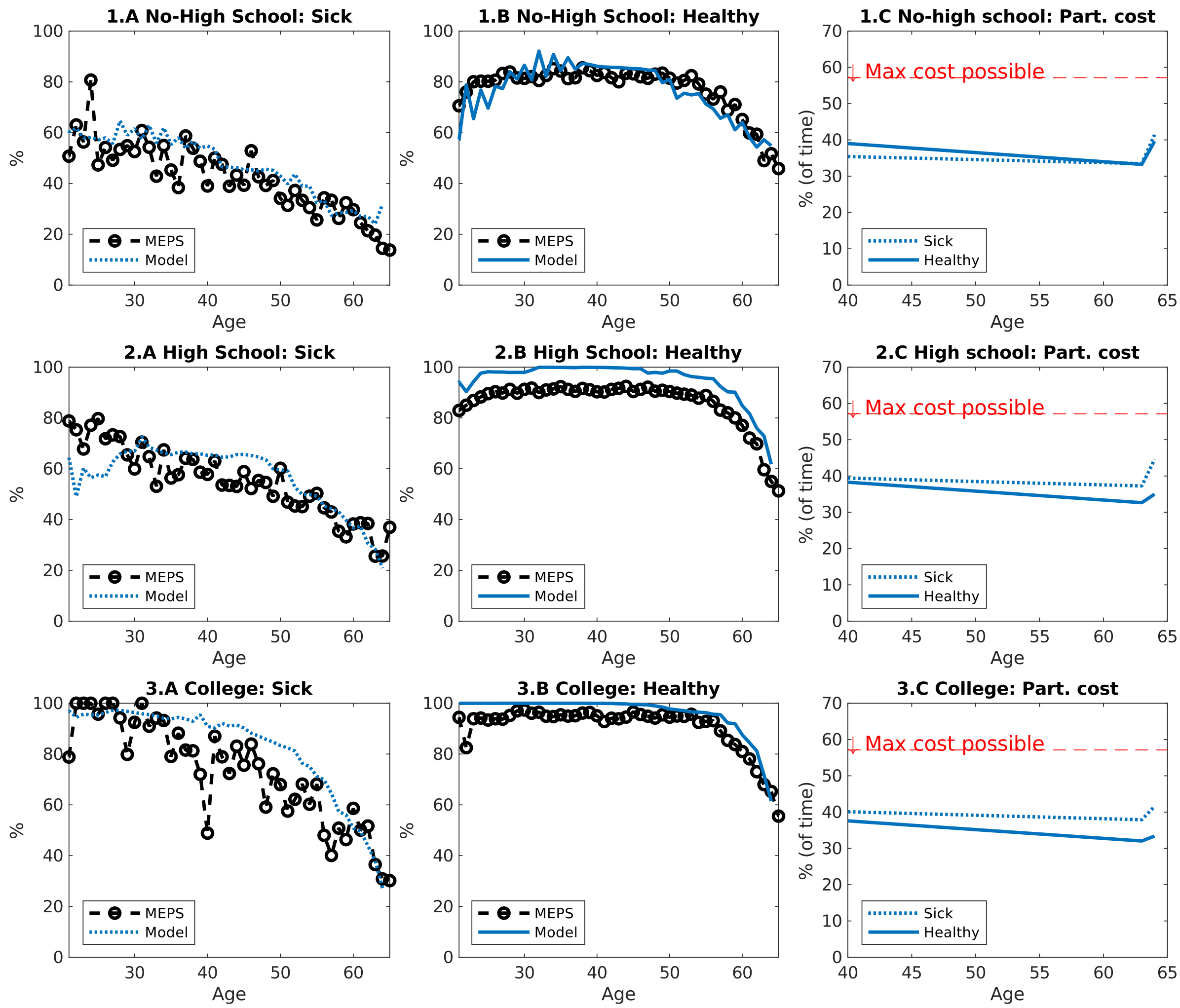


Figure 3: **Calibration Targets: Labor market participation by education and health status**

Notes: Labor participation (5-year averages) by education and health status are calibration targets that determine the fixed cost of labor participation. Data source is MEPS 1999–2009, heads of HIEU, population weighted.

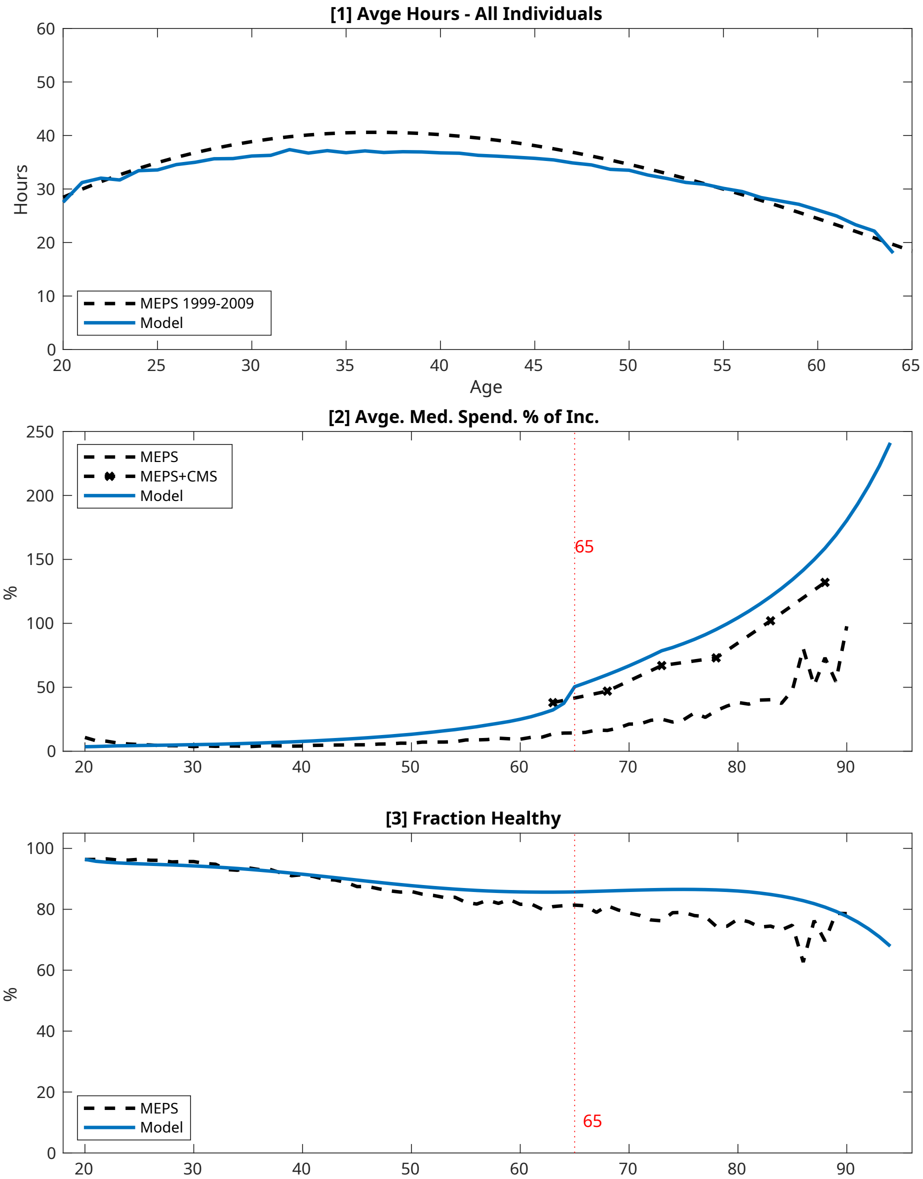


Figure 4: **Model performance: Lifecycle profiles**

Notes: Only Panels 1 and 2 are targets. Panel 3 is a performance check that shows that the exogenous health process replicates the fraction of healthy vs. sick individuals from the data by age group well. Data sources: is MEPS 1999–2009, heads of HIEU, population weighted.

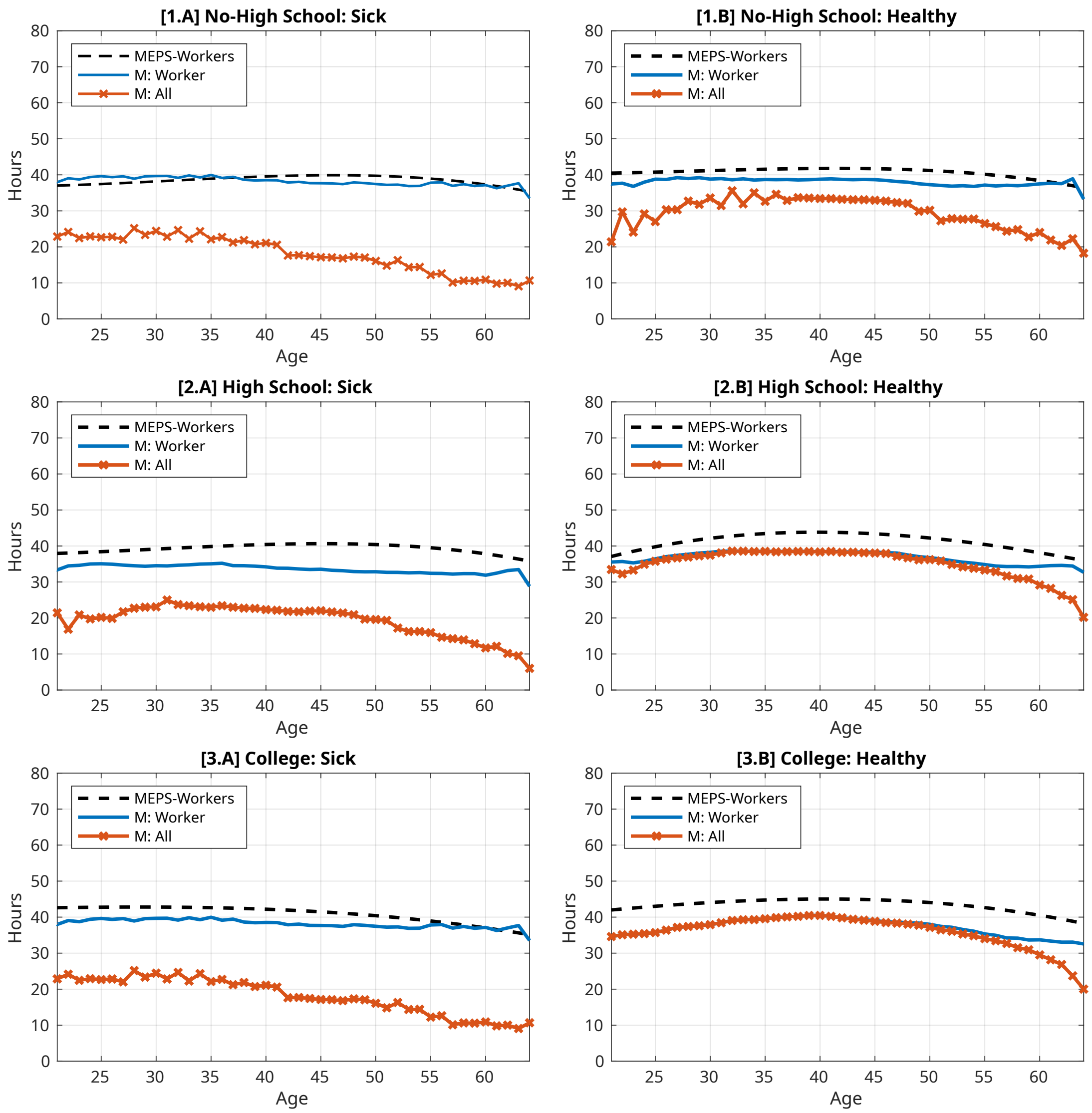


Figure 5: **Model performance: Worker hours by education and health status**

Notes: Labor hours of workers (conditional on working) and all individuals (includes zero hours from non-workers) (5-year averages) by education and health status are calibration targets that determine the fixed cost of labor participation. Data source is MEPS 1999–2009, heads of HIEU, population weighted.

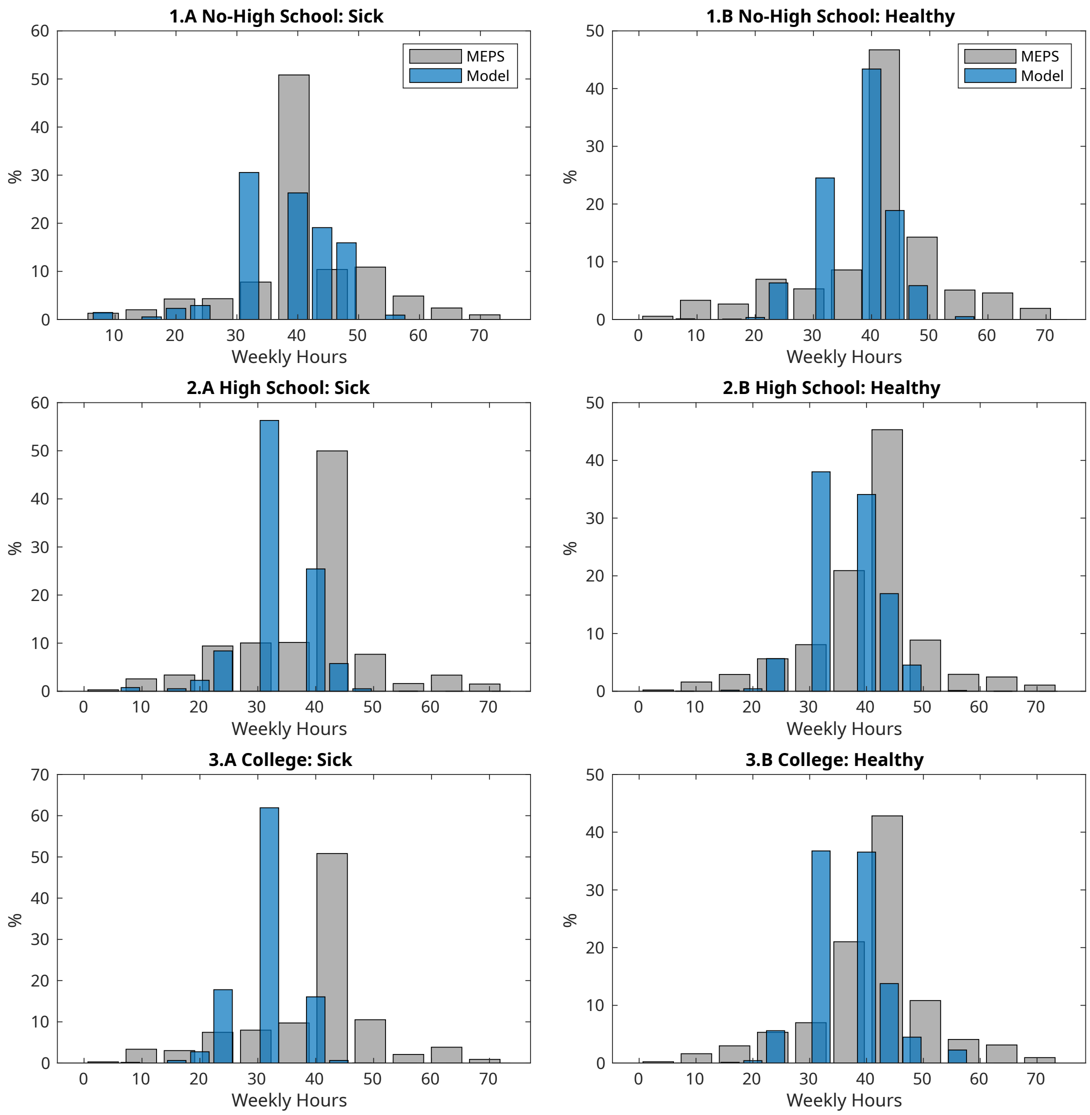


Figure 6: **Model performance: Weekly worker hours distribution by education and health status**

Notes: The figure shows the distribution of weekly work hours of the actively working population between age 20–64 by education and health status. Data source is MEPS 1999–2009, heads of HIEU, population weighted.

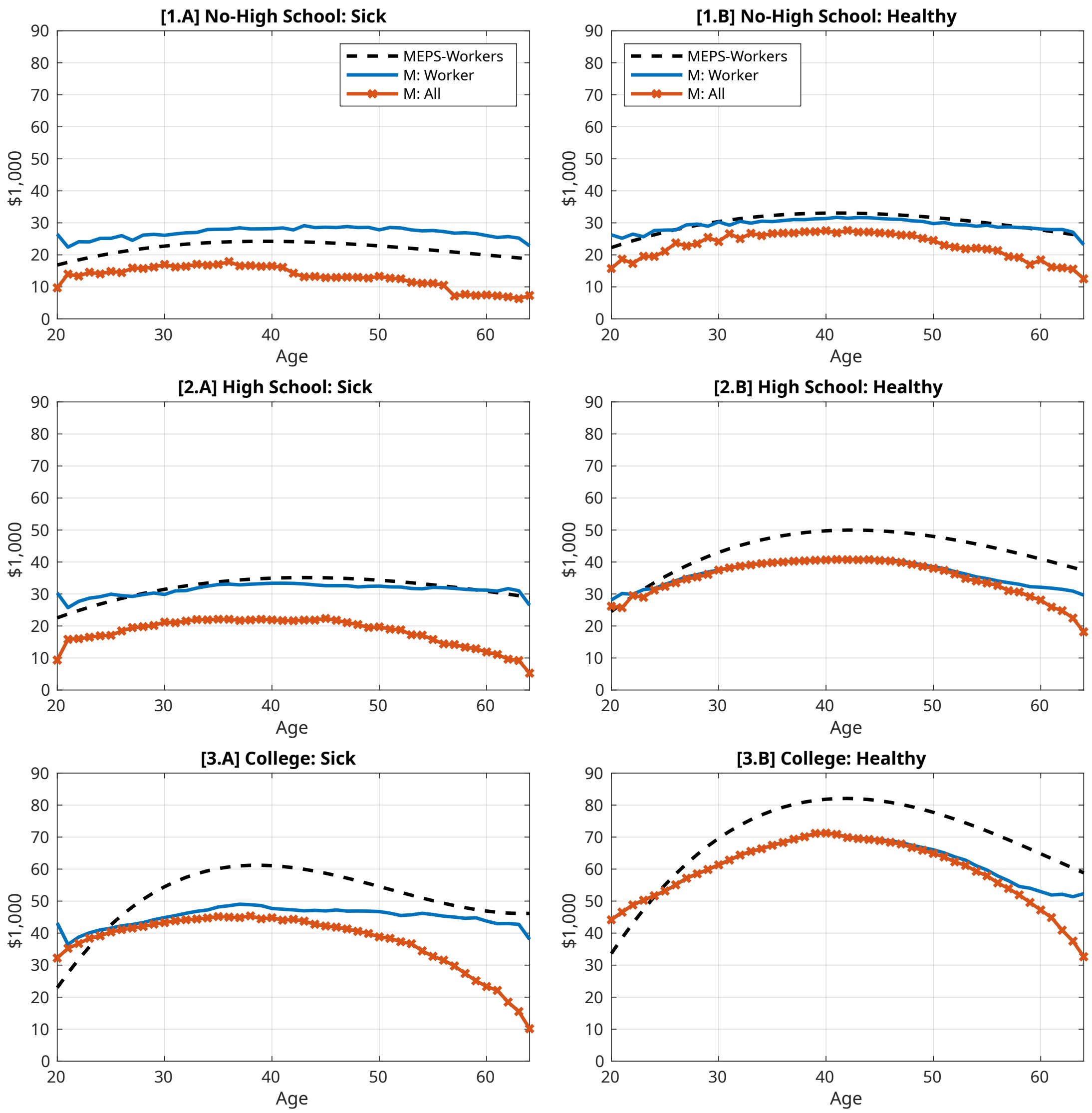


Figure 7: **Model performance: Labor income by education and health status**

Notes: Labor income of workers (conditional on working) and all individuals (includes non-workers with zero labor income) by education and health status are calibration targets that determine the fixed cost of labor participation. Data source is **MEPS 1999–2009**, heads of HIEU, population weighted. All dollar values are in 2009 USD.

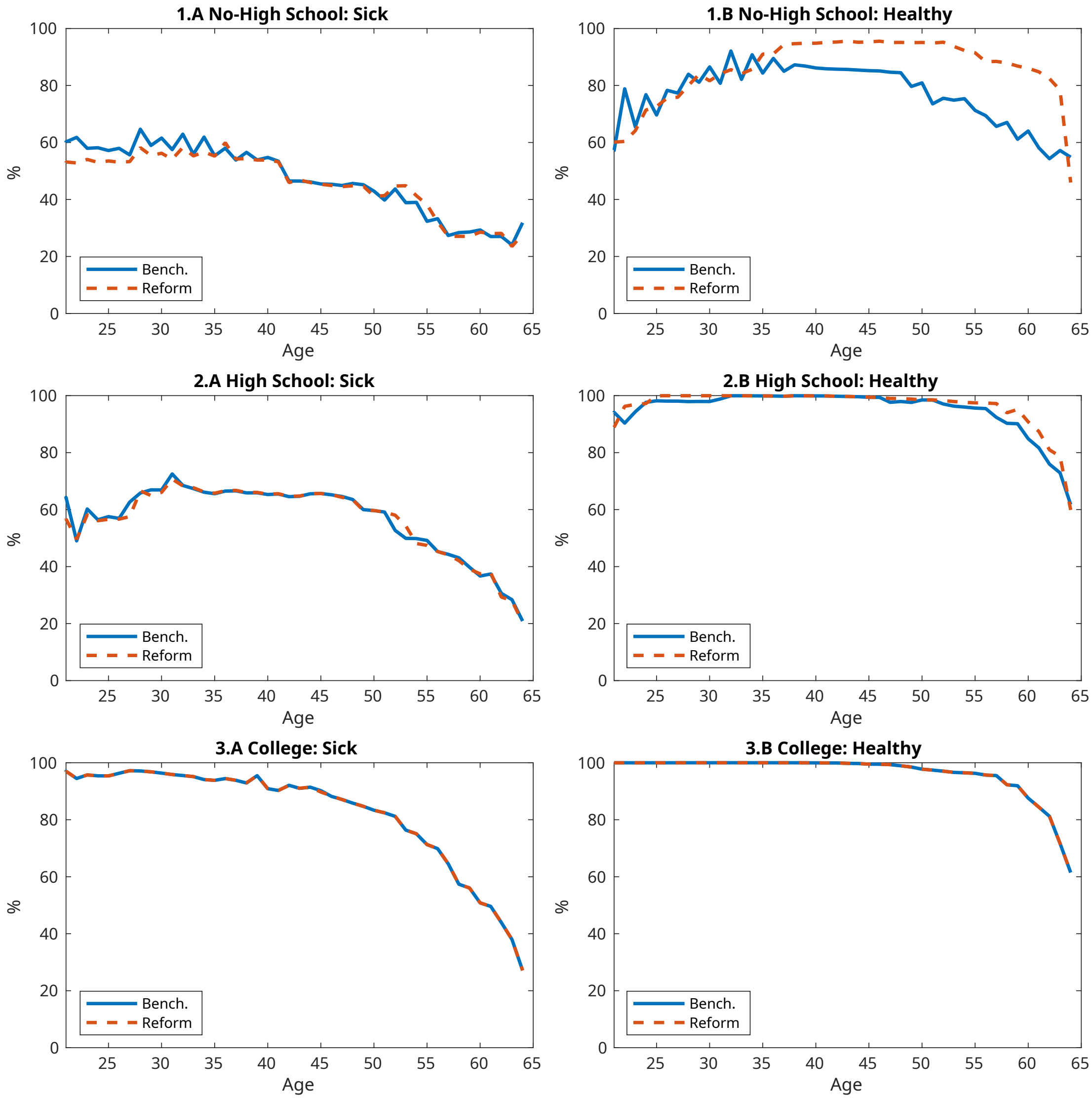


Figure 8: **Labor participation with work requirements of 8 hours/week (Partial equilibrium)**

Notes: The work requirements are only introduced for healthy working age individuals.

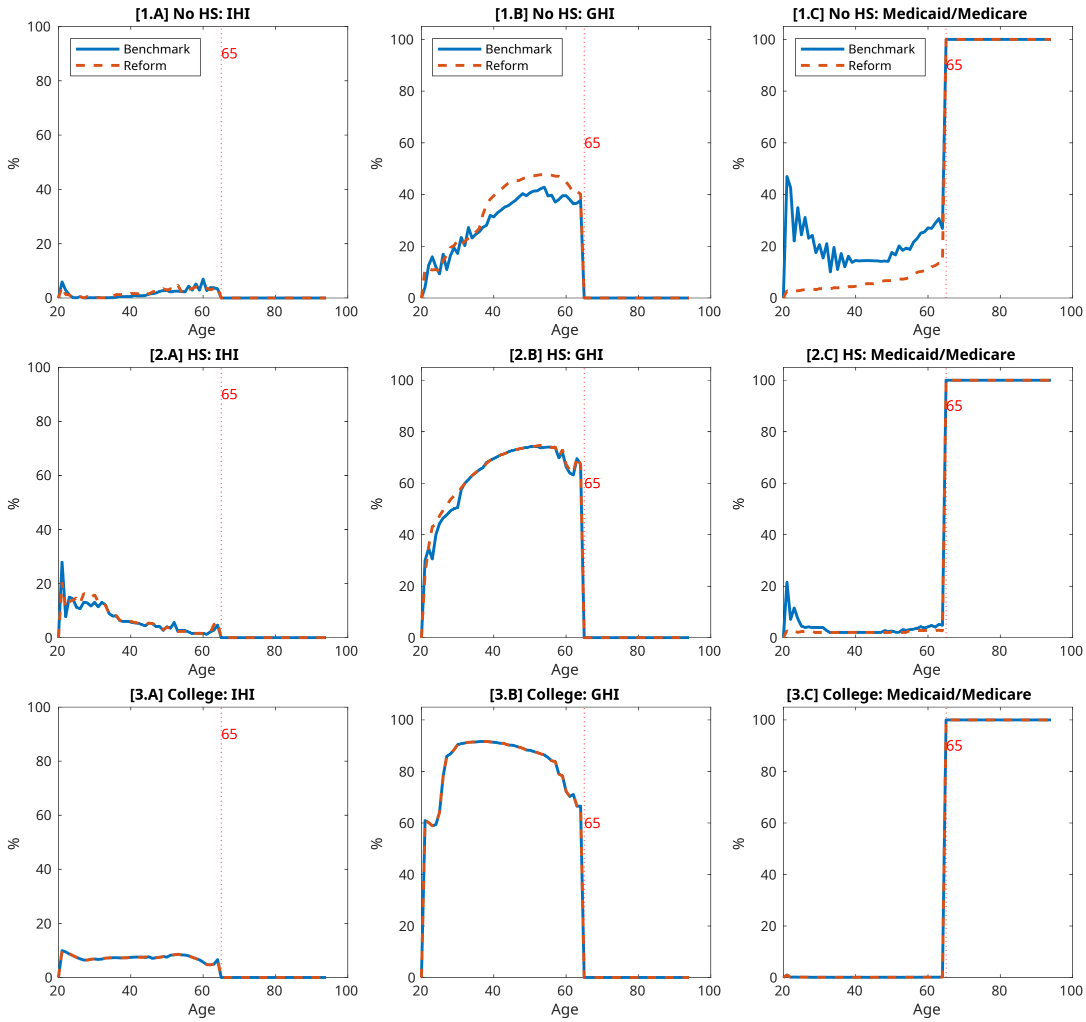
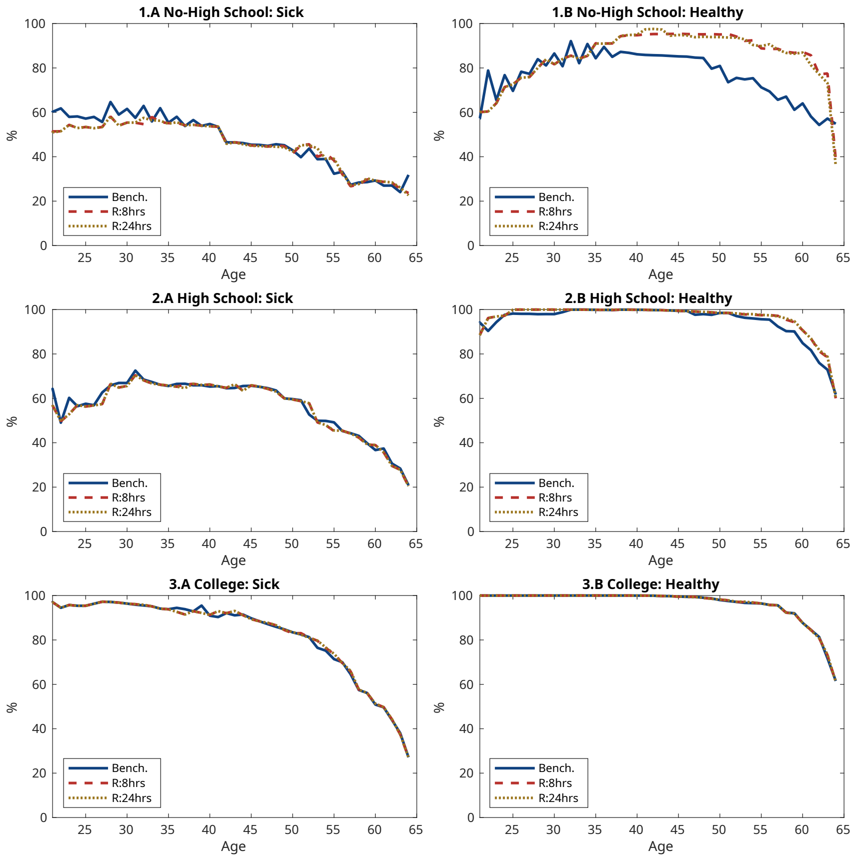
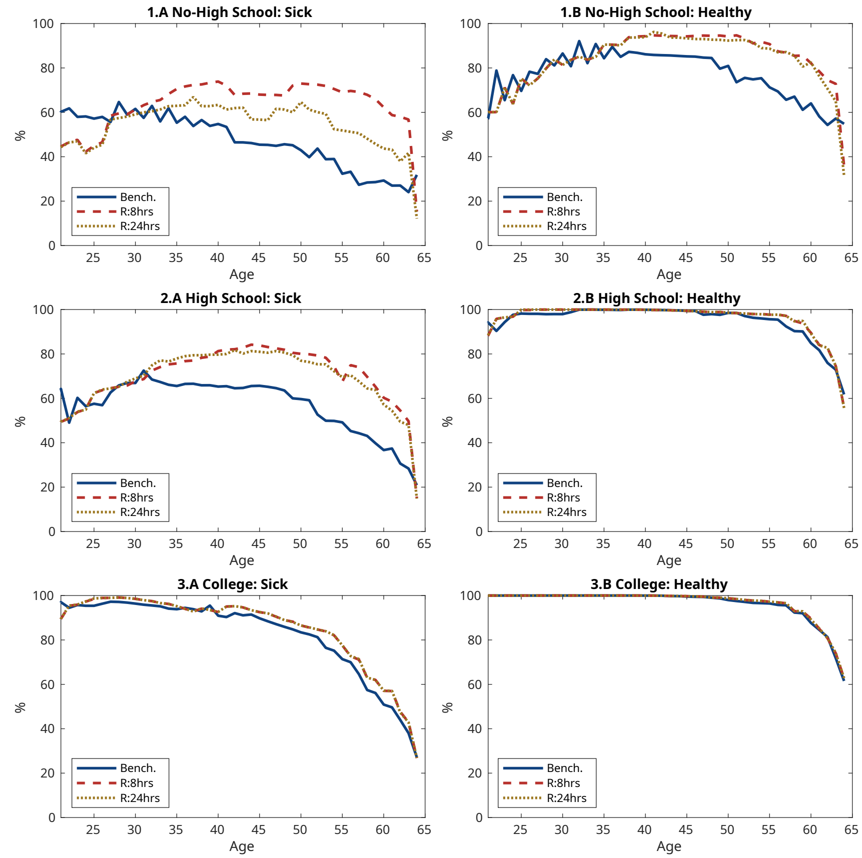


Figure 9: **Health insurance enrollment with work requirements of 8 hours/week (Partial equilibrium)**

Notes: Work requirements are only introduced for healthy working age individuals.



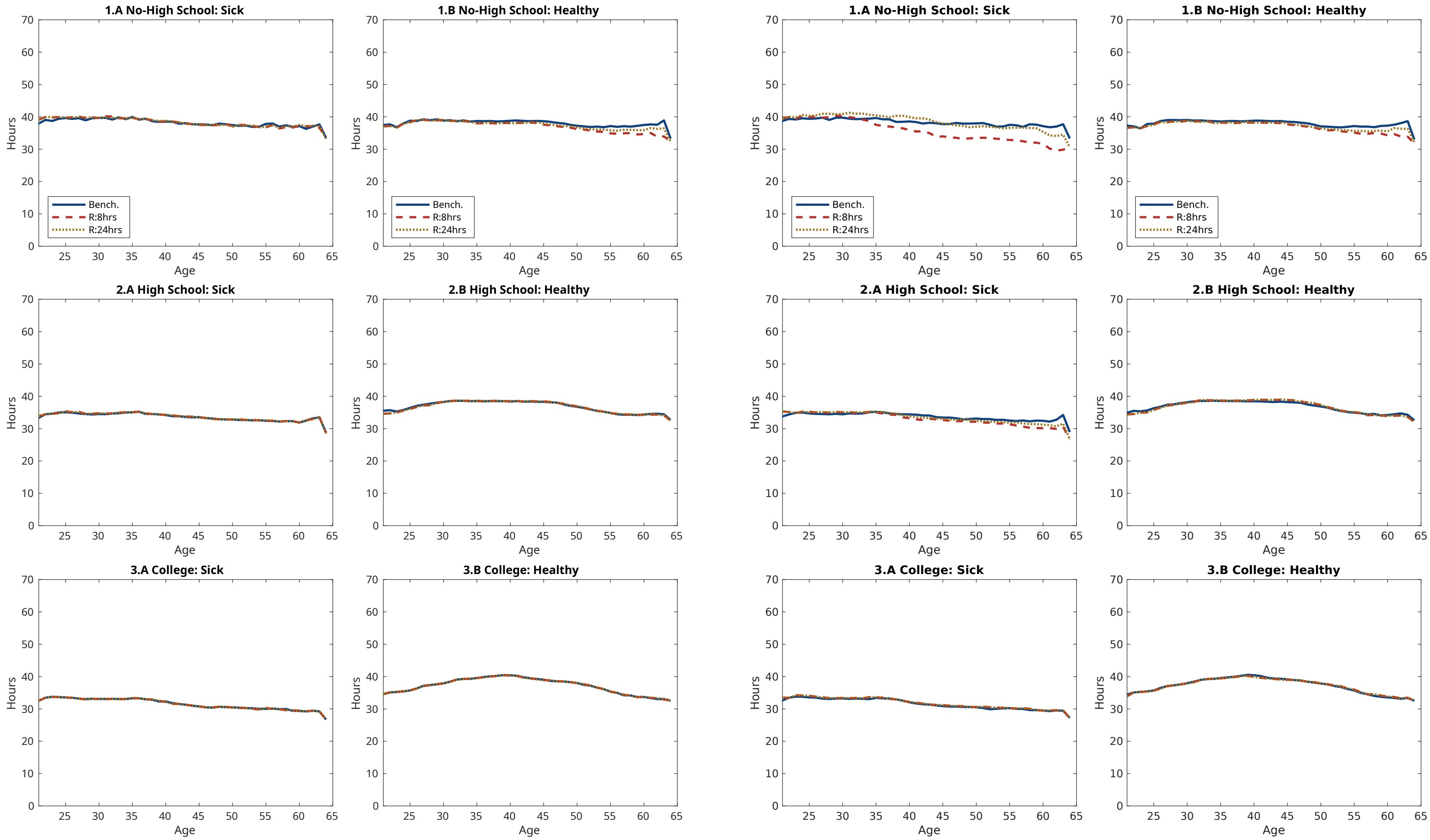
(a) Work requirements (healthy working age individuals)



(b) Work requirements (all working age individuals)

Figure 10: **Labor participation with 8 vs. 24 hours work requirements (General equilibrium)**

Notes: In panel (a) the work requirement is only introduced for healthy working age individuals. In panel (b) the work requirement is introduced for all working age individuals.

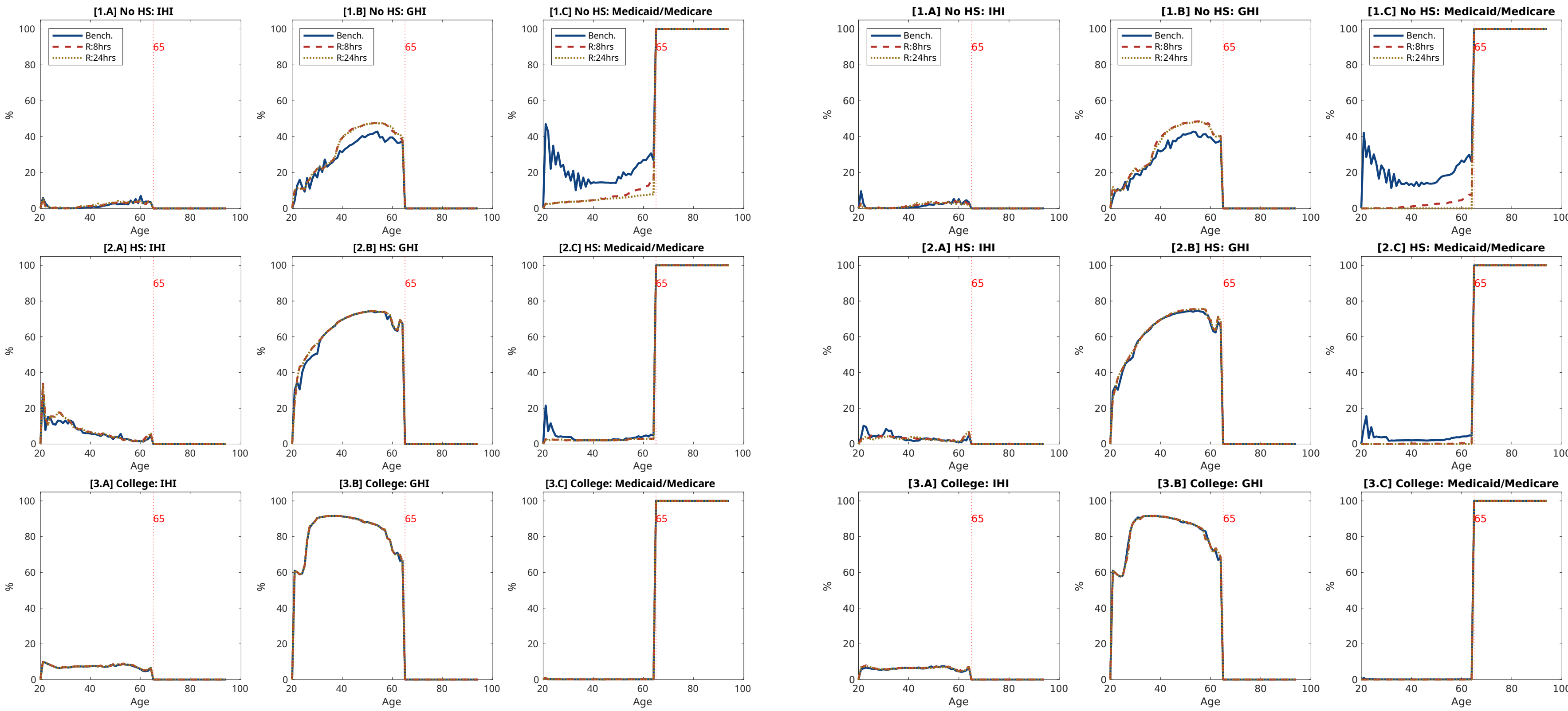


(a) Work requirements (healthy working age individuals)

(b) Work requirements (all working age individuals)

Figure 11: **Weekly work hours of active workers with 8 vs. 24 hours work requirements (General equilibrium)**

Notes:



(a) Work requirements (healthy working age individuals)

(b) Work requirements (all working age individuals)

Figure 12: **Health insurance enrollment with 8 or 24 hours work requirements (General equilibrium)**

Notes: In panel (a) the work requirement is only introduced for healthy working age individuals. In panel (b) the work requirement is introduced for all working age individuals.

Tables

Table 1: **External parameters**

Parameter descriptions	Parameter values	Sources
Periods	$J = 75$	
Periods work	$J_W = 45$	Age 20–64
Years modeled	75	Age 20–95
Total factor productivity	$A = 1$	Normalization
Capital share in prod.	$\alpha = 0.36$	Koh, Santaeulàlia-Llopis and Zheng (2020)
Capital depreciation	δ =6.4%	Koh, Santaeulàlia-Llopis and Zheng (2020)
Firm share of prem$^{\text{GHI}}$	$\psi = 0.8$	Jeske and Kitao (2009)
Relative risk aversion	$\sigma = 3$	Standard values between $2.5 - 3.5$
Equivalence weight	$\omega_{j,\vartheta}$	MEPS 1999–2009
Survival probabilities	$\pi_j\left(h\left(\varepsilon^h\right)\right)$ Pan. 8, Fig. 1	İmrohoroğlu and Kitao (2012)
Health Shocks	ε_j^hPan. 7, Fig. 1	MEPS 1999–2009
Medical spending shocks	$m\left(j,\vartheta,\varepsilon^h\right)$ Pan. 1–3, Fig. 1	MEPS 1999–2009
Health transition prob.	$\Pi^h\left(j,\vartheta,1_{\text{in}_j>0}\right)$ App. A	MEPS 1999–2009
Pers. labor shock auto-corr.	$\rho = 0.977$	French (2005)
Var. transitory labor shock	$\sigma_\varepsilon^2 = 0.0141$	French (2005)
Bias adjusted wage profile	$\bar{e}_j\left(\vartheta,h\left(\varepsilon^h\right)\right)$ App. A, Fig. A.3	MEPS 1999–2009
Private HI coins.	$\gamma^{\text{IHI}} = 0.46$	MEPS 1999–2009
Private group HI coins.	$\gamma^{\text{GHI}} = 0.31$	MEPS 1999–2009
Medicaid coins.	$\gamma^{\text{MAid}} = 0.11$	MEPS 1999–2009
Medicare coins.	$\gamma^{\text{MCare}} = 0.30$	MEPS 1999–2009
Medicare premiums/GDP	2.11%	Jeske and Kitao (2009)
Consumption tax	$\tau^C = 5\%$	IRS
Bequest parameter	$\theta_2 = \$500,000$	De Nardi (2004); French (2005)
Bequest Tax	$\tau^{\text{Beq}} = 20\%$	De Nardi and Yang (2014)
Payroll tax Soc. Sec.	$\tau^{\text{SS}} = 12.4\%$	SSA (2007)
Payroll tax Medicare	$\tau^{\text{MCare}} = 2.9\%$	SSA (2007)
Govt cons	$C_G/Y = 15\%$	BEA 2009
Tax progressivity para.	$\tau = 0.053$	Guner, Lopez-Daneri and Ventura (2016)
Consumption floor	$c_{\min} = \$2,500$	De Nardi, French and Jones (2010)

Notes: These parameters are based on our own estimates from MEPS and CMS data as well as other studies.

Table 2: **Internal (Calibrated) parameters**

Parameters	Values	Calibration targets	Model generated moments	Data	Sources
Discount factor	$\beta = 0.995$	$\frac{K}{Y}$	2.82	3	Standard value
Population adjustment rate	$n = 0.01$	Fraction of pop 65+	17.5%	17.5%	US Census 2010
Fixed time cost of labor	$\bar{n}_j(\vartheta,h)$	Labor participation by age	Fig. 3		MEPS 1999–2009
Pref. cons. vs. leisure	$\eta = 0.272$	Avge. work hours workers	Pan2, Fig. 2		MEPS 1999–2009
GHI prem. scaling	$\phi^{\text{GHI}} = 0.75$	GHI take-up of 25 year olds	Pan4, Fig. 2		MEPS 1999–2009
Tax scaling parameter	$\lambda = 1.016$	Clear govt BC with C_G/Y	14%	$15\% - 17\%$	BEA 2009
Bequest parameter	$\theta_1 = 100$	Asset holding of old (90–94)	Pan4, Fig. 2		
Pension scaling	$\Psi = 0.32$	Size of Social Security/Y	4.5%	4.8%	SSA (2010)
Medicaid asset test	$\bar{a}^{\text{MAid}} = \$75k$	Age 40–64 on Medicaid	Pan6, Fig. 2		MEPS 1999–2009
Medicaid income test	$\bar{y}^{\text{MAid}} = \$5,5k$	Age 20–39 on Medicaid	Pan6, Fig. 2		MEPS 1999–2009
Consumption floor	$c_{\min} = \$2,250$	Frac. net-assets<USD 5,000	20 (of popul.)	20%	Jeske and Kitao (2009)

Notes: We choose these parameters in order to match a set of target moments in the data.

Table 3: **Performance: Fraction of education and health types of working population age 20–65**

Moments	**Model**	**Data**
Sick		
No High School	2.3%	3.7%
High School	5.1%	5.2%
College	1.4%	1.2%
Healthy		
No High School	16.2%	14.9%
High School	50.0%	49.7%
College	25.1%	25.1%

Notes: These are not calibration targets but the outcome of initial share of individuals by education and health at age 20 the subsequent evolution of health states over the lifecycle. Our model with exogenous health states tracks the overall fraction of individual types by education and health very well. Weighted data from MEPS 1999–2009. Sick are individuals who report having fair or poor health. Healthy are individuals who report excellent, very good, and good health. We show the distribution of health-education types of working age individuals between age 20–65.

Table 4: **Performance of the benchmark model**

Moments	**Model**	**Data**	**Sources**
Medical expenses/Y	15.9%	17.2%*	NHEA (2020*b*)
Gini medical spending	0.57	0.60	MEPS 1999–2009
Gini gross income	0.33	0.46	MEPS 1999–2009
Gini labor income	0.45	0.54	MEPS 1999–2009
Gini assets	0.54	0.69	PSID 1999–2009
Frisch labor supply elasticities	1.19–1.51	1.1–1.7	Fiorito and Zanella (2012)
Interest rate: r	6.6%	$5.2-5.9$%	Gomme, Ravikumar and Rupert (2011)
Size of Medicare/Y	5.4%	3.96% (3.44%)**	NHEA (2020*a*)
Size of Medicaid/Y	0.68%	1.49% (2.58%)***	CMS-OAC (2010), NHEA (2020*a*)
Medicaid/enrolled (work-age)	$7,000	$9,611	CMS-OAC (2010)

Notes: These are not calibration targets.
* The 17.2 percent figure includes spending on children which our model does not cover.
** We do not distinguish between Medicare and Medicaid for the population older than 65. We therefore compare the size of Medicare in the model to the spending of Medicare plus Medicaid on individuals older than 65 to capture the out-of-pocket spending of the older generation more realistically without explicitly modeling Medicaid past the age of 65. According to NHEA (2020*b*) aggregate Medicare spending in 2010 was approximately 3.44 percent of GDP. Medicaid spending on the age was around 74.6 billions in 2009 (CMS-OAC, 2010, Table 2, p. 13) which is about 0.52 percent of GDP. The total size of Medicare plus Medicaid spending the 65+ population is therefore around 3.96 percent of GDP. More details are provided in Section 5.5.
*** Medicaid in the model refers to the portion of Medicaid that targets the working age population from age 20–65. Removing spending on children and retired individuals (approx. 42.3 percent of total Medicaid spending according to CMS-OAC (2010)) results in total Medicaid spending on the working age population of about 1.5 percent of GDP in 2009. This includes spending on disabled and non-disabled individuals. More details are provided in Section 5.5.

Table 5: **Medicaid work requirements for healthy workers (Partial equilibrium)**

	Bench.	8Hrs	16Hrs	20Hrs	24Hrs		ACA-B.	ACA-8	ACA-16	ACA-20	ACA-24
Assets	100.00	100.26	100.30	100.30	100.30	Assets	100.00	99.81	99.79	99.75	99.75
Consumption	100.00	100.57	100.60	100.60	100.60	Consumption	100.00	99.96	100.01	100.06	100.07
Labor part. rate	73.19	74.58	74.54	74.54	74.54	Labor part. rate	72.61	73.12	73.19	73.27	73.29
Agg. work hours	100.00	101.45	101.53	101.53	101.53	Agg. work hours	100.00	100.01	100.17	100.31	100.35
Weekly hrs. workers	37.08	36.92	36.96	36.96	36.96	Weekly hrs. workers	36.53	36.28	36.30	36.31	36.32
IHI-subsidy						**IHI-subsidy**	100.00	123.44	125.32	126.83	127.30
Insured-working age (%)	73.68	71.48	71.30	71.30	71.30	Insured-working age (%)	75.58	74.78	74.72	74.90	74.85
• IHI (%)	6.50	6.72	6.74	6.74	6.74	• IHI (%)	10.01	12.21	12.28	12.37	12.39
• GHI (%)	61.05	62.45	62.42	62.41	62.41	• GHI (%)	59.40	59.83	59.86	60.06	60.03
• Medicaid (%)	6.13	2.31	2.15	2.14	2.14	• Medicaid (%)	6.17	2.74	2.57	2.47	2.43
Medicaid payments	100.00	72.30	69.01	68.97	68.97	Medicaid payments	100.00	81.21	77.96	76.65	76.13
Avge.Medicaid paym. ($1,000)	6.99	13.41	13.76	13.76	13.76	Avge.Medicaid paym. ($1,000)	7.95	14.54	14.87	15.25	15.38
SI (c_{min}) transfers	100.00	121.68	129.11	129.34	129.34	SI (c_{min}) transfers	100.00	133.62	133.97	134.97	134.82
Avge.SI transf. ($1,000)	4.61	4.40	4.58	4.59	4.59	Avge.SI transf. ($1,000)	3.29	3.27	3.28	3.27	3.27
SI total recipients (%)	1.85	2.35	2.41	2.42	2.42	SI total recipients (%)	1.23	1.67	1.67	1.68	1.69
SI retired recip. (%)	0.43	0.38	0.38	0.38	0.38	SI retired recip. (%)	0.09	0.10	0.10	0.10	0.10
SI wrk-age recip. (%)	1.41	1.96	2.03	2.03	2.03	SI wrk-age recip. (%)	1.14	1.57	1.57	1.58	1.59
SI recip.among wrk-age (%)	1.73	2.40	2.49	2.49	2.49	SI recip.among wrk-age (%)	1.40	1.92	1.92	1.94	1.94
• Low-inc sick (%)	12.08	11.53	11.95	11.96	11.96	• Low-inc sick (%)	9.42	9.14	9.18	9.13	9.06
• Low-inc healthy (%)	47.61	53.76	54.50	54.52	54.52	• Low-inc healthy (%)	51.03	56.27	56.24	56.24	56.35
• Mid-inc sick (%)	21.10	17.23	16.65	16.64	16.64	• Mid-inc sick (%)	21.15	17.01	17.02	17.12	17.10
• Mid-inc healthy (%)	18.11	16.68	16.12	16.11	16.11	• Mid-inc healthy (%)	17.18	16.69	16.67	16.62	16.60
• High-inc sick (%)	1.11	0.80	0.78	0.77	0.77	• High-inc sick (%)	1.21	0.89	0.89	0.88	0.88
• High-inc healthy (%)	0.00	0.00	0.00	0.00	0.00	• High-inc healthy (%)	0.00	0.00	0.00	0.00	0.00
Tax revenue	100.00	100.74	100.79	100.79	100.79	Tax revenue	100.00	99.84	99.88	99.92	99.93
• Income tax revenue	100.00	100.71	100.77	100.77	100.77	• Income tax revenue	100.00	99.72	99.75	99.75	99.77
SI/tax revenue (%)	0.70	0.84	0.89	0.90	0.90	SI/tax revenue (%)	0.32	0.43	0.43	0.43	0.43
Medicaid/tax revenue (%)	2.68	1.92	1.84	1.83	1.83	Medicaid/tax revenue (%)	2.91	2.37	2.27	2.23	2.22
Gini: wealth	0.53	0.53	0.53	0.53	0.53	Gini: wealth	0.52	0.53	0.53	0.53	0.53
Gini: OOP med.spend.	0.55	0.54	0.54	0.54	0.54	Gini: OOP med.spend.	0.51	0.50	0.50	0.50	0.50
Welfare all (%CEV)	0.00	-0.74	-0.79	-0.79	-0.79	Welfare all (%CEV)	0.00	-0.32	-0.34	-0.36	-0.37
• %CEV Low-inc sick	0.00	-2.86	-3.05	-3.06	-3.06	• %CEV Low-inc sick	0.00	-1.53	-1.50	-1.53	-1.62
healthy	0.00	-2.88	-3.14	-3.15	-3.15	healthy	0.00	-1.55	-1.60	-1.66	-1.71
• %CEV Mid-inc sick	0.00	-0.28	-0.28	-0.28	-0.28	• %CEV Mid-inc sick	0.00	0.02	-0.01	-0.02	-0.02
healthy	0.00	-0.39	-0.39	-0.39	-0.39	healthy	0.00	-0.05	-0.08	-0.10	-0.10
• %CEV High-inc sick	0.00	0.00	0.00	0.00	0.00	• %CEV High-inc sick	0.00	-0.00	-0.00	-0.00	-0.00
healthy	0.00	0.00	0.00	0.00	0.00	healthy	0.00	-0.01	-0.01	-0.01	-0.01

Notes: Medicaid work requirements are implemented only for the **healthy** working age population from age 20–64 with different week hour thresholds. Healthy is defined as having a health state of $h \in \{\text{excellent}, \text{very good}, \text{good}\}$ and sick is defined as $h \in \{\text{fair}, \text{poor}\}$. Partial equilibrium results do not account for price adjustments, the production side and government budget constraints. The left part of the table shows the results without the provision of the ACA in place. The right part of the table shows the results with the ACA provisions in place and compares the results of the reform to a steady state with ACA policies.

Table 6: **Medicaid work requirements for healthy workers (General equilibrium)**

	Bench.	8Hrs	16Hrs	20Hrs	24Hrs
Output	100.00	100.96	101.01	101.02	101.02
Capital	100.00	101.29	101.34	101.36	101.36
Consumption	100.00	101.10	101.17	101.17	101.17
Labor part. rate	73.19	74.52	74.51	74.51	74.51
Agg. work hours	100.00	101.34	101.44	101.45	101.45
Weekly hrs. workers	37.08	36.91	36.95	36.95	36.95
K/Y	2.82	2.82	2.82	2.82	2.82
M/Y (%)	15.92	15.92	15.92	15.92	15.92
Interest (%)	6.79	6.75	6.75	6.75	6.75
Wages	100.00	100.17	100.18	100.18	100.18
Wages w/ GHI off.	100.00	100.08	100.09	100.09	100.09
Avge IHI premium	100.00	97.44	96.70	96.82	96.82
IHI-subsidy					
Avge GHI premium	100.00	100.22	100.31	100.31	100.31
Insured-working age (%)	73.68	71.98	71.76	71.74	71.74
• IHI (%)	6.50	7.24	7.21	7.18	7.18
• GHI (%)	61.05	62.39	62.39	62.39	62.39
• Medicaid (%)	6.13	2.34	2.17	2.16	2.16
Medicaid payments	100.00	73.91	70.43	70.40	70.40
Avge.Medicaid paym. ($1,000)	6.99	13.40	13.81	13.82	13.82
SI (c_{min}) transfers	100.00	123.93	132.29	132.46	132.46
Avge.SI transf. ($1,000)	4.61	4.42	4.63	4.63	4.63
SI total recipients (%)	1.85	2.36	2.44	2.44	2.44
SI retired recip. (%)	0.43	0.37	0.37	0.37	0.37
SI wrk-age recip. (%)	1.41	1.99	2.06	2.07	2.07
SI recip.among wrk-age (%)	1.73	2.43	2.53	2.53	2.53
• Low-inc sick (%)	12.08	11.69	12.14	12.12	12.12
• Low-inc healthy (%)	47.61	53.96	54.73	54.77	54.77
• Mid-inc sick (%)	21.10	17.07	16.47	16.46	16.46
• Mid-inc healthy (%)	18.11	16.49	15.89	15.88	15.88
• High-inc sick (%)	1.11	0.79	0.76	0.76	0.76
• High-inc healthy (%)	0.00	0.00	0.00	0.00	0.00
Tax revenue	100.00	99.78	99.77	99.77	99.77
• Income tax revenue	100.00	98.63	98.54	98.55	98.55
SI/tax revenue (%)	0.70	0.87	0.93	0.93	0.93
Medicaid/tax revenue (%)	2.68	1.99	1.89	1.89	1.89
Gini: wealth	0.53	0.53	0.53	0.53	0.53
Gini: OOP med.spend.	0.55	0.54	0.54	0.54	0.54
Welfare all (%CEV)	0.00	-0.05	-0.07	-0.07	-0.07
• %CEV Low-inc sick	0.00	-1.92	-2.07	-2.07	-2.07
healthy	0.00	-1.90	-2.14	-2.15	-2.15
• %CEV Mid-inc sick	0.00	0.41	0.42	0.42	0.42
healthy	0.00	0.27	0.31	0.30	0.30
• %CEV High-inc sick	0.00	0.62	0.61	0.60	0.60
healthy	0.00	0.56	0.60	0.60	0.60

	ACA-B.	ACA-8	ACA-16	ACA-20	ACA-24
Output	100.00	100.31	100.32	100.36	100.35
Capital	100.00	100.41	100.44	100.46	100.43
Consumption	100.00	100.36	100.37	100.43	100.43
Labor part. rate	72.61	73.35	73.36	73.44	73.43
Agg. work hours	100.00	100.40	100.43	100.53	100.54
Weekly hrs. workers	36.53	36.31	36.31	36.31	36.32
K/Y	2.78	2.79	2.79	2.79	2.79
M/Y (%)	15.91	15.91	15.91	15.91	15.91
Interest (%)	6.93	6.91	6.91	6.92	6.92
Wages	100.00	100.05	100.06	100.04	100.04
Wages w/ GHI off.	100.00	100.01	100.02	100.00	100.00
Avge IHI premium	100.00	90.03	90.36	90.28	90.57
IHI-subsidy	100.00	114.10	116.10	117.39	117.86
Avge GHI premium	100.00	99.99	100.04	99.97	99.91
Insured-working age (%)	75.58	75.23	75.32	75.51	75.39
• IHI (%)	10.01	12.60	12.76	12.91	12.87
• GHI (%)	59.40	60.12	60.12	60.24	60.17
• Medicaid (%)	6.17	2.51	2.44	2.36	2.35
Medicaid payments	100.00	76.73	75.40	74.41	74.20
Avge.Medicaid paym. ($1,000)	7.95	14.96	15.08	15.37	15.43
SI (c_{min}) transfers	100.00	131.65	131.93	132.69	132.80
Avge.SI transf. ($1,000)	3.29	3.25	3.25	3.25	3.25
SI total recipients (%)	1.23	1.66	1.66	1.67	1.67
SI retired recip. (%)	0.09	0.09	0.09	0.09	0.09
SI wrk-age recip. (%)	1.14	1.57	1.57	1.58	1.58
SI recip.among wrk-age (%)	1.40	1.92	1.92	1.93	1.94
• Low-inc sick (%)	9.42	9.42	9.46	9.46	9.41
• Low-inc healthy (%)	51.03	56.26	56.24	56.10	56.18
• Mid-inc sick (%)	21.15	16.77	16.77	16.90	16.88
• Mid-inc healthy (%)	17.18	16.67	16.65	16.66	16.65
• High-inc sick (%)	1.21	0.88	0.88	0.87	0.87
• High-inc healthy (%)	0.00	0.00	0.00	0.00	0.00
Tax revenue	100.00	99.79	99.80	99.83	99.81
• Income tax revenue	100.00	99.35	99.34	99.37	99.34
SI/tax revenue (%)	0.32	0.42	0.42	0.42	0.43
Medicaid/tax revenue (%)	2.91	2.24	2.20	2.17	2.16
Gini: wealth	0.52	0.52	0.52	0.52	0.52
Gini: OOP med.spend.	0.51	0.50	0.50	0.50	0.50
Welfare all (%CEV)	0.00	-0.18	-0.17	-0.18	-0.18
• %CEV Low-inc sick	0.00	-1.41	-1.38	-1.35	-1.34
healthy	0.00	-1.42	-1.43	-1.44	-1.45
• %CEV Mid-inc sick	0.00	0.08	0.07	0.09	0.07
healthy	0.00	0.04	0.05	0.03	0.04
• %CEV High-inc sick	0.00	0.28	0.30	0.28	0.28
healthy	0.00	0.23	0.24	0.25	0.25

Notes: Medicaid work requirements are implemented only for the **healthy** working age population from age 20–64 with different week hour thresholds. Healthy is defined as having a health state of $h \in \{\text{excellent, very good, good}\}$ and sick is defined as $h \in \{\text{fair, poor}\}$. The left part of the table shows the results without the provision of the ACA in place. The right part of the table shows the results with the ACA provisions in place and compares the results of the reform to a steady state with ACA policies.

Table 7: **Medicaid work requirements for all workers (General equilibrium)**

	Bench.	8Hrs	16Hrs	20Hrs	24Hrs
Output	100.00	101.94	101.88	101.88	101.88
Capital	100.00	102.77	102.69	102.69	102.69
Consumption	100.00	102.12	102.04	102.03	102.03
Labor part. rate	73.19	75.45	75.14	75.13	75.13
Agg. work hours	100.00	102.30	102.18	102.17	102.17
Weekly hrs. workers	37.08	36.80	36.90	36.90	36.90
K/Y	2.82	2.84	2.84	2.84	2.84
M/Y (%)	15.92	15.93	15.93	15.93	15.93
Interest (%)	6.79	6.68	6.68	6.68	6.68
Wages	100.00	100.46	100.46	100.46	100.46
Wages w/ GHI off.	100.00	100.27	100.27	100.28	100.28
Avge IHI premium	100.00	103.40	102.89	102.86	102.86
IHI-subsidy					
Avge GHI premium	100.00	103.28	103.01	102.97	102.97
Insured-working age (%)	73.68	70.50	69.46	69.46	69.46
• IHI (%)	6.50	7.66	7.03	7.02	7.02
• GHI (%)	61.05	62.45	62.43	62.44	62.44
• Medicaid (%)	6.13	0.39	0.01	0.00	0.00
Medicaid payments	100.00	11.26	0.16	0.00	0.00
Avge.Medicaid paym. ($1,000)	6.99	12.18	8.55	4.25	
SI (c_{min}) transfers	100.00	249.57	306.47	308.70	308.70
Avge.SI transf. ($1,000)	4.61	8.06	9.02	9.05	9.05
SI total recipients (%)	1.85	2.81	3.11	3.13	3.13
SI retired recip. (%)	0.43	0.36	0.39	0.39	0.39
SI wrk-age recip. (%)	1.41	2.44	2.72	2.74	2.74
SI recip.among wrk-age (%)	1.73	2.99	3.33	3.35	3.35
• Low-inc sick (%)	12.08	16.36	19.07	19.21	19.21
• Low-inc healthy (%)	47.61	47.57	46.59	46.62	46.62
• Mid-inc sick (%)	21.10	21.23	20.92	20.82	20.82
• Mid-inc healthy (%)	18.11	14.37	12.99	12.93	12.93
• High-inc sick (%)	1.11	0.47	0.42	0.42	0.42
• High-inc healthy (%)	0.00	0.00	0.00	0.00	0.00
Tax revenue	100.00	99.33	99.43	99.44	99.44
• Income tax revenue	100.00	96.85	97.09	97.11	97.11
SI/tax revenue (%)	0.70	1.75	2.15	2.17	2.17
Medicaid/tax revenue (%)	2.68	0.30	0.00	0.00	0.00
Gini: wealth	0.53	0.53	0.53	0.53	0.53
Gini: OOP med.spend.	0.55	0.55	0.55	0.55	0.55
Welfare all (%CEV)	0.00	-0.32	-0.52	-0.53	-0.53
• %CEV Low-inc sick	0.00	-3.02	-3.53	-3.62	-3.62
healthy	0.00	-2.80	-3.39	-3.43	-3.43
• %CEV Mid-inc sick	0.00	-0.48	-0.59	-0.60	-0.60
healthy	0.00	-0.17	-0.30	-0.31	-0.31
• %CEV High-inc sick	0.00	0.76	0.70	0.69	0.69
healthy	0.00	1.13	1.07	1.07	1.07

	ACA-B.	ACA-8	ACA-16	ACA-20	ACA-24
Output	100.00	101.03	101.17	101.27	101.24
Capital	100.00	101.58	101.75	101.86	101.83
Consumption	100.00	101.11	101.26	101.40	101.36
Labor part. rate	72.61	74.38	74.31	74.42	74.30
Agg. work hours	100.00	101.07	101.27	101.47	101.41
Weekly hrs. workers	36.53	36.05	36.15	36.17	36.20
K/Y	2.78	2.80	2.80	2.80	2.80
M/Y (%)	15.91	15.91	15.91	15.91	15.91
Interest (%)	6.93	6.86	6.85	6.85	6.85
Wages	100.00	100.29	100.33	100.32	100.32
Wages w/ GHI off.	100.00	100.18	100.20	100.19	100.20
Avge IHI premium	100.00	92.66	94.26	93.56	93.69
IHI-subsidy	100.00	134.56	145.91	151.92	151.64
Avge GHI premium	100.00	103.53	104.30	104.26	104.13
Insured-working age (%)	75.58	74.45	74.36	74.74	74.54
• IHI (%)	10.01	13.93	14.54	15.15	15.09
• GHI (%)	59.40	59.50	59.36	59.45	59.45
• Medicaid (%)	6.17	1.01	0.46	0.13	0.00
Medicaid payments	100.00	28.77	9.77	2.84	0.00
Avge.Medicaid paym. ($1,000)	7.95	13.77	10.19	10.43	
SI (c_{min}) transfers	100.00	240.02	296.78	327.15	366.03
Avge.SI transf. ($1,000)	3.29	5.80	6.83	7.16	7.62
SI total recipients (%)	1.23	1.75	1.86	1.95	2.06
SI retired recip. (%)	0.09	0.10	0.10	0.10	0.11
SI wrk-age recip. (%)	1.14	1.66	1.75	1.85	1.95
SI recip.among wrk-age (%)	1.40	2.03	2.15	2.26	2.39
• Low-inc sick (%)	9.42	10.75	10.75	13.23	16.05
• Low-inc healthy (%)	51.03	52.74	50.08	50.32	49.32
• Mid-inc sick (%)	21.15	19.71	22.82	20.79	19.77
• Mid-inc healthy (%)	17.18	16.30	15.90	15.23	14.44
• High-inc sick (%)	1.21	0.49	0.45	0.43	0.41
• High-inc healthy (%)	0.00	0.00	0.00	0.00	0.00
Tax revenue	100.00	99.40	99.29	99.33	99.37
• Income tax revenue	100.00	98.00	97.68	97.67	97.74
SI/tax revenue (%)	0.32	0.77	0.95	1.05	1.18
Medicaid/tax revenue (%)	2.91	0.84	0.29	0.08	0.00
Gini: wealth	0.52	0.53	0.53	0.53	0.53
Gini: OOP med.spend.	0.51	0.51	0.51	0.51	0.51
Welfare all (%CEV)	0.00	-0.39	-0.38	-0.44	-0.49
• %CEV Low-inc sick	0.00	-2.19	-2.08	-2.30	-2.58
healthy	0.00	-1.91	-1.93	-2.27	-2.50
• %CEV Mid-inc sick	0.00	-0.82	-0.84	-0.80	-0.84
healthy	0.00	-0.39	-0.41	-0.41	-0.43
• %CEV High-inc sick	0.00	0.25	0.43	0.41	0.40
healthy	0.00	0.69	0.79	0.83	0.80

Notes: Medicaid work requirements are implemented for the entire working age population from age 20–64 with different week hour thresholds. The left part of the table shows the results without the provision of the ACA in place. The right part of the table shows the results with the ACA provisions in place and compares the results of the reform to a steady state with ACA policies.

Appendices

A Data appendix: Medical expenditure panel survey (MEPS)

A.1 Sample selection

We primarily use data from the Medical Expenditure Panel Survey (MEPS) from the years 1999–2009 for our estimation and calibration. MEPS provides a nationally representative survey about health care use, health expenditures, health insurance coverage as well as demographic data on income, health status, and other socioeconomic characteristics. The original household component of MEPS was initiated in 1996. Each year about $15,000$ households are selected and interviewed five times over two full calendar years. MEPS groups individuals into Health Insurance Eligibility Units (HIEU) which are subsets of households. We do abstract from family size effects and concentrate on adults aged 20–95 who are the head of the HIEU.

A variable in a MEPS survey of year t is typically represented three times as either VARNAME13, VARNAME24, and VARNAME35, where 13 indicates that this variable is either a response of a first round interview of an individual who entered the survey in year t or the third round interview of an individual who entered the survey in year $t-1$. Similarly 24 indicates that this response is the second interview response of the individual who entered in year t or the fourth round response of the individual who entered the previous year $t-1$. Finally, 35 indicates that this variable is the response from the third interview of an individual who entered in year t or the final fifth round interview response from an individual who entered in the prior year $t-1$ and then subsequently exits the survey.

We drop outlier observations from individuals whose gross household income exceeds 1 million USD, whose labor income exceeds 400,000 USD, and whose medical spending exceeds 100,000 USD.

A.2 Summary statistics

Summary statistics of the unweighted sample are presented in Table A.1 and a histogram of the age distribution is presented in Figure A.1. All dollar values are denominated in 2010 dollars using the OECD CPI for the US for all monetary measures.[53]

[53] OECD (2018), Inflation (CPI) (indicator). doi: 10.1787/eee82e6e-en (Accessed on 29 June 2018) at https://data.oecd.org/price/inflation-cpi.htm

Table A.1: **MEPS: Summary Statistics**

	(1) All mean/sd	(2) LaborIncome>$400 mean/sd
Year	2004.249	2004.217
	(3.074)	(3.090)
Age of head of HIEU	46.825	41.866
	(17.714)	(14.204)
Five-year age groups	5.980	4.982
	(3.559)	(2.848)
Female	0.442	0.396
	(0.497)	(0.489)
Married/Partnered	0.417	0.444
	(0.493)	(0.497)
Black	0.145	0.134
	(0.352)	(0.341)
Years of education	12.003	12.488
	(4.017)	(3.740)
Avge hourly wage over 3 waves	17.841	17.895
	(12.503)	(12.521)
Labor income (in $1,000)	25.467	35.215
	(31.239)	(31.720)
Labor income of HH (in $1,000)	46.762	58.495
	(48.387)	(48.591)
Pre-government HH income (in $1,000)	56.634	65.018
	(49.985)	(51.746)
Pre-government HIEU income (in $1,000)	43.964	52.159
	(45.821)	(48.203)
Total health expenditures (in $1,000)	3.837	2.522
	(8.707)	(6.323)
healthExpenditureHIEU	6.197	4.876
	(12.891)	(11.066)
Total health expenditures HIEU (in $1,000)	8.165	6.684
	(15.714)	(14.176)
Out-of-pocket health exp	0.679	0.527
	(1.644)	(1.286)
OOPExpenditureHIEU	1.110	0.979
	(2.190)	(1.948)
Total OOP expenditure HIEU ($1,000)	1.417	1.273
	(2.542)	(2.309)
No high school degree	0.286	0.230
	(0.452)	(0.421)
High school degree	0.511	0.537
	(0.500)	(0.499)
College or higher degree	0.193	0.224
	(0.395)	(0.417)
Insured	0.797	0.778
	(0.402)	(0.415)
Public health insurance	0.207	0.098
	(0.405)	(0.298)
Private health insurance	0.590	0.680
	(0.492)	(0.466)
d_H_excellent	0.173	0.206
	(0.378)	(0.404)
d_H_very_good	0.377	0.424
	(0.485)	(0.494)
d_H_good	0.300	0.288
	(0.458)	(0.453)
d_H_fair	0.116	0.071
	(0.320)	(0.258)
d_H_poor	0.033	0.010
	(0.178)	(0.100)
Observations	169543	122684

Notes: Unweighted summary statistics of heads of Health Insurance Eligibility Units (HIEU) based on MEPS 1999–2009.

Figure A.1: **MEPS: Age distribution**

Notes: Data source is MEPS 1999–2009, heads of HIEU, population weighted.

A.3 Cohort effects

Panel data variables over the lifecycle of an individual are determined by age, time and cohort effects. Since our model only explicitly accounts for age effects, we should ideally remove time and cohort effects from the data in order to make lifecycle observations from the data consistent with lifecycle statistics generated by the model. Since age, time and cohort effects are perfectly collinear it is difficult to estimate all three simultaneously (e.g., Jung and Tran (2014)). The literature (e.g., Kaplan (2012)) suggests to conduct separate analyses once controlling for the cohort effect and in a repeat exercise controlling for the time effect in order to assess modeling implications. In this work we explicitly control for cohort effects of wages, income, wealth and health expenditures by regressing the log of the output variable on a set of age and cohort dummies. We focus on controlling of cohort effects because Jung and Tran (2014) show that they seem to be large in health expenditure data and time effects can be somewhat mitigated by deflating with the CPI index. We then use predictions of these regressions to generate cohort-adjusted variables with the birth cohort 1945–1954 as reference group.

A.4 Unbiased wage profiles

We follow Rupert and Zanella (2015) and Casanova (2013) and estimate a selection model to remove biases in self reported wages. Rupert and Zanella (2015) use PSID and CPS data and then employ a Tobit 2-step procedure based on Wooldridge (1995) to estimate selection corrected wage profiles. They find that once wage profiles are bias corrected they tend to be very flat which contradicts the often used hump-shaped wage profiles. Similarly, Casanova (2013) uses HRS data and finds evidence of flat wage profiles but no selection bias.

In our selection model we include fourth order polynomials in age, a health status variable, whether someone lives with a partner, family size, schooling, gender, and an indicator for part-time work. We use indicator variables for whether an individual is older than 62 and a second indicator variable for whether an individual is older 65 in the selection equation as is customary in this literature. These two indicator variables are exclusion restrictions and not included in the outcome equation of the selection model. Figure A.3 shows the wage profiles for healthy and unhealthy types and the three educational groups.

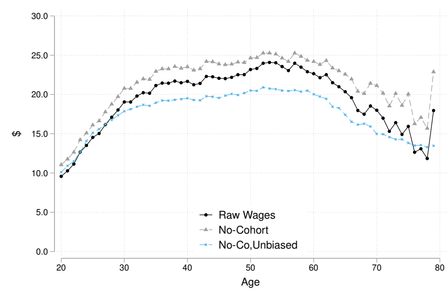


Figure A.2: **MEPS: Raw wages vs. unbiased and cohort adjusted wage profiles**

Notes: Data source is MEPS 1999–2009, heads of HIEU, population weighted. We report raw hourly wages, cohort adjusted wages, and cohort adjust unbiased wages. Unbiased wages are based on a selection model. The latter is used as wage efficiency input. We use a dummy variable approach to estimate unbiased wages profiles for two health (healthy vs. sick) and two education (no college vs. college) types.

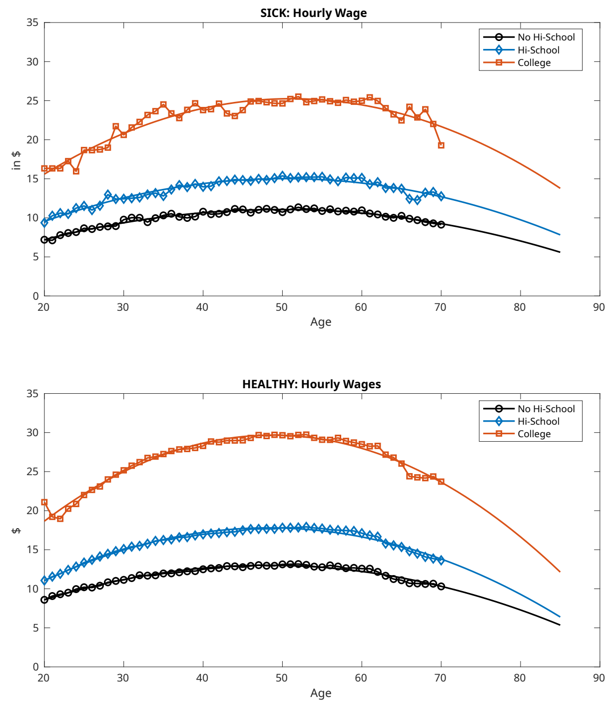


Figure A.3: **MEPS: Selection bias adjusted wage profiles of heads of HIEUs**

Notes: Data source is MEPS 1999–2009, heads of HIEU, population weighted. This is used as wage efficiency input by health and education type into the model.

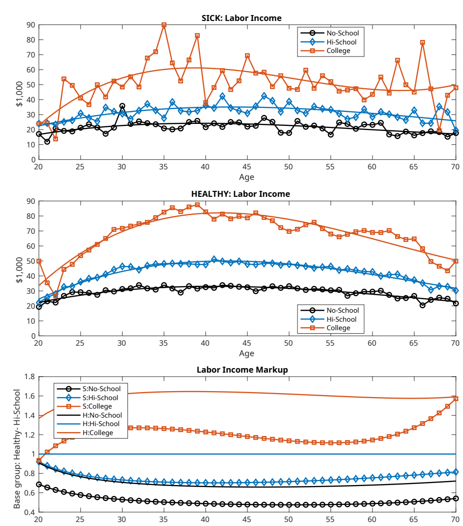


Figure A.4: **MEPS: Cohort adjusted labor income profiles of heads of HIEUs**

Notes: Data source is MEPS 1999–2009, heads of HIEU, population weighted. This is a calibration target.

A.5 Medical expenditure profiles

MEPS provides high quality health expenditure and health care utilization data. The MEPS Household Component (HC) collects data in each round on use and expenditures for office- and hospital-based care, home health care, dental services, vision aids, and prescribed medicines. In addition, the MEPS Medical Provider Component (MPC) is a follow-back survey that collects data from a sample of medical providers and pharmacies that were used by sample persons in a given year. Expenditure data collected in the MPC are generally regarded as more accurate than information collected in the HC and are used to improve the overall quality of MEPS expenditure data. Expenditures in MEPS refer to what is paid for health care services. Expenditures are defined as the sum of direct payments for care provided during the year, including out-of-pocket payments and payments by private insurance, Medicaid, Medicare, and other sources. Payments for over-the-counter drugs are not included in MEPS and neither are payments for long-term care. Similarly payments not related to specific medical events, such as Medicaid Disproportionate Share and Medicare Direct Medical Education subsidies, are also not included. MEPS records actual payments made and not original charges which tend to be much higher. However, it has become customary to apply discounts. In addition charges associated with uncollected liabilities, bad debt and charitable care do not constitute actual health care expenses and are therefore not counted. We drop 443 observations (out of 239,170) with health expenditure larger than USD 100,000 so that our estimates are not driven by outliers.

We next calculate average medical spending of each health state type by age and education level (i.e., no high school, high school, or college and higher) to determine the magnitude of the health spending shocks $m\left(j, \vartheta, \varepsilon^h\right)$ for a model period. We use a cubic spline to smooth out the expenditure profiles shown in Figure A.5.

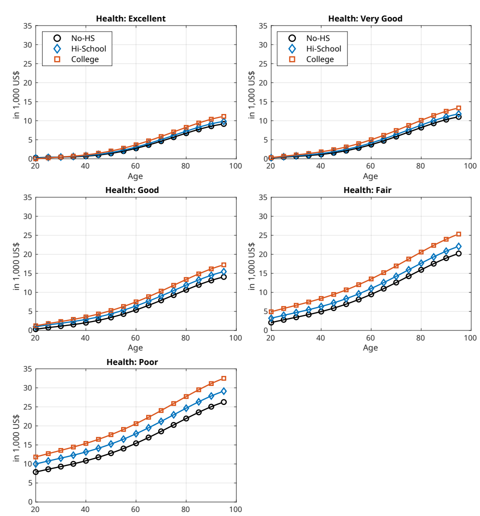


Figure A.5: **MEPS: Average health spending by 5-year age group and health state**

Notes: Data source is MEPS 1999–2009, heads of HIEU, population weighted. Cohort adjusted average health spending by self-reported health state and age in 2009 USD.

A.6 Health state transition probabilities

We group individuals into five health groups $\varepsilon^h \in \{1,2,3,4,5\}$ by self-reported health status: 1. excellent health, 2. very good health, 3. good health, 4. fair health, and 5. poor health. We then estimate an ordered logit model with next year's health state as dependent variable. We regress this on current health state, a 4th order age polynomial, and indicator variables for relationship status, gender, race, schooling type, insurance status, region, birth cohort, and a variable controlling for household income. We then use these estimates and predict the probability to move between health states by current health, age, education, and insurance status (all other control variables are evaluated at their average). This results in conditional transition probabilities $\Pr\left(\varepsilon^h_{t+1}|\varepsilon^h_t, j, \vartheta, 1_{\text{in}_j>0}\right)$ where t is the current year and $t+1$ is the future year. We collect these annual transition probabilities into a transition probability matrix $\Pi^h\left(t, \vartheta, 1_{\text{in}_j>0}\right)$. Figure A.6 shows the profiles of the conditional health transition probabilities for the uninsured and Figure A.7 shows the conditional health transition probabilities for the insured. Overall the insured have higher probabilities to remain in better health than the uninsured. However, the differences are very small and range between 1 to 2 percentage points.

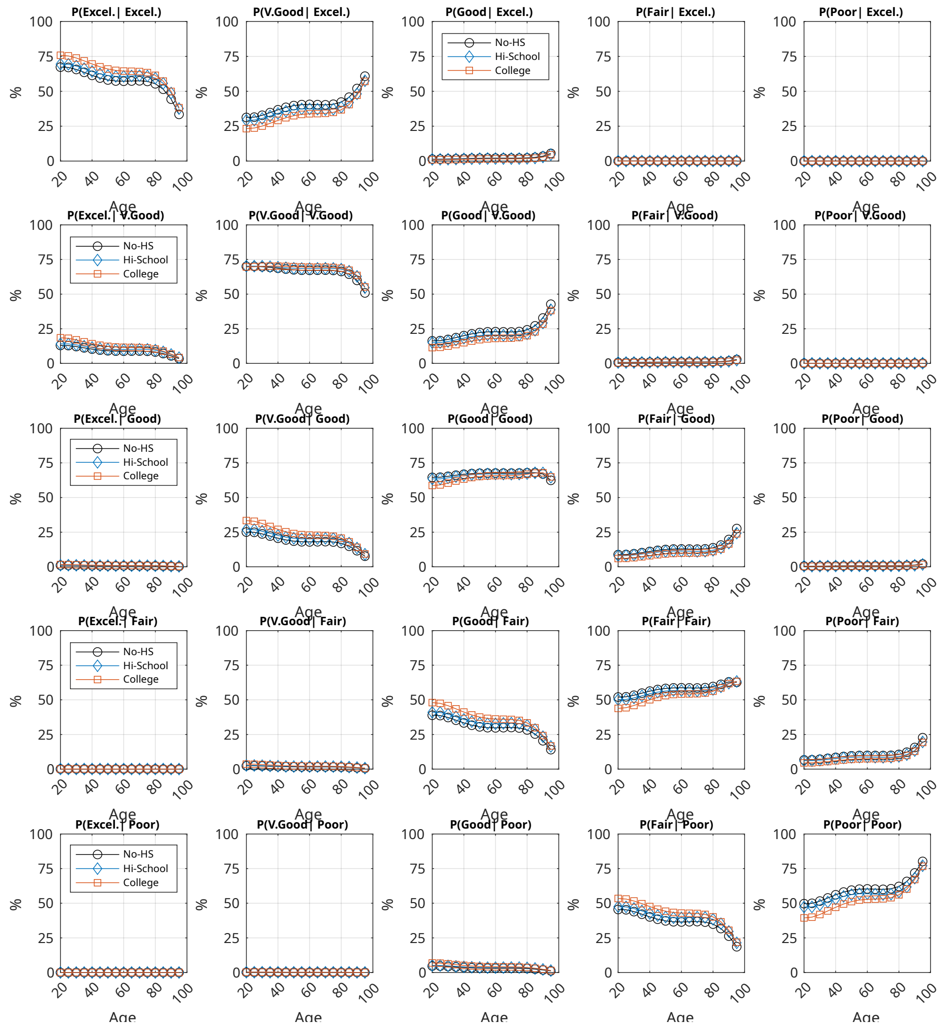


Figure A.6: **Uninsured: Conditional health status Markov transition probabilities**

Notes: The estimates of the conditional health state transition probabilities are based on an ordered logit model. Data source is MEPS 1999–2009, heads of HIEU, population weighted.

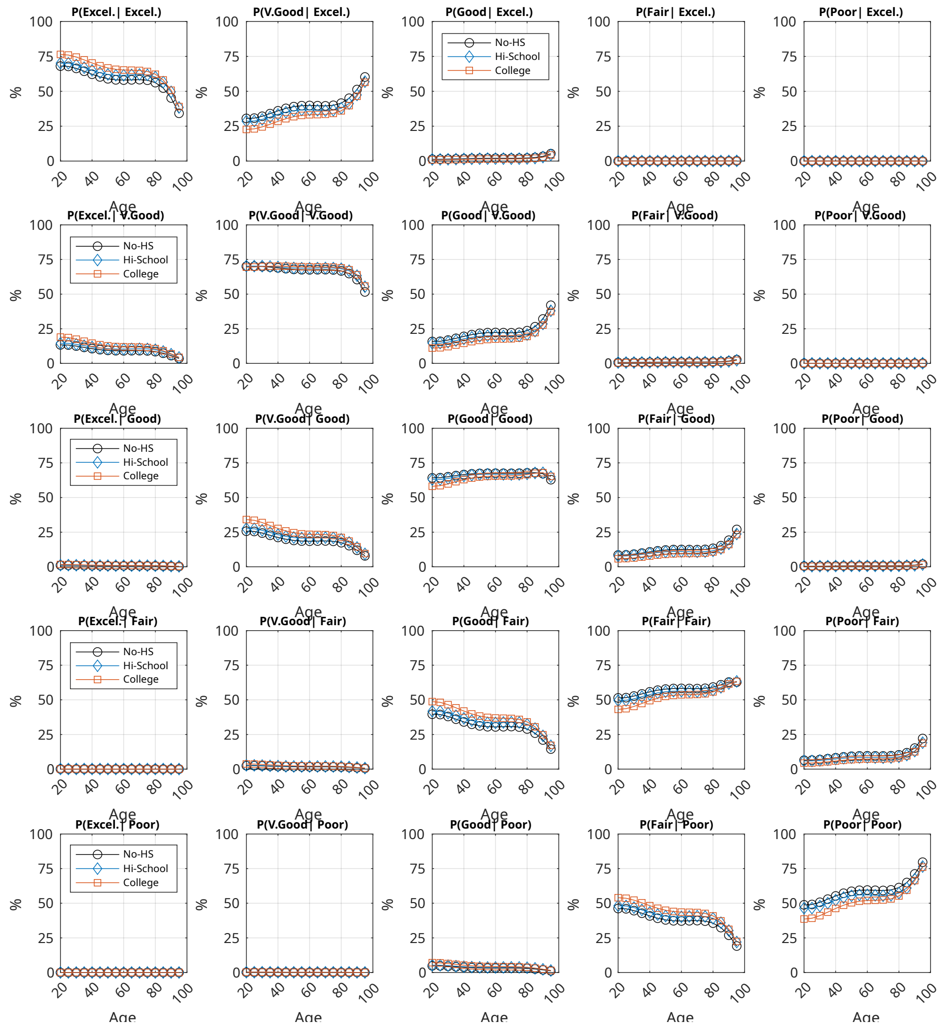


Figure A.7: **Insured: Conditional health status Markov transition probabilities**

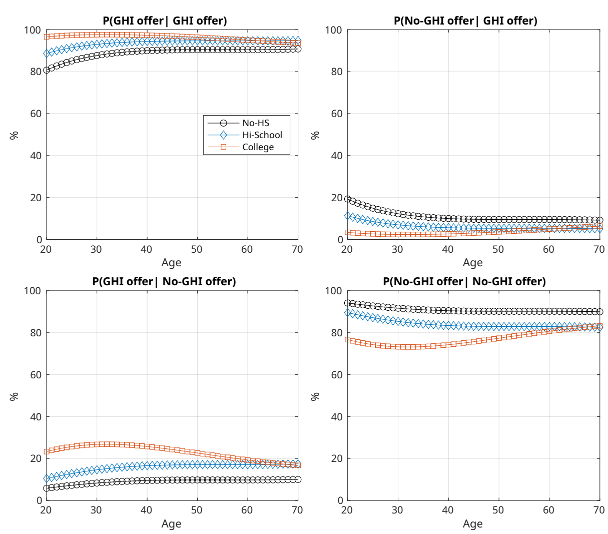
Notes: The estimates of the conditional health state transition probabilities are based on an ordered logit model. Data source is MEPS 1999–2009, heads of HIEU, population weighted.

A.7 Group Health Insurance (GHI) offer status

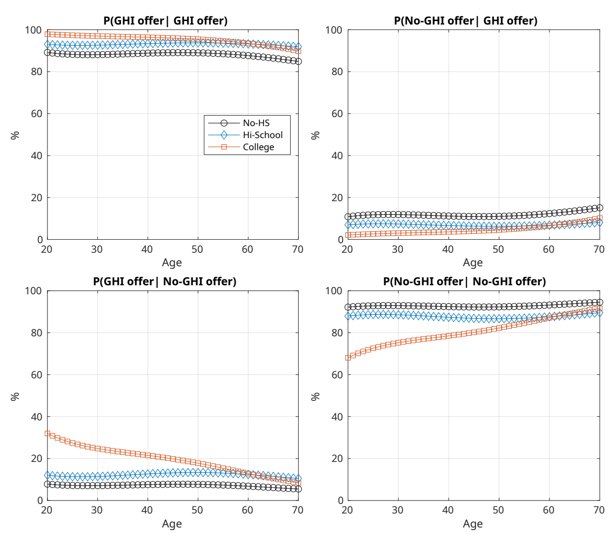
MEPS asks detailed questions about the type and length of health insurance coverage. If health insurance is offered through the current main job (OFFER31X, OFFER42X, OFFER 53X) an individual can opt into buying employer sponsored (group) health insurance. The offer variable is automatically set to one (and skipped in the survey) if the individual reports having health insurance via their employer. We set the indicator variable GROUP-OFFER equal to one if the individual reports having received a health insurance offer from their employer in either one of the three interview rounds.

In addition, a second variable asks whether an individual has had public (PUBJAx–PUBDEx) or private health insurance (PRIJAx–PRIDEx) for each month. In addition, if it is private health insurance, the survey asks whether the insurance is from an employer or union (PEGJAx–PEGDEx). We define an individual as having employer provided group insurance (GHI) in a given year if she is covered for at least 8 months with employer provided insurance, she is otherwise classified as having individual private health insurance (IHI).

We estimate an order logit model in order to determine the GHI offer probability for each age-education group where we distinguish between individuals with less than high school, high school, or college level education. The predicted probabilities of receiving a GHI offer from an employer are shown in Figure A.8 for the benchmark pre-ACA economy. We use data from MEPS 1999–2009. WE then similarly estimate the post-ACA GHI offer transition probability profiles using data from MEPS 2015–2017 as shown in Figure A.8b. Overall, the GHI offer probabilities are higher in the post-ACA regime due to the employer mandates that became effective in 2015 and 2016.



(a) Pre-ACA: MEPS 1999–2009



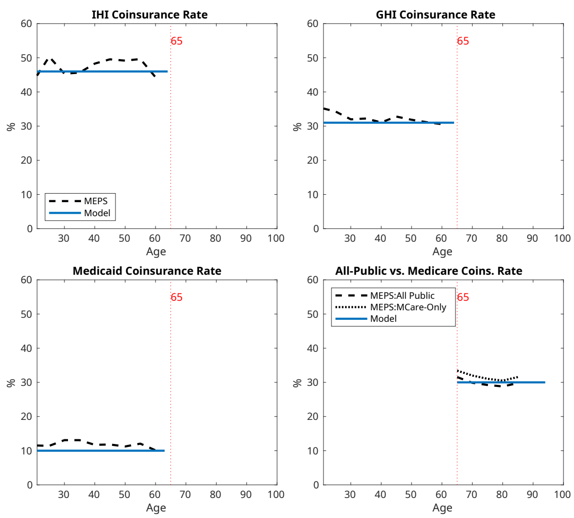
(b) Post-ACA: MEPS 2015–2017

Figure A.8: **Conditional GHI offer status Markov transition probabilities**

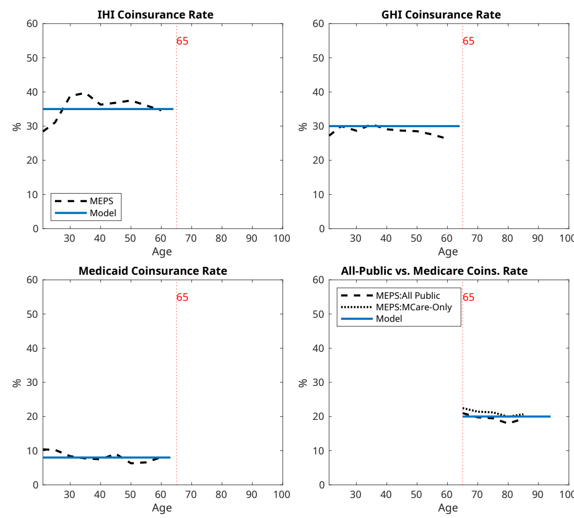
Notes: Data source is MEPS 1999–2009 and MEPS 2015–2017, heads of HIEU, population weighted. Using spline interpolation to get annual frequencies.

A.8 Coinsurance rates

We define the coinsurance rate as the fraction of out-of-pocket health expenditures over total health expenditures. The coinsurance rates in our model therefore include copays and other direct out-of-pocket payments. We use MEPS data from 1999–2009 and calculate the average coinsurance rate of heads of HIEU (population weighted) by age for all four insurance types represented in the model. Consequently we set the coinsurance rates for the different types of insurance plans to $\gamma^{\text{IHI}} = 0.46$, $\gamma^{\text{GHI}} = 0.31$, $\gamma^{\text{MAid}} = 0.10$, and $\gamma^{\text{MCare}} = 0.30$ respectively, as shown in Figure A.9a. The post-ACA coinsurance rates are calculated using MEPS data from 2015–2017 and set to $\gamma^{\text{IHI}} = 0.35$, $\gamma^{\text{GHI}} = 0.30$, $\gamma^{\text{MAid}} = 0.08$, and $\gamma^{\text{MCare}} = 0.20$ as shown in Figure A.9b. Overall, the post-ACA coinsurance rates are lower and reflect some of the ACA policies that established more comprehensive insurance coverage overall but especially in private IHI markets that have become government subsidized.



(a) Pre-ACA: MEPS 1999–2009



(b) Post-ACA: MEPS 2015–2017

Figure A.9: **Coinsurance rates by insurance plans**

Notes: These are not calibration targets. Data sources: is MEPS 1999–2009 and MEPS 2015–2017, heads of HIEU, population weighted.

B Computational appendix: quantitative model

We parameterize the model and use a standard grid search algorithm to solve for an equilibrium. We first guess a price vector, then backward solve the household problem starting in the last period using these prices. We then use the optimal policy function and forward solve the model for the distribution of individual households. We then aggregate across all households and solve for a new price vector using firm first order conditions. We then update the price vector and repeat all the steps until the price vector converges.

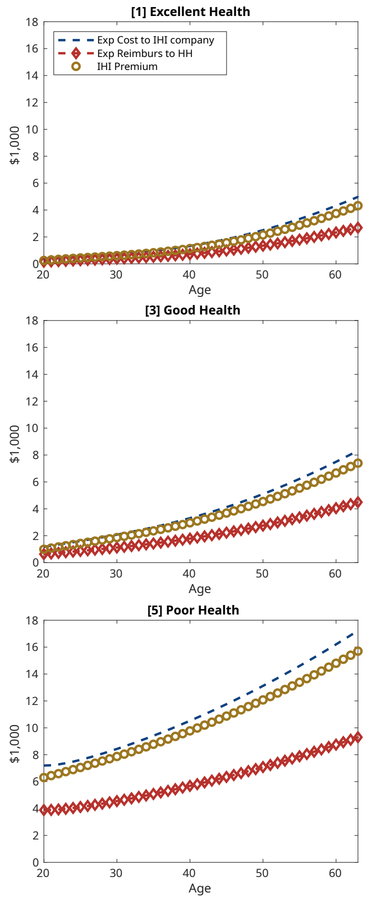
In the main specification the state vector of a worker at age j is defined as $x_j = \left\{\vartheta, a_j, \text{in}_j, \varepsilon_j^n, \varepsilon^h, \varepsilon_j^{\text{GHI}}\right\} \in \{1,2,3\} \times \{44\} \times \{0,1,2,3\} \times \{1,2,3,4,5\} \times \{1,2,3,4,5\} \times \{0,1\}$ and the state vector of a retiree at a particular age is defined as $x_j = \left\{\vartheta, a_j, \varepsilon^h\right\} \in \{1,2,3\} \times \{42\} \times \{1,2,3,4,5\}$. Given that individuals work for 45 periods and retire for 30 periods, the size of the overall model state space is $(3 \times 44 \times 4 \times 5 \times 5 \times 2) \times 45$ + $(3 \times 44 \times 5) \times 30 = 1,207,800$ points.

The asset **search space** (as opposed to the asset state space) is larger with 88 points and the labor search grid space is 12 points. We use interpolation to map the 88 asset search grid back into the smaller 44 point asset state grid. The asset grids are unevenly spaced, with more grid points at lower asset levels where the curvature of the optimal savings policy function is more pronounced. All algorithms are implemented on a multi-core workstation in Matlab.

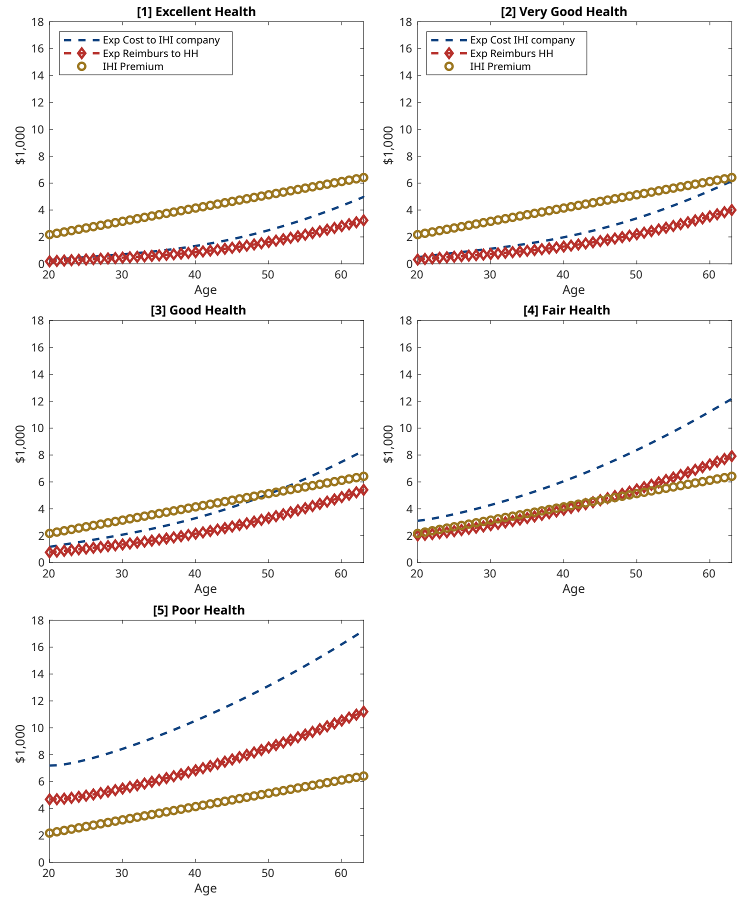
C Additional results

C.1 IHI Premiums in pre-ACA vs. ACA scenario

Figure C.1 illustrates the changes in effective IHI premiums across different age groups before and after the implementation of the ACA in the model, respectively. Figure C.1a demonstrates price discrimination by health and age, while Figure C.1b shows that post-ACA, insurers only price discriminate by age, with a maximum ratio of 1:3. Healthy individuals are charged premiums above their expected health payouts (Panels 1–2), whereas sicker individuals are charged premiums below their expected health payouts (Panels 4–5).



(a) IHI insurance premiums “discriminate” by health and age



(b) ACA IHI insurance premiums “discriminate” by age (limited 1:3 ratio)

Figure C.1: **IHI insurance premiums**

Notes: Panel (a) shows pre-ACA HI premium setting in IHI markets where insurance companies can price discriminate by age and health status of an individuals. Panel (b) shows post-ACA HI premium setting in subsidized IHI markets (health insurance exchanges) where insurance companies can only price discriminate by health on a limited basis. The price differential in premiums charged from young vs. old individuals cannot exceed a factor of three. The lowest spenders (in panel 1) are individuals in excellent health, the low spenders (in panel 2) are individuals in “very good” health, while the highest spenders (in panel 5) are individuals in poor health. We compare their expected spending in the next period (blue line) to the collected IHI premium in the current period (dark yellow circles). We can clearly see the price discrimination by health and age in action in Panel (a). In panel (b) insurance companies are restricted to price discrimination by age only in a maximum ratio of 1:3. We therefore see that IHI companies charge healthy individuals premiums that are above their expected health payouts (Panels 1–2) whereas sicker individuals are charged premiums below their expected health payouts (Panels 4–5).

C.2 Medicaid work requirements without exceptions for the sick (Partial equilibrium)

Here we provide the discussion of the partial equilibrium results for the reforms that do not allow for exceptions of work requirements for individuals who are sick. This complements the discussion of the general equilibrium results of this reform in Section 6.4.

C.2.1 Pre-ACA

The results in this section are based on partial equilibrium. This highlights the reaction to the reform from the household side in the short-run. In partial equilibrium all prices including premiums do not change, the production side of the economy is not factored in and the government does not adjust any tax rates to clear the government budget constraint. Changes in tax revenue are therefore only due to changes in household behavior that determine consumption and work levels which are the tax bases for the consumption and income/payroll taxes. We report these results in Table C.1.

The first column in this table shows the benchmark outcomes we just discussed in Section 5.6. Level variables are normalized to 100 for easy comparison across different reforms. Welfare results are normalized to zero, for the same reason. The second column shows partial equilibrium outcomes based on the 8-hour work requirement.

The second column in Table C.1 shows that due to an 8 hour work requirement to maintain Medicaid eligibility, the labor participation rate increases from 73.8 percent to 75.8 percent. The average weekly hours of all actively working individuals decreases from 37.0 to 36.8 hours. This is obviously a function of some individuals entering the labor force who only work the hours required to stay on Medicaid which reduces the overall average of hours worked. Figure C.2 shows the adjustment in labor force participation lifecycle profiles by permanent income and health types. It is obvious from the graphs (Panel 1.A, 1.B and 2.A) that most of the increases in labor force participation comes from lower income and sicker individuals that are 30 or older.

The fraction of workers with health insurance decreases from 70.1 to 66.5 percent. The bulk of this decrease in the number of insured individuals is caused by a reduction in Medicaid enrollment from 5.6 to 0.3 percent of workers. This can be clearly seen from Panels 1.C and 2.C in Figure C.3. Medicaid payouts therefore decrease by almost 90 percent. The fraction of individuals on IHI remains constant at 4 percent but the fraction of individuals with employer provided GHI increases by about 2 percent which is a direct reaction to the increase in the labor force. The first and second columns in Figure C.3 make this point. The Gini coefficient of out-of-pocket health expenses increases slightly as Medicaid provides "redistribution" of medical spending risk from high income low health risk types to low income high health risk types.

Due to the increase in overall labor income, we subsequently observe an increase in aggregate consumption of about 1 percent. In terms of welfare we observe an overall decrease in welfare (in terms of consumption equivalent variation or CEV) of -1.56 percent. Welfare losses are realized across all agent types but are larger for low income and sick individuals. Individuals without high school degrees who report a sick health state lose about -4.76 percent whereas healthy individuals with college degrees only suffer minor welfare losses of -0.05 percent.

Effects of different week hours thresholds. We see that if the work requirement threshold reaches 20 hours per week, the labor force participation rate and the average weekly hours worked do not change anymore. This makes sense as once workers work 20 hours or more their earnings start to exceed the Medicaid income eligibility threshold, so that nobody in the model qualifies for Medicaid anymore, either because their income is too high or because they do not work enough hours. It becomes an essentially Medicaid free environment and further increases of the work hours threshold do not affect the economy anymore.

At 20 hours the work participation rate increase from 73.8 to 75.6 and the weekly hours worked drop from 37.0 to 36.9. This leads us to conclude that most of the adjustments to the policy happen on the extensive (participation) labor margin and not on the intensive (labor hours) margin. The IHI markets are not affected by the policy but the GHI markets do expand as the number of workers increases.

Overall the policy leads to welfare losses in partial equilibrium as sicker individuals are now forced back into the labor market. The welfare losses reach up to 5.2 percent of CEV among the low income and sick types whereas high income individuals are barely affected by this policy.

C.2.2 ACA and work requirements without exceptions for the sick

The first observed difference in partial equilibrium outcomes after implementing work requirements in a post-ACA world stems from changes in health insurance take-up rates. Pressuring low income individuals out of Medicaid by having them join the labor market leads to a large increase in IHI health insurance take up—and only a very small change in GHI take-up. This makes sense as low income individuals who do not qualify for Medicaid anymore (either because they do not work the required hours or by now joining the workforce their income exceeds the eligibility criterion) now benefit from subsidized IHI, which presents itself as the next best alternative. The IHI take-up increases by over 2 percentage points from 7.3 to 9.4 while Medicaid enrollment drops from 5.7 to 1.2 percent of the working age population. Payouts for IHI subsidies increase by about 31.8 percent and welfare losses of -1.1 percent of CEV are realized. These welfare losses are much smaller than in the pre-ACA environment in which low income individuals are not provided with subsidized IHI and hence enrollment in IHI stagnated at around 4 percent. All in all, work requirements for Medicaid are somewhat mitigated by the stronger safety net provided by the ACA.

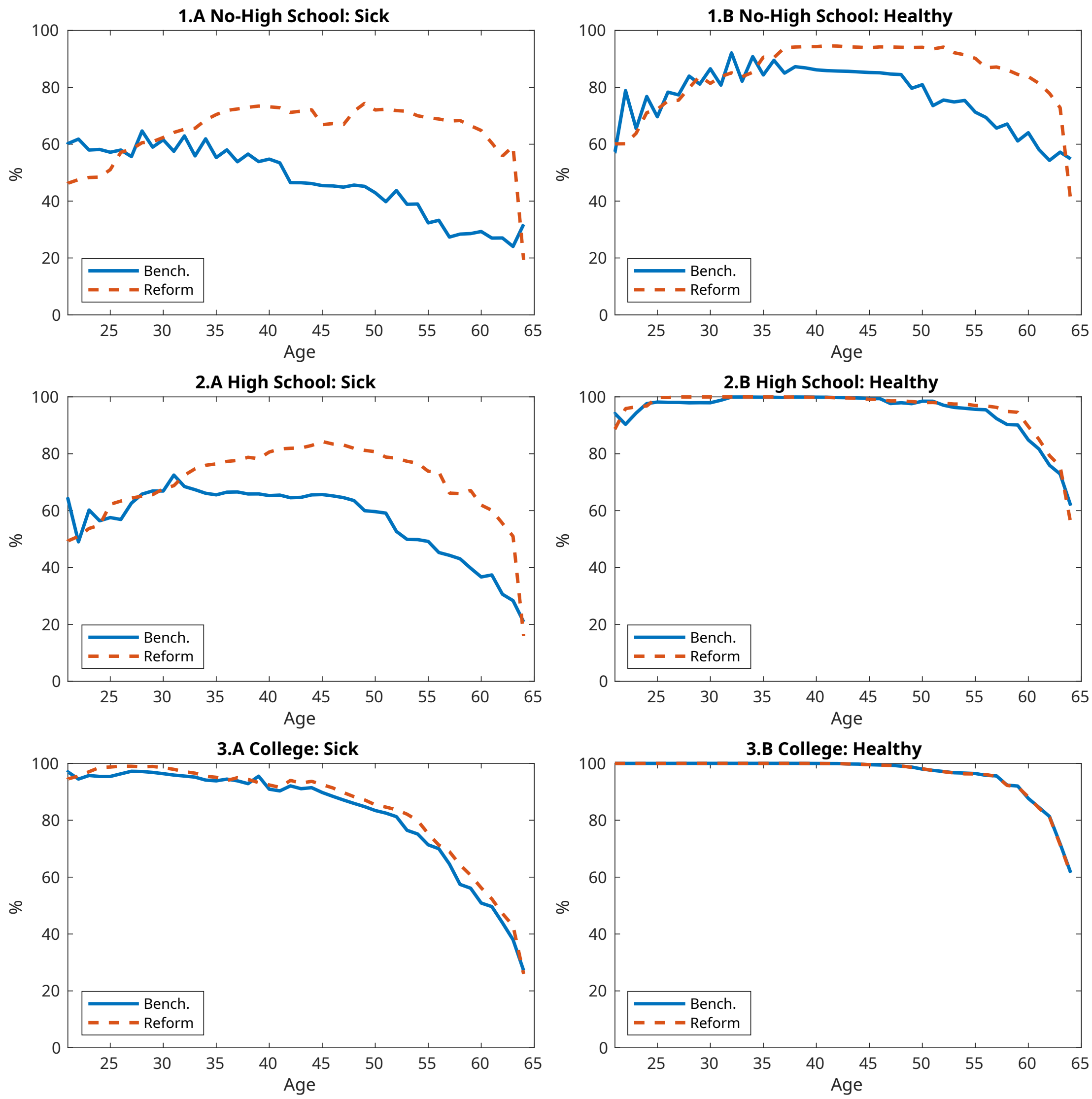


Figure C.2: **Labor participation with work requirements of 8 hours/week (Partial equilibrium)**

Notes: The work requirements are introduced for all working age individuals, independent of their health status.

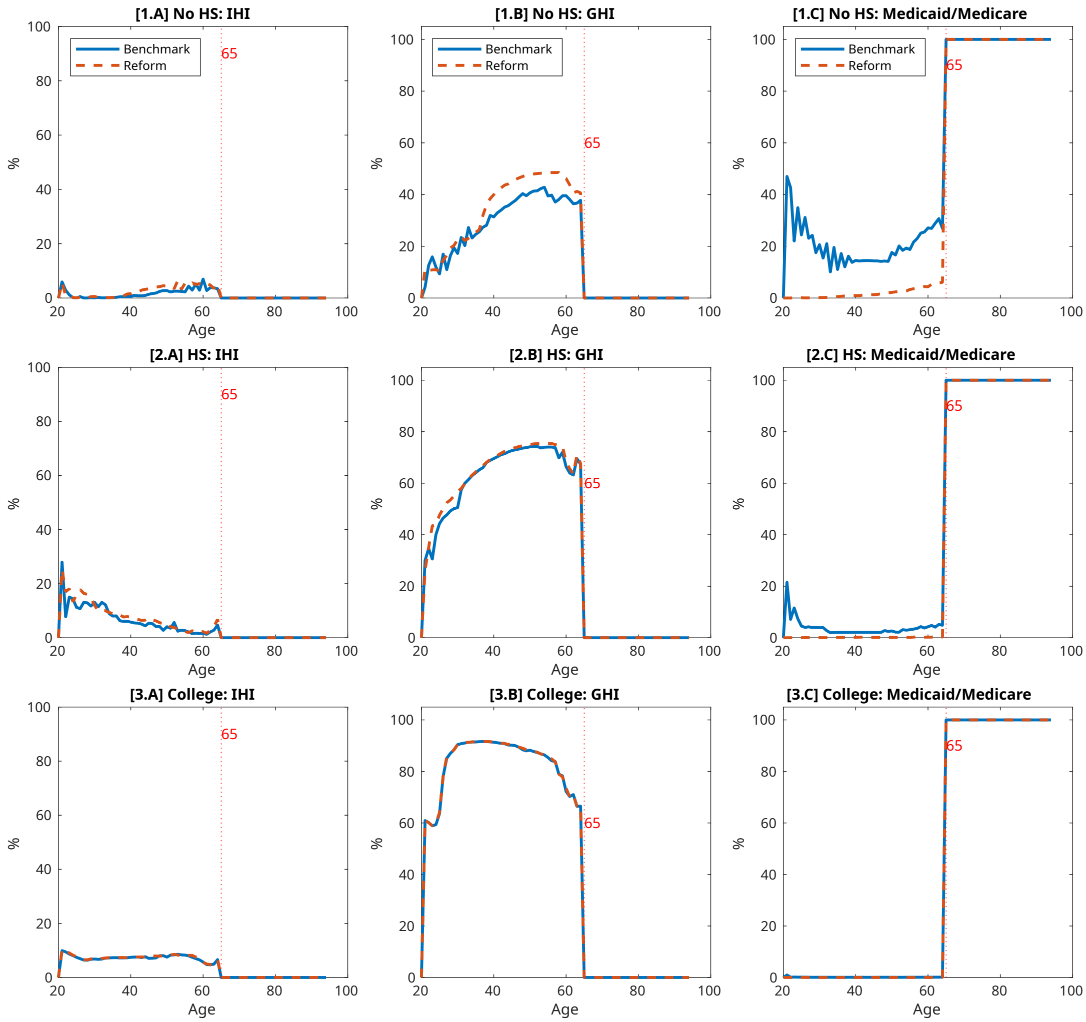


Figure C.3: **Health insurance enrollment with work requirements of 8 hours/week (Partial equilibrium)**

Notes: The work requirements are introduced for all working age individuals, independent of their health status.

Table C.1: **Medicaid work requirements for all workers (Partial equilibrium)**

	Bench.	8Hrs	16Hrs	20Hrs	24Hrs
Assets	100.00	101.03	101.04	101.04	101.04
Consumption	100.00	101.02	100.99	100.99	100.99
Labor part. rate	73.19	75.38	75.09	75.08	75.08
Agg. work hours	100.00	102.35	102.23	102.22	102.22
Weekly hrs. workers	37.08	36.84	36.94	36.95	36.95
IHI-subsidy					
Insured-working age (%)	73.68	70.63	69.91	69.91	69.91
• IHI (%)	6.50	7.41	7.13	7.14	7.14
• GHI (%)	61.05	62.87	62.77	62.77	62.77
• Medicaid (%)	6.13	0.35	0.01	0.00	0.00
Medicaid payments	100.00	9.84	0.12	0.00	0.00
Avge.Medicaid paym. ($1,000)	6.99	12.10	9.04	4.30	
SI (c_{min}) transfers	100.00	238.02	288.98	290.55	290.55
Avge.SI transf. ($1,000)	4.61	7.92	8.82	8.84	8.84
SI total recipients (%)	1.85	2.76	3.04	3.05	3.05
SI retired recip. (%)	0.43	0.37	0.39	0.39	0.39
SI wrk-age recip. (%)	1.41	2.40	2.65	2.66	2.66
SI recip.among wrk-age (%)	1.73	2.93	3.24	3.26	3.26
• Low-inc sick (%)	12.08	15.99	18.55	18.67	18.67
• Low-inc healthy (%)	47.61	47.75	46.77	46.78	46.78
• Mid-inc sick (%)	21.10	21.27	21.05	20.98	20.98
• Mid-inc healthy (%)	18.11	14.58	13.26	13.21	13.21
• High-inc sick (%)	1.11	0.40	0.37	0.36	0.36
• High-inc healthy (%)	0.00	0.00	0.00	0.00	0.00
Tax revenue	100.00	101.62	101.62	101.62	101.62
• Income tax revenue	100.00	101.84	101.87	101.87	101.87
SI/tax revenue (%)	0.70	1.64	1.99	2.00	2.00
Medicaid/tax revenue (%)	2.68	0.26	0.00	0.00	0.00
Gini: wealth	0.53	0.53	0.53	0.53	0.53
Gini: OOP med.spend.	0.55	0.55	0.55	0.55	0.55
Welfare all (%CEV)	0.00	-1.71	-1.83	-1.84	-1.84
• %CEV Low-inc sick	0.00	-4.82	-5.21	-5.21	-5.21
healthy	0.00	-4.56	-5.01	-5.04	-5.04
• %CEV Mid-inc sick	0.00	-1.90	-1.94	-1.94	-1.94
healthy	0.00	-1.53	-1.60	-1.60	-1.60
• %CEV High-inc sick	0.00	-0.47	-0.48	-0.48	-0.48
healthy	0.00	-0.06	-0.06	-0.06	-0.06

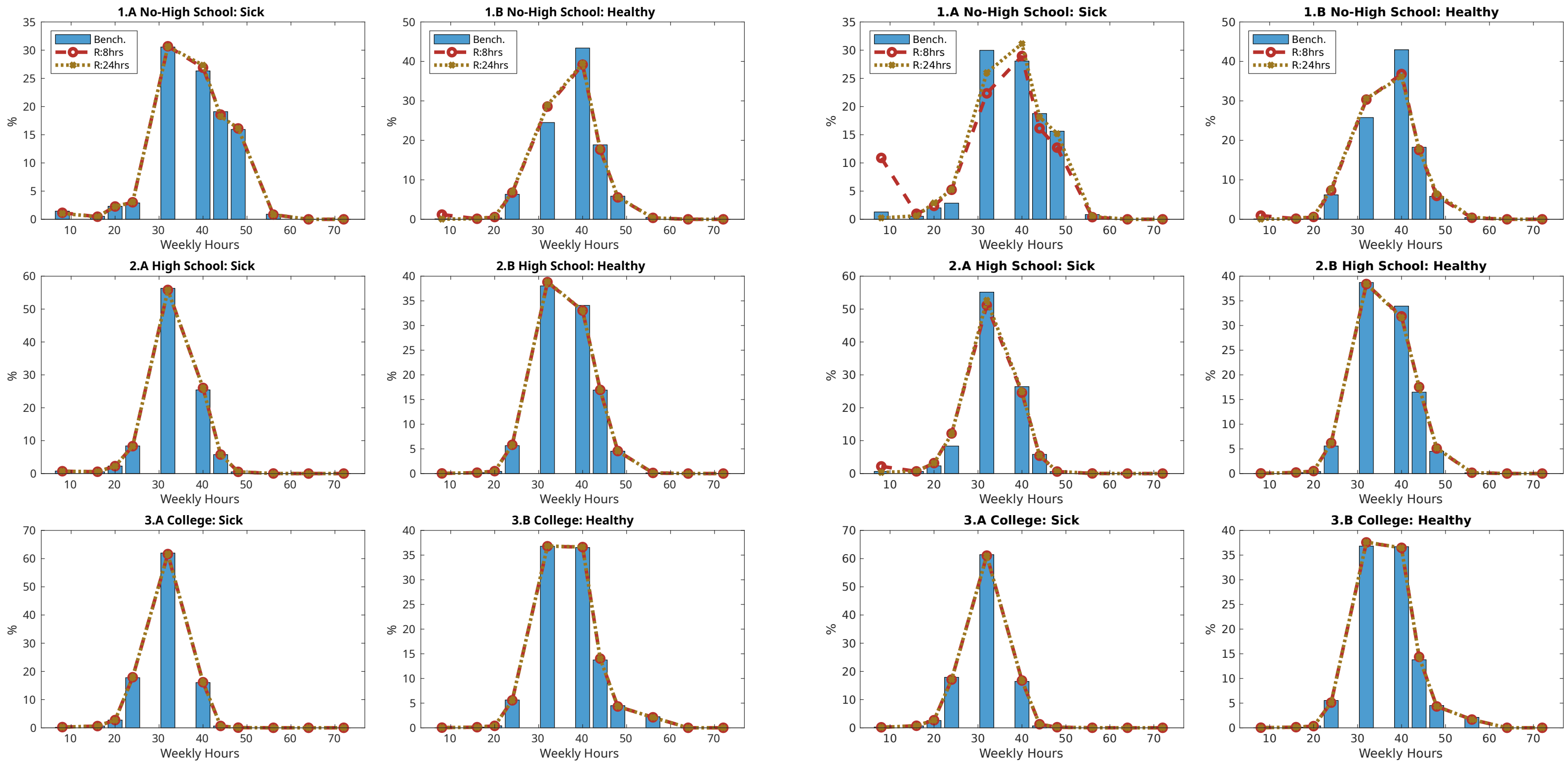
	ACA-B.	ACA-8	ACA-16	ACA-20	ACA-24
Assets	100.00	100.18	100.31	100.27	100.28
Consumption	100.00	100.19	100.30	100.42	100.40
Labor part. rate	72.61	74.10	74.07	74.26	74.12
Agg. work hours	100.00	100.65	100.95	101.28	101.20
Weekly hrs. workers	36.53	36.03	36.15	36.17	36.22
IHI-subsidy	100.00	130.37	140.53	147.04	147.52
Insured-working age (%)	75.58	74.29	74.31	74.69	74.48
• IHI (%)	10.01	12.86	13.50	14.07	14.11
• GHI (%)	59.40	60.14	60.20	60.42	60.37
• Medicaid (%)	6.17	1.30	0.61	0.20	0.00
Medicaid payments	100.00	34.74	12.51	3.89	0.01
Avge.Medicaid paym. ($1,000)	7.95	13.10	10.06	9.32	11.47
SI (c_{min}) transfers	100.00	236.29	284.91	320.80	368.23
Avge.SI transf. ($1,000)	3.29	5.67	6.60	7.17	7.73
SI total recipients (%)	1.23	1.78	1.86	1.93	2.06
SI retired recip. (%)	0.09	0.11	0.11	0.11	0.12
SI wrk-age recip. (%)	1.14	1.67	1.75	1.82	1.95
SI recip.among wrk-age (%)	1.40	2.04	2.14	2.23	2.38
• Low-inc sick (%)	9.42	10.06	10.01	12.10	15.76
• Low-inc healthy (%)	51.03	53.88	51.65	50.56	49.24
• Mid-inc sick (%)	21.15	19.39	22.30	21.76	20.42
• Mid-inc healthy (%)	17.18	16.19	15.58	15.15	14.17
• High-inc sick (%)	1.21	0.49	0.46	0.44	0.41
• High-inc healthy (%)	0.00	0.00	0.00	0.00	0.00
Tax revenue	100.00	100.35	100.55	100.65	100.65
• Income tax revenue	100.00	100.32	100.55	100.62	100.64
SI/tax revenue (%)	0.32	0.75	0.91	1.02	1.17
Medicaid/tax revenue (%)	2.91	1.01	0.36	0.11	0.00
Gini: wealth	0.52	0.54	0.54	0.54	0.54
Gini: OOP med.spend.	0.51	0.51	0.51	0.51	0.51
Welfare all (%CEV)	0.00	-1.12	-1.27	-1.38	-1.43
• %CEV Low-inc sick	0.00	-3.08	-3.28	-3.61	-3.89
healthy	0.00	-2.77	-2.97	-3.35	-3.67
• %CEV Mid-inc sick	0.00	-1.46	-1.67	-1.69	-1.69
healthy	0.00	-1.04	-1.24	-1.30	-1.30
• %CEV High-inc sick	0.00	-0.48	-0.47	-0.47	-0.47
healthy	0.00	-0.11	-0.11	-0.11	-0.11

Notes: Medicaid work requirements are implemented for the entire working age population from age 20–64 with different week hour thresholds. Partial equilibrium results do not account for price adjustments, the production side and government budget constraints. The left part of the table shows the results without the provision of the ACA in place. The right part of the table shows the results with the ACA provisions in place and compares the results of the reform to a steady state with ACA policies.

C.3 Changes in the work hours distribution (General equilibrium)

The work hours distribution is not changed much if the reform only targets healthy individuals as shown in Figure C.4a.

When the implementation of work requirements affects does not provide an exception for sick individuals the work hours distribution does change as shown in Figures 11b in the main text and Figure C.4b below. Comparing the average hours worked we see that while the policy increases the overall hours worked by 2.3 percent (see entry for Agg. work hours in column **8Hrs** in Table 7), it decreases the average work hours of the actively working population. Some of the new entrants into the labor market are simply just working enough to pass the work requirement test in order to stay on Medicaid. This pulls the average down as can be seen from Figure 11b. This effect is the strongest for sick individuals without a high school degree in Panel 1.A. In fact, the lower tail of the work hours distribution disappears (i.e., the 10–20 work hours range) and more individuals choose to work 30–40 hours a week. Panel 1.A in Figure C.4b shows this clearly.



(a) 8 or 24 hours work requirement (healthy working age individuals)

(b) 8 or 24 hours work requirement (all working age individuals)

Figure C.4: **Changes in weekly work-hours distribution for 8 or 24 hours work requirements for all workers (General equilibrium)**

Notes: The figure shows the distribution of weekly work hours of the actively working population between age 20–64 by education and health status for the benchmark economy, for a counterfactual economy with a Medicaid work requirement of 8 hours per week, and a counterfactual economy with a Medicaid work requirement of 24 hours per week. In panel (a) the work requirement is only introduced for healthy working age individuals. In panel (b) the work requirement is introduced for all working age individuals.