



# Aging and health financing in the U.S.: A general equilibrium analysis<sup>☆</sup>



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## ABSTRACT

We quantify the effects of population aging on the U.S. healthcare system. Our analysis is based on a stochastic general equilibrium overlapping generations model of endogenous health accumulation calibrated to match pre-2010 U.S. data. We find that population aging not only leads to large increases in medical spending but also a large shift in the relative size of private vs. public insurance. Without the *Affordable Care Act* (ACA), aging by itself leads to a 40% increase in health expenditures by 2060 and a 9.6% increase in GDP which is mainly driven by the increase of the fraction of older higher-risk individuals in the economy as well as behavioral responses to aging and the subsequent expansion of the healthcare sector. Aging increases the premium in *group-based health insurance* (GHI) markets and enrollment in GHI decreases, while the *individual-based health insurance* (IHI) market, Medicaid and Medicare expand significantly. The size of Medicare will almost double by 2060 as the elderly dependency ratio increases. Additional funds equivalent to roughly 2.7% of GDP are required to finance Medicare and Medicaid. The introduction of the ACA increases the fraction of insured workers to almost 100% by 2060, compared to 82% without the ACA. This increase is driven by the stabilization of GHI markets and the further expansions of Medicaid and the IHI market. The ACA mitigates the increase of healthcare costs by reducing the number of the uninsured who pay the highest market price for healthcare services. Overall, the ACA adds to the fiscal cost of population aging mainly via the Medicaid expansion. Our findings demonstrate the importance of accounting for behavioral responses, structural changes in the healthcare sector and general equilibrium adjustments when assessing the economy-wide effects of aging.

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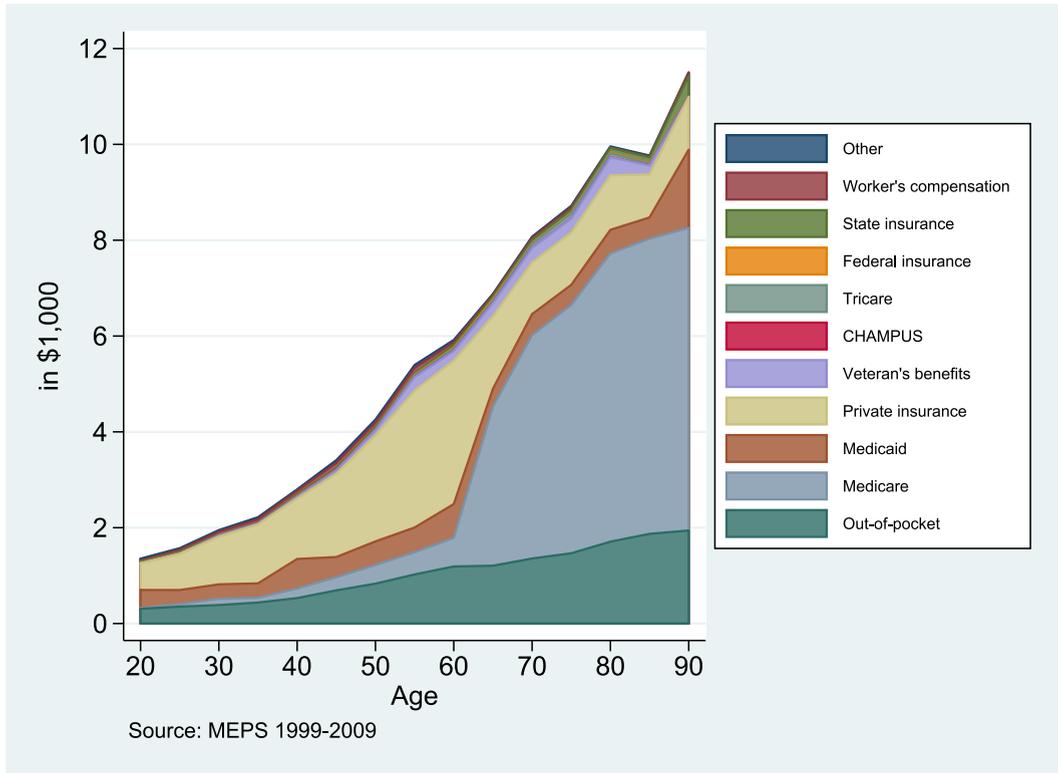
## 1. Introduction

Unlike many other developed nations, the U.S. has a mixed public/private health insurance system, where public health insurance (Medicare and Medicaid) covers retirees and low income individuals and private health insurance covers most of

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**Fig. 1.** Health spending over the lifecycle by financing source. We present average health spending per 5-year age cohort based on MEPS 1999–2009. We break down health spending by spending source. Spending values are inflation adjusted to 2009-dollar values.

the working population (see Fig. 1). In 2010 this system left over 45 million Americans without health insurance. In addition, the U.S. healthcare system is the most expensive in the world. National health expenditure reached 17.7 % of GDP in 2010 according to a study by the Centers for Medicare and Medicaid Services (Keehan et al., 2011). The increase in healthcare costs at rates greater than the rate of GDP growth causes concerns about the long-term solvency of the health insurance system. The situation is made worse by projected population aging, compare Fig. 2, which will increase the number of the elderly who, on average, spend more on healthcare and rely more heavily on Medicare and Medicaid. According to CBO (2016a), the fiscal problems created by Medicare/Medicaid are already larger in magnitude relative to Social Security.<sup>1</sup> In March 2010 the Obama administration introduced a comprehensive healthcare reform at the federal level via the *Affordable Care Act* (ACA). The reform encompasses many objectives including promoting universal health insurance coverage, fixing the Medicare program and controlling healthcare cost. Critics maintain that the reform is underfunded and will drive up healthcare prices and healthcare premiums. With population aging accelerating, the possible adverse effects of the ACA become more unclear.

The long-term fiscal outlook in the U.S. is sensitive to assumptions about how healthcare spending will respond to the ACA as reported in CBO (2013, 2016b, 2017). Auerbach and Gale (2013) point out that the long-term fiscal gap in the federal government budget depends on the assumed growth rate of healthcare expenditures and ranges between 3 and 7% of GDP. The behavioral responses to the demographic changes and their effects on insurance markets are important determinants of the growth in healthcare expenditures. Some of these health related behaviors are not considered in CBO (2007) projections as their models are not based on the micro foundations of dynamic household decision making in a lifecycle context. The current paper aims to fill this gap and focuses on two issues. First, we quantify the effects of population aging on healthcare spending and financing in the U.S. Second, we assess the implications of the ACA reform in the context of aging.

We use a general equilibrium, overlapping-generations model calibrated to reproduce the consumption-savings behavior of U.S. households. The framework embeds the micro foundations of the demand for medical services and the demand for health insurance together with optimal household consumption, labor supply and savings. We essentially combine a general equilibrium overlapping generations model with incomplete markets and heterogeneous agents similar to Huggett (1996) with the Grossman (1972) health capital model and then introduce idiosyncratic health shocks. Importantly, the

<sup>1</sup> Spending of the major healthcare programs are projected to grow to 6.6% of GDP by 2026 compared to 5.9% of Social Security spending. See also Council (2012) and Lee (2014) for an overview of the macroeconomic effects of aging in the U.S.

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