Medical Expenditure Risk: Evidence in the MEPS 1996-2019*

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Abstract

I examine individual-level medical expenditure risk in the United States from 1996 to 2019 using the Medical Expenditure Panel Survey (MEPS). I compute the adjusted out-of-pocket medical expenses to account for survey underreporting and bad debts. The average medical spending-to-income ratio (risk exposure) has risen steadily, even among the insured, while its dispersion (risk uncertainty) peaked in the 2000s before returning to the 1996 level. Following the Affordable Care Act (ACA), the uninsured rate declined significantly among low-income, young individuals. In the post-ACA period, medical expenditure uncertainty decreased for low-income individuals but remained substantially higher than for other income groups, while older individuals experienced reduced risk overall.

Keywords: Medical Expenditure Risk, Medical Expenses, Health Insurance, Affordable Care Act

JEL Classifications: I13, I14, I18

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1 Introduction

Individuals cope with idiosyncratic risks of all kinds throughout their lives. Medical expenditure risk stands out due to its prevalence and substantial impact. Almost all individuals face non-trivial medical expenses at some point in their lives, and such medical events can result in long-lasting effects. Medical expenditure risk has been shown to play an essential role in several economic decisions, such as bankruptcy filings (Sullivan, Warren, and Westbrook, 2000; Livshits, MacGee, and Tertilt, 2007; Gross and Notowidigdo, 2011) and savings behavior (Palumbo, 1999; Scholz, Seshadri, and Khitatrakun, 2006; De Nardi, French, and Jones, 2010).

Given the ubiquitous importance of medical expenditure risk, it is essential to understand how such risk varies over time and across income and age groups. To this end, I investigate individual-level medical expenditure risk in the United States from 1996 to 2019 using the Medical Expenditure Panel Survey (MEPS). To better measure medical expenditure risk, I compute the adjusted out-of-pocket medical expenses to account for survey underreporting and bad debts, à la Livshits et al. (2007).[1] I examine cross-year variations in medical expenditure risk exposure and uncertainty, as well as the fraction of uninsured individuals. I then analyze how medical expenditure risk differs across income and age before and after the implementation of the Affordable Care Act (ACA).

I document that: (1) medical expenditure risk exposure has steadily risen over time, even among the insured, while medical expenditure uncertainty increased in the 2000s but has since declined to its 1996 level; (2) the uninsured share dropped significantly among low-income, young individuals following the implementation of the ACA in 2014; (3) in the post-ACA period, medical expenditure uncertainty for low-income individuals declined but remains substantially higher compared to other income groups; and (4) after the ACA, older individuals experienced a reduction in medical expenditure risk, both in terms of exposure and uncertainty.

I contribute to the literature by comprehensively exploring medical expenditure risk. Unlike the short period considered in Livshits et al. (2007), I extend the temporal scope to 1996–2019, offering insights into long-term trends to inform policy discussions. Beyond

[1] The same approach is applied in, for example, Livshits, MacGee, and Tertilt (2010) and Exler, Livshits, MacGee, and Tertilt (2024).

the elderly population studied by De Nardi et al. (2010), I analyze medical expenditure risk across the entire life cycle, highlighting the age-related distributional implications. Additionally, I compare pre- and post-ACA variations in medical expenditure risk, shedding light on the policy's impact on risk exposure and uncertainty across demographic and economic groups.

The rest of the paper is organized as follows. Section 2 briefly introduces the MEPS data and the calculation of the adjusted out-of-pocket medical expenses. Section 3 presents the results. Section 4 concludes with potential avenues for further research.

2 Data and Methodology

I utilize the U.S. MEPS Household Component to examine medical expenditure uncertainty at the individual level.[2] Since 1996, the MEPS has systematically collected detailed information on demographics, healthcare charges and payments, health insurance coverage, and related topics from a representative sample of the U.S. population. For this study, I focus on data from the 1996–2019 waves to exclude potential confounding effects of the COVID-19 pandemic. Additionally, I restrict the sample to individuals aged over 20 with positive income and non-zero survey weights. These restrictions yield a total sample size of 461,641 observations across a 24-year period.[3]

I adopt the out-of-pocket medical expenditures to measure medical expenditure risk. One of the MEPS survey questions explicitly asks individuals about their out-of-pocket medical spending. I denote $oop_{i,t}$ as the MEPS self-reported out-of-pocket medical expenditures for individual i in survey year t. However, there are two issues with directly using this MEPS measure as a proxy for medical expenditure uncertainty. First, individuals in MEPS tend to underreport their medical expenditures compared to aggregate data. Second, MEPS excludes bad debts, which constitute a significant source of medical expenditure uncertainty for individuals. To address these issues, I follow Livshits et al. (2007) to compute adjusted out-of-pocket medical expenditures, denoted as $\widetilde{oop}_{i,t}$.

[2] The MEPS consists of Household and Insurance Components. The Insurance Component provides information on employer-based health insurance.

[3] The MEPS employs a rotating panel design that spans two full calendar years. However, as the objective of this paper is to analyze cross-sectional medical expenditure uncertainty across years, I do not utilize this panel feature.

This adjustment involves two steps. The first step is to inflate $oop_{i,t}$ using the corresponding aggregate figure from the National Health Expenditure Data (NHED), OOP_t^{NHED}, across all survey years, assuming an identical degree of underreporting across individuals. Specifically, the year-t underreporting adjustment factor, α_t, is computed as:

$$\alpha_t = \frac{OOP_t^{NHED}}{\sum_i (\omega_{i,t} \cdot oop_{i,t})}, \tag{1}$$

where $\omega_{i,t}$ denotes the survey weight for individual i in year t.

The second step is to allocate aggregate bad debts to uninsured individuals in proportion to their unpaid medical expenditures. Since the total amount of bad debts for the entire medical sector, BD_t, is unobserved, I infer it using data from the American Hospital Association (AHA) on uncompensated hospital care costs, UHC_t^{AHA}, the NHED total hospital spending, THS_t^{NHED}, and the NHED total personal health care expenditures, $TPHC_t^{NHED}$. Specifically, I calculate BD_t as:

$$BD_t = \frac{UHC_t^{AHA}}{THS_t^{NHED}} \cdot TPHC_t^{NHED}, \tag{2}$$

where the underlying assumption is that the uncompensated ratio for hospitals applies to the aggregate medical sector. The adjustment factor to allocate bad debts in year t to individual i, $\beta_{i,t}$, is computed as:

$$\beta_{i,t} = \frac{\mathbb{I}_{i,t}^{unins} \cdot (chr_{i,t} - exp_{i,t})}{\sum_i \left(\omega_{i,t} \cdot \mathbb{I}_{i,t}^{unins} \cdot (chr_{i,t} - exp_{i,t})\right)}, \tag{3}$$

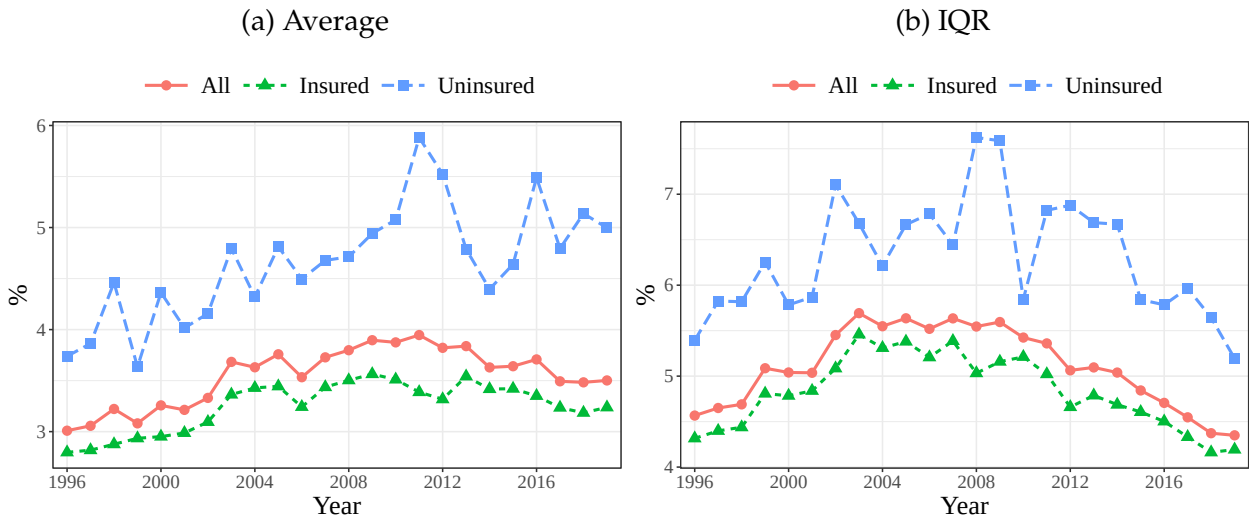
where $\mathbb{I}_{i,t}^{unins}$ is an indicator function that equals one if individual i is uninsured in any month of the survey year t, $chr_{i,t}$ denotes the total medical charges for individual i, including services and prescribed medicines in year t, and $exp_{i,t}$ represents the total paid expenditures for individual i in year t.

The adjusted out-of-pocket medical expenditures are then given by:

$$\widetilde{oop}_{i,t} = \alpha_t \cdot oop_{i,t} + BD_t \cdot \beta_{i,t}, \tag{4}$$

which implies $\sum_i \left(\omega_{i,t} \cdot \widetilde{oop}_{i,t}\right) = OOP_t^{NHED} + BD_t$. This adjusted measure thus ensures that its summation over individuals is consistent with the aggregate counterparts for any

Figure 1: Medical Expenditure Risk over the MEPS 1996–2019



Notes: All statistics are weighted using the MEPS survey weights. The average ratio of medical expenses to income is calculated as the average medical expenses divided by the average income.

given survey year t.

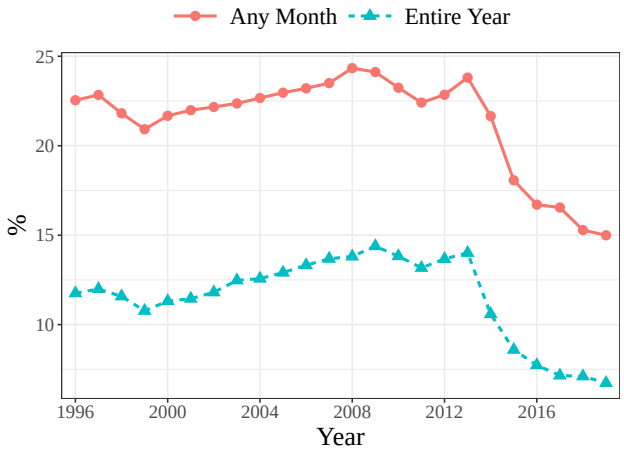
3 Results

In the following analysis, I focus on the ratio of adjusted out-of-pocket medical expenditures relative to income (henceforth, $\widetilde{oop}$-income ratio), as this measure reflects the actual financial burden of medical goods and services faced by individuals. I begin by reporting in Figure 1 the average $\widetilde{oop}$-income ratio and its interquartile range (IQR) over the MEPS 1996–2019,[4] categorized by insurance status.

In Figure 1a, the average ratio increased from 3% in 1996 to 3.5% in 2019 overall. Uninsured individuals exhibited the highest variability, with their spending peaking at 6% of income in 2011. Notably, even insured individuals experienced a consistent rise in out-of-pocket spending relative to income. Over the two decades, medical spending among the uninsured increased disproportionately by over 30%, while the insured experienced a rise of nearly 20%. These trends highlight a growing financial burden of medical expenses at the intensive margin, regardless of insurance status.

[4] There are extreme values in these ratios due to either skyrocketing medical spending or near-zero income. To mitigate the influence of extreme values, I choose IQR as the measure of dispersion.

Figure 2: Fraction of Uninsured Individuals over the MEPS 1996–2019



Notes: All statistics are weighted using the MEPS survey weights. "Entire Year" includes individuals who remained uninsured for the entire survey year, while "Any Month" refers to individuals who were uninsured during any month of the survey year.

The across-year dispersion of individual $\widetilde{oop}$-income ratios, measured by IQR, is visualized in Figure 1b. The results reveal that individuals, including those who are insured, experienced more dispersed medical expenses relative to income around the 2000s, followed by a gradual stabilization back to the levels observed in 1996. In contrast to insured individuals, uninsured individuals faced greater downside risk in medical expenses. Notably, the uninsured group experienced disproportionately greater medical spending uncertainty over time, exceeding 40% above the baseline during its peak around 2008.

It is peculiar that medical expenditure uncertainty began to decline in the 2010s, as observed in Figure 1b. This decreased uncertainty could be correlated with the ACA, a comprehensive healthcare reform law enacted in 2010, with most states implementing its expansions around the beginning of 2014. The primary goal of the ACA is to extend affordable insurance coverage, particularly to low-income households. The share of uninsured individuals remained above 20% during the 1996–2013 period and started to drop markedly in 2014, reaching 15.0% in 2019, as shown in Figure 2.[5]

Inspired by the ACA's focus on low-income households, as well as the inherent correlation between medical spending and age, I will examine variations in the uninsured share and medical expenditure risk before and after the ACA from income and life-cycle per-

[5] This result holds under different definitions of being uninsured. Even when adopting the strictest approach to identify the uninsured group—by including only those who remained uninsured for the entire survey year (the dashed line in Figure 2)—the notable 2014 decline in the uninsured share still exists.

(%)	Income group				
	1	2	3	4	5
1996–2013	33.3	31.8	22.2	13.6	8.9
2014–2019	25.6	25.1	21.6	13.8	7.3
	Age group				
	20–34	35–44	45–54	55–64	65+
1996–2013	38.8	25.0	20.3	18.0	2.4
2014–2019	28.2	22.3	17.5	14.4	2.0

Table 1: Fraction of Uninsured Individuals by Income and Age Groups

Notes: All statistics are weighted using the MEPS survey weights. The fraction of uninsured individuals is calculated among a certain income or age group for the given period.

spectives. These analyses aim to inform the ACA's distributional implications for medical spending patterns and uncertainties across diverse economic strata and demographics. To this end, I group individuals into five income quintile groups, as well as into the following five age categories: 20–34, 35–44, 45–54, 55–64, and 65+. Survey years are divided into two periods: 1996–2013 (the pre-ACA period) and 2014–2019 (the post-ACA period).[6]

I first present the fraction of uninsured individuals by income and age groups before and after the ACA in Table 1. The uninsured share decreases monotonically with both income and age groups. In the post-ACA period, the uninsured share dropped significantly among individuals in the lowest two income quintile groups (i.e., the bottom 40% of income earners) and the youngest age group. These results suggest that the ACA appears to have achieved its goal of extending health insurance to low-income populations.[7]

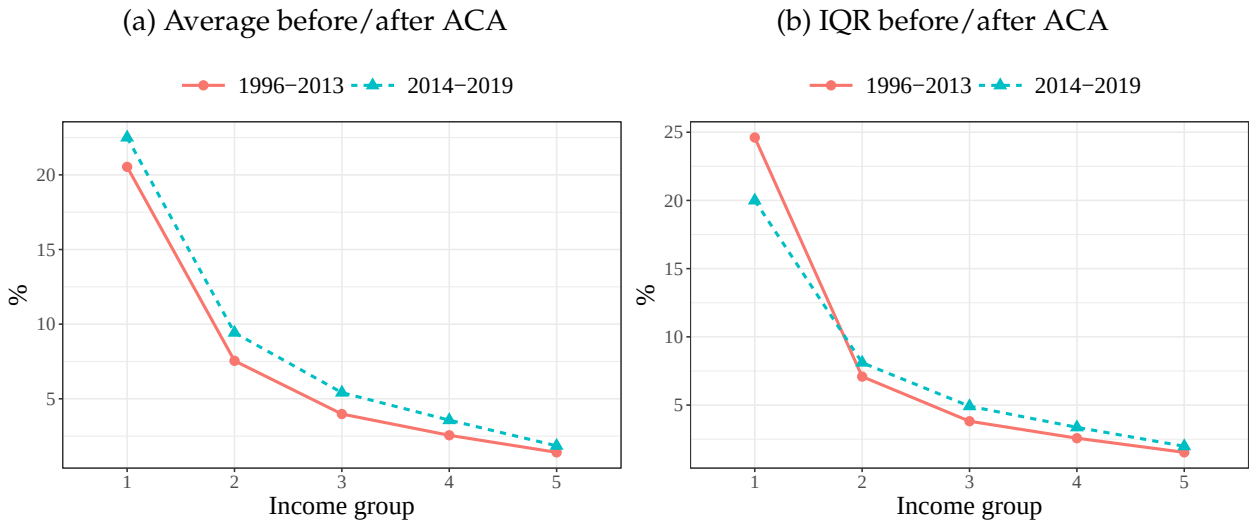
Individuals at different income levels may confront different degrees of medical expenditure risk in the pre-ACA and post-ACA periods. To this end, I calculate the average $\widetilde{oop}$-income ratios and their IQR for each income-year group combination and present the results in Figure 3.

As illustrated in Figure 3a, medical spending constitutes a larger share of income for low-income individuals compared to their high-income counterparts, by a factor of more than 10. Additionally, the average $\widetilde{oop}$-income ratios increased across all income groups

[6] I use 2014 as the time break since most states implemented the ACA starting that year.

[7] The youngest age group of 20–34 is relatively poorer. In the MEPS 1996–2019 data, 49% of individuals aged 20–34 belong to the lowest two income quintile groups.

Figure 3: Medical Expenditure Risk by Income



Notes: All statistics are weighted using the MEPS survey weights. The average and IQR are computed for each income and year group.

over time. Regarding medical expenditure uncertainty, Figure 3b shows that low-income individuals faced a significantly greater risk of out-of-pocket medical expenses than high-income individuals. The medical spending uncertainty for the lowest income quintile group dropped from 25% before to 20% after the ACA, but this reduction was not observed for other income groups. Nevertheless, the 20% uncertainty for the lowest income group remains substantially higher than that of other groups, which stayed below 7.5%.

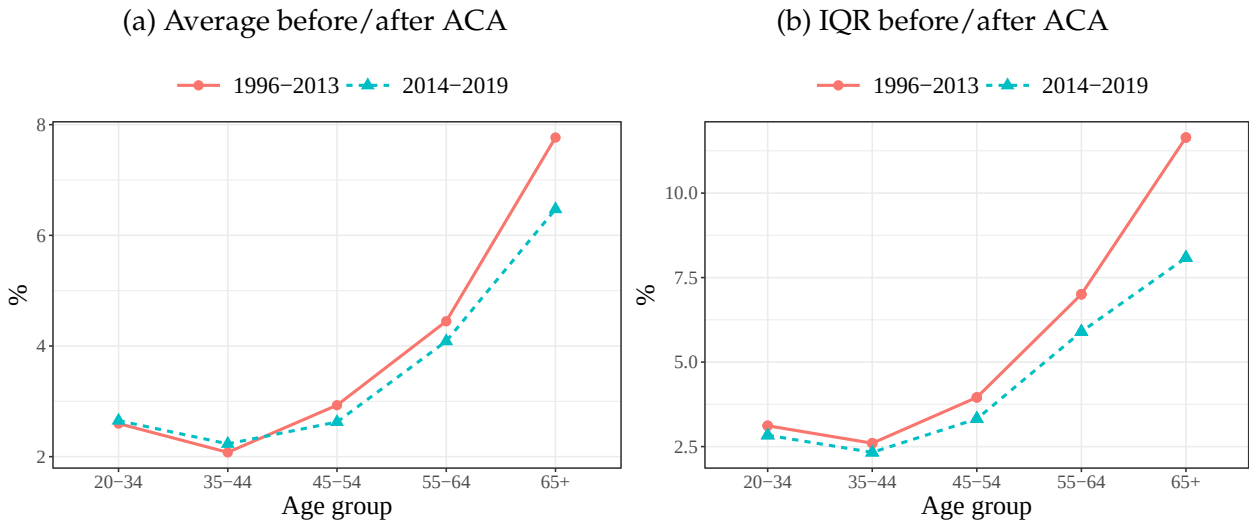
Notably, the bottom 20% of the income distribution not only spent much more on medical goods and services but also faced disproportionately high uncertainty. Together, these factors make it particularly challenging for this group to cope with the significant downside risk associated with medical expenses.

Following the same vein, to assess whether individuals of different ages faced varying degrees of medical expenditure risk before and after the ACA, I calculate the average $\widetilde{oop}$-income ratios and their IQR for each combination of age and year group. Figure 4 presents the results.

Figure 4a shows that the average $\widetilde{oop}$-income ratios follow an overall U-shaped pattern across age groups: the ratio increases with age, with a slight upward trend for the youngest group (20–34), likely due to their lower income levels.[8] This highlights the

[8] Specifically, medical expenditures rise steadily with age, while income is hump-shaped over the life cycle.

Figure 4: Medical Expenditure Risk by Age



Notes: All statistics are weighted using the MEPS survey weights. The average and IQR are computed for each age and year group.

increasing financial burden of medical spending with age. Comparing the periods before and after the ACA's implementation, the life-cycle $\widetilde{oop}$-income ratio profile shows an overall downward shift for older age groups, albeit with ambiguous effects on younger groups. For instance, among individuals aged 65 and older, the average ratio exceeded 7.8% during the 1996–2013 period but declined to approximately 6.5% in 2014–2019.

The life-cycle medical expenditure uncertainty in Figure 4b also follows a U-shaped pattern, with a slight upward bump for the 20–34 age group, likely due to their volatile income. In the post-ACA era, uncertainty for all age groups decreased, with the older age groups declining significantly. For instance, the IQR in the 65+ age group dropped from 11.6% to 8.1%, corresponding to a salient drop of 30%.

4 Concluding Remarks

Medical expenditure risk is a significant idiosyncratic risk that individuals constantly face. Given its pervasive importance, I use MEPS data from 1996 to 2019 to construct adjusted out-of-pocket medical expenses as a measure of medical expenditure risk. I examine how medical expenditure risk evolves over time and varies across income and age groups before and after the ACA.

The findings are fourfold. First, medical expenditure risk exposure has risen steadily, even among the insured, while uncertainty peaked in the 2000s but returned to its 1996 level. Second, after the ACA, the uninsured rate dropped significantly among low-income, young individuals. Third, in the post-ACA period, medical expenditure uncertainty declined for low-income individuals but remained much higher than for other income groups. Fourth, older individuals experienced reduced medical expenditure risk exposure and uncertainty after the ACA.

In the future, a natural extension is to leverage the two-year rotating panel feature of the MEPS to study the persistence of medical expenditure risk. For example, one could investigate whether medical expenses persist and how such persistence correlates with demographic attributes. In addition, other surveys can complement the evidence found in the MEPS. For instance, the Assets and Health Dynamics of the Oldest Old (AHEAD) dataset collects information on out-of-pocket medical expenditures for the elderly and could complement the current findings for the older groups.

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