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

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Abstract

I examine the macroeconomic implications of medical expenditure risk in the U.S. 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) increased in the 2000s and then returned to its 1996 level. Following the Affordable Care Act, the uninsured rate declined significantly, and medical expenditure uncertainty decreased for the low-income group. Older individuals experienced reduced risk due to gains at the intensive margin.

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. Nearly all individuals incur significant medical expenses at some point, and such events can have long-lasting consequences. Medical expenditure risk has been shown to influence key economic decisions, including consumption and savings behavior (Palumbo, 1999; Scholz, Seshadri, and Khitatrakun, 2006; De Nardi, French, and Jones, 2010; Miranda-Pinto, Murphy, Walsh, and Young, 2020), as well as bankruptcy filings (Sullivan, Warren, and Westbrook, 2000; Livshits, MacGee, and Tertilt, 2007; Gross and Notowidigdo, 2011).

Given its widespread importance, understanding how medical expenditure risk varies over time and across income and age groups is crucial. To this end, I use the Medical Expenditure Panel Survey (MEPS) to investigate the macroeconomic implications of medical expenditure risk in the United States from 1996 to 2019.

To better measure medical expenditure risk, I compute 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 the medical spending-to-income ratio (risk exposure) and its dispersion (risk uncertainty), as well as the fractions of uninsured individuals and those experiencing Catastrophic Health Spending (CHS). I then analyze how medical expenditure risk differs across income and age groups 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 returned to its 1996 level; (2) the uninsured and CHS rates dropped significantly following the ACA's implementation in 2014; (3) in the post-ACA period, medical expenditure uncertainty for low-income individuals declined but remained substantially higher than for other income groups; and (4) after the ACA, older individuals experienced reductions in both medical expenditure risk exposure and uncertainty.

This study contributes to the literature by providing a comprehensive analysis of med-

[1] This approach has been widely applied, including in Livshits, MacGee, and Tertilt (2010) and Exler, Livshits, MacGee, and Tertilt (2024).

ical expenditure risk. Unlike Livshits et al. (2007), which examines a shorter period, I extend the temporal scope to 1996–2019, offering insights into long-term trends relevant to policy discussions. Beyond the elderly-focused analysis in De Nardi et al. (2010), I examine medical expenditure risk across the entire life cycle, highlighting 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.

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. I focus on data from the 1996–2019 waves to exclude the effects of the COVID-19 pandemic. I restrict the sample to individuals aged over 20 with positive income. 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 this MEPS measure. First, individuals 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 $\widetilde{oop}_{i,t}$.

The first adjustment 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

[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.

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:

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

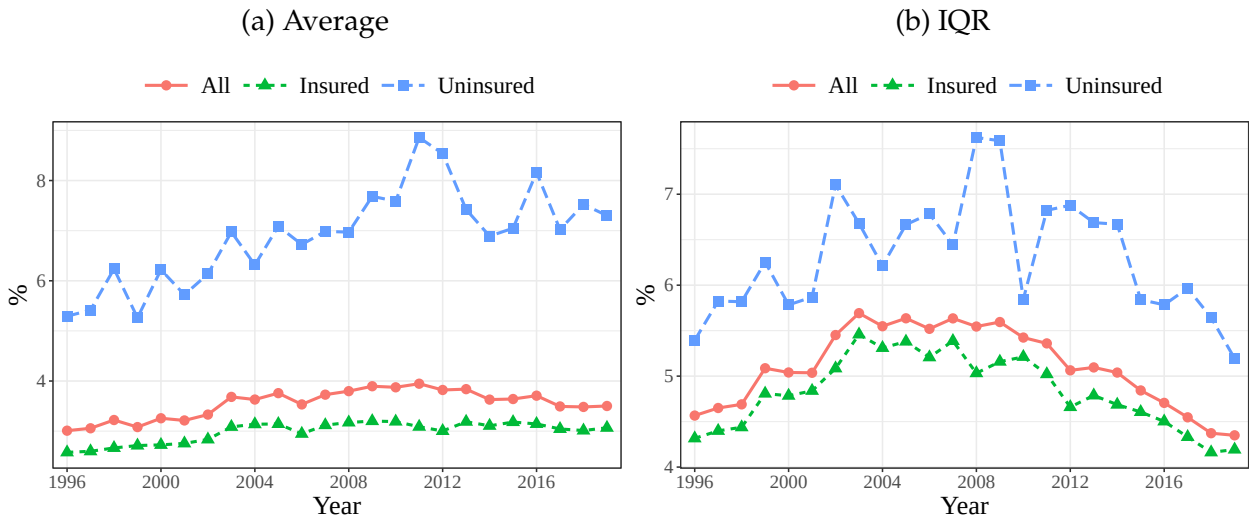
where $\mathbb{I}_{i,t}^{unins}$ is an indicator function that equals one if individual i is uninsured in any month of the survey year t, $chr_{i,t}$ denotes the total medical charges for individual i in year t, and $exp_{i,t}$ represents the total paid expenditures for individual i in year t.

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 given survey year t.

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



Notes: All statistics are weighted using the MEPS survey weights.

3 Results

I measure exposure to medical expenditure risk using the ratio of average adjusted out-of-pocket medical expenditures to average income (henceforth, the average $\widetilde{oop}$-income ratio).[4] To assess risk uncertainty, I measure the dispersion of individual $\widetilde{oop}$-income ratios using the interquartile range (IQR). I begin by reporting the average $\widetilde{oop}$-income ratio and its IQR over the MEPS 1996–2019 in Figures 1a and 1b across insurance groups.

In Figure 1a, the average ratio increased from 3% in 1996 to 3.5% in 2019. Uninsured individuals exhibited the highest variability, with their spending peaking at nearly 9% of income in 2011. Notably, even insured individuals experienced a mild rise in out-of-pocket spending relative to income. Over two decades, medical spending among the uninsured increased disproportionately by 38%, while the insured saw a comparatively smaller rise of 19%. These trends highlight the growing financial burden of medical expenses at the intensive margin, regardless of insurance status.

In Figure 1b, individuals, including those who are insured, experienced more dispersed medical expenses relative to income around the 2000s, followed by a gradual sta-

[4] There are two primary reasons. First, this paper focuses on the macroeconomic implications of medical expenditure risk, and this measure captures the financial burden of medical goods and services at the aggregate level. Second, the ratio-of-mean approach mitigates the influence of extreme values resulting from exceptionally high medical expenses or near-zero income while preserving all relevant information.

bilization 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 yet peculiar that medical expenditure uncertainty began to decline in the 2010s, as observed in Figure 1b. This decreased uncertainty could be related to the ACA, a comprehensive healthcare reform law enacted in 2010, with most states implementing its expansions around early 2014. The primary goal of the ACA was to expand Medicaid eligibility and provide affordable insurance coverage, particularly for low-income households.[5]

To study the ACA's aggregate effects, I report the fraction of uninsured individuals and those experiencing CHS in Figures 2a and 2b.[6] The uninsured rate among those without coverage for any month remained above 20% from 1996 to 2013 before declining significantly in 2014, reaching 15.0% in 2019.[7] The CHS rate also shows a pronounced downward trend after 2014. Both trends suggest that more individuals have gained protection against medical expenditure risk after the implementation of the ACA.

Inspired by the ACA's focus on low-income households and the inherent correlation between medical spending and age, I delve into the variations in the uninsured rate and medical expenditure risk before and after the ACA from income and life-cycle perspectives.[8] 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).[9]

I first present the fraction of uninsured individuals by income and age groups before and after the ACA in Table 1. The uninsured rate decreases monotonically with both in-

[5] Uninsured low-income individuals are particularly susceptible to medical expenditure risk, and the ACA's expansion has provided protection for this group. As a result, medical expenditure uncertainty declined among those who remained uninsured after the ACA's implementation.

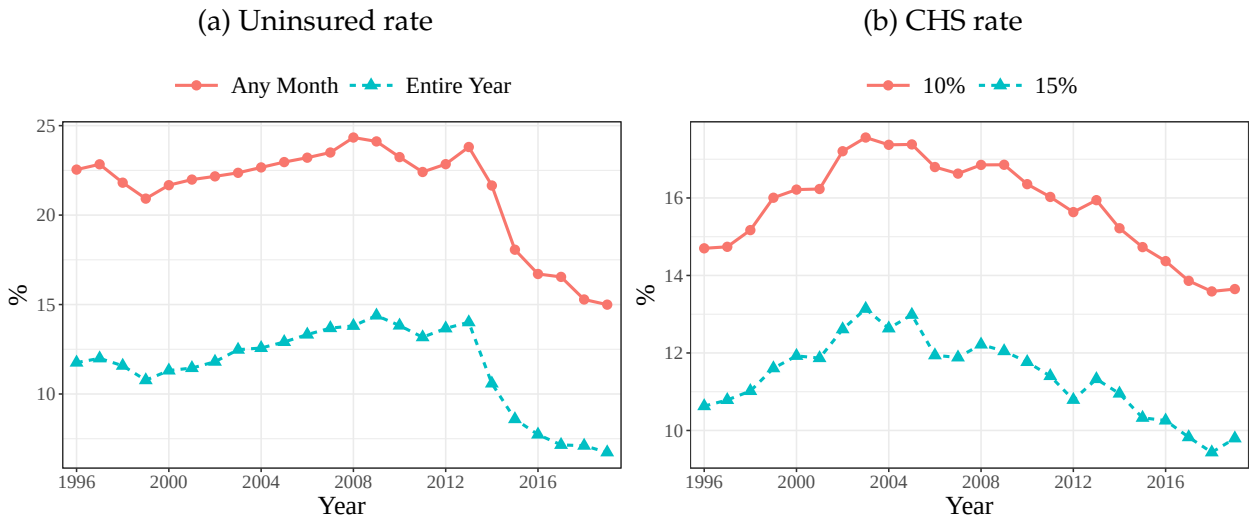
[6] CHS is defined as out-of-pocket medical expenses exceeding 10% of income, following the World Health Organization (WHO) definition. For robustness, I also report results using a stricter 15% threshold.

[7] This result holds under different definitions of being uninsured. Even under the strictest definition—considering as uninsured only those who remained so for the entire survey year (the dashed line in Figure 2a)—the sharp decline in 2014 persists.

[8] These analyses aim to inform the ACA's distributional implications for medical spending patterns and uncertainties across diverse economic strata and demographics.

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

Figure 2: ACA's Aggregate Effects



Notes: All statistics are weighted using MEPS survey weights. The uninsured rate represents the fraction of uninsured individuals. *Entire Year* includes those who remained uninsured throughout the survey year, while *Any Month* refers to those uninsured for at least one month. The CHS rate denotes the share of individuals with out-of-pocket medical expenses accounting for at least 10% or 15% of income.

come and age groups. In the post-ACA period, the uninsured rate 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.[10]

Individuals at different income levels may confront different degrees of medical expenditure risk before and after the ACA. Thus, I calculate the average $\widetilde{oop}$-income ratios and their IQR for each income-year group 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 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.

[10] 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.

(%)	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: Uninsured Rate by Income and Age Groups

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

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.

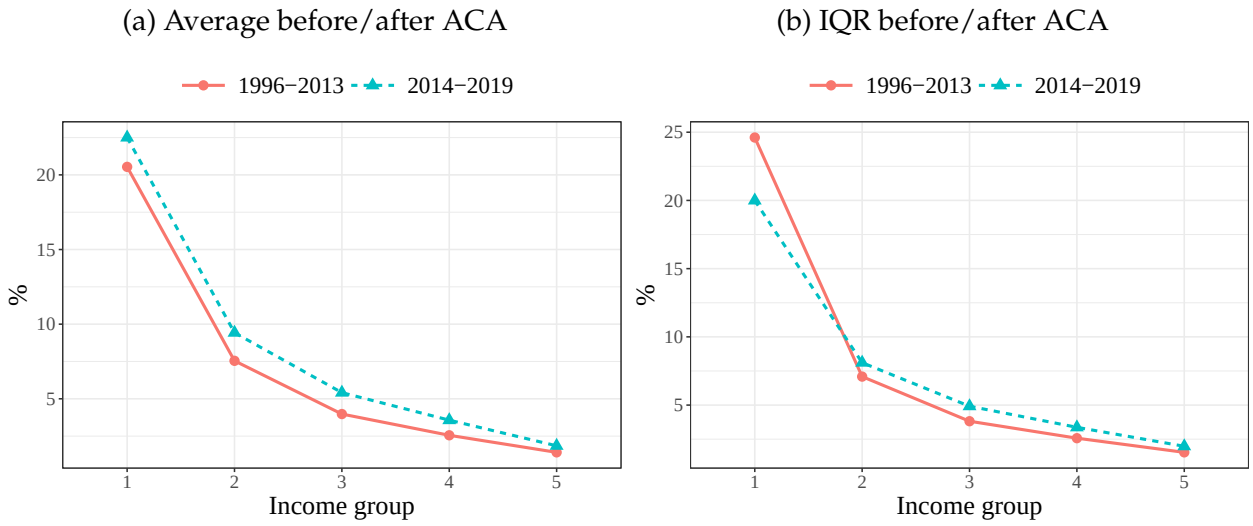
Analogously, I calculate the average $\widetilde{oop}$-income ratios and their IQR for each combination of age and year group in Figure 4.

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.[11] This highlights the 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.[12]

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.[13]

[11] Specifically, medical expenditures rise steadily with age, while income is hump-shaped over the life cycle.
[12] 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.
[13] For instance, the IQR in the 65+ age group dropped from 11.6% to 8.1%, corresponding to a salient drop

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.

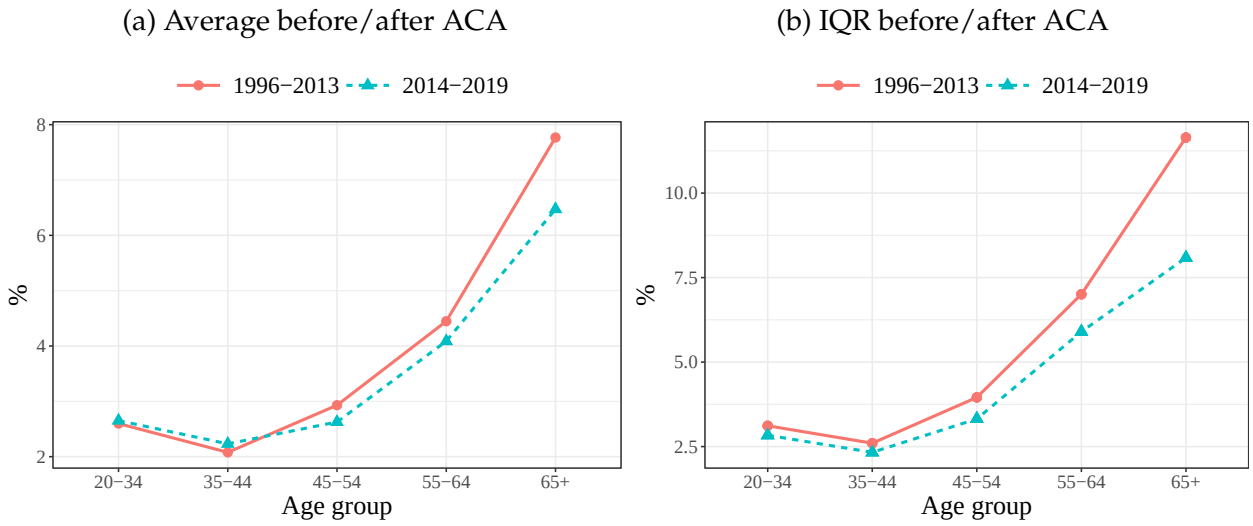
Given that the ACA aims to expand insurance coverage for low-income households, the reduced risk among the older population following its implementation is somewhat surprising. However, these unintended gains may stem from several factors. First, while Medicare covers individuals aged 65 and older, low-income seniors may also qualify for Medicaid. In MEPS 2014–2019, 16.3% of individuals over 65 belonged to the lowest income quintile. Second, dual coverage provides more extensive benefits, such as the ACA's gradual closure of the Medicare coverage gap, or Part D "donut hole," which previously required seniors to pay high out-of-pocket drug costs (Bonakdar Tehrani and Cunningham, 2017). Third, since Medicare does not cover long-term care, the ACA's expanded funding for Home and Community-Based Services (HCBS) may have helped seniors lower out-of-pocket spending in this category (Edwards, Douglas, and Yiu, 2023).

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

of 30%.

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.

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 and CHS rates dropped significantly. 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.

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