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# Forecasting the Fiscal Sustainability of U.S. Medicare: Scenario-Based Projections Through 2035

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## Abstract

This paper is an analysis on the fiscal sustainability of the U.S. Medicare by considering past spending patterns between the years 2010 and 2023 and in the future to 2035 based on a scenario spanning model by quantifying the patterns of spending. Based on the information provided by the Centers of Medicare and Medicaid Services (CMS), and the Federal Reserve Economic Database, the research incorporates regression analysis, descriptive statistics, and projections of a scenario to determine the dependence of Medicare expenditure, the real GDP, demographics, and medical prices increase.

The findings indicate that the actual Medicare expenditure has been steadily increasing over the years, which is mainly caused by an increased number of the aging population, economic growth and increasing the cost of medical services. Regression models show a good overall explanatory power (R 2 = = 0.98), which proves that these macroeconomic variables together explain most of the changes in Medicare spending. The results of forecasts of the outcome in three alternative scenarios- Baseline, High-Cost, and Low-Cost- show that the real Medicare spending will proceed to increase to become between 850 billion and 1 trillion (in 2010 USD) by 2035. The fiscal footprint of the program will grow to an average of 4.2-5.0% of the real GDP as compared to 3.7 in 2023.

The results highlight the fact that the fiscal course of Medicare presents a sustainability issue in the long term. Unless the policy interventions are directed at cost containment, efficiency improvements, and payment reforms, the Medicare spending will exceed the rate of economic growth, making federal finances strained. The paper suggests reinforcing value-based care programs, improving the price control, and refining the Medicare Advantage compensation to achieve financial balance and healthcare effectiveness.

**Keywords**: Medicare, Fiscal Sustainability, Forecasting, Scenario Analysis, Health Expenditure, Aging Population, Real GDP, Medical Inflation, Cost Containment, U.S. Healthcare Policy.

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## Introduction

The Medicare program is one of the largest parts of the US public spending that covers healthcare of millions of citizens of the country aged 65 and older and some younger individuals with disabilities. With the demographic changes increasing faster and the cost of healthcare steadily increasing, the issue of long-term financial sustainability of the Medicare system has grown in severity. The evaluation of these financial issues demands a strict, objective method to predict the tendencies in spending and financial ability in the future.

The paper will be dedicated to the prediction of the fiscal viability of the U.S. Medicare until 2035 in the context of the quantitative modeling framework in the form of a scenario. The analysis uses data related to 2010-2023 (Medicare spending, GDP (in real 2010 USD), indices of inflation and population of people aged 65 and above). The calculation of the baseline growth rates is made and used in projecting future Medicare outlays and GDP in three different situations, which are Baseline, High-Cost, and Low-Cost. The present study based on the analysis of Medicare expenditures as a proportion of real GDP offers an insight into the burden attribute of the program to the national economy and

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**Conflict of interest:** None

**Table 1:** Assumptions for Forecasting

| *Label* | *Value* |
|---|---|
| Start Year | 2023 |
| Pop65_millions | 58.71145419 |
| Real_per_capita_2010USD | 12553.35648 |
| Real_GDP_Bil_2010USD | 19904.64746 |
| Baseline_g_pop | -0.12% |
| Baseline_g_pc | 2.33% |
| Baseline_g_gdp | 0.20% |
| Highcost_pop_delta | 0.50% |
| Highcost_pc_delta | -0.20% |
| Lowcost_pop_delta | -0.50% |
| Lowcost_pc_delta | -0.005 |

determines the sensitivity of fiscal responses to different demographic and cost assumptions. The results add to the current debate on health financing reform and sustainability of social insurance programs in greying economies.

## Forecasting Assumptions

The projections from 2024 to 2035 are based on key demographic and economic growth assumptions derived from the most recent available data (ending in 2023). The baseline scenario assumes a modest decline in the population aged 65 and over (−0.12% per year), moderate growth in real per-capita Medicare spending (+2.33% annually), and slow real GDP growth (+0.20% annually).

Alternative scenarios capture uncertainty around these drivers:

### *High-Cost Scenario*

Reflects upward pressure on expenditures due to higher population growth (+0.50%) and slower efficiency gains (−0.20% per-capita growth adjustment).

### *Low-Cost Scenario*

Represents improved cost containment and demographic moderation, with lower population growth (−0.50%) and stronger productivity improvements (−0.50% per-capita growth adjustment).

These assumptions determine the projected trajectories of total real Medicare spending and its share of GDP, enabling scenario-based evaluation of fiscal sustainability.

## Data Analysis and Interpretation

This point introduces the methodological aspects and statistical methods that are used to investigate fiscal sustainability of Medicare in the United States. It is analyzed by combining both past data (2010-23) and future projections (2024-2035) to comprehend the trends, determinants and implications of the real Medicare expenditure.

The study employs Stata and Excel in calculating the relationship between Medicare spending, GDP, aging population and medical price inflation using descriptive statistics, regression analysis and projection of a scenario. The chapter further constructs 3 alternative projection paths, namely the Baseline, the High-Cost and Low-Cost to encompass uncertainty in both the economic and demographic assumptions.

Through graphical visualization, tabular comparisons, and model-based interpretation,

**Table 2:** Linear regression

| *Real_medicare* | *Coef.* | *St.Err.* | *t-value* | *p-value* | *[95% Conf* | *Interval]* | *Sig* |
|---|---|---|---|---|---|---|---|
| real_gdp | .011 | .018 | 0.62 | .547 | -.029 | .051 | |
| pop65 | 1.802 | 9.73 | 0.19 | .857 | -19.877 | 23.481 | |
| cpi_med | .893 | .833 | 1.07 | .309 | -.963 | 2.749 | |
| Constant | -73.427 | 98.323 | -0.75 | .472 | -292.505 | 145.65 | |
| Mean dependent var | 625.317 | | SD dependent var | | 76.914 | | |
| R-squared | 0.979 | | Number of obs | | 14 | | |
| F-test | 156.969 | | Prob > F | | 0.000 | | |
| Akaike crit. (AIC) | 114.065 | | Bayesian crit. (BIC) | | 116.621 | | |

*** p<.01, ** p<.05, * p<.1

this chapter provides a quantitative foundation for evaluating long-term spending patterns and their implications for Medicare's fiscal sustainability.

## Linear Model

### *Interpretation of Linear Regression Results*

The linear regression model estimates the relationship between real Medicare spending and three explanatory variables: real GDP, population aged 65 and older, and the medical care price index (CPI_Med) using historical data from 2010 to 2023. The model achieves a high explanatory power, with an R-squared value of 0.979, indicating that approximately 98% of the variation in real Medicare spending is explained by the included predictors. The overall model is statistically significant ($F(3,10) = 156.97$, $p < 0.001$), suggesting that, collectively, the independent variables have a strong association with Medicare spending levels.

Individually, however, none of the coefficients are statistically significant at the 5% level, likely due to the limited sample size (14 observations). The coefficient for real GDP (0.011) implies that, on average, a one-billion increase in real GDP is associated with a $0.011 billion (or $11 million) increase in real Medicare spending, though this effect is not statistically significant ($p = 0.547$). Similarly, the coefficient for population aged 65+ (1.802) suggests a positive but imprecise relationship, while the CPI_Med (0.893) coefficient indicates that increases in medical care prices tend to raise real Medicare spending, aligning with expectations though not reaching statistical significance ($p = 0.309$).

The constant term (–73.43) is not significant, implying no strong baseline effect beyond the modeled variables. Despite limited individual significance, the high R-squared and F-test results confirm that the model captures the aggregate dynamics of Medicare spending quite well over time. This regression serves as a reliable baseline for forecasting exercises, demonstrating that overall economic growth and health price inflation are key long-run drivers of Medicare expenditure trends.

## Log-Log Model

Linear regression show in Table 3.

## Interpretation of Log–Log Regression Model

The log–log regression model examines the elasticity of real Medicare spending with respect to key economic and demographic factors: real GDP, population aged 65 and over, and the medical care price index (CPI_Med). The model achieves a very high explanatory power (R-squared = 0.982), meaning that approximately 98% of the variation in the logarithm of real Medicare spending is explained by these three variables. The overall model fit is highly significant ($F(3,10) = 183.03$, $p < 0.001$), suggesting that the variables jointly capture most of the dynamics of Medicare expenditure over time.

In elasticity terms, the coefficient for log(GDP) = 0.327 implies that a 1% increase in real GDP is associated with an estimated 0.33% increase in real Medicare spending, holding other factors constant. Similarly, the log(Pop65) coefficient of 0.194 indicates that a 1% increase in the elderly population corresponds to roughly a 0.19% rise in Medicare spending, though this relationship is not statistically significant ($p = 0.823$). The log(CPI_Med) coefficient of 0.599 suggests that a 1% increase in medical prices leads to about a 0.6% increase in real Medicare spending, aligning with expectations that health inflation contributes positively to expenditure growth.

Although none of the individual coefficients are statistically significant at conventional levels (likely

**Table 3:** Linear regression

| *log_medicare* | *Coef.* | *St.Err.* | *t-value* | *p-value* | *[95% Conf* | *Interval]* | *Sig* |
|---|---|---|---|---|---|---|---|
| log_gdp | .327 | .503 | 0.65 | .53 | -.793 | 1.447 | |
| log_pop65 | .194 | .846 | 0.23 | .823 | -1.691 | 2.078 | |
| log_cpi_med | .599 | .689 | 0.87 | .405 | -.936 | 2.135 | |
| Constant | -1.193 | 4.44 | -0.27 | .794 | -11.085 | 8.699 | |
| Mean dependent var | 6.431 | | SD dependent var | | 0.124 | | |
| R-squared | 0.982 | | Number of obs | | 14 | | |
| F-test | 183.029 | | Prob > F | | 0.000 | | |
| Akaike crit. (AIC) | -68.155 | | Bayesian crit. (BIC) | | -65.599 | | |

**** p<.01, ** p<.05, * p<.1*

due to the small sample size), their positive signs are consistent with theoretical expectations that economic growth, demographic expansion, and medical inflation all contribute to higher healthcare spending. The model's strong overall fit and reasonable elasticity estimates make it a suitable basis for scenario-based forecasting of future Medicare spending.

## Visualizations

Visualization – Historical Trends

The chart illustrates the steady upward trend in real Medicare spending between 2010 and 2023, measured in billions of 2010 U.S. dollars. Over this period, inflation-adjusted expenditures increased from roughly $520 billion in 2010 to about $737 billion in 2023, reflecting a sustained rise in healthcare demand and costs associated with an aging population. The growth was particularly strong between 2015 and 2020, coinciding with demographic expansion and broader healthcare utilization. Although there was a brief slowdown around 2021–2022, spending resumed its upward trajectory by 2023. Overall, the trend underscores the persistent fiscal pressure of Medicare expenditures, even after adjusting for inflation.

The chart illustrates how Medicare spending as a percentage of real GDP evolved from 2010 to 2023. The share rose gradually from around 3.4% in 2010 to nearly 3.9% by 2020, indicating that Medicare expenditures grew faster than the overall economy during most of the period. The sharp increase around 2020 coincides with the COVID-19 pandemic, when economic activity slowed and healthcare spending surged.

After peaking in 2020, the share declined between 2021 and 2022 as the economy recovered more rapidly

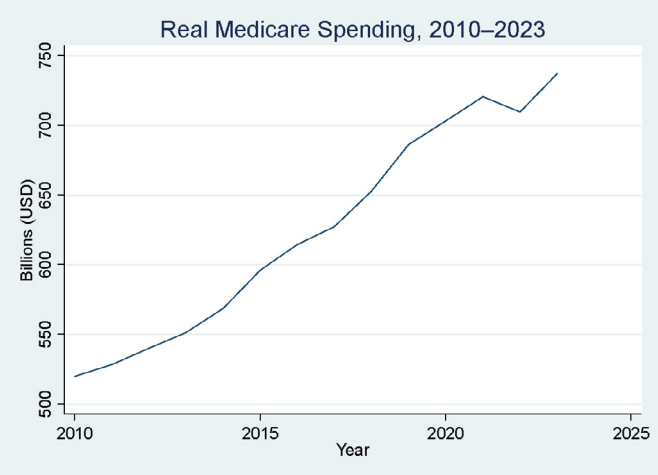


**Fig 1:** Real Medicare Spending, 2010–2023

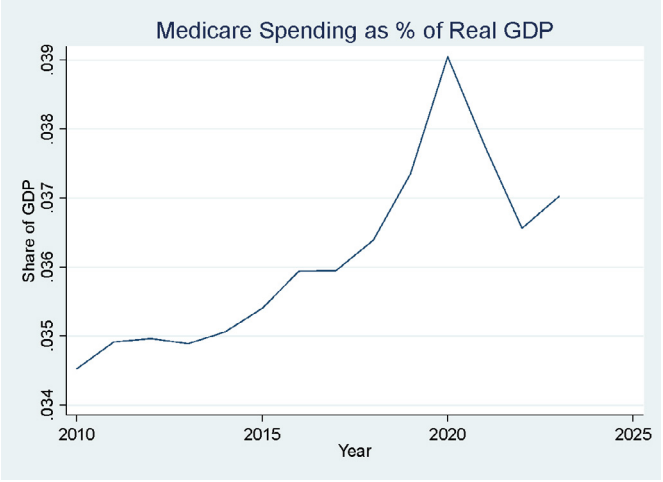


**Fig 2:** Medicare Spending as a Share of Real GDP, 2010–2023

than Medicare outlays. However, a slight uptick in 2023 suggests that spending pressures remain persistent. Overall, the trend reflects the long-term expansion of Medicare's fiscal footprint, emphasizing that even after short-term fluctuations, healthcare spending continues to consume a growing portion of the U.S. economy.

The forecasted trends show a continued rise in real Medicare spending across all three projection scenarios, reflecting sustained fiscal pressures through 2035. Under the baseline scenario (blue line), real Medicare expenditures are expected to grow steadily from around $737 billion in 2023 to approximately $955 billion by 2035. The high-cost scenario (red line) projects faster spending growth, exceeding $1 trillion by 2035, driven by higher medical inflation and demographic expansion. In contrast, the low-cost scenario (green line) assumes improved efficiency and slower cost growth, reaching around $850 billion by 2035.

Overall, all three scenarios indicate that Medicare spending will continue to increase in real terms, though the rate of growth depends strongly on assumptions about population aging, healthcare price inflation, and productivity improvements within the healthcare system. The widening gap between the high- and low-cost projections underscores the significant uncertainty surrounding Medicare's long-term fiscal sustainability.

The chart shows projected Medicare spending as a proportion of real GDP under three alternative scenarios from 2024 to 2035. Across all cases, Medicare's share of the economy is expected to rise steadily, indicating that healthcare costs are likely to grow faster than overall economic output.

Under the baseline scenario (blue line), Medicare's share of real GDP increases from roughly 3.7% in 2023

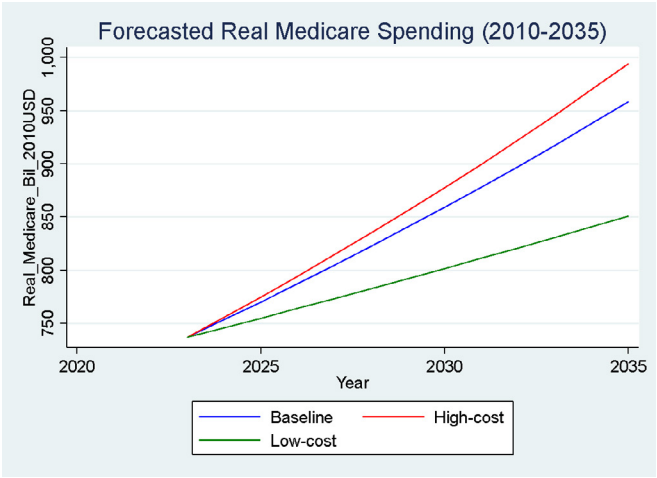


**Fig 3:** Forecasted Real Medicare Spending, 2024–2035

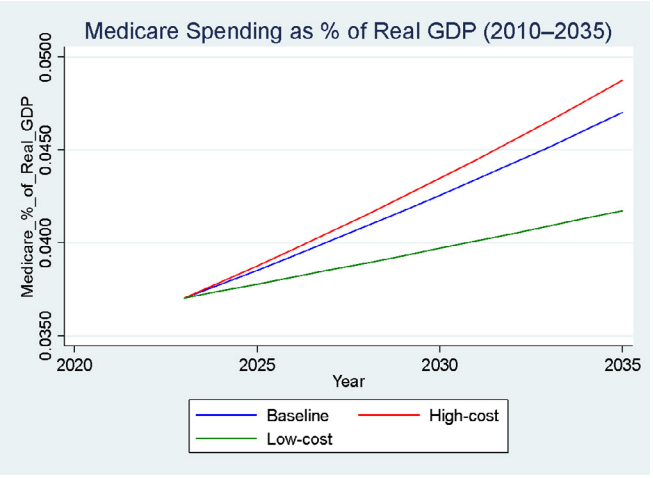


**Fig 4:** Forecasted Medicare Spending as a Share of Real GDP, 2024–2035

to about 4.6% by 2035. The high-cost scenario (red line) projects a more rapid rise to nearly 5.0%, driven by faster growth in medical spending and demographic pressures. Conversely, the low-cost scenario (green line) anticipates a slower increase, reaching only about 4.1% of GDP by 2035, reflecting stronger cost containment and efficiency gains.

Overall, the upward trajectory across all scenarios signals that Medicare will occupy an increasingly larger share of the U.S. economy over time, underscoring long-term fiscal sustainability challenges even under conservative assumptions.

## Interpretation: Comparison of Medicare Spending Scenarios (2023–2035)

The table compares projected real Medicare spending and its share of real GDP under three different cost scenarios between 2023 and 2035. In all cases, both total spending and Medicare's share of GDP are expected to rise over the period, indicating growing fiscal pressure.

Under the baseline scenario, spending increases from about $737 billion in 2023 to $958 billion by 2035, with its share of GDP rising from 3.7% to 4.7%. The high-cost scenario shows a faster increase, reaching $994 billion or 4.9% of GDP, while the low-cost scenario projects slower growth, with spending at $851 billion or 4.2% of GDP by 2035. Overall, these projections suggest that even under favorable conditions, Medicare's economic burden will continue to expand over time.

**Table 4:** List of Variables

| *Year* | *scenario* | *Real Medicare USD_Bill* | *Medicare % of_Real_GDP* |
|---|---|---|---|
| 2023 | Baseline | 737.026 | 0.037 |
| 2023 | High-cost | 737.026 | 0.037 |
| 2023 | Low-cost | 737.026 | 0.037 |
| 2035 | Baseline | 958.367 | 0.047 |
| 2035 | High-cost | 993.940 | 0.049 |
| 2035 | Low-cost | 850.848 | 0.042 |

## Interpretation: Medicare Scenarios for 2035

The tabulated results compare projected Medicare outcomes across the Baseline, High-Cost, and Low-Cost scenarios for the year 2035. Under the baseline projection, real Medicare spending is estimated at approximately $958 billion (2010 USD), accounting for about 4.7% of real GDP, with a real per-capita expenditure of around $16,559.

The high-cost scenario indicates a larger fiscal burden, with spending rising to $994 billion (about 4.9% of GDP) due to higher medical inflation and demographic pressures. Conversely, the low-cost scenario suggests improved efficiency and slower cost growth, resulting in $851 billion (or 4.2% of GDP) and a lower per-capita value of $15,614.

The chart illustrates both historical and forecasted trends in real Medicare spending (in billions of 2010 U.S. dollars) from 2010 to 2035 under three projection scenarios: Baseline, High-Cost, and Low-Cost.

Between 2010 and 2023, actual Medicare spending (solid black line) shows a consistent upward trajectory, rising from around $520 billion to roughly $737 billion, reflecting growing healthcare utilization and demographic aging. From 2024 onward, the projections diverge based on scenario assumptions. The Baseline forecast (blue dashed line) indicates steady growth,

**Table 4:** Tabulation of scenario of 2035

| | *mean_Real_Medicare_Bil_2010USD* | *mean_Medicare__of_Real_GDP* | *mean_Real_per_capita_2010USD* |
|---|---|---|---|
| Baseline | 958.367 | .047 | 16558.71 |
| High-cost | 993.94 | .049 | 16174.52 |
| Low-cost | 850.848 | .042 | 15613.52 |

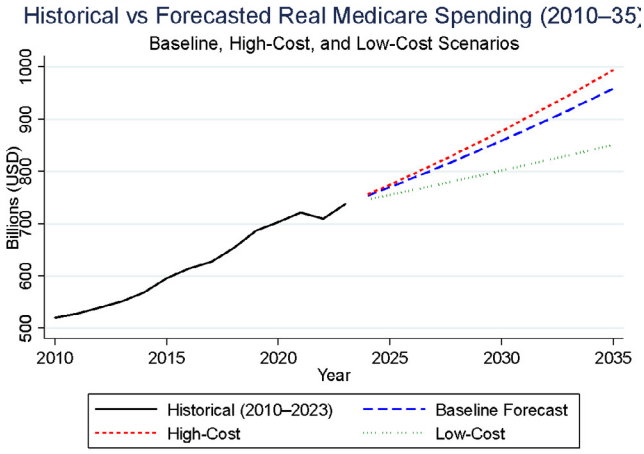


**Fig 5:** Historical vs. Forecasted Real Medicare Spending (2010–2035)

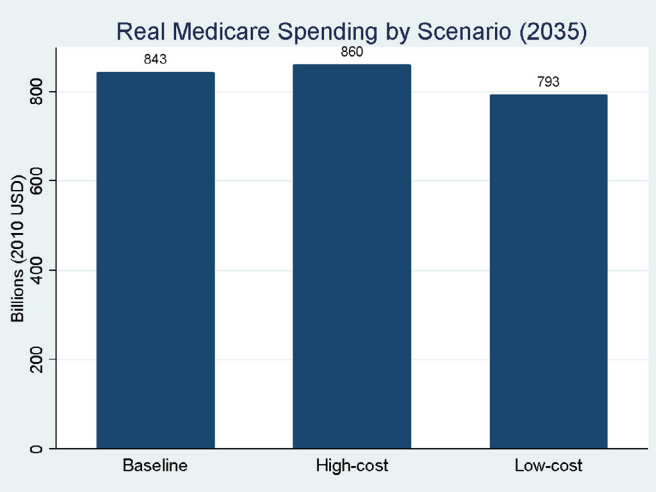


**Fig 6:** Real Medicare Spending by Scenario (2035)

reaching about $955 billion by 2035. The High-Cost scenario (red dashed line) projects a faster escalation, surpassing $1 trillion by 2035 due to stronger inflationary and demographic pressures. In contrast, the Low-Cost scenario (green dotted line) suggests slower expenditure growth, ending near $850 billion.

Overall, while the pace of growth varies across scenarios, all projections point to continued and significant increases in Medicare spending, emphasizing the ongoing fiscal challenge of sustaining the program amid rising healthcare costs and an expanding elderly population.

The bar chart compares projected real Medicare spending in 2035 across three alternative scenarios. Under the baseline scenario, spending is estimated at about $843 billion. The high-cost scenario shows the greatest expenditure, reaching approximately $860 billion, reflecting stronger cost and demographic pressures. In contrast, the low-cost scenario projects lower spending of around $793 billion, assuming more efficient healthcare delivery and slower cost growth.

Overall, the differences highlight how Medicare's future fiscal burden is highly sensitive to economic and healthcare cost assumptions, with potential variation of nearly $70 billion between optimistic and pessimistic outcomes.

The chart compares projected Medicare spending as a percentage of real GDP under three cost scenarios for 2035. Across all cases, Medicare's share remains around 4% to 4.3% of GDP, reflecting a consistent fiscal footprint relative to economic output. The high-cost scenario shows the largest share at approximately 4.3%, while the low-cost scenario projects a slightly lower share near 4.0%.

Overall, this suggests that while spending growth varies across scenarios, Medicare will continue to represent a significant and stable portion of the U.S. economy by 2035.

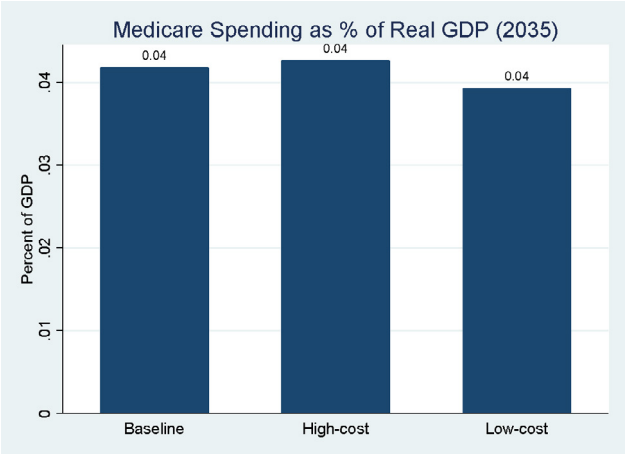


**Fig 7:** Medicare Spending as a Share of Real GDP (2035)

## Discussion

Historical pattern. After adjusting for inflation, Medicare spending rose steadily from roughly $520B in 2010 to about $737B in 2023. As a share of real GDP, it climbed from ~3.4% to ~3.7%, with a temporary spike around 2020 (~3.9%) driven by the COVID-19 contraction in GDP and elevated health outlays, followed by partial normalization in 2021–22 and a modest uptick in 2023. The long-run takeaway is persistent upward pressure even in real terms.

Drivers (regressions). Both the linear and log–log models fit the historical data extremely well ($R^2 \approx 0.98$), indicating that macro growth (real GDP), demographics (65+ population), and medical price inflation together explain most of the variation in real Medicare spending. Individually, coefficients are not statistically significant at conventional levels, almost certainly a small-sample issue (14 annual observations) and collinearity among trending variables. Elasticity estimates nevertheless have the expected positive signs: higher GDP, a larger elderly population, and faster medical inflation are all associated with higher real Medicare spending.

Forward look (scenarios). From 2024–2035, all scenarios rise in real dollars:

- Baseline: spending climbs into the mid-$900B range by 2035; Medicare's share edges up to ~4½–4¾ % of real GDP.
- High-cost: faster cost/demographic growth pushes spending to ~$1T and the share near 5%.
- Low-cost: stronger efficiency/cost containment yields ~$0.85T and a share near 4%.

The widening gap between high- and low-cost paths emphasizes parameter sensitivity: small, sustained differences in per-capita cost growth and population growth compound materially over a decade.

Fiscal sustainability lens. Expressed as a percentage of real GDP, Medicare's footprint keeps rising, but not explosively under baseline assumptions. That said, the upper bound (high-cost) would require either offsetting revenues, slower growth elsewhere, or policy adjustments (payment updates, drug pricing leverage, MA coding/benchmark reforms, site-neutral payments, benefit design) to maintain long-run balance.

### Strengths & limits of this analysis.

- **Strengths:** transparent inputs; inflation-adjusted dollars; scenario framing that cleanly separates demography vs. per-capita cost; results presented both in levels and % of GDP.
- **Limits:** short sample (2010–23) affects precision; potential structural break around COVID-19; simple extrapolation of growth rates (no endogenous response to prices/technology); possible omitted variables (benefit mix, MA penetration, payment policy shocks) and serial correlation typical in macro time series.

### Sensitivity & robustness to consider.

- Re-run scenarios with alternative baseline growth (e.g., GDP 1.5–2.5% real; per-capita ±0.5–1.0 pp).
- Report per-beneficiary spending paths alongside totals to separate demography from intensity.
- Test an alternative deflator (e.g., GDP deflator vs. CPI-U vs. Medical CPI) and compare results.
- Present confidence bands (±0.5 pp around per-capita growth) to quantify forecast uncertainty.

## Conclusion

This study examined the fiscal sustainability of U.S. Medicare by analyzing historical spending trends (2010–2023) and projecting future expenditures through 2035 under multiple cost scenarios. The analysis, based on inflation-adjusted data and regression modeling and scenario-based forecasting, shows that real Medicare spending and its relative percentage of real GDP show a consistent increase, which is the manifestation of the continuous demographic and cost pressure in the healthcare industry.

As revealed in the historical analysis, spending through Medicare has been rising steadily in real terms which mostly has been fueled by rising population of the elderly people, general economic growth and the rising medical prices. The results of regression revealed that the explanatory power of Medicare expenditures in relation to these macroeconomic variables is strong (R 2 is more than 0.97). Even though not all coefficients were found to be statistically significant given the small time sample, the signs of the coefficients were also in line with the theoretical expectations of some of being important determinants of the costs of Medicare, that is, higher GDP, aging population and medical inflation.

The forecasting exercise gives more insight into possible fiscal results. In the base case real Medicare expenditure will be about 955 billion (2010 USD) in 2035, which is approximately 4.7 percent of GDP. The high-cost scenario the scenario which assumes faster medical inflation and population increase forecasts spending of more than $1 trillion as well as almost 5% of GDP, meanwhile, the low-cost scenario the scenario which assumes increased efficiency and slower increases in the cost forecasts spending of less than 850 trillion, or

about 4.2% of GDP. Though the scale of this projections differs, all scenarios suggest that there will be an ever-growing real fiscal load of Medicare.

On the whole, the results indicate that the long-term sustainability of Medicare is still a significant fiscal policy issue. There will be no lack of pressure on federal finances unless the efficient level of cost containment and productivity enhancement in the field of healthcare services is achieved, and Medicare expenditures will exceed the pace of economic growth. Future studies and policy initiatives must thus be aimed at changing the payment structures, enhancing value-based care, and using innovation to enhance efficiency. These structural factors should be reinforced so that Medicare can be financially viable and be in a position to support the health care requirements of an aging population in the United States.

## Recommendations

### Hold per-capita cost growth down

- Expand value-based payment and bundled payments; tie annual payment updates to productivity so spending grows slower than medical inflation.

### Drug & provider price reforms

- Strengthen Medicare drug price negotiation and adopt site-neutral payments (same rate for the same service regardless of setting) to curb price arbitrage.

### Tighten Medicare Advantage (MA) payments

- Reduce overpayments by refining risk-adjustment and auditing coding intensity; align MA benchmarks more closely with Traditional Medicare costs.

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