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Has the United States Bent the Health Care Cost Curve?

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Abstract

In 2024, medical spending as a share of GDP was 15% below forecasts made in 2010 and only marginally higher than in 2010. Relative to expectations, the savings were nearly $1 trillion in 2024. In light of this prolonged period of slower growth, we ask the question: has the United States bent the health care cost curve? We start with a model of medical spending that incorporates both the development of new technologies and the equilibrium use of those technologies. Technology development and incentives around its use may add to or subtract from spending growth. We then examine the drivers of the spending slowdown empirically. We attribute slower medical spending growth to five factors: the natural development of technologies that simultaneously improve health and lower cost; long-run supply elasticities that exceed short-run elasticities; improvements in population health; reimbursement changes that reduce demand and make demand more price-elastic; and reductions in the rate of price increases, likely driven by some of these same demand factors. Because these cost slowing mechanisms are expanding over time, we conclude that the United States has bent the health care cost curve, though not as much as it could be or will need to be bent.

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In 2010, medical spending in the United States was 17.2% of GDP. The actuaries at the Centers for Medicare and Medicaid Services (CMS) forecast that medical spending would rise to 19% of GDP by 2019 and continue to increase by twice the rate of GDP growth thereafter. Extrapolating this to 2024, health spending would be expected to reach 21.2% of GDP, or $6.3 trillion. In reality, health care spending in 2024 was only 18.0% of GDP (Figure 1), a reduction of 15% below forecast. This lower spending amounts to nearly $1 trillion in 2024 and $6.7 trillion in total from 2011-24.

In 2008 and 2009, President Obama famously noted the need to ‘bend the health care cost curve.’ In light of the slower than expected growth of medical spending since 2010, we ask the question: has the US bent the health care cost curve?

The slowdown in medical spending growth is not only large substantively, it is unprecedented historically. Since the advent of systematic data on medical spending in 1960, no 14-year period has seen as slow growth of medical spending relative to GDP as was realized over the 2010-24 time period. Similarly, no period since 1970 has seen a lower growth rate of medical spending above GDP growth in the US relative to other countries than that realized in the 2010-24 period.

This finding is also surprising theoretically. There are three common theories about medical spending growth, all of which predict that spending should increase relative to the economy over time. One theory of rising health care costs is ‘Baumol’s disease’: slower labor productivity growth in health care than elsewhere in the economy means that wages in health care, and hence prices, need to rise over time to keep workers in the industry (Baumol and Bowen, 1965). A second theory is that health care is a luxury good and thus spending should grow more rapidly than income (Hall and

Jones, 2007).[1] A third theory is that exogenous technological change leads to more treatment ability and thus greater spending (Newhouse, 1992). The fact that consumers pay little for care at the margin (Feldstein, 1973), and that providers are paid more for doing more and may be sued if they do less (Chandra, Cutler, and Song, 2011) may lead to technology being used even if the value is low. In all of these theories, the current slowdown is particularly unusual.

We are not the first to note the health care spending slowdown (Buntin et al., 2022; Glied and Lui, 2026; Smith and Newhouse, 2026). Originally, there was debate about whether the slowdown was attributed to the Great Recession (Dranove et al., 2014), though the length of the slowdown indicates that is not the case. Studies have suggested several causes for reduction in cost increases. Fee reductions in public insurance have lowered spending there. Care has shifted from more expensive inpatient settings to less expensive outpatient settings. Fewer impaired older people are using home health services.

There are also a variety of underlying economic theories about why this has occurred. Several changes have reduced demand and increased the price elasticity of demand over time, for example rising cost sharing (Chandra et al., 2013), utilization restrictions in insurance (Sarig, 2024), and a change in the reimbursement environment from a volume basis into more of a value-based approach (Buntin et al., 2025). All of these might lead to lower spending growth. Other studies attribute the slowdown to less rapid technological change (Smith and Newhouse, 2025), though a theory of why this might have occurred has not been worked out. Whether these changes can continue,

[1] The marginal utility of goods consumption declines more rapidly than the marginal utility of more years in which people can enjoy goods.

and for how long, has not been determined.

Analysis of the durability of the spending slowdown is difficult in part because there is no conceptual model of the dynamics of medical care. We start by developing such a model. At a point in time, medical technology decisions are a balance between patient benefits and several constraints: cost sharing facing patients; authorization requirements imposed by insurers; and positive or negative financial incentives facing physicians. Over time, research on new treatments responds to unmet health needs. Initial treatments for conditions tend to be expensive and come with side effects. Subsequent rounds of innovations generally reduce side effects and improve functioning. They may also substitute for older treatments. As a result, follow-on innovations add less to spending than initial treatments and may even reduce spending. Further, treatments that start out expensive may become cheaper over time, if long-run supply is more elastic than short-run supply. The net effect is that as innovation proceeds, spending growth will slow, and spending itself may fall.

With this framework in mind, we turn to an empirical analysis of the spending slowdown. There is no single year in which there is a sharp break in spending growth, though some time between 2005 and 2010 is the most likely date. The slowdown in spending growth occurred for all major payers and reflects lower spending per enrollee. Insurance enrollment turned out to be higher than expected.

To examine the sources of the spending slowdown, we analyze spending for general acute care, prescription drugs, and long-term services and supports for people with special needs. The spending slowdown has been greatest for acute spending and prescription drugs and less for long-term services and supports.

Aggregating across a number of data sets and analyses, we highlight the role of five central factors in the spending slowdown. First, technological innovation has become more likely to save money over time. This shows up in medications that prevent acute events and in surgeries that can be performed cheaper and with fewer complications. We estimate the development of cost saving technology accounts for about 21% of the spending slowdown. Second, demand for some types of care has fallen. Demand changes might be due to changes in reimbursement, higher cost sharing, and tighter insurer restrictions on utilization. Together, demand changes accounts for 10-26% of the spending slowdown, with the range reflecting economic uncertainty about effects. Third, long-run supply elasticities tend to be greater than short-run supply elasticities, leading to price reductions over time. Examples of this include pharmaceuticals going off patent and imaging prices declining. These account for 6% of the spending slowdown. Fourth, health status has improved in other ways that we do not understand, but that may be due to reduced smoking and other preventive care. A healthier population needs less care than does a less healthy one. These trends account for 7% of the spending slowdown. Fifth, there was a reduction in the rate of price growth, from 1-2% above general inflation to about general inflation. This results in about 24% of the spending slowdown. The price growth slowdown is perhaps due to greater demand elasticities, but we do not show this formally.

Considering our primary question, we conclude that the US has bent the health care cost curve. The role of technology in particular is fundamentally different from what it was in the past, and that means that cost growth has slowed relative to the past. That said, the cost curve has not bent as much as it could, or as much as it needs to. In the last section, we consider other changes that may help to realize additional savings.

This paper is structured as follows. The first section presents an analysis of national health expenditures relative to forecasts and the international experience. The second section presents a framework for thinking about cost increases. Sections III-V consider in detail spending on acute services, pharmaceutical spending, and long-term services and supports. The last section summarizes our findings and offers suggestions about the future.

I. The Medical Care Spending Slowdown

National health expenditures are estimated by the actuaries in the Centers for Medicare and Medicaid Services of the Department of Health and Human Services (CMS, 2026a, b; Hartman et al., 2026). Data for the US are available annually from 1960 on; comparable international data are available from 1970.

The accounts divide spending into sources and uses of funds (see Appendix Table A1 for an example). Major sources of funds include public insurance (divided into Medicare, Medicaid, and smaller programs such as the Department of Defense and Department of Veterans' Affairs), private health insurance, and out-of-pocket spending. On the uses side, the accounts include consumption and investment, with the vast bulk of spending being consumption. Health care consumption is delineated by the industry of the receiving company, for example hospitals, physicians' offices, and pharmaceuticals (table 1 has the full list).

In judging whether the US has bent the health care cost curve, the primary comparative benchmark we consider is the forecast made by the CMS actuaries. Each year, the actuaries produce forecasts of medical spending for the next decade on the basis of historical time series analysis coupled with economic and demographic projections (CMS, 2025). Our focus is on the 2010 forecast because it was developed after the Affordable Care Act (ACA) was enacted and thus accounts for the expected spending impact of that legislation. Our goal is not to critique the actuaries' methodology. Rather, we use them because they are state-of-the-art. We eliminate differences between forecast inflation and realized inflation by rescaling the projected numbers to match realized inflation. Comparing the realized experience to forecasts based on past growth rates yields a spending gap of the same magnitude or higher than the gap implied by CMS projections (Appendix Figure 1).[2]

Figure 1, introduced earlier, shows the growth of medical spending relative to GDP, and the actuaries' forecast for that ratio. The change in trend over time is striking. 2010 is the year where medical spending as a share of GDP was relatively highest prior to the slowdown. That is also the worst year of the Great Recession. Without the Great Recession, it is possible the date for the slowdown would be earlier.[3] Our conclusions do not depend on any particular year as being the year in which cost growth slowed.

The deviation from trend is large. In 2024, spending was $977 billion below expected values, or 15% of the projected total. The cumulative gap since 2010 is $6.7 trillion.

The only other time period of any length with a comparable spending slowdown was the managed care era from 1993 through 2000, when medical spending increased

[2] Forecasts based only on past growth project medical spending as a share of GDP would have been roughly 22% of GDP in 2024, even higher than the CMS forecasts.
[3] Cutler et al. (2019) date the slowdown in Medicare spending growth to around 2005. Smith and Newhouse (2026) date it to 2004.

at only the rate of GDP growth. This is widely attributed to price reductions negotiated by managed care insurers bidding providers against each other to be in the preferred tier of insurance networks (Cutler, et al., 2000). As restrictions on preferred networks were relaxed late in the 1990s, the ability to achieve price reductions fell, resulting in rebound spending increases (Mechanic, 2001).

While our analysis is on the full time period since 2010, we note that there was an increase in spending growth at the very end of our time period, in 2023-24 and continuing into 2025 (not shown in the chart). We return to this later in the paper.

International data further emphasizes the health care spending slowdown in the US. Figure 2 shows the growth in medical spending as a share of GDP in the US and other high income countries.[4] Spending growth slowed post-2010 everywhere. However, spending growth in the US rose less than elsewhere, the only 'decade' in which this occurred. Whatever happened around the world happened to a great extent in the US.

CMS estimates medical spending by age in addition to payer and service. These estimates are only approximate, based on population surveys adjusted to national totals (CMS, 2024). Appendix Figure 2 shows an index of real, per capita medical spending for four age groups: 0-18, 19-44, 19-64, 65+. The slowdown in medical spending is particularly apparent for children and the elderly. For adult populations, there is no evidence of a sustained reduction in spending growth, though spending growth slowed in the Great Recession.

[4] We use the same set of countries examined by Smith and Newhouse (2025).

Enrollment v. Per Capita Spending

Spending may differ from expectations for a number of reasons. We start with population coverage. Enrollment may be above or below forecast, and can move across programs. Table 1 shows total spending for major insurance programs (Medicare, Medicaid, and private insurance) along with enrollment and spending per beneficiary. In each case, we show the actual data as well as the 2010 forecast. Appendix Figure 3 shows insurance enrollment and forecasts by year.

Overall insurance coverage increased over time, and generally tracked projections. For many years, Medicaid enrollment was below forecast, as the Supreme Court declared unconstitutional the requirement that states expand Medicaid coverage.[5] Coverage rose during COVID. Private insurance enrollment generally exceeded expectations over the entire time period; the Great Recession was not as bad for private coverage as the historical analysis suggested.

The implication of coverage generally being on trend is that per capita spending in each program slowed. Figure 3 and table 1 show that for each major payer, per capita spending was far below forecast.[6] The growth rate for Medicaid is particularly low – no real per capita spending increase since 2010 – though this partly reflects the expansion of Medicaid to healthier groups in the population. The reduction for private insurance may be partly due to substitution of insurer spending into out-of-pocket spending, with the rise of high deductible health plans. Consistent with this, table 1 shows that out-of-pocket spending was far closer to forecasts than was covered spending.

[5] The Actuaries' forecast was made after the law was passed but before the Supreme Court's *NFIB v. Sebelius* decision, which allowed states to opt out of the Medicaid expansion if they so chose.
[6] Spending for Medicare and Medicaid each include traditional spending from government-run programs along with spending to private insurers that serve beneficiaries in these programs.

The net effect of enrollment being a bit higher than expected is that just over 100% of the reduction in insurance spending (110%) is a result of per capita costs growing less rapidly than expected. The fact that the spending slowdown is so widespread across payers suggests that we need not worry about the intricacies of any single program. Put another way, the medical care goods and services marketplace is more important to examine than the health insurance marketplace. We thus focus on goods and services.

Spending by Service Category

The national health accounts delineate spending by type of provider: hospital, physician's office, pharmaceutical company, and the like. This is not ideal, because conditions span providers and conditions are more natural to study, and because some medical care products are sold to other medical companies (e.g., prescription drugs sold to hospitals and physicians' offices). We rearrange the recipients of dollars to partly account for this.

We group spending into three major categories, shown in table 2; figure 4 shows trends in spending and the forecast for each category. The first category is acute care. This includes hospital care, physician and professional spending, the Medicare component of skilled nursing facility care,[7] investment in structures and equipment (most of which are hospitals),[8] and a few more minor items. We do not include pharmaceuticals in this group, as we examine them separately. General acute care

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[7] Medicare only pays for skilled nursing facilities used for rehabilitation purposes after an acute event. Thus, it is properly grouped with acute care.

[8] It also includes other non-retail medical establishments such as ambulances and nursing homes.

encompasses 57% of total medical spending and 47% of the spending slowdown.

The second category is prescription drugs. We separate prescription drugs because we have good data on spending by product and because the reduction in prescription drug spending relative to forecast is so large. Prescription drugs are 9% of spending and 26% of the spending slowdown.

Prescription drug spending as a separate entry in the accounts includes only retail sales of prescription drugs to patients. There are also sales of pharmaceuticals to other health care providers, for example hospitals, skilled nursing facilities, and offices of oncologists. IQVIA (2021) estimates that roughly one-third of prescription drug spending is to these other entities, a share that has been relatively constant over time.[9] To the extent that the slowing of retail prescription drug spending extends to non-retail channels as well and is passed into prices, the slowdown attributable to prescription drugs would be even larger. In our analysis, we focus on retail sales, as the data are best there.

The third category is long-term services and supports (LTSS). This includes home health care, nursing facilities outside of the Medicare covered component, and community-based and institutional care for people with intellectual and developmental disabilities and mental health or substance use problems. This category of spending is 11% of medical spending and accounts for 6% of the spending slowdown. We note here a key asymmetry LTSS spending. Dollars paid by individuals for a nursing home are

[9] It is difficult to know this exactly because there are rebates to purchasers of drugs that do not show up in the list price of what facilities and offices pay for them.

classified as medical care, but dollars paid for assisted living are not.[10] Thus, a substitution from nursing home care to assisted living care shows up as a reduction in medical spending, even if the underlying situation is similar.

Residual spending includes public and private insurance administration, durable and non-durable medical equipment, dental care, private insurance administration, public medical research, and public health. The residual accounts for 24% of medical spending and 21% of the spending slowdown. In some cases, the ACA is a possible explanation for the spending slowdown, for example the ACA required higher minimum loss ratios on health insurance (Glied and Lui, 2026).[11] NIH spending fell during the Great Recession, and while the growth rate has since recovered, spending remains below the trend from prior to the Great Recession. We do not include a detailed analysis of these spending areas in our consideration of the spending decline.

II. A Framework for the Growth of Medical Spending

Technological change is the leading cause of medical spending increases over time (Newhouse, 1992), yet there are no good models of the evolution of medical technology. This makes understanding the dynamics of medical spending impossible. There are general theoretical models of endogenous technological change (e.g., Acemoglu, 2002), but they tend to fit less well in medical care, where there may be multiple competing or substitutable technologies to choose from and different incentives

[10] The same is true if people substitute from formal home health care to informal home health care, an anomaly noted as far back as Kuznets. In some countries, the medical component of nursing home care is separated from the residential component, and only the former is termed medical spending.

[11] The minimum loss ratio is the share of premiums that must be paid out as benefits. In the individual market, insurers must pay out at least 80% of premiums as benefits. The share is 85% for large groups. Prior to the ACA, individual insurance had much higher administrative loads.

for utilization than in other markets. For example, some technologies may complement or substitute for other technologies, thus driving up or down total spending. Other technologies may prevent disease and thus result in spending offsets that rival or exceed their direct cost. The nuance of the health production function is key. We develop a model that endogenizes technological change in such a setting .

We start in a static setting – static in that the types of treatments available are fixed. Equilibrium utilization is decided by physicians in light of expected patient benefits and physician utility, as in Ellis and McGuire (1996) and McGuire (2000).[12] The expected benefit of the technology for the patient depends on the health improvement the treatment affords ($\theta_i \Delta H$), which varies in the population based on a parameter θ_i. There are side effects from treatment (s),[13] and patients pay an out-of-pocket price (P_O). The benefits function is : $B_i = B(\theta_i \Delta H, s, P_O)$.

In addition to the patient benefits, which physicians value, the physician's return to providing the care has two additional parts: financial profit, $\pi(P_{TOT})$, which may vary positively or negatively with the total cost of the technology; and the implicit costs of overcoming insurance hurdles ($\lambda(P_{TOT})$), for example having to obtain prior approval. We model this latter cost as a shadow price; insurers will generally increase the shadow price for services for which their spending is higher. Suppose the physician assigns a weight γ to patient benefits and 1-γ to their own return. The physician uses the technology if:

[12] Standard market clearing models have difficulty in medical care because prices on the demand and supply side differ, so there is no obvious equilibrium where prices clear and quantities are on both the demand and supply curve.
[13] For convenience, we assume side effects are the same for everyone.

$$\gamma\, B(\theta_i\, \Delta H,\, s,\, P_O) \;+\; (1\text{-}\gamma)\, (\boldsymbol{\pi}(P_{TOT}) - \lambda(P_{TOT})) \;>\; 0.$$

Figure 5 shows the equilibrium, with price on the vertical axis and θ on the horizontal axis. At any price, patients with high enough θ will receive the technology and those with lower θ will not. There is a cutoff θ* which divides those who receive the technology from those who do not.[14] As P_{TOT} rises, θ* may rise or fall. θ* will rise (i.e., fewer people receive treatment) if cost sharing makes patients not want the technology; if physicians are under reimbursement contracts where their incomes fall with provision of higher cost treatments; or if insurers impose restrictions on receipt of care with higher total costs. Conversely, θ* will fall if physicians financially profit enough from providing the care to offset the other two effects, for example through partial ownership of a facility that provides the relevant imaging. We show a situation where the required health benefits rise with cost, i.e., θ* increases with P_{TOT}.

A more clinically effective treatment is represented by a rotation of the line for θ*: those with low θ_i do not benefit greatly, but the benefits are much greater at higher levels of θ_i. Thus, many more people fall in the range where treatment is optimal. A reduction in side effects of treatment would result in a shift in line for θ*; people with lower θ will optimally receive the care.

P_O is determined by insurers, and P_{TOT} is determined by technology marketers. In a competitive market, price will equal cost. With fewer suppliers (for example because of patents), price will exceed cost. Choices of prices may be sequential or simultaneous, influencing the dynamics of the model.

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[14] θ* is defined as the solution to $B(\theta^*\Delta H, s, P_O) = -((1-\gamma)/\gamma)\, (\boldsymbol{\pi}(P_{TOT}) - \lambda(P_{TOT}))$.

II.1 Incentives and the Choice of Care

At a point in time, utilization of medical technology is a key driver of spending. Three aspects of the economic environment will influence equilibrium utilization. The first is patient cost sharing. Going from a traditional insurance plan to a high cost sharing plan cuts utilization; the effect is general on the order of a 15% reduction in spending (Brot-Goldberg et al., 2017). While this is significant, it is not large enough to explain much of the spending slowdown. Enrollment in high cost sharing plans increased from 13% of the privately insured population in 2010 to 33% in 2025. This increase, combined with the 15% spending reduction, suggests a reduction of about 3% in utilization in commercial insurance, or about 5% of the spending slowdown.[15]

Insurance-based utilization restrictions are a second element. The period since 2010 has seen a rapid growth in prior authorization requirements. No overall estimates of the impact of prior authorization have been made, but some guesses are possible. In 2017-19, 25% of outpatient spending (Schwartz et al., 2021) and 43% of prescription drugs (Kyle et al., 2025) were subject to prior authorization, in the latter case roughly double the rates from 2011. Prior authorization on average reduces pharmaceutical spending on restricted drugs by 22% (Brot et al., 2024). If this reduction applies to physician services as well, the net effect of expanding prior authorization would be a 8% the spending slowdown.[16]

[15] This calculation involves a 20% increase in cost sharing with 15% savings for the 25% of spending in commercial insurance. In the next paragraph, the savings for pharmaceuticals is 22% which affects 5% of spending for 26% of people; and for physicians 22% savings which affects 21% of spending for 25% of people. In the subsequent paragraph, the savings are about 3% on 60% of spending for 40% of the population.

[16] Drugs: 22% savings for 26% of people on 5% of spending; physicians: 22% savings x 25% of people for 21% of spending).

Physician reimbursement may also affect utilization. Over the 2010s, both public and commercial insurers moved away from paying for care on a volume basis to more of a value basis. Accountable Care Organizations (ACOs) are the most common manifestation. In an ACO, physicians have a target spending; their profits increase if they come in below the target and meet quality metrics, generally targeted around primary care. Empirical studies show that ACO savings are roughly 1% to 6% (Value Based Payment, 2022). About 40% of the population is in some type of advanced alternative payment model. Thus, the savings from this change are perhaps 4% of the total spending slowdown

For each of these policy changes, there may also be indirect effects on spending. For example, as value-based care arrangements have spread, many physicians may have decided that high cost, low value services are not as important to provide as they had formerly – what some term "the value zeitgeist" (Buntin et al., 2025). Such a theory is difficult to test, but it is important in considering the reduction in medical spending.

II.2 Directed Technical Change

This equilibrium in figure 5 is not satisfying clinically. Many patients with health impairments do not receive treatment because the treatment is not sufficiently efficacious. There are also side effects of treatments, and high prices or insurer restrictions limit utilization. Thus, there are incentives to develop better care.

Figure 6 shows how the innovation market unfolds. Consider a situation where initially there is no effective treatment for a condition initially ($\Delta H=0$). There is a high clinical burden, as shown in the upper part of figure 6. There may or may not be medical spending associated with supportive care for people with the condition (for example, home health aides). Figure 6 assumes no such spending.

Observing the health impact and/or potential market, researchers work on a treatment.[17] Suppose that as a result of this research, a technology is invented to treat the condition, termed T_1. T_1 will diffuse as in the lower part of figure 6. The fully-diffused level of utilization is Q_1, which corresponds to spending $S_1 = P_1 * Q_1$.

P_1, and thus Q_1, may change over time. If the technology becomes cheaper (for example, the exclusivity period for a branded drug ends), price will fall, which will increase utilization. Consolidation of providers might have the opposite effect. Going from no spending to S_1 is a large increase in spending growth. In periods of time when many T_1 technologies appear, medical spending will grow rapidly.

In the example shown, T_1 ameliorates but does not cure the condition. There are also treatment side effects, shown in the upper part of the figure. These health burdens create incentives for follow-on innovations. Assuming technical feasibility, a new technology, T_2, will enter the market. In order to be successful, T_2 will need to be superior in one or more of clinical benefits, fewer side effects, or price.

The impact of the introduction of T_2 on total spending is uncertain. In some cases, T_2 might be an adjunct to T_1 and hence raises total spending. An example of this is a drug that allows more patients to receive chemotherapy and tolerate the side effects. In other cases, T_2 might substitute for T_1. For example, new anti-cancer medications may replace existing ones that are not as effective, and minimally invasive surgery may replace open surgery. The unit costs of T_2 may be higher or lower than T_1,

[17] Cutler, Meara, and Richards-Shubik (2012) argue for this in the case of inventions to reduce neonatal mortality.

and utilization may be higher or lower too. Overall, S_2 may be higher or lower than S_1.

In figure 6, T_2 is shown as substituting for T_1 at lower total cost. But even if $S_2 > S_1$, overall cost growth may slow with the transition from T_1 to T_2. That is because T_1 and T_2 are substitutes, so moving from T_1 to T_2 leads to reductions in spending on T_1.

In the figure, T_2 reduces but does not eliminate the disease burden and still has side effects. Thus, innovation will continue, as shown by T_3. The cycle can occur many times. Assuming sufficient technological possibility, this model ultimately leads to a 'cure' – a technology that fully offsets the health condition. If the marginal cost of the cure is sufficiently low and long-run supply is sufficiently elastic (i.e., there are no infinite patents), the cure will ultimately be cheap.

We have seen effective cures happen for many conditions. Polio vaccination is a classic example. Treatment for Hepatitis C is a more recent example. Medications treating HIV and high blood pressure do not cure disease but they substantially ameliorate its downstream effects.

Different medical conditions are in different states of the diffusion cycle. For most of the 1960s through the 1990s, many technologies were in the first stage of diffusion – scientists and clinicians were developing first line treatments for them. These treatments were expensive, especially when no prior care was provided. Thus, there was an explosion in costs for a range of conditions: heart disease, stroke, cancer, premature birth, and many others. This is the time series that analysts use to make forecasts. Over time, more technologies have entered phases where new innovations are being introduced with lower unit costs and use is not increasing enough to raise total spending, or where unit costs are falling over time.

The fact that new innovations will often come with a lower increment to spending if not an absolute reduction means that the health care cost curve necessarily bends over time. However, that may not be true for all periods of time, depending on what technologies are developed and how new technologies interact with older ones.

II.3 Changes in the Disease Environment

Exogenous changes in the disease environment may increase or decrease spending over time. HIV and COVID both increased medical spending. The reduction in smoking over time has reduced spending, while the increase in obesity has increased it. We think of these as exogenous to the medical care marketplace, though they may be endogenous to other economic or policy changes.

III. Acute Care Spending

We begin our empirical analysis of the spending slowdown by considering acute care spending. Figure 7 shows trends in major components of acute care spending: hospitals, physicians and clinics, acute skilled nursing facilities, structures and equipment, and a few smaller items. The largest trend breaks are in inpatient care, acute skilled nursing facility care, and structures and equipment, all of which have trend changes around 2010. Spending growth for physician and clinic services is largely unchanged.

Hospital spending is a mix of inpatient and outpatient revenue. The national accounts do not break out these components. To differentiate the two, we use data from the Healthcare Cost Report Information System (see the Appendix). As figures 7(c) and

(d) show, the break in hospital spending is entirely on the inpatient side; there is no discernible trend break in outpatient spending any time after 2000. In 2024, inpatient spending was 26% percent below the forecast one would have made from an extrapolation of growth in the 1997-2010 time period.[18]

Total spending is the product of prices and quantities. An ideal analysis would differentiate spending into these two components. For data reasons, a decomposition along these lines is not possible.[19] We provide evidence as we can on prices and quantities.

We consider the spending slowdown at two levels: what are the clinical areas in which spending growth has slowed? and what are the economic and technical changes that drive these clinical changes? In some cases, we can estimate one better than the other. We use these estimates to infer the root causes of the spending slowdown. We keep a summary of the causes of the spending slowdown in Table 3. Because our calculations are necessarily involved, the appendix explains them in detail.

III.1 The Slowdown in Traditional Medicare

For understanding acute care, the best data that we have are from Medicare, so we start there. We have data on 20% of beneficiaries in traditional Medicare from 1999-2019 (roughly 40 million people annually) and tabulations from CMS thereafter. The data include quantities as well as prices – both insurer and patient paid. In 2024, Medicare spending per beneficiary was 11% below forecast values (table 1).

[18] The CMS actuaries do not forecast inpatient and outpatient revenue separately.
[19] There is no record of all quantities provided. In addition, prices are proprietary, vary by payer-provider pair, and use multiple bases of payment.

In addition to the traditional Medicare program, nearly half of beneficiaries are in private plans (termed Medicare Advantage). Medicare Advantage plans are known to mirror Medicare prices (Berenson et al., 2015), and spending growth for comparable enrollees for the two has been relatively similar.[20] Given this relative constancy, we assume that prices and utilization trend relatively similarly in traditional Medicare and Medicare Advantage. In calculating sources of savings, we upweight enrollment of traditional Medicare beneficiaries within age and sex groups to match the total Medicare population.[21]

Understanding changes in acute care Medicare spending is complex, because there are so many different services provided and the reimbursement systems are extraordinarily detailed. To capture spending trends, we started with an exhaustive list of spending changes. On the inpatient side, we grouped inpatient and associated skilled nursing admissions into roughly 80 conditions (Cutler et al., 2022), which we generally roll up into about 20 categories. For outpatient care, we grouped services into BETOS categories (procedures, imaging, office visits, and the like)[22] and looked at trends in each. Looking across inpatient and outpatient service use, care has changed in four major ways.

Improvements in Population Health. One central change has been an

[20] Adjusting for selection and coding, MedPAC (2025) estimates Medicare Advantage payments per beneficiary have been approximately 20% above those enrollees projected spending had they been in traditional Medicare since 2007.

[21] This accounts for demographic differences in Medicare Advantage enrollment but not health status differences within demographic cells. Medicare Advantage enrollees are healthier given any set of demographics (Lieberman and Mays, 2025).

[22] Berenson-Eggers Type of Service (BETOS) groupings. Major groups include evaluation and management, procedures, imaging, tests, durable medical equipment, and other.

improvement in population health, experienced as a reduction in urgent and emergency hospitalizations. We focus on hospitalizations for urgent and emergency reasons because such patients will generally receive some care; elective admissions (which represent one-third of admissions) may respond to other factors.

Figure 8 shows trends in urgent and emergency hospitalizations for 18 conditions, aggregated from the original 80. For reasons we discuss below, we omit admissions for patients with vague symptoms such as nausea and fainting who do not receive a disease-based diagnosis. In total, hospitalizations fell by 10%. Nearly 40% of this change is in acute cardiovascular admissions. This includes heart attacks (blockage of blood flow to the heart), heart failure (difficulty pumping blood through the body because of a weakened heart), and stroke (blockage or bleeding in the brain). Each of these specific causes has declined. These declines occurred even as there was an increase in admissions for cardiovascular risk factors, largely a result of greater admissions for diabetic complications.

Cutler et al. (2019) examine the reasons for the reduction in acute cardiovascular hospitalizations over time. They show that preventive medical technology can explain a large part of it. A high number of cardiovascular treatments were disseminated over time, including drugs to control blood pressure, reduce cholesterol, and manage blood sugar. Clinical trial estimates of the impact of these preventive treatments combined with the change in use of these treatments over time, can explain nearly all of the decline in cardiovascular hospitalizations. We thus attribute the cardiovascular component to improved technologies.

To measure the cost savings from fewer urgent and emergency admissions for cardiovascular disease, we calculate the average cost of these hospitalizations, adding in relevant physician and skilled nursing facility use. The decline in cardiovascular admissions accounts for 11% of the Medicare spending slowdown.

Many other conditions have also experienced inpatient reductions, as shown in Figure 8. The reasons for these declines have not been studied as completely as have cardiovascular admissions. Some are likely to reflect a healthier population. For example, smoking reductions would lower respiratory conditions and lung cancer, and cancer screening prevents some forms of cancer. Without an exhaustive assessment, however, we cannot assess the contribution of these system changes. Thus, we classify the residual reduction in urgent and emergency admissions as due to a healthier population without attribution to specific causes. The reduction in residual urgent/emergency admissions is 13% of the Medicare spending slowdown.

Development of Less Expensive Technologies. A second major change is the development of less intensive technologies, for which less is paid. The example we focus on is inpatient v. outpatient setting for major surgery. Procedures are delineated into “major” and “minor” procedures. Major procedures include significant cardiac, orthopedic, and other operations. Minor procedures are a host of smaller procedures from wound closure to oncology.[23]

We examine surgical site of care using data for the traditional Medicare population. For each procedure, there is a physician bill that indicates where the surgery took place (inpatient, outpatient, ambulatory surgery center, etc.). We tabulate this.

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[23] The BETOS category of minor procedures (for example wound closure or PAP smear); eye procedures; ambulatory procedures; oncology; and endoscopy.

Figure 9(a) and (b) show the location of major and minor surgical procedures over time. In 2000, essentially all major procedures were done as an inpatient, and minor procedures were done as an outpatient. Since 2000, and especially since 2010, a large share of major procedures have moved to an outpatient basis – first to hospital outpatient departments and then to ambulatory surgery centers.

To measure the cost savings from this change, we estimate site-specific payment rates using Medicare claims data, including facility as well as physician payments. The cost of an outpatient procedure is approximately 40% less than the cost of an inpatient procedure. In total, Medicare acute spending was 18% lower because of changes in site of care for major procedures.

A central question is why major procedures were able to move out of the inpatient setting. We consider this using the example of total knee and hip replacements. These procedures are common; Medicare pays for approximately 900,000 annually. Experimentation with joint replacement dates from the German physician Theophilus Gluck in the 1890s, who used ivory as an implant.[24] In the 1960s, British orthopedic surgeon Sir John Charnley innovated in materials for implants and methods to implant them, which led to a series of follow-on innovations in the 1970s-1990s. The procedure spread from there.

Traditionally, joint replacements were "open" procedures – a 10-12 inch incision was made near the joint, through which the physician performed the replacement. Because of the significant consequences of open procedures for surgical injury, recovery time, and complications, the surgery was done on an inpatient basis. People

[24] For histories, see Tria and Scuderi (2015), Patel et al. (2019), and Ferrini et al. (2025).

were often discharged to a skilled nursing or rehabilitation facility to recover.[25]

In an effort to improve operative and post-operative outcomes for patients, surgeons began to experiment with minimally invasive joint replacement. Minimally invasive surgery uses multiple, smaller incisions. Because no incision is that large and incisions can be placed strategically, damage to nearby tissue is limited, and recovery time is shortened. Minimally invasive surgery was first used in partial joint replacement in the 1990s. Total joints followed in the early 2000s. The development was rapid, including four different surgical techniques along with enhancements in the instruments and implants. Through a combination of these changes, along with better pre-surgical management and advances in anesthesia, many more patients are able to be discharged home.

Because joint replacement surgery was so complex, Medicare traditionally paid for joint replacement only on an inpatient basis. As a result of these technological advances, Medicare moved total joint replacements off of the Inpatient Only list in the late 2010s. Figure 9(c) and (d) show trends in site of care for total knee and hip replacements. By 2024, over three-quarters of hip and knee replacements were on an outpatient basis.

Financial incentives aided this clinical substitution. Even though reimbursement is lower for outpatient than inpatient joint replacement, costs are sufficiently lower that the profit margin on outpatient care is higher. In addition, surgeons can benefit from owning part of an ambulatory surgery facility, increasing their incentive to perform outpatient surgery. Further, many hospitals are constrained in inpatient capacity;

[25] The average inpatient knee or hip replacement was associated with a 5 day hospital stay in the early 2000s, and 30% of patients were discharged to a skilled nursing facility or rehab hospital.

expanding outpatient care is the cheapest way to grow volume.

Overall, we attribute the move to outpatient surgery to represent a result of technological change, albeit encouraged by financial incentives.

Price reductions. Price increases in Medicare have slowed over time. The ACA built in productivity improvements in many Medicare prices to match productivity growth in the economy as a whole. This has resulted in price increases roughly 0.5% lower than input costs annually since 2012, or 6% in total by 2024.[26] Importantly, these price reductions were known about and incorporated in the 2010 actuarial forecast (Appendix Figure 4). Thus, they are not part of the post-2010 spending slowdown.

There were other price reductions after 2010 that were not expected in 2010. Program-wide, there was a 2% reduction in spending taking effect with budget sequestration in 2013.[27] There were also more targeted price reductions.

One major price reduction was to relabel some inpatient admissions as outpatient care. Many patients present at the emergency department with vague symptoms that may indicate serious disease, but the symptoms themselves are not obviously severe (e.g., nausea, vertigo, non-specific abdominal pain). Such patients used to be admitted to the hospital for testing and follow-up. Often, no underlying clinical diagnosis was discovered, and the patient was discharged a day or two later.

As a result of Medicare regulatory changes in 2013 (the “two midnight rule”), patients are not supposed to be admitted to the hospital if their expected stay is less

[26] We are grateful to Melinda Buntin for providing us with the compilation of these price reductions.
[27] This was put in place in the Budget Control Act of 2011. There were other changes in specific outpatient services as some services required fewer inputs over time.

than two days. Rather, these patients were deemed to be "observation stays" and paid on an outpatient basis. This cuts reimbursement by roughly two-thirds (Wright et al., 2018). Given the volume of such admissions prior to the pricing change, the savings from this change account for 8% of the total Medicare slowdown. The move to observation units is not a result of new medical technology. Rather, the change is financial. We thus show this as a price reduction in table 3.

Long-run supply elasticity. In addition, Medicare has made targeted reductions in reimbursement for some services as costs have fallen over time. Imaging is a major example. Over time, Medicare reduced the work requirement estimated in each image, and this lowered prices. Relatedly, it combined some imaging services that were formerly reimbursed separately into a single bundle, which came in at a lower total price.[28] The result was again a reduction in imaging prices.

Imaging prices have been declining since 2000, though somewhat more rapidly post-2010 (Appendix Figure 6). Assuming a counterfactual rate of price change equal to that in 2001-2008,[29] which would have been in the forecast, the more rapid reduction in imaging prices post-2010 explains 2% of the Medicare spending slowdown.

Unlike with observation stays, where the price change was not associated with technological advance, the changes in imaging prices are associated with lower costs of imaging over time. We thus include this in our tabulations as a product of a long-run

[28] For example, radiologists used to bill separately for CT scans of the abdomen and pelvis. Because the two body parts are contiguous, they are often captured with a single image. Medicare thus moved to a single image payment, which it set below the price for the two images done separately.

[29] The 2009-2011 period is excluded due to substantial code bundling in this period that leads to difficulties in quantifying imaging volume.

supply elasticity that is greater than the short run elasticity.

Changes in demand. A final factor in slower Medicare growth is a general reduction in outpatient use outside of the site of care shifts noted above. With the exception of physician-administered drugs, spending growth fell in all areas of outpatient care: physician visits, procedures, images, tests, and medical equipment.

To understand some of these trends, we focus on imaging. Imaging is expensive (about 9% of medical spending; Horný, et al., 2024) but also quite concentrated. Half of all imaging spending in Medicare is for five types of images.[30] All of these top imaging categories experienced slower growth over time.

Figure 10 shows the slowdown in imaging growth (see also Hong et al., 2020). In the early 2000s, total imaging grew at a pace of approximately 80 additional images per 1,000 beneficiaries per year. This growth was common to all modalities. Around 2006-2008 growth slowed for all imaging types. Some imaging has declined since then, and other imaging has increased, but not to the rate of the prior trend and not to offset the earlier reduction. This slowdown in imaging growth is unique to the United States; appendix figure 7 shows no reduction in imaging growth over time in our aggregate of other countries.

The slowdown in imaging growth has large financial consequences. Assuming a counterfactual in which the 2001-2008 spending growth rate continued unchanged from 2011, the slowdown in imaging growth accounts for 10% of the overall Medicare

[30] These include echocardiography; CT of the abdomen/pelvis; cardiac nuclear imaging; PET / general nuclear medicine; and vascular duplex.

slowdown.[31]

There is no single explanation for the reduction in imaging growth in the literature, but some themes emerge. One theme is the realization by many clinicians and patients that imaging was overused. Some forms of imaging can result in harm from excess radiation; some images find abnormalities that are not problematic but lead to a cascade of further tests and procedures, which are expensive and possibly health harming. Attention to these clinical and financial risks increased over time.[32]

Economic considerations are important too. On the patient side, imaging can come with high out-of-pocket costs, especially if the patient has a high deductible plan. On the provider side, physicians may have responded to the reduction in Medicare prices by reducing the number of images they order. In addition, an increasing number of physicians are reimbursed under value-based contracts. In such payment models, reducing excess imaging is one way to meet spending targets. Finally, private insurers put restrictions on a good deal of advanced (i.e., expensive) imaging, requiring prior approval or denying reimbursement outright.

Finally, technological change in imaging storage may have reduced imaging. Prior to the 2010s, images were not easily transported and thus often had to be redone when a patient saw a new doctor. Better data storage and electronic medical records have reduced the need for repeat imaging.

The literature has not estimated the relative impact of each of these components

[31] CMS does not forecast imaging separately, so we use a prior growth rate for the counterfactual. We omit the period from 2009-2011 because Medicare payment changes for imaging were prominent then.

[32] For example, the "Choosing Wisely" report of the American Board of Internal Medicine, released in 2012, highlighted imaging as a service that physicians and patients should think about carefully because it may be overused.

on imaging trends. Thus, we include this as a result of demand reduction without a detailed explanation about why. Future work could usefully examine this issue.

All told, the factors we identify explain two-thirds of the Medicare spending slowdown, as shown in Table 3. We suspect the remainder is reductions in utilization along the lines of the reduced growth of imaging, but we have not analyzed it in detail.

III.2 Extension to All Payers

It is not possible to extend these results with the same quantitative precision to all payers, as neither quantities nor prices are measured as accurately outside of Medicare. Still, we extrapolate as best we can.

On the quantity side, data for all payers are fully consistent with the Medicare data. Appendix Figure 5 shows age and sex adjusted hospitalization rates for urgent and emergency admissions, analogous to the Medicare data shown in Figure 8. Not surprisingly, acute cardiovascular disease has declined for the population as a whole. The reduction in acute cardiovascular disease admissions accounts for 3% of the total spending reduction. The share is lower than for Medicare because other conditions are much more salient for the younger population.

The setting for major procedures also appears to have changed in private insurance, analogous to Medicare. Rullan et al. (2023) and United HealthGroup (2025) show that the share of hip and knee replacements done on an outpatient basis has been nearly identical over time for those above and below Medicare eligibility age. The slowdown in imaging growth is also comparable across age groups (Hong et al., 2020).

Finally, in the national data, we also see a large reduction of hospitalizations for signs and symptoms. We do not have comparable data on outpatient care to determine if the reduction in admissions is a result of substitution to observation units, but the literature suggests this is likely (Lind et al., 2017).

If we assume that quantity changes are similar for all payers as for Medicare, we estimate that these factors can explain one fifth of the total spending slowdown.[33]

There is another way we can estimate the impact of policies that influence demand on spending. As described above, a number of studies have examined how patient and provider incentives influence care delivered. Back-of-the-envelope calculations that combine those estimates with the change in prevalence of prior authorization, ACOs, and high deductible plans suggest that combined they account for 16% of the slowdown.

Clearly, there is overlap between imaging service reductions and economic incentives. For example, when people in high cost sharing plans cut back, imaging is one area that is reduced. Further these utilization restrictions contributed to reduced spending on prescription drugs and perhaps also fewer emergency/urgent hospitalizations. To make clear some of these savings may be double counted with other explanations in Table 3, we report the effects as a range from 0% - 16% of the spending slowdown.

One addition to quantity reductions in the non-Medicare population is pregnancy. Pregnancy is a small part of spending for Medicare but a large part of spending for commercial payers. The US fertility rate is down 15% from from 2010 through 2024. Along with that is a reduction in pregnancy-related hospital admissions. Given average

[33] See the appendix for details on this calculation.

reimbursement for pregnancies, including pre- and post-natal care, this explains 1% of the total spending slowdown.

Price changes. In forming forecasts, the CMS actuaries account for legislated changes in Medicare prices, but not Medicaid or commercial insurer price changes. Medicaid prices are generally set administratively, as are Medicare prices. For physician services, Medicaid pays approximately 70% of the Medicare price on average (Skopec et al., 2025); for hospitals, Medicaid pays comparably to Medicare on average (MacPac, 2017). Data suggest that the ratio of Medicaid to Medicare prices was roughly constant over time (Zuckerman et al., 2021 and Skopec et al., 2025 for physicians; AHA 2016 for hospitals). Thus, we assume the same price trajectory in Medicaid acute care as in Medicare acute care. Because Medicaid is such a large payer, this amounts to 5% of the total spending reduction.

Private payers negotiate prices with providers, and generally pay 50% - 100% more than Medicare and Medicaid per case (Lopez et al., 2020). Many private insurers set prices in reference to Medicare (Clemens and Gottlieb, 2017). In those cases, the contract may have private payments fall when Medicare payments fall. Even if not, however, fewer inpatient stays, higher cost sharing, and the spread of insurance restrictions gave private insurers greater ability to bargain over prices with providers.

The full extent of price changes in private insurance is difficult to determine, both for data reasons and because of provider workarounds. Many hospitals bought physician practices and relabeled them “hospital outpatient departments”, which are reimbursed at a higher rate than care in physicians’ offices. Similarly, health systems "upcoded" patients to make them appear sicker and thus receive higher reimbursement.[34] Each of these changes is believed to have been more common after 2010 (Joiner and Jianjing, 2025; Cooper et al., 2025). The presence of these hidden price increases likely caused private payers to hold the line on list price increases.

We do not have data on prices that account for all of this. The Producer Price Index (PPI) has some data on transaction prices for constant goods (i.e., not allowing for upcoding or changes in site of care), so we start there. Figure 11 shows the PPI for hospitals, physician services, and imaging relative to the GDP deflator. For hospital and physician services, we differentiate Medicare and commercial prices, based on the Medicare fee schedule.

For all three services, there was a slowdown in average price growth roughly after 2010. Commercial hospital price increases went from 2.3 percentage points above the general inflation rate in 2000-10 to 0.5 percentage points above the general inflation rate in 2011-24, a decline of 1.8 percentage points annually. Physician prices show an even larger 2.2 percentage point annual reduction in price growth. Imaging price growth fell by 1.4 percentage points annually post-2010.

Offsetting this is the hidden price increases noted above. Crespin et al., (2024) estimate that growth in upcoding between 2011 and 2019 increased inpatient hospital spending by about 3%.[35] If this applied also to outpatient spending, adjusting for upcoding would take off about 30% of the price increase.

Even accounting for offsets, the results imply significant savings from lower

[34] An example is reclassifying a patient admitted to the hospital for an infection as having sepsis, which is paid much higher.
[35] This impact of upcoding is for all payers, not just commercial insurers.

prices. The reduction in price growth for hospitals, physicians, and imaging net of increased upcoding implies savings of $218 billion in 2024, one-fifth of the total spending slowdown.

IV. Pharmaceuticals

The largest gap between projected and actual spending is for retail prescription medications—26% of the slowdown is from less rapid growth of retail pharmaceutical sales, and there is likely more from non-retail sales. As shown in Figure 4, prescription drug spending growth began to deviate from a high-growth trend in the mid 2000s; real per-capita growth averaged 7.8% per year between 2000 and 2005, but only 1.3% per year between 2010 and 2024.

To understand the dynamics of pharmaceutical spending, we use data from IQVIA, which tracks drug sales by molecule over time. We consider the 1998-2023 time period. One complication in analyzing pharmaceutical spending is rebates. IQVIA collects gross sales; rebates are then paid from manufacturers to pharmacy benefit managers, Medicaid programs, and other purchasers. These rebates are not public, though guesses about them have been made. We allocate estimated total rebates to patented drugs, where rebates are most common.

Figure 12 shows annual data on the growth of pharmaceutical spending. The solid line shows the annual growth rate of real, per capita spending. Growth rates were extremely high in the late 1990s – and were only a bit lower in the decades before then. They then declined sharply. Spending growth has remained low from roughly 2008 on, with the exception of a spike in spending growth in 2014-15 and a sustained growth in the last few years. There is no single year of change, but the difference in average growth over time is unmistakable.

To understand why growth has slowed over time, we divide the total growth rate into four groups: the impact of new drugs (defined as the first two years after launch), sales increases from existing protected branded drugs, sales increases from generics, and the impact of loss of patent expiry. These are shown by the bars for each year.

Changes in the impact of patent expiry is a major factor in the growth slowdown. This is especially apparent in 2011 and 2012, when LOE led to a 14% savings from 2010 levels, including major sellers such as Lipitor, Advair, Zyprexa, and Plavix. Further, because these drugs were priced so low after patent expiry, price and quantity increases in subsequent years had negligible impacts on total spending growth. In our theoretical framework above, this corresponds to a higher long-run than short-run price elasticity. We estimate that the increase in the share of drugs losing patent protection in the average year explains 13% of the pharmaceutical spending slowdown and 3% of the total spending slowdown.

The loss of exclusivity was predictable. However, it was not built into the forecasts directly, because the forecasts are based on time series analysis of historical data. Using the historical record would be fine if the past had roughly the same extent of lost exclusivity as occurred in recent years. Because pharmaceutical prices have been rising over time, however, very high selling drugs going off patent is far more important in recent years. Thus, known patent expirations are essentially missed.

Slower contribution of new drugs to pharmaceutical spending growth is a second factor in slower growth. Between 1998 and 2004, new drugs contributed 10% to drug sales annually. After 2004, that share fell in half. There are specific time periods where one sees spending impacts of new medications. In 2014-16, a host of new, expensive drugs were introduced (including Hepatitis C and diabetes medications), which resulted in rapid spending growth. COVID medications are apparent in 2021, along with new uses of older drugs (GLP-1 inhibitors for weight loss as well as diabetes management), and some new anti-cancer drugs in 2023 and 2024. But overall, the impact of new drugs on spending growth has declined and accounts for approximately 8% of the total spending slowdown.

This decline in growth from new molecules is particularly notable because the number of new molecular entities increased from 2010 on (Mullard, 2024), as did new indications for existing drugs. It is not the case that blockbuster drugs disappeared. The 2010s and 2020s saw a host of top sellers, as noted above. Rather, the drugs below the top sellers did not do as well. Some of the new drugs are niche drugs, which are expensive, but sell in limited quantities. Others failed to dislodge existing drugs that were cheaper and effective, for example PCSK-9 inhibitors for high cholesterol. The "blockbuster drugs"[36] of 2000 were pain medications (opioids) and mental health drugs (anti-depressants and anxiolytics), each with a relatively low price but high quantity. Indeed, quantity often exceeded what was deemed clinically appropriate (Cutler and Glaeser, 2021; Conti et al., 2011). Blockbuster drugs today are more likely to be targeted anti-cancer drugs. Prices are much higher, but utilization is limited.

Third, there has also been a reduction in the growth of spending on existing branded drugs. Growth of spending on drugs keeping protected brand status averaged

[36] Defined as drugs with over $1 billion annual sales in 1986 dollars ($2.4 billion in 2024 dollars).

19% from 1998 through 2004 and by 4% annually afterwards. Data suggests that both price and quantity growth appear to have slowed. We estimate that reduced spending growth on protected branded drugs explains 5% of the spending slowdown.

Finally, growth in spending on generic drugs has slowed. Generic drugs spending growth contributed an additional 1.4% annually to total pharmaceutical spending from 1998 through 2010, but only 0.8% annually since 2011. Part of this change may be due to lower prices for generics driven by intense competition, although the literature is unclear on this (Berndt et al., 2017; GAO, 2016). Another part is due to rules that give automatic rebates to Medicaid programs and certain other buyers, which significantly limit the profitability of price increases (Dolan, 2019).[37] Less rapid spending growth of generic drugs explains 4% of the spending slowdown.

Rebates are essential to the slower price growth. Rebates accounted for just under 10% of gross sales until 2009, and 35% of gross sales in 2023. Increasing rebates may be partially offset by higher list prices,[38] but data suggest a reduction in net price growth over time (Drug Channels, 2025).

As noted, some rebates are a mandatory part of legislation that guarantees low prices to certain buyers such as Medicaid. Many rebates are to commercial insurers, and these will not be given unless demand is elastic. Thus, the central issue in the pharmaceutical spending slowdown is where the greater demand elasticity is coming

[37] Medicaid has had a mandatory drug rebate program since the early 1990s, though it was expanded greatly in the Affordable Care Act. Among other components, the program requires companies to pay rebates to Medicaid if list price inflation exceeds CPI growth. This significantly reduces the value of price increases for drugs with a high Medicaid market share. The program was expanded further in 2021 so that companies could actually earn negative profits for Medicaid use for drugs with high inflation rates. This had additional impacts on incentives for drug pricing.

[38] Some studies suggest that pharmacy benefit managers prefer high list prices and hefty rebates to low list prices and low rebates because cost-sharing is based on list prices, and because rebates are secret and thus not always returned to purchasing employers and insurers (Lakdawalla, 2018).

from. The factors noted above each seem to be important. Patient cost sharing is often high and rising. Coinsurance rates of 20% or more are common for expensive medications in the Medicare prescription drug program (Cubanski and Damico, 2024). In addition, insurers have added restrictions for expensive medications. Prior authorization is especially important for expensive drugs (Maini and Kakani, 2025).[39] Often, these restrictions limit use to a specialized set of patients – for example, those that meet the exact approval criteria of the FDA.[40] Finally, physicians are not always eager to use new drugs. Patients may have to go to a specialized facility to receive the treatment, where they are removed from the physician's practice. Many drugs have severe side effects, which need close monitoring. And physicians on a global target may find the cost of such drugs offputting. Thus, the slowdown of pharmaceutical spending growth is due at least in part to policies that both reduced demand and made demand more elastic.

V. Long Term Services and Supports

Ten percent of medical spending is LTSS care for populations with special needs. Common examples are the frail elderly and people with intellectual and developmental disabilities.[41] Spending on these services is about 10% below trend forecasts.

[39] Note that we are including the actions of pharmacy benefit managers as being part of "demand-side" changes, thinking about these companies as (imperfect) agents for patients.

[40] Many anti-cancer drugs are tested in patients with metastatic disease, since patients are easier to recruit for trials, and the outcome is known more rapidly than in trials of patients with localized cancer (Budish et al, 2015). Approval in this population does not mean that the drug will not be successful in local disease. However, insurers often restrict coverage to people meeting the clinical trial criteria. To broaden coverage, manufacturers often have to seek subsequent approval for each additional population group, which takes time and limits the market growth.

[41] Other common programs are for people with traumatic brain and/or spinal cord injuries, medically fragile / technology dependent children, people with severe mental health challenges, people with autism, and people with HIV (Mohamed, Burns, and Watts, 2026).

Spending on LTSS services is complex. Historically, many individuals in need of LTSS were institutionalized in nursing facilities or homes for people with intellectual or developmental disabilities. Because incomes of such individuals are low and medical needs are high, state governments wound up paying for a good deal of care. In response to budget concerns and a growing sense that such individuals preferred to be in the community, states created community-based programs to the LTSS population. Typically, these are done through Home and Community Based Service (HCBS) waivers (Mohamed et al., 2026).[42] Typical waivers provide coverage for home health care; speech, language, physical, and occupational therapy; and sponsored employment and technology modifications for working age individuals.

The implication of these waiver programs has been a major shift out of institutions. In 1990, 13% percent of Medicaid spending on LTSS was in home and community-based services; in 2024, it was 65% percent (Murray et al., 2024). Figure 13 shows the trends in spending for LTSS services, showing the switch from inpatient to community care.[43]

The trend break for LTSS services occurred around 2010, with the onset of the Great Recession. The initial response to the Great Recession was an increase in LTSS spending, as the federal Medicaid matching rate increased in 2010 and 2011.[44] When that provision of the ARRA sunset, nearly all states cut back (Mohamed et al., 2025). No single component of spending changed that markedly. Nor is there clear data to

[42] States can create programs as part of their standard Medicaid benefit, but this limits their ability to impose limits on access and service use. A waiver allows more tailoring.
[43] There is double counting in some part of this data. Some of spending in home and community-based services waivers is for home health care. This is also included in the home health care revenue line. CMS is aware of this and is working to address the issue.
[44] This was part of the American Recovery and Reinvestment Act (ARRA) of 2009.

understand exactly how states achieved these goals. How the actions taken by states translate into prices and quantities has not been compiled.

As a result, we take a different tack to understand the change in LTSS spending. We use data on individuals to understand what changes in services occurred after 2010 and divide this into a component due to improved health and a residual component, which reflects policy changes and any uncaptured demand.

We utilize data from the Health and Retirement Study (HRS) and focus on the frail elderly population, since the data are better there. The HRS is a longitudinal survey of adults aged 51 and older conducted biennially since 1992. Our analysis starts in 2000, when questions about living and care arrangements are standardized. We end the analysis in 2018, as COVID was particularly devastating to the LTSS population.

We consider five types of living and care arrangements: living in a nursing facility; living in an assisted living facility; at home with formal help; at home with informal help; and at home with no help. The latter situation may involve some informal help (for example, a spouse helping with groceries or kitchen cleanup), but the individual does not associate that help with health needs.

Figure 14 shows the age and sex adjusted share of the elderly population in each of these five living arrangements.[45] From 2000 through 2010, there was a reduction in the share of people living in nursing homes and in assisted living. After 2010, the share of elderly people in nursing homes and assisted living facilities was relatively constant. The biggest change between 2010 and 2018 was a reduction in the share of people living at home with informal help and a corresponding increase in the share of people

[45] The HRS has some difficulty with assisted living facilities. Since our focus is not particularly on assisted living and the HRS has a longer duration, we proceed with the HRS analysis.

living with no help.

To estimate how much of this change was due to health and other factors, we use the 2010 HRS data and estimate a multinomial logistic model relating the five measures of living and care arrangements to health status and marital status.[46] health status measures include any impairment in Activities of Daily Living (such as dressing and bathing), any impairment in Instrumental Activities of Daily Living (doing light housework, managing money), and difficulty with cognition, motor skills, mobility, and muscle skills. We think of the marital status variable as picking up implicit help.

The results of the multinomial logit are reported in Appendix Table A2. People with greater health impairment are more likely to receive more intensive care, and people with a spouse are less likely to. Using these coefficients, we then simulate what would have happened to care arrangements for the elderly in 2018 had the relationship between demographics, health status, and care receipt remained at its 2010 level.

Figure 15 shows the results. Based on health status changes, there should have been a reduction in all forms of care with help, and an increase in the share of people living without help. The presence of any ADL or IADL impairment is the largest contributor to needing help with care arrangements; the share of people with such impairments has declined over time. Changes in the presence of a spouse in the household has only minimal impacts on predicted care arrangements of any form.

Actual living arrangement status generally mirrored these predictions, including even greater movement in this direction. The data do not suggest a large unexplained increase in nursing home residence, as one might fear given cutbacks in spending. Nor

[46] We also control for age and sex dummy variables.

was there an unexplained decline in formal home care. Thus, for the elderly population at least, we see evidence for the impact of a healthier population with no obvious drawbacks.

The change in care needs implied by the healthier population is modest. We estimate that 2% of the total slowdown is due to this improvement in health. There was another decline of 1%, because of the increase in spouse presence. Both of these are small components of the total slowdown. Studying the rest of the LTSS slowdown would be a valuable addition to this analysis.

VI. Summary and Conclusion

Figure 16 summarizes the results of the previous three sections. Considering all types of spending, five factors are important in the slowdown in spending. The first is technology-associated changes in health and site of care. These correspond to the subsequent innovations in our model. Together, technologies along these lines account for 21% of the overall cost slowdown and double that in Medicare.

Second, long-run supply is more elastic than short-run supply, and this lowers spending over time. This is particularly apparent in the impact of patent expiration for pharmaceuticals and in relative declines in imaging reimbursement. We estimate that greater long-run supply explains 6% of the spending slowdown.

Third, a variety of market changes contribute to reduced and more elastic demand, including increased cost sharing paid by consumers, physicians not paid as much for using technologies, and insurers imposing restrictions on technology use. We do not have a precise estimate of the impact of each of these factors, but a rough guess is that they account for 11% to 27% of the spending slowdown. The lower end includes just services we measure directly; the upper end is taken from studies of the impact of reimbursement changes.

Fourth, the population is healthier in ways that reduce spending. This includes fewer hospitalizations for smoking-related conditions and reduced need for formal home health care. The birth rate has fallen as well, which is not a statement about population health but is functionally similar in reducing the need for care. We estimate improved population health explains 7% of the spending slowdown.

A major component is slower price growth. Net of upcoding, we estimate lower price growth explains 24% of the spending slowdown. Some of this reduction is likely due to reduced and more elastic demand. That said, there is substantial uncertainty in this estimate due to data limitations and other ways providers can skirt price cuts.

In light of these findings, the answer to the question we posed at the beginning of this paper – has the US bent the health care cost curve – is “Yes.” The health care market has matured, and with that maturation comes a reduction in the rate at which spending increases. Technology is no longer as vital a driver of increased spending. In addition, payers are better at fostering demand and supply conditions that lead to lower spending growth.

While the health care cost curve has been bent, it likely has not been bent enough. Medical spending is still higher in the US than elsewhere, and health outcomes do not appear to justify that additional expense. Slower growth of medical costs helps with affordability, but it has not solved it. And a consequence of higher cost sharing and insurer restrictions is that even people who are insured find it increasingly difficult to access care.

As best we can determine, much of the spending slowdown was not associated with worse outcomes. Indeed, the technology-associated component is associated with improved health. That said, we do not look at the health implications of all service reductions, and some other evidence shows that high cost sharing insurance plans and insurance market restrictions have had some adverse effects on health. More work on this would be valuable.

Looking forward, a key issue in how much the cost curve will bend is how the pace and cost of new technologies changes. If we develop more cost-saving technologies, the impact on spending could be large. Similarly, if the cost of developing new therapeutic advances falls, there will be more product entry and prices will be bid down or could be more readily lowered when set administratively. There is some speculation that artificial intelligence could reduce costs, by substituting cheaper computer technology for more expensive people. It might also be an input into a new wave of less expensive medical cures. Whether this will occur or not is not known. But if it does, it could have profound implications for the trajectory of health care spending.

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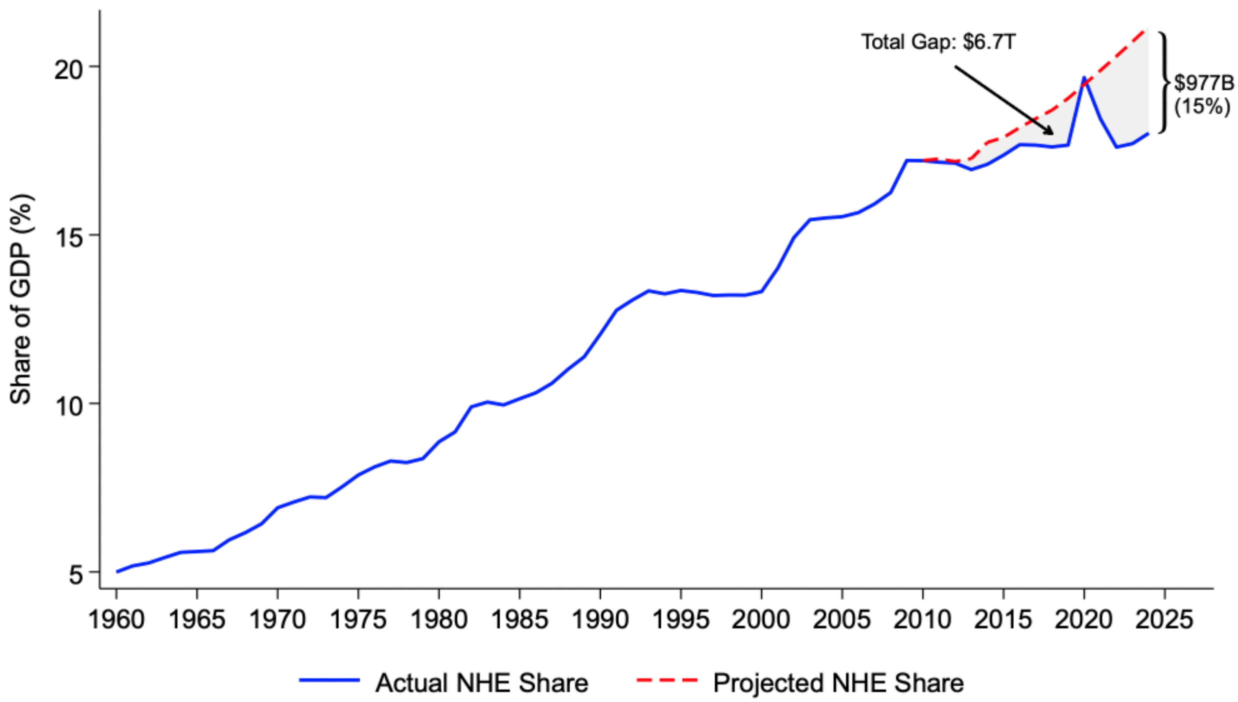
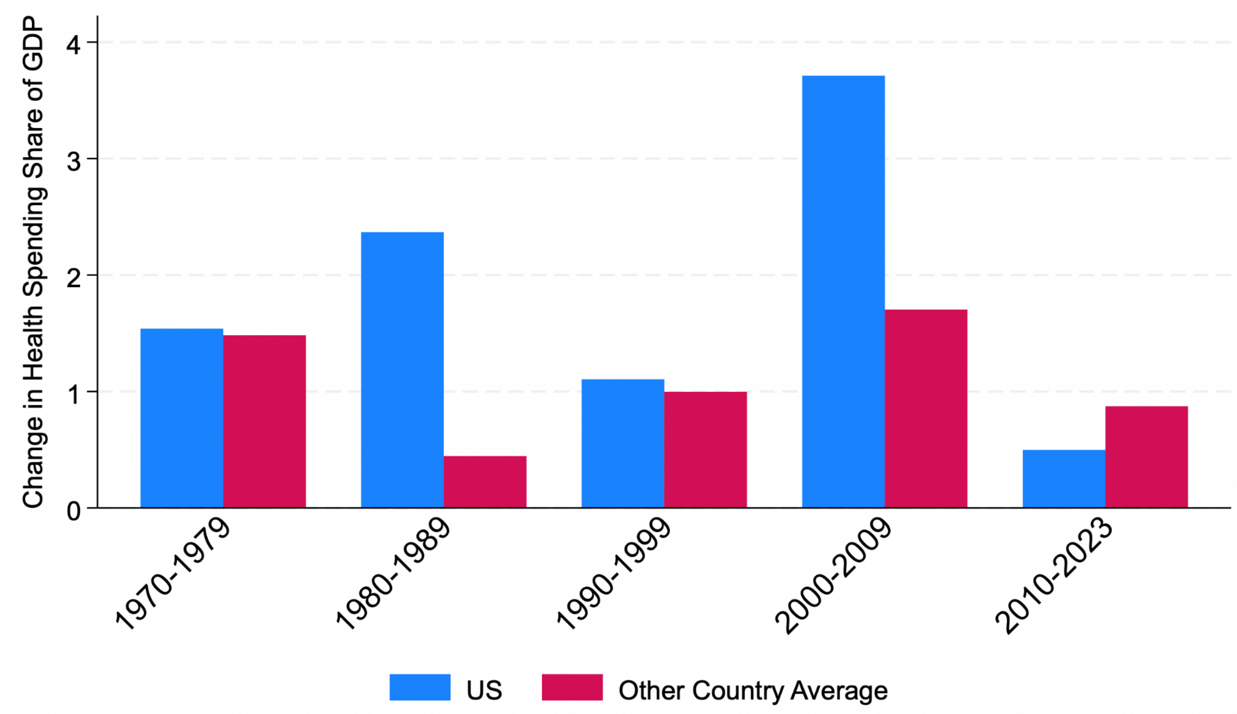
Figure 1: Medical Spending as a Share of GDP and Forecasts, 1960-2024



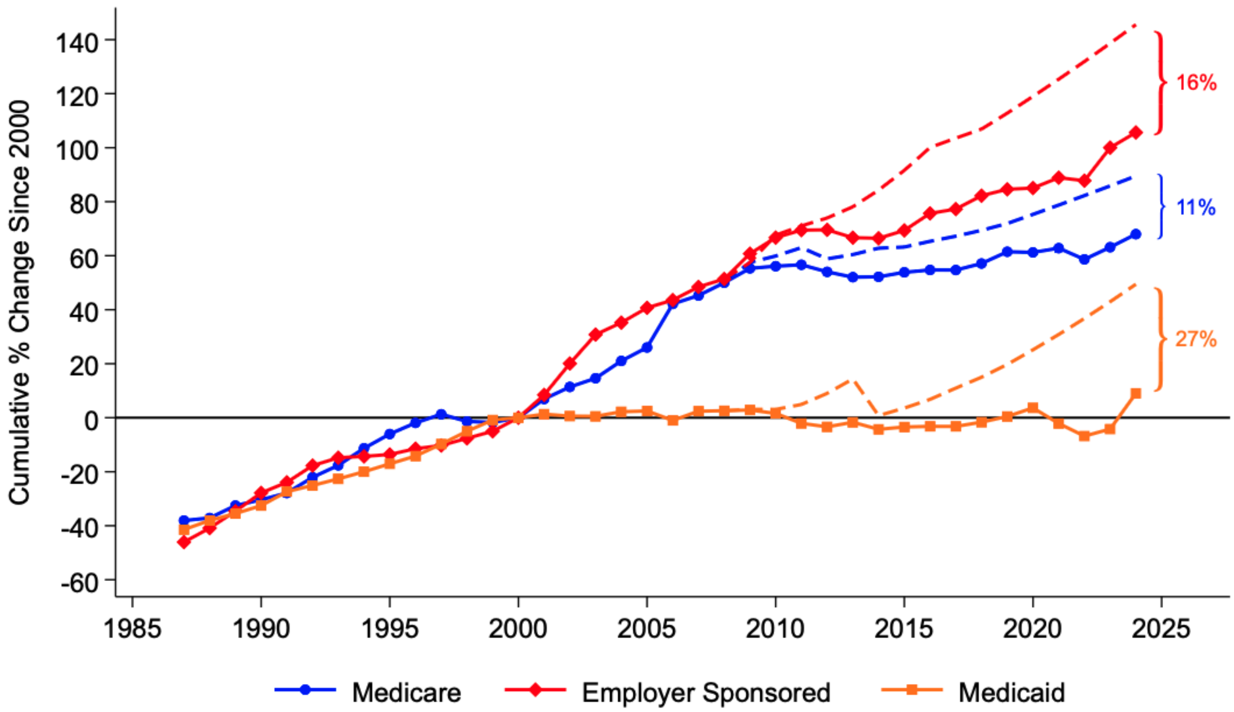
Notes: Source CMS NHE Fact Sheet. CMS constructed projections between 2010-2020, extrapolated through 2024.

Figure 2: Medical Spending Growth in the US and Other High Income Countries



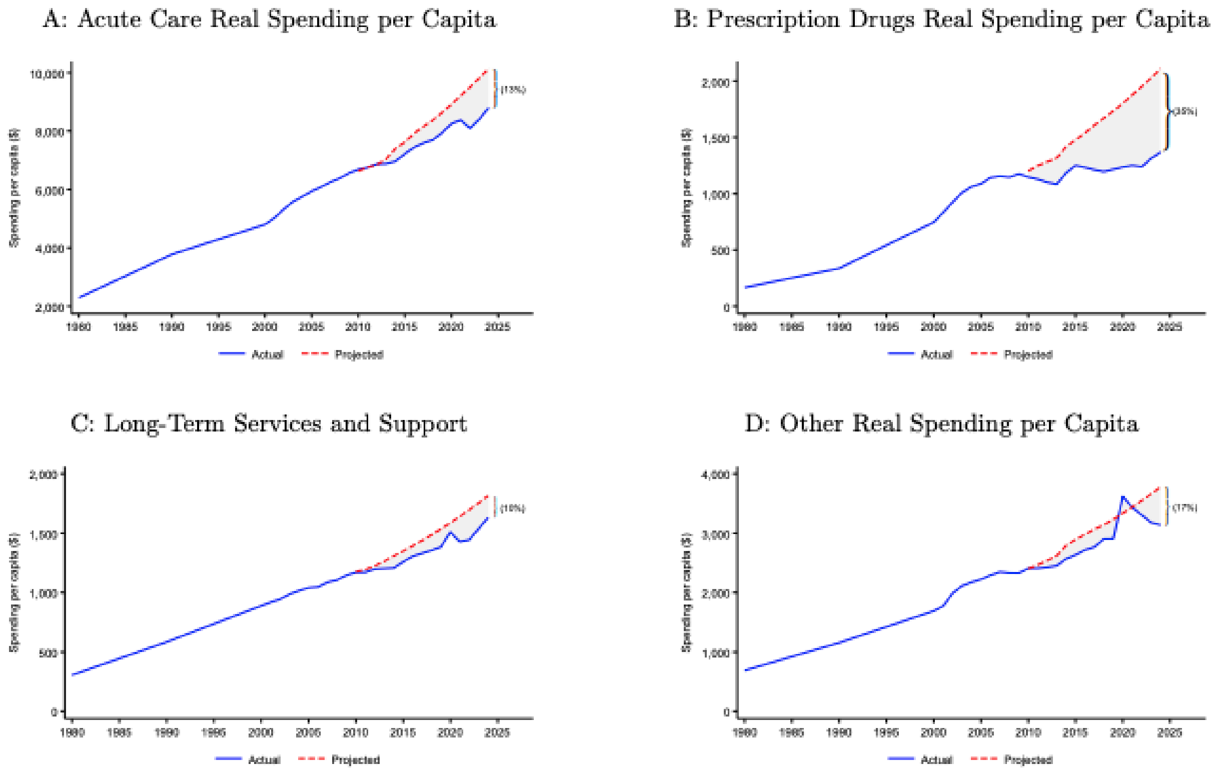
Notes: Source OECD. Medical spending excludes investment. Unique to this graph medical spending for the United States is measured from OECD data, not the NHEA. Other country average includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Iceland, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and the UK.

Figure 3: Real Per Enrollee Spending by Insurer and Forecasts, 1987-2024



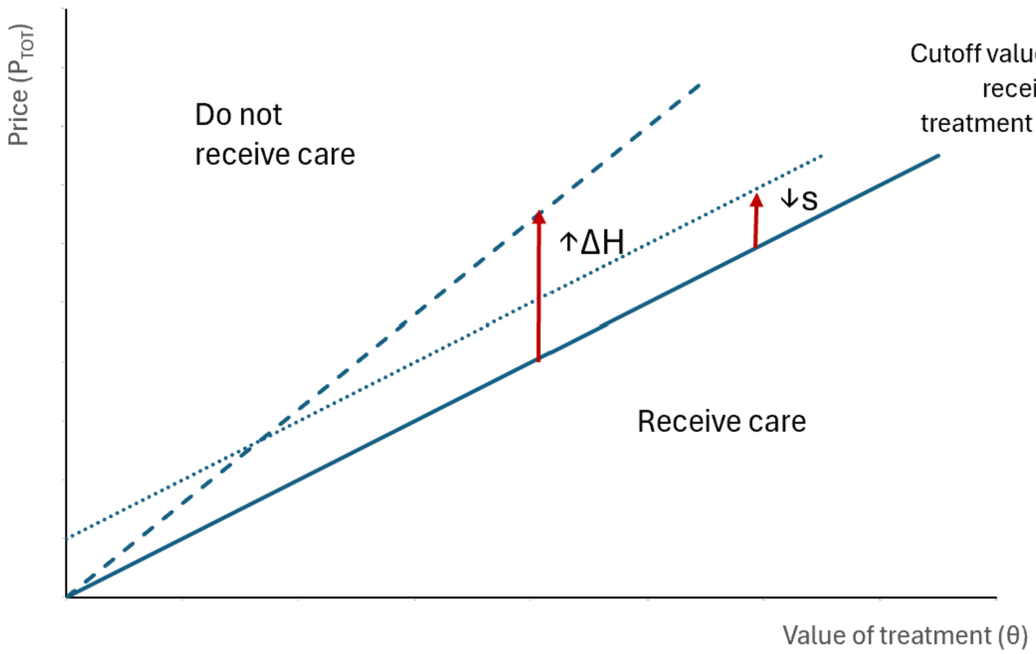
Notes: Source CMS NHE Fact Sheet. CMS constructed projections between 2010-2020, extrapolated through 2024. Amounts inflation adjusted using the GDP deflator and forecasts adjusted to correct for errors in inflation forecasts (see Appendix for additional details). Percent changes show the discrepancy between forecast and actual values as a share of projected spending per enrollee per insurer.

Figure 4: Real Spending per Capita by Type, Actual vs Projected



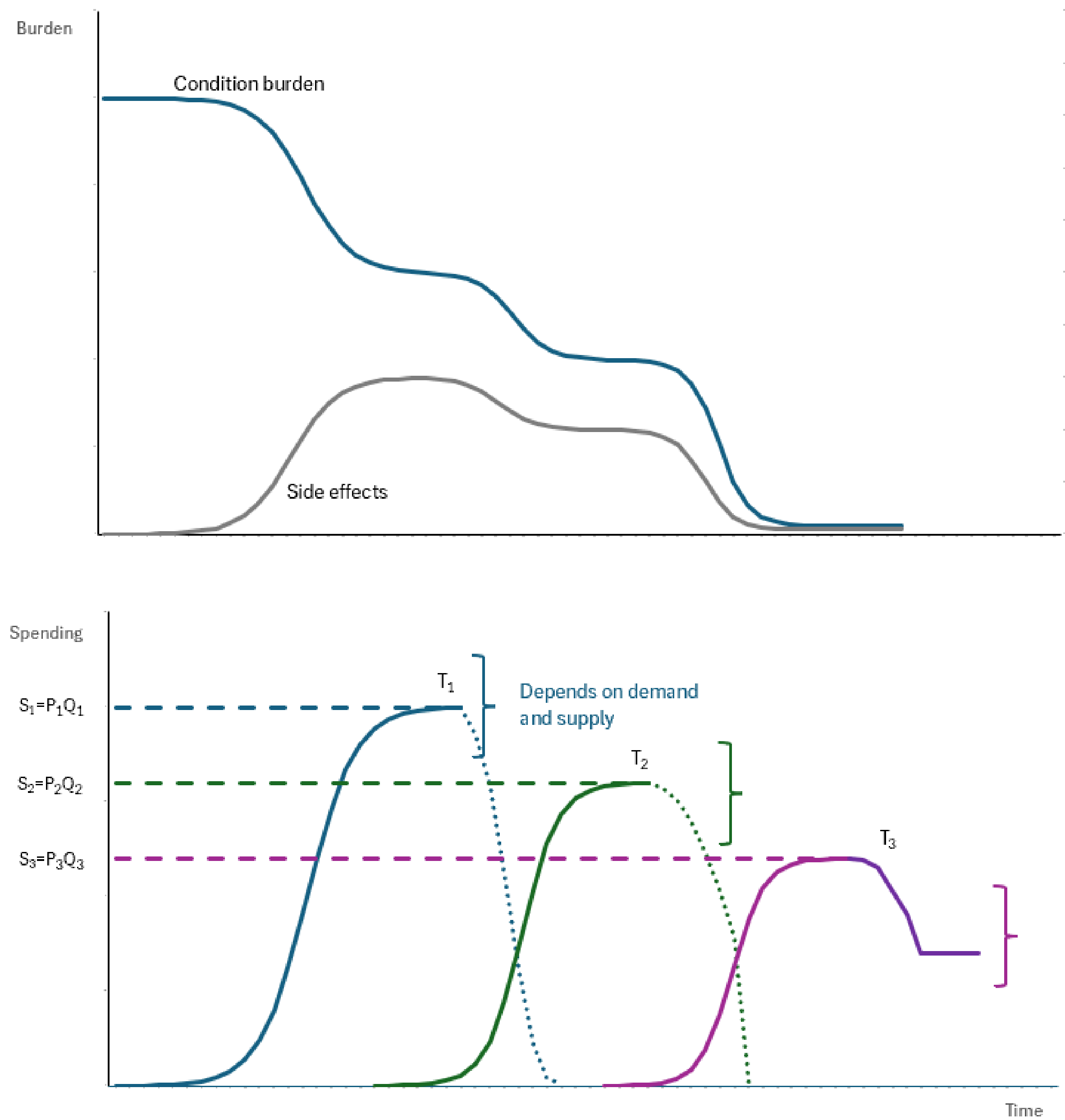
Notes: Source CMS NHEA Fact Sheet. Projections constructed between 2010-2020, extrapolated through 2024. Acute care includes hospitals, physician services, Medicare spending on skilled nursing facilities, investment in structures and equipment, ambulance, and worksite healthcare. Pharmaceuticals includes retail sales only. Long-term services and supports includes non-Medicare nursing home spending, home health care, spending on home and community-based care, and other residential care facilities. Other spending includes durable and non-durable medical equipment, insurance administration, and NIH research, dental, public health, and school health. Amounts inflation adjusted using the GDP deflator and forecasts adjusted to correct for errors in inflation forecasts (see Appendix for additional details).

Figure 5: Equilibrium Usage of Technology



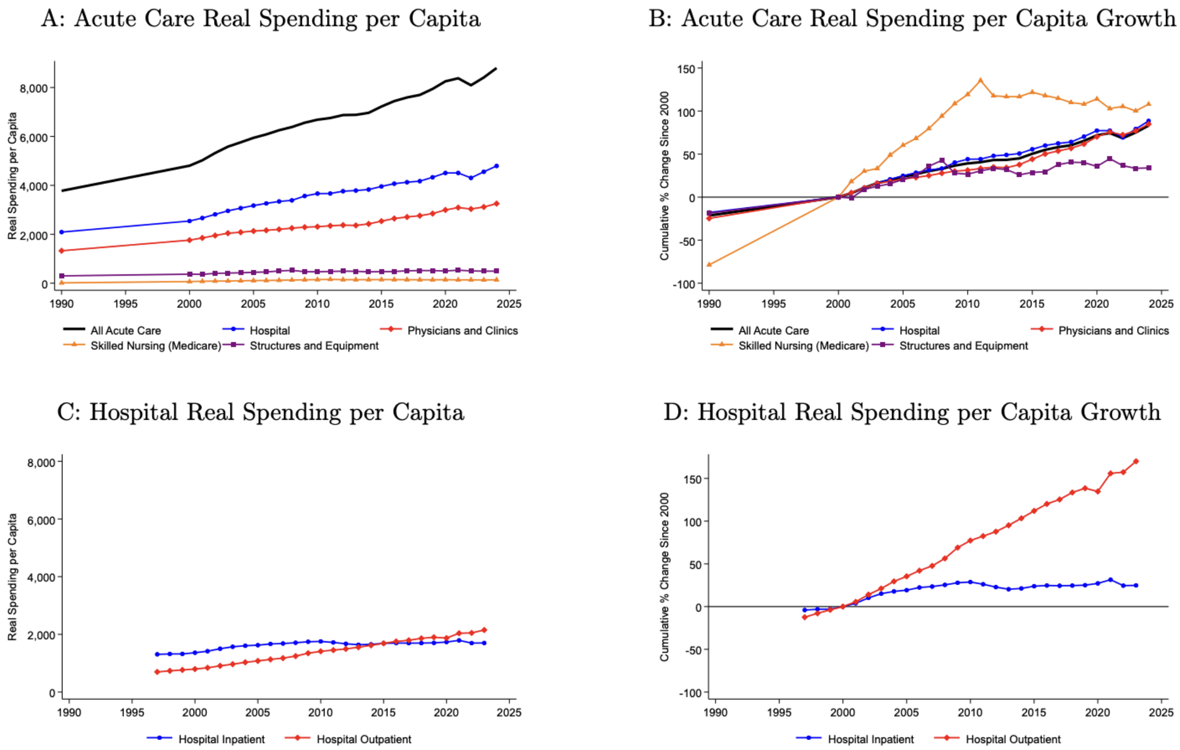
Note: The solid line shows the marginal person for whom the treatment may or may not be provided, with equal physician utility. Patients with θ_i to the left of the line do not receive the treatment. Patients with θ_i to the right of the line receive the treatment.

Figure 6: The Dynamics of Medical Technology



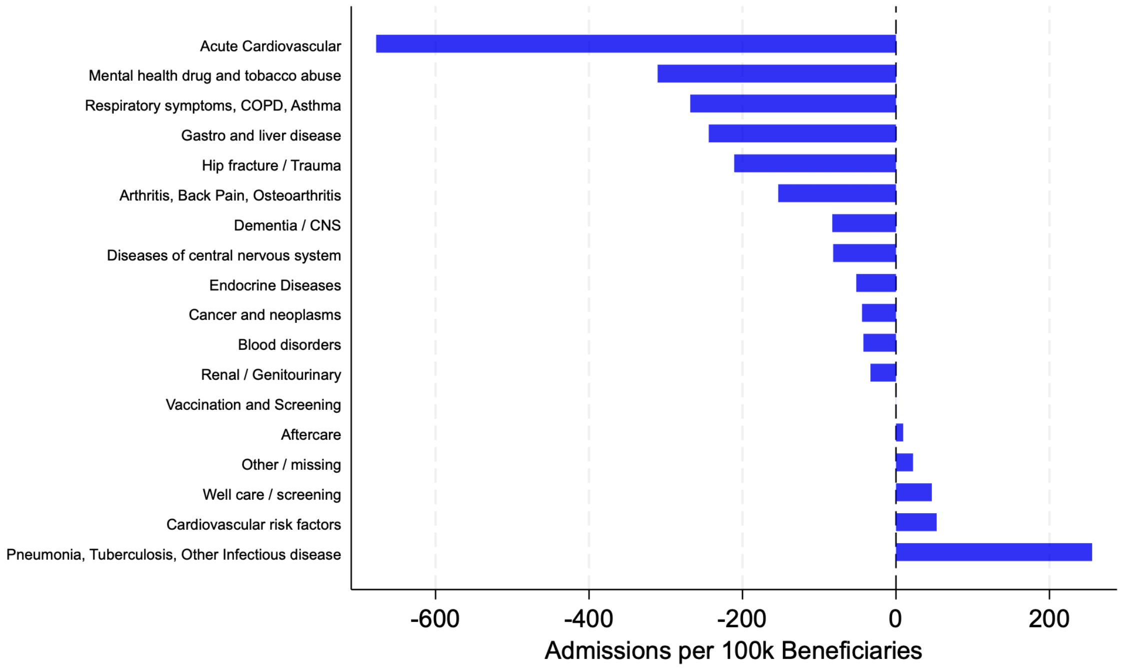
Note: The figure shows the evolution of medical technology. The upper panel shows the evolution of burden of the condition and side effects of treatment. The lower panel shows different technologies: a first therapy with high spending and side effects, a second treatment that is better and cheaper, and a cure. Each diffuses over time, after which spending may fall.

Figure 7: Trend in Spending on Acute Events



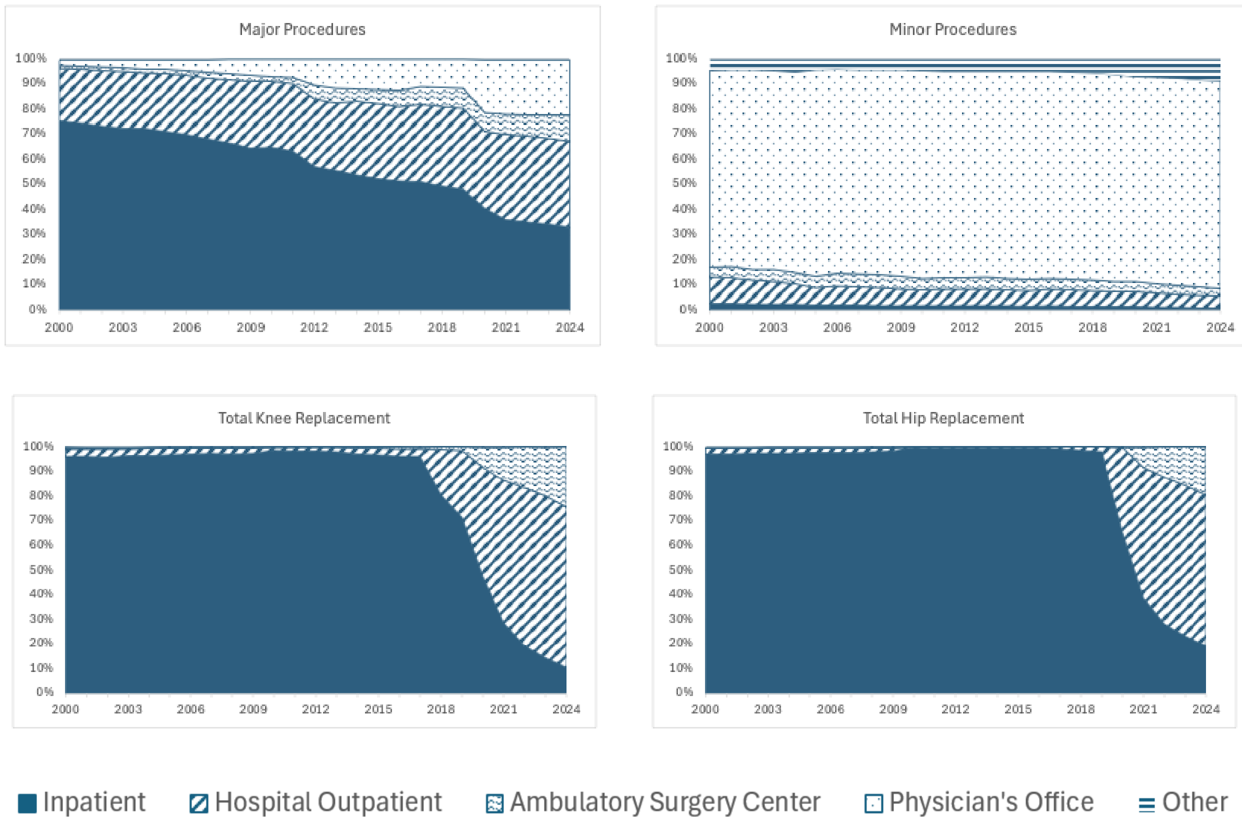
Note: Data from panels A and B from CMS NHE Fact Sheet; hospital inpatient and hospital outpatient spending in panels C and D are from Healthcare Cost Report Information System (HCRIS). Net inpatient (outpatient) hospital revenue is calculated at the hospital level as gross inpatient (outpatient) revenue multiplied by a hospital-specific discount factor (total net patient revenue/total gross patient revenue).

Figure 8: Changes in Medicare Hospital Admissions by Diagnosis, 2010-2019



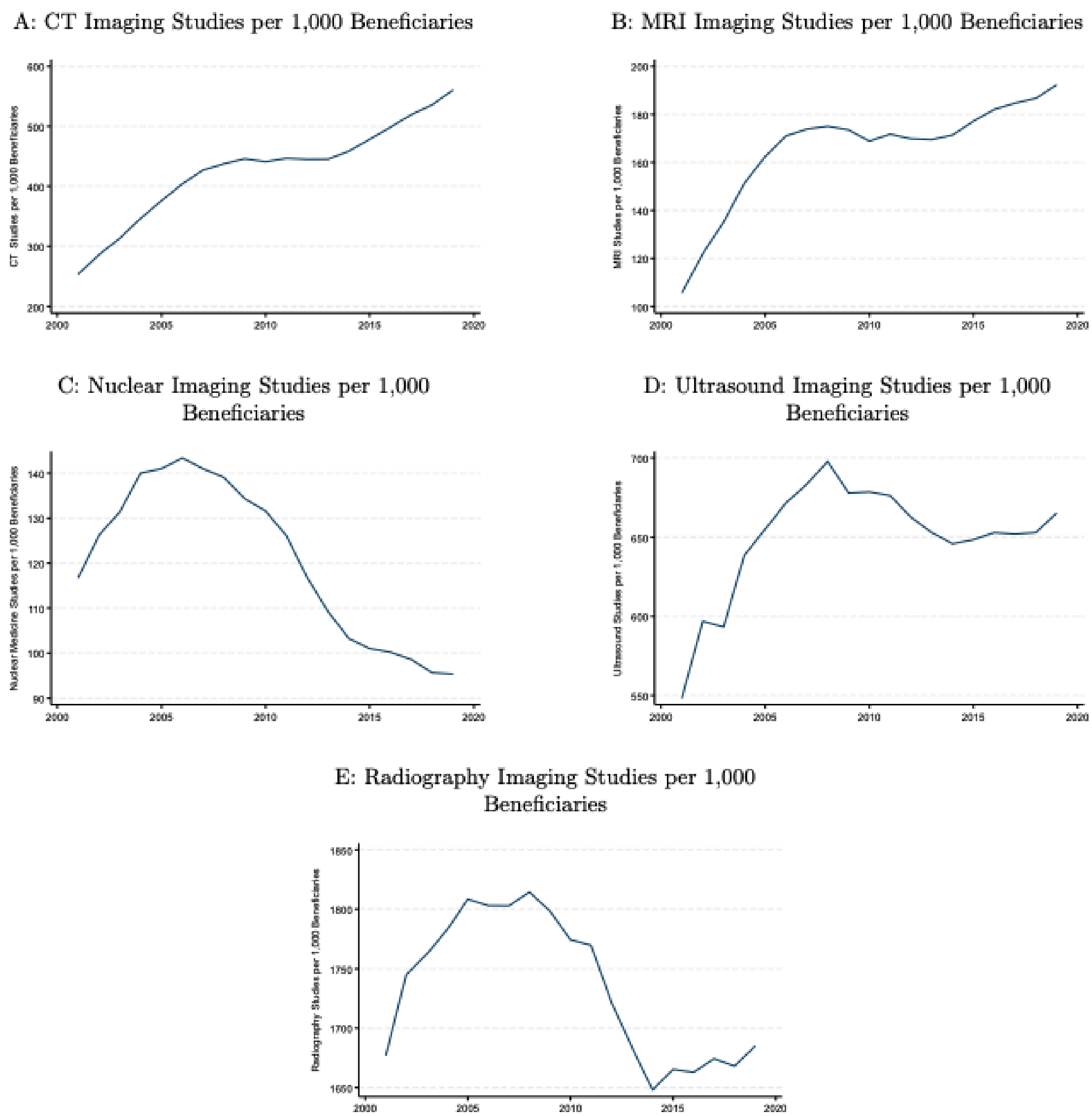
Note: Source Medicare claims data. Admissions per 100k beneficiaries are age and sex adjusted within three-year age bins. Diagnosis categories are defined using ICD-CM codes as defined in Cutler et al. (2022).

Figure 9: Changes in Site of Care for Procedures, 2000-2024



Note: Authors' tabulations from CMS claims data from 2010-2019 and extended through 2024 using the Physician/Supplier Procedure Summary public use files. Minor procedures include the categories of minor procedures, eye procedures, endoscopy, and oncology. Procedures are identified and categorized using BETOS codes from physician claims.

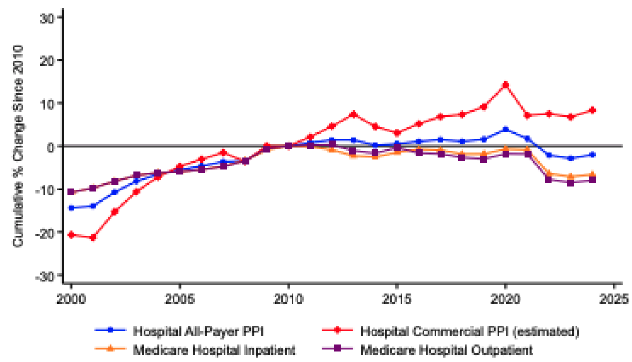
Figure 10: Imaging Trends per 1,000 Beneficiaries in Medicare



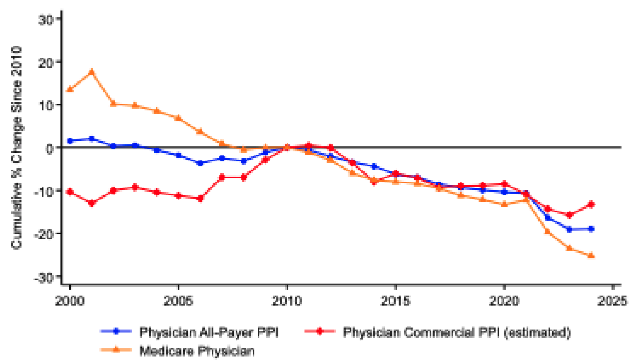
Source: Authors' tabulations from CMS claims data. Images are identified using HCPCS codes from physician and outpatient claims data and classified by modality using Neiman Imaging Types of Service (NITOS) codes. To account for imaging code bundling over time, a unique image is defined as a modality by body region by beneficiary by day.

Figure 11: Acute Care Real Price Index by Payer, 2000-2024

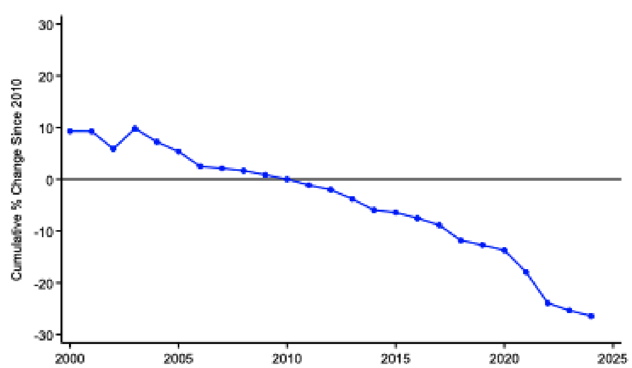
A: Hospital Real Price Index by Payer



B: Physician Real Price Index by Payer

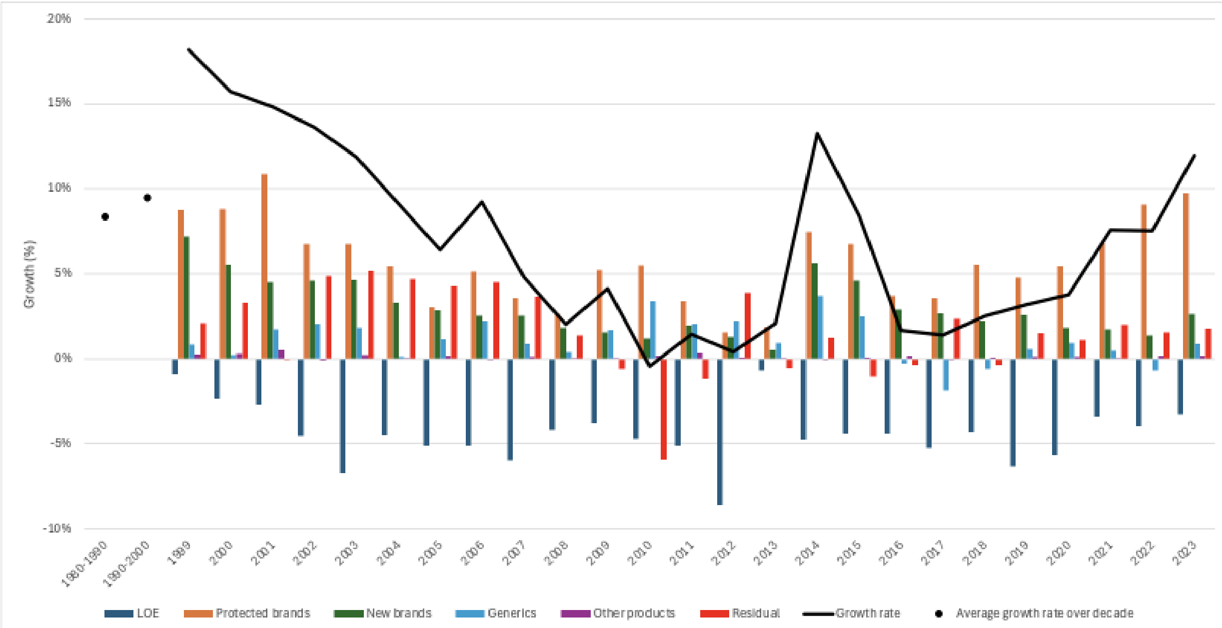


C: Imaging Real Price Index, All Payers



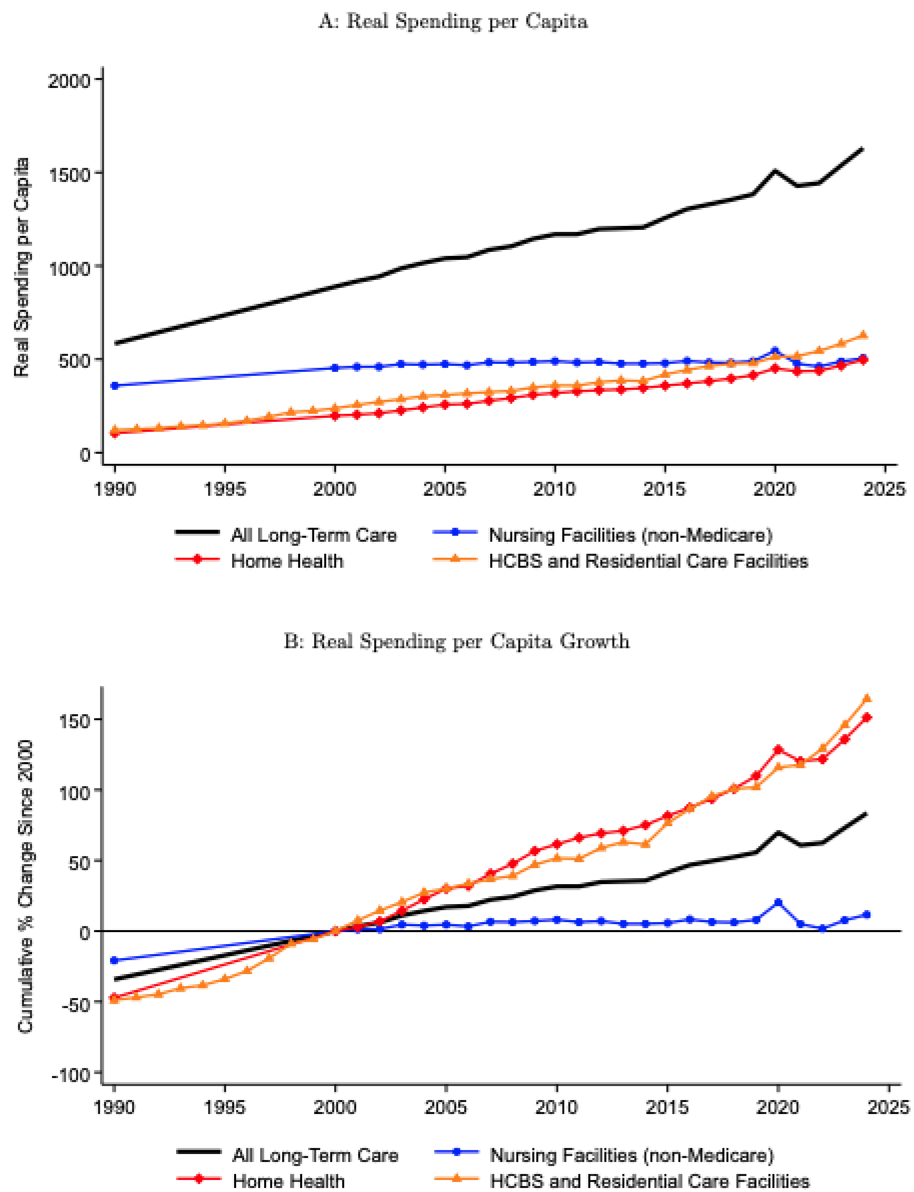
Note: Hospital all-payer PPI is sourced to BLS data. Medicare hospital inpatient and outpatient rates are constructed from CMS data and adjusted to reflect legislative changes and sequestration. Hospital commercial PPI is estimated by solving for commercial price growth by taking the overall PPI change and subtracting the part due to Medicare and Medicaid, weighted by the year-specific share of spending on each, based on NHEA data. We assume the Medicaid price is equal to the Medicare price for hospitals and approximately 70% of the Medicare price for physicians (AHA, 2016 and MACPAC 2017).

Figure 12: Per Capita Pharmaceutical Spending Growth by Branded-Generic Status



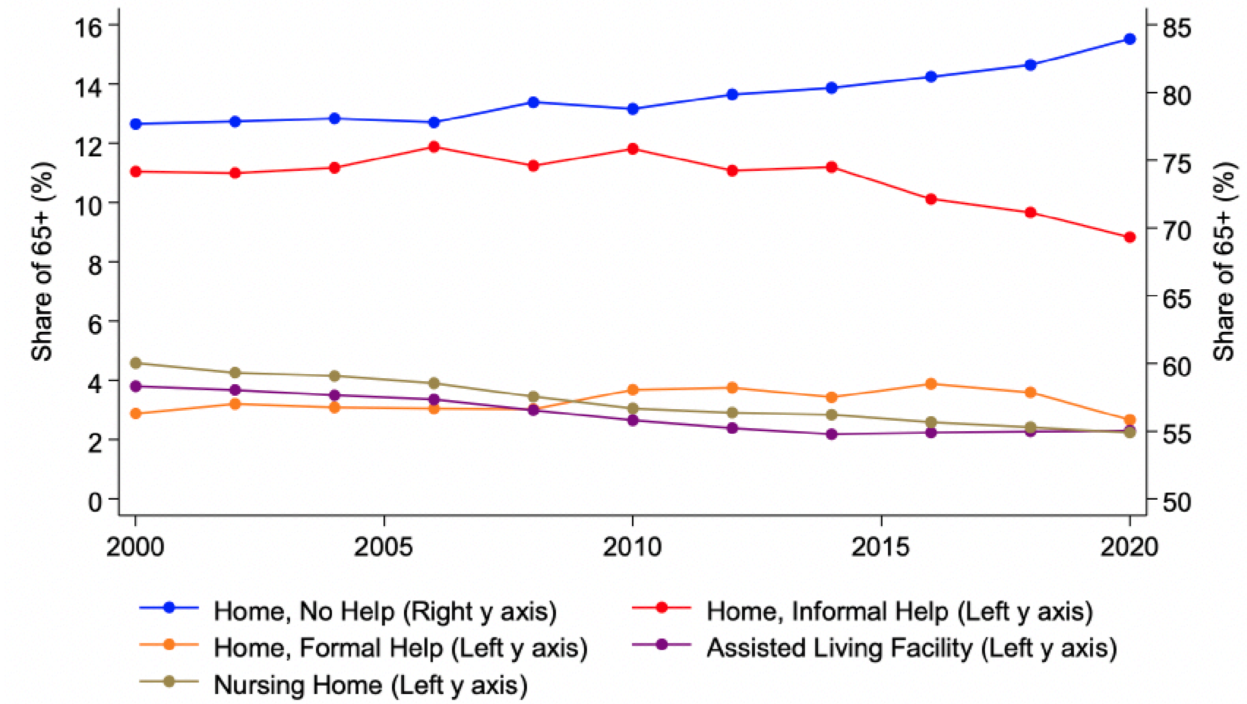
Note: Spending for new brands, protected brands, and loss-of-exclusivity (LOE) products is measured net of manufacturer rebates, estimated using average rebate rates each year. Segments are constructed using IQVIA's Elements of Growth (EOG) framework, which measures the year-over-year change in dollar spending for all products belonging to a segment in the current year, rather than counting product changes as contributing to their growth. Without this adjustment the LOE segment would often be positive and appear to grow in years when many high-revenue drugs go off patent. Under the EOG framework, the LOE category captures the change in total revenue for drugs that last year had exclusivity but this year face generic competition, appropriately grouping drugs as they change categories.

Figure 13: Trend in Spending on Long-Term Services and Supports



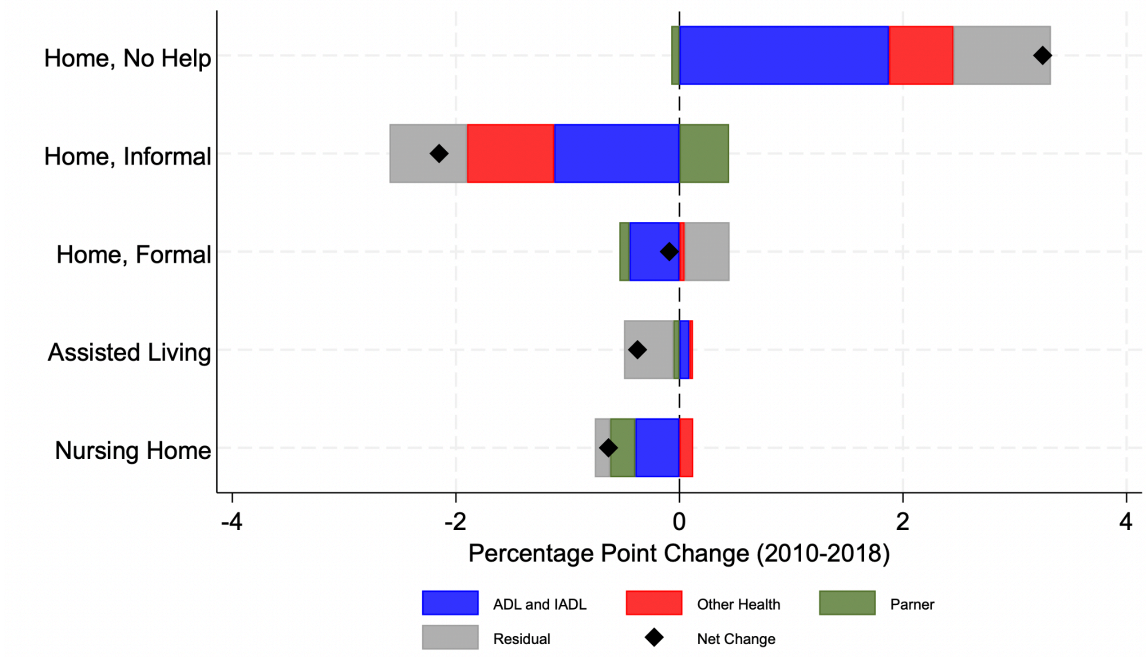
Note: Data from CMS NHE Fact Sheet. Amounts inflation adjusted using the GDP deflator.

Figure 14: Share of 65+ by Living Arrangement



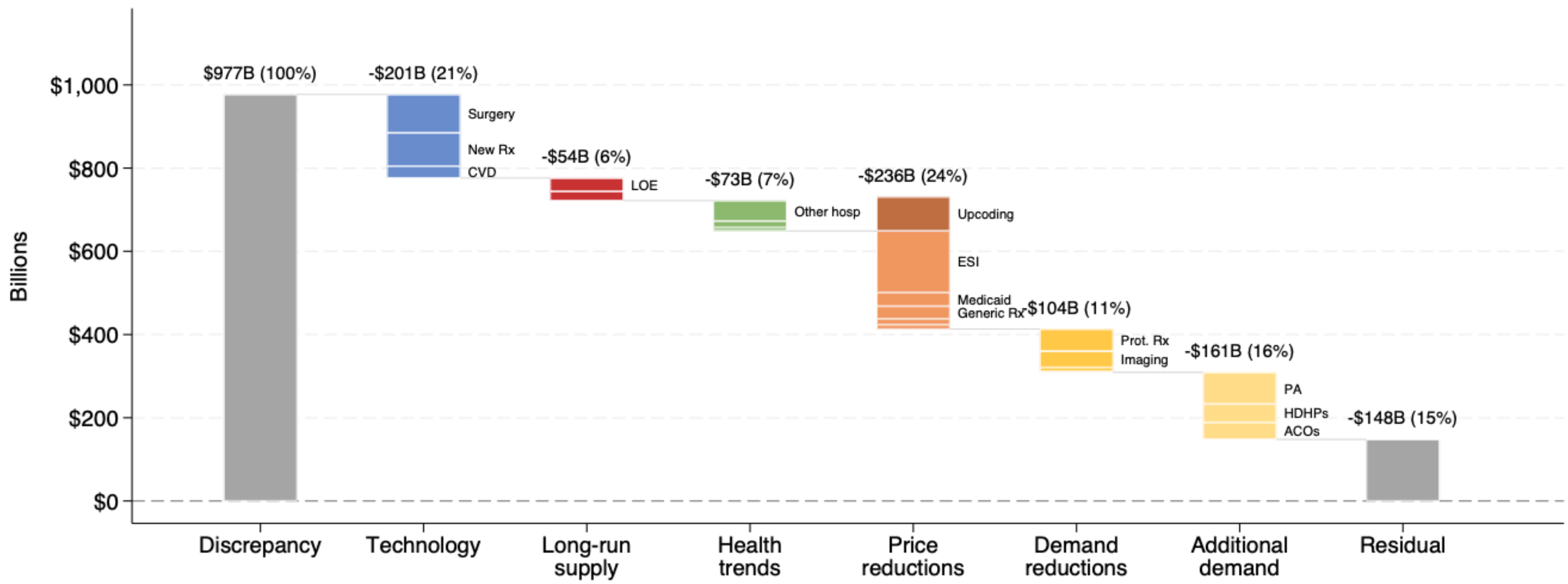
Note: Data from the Health and Retirement Study (HRS). All trends are age and sex adjusted to 2010 levels. Nursing home living arrangement is identified directly in the data, all other living arrangements were inferred from the survey. An individual is classified as receiving help if they report receiving help for any ADL or IADL. Helpers are classified as formal if they are paid, they are otherwise classified as informal. Assisted living is defined as in Spillman and Black (2006), which is a senior living facility that provides particular services such as a nurse on site.

Figure 15: Multinomial Logit Decomposition of Elderly Residence Type



Note: Data from the Health and Retirement Study (HRS). Net change shows the actual change in share of elderly living in each setting between 2010 and 2018. To decompose this change, we estimate a multinomial logit of residence type on functional limitations (ADLs and IADLs), other health conditions, and whether you have a partner, the results of which are reported in Appendix table A2. The ADL and IADL, other health, and partner categories show each covariate group's predicted contribution to the change in setting. The residual is the difference between the actual 2018 share and the model-predicted share for each residence type.

Figure 16: Summary of the Reasons for the Decline in Medical Spending



Note: This figure categorizes the $977B gap between projected and actual medical care spending into contributing factors. Each component of Table 3 has been categorized into a category. Components contributing $25B or less are not labeled and include: imaging price reductions ($22B, Long-run supply); declining birth rate ($8B) and a healthier elderly population ($16B) (Health trends); observation stay reclassification ($19B) and Medicare sequestration ($15B) (Price reductions); and reduced formal care use among elderly patients and their spouses ($2B and $10B, respectively) (Demand reductions). Prior authorization, high deductibles plans, and accountable care organization (ACO) changes included as a range as these may double count with reduced hospitalizations and imaging. Detailed derivations for each component are provided in the Appendix.

Table 1: Actual vs. Predicted Spending by Insurer in 2024

	Predicted	Actual	Difference (1)-(2)	Total Contribution to Spending Gap (Billions / %)
	(1)	(2)	(3)	(4)
	Total spending (billions)			
Total	**$6,255**	**$5,279**	**-$977**	**-$997 / 100%**
Insurance Spending	$4,160	$3,479	-$681	-$681 / 68%
Medicare	$1,283	$1,118	-$165	-$165 / 17%
Medicaid	$1,275	$932	-$343	-$343 / 34%
Employer-Sponsed Health Insurance	$1,602	$1,429	-$173	-$173 / 17%
Out of Pocket	$585	$557	-$29	-$29 / 3%
Other	$1,510	$1,243	-$267	-$267 / 27%
	Total enrollment (millions)			
Total	**320**	**330**	**10**	**$70 / -7%**
Medicare	68	67	-1	-$19 / 2%
Medicaid	84	84	0	$2 / 0%
Employer-Sponsed Health Insurance	168	179	11	$87 / -9%
	Spending per beneficiary			
Total	**$14,849**	**$12,247**	**-$2,602**	**-$752 / 75%**
Medicare	$18,939	$16,787	-$2,152	-$146 / 15%
Medicaid	$15,148	$11,052	-$4,095	-$345 / 35%
Employer-Sponsed Health Insurance	$9,556	$8,002	-$1,555	-$261 / 26%

Note: Predicted spending is from the forecasts of the CMS actuaries made in 2010. After 2019, growth is assumed to exceed GDP growth at a constant rate.

Table 2: Actual vs. Predicted Spending by Care Type in 2024

	Per Capita Spending			Total	Contribution to
	Predicted	Actual	Difference (1)-(2)	Contribution to Spending Gap (Billions)	Baseline Spending / Spending Gap (%)
	(1)	(2)	(3)	(4)	(5)
NHE total	**$18,339**	**$15,475**	**-$2,863**	**-$977**	**100% / 100%**
General-acute care	**$10,143**	**$8,797**	**-$1,346**	**-$459**	**57% / 47%**
Hospital care	$5,597	$4,792	-$804	-$274	
Physician and clinical services	$3,300	$3,253	-$47	-$16	
Nursing Facilities (Medicare)	$216	$139	-$77	-$26	
Structures and equipment	$838	$493	-$344	-$118	
Ambulance	$168	$90	-$78	-$26	
Worksite Healthcare	$24	$29	$5	$2	
Prescription drugs	**$2,111**	**$1,369**	**-$742**	**-$253**	**9% / 26%**
Populations with long-term care service needs	**$1,814**	**$1,630**	**-$184**	**-$63**	**10% / 6%**
Nursing Facilities (non-Medicare)	$587	$506	-$81	-$28	
Home health	$555	$497	-$58	-$20	
HCBS and Residential Care Facilities	$672	$628	-$44	-$15	
Other	**$4,279**	**$3,679**	**-$600**	**-$205**	**24% / 21%**
Durable & other medical products	$513	$631	$117	$40	
Research	$362	$206	-$156	-$53	
Private Insurance Admin.	$1,093	$897	-$196	-$67	
Government Admin.	$281	$194	-$87	-$30	
Dental	$649	$555	-$94	-$32	
Government Public Health	$612	$462	-$150	-$51	
School Health	$32	$24	-$9	-$3	
Other	$736	$711	-$25	-$9	

Note: Predicted spending is from the forecasts of the CMS actuaries made in 2010. after 2019, growth is assumed to exceed GDP growth at a constant rate.

Table 3: Impact of Various Factors on Acute and Pharmaceuticals Spendingin 2024 ($billion)

	Medicare		All Payers	
Element	**Dollars**	**Percent**	**Dollars**	**Percent**
Total spending reduction	$165	100%	$977	100%
Acute Care	$113	68%	$435	45%
Population health improvements	$40	24%	$86	9%
Cardiovascular hospitalizations reductions	$18	11%	$29	3%
reductions	$22	13%	$49	5%
Declining birth rate	---	---	$8	1%
Site of care substitution: Surgery	$29	18%	$92	9%
Less rapid growth of imaging	$16	10%	$39	4%
Price reductions	$28	17%	$218	22%
Employer-sponsored insurance	---	---	$199	20%
Medicaid	---	---	$45	5%
Sequestration	$15	9%	$15	2%
Observation stays	$13	8%	$19	2%
Imaging price reductions	$4	2%	$22	2%
Upcoding (offset)	---	---	-$82	-8%
Pharmaceuticals			$205	21%
Loss of exclusivity	---	---	$32	3%
Less rapid protected brand growth	---	---	$53	5%
Less rapid new brand growth	---	---	$80	8%
Less rapid generic growth	---	---	$40	4%
Long-Term Services and Supports			$28	3%
Healthier elderly population	---	---	$16	2%
Demographic shift	---	---	$10	1%
Lower formal care use for elderly	---	---	$2	0%
Cross-cutting components*			$0 - $161	0% - 16%
Prior authorization	---	---	$76	8%
High deductible plans	---	---	$44	5%
Accountable Care Organizations	---	---	$41	4%
Total explained	$113	68%	$668 - $829	68% - 85%
Residual	$52	32%	$148 - $309	15% - 32%

Note: The table summarizes estimates described in the text and Appendix.
* Reimbursement changes included as a range as these may double count with reduced hospitalizations and imaging

Appendix

Adjustments to the National Health Accounts

We form several adjustments to the National Health Expenditure Accounts (NHEA). This is primarily required for the 2010 projections. To make projections about health expenditure, NHEA projections must also include projections about population growth, inflation, and GDP growth. Because realized population and inflation can differ from these assumptions, we rescale the published projections to align them with realized trends. To address discrepancies in inflation, we deflate projections down to their 2005 value (prior to forecasts), and then re-express them in current dollars using the actual realized inflation rate. To address differences between projected and realized population, we convert projected spending to a per-capita basis (spending divided by the projected population), and then re-aggregate using realized population. In practice, this per-capita rescaling is applied wherever population levels mechanically affect totals, such as the aggregate spending series. These adjustments remove differences in projected vs actual spending growth driven by forecast errors in inflation or population.

Additionally, there have been methodological revisions to national health accounts that cause the 2010 vintage to diverge from the 2024 vintage for overlapping years prior to 2008. To align these series, we adjust the projection series by the level difference between the two vintages in 2008.

Methodology for Estimating Contributors to Spending Reduction

Site of care substitution

Medicare

Estimates of savings from site of care substitution for acute care are limited to savings from substitution of major procedures and endoscopies from inpatient hospital settings to hospital outpatient and ambulatory surgical centers. Major procedures and endoscopies are defined using HCPCS codes mapped to the broad two-digit BETOS classification. We measure the volume of procedures by site of care and year using physician claims from the 20% Carrier file. From 2020 through 2024 we extend analysis using the publicly available Physician/Supplier Procedure Summary file.

Since Medicare pays differently across inpatient and outpatient settings, we construct average prices at the HCPCS × site-of-care level using claims data. To ensure these estimates represent clean procedural costs, we restrict our analysis to cases where a beneficiary received only one procedure for a given visit (excluding anesthesia), allowing us to accurately compare reimbursement for the same services across inpatient and outpatient settings. The price for each HCPCS code in each site is calculated as the average allowed amount for all facility and professional fees over the visit. All prices are estimated in 2019–the latest year we have claims data available–and rescaled to 2024 payment rates using updates to the Medicare price schedule.

To calculate savings from site-of-care substitution, we combine our estimated procedure-by-site prices with the 2024 volume of major procedures and endoscopies. We first compute total spending using the observed 2024 distribution of sites of care.

We then recompute total spending under a counterfactual in which the site-of-care mix is held fixed at its 2010 distribution (while keeping total 2024 procedure volumes constant). The difference between counterfactual and observed spending is $15 billion.

To scale this estimate to include Medicare Advantage, we project Medicare Advantage utilization by site of care by re-weighting the Medicare fee-for-service claims data to match the distribution of all Medicare enrollees by 3-year age bin and sex.

National

To scale this estimate to all payers, we assume similar rates of substitution for major procedures and endoscopies for private and Medicaid enrollees. Using NIS data, commercial enrollees had about 60% as many total inpatient surgeries as Medicare beneficiaries since 2017, and Medicaid enrollees had about 25%. Assuming that site of care does not differ substantially across these groups, this implies the total number of major procedures by payer which we use to scale our Medicare savings estimate to Medicaid and private payers below..

For Medicaid, we assume hospital payment levels are broadly similar to Medicare's (see AHA, 2016 and MACPAC 2017). Given that Medicaid performs roughly one-quarter as many inpatient surgeries as Medicare annually per NIS, we scale our Medicare savings estimate proportionally and obtain estimated Medicaid savings of about $7 billion ($29 billion total Medicare savings / 4) from site-of-care substitution.

For private insurers, savings are larger because prices are higher than Medicare's and there is evidence that they save more per case on substitution away from inpatient care. In 2022, private insurers paid 254% of Medicare rates for hospital services (Whaley et al., 2024) and 170% of Medicare rates for ASCs. Moreover, while Medicare savings from shifting total joint replacement from inpatient to hospital outpatient settings are on the order of 16–20%, UnitedHealth Group reports savings of roughly 27% for similar substitutions. We thus assume that private insurers pay on average 200% of Medicare prices, and save 60% more per procedure substituted away from inpatient care. Scaling by the relative private procedure volume (about 60% of Medicare's), we estimate private savings from substitution as 2 x 1.6 x 0.6 x $29 billion = $56 billion.

Healthier population

Medicare

We estimate the spending impact of lower inpatient admission rates using 100% Medicare fee-for-service claims from 2010 through 2019, projected forward to 2024. We restrict to emergency and urgent admissions and exclude diagnoses coded as "unspecified symptoms." Because Medicare Advantage enrollment grew substantially over this period, we reweight the fee-for-service claims within age–sex cells to match the full Medicare population.

For each clinical condition, we compute the age and sex adjusted emergency and urgent admission rate per beneficiary and hold it fixed at its 2010 level as the counterfactual. Between 2010 and 2019, admission rates and average facility and professional payments are taken directly from the claims. For projected years between 2020 and 2024, each condition's age/sex adjusted admission rate is extrapolated using the average annual change between 2010 and 2019. Average inpatient prices in projected years are taken from 2019 and adjusted to 2024 prices using the CMS Medicare inpatient price index.

The inpatient spending impact in each year equals the change in admission rate relative to 2010, times the average total payment per admission (facility plus professional), times total Medicare enrollment in both traditional Medicare and MA. Summing across all conditions, lower emergency and urgent admissions are estimated to have saved $18 billion in Medicare inpatient spending by 2019 and $32 billion by 2024.

Many inpatient admissions are followed by a skilled nursing facility (SNF) stay, so fewer admissions also reduce downstream SNF spending. To capture this, we multiply the change in admissions by the 2010 conditional SNF discharge rate and the contemporaneous average SNF payment per discharge. This isolates the channel by which fewer admissions mechanically translate into fewer SNF stays; we separately estimate, but do not attribute to population health, the additional decline in SNF utilization conditional on admission. The SNF impact from fewer admissions amounts to $9 billion in 2024. Combined with inpatient savings, the total estimated Medicare savings from reduced urgent and emergency admission rates is $40 billion in 2024.

Cardiovascular conditions account for the largest share of savings ($18 billion), reflecting the sharp decline in acute cardiovascular admissions documented above. Hip fracture and trauma ($8 billion), mental health and substance use ($6 billion), gastrointestinal disease ($6 billion), and respiratory disease ($5 billion) also contribute substantially. Admissions for infectious disease increased over the period, partially offsetting savings from other conditions.

National

To extend this estimate to the national population, we apply the same methodology using the National Inpatient Sample (NIS), which contains nationally representative discharge data from a 20% sample of hospitals from 1998 through 2023. For each condition we compute the rate of age and sex adjusted urgent and emergency admissions per 100,000 population. We obtain national population estimates by age and sex over time from the Census Bureau Population Estimates Program.

Unlike in Medicare data, the NIS does not report payment amounts. To infer average payment amount by condition, we multiply average payment across all discharges in HCRIS (approximately $16,600 in 2023) by the ratio of the within condition average payment to overall average payment amounts in Medicare. This adjusts for broad differences in payment amounts by condition. We further scale up the average inpatient payment by the condition-specific professional share and SNF share of total payments in Medicare to account for associated physician claims and downstream SNF spending per admission.

Special adjustments are made for pregnancy and birth defects which are rare in the Medicare population. Average health costs for pregnancy, including childbirth and post-partum care are around $20,000 for women enrolled in ESI plans (Winger, Rae, and Cox, 2025). For birth defects we assume the price is equal to the average price across all admissions.

Imaging analysis

Medicare

We identify imaging utilization and reimbursement by modality and body region using HCPCS codes from physician and outpatient claims mapped to Neiman Imaging Types of Service (NITOS) codes, which classify procedures by imaging modality (CT, MRI, nuclear medicine, ultrasound, radiography) and body region. The key challenge is that some images were bundled over time (e.g., CT scan for abdomen/pelvis), so simply counting claim lines would suggest large declines in imaging over time, even adjusting correctly for claims modifiers. To address this, we define an imaging study as unique at the beneficiary x NITOS code x day level, pooling physician and outpatient claims before deduplication. This approach is robust to rebundling events because a CT abdomen and CT pelvis performed on the same day count as one study before and after the code change. If a patient genuinely received multiple images of the same modality and body region on a single day, this methodology would classify them as a single study, leading us to conservatively undercount total utilization. We calculate the average payment per imaging study as total allowed amounts across physician and outpatient claims divided by the number of studies within each NITOS code. We apply backcast adjustments for CT abdomen/pelvis and cardiac nuclear imaging to account for the important HCPCS restructuring for those two imaging types when analyzing trends as in Figure 10.

To calculate the spending impact of the slowdown in imaging utilization growth, we estimate counterfactual imaging utilization growth had the modality-specific average annual growth rates continued at the rate over 2000-2008. We conservatively exclude

2008 through 2011 due to substantial code bundling over this period which our beneficiary-NITOS-day approach may imperfectly capture. The spending impact in each year is the difference between counterfactual and actual images per 1,000 HMO-adjusted beneficiaries multiplied by 2010 nominal price per image to isolate the pure quantity effect. We extend estimates through 2024 by projecting actual utilization forward along the post-2010 linear trend. We separately estimate the price impact by multiplying actual images by the change in real price per image relative to 2010, holding quantities fixed; this isolates the contribution of falling real prices independently of the utilization slowdown.

National

To extend these estimates to the national population, we use OECD data on images per 1,000 residents for CT, MRI, and PET scans conducted in the United States. We apply the same methodology as for Medicare—estimating counterfactual growth from the 2001–2008 trend and comparing to actual utilization from 2011 onward—and convert the gap to dollars using 2019 Medicare average prices scaled by a factor of 1.5 to reflect the higher prices paid by commercial payers and their approximate share of total spending. For modalities not covered by the OECD data (nuclear medicine, ultrasound, and radiography), we assume they had the same proportional savings rate as CT, MRI, and PET combined.

Price reductions

Medicare

To calculate Medicare prices by sector we use the methodology in Buntin et al., (2022). We are grateful to Melinda Buntin for sharing their data on Medicare prices from 2007 to 2018. We extend the data back to 2000 and forward to 2024. Broadly, the data are a national price index by sector (e.g., inpatient hospital, outpatient hospital, physician, SNF). The price indices are constructed using market basket updates reported annually by CMS adjusted for legislative updates—such as the ACA productivity adjustments and sequestration—as reported in the Federal Register. As a result, these payment changes only reflect national changes, and omit changes affecting individual providers or regions. Further, these measures are price indices that do not capture changes in reimbursement due to upcoding or changing site of care.

National

Estimating price changes nationally is more challenging, especially by payer over a long time horizon. The best source of consistent price series dating back to 2000 by sector are producer price indices (PPI) compiled by the BLS. We use separate all-payer price indices for hospitals (PCU622622) and physicians (PCU62116211). We recover the implied commercial price change as the residual after removing the contributions of Medicare and Medicaid price changes, weighted by their spending shares. We assume the Medicaid price is equal to the Medicare price for hospitals (AHA, 2016 and MACPAC 2017). For physicians, we use Medicaid-to-Medicare physician fee ratios from available survey years over time by collective works of Laura Skopec, Stephen Zuckerman and coauthors.

In 2014 the BLS started producing commercial payer specific PPIs for hospitals (PCU62211A62211A61) and physicians (WPU51110104). Appendix figure 8 plots the estimated commercial hospital and physician price indices using the methodology described above against the actual commercial price indices reported by the BLS starting in 2014. The two series line up closely, providing evidence this methodology accurately captures commercial price growth over time.

Real commercial prices for hospitals and physicians grew 2.3% and 1.1% annually from 2000 to 2010. These rates fell to 0.5% and -1.1% from 2011 to 2024, respectively. To compute the spending impact of slower price growth, we simulate counterfactual spending had the average 2000-2010 annual price growth continued using commercial spending by sector from the NHEA. Had commercial price growth kept pace at the pre-2011 annual trend, it would have added $199 billion to 2024 spending. Given the magnitude of these numbers and the uncertainty in the estimation strategy, we replicate this spending effect using annual commercial price growth for select payers reported in Healthcare Cost Institute (HCCI) annual reports, covering 2007 onward. The HCCI data reports a similar slowdown in annual growth after 2011, and applying the same methodology using HCCI price series gives a spending estimate of $197 billion lower spending due to reduced commercial price growth. We rely primarily on the BLS price series due to the longer time horizon and because the HCCI series relies on a subset of payers and does not consistently adjust for case mix.

We employ the same methodology to estimate the spending impact from slower imaging and Medicaid price growth. Commercial and Medicaid spending impacts are adjusted down to avoid double counting with the impact of imaging price reductions. Although Medicare price growth was similarly slower post-2010, this slowdown was primarily due to legislative changes in the ACA and accounted for in CMS spending projections. Thus, the only Medicare price reduction included in table 3 is the 2% spending reduction due to sequestration, which was not included in the 2010 projections.

Pharmaceuticals

Detailed data on pharmaceutical spending by molecule comes from IQVIA. We decompose the slowdown in pharmaceutical spending by grouping drugs into five categories: new brands (defined as the first two years a drug is on the market), protected brands, loss of exclusivity (LOE), generics, and other products. To account for drugs moving across categories over time, we employ IQVIA's Effect on Growth (EOG) framework, which is important to understand for interpreting the results.

Formally, in year t, we assign drug j to its current category in that year. The EOG year-over-year spending changes across all drugs in each category k is defined as:

$$EOG_{kt} = \sum_{j \in C_{kt}} (d_{j,t} - d_{j,t-1})$$

where C_{kt} is the set of drugs in category k in year t and $d_{j,t}$ is the spending on drug j in year t. Importantly, this holds each drug fixed in its current year category. The EOG contribution rate for category k to total spending growth is:

$$g_{kt} = \frac{EOG_{kt}}{S_{t-1}}$$

where S_{t-1} is total drug spending in t-1.

Intuitively, when a large drug loses exclusivity—say, Lipitor in 2011—it is classified as LOE in that year, and its large negative spending change is attributed entirely to the LOE category. It does not appear in protected brands in 2011 or any subsequent year. Consider had we not fixed the categories in year t and instead analyzed total sales allowing Lipitor to change categories from protected brand in 2010 to LOE in 2011. We would conclude that protected brand spending declined substantially and LOE spending increased; however, the spending reduction was due to Lipitor losing exclusivity. In order to appropriately capture the impact of LOE on total spending, the EOG framework is required.

As shown in figure 14, retail pharmaceutical spending growth slowed substantially in the mid 2000s. To calculate the contribution of slower growth by each drug category to the spending slowdown we compare actual spending to counterfactual spending had each category continued contributing to growth at its pre-2011 average rate. Because holding multiple categories at baseline simultaneously may have a different effect than the sum of holding each individually, we use Shapley values to attribute the total gap across categories. The total gap is $\Delta = V(N) - V(\varnothing)$, where $V(S)$ denotes 2023 counterfactual spending when the categories in S are held at baseline, N is the full set of all categories, and $V(\varnothing)$ is actual 2023 spending. For each category k, we calculate its Shapley value ϕ_k as:

$$\phi_k = \sum_{S \subseteq N \setminus \{k\}} \frac{|S|!(n-|S|-1)!}{n!}[V(S \cup \{k\}) - V(S)]$$

where n = 6, one for each category and a residual. The Shapley value is the average marginal contribution of category k across all possible orderings.

HRS analysis

For national estimates of elderly population living arrangements and help required we rely on the Health and Retirement Study (HRS). We categorize each survey respondent into the following living arrangement categories: nursing home, assisted living facility, home with formal help, home with informal help, and home with no help. Whether a respondent lives in a nursing home is directly available in the data; all other living arrangements were inferred from the survey. An individual is classified as receiving help if they report receiving help for any ADL or IADL. Helpers are classified as formal if they are paid, they are otherwise classified as informal. Unfortunately, the HRS does not directly report whether respondents live in an assisted living facility. We follow the methodology in Spillman and Black (2006) to identify assisted living facility residence as follows: the resident lives in a non-nursing home senior residence that “offers help with bathing, dressing or eating, or offers housekeeping, group meals and either an emergency call button or checks on residents or nursing care/a nurse on-site.”

This categorical living arrangements variable is used as the dependent variable in the following multinomial logit specification estimated using 2010 data:

$$LivingArrangement_i = \alpha + \beta X_i + \gamma_{as} + \varepsilon_i$$

where γ_{as} are five year age bin by sex fixed effects and X_i includes the following individual characteristics: number of ADLs (0, 1, 2, 3+), number of IADLs (0, 1, 2, 3+), cognition index (z scored), gross motor skills index (0, 1, 2, 3+), fine motor skills index (0, 1, 2, 3+), mobility index (0, 1, 2, 3+), muscle strength index (0, 1, 2, 3+), and whether the individual has a partner. The regression is weighted by the survey weights corrected to account for the nursing home population. The regression results are reported in appendix table A2.

We next estimate the change in spending from changes between 2010 and 2018 due to the following factors: health, presence of a spouse, and a residual. Figure 15 shows the decomposition of the change in living arrangements by each factor. We compute the health spending impact of the change for each living arrangement l as the total 65+ population in 2018 x percentage point change in share elderly in living arrangement l x average health spending of living arrangement l. We use the following average annual payment rates by living arrangement: nursing homes $72,000, calculated as $198 average per diem rate for Medicaid x 365 days (Bowblis et al., 2024); assisted living $64,000 (Genworth Financial, Inc., 2024); and home formal help $18,000, calculated as average number of hours of paid helped per month conditional on having paid help in HRS (85) x median Medicaid hourly rate for home health aides ($18) x 12 (Burns et al., 2025). There is no health spending for home with informal care and no care. Although we calculate the spending change due to changes in assisted living, we follow the NHEA and do not allocate this as health spending.

These numbers imply the total decline in spending for elder care due to changes in living arrangements was $28 billion. Of that, $27 billion was due to a lower share of elderly living in nursing homes—conditional on age and sex—and $1 billion was due to lower formal care provided at home. This reduction in use explains nearly all of the slowdown in non-Medicare nursing home spending and nearly half of the spending slowdown for populations with long-term care service needs. This spending was not compensated for by higher spending on assisted living, which also fell over the period. Applying the percentage point changes in living arrangements implied by the multinomial logit, we allocate this spending reduction to various factors. The largest cause of the reduction is that the elderly population is healthier ($16 billion)—conditional on age and sex—followed by a larger share of elderly with a spouse ($10 billion).

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Appendix Table A1: An Example of National Health Accounts

Table 19
National Health Expenditures by Type of Expenditure and Program: Calendar Year 2024

Levels in Millions	Total National Health Expenditures	Hospital Care	Physician and Clinical Services	Other Professional Services	Dental Services	Other Health, Residential, and Personal Care	Home Health Care	Nursing Care Facilities and Continuing Care	Prescription Drugs	Durable Medical Equipment	Other Non-Durable Medical Products	Government Administration: State	Government Administration: Federal	Net Cost of Health Insurance Expenditures	Government Public Health Activities	Research	Structures	Equipment
National Health Expenditures	$5,278,588	$1,694,798	$1,185,684	$184,859	$183,479	$320,463	$169,365	$249,389	$466,968	$86,358	$128,782	$18,426	$47,718	$385,396	$157,569	$78,498	$71,831	$57,144
Out of pocket	556,554	48,685	94,268	44,845	72,546	11,249	38,368	48,639	54,979	35,848	123,298	–	–	–	–	–	–	–
Health Insurance	3,832,868	1,428,324	916,693	122,784	112,649	223,314	132,314	152,438	485,634	43,288	5,472	16,767	46,451	281,538	–	–	–	–
Private Health Insurance	1,644,532	558,396	585,853	57,383	78,478	21,181	37,231	19,257	172,835	18,329	–	–	–	176,458	–	–	–	–
Medicare	1,118,888	499,834	251,498	47,483	12,531	4,569	55,742	47,258	162,769	18,472	5,472	–	14,972	57,642	–	–	–	–
Medicaid (Title XIX)	931,632	318,878	112,483	17,148	15,191	199,841	38,183	78,939	53,886	11,519	–	15,832	24,286	45,596	–	–	–	–
Federal	596,634	218,387	75,863	11,399	9,862	119,215	22,631	49,529	36,975	7,345	–	–	24,286	38,887	–	–	–	–
State and Local	334,998	188,489	37,426	5,741	5,328	88,626	15,558	29,416	16,911	4,168	–	15,832	–	15,449	–	–	–	–
Total CHIP (Title XIX and Title XXI)	38,995	7,838	6,883	779	3,532	2,785	83	15	3,857	292	–	875	2,112	1,954	–	–	–	–
Federal	22,118	5,557	4,916	548	2,528	1,992	68	18	2,828	207	–	–	2,112	1,368	–	–	–	–
State and Local	8,877	2,279	1,979	225	1,812	793	23	4	1,828	85	–	875	–	586	–	–	–	–
Department of Defense	58,889	18,244	19,778	–	1,799	–	–	–	7,244	–	–	–	2,931	–	–	–	–	–
Department of Veterans' Affairs	117,588	77,248	21,989	–	1,972	1,818	1,618	7,824	5,846	–	–	–	2,478	–	–	–	–	–
Other Third Party Payers and Programs	492,399	179,285	38,722	17,399	3,383	79,312	6,883	18,714	6,381	1,349	–	1,659	1,259	24,487	–	–	–	–
Worksite Health Care	3,381	–	–	–	–	3,381	–	–	–	–	–	–	–	–	–	–	–	–
Other Private Revenues	285,475	129,259	79,465	14,868	3,381	29,985	4,886	14,889	4,467	461	–	–	–	8,794	–	–	–	–
Indian Health Services	6,672	3,341	1,748	–	492	791	–	–	95	19	–	–	919	–	–	–	–	–
Workers' Compensation	48,475	15,577	12,241	1,678	–	–	–	–	784	689	–	1,387	166	15,612	–	–	–	–
General Assistance	8,822	3,931	391	182	291	939	331	476	1,332	29	–	–	–	–	–	–	–	–
Maternal/Child Health	2,171	181	126	678	28	997	–	–	55	48	–	198	4	–	–	–	–	–
Federal	718	69	72	287	11	227	–	–	95	19	–	–	4	–	–	–	–	–
State and Local	1,459	118	54	391	9	748	–	–	28	21	–	198	–	–	–	–	–	–
Vocational Rehabilitation	678	211	251	–	–	–	–	–	–	111	–	22	79	–	–	–	–	–
Federal	516	162	199	–	–	–	–	–	–	88	–	–	79	–	–	–	–	–
State and Local	154	48	57	–	–	–	–	–	–	26	–	22	–	–	–	–	–	–
Other Federal Programs	17,831	2,958	8,695	–	–	6,295	–	–	–	–	–	–	611	–	–	–	–	–
SAMHSA	7,476	188	1,498	–	–	5,474	–	–	–	–	–	–	85	–	–	–	–	–
Other State and Local Programs	48,939	18,569	83	19	–	18,849	866	9,348	7	9	–	–	–	–	–	–	–	–
School Health	8,447	–	–	–	–	8,447	–	–	–	–	–	–	–	–	–	–	–	–
Government Public Health Activities	157,569	–	–	–	–	–	–	–	–	–	–	–	–	–	157,569	–	–	–
Federal	35,458	–	–	–	–	–	–	–	–	–	–	–	–	–	35,458	–	–	–
State and Local	122,119	–	–	–	–	–	–	–	–	–	–	–	–	–	122,119	–	–	–
Investment	238,664	–	–	–	–	–	–	–	–	–	–	–	–	–	–	78,498	71,831	57,144
Research	78,498	–	–	–	–	–	–	–	–	–	–	–	–	–	–	78,498	–	–
Private	7,383	–	–	–	–	–	–	–	–	–	–	–	–	–	–	7,383	–	–
Federal	59,292	–	–	–	–	–	–	–	–	–	–	–	–	–	–	59,292	–	–
State and Local	9,748	–	–	–	–	–	–	–	–	–	–	–	–	–	–	9,748	–	–
Structures & Equipment	168,235	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	71,831	57,144
Private	105,287	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	57,812	47,475
Federal	39,386	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	9,388	29,998
State and Local	29,562	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	9,891	19,671

SOURCE: [illegible]

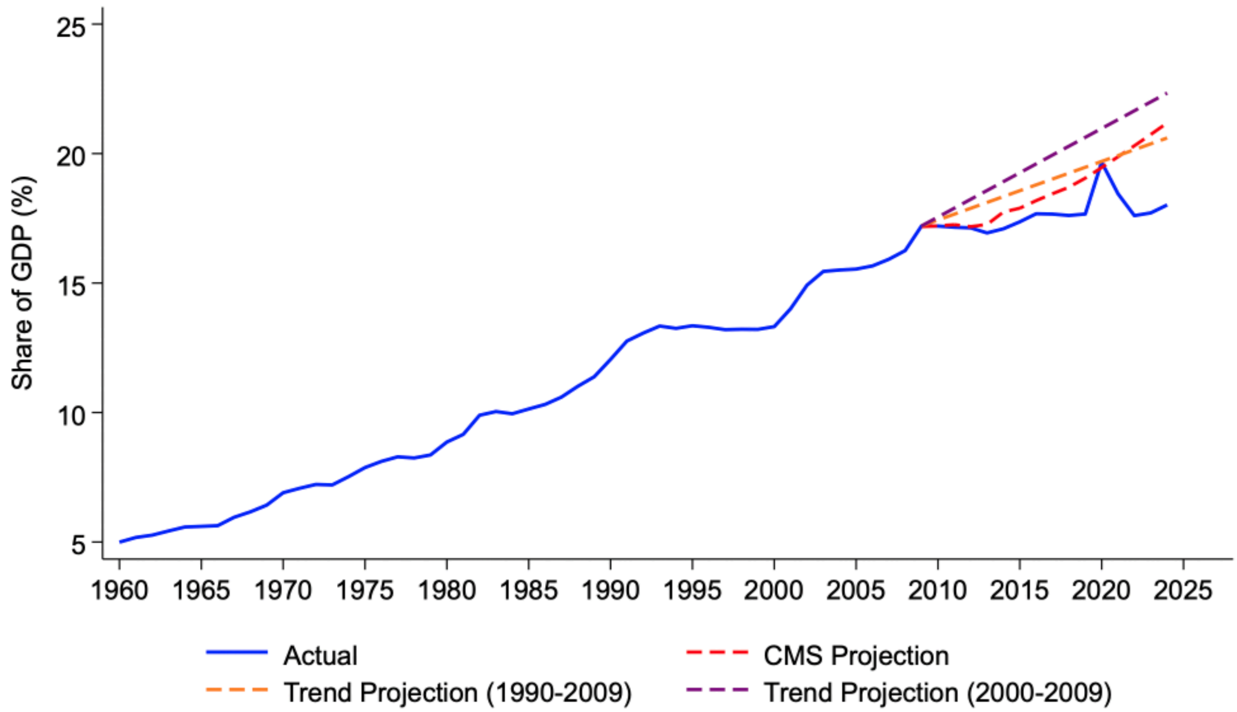
Source: CMS (2026).

Appendix Table A2: Multinomial Logit of Elderly Population Residence Type

	Community Informal Help	Community Formal Help	Assisted Living	Nursing Home
Mobility index (ref: 0 limitations)				
Mobility limitations (1)	0.506***	0.359	0.106	0.400
	(0.158)	(0.351)	(0.216)	(0.394)
Mobility limitations (2)	0.636***	0.728*	0.215	0.842**
	(0.195)	(0.415)	(0.263)	(0.397)
Mobility limitations (3+)	1.296***	1.540***	0.411	0.566
	(0.303)	(0.495)	(0.376)	(0.521)
Muscle strength index (ref: 0)				
Muscle strength limitations (1)	0.100	-0.243	-0.171	-0.016
	(0.165)	(0.327)	(0.219)	(0.353)
Muscle strength limitations (2)	0.102	-0.683**	-0.396	-0.742**
	(0.176)	(0.339)	(0.251)	(0.365)
Muscle strength limitations (3+)	0.137	-0.519	-0.251	-0.576*
	(0.186)	(0.338)	(0.248)	(0.348)
ADL index (ref: 0 limitations)				
ADL limitations (1)	1.642***	1.947***	0.514*	0.752**
	(0.175)	(0.317)	(0.282)	(0.349)
ADL limitations (2)	1.966***	2.585***	0.210	1.925***
	(0.320)	(0.448)	(0.448)	(0.432)
ADL limitations (3+)	1.479***	2.366***	1.053**	2.208***
	(0.430)	(0.579)	(0.500)	(0.558)
Gross motor index (ref: 0)				
Gross motor limitations (1)	-0.118	-0.036	0.321	0.146
	(0.231)	(0.379)	(0.295)	(0.374)
Gross motor limitations (2)	-0.525	-0.554	0.171	0.353
	(0.331)	(0.518)	(0.422)	(0.532)
Gross motor limitations (3+)	-0.650	-0.468	0.329	1.127*
	(0.422)	(0.619)	(0.556)	(0.658)
Fine motor index (ref: 0)				
Fine motor limitations (1)	0.526***	0.328	0.113	-0.043
	(0.168)	(0.273)	(0.254)	(0.286)
Fine motor limitations (2)	0.877***	0.872**	0.149	0.348
	(0.340)	(0.408)	(0.453)	(0.412)
Fine motor limitations (3+)	0.486	0.763	-0.626	0.557
	(0.869)	(0.892)	(0.907)	(0.876)
IADL index (ref: 0 limitations)				
IADL limitations (1)	4.090***	4.067***	1.367***	2.264***
	(0.140)	(0.296)	(0.215)	(0.309)
IADL limitations (2)	5.266***	5.499***	2.411***	3.804***
	(0.244)	(0.360)	(0.328)	(0.377)
IADL limitations (3+)	5.637***	6.456***	3.310***	5.888***
	(0.313)	(0.407)	(0.371)	(0.377)
Cognition & demographics				
Cognition (z-score)	-0.227***	-0.181	0.145	-0.322***
	(0.069)	(0.112)	(0.093)	(0.111)
Has partner	1.033***	-0.238	-0.237	-1.233***
	(0.134)	(0.198)	(0.174)	(0.241)
Constant	-5.901***	-7.312***	-5.472***	-6.959***
	(0.268)	(0.700)	(0.478)	(0.700)

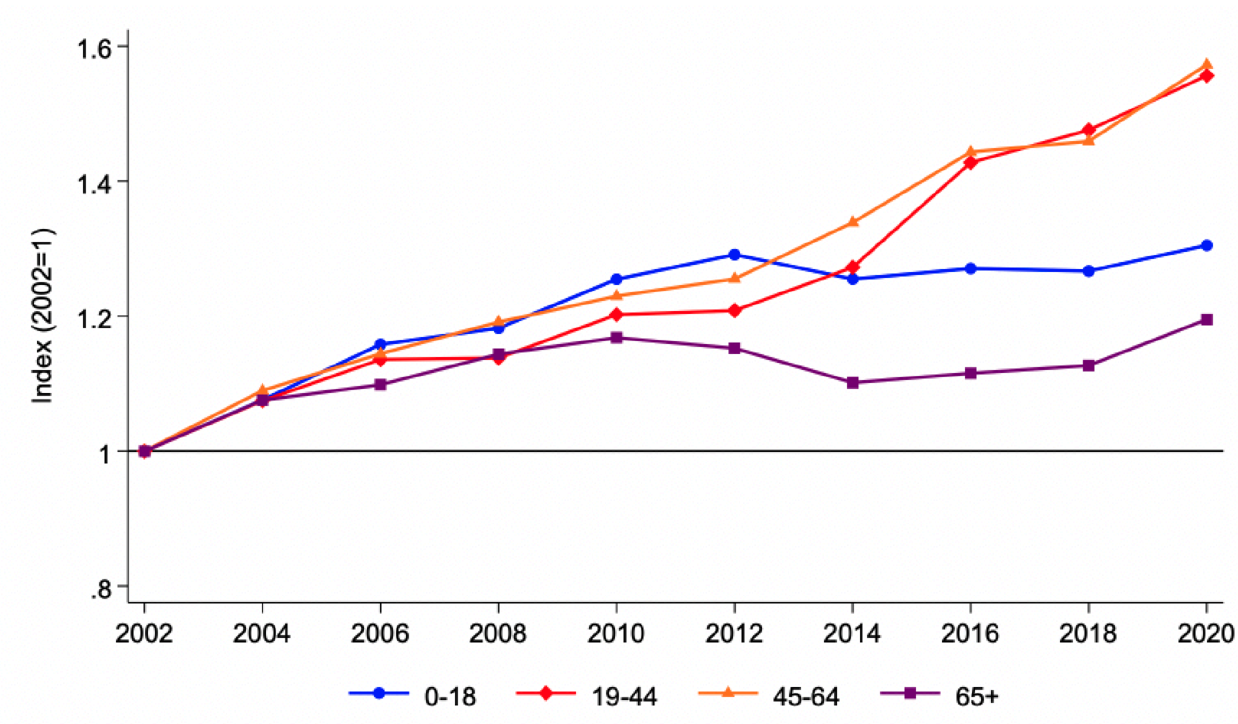
Note: Base outcome: Community, No Help. Sample restricted to HRS respondents aged 65+ in 2010. Health indices are capped at 3+ limitations. Cognition is standardized to mean zero, unit standard deviation. Proxy respondents imputed to 1 SD below mean cognition. Weighted using HRS respondent weights. Coefficients reported as log-odds ratios. Standard errors in parentheses. * p<0.10 ** p<0.05 *** p<0.01.

Appendix Figure 1: Medical Spending as a Share of GDP, CMS Projections, and Projections from Time Trend



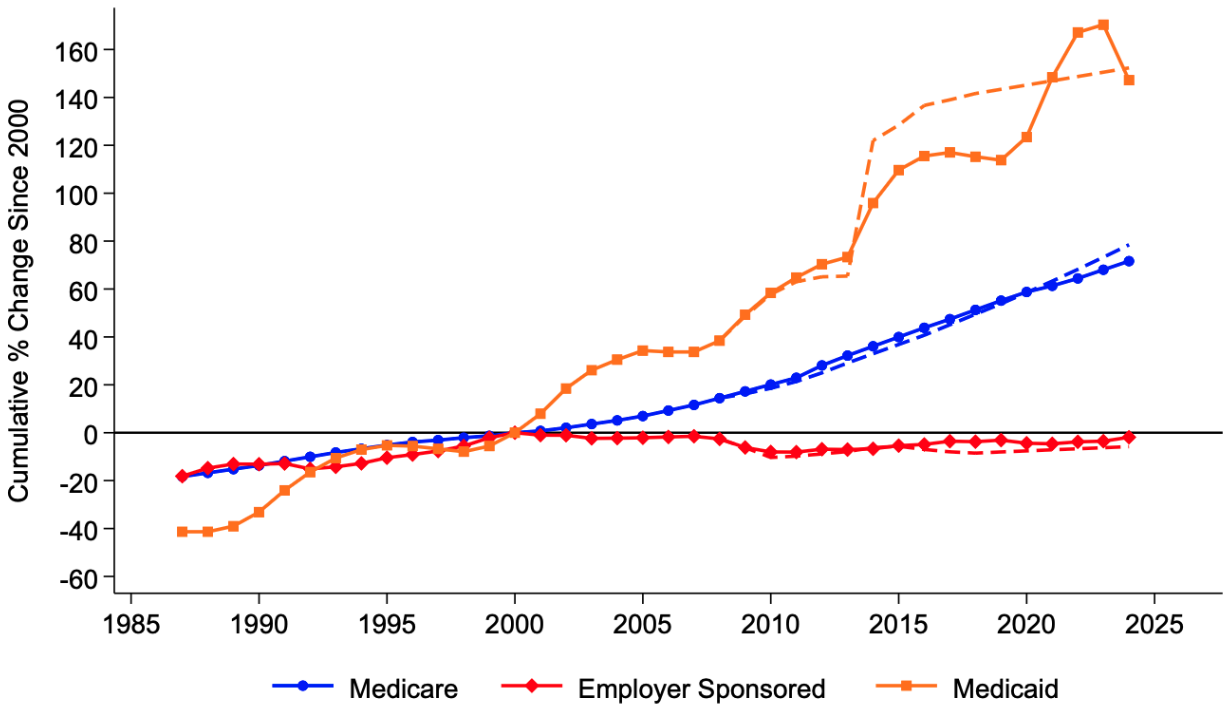
Source: CMS 2010 projections. Projections constructed between 2010-2020, extrapolated through 2024.

Appendix Figure 2: Relative Medical Spending By Age



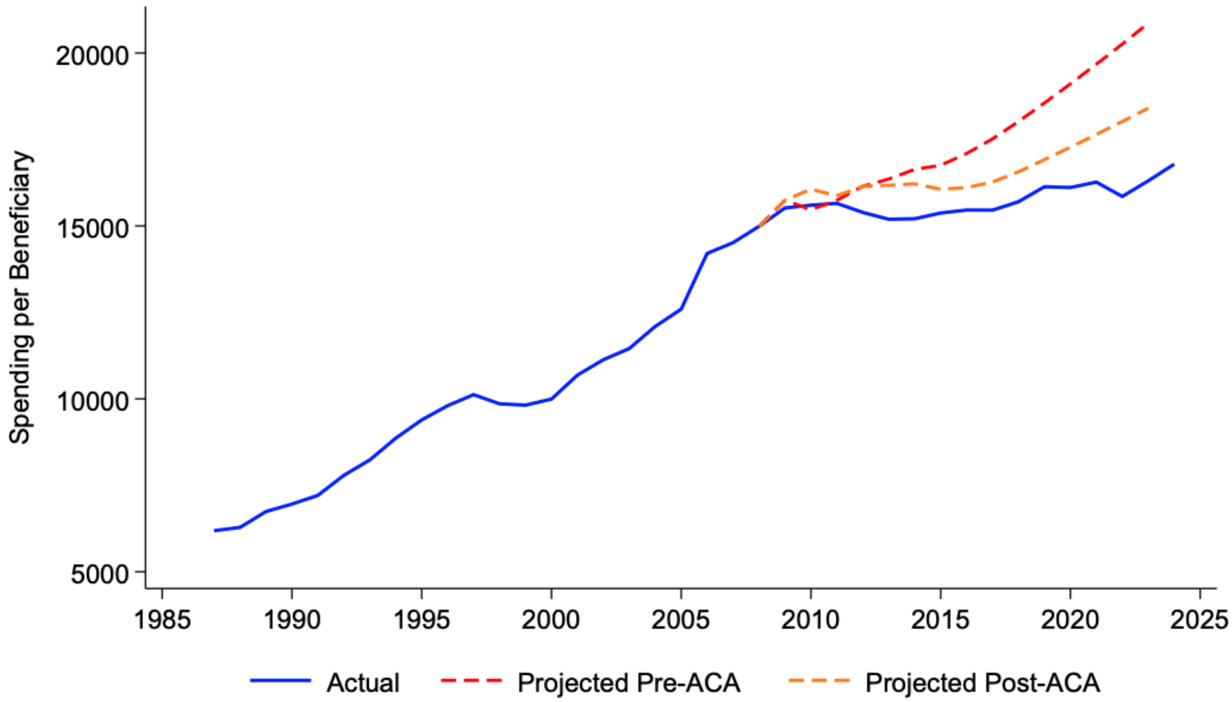
Notes: Source CMS (2024).

Appendix Figure 3: Enrollment by Insurer and Forecasts



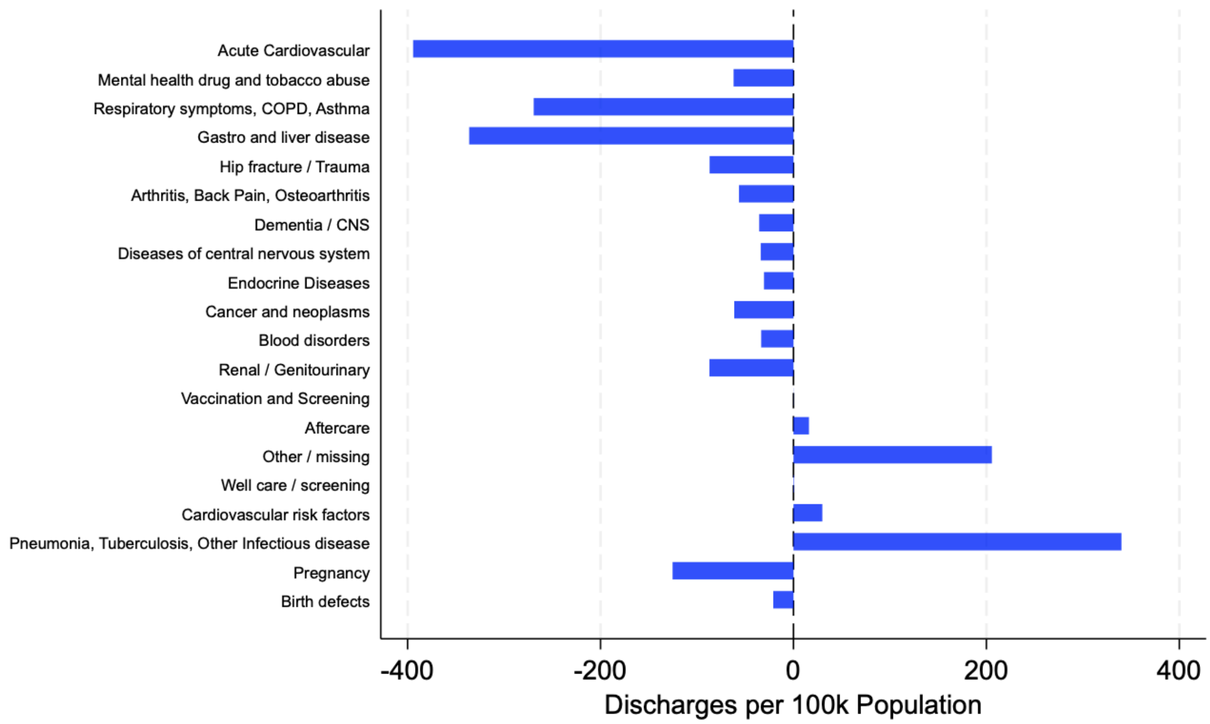
Notes: Source CMS NHEA Fact Sheet. Dashed lines are projections constructed between 2010-2020, extrapolated through 2024.

Appendix Figure 4: CMS Medicare Spending Projections Before and After the ACA



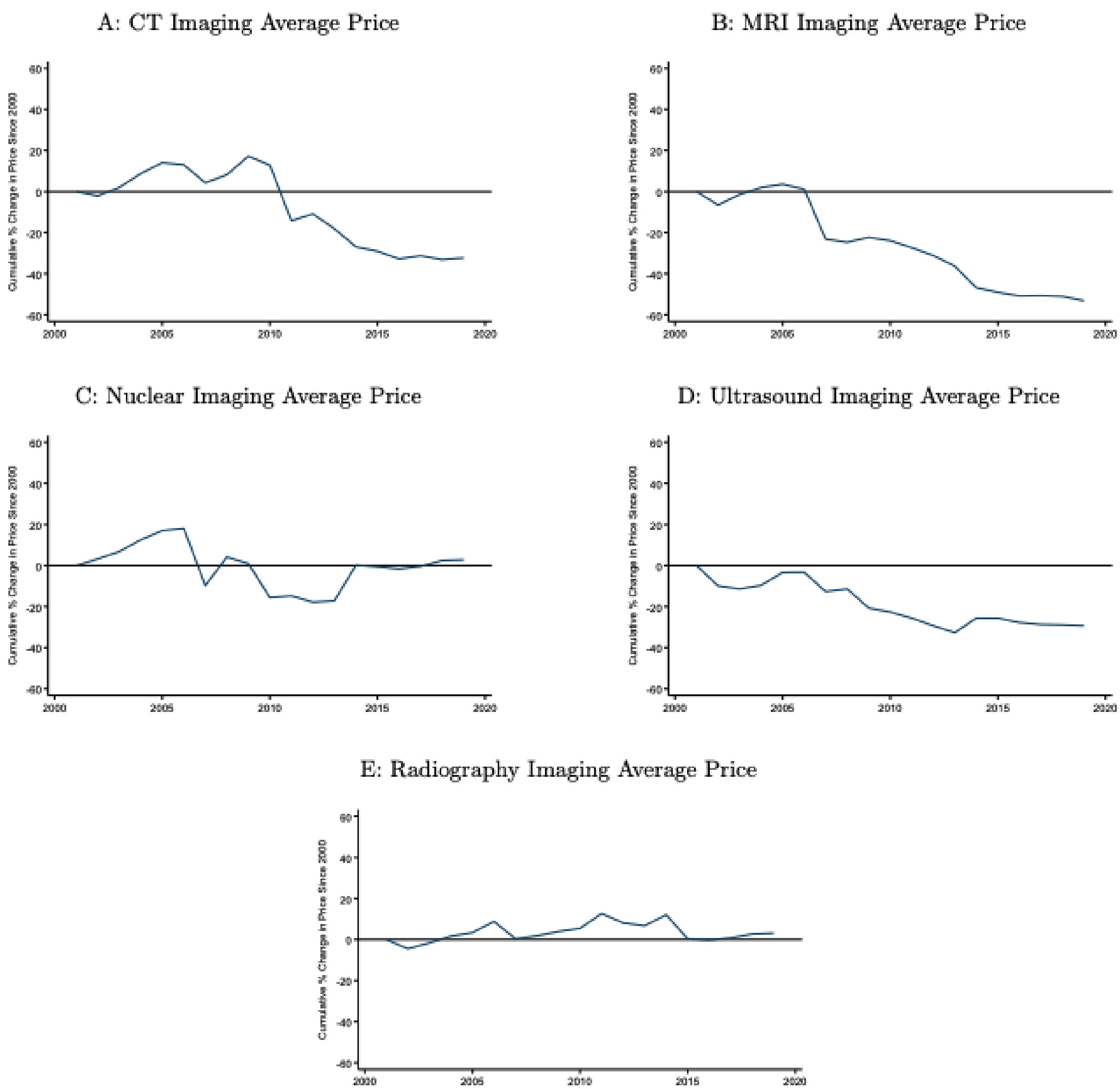
Source: CMS 2009 projections. Projections constructed between 2009-2019, extrapolated through 2024.

Appendix Figure 5: Changes in National Hospital Discharges by Diagnosis, 2010-2023



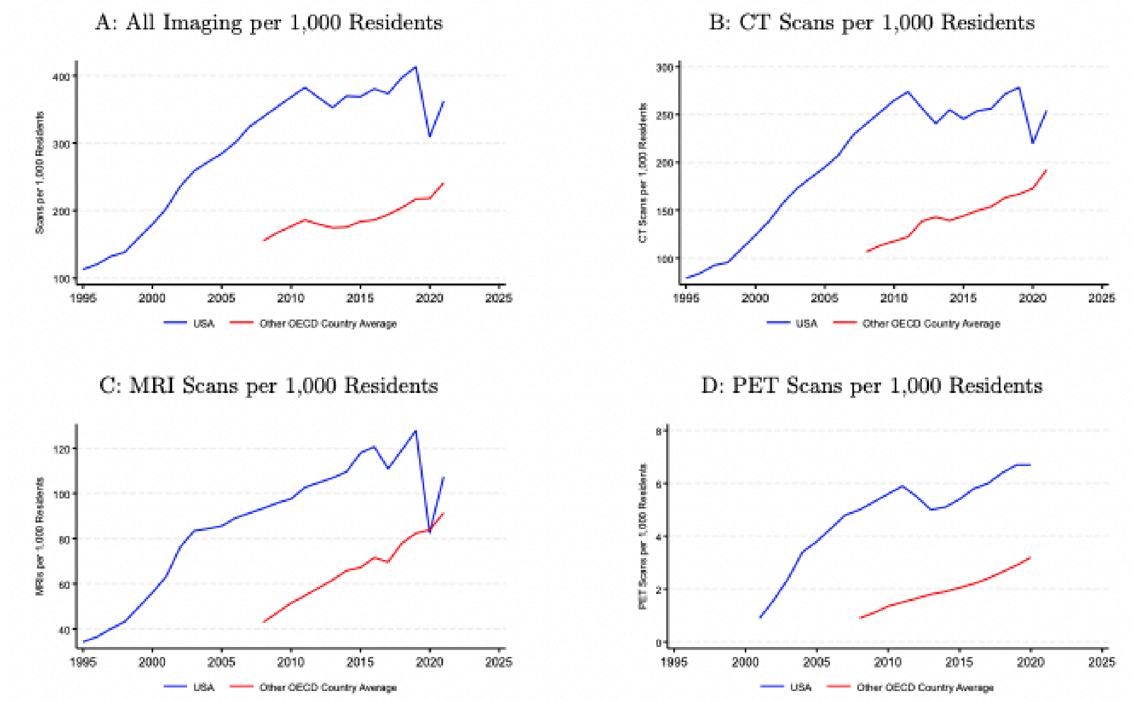
Note: This figure replicates the results in Figure 8, except it applies to the national population estimated using NIS instead of Medicare data. Discharges per 100k population are age and sex adjusted within three-year age bins. Diagnosis categories are defined using ICD-CM codes as defined in Cutler et al. (2022).

Appendix Figure 6: Medicare Imaging Price Trends



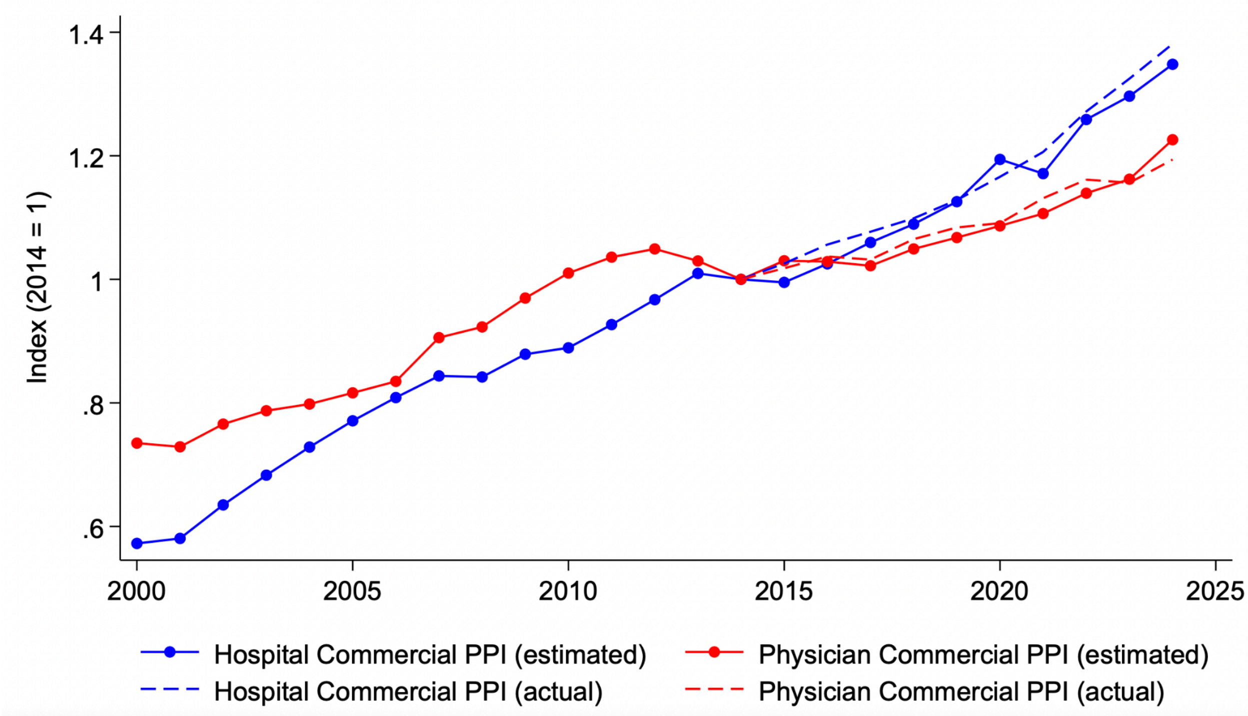
Note: Authors' analysis of CMS claims data. Images are identified using HCPCS codes from physician and outpatient claims data and classified by modality using Neiman Imaging Types of Service (NITOS) codes. To account for imaging code bundling over time, a unique image is defined as a modality by body region by beneficiary by day. Prices are the total reimbursement per image.

Appendix Figure 7: Imaging Trends per 1,000 Residents Compared to OECD Average



Note: Authors' tabulations of OECD data. Other country average includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Iceland, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and the UK. The change in CT scanning rate in the US in 2011 was artificially low because abdominal and pelvic scans were combined starting in 2011 but separated before.

Appendix Figure 8: Estimated Commercial Hospital and Physician PPI vs Actual



Notes: Data is sourced to the BLS. Hospital and physician commercial PPI is estimated by solving for commercial price growth by taking the overall PPI change and subtracting the part due to Medicare and Medicaid, weighted by the year-specific share of spending on each, based on NHEA data. We assume the Medicaid price is equal to the Medicare price for hospitals and approximately 70% of the Medicare price for physicians (AHA, 2016 and MACPAC 2017). The actual commercial price series are from the BLS and start in 2014.