How Has the 80th Percentile Rule Affected Alaska's Health-Care Expenditures?

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Executive Summary: How Has the 80th Percentile Rule Affected Alaska's Health-Care Expenditures?

Background

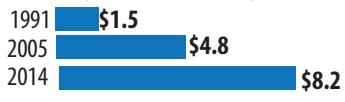
In 2004, Alaska's Division of Insurance adopted what's known as the 80th percentile rule. That rule sets a minimum for how much health-insurance companies have to pay, when Alaskans with private insurance plans see doctors or other providers outside their insurers' networks.

The rule applies to all individual plans and to most private group plans.* The division established the rule after it got complaints from Alaskans who had insurance but faced unexpectedly large remaining bills, after their insurance companies had paid a share.

The 80th percentile rule requires insurers to base their payments for out-of-network claims on the amount at or above 80 percent of what all the providers charge for a specific service, in a given area of the state. (This is not, as many Alaskans believe, a requirement that insurers pay 80% of the billed charges. The back page gives an example of how the rule works.)

Spending for health-care in Alaska increased from $1.5 billion in 1991 to $4.8 billion in 2005 and $8.2 billion by 2014. Critics think the rule may be adding to that soaring spending, partly because over time providers could increase their charges—and insurance payments would have to keep pace.

Figure 1. Alaska Health-Care Spending
(In Billions of Dollars)



Source: Centers for Medicare and Medicaid

The state Office of Management and Budget asked us to assess how the 80th percentile rule has affected Alaska's overall health-care spending. Our analysis looks narrowly at just that potential effect of the rule. It's important to say that we're not taking any position on whether the state should keep, change, or repeal the rule.

And remember that spending is not the same as cost. How much Alaskans spend for health care depends not only on how much they pay for services, but also on how much they use those services. We don't have broad information on costs, or on whether the 80th percentile rule has in fact reduced out-of-pocket costs for Alaskans seeing out-of-network providers.

What Did We Do?

We used federal data to compare Alaska health-care spending with that in other states from 1991 to 2004, and identified a group of states with similar growth in spending before the 80th percentile rule was enacted. We then built a model to project how much spending would likely have increased in Alaska, without the rule.

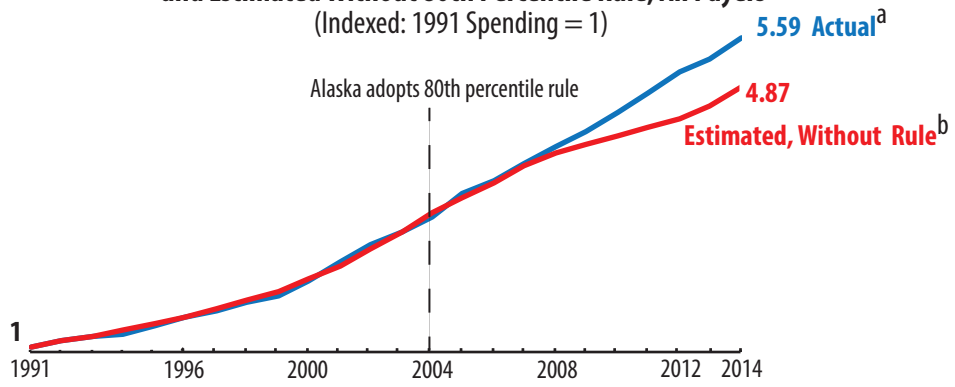
What Did We Find?

Figures 2 and 3 show different ways of estimating effects of the 80th percentile rule, for all health-care payers (private and public). Figure 2 compares actual and estimated growth—without the rule—through an index, with 1991 as the benchmark. Figure 3 shows average annual growth from 2005-2014, and estimates percentages attributable to the rule.

• Without the rule, spending in 2014 would have been 4.9 times what it had been in 1991, while actual spending was 5.6 times (Figure 2). That estimate of spending without the rule is based on our full sample, comparing Alaska with states that had similar pre-2004 spending growth.

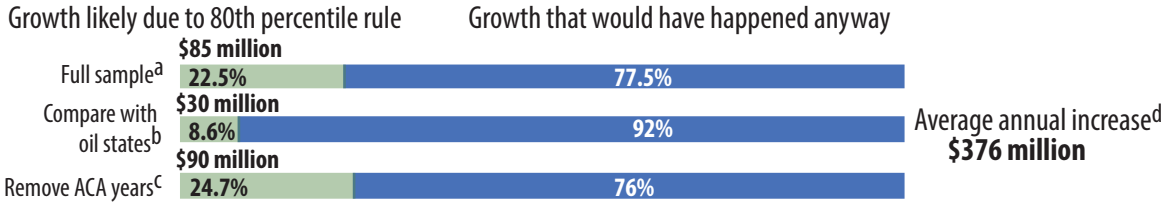
• The average annual increase in spending from 2005 through 2014 was $376 million, and the rule accounted for anywhere from 8% to nearly 25% of that annual growth (Figure 3). We report a range of results, because the basis of comparison makes a difference. If we compare Alaska with states that had similar pre-2004 spending growth, about 22.5% of the annual increase can be attributed to the rule. But if we instead compare Alaska growth just with that in other oil rich-states, the percentage drops to 9%, and if we eliminate the effects of the Affordable Care Act, the percentage increases to just under 25%.

Figure 2. Growth of Personal Health-Care Spending by Alaskans, 1991-2014, Actual and Estimated Without 80th Percentile Rule, All Payers
(Indexed: 1991 Spending = 1)



[a]Centers for Medicare and Medicaid, Health Expenditures by State of Residence, 1991-2014
[b]Author's estimate of growth in expenditures by all Alaska payers (private and public), based on results from a synthetic model—a model that estimates spending without the rule, using a combination of states where growth of health-care spending was similar to spending growth in Alaska from 1991 to 2004.

Figure 3. How Much Did the 80th Percentile Rule Likely Contribute to Growth in Alaska Health-Care Spending? (Estimated Share of Average Annual Increase, All Payers, 2005-2014)



[a]Estimated share of average annual increase attributable to the 80th percentile rule, for all health-care payers (private and public), based on comparing actual growth in spending with synthetic-model estimate of what spending would have been, without the 80th rule.
[b]Same as note a, except comparing only with spending growth in other oil-rich states. [c]Same as note a, except limiting period to 2005-2011.
[d]Based on data from Centers for Medicare and Medicaid, Health Expenditures by State of Residence, 1991-2014.

* It doesn't apply to plans offered by firms that self-insure, which is most common among the largest employers.

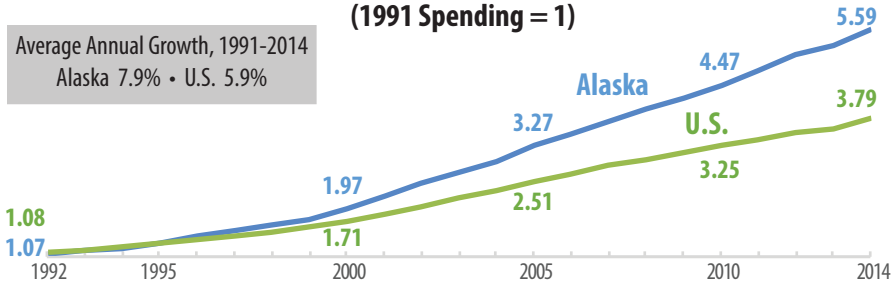
Why Do More Than one Comparison?

As we said earlier, our broad base for estimating effects of the 80th percentile rule is a comparison with states that had similar growth in health-care spending before Alaska adopted the 80th percentile rule, including spending by all payers, private and public.

But using that base alone doesn't take into account other reasonable ways of estimating effects of the rule—so we made a range of estimates, using somewhat different bases.

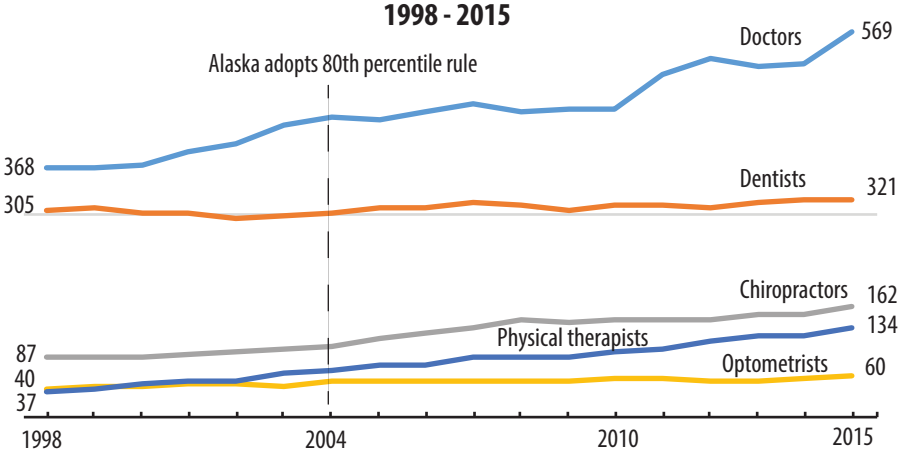
In general, excluding spending by Medicare and Medicaid payers, and eliminating the years after the ACA went into effect, yield higher estimates of how much the rule added to the growth of health-care spending. Using changes in oil-rich states as a comparison produces a lower estimate.

Figure 4. Growth in Health-Care Spending, Alaska and U.S., 1991-2014 (1991 Spending = 1)



Source: Authors' calculations, based on data from Centers for Medicare and Medicaid Services (CMS)

Figure 5. Growth in Number of Offices, Selected Alaska Health-Care Providers, 1998 - 2015



Source: U.S. Census Bureau, County Business Patterns

What Else is Responsible for Growth?

Most of the growth in spending since 2005 wasn't due to the 80th percentile rule. That spending—in Alaska and across the U.S.—has been rising fast since the 1990s. The pace of growth was similar in Alaska and nationwide until the late 1990s, but after that spending in Alaska began growing faster. By 2014, spending in Alaska was 5.8 times what it had been in 1991; nationwide it was 3.8 times (Figure 4).

Analysts cite a number of reasons why health-care spending has climbed so much everywhere—including high prices for new procedures, technology, and drugs; inadequate management of widespread chronic diseases; and high administrative costs.

In Alaska, health-care infrastructure—particularly doctor's offices—has grown considerably (Figure 5). This increase in availability and variety of facilities has made it easier for Alaskans to get care in-state, and it's safe to assume that increased availability translates into more use.

Conclusions

We looked only at the aggregate increase in spending that likely resulted from the 80th percentile rule. Future work should focus on identifying how the rule affected health-care use and out-of-pocket spending.

Also, before there can be an analysis of how the rule has affected prices in various parts of the health-care system, the necessary data has to be collected.

Explaining Alaska's 80th Percentile Rule: It Does Not Mean Insurers Have to Pay 80% of Billed Charges

The name "80th percentile rule" is confusing, because it leads people to think it requires health-insurers to pay 80% of whatever are determined to be customary rates for medical services. That's not true. Here's how it works:

- Say your hip is worn out. You go to a surgeon and have it replaced.
- You have health-insurance, but the surgeon who replaces your hip is outside your insurance network. Surgeons in your network have agreed to charge some specific amount for your new hip—but those outside the network set their own rates.
- Your out-of-network surgeon bills your insurance company, at a rate that may be more or less than other surgeons in your area charge to replace a hip.
- Under the 80th percentile rule, your insurance company has to base its payment on the billed amount that is at the 80th percentile of all the bills—that is, 80% of bills are below that amount, and 20% are above.
- The bill at the 80th percentile of all bills becomes the basis—called the allowed amount— for what insurance pays for your hip surgery. It pays whatever share of that allowed amount your policy calls for—in many cases, that's 60% for out-of-network providers.

How has the 80th percentile rule affected Alaska's Health Care Expenditures?

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May 16, 2018

Abstract

We use the Health Expenditures by State of Residence data (1991-2014) compiled by Centers for Medicare & Medicaid Services to examine the causal effect of the 80th percentile rule on Alaska's health care expenditures. We find evidence that Alaska's expenditures would have been lower in the absence of rule. The share of the overall increase in expenditures that we attribute to the 80th percentile rule is between 8.61% and 24.65%. It is important to note that using expenditures as a proxy for costs has limitations as it is the product of both quantity of services used and prices.

Keywords: Alaska Health care; Expenditures; Synthetic control method.

JEL Classification: I11; I18

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Contents

1 Summary

1.1 Main findings

Since 2004, Alaska has had a regulation known as the 80th percentile rule which applies to all individual plans as well as fully-insured large and small group plans.[1] As a result of the regulation, when charges for out-of-network care are billed to insurers, the insurers are required to pay an amount that is at least as much as the 80th percentile of billed charges for that service in that geographical area. We evaluate the effect of this rule on Alaska's health care expenditures by relying on the State Health Expenditure Accounts (SHEA) estimated by the Office of the Actuary (OACT) which are available from 1991 to 2014 by service, payer, and state. During the period of our analysis, Alaska's health expenditures grew, on average, at 8.62% per year between 1991 and 2004 and at 6.15% between 2005 and 2014. We use a statistical technique called the synthetic control method[2] to assess how Alaska's expenditures would have evolved in the absence of the regulation. The method finds units -combination of states- that mimic the growth of Alaska's expenditures before 2004 and then evaluates if any divergence between Alaska and the "synthetic" occurs after the intervention. Our main analysis uses all payers[3] and the full dataset (1991-2014). Table 1 presents a summary of our results that contain Alaska's actual average growth rates, the synthetic growth rates which capture the evolution of expenditures in the absence of the rule, and the growth rate differential between the actual and synthetic for each expenditure category for all the samples. These different samples allow us to examine the sensitivity of our results. Below is a summary findings:

- For the all payer sample which includes both private and government payers, we look at the effect of the rule using three comparisons: the synthetic control made up of states

[1] It does not apply to self-insured plans, which is the preferred insurance approach for very large employers.
[2] The appendix includes technical and health expenditure definitions.
[3] Private health insurance plans, large employer self-insured plans, uninsured patients, and Medicaid and Medicare

that best fit Alaska's growth pattern, an analysis just from 2005-2011, to exclude any increases attributable to the Affordable Care Act; and a comparison with just oil states, which did not suffer as severe a recession as other states.[4] we find the following:

  - Alaska's personal health care expenditures would have grown, on average, at between 0.58% and 1.78% percentage point less per year in the absence of the 80th percentile rule depending on the sample. In other words, the 80th percentile rule explains between 8.61% and 24.65%[5] of the increases in expenditures the state has experienced over the last decade. These results are statistically significant and robust.

  - The category for which we find the largest effect is Physician and Clinician services. For this category, we find that the 80th percentile explains between 15% and 39% of the growth rates. This means the yearly growth would have been between 1.06% and 2.74% percentage point less per year in the absence of the 80th percentile rule.

- If we exclude government payers-Medicare and Medicaid-[6], we find the following:

  - Alaska's personal health care expenditures would have grown, on average, at between 0.92% and 2.44% percentage point per year less in the absence of the 80th percentile rule. In other words, the 80th percentile rule explains at between 12.97% and 33.99% of the increases the state has experienced over the last decade. These results are statistically significant and robust. It is important to note that this subsample shows larger effects because Medicaid expenditures in Alaska, included in the full sample, were growing slower in Alaska during the period of interest.

[4]The range of estimates stem from three different exercises. First, we find the best fit from all the rest of country. Second, we restrict the analysis to 2011 to avoid any increases attributable to the ACA. Third, we restrict the comparison group to just oil states which did not suffer as severe a recession as the rest of the country.

[5]We calculate these shares by dividing the difference between the actual and synthetic by Alaska's average growth post the policy change.

[6]This sample removes government payers-Medicaid and Medicare- from the total spending by Alaskans.

- For Physician and Clinician services, we find that the 80th percentile explains between 18.69% and 52.14% of the growth rates. This means that we find Physician and Clinician services would have grown at between 1.35% and 3.65% percentage point less per year in the absence of the rule.

- There have also been significant changes in the Alaska health care market:
  - We find that since the early 2000's the Alaska healthcare market has grown considerably. The number of Physician offices, for example, increased from 368 in 1998 to 569 in 2015. Those of physical therapists increased from 37 in 1998 to 134 in 2015. This increase in availability and variety of healthcare facilities has made it easier for Alaskans to obtain medical services. While we do not have data on usage rates, it is safe to assume that added availability translates into additional consumption of services, which influenced health care expenditures. In 2016, there were 264.32 physicians for every 100,000 Alaskans which is higher than the 240.21 per 100,000 in 2004. Even though the number of physicians has increased, the state still lags the national average which has 291.98 per 100,000 Alaskans.

- Going forward it will be important to understand how the passage of the rule affected consumers:
  - This analysis focuses on the aggregate change in expenditures as a result of a regulation change that was intended to lower the burden on Alaskan households.
  - Future work should focus on identifying how the regulation impacted healthcare usage and the extent to which it reduced out of pocket spending.
  - Additionally, there should be an effort to obtain more detailed data sets that would allow more precise analysis of how the regulation has affected healthcare prices of specific subsets of the market.

1.2 Limitations

Our analysis evaluates the effect of the 80th percentile rule on expenditures and not costs. It has some other important limitations we list below:

- Expenditures are the product of prices and quantity of services used. In this analysis, we can not disentangle usage from prices.
- The introduction of the rule might have resulted in higher usage by consumers, which could explain a portion of the higher expenditures.
- We do not have data on charges or reimbursement levels which limits what we can say about provider behavior after the rule was enacted.
- The rule was intended to reduce the consumer's out of pocket portion of the expenditures and we do not have a way to evaluate that.
- The data we use does not isolate the expenditures incurred simply by those who have private insurance. This is an important limitation as this is the group most likely to feel the effects of the rule change.
- Finally, and most importantly, this analysis does not make a recommendation regarding the 80th percentile rule, since it only examines one aspect of the question.

1.3 Report Funding

ISER's preparation of this report was supported with funding from the Office of Management and Budget. The total budget was $31,250.

1.4 Study independence

As with all ISER research, this report and its conclusions are solely the work of the individual authors and should be attributed to them, not to ISER, the University of Alaska Anchorage,

Table 1: Summary of results

	Personal Health Expen-ditures	Hospital	Physician and Clin-ician services	Other prof	Dental care	Home	Nursing	Drugs	Durable	Other health
A) Alaska actual growth rates before the 80th percentile rule: 1991-2004										
Full sample: All payers	8.62%	7.82%	9.26%	9.97%	6.89%	27.93%	7.68%	8.96%	6.48%	13.24%
Non Medicare/Medicaid	7.67%	6.92%	8.95%	9.68%	6.76%	20.40%	7.68%	7.42%	6.48%	10.36%
B) Alaska actual growth rates post 2004 with the 80th percentile rule										
Full sample: All payers	6.73%	7.68%	7.03%	7.62%	5.24%	10.06%	3.27%	1.21%	4.96%	8.47%
All payers: 2005-2011 (Pre-ACA)	7.23%	8.67%	7.14%	7.54%	4.80%	12.89%	1.98%	1.89%	5.58%	9.06%
Non Medicare/Medicaid	7.06%	8.76%	7.21%	6.88%	4.13%	25.25%	3.27%	1.14%	4.96%	9.30%
C) Synthetic growth rates from 1991-2004										
Full sample: All payers	8.76%	8.04%	8.88%	9.17%	7.02%	16.9%	18.10%	9.06%	6.46%	13.23%
Oil States	8.35%	6.82%	8.22%	9.04%	6.92%	17.44%	7.94%	9.08%	6.38%	12.75%
2005-2011 (Pre-ACA)	8.76%	8.04%	8.88%	9.17%	7.02%	16.9%	18.10%	9.06%	6.46%	13.23%
Non Medicare/Medicaid	7.68%	6.62%	8.42%	8.80%	6.91%	12.16%	8.54%	8.14%	10.14%	17.18%
D) Synthetic growth rates post 2004 in the absence of the 80th percentile rule										
Full sample: All payers	5.07%	7.60%	4.10%	5.91%	3.36%	7.07%	6.60%	4.81%	4.36%	3.34%
Oil States: All payers	5.88%	7.67%	4.93%	6.48%	3.58%	7.01%	3.87%	4.50%	4.07%	6.01%
2005-2011 (Pre-ACA):All payers	5.31%	7.86%	4.01%	6.98%	3.89%	7.44%	7.65%	4.80%	4.71%	3.25%
Non Medicare/Medicaid	4.65%	8.27%	3.08%	5.02%	2.20%	6.73%	6.60%	3.08%	4.36%	3.86%
Growth rate differential between the actual and the synthetic: $\|B-D\|$-$\|A-C\|$ * Differences in bold are statistically significant										
Full sample: All payers	**1.52%**	-0.15%	**2.56%**	**0.91%**	1.74%	**-7.98%**	**2.47%**	**3.50%**	0.58%	**5.11%**
Oil States: All payers	**0.58%**	-0.99%	**1.06%**	**0.21%**	1.63%	7.44%	**0.35%**	**3.16%**	0.79%	**1.96%**
2005-2011 (Pre-ACA):All payers	**1.78%**	0.58%	**2.74%**	-0.23%	1.04%	-5.5%	**4.8%**	**2.8%**	0.9%	**5.8%**
Non Medicare/Medicaid	**2.40%**	0.19%	**3.59%**	0.99%	1.79%	10.28%	**2.40%**	**1.21%**	0.58%	**5.22%**

or the research sponsors. The funding agency did not influence the conclusions of the report. We decided which dataset to analysze, methods to use, and how to wrtite our conclusions. In our study design, analysis, and conclusions we are not advocating for maintaining, repealing, or altering the current rule governing out-of network reimbursements. Our purpose is solely to provide empirical analysis to advance the conversation.

2 Introduction

Since 2004, Alaska has had a regulation known as the 80th percentile rule which applies to all individual plans as well as fully-insured large and small group plans.[7] As a result of the regulation, when charges for out-of-network care are billed to insurers, the insurers are required to pay an amount that is at least as much as the 80th percentile of billed charges for that service in that geographical area. In theory, this provides transparency about how reimbursements are paid and gives consumers protection. In fact, the 80th percentile rule was implemented in 2004 as an effort to protect consumers given a string of complaints about unexpected and large bills.

Over the last few years, it has been suggested in multiple media outlets and by health analysts that the rule may be at least partially responsible for the cost increases in Alaska. To date, however, there has not been any quantitative assessment linking the rule's passage to Alaska's spiraling health costs. The Alaska Division of Insurance held multiple public hearings in 2017 where both opponents and proponents presented their views on whether the rule should be maintained, altered, or repealed.

The biggest concern regarding the rule is that providers can potentially increase their charges over time, and insurance company reimbursements have to keep pace with the cost increases. It may also be disincentive for providers to join insurance networks, and drives up the cost of insurance.[8]

Our goal, in this paper, is to isolate the effect of the 80th percentile rule on Alaska's health care expenditures. This is clearly challenging given that we only observe the evolution of Alaska's health expenditures with the 80th percentile and do not know how these expenditures

[7] It does not apply to self-insured plans, which is the preferred insurance approach for very large employers.
[8] https://www.healthinsurance.org/alaska-state-health-insurance-exchange/rule

would have been different in its absence. In order to solve this problem, we use information from the rest of the U.S to construct what Alaska's expenditures would have been in the absence of the rule. We do this by identifying states or combination of states which evolved in a similar manner to Alaska's prior to the passage of the 80th percentile rule. This is a data-driven strategy which attempts to find units or combination of units (states) which we call the synthetic that mimic the evolution or growth rate of Alaska's health expenditures before the intervention by matching on both the outcome of interest (health expenditures) and other characteristics. By doing that, whether health care spending for the actual Alaska, which has experienced a law change and the synthetic Alaska which did not, diverge after the law change. For example, the continuous line in Figure 2(a) is Alaska's personal health expenditures, and the dashed line is the synthetic which is constructed from a combination of (0.154 of California/0.34 Maine/0.384 Nevada/ and 0.122 Vermont). This combination of states is the one that best approximates the evolution of Alaska's expenditures and therefore minimizes pre-intervention differences. To simplify the matching and make the comparison across states easier, we divide each year's expenditure for each state by its level of spending in 1991. This means that the ratio is 1 in 1991 for both the actual and synthetic and then we track how yearly expenditures differ from the initial level. We note that there is an upward trend pre-2004 in both markets but they track each other very closely. However, after 2004 the trajectories diverge, and Alaska's growth rate is higher. Figure 2(b) shows the difference between the actual and synthetic, and Figure 2(c) shows whether or not the divergence between Alaska and its counterfactual are statistically significant or they simply happen as a result of chance. To determine that, we assign the treatment (2004 intervention) to each US state and develop a counterfactual case for each one of them. This allows us to determine how Alaska's divergence from its counterfactual post 2004 compares to that of every other unit. Therefore, we can establish for each of the categories of interest whether the 80th percentile rule has indeed resulted in a change in expenditures that can be causally attributed to the policy shift.

Alaska's gap is the one in bold and each other line represents the difference between the actual and the synthetic for every other state.[9]

Our results indicate that expenditures would have been between 8.61% and 24.65% per year in the absence of the rule. The category for which we find the most important change is Physician and Clinician services where we attribute between 15% and 39% of the increases in expenditures to the passage of the 80th percentile rule. In the next few sections, we lay out the exact nature of the regulation, describe the health care cost challenge both nationally and in Alaska, provide an overview of the data, present an overview of the methodology, discuss our results, and then describe the Alaska health care market.

3 What does the regulation say?

3AAC 26.110(a) in the relevant part provides "a person that provides coverage in this state for health care services or supplies on an expense incurred basis for which benefits are based on an amount that is less than the actual amount billed for the health care services or supplies shall...determine the final payment for a covered service or supply based on an amount that ...is equal to or greater than the 80th percentile of charges (based on a statistically credible profile for each geographical area) for the health care services or supplies."

4 Health care costs at the national level

Before delving into the Alaska health care market and the effect of the 80th percentile rule, we first show how health care expenditures have evolved at the national level. Clearly, the high and growing cost of health care is a significant issue for people, businesses, and governments as spending on health care keeps growing as a share of the U.S. gross domestic product (GDP). In Table 2, we summarize some of the key statistics about the level and growth of health

[9] A more technical explanation is provided in the methodology section.

care expenditures in the U.S. The average yearly growth rate of health expenditures was 6% between 1991 and 2014. During that same period, per capita personal income only grew at 3.69%. The components of spending growing at the fastest rate were prescription drugs, Other Health and Residential, and Home Health care which grew at 7.6%, 7.7% and 7.7%, respectively. It is apparent from these figures that the high health care growth rates are not just an Alaska issue but instead a national issue.

Table 2: Personal health expenditures in the United States in millions

Expenditure Category	1991	2014	Average annual growth rate
Hospital Care	275,768	980,966	5.7%
Physician and Clinician Services	175,750	597,137	5.5%
Other Professional Services	18,559	82,826	6.7%
Dental Services	33,397	112,832	5.4%
Home Health Care	15,135	83,566	7.7%
Prescription Drugs	67,628	354,784	7.5%
Durable Medical Products	13,081	46,622	5.7 %
Nursing Home Care	49,212	152,635	5.0%
Other Health, Residential, and Personal Care	27,365	151,456	7.7%
All categories	675,896	2,562,824	6%

5 Alaska's Health Care Market

5.1 How much money is being spent on health care in Alaska?

All our analysis uses health expenditure estimates by state of residence, which reflect all health care expenditures made by, or on behalf of, the residents of a state, regardless of whether the care is provided in-state or out-of-state, and are useful for making comparisons of per capita spending between states. These data are estimated by the Office of the Actuary (OACT) and are an extension of the National Health Expenditure Accounts (NHEA). We use these Health Accounts by State of residence to describe estimates of health care spending by type of establishment delivering care (hospitals, physicians and clinics, nursing homes,

etc.) and for medical products (prescription drugs, over-the-counter medicines and sundries and durable medical products such as eyeglasses and hearing aids) purchased in retail outlets. From Table 2, we can see that the total dollars spent on health care in 2014 was $8.151 billion. The average yearly growth of expenditures was 7.8% with Other Professional Services, Other health and residential services, and Physician and Clinician services experiencing the most pronounced growth rates. Between 1991 and 2014, the average growth rate on personal health care expenditures for Alaska was 7.8% which is second to Nevada that experienced an average growth of 8.2%. Figure 1 shows that 73.07% (42.62% are in Hospital Care and 30.45% are in Physician care) of the expenditures in 2014 are in Hospital and Physician care services with the third largest category being for Other Health and Residential services. In 1991, the first year for our data, Hospital care and Physican & Clinician services represented 70.9% of the total, and the third largest category was Prescription drugs at 9.746%.

Figure 1: Distribution of Alaska's Health Expenditures in 1991 and 2014

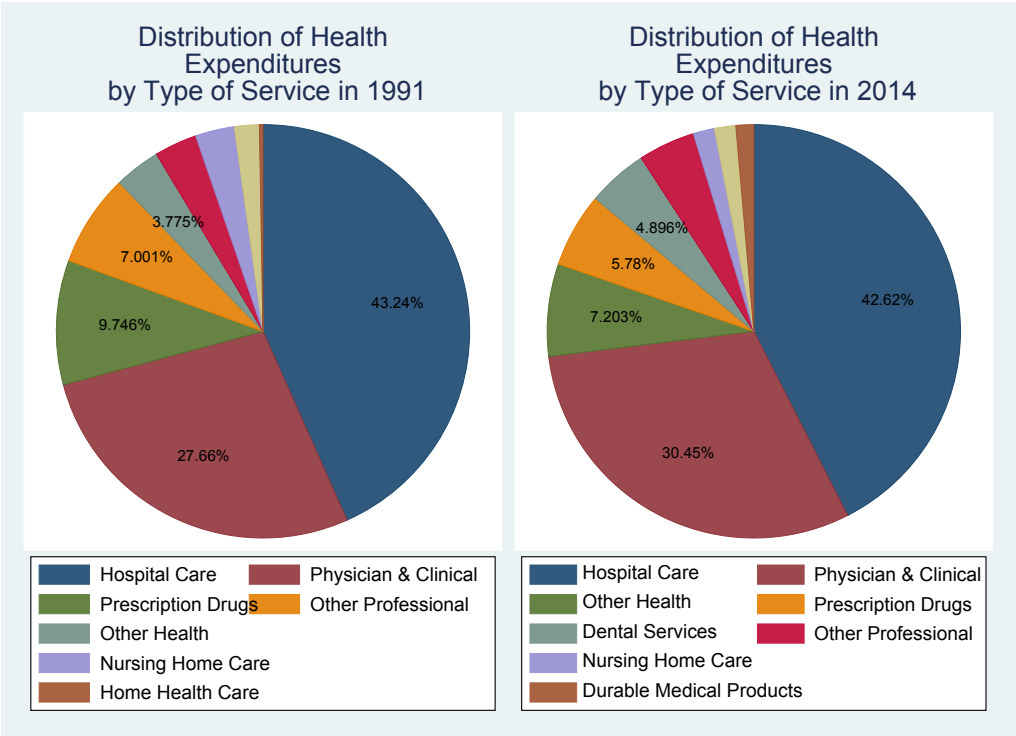

Table 3: Personal health expenditures in Alaska in millions

Expenditure Category	1991	2014	Average growth rate
Hospital Care	630	3,473	7.7%
Physician and Clinician Services	403	2,481	8.2%
Other Professional Services	49	324	8.8%
Dental Services	102	399	6.1%
Home Health Care	4	144	17%
Prescription Drugs	142	471	5.3%
Durable Medical Products	28	102	5.7 %
Nursing Home Care	44	150	5.5%
Other Health, Residential, and Personal Care	55	587	10.8%
All categories	1,458	8,151	7.8%

5.2 A note on the data

The State Health Expenditure Accounts (SHEA) is estimated at the Personal Health Care (PHC) level. PHC is the component of total national health care spending that includes all health care goods and services consumed and excludes administration and the net cost of private health insurance, government public health activities, and investment in research and structures & equipment. In the SHEA, total U.S. health spending for each type of service or good is distributed among states using various nationally-available state level data sources. In addition, state-by-state distributions of personal health care expenditures are developed for Medicare, Medicaid, and private health insurance. The provider-based expenditures for each service and for Medicare are converted to a state of residence basis using information on health care expenditure patterns (or flows) between states.[10]

That is because some individuals cross state borders to receive health care services, health care spending by provider location is not necessarily an accurate reflection of spending on behalf of persons residing in that state.

[10]For detailed information on the conversion methodology, see Centers for Medicare and Medicaid Services.

5.3 How high are Alaska's health care expenditures per capita?

Table 4 shows that Alaskans spent $11,000 dollars per person on healthcare in 2014. Of that, $4,710 went toward hospital care, and another $3,360 dollars in physician and clinician care. The third largest category of expenditure was Other health, residential, and personal care which includes care at community centers or homes. Alaska's health care expenditures per capita are second only to the District of Columbia, where residents spent close to $12,000 per person. The state with the lowest personal expenditures per capita was Utah with only $5,980 dollars per person. Utah's expenditures per person were only 54% of those incurred by Alaskans. Washington and Oregon, the two states most often compared to Alaska, had expenditures per capita that were 71.5% and 72.7% of those of Alaskans.

6 Methodology

There are a number of advantages of using the synthetic control method (SCM) in this study. First, in program evaluation, researchers often select comparisons on the basis of subjective measures of similarity between the affected and the unaffected regions or states. But neither the set of all U.S. states nor a single state likely approximates the most relevant characteristics of Alaska (exposed unit). SCM, in contrast, provides a comparison state (or synthetic) that is a combination of the control states— a data-driven procedure that calculates "optimal" weights to be assigned to each state in the control group based on pre-intervention characteristics — thus making explicit the relative contribution of each control unit to the counterfactual of interest (Abadie and Gardeazabal, 2003 [1]; Abadie *et al.*, 2010 [2]). SCM provides a systematic way to choose comparison units where the researcher is forced to demonstrate the affinities between the affected and unaffected units using observed characteristics (Abadie *et al.*, 2010 [2]; Abadie *et al.*, 2015 [3]).

When aggregate data are employed (as is the case in this paper) the uncertainty remains

Table 4: Per Capita Spending in thousands by category and state in 2014

State Name	Personal Health Expenditures	Hospital	Physician and Clinician services	Other prof	Dental care	Home	Nursing	Drugs	Durable	Other health
Alabama	**7.28**	2.62	1.73	0.170	0.279	0.202	0.39	1.407	0.141	3.24
Alaska	**11.05**	**4.71**	**3.36**	**0.464**	**0.541**	**0.195**	**0.203**	**0.639**	**0.138**	**7.97**
Arizona	**6.451**	2.33	1.77	0.247	0.334	0.135	0.286	0.813	0.174	3.47
Arkansas	**7.408**	2.67	1.63	0.261	0.309	0.181	0.439	1.16	0.103	6.35
California	**7.548**	2.75	1.98	0.216	0.376	0.290	0.382	0.954	0.096	4.95
Colorado	**6.803**	2.73	1.60	0.325	0.418	0.191	0.384	0.680	0.171	2.90
Connecticut	**9.85**	3.32	2.18	0.321	0.468	0.295	0.853	1.47	0.140	7.9
Delaware	**10.25**	4.07	2.25	0.348	0.409	0.239	0.607	1.52	0.196	5.91
D.C	**11.94**	5.23	2.45	0.223	0.409	0.652	0.582	1.16	0.115	10.98
Florida	**8.07**	2.73	2.19	0.300	0.329	0.293	0.489	1.23	0.252	2.54
Georgia	**6.58**	2.44	1.81	0.211	0.318	0.162	0.293	0.938	0.139	2.59
Hawaii	**7.30**	2.76	1.92	0.233	0.343	0.162	0.350	1.181	0.169	1.74
Idaho	**6.92**	3.03	1.32	0.301	0.389	0.178	0.365	0.796	0.149	3.83
Illinois	**8.26**	3.38	1.87	0.339	0.357	0.217	0.517	1.00	0.128	4.39
Indiana	**8.30**	3.49	1.84	0.241	0.328	0.162	0.580	1.11	0.164	3.72
Iowa	**8.20**	3.29	1.55	0.261	0.351	0.176	0.662	1.14	0.139	6.16
Kansas	**7.65**	2.96	1.70	0.266	0.352	0.137	0.566	1.11	0.125	4.17
Kentucky	**8.00**	3.21	1.83	0.228	0.267	0.159	0.476	1.19	0.148	4.77
Louisiana	**7.81**	3.04	1.71	0.237	0.290	0.283	0.398	1.25	0.101	4.79
Maine	**9.52**	3.95	1.68	0.329	0.376	0.202	0.589	1.15	0.137	11.00
Maryland	**8.60**	3.28	2.11	0.275	0.371	0.176	0.626	1.14	0.125	4.82
Massachusetts	**10.55**	3.93	2.26	0.301	0.480	0.667	0.72	1.24	0.170	7.74
Michigan	**8.05**	3.25	1.73	0.264	0.378	0.288	0.477	1.10	0.273	2.73
Minnesota	**8.87**	3.37	1.75	0.269	0.403	0.524	0.584	0.954	0.134	8.67
Mississippi	**7.64**	3.22	1.56	0.189	0.253	0.212	0.449	1.13	0.164	4.52
Missouri	**8.10**	3.49	1.54	0.227	0.294	0.226	0.530	1.27	0.106	4.13
Montana	**8.21**	3.72	1.65	0.303	0.387	0.151	0.421	0.865	0.165	5.46
Nebraska	**8.41**	3.49	1.75	0.296	0.325	0.096	0.604	1.24	0.185	4.12
Nevada	**6.71**	2.37	1.87	0.272	0.349	0.233	0.250	0.965	0.150	2.44
New Hampshire	**9.58**	3.79	2.22	0.262	0.532	0.227	0.583	1.22	0.191	5.71
New Jersey	**8.85**	2.91	2.36	0.361	0.412	0.244	0.565	1.35	0.158	4.78
New Mexico	**7.21**	3.16	1.59	0.267	0.347	0.250	0.282	0.747	0.206	3.54
New York	**9.77**	3.63	1.87	0.298	0.361	0.487	0.618	1.43	0.143	9.36
North Carolina	**7.26**	2.77	1.61	0.221	0.357	0.195	0.452	1.237	0.142	2.67
North Dakota	**9.85**	4.47	1.71	0.260	0.429	0.072	0.744	1.17	0.164	8.11
Ohio	**8.71**	3.80	1.77	0.232	0.317	0.259	0.605	1.02	0.143	5.42
Oklahoma	**7.62**	3.11	1.65	0.259	0.341	0.194	0.407	1.18	0.115	3.59
Oregon	**8.04**	2.94	1.87	0.330	0.456	0.166	0.467	0.882	0.129	7.93
Pennsylvania	**9.25**	3.41	1.96	0.308	0.315	0.244	0.774	1.345	0.141	7.47
Rhode Island	**9.55**	3.61	1.85	0.311	0.335	0.252	0.742	1.41	0.137	8.88
South Carolina	**7.31**	2.93	1.61	0.204	0.318	0.218	0.382	1.19	0.154	2.88
South Dakota	**8.92**	4.41	1.63	0.255	0.416	0.092	0.573	0.948	0.126	4.68
Tennessee	**7.37**	2.61	1.87	0.218	0.286	0.214	0.413	1.21	0.135	3.91
Texas	**6.99**	2.69	1.69	0.207	0.288	0.282	0.305	1.07	0.115	3.33
Utah	**5.98**	2.35	1.31	0.212	0.376	0.187	0.229	0.783	0.160	3.61
Vermont	**10.18**	4.66	1.74	0.320	0.462	0.301	0.562	1.15	0.129	8.37
Virginia	**7.55**	2.91	1.87	0.224	0.382	0.152	0.437	1.01	0.135	4.20
Washington	**7.91**	3.09	2.06	0.323	0.497	0.187	0.461	0.795	0.146	3.46
West Virginia	**9.45**	4.03	1.80	0.237	0.296	0.272	0.538	1.37	0.185	7.10
Wisconsin	**8.70**	3.50	2.16	0.263	0.396	0.230	0.552	1.10	0.124	3.63
Wyoming	**8.31**	3.99	1.77	0.376	0.412	0.077	0.385	0.75	0.128	4.16

about the ability of the control group to reproduce the counterfactual outcomes that the affected unit would have exhibited in the absence of the intervention. This type of uncertainty is not reflected by the standard errors constructed with the traditional inferential techniques for comparative case studies. As Buchmueller *et al.* (2011) explain, in a "clustering" framework, inference is based on asymptotic assumptions that do not apply in our case as our focus is one state at a time.

Additionally, Abadie *et al.* (2010) argue that unlike the traditional regression-based difference-in-difference model that restricts the effects of the unobservable confounders to be time-invariant so that they can be eliminated by taking time differences, SCM allows the effects of such unobservables to vary with time. In particular, Abadie *et al.* (2010)[2] show that with a long pre-intervention matching on outcomes and characteristics a synthetic control also matches on time-varying unobservables.[11]

Finally, because the construction of a synthetic control does not require access to post intervention outcomes, SCM allows us to decide on a study design without knowing its bearing on its findings (Abadie *et al.*, 2010[2]). The ability to make decisions on research design while remaining blind to how each particular decision affects the conclusions of the study is a safeguard against actions motivated by a "desired" finding (Rubin, 2001)[4].

To obtain the synthetic control we follow Abadie and Gardeazabal (2003)[1] and Abadie *et al.* (2010)[2]. For states $i = 1, ..., J+1$ and periods $t = 1, ..., T$ suppose state $i = 1$ is exposed to the intervention (the 80th percentile rule) at time $t^* \in (1, T)$. The observed outcome for any state i at time t is

$$Y_{i,t} = Y_{it}^N + \alpha_{it} S_{it}, \tag{1}$$

[11] As Abadie *et al.* put it, "...only units that are alike in both observed and unobserved determinants of the outcome variable as well as in the effect of those determinants on the outcome variable as well as in the effect of those determinants on the outcome variable should produce similar trajectories of the outcome variable over extended periods time."

where Y_{it}^N is the outcome for state i at time t in the absence of the intervention, the binary indicator variable, S_{it}, denotes the intervention taking the value of 1 if $i = 1$ and $t > t^*$, and α_{it}, the coefficient to be estimated, is the effect of the intervention for state i at time t.

Under standard conditions, there exists $\mathbf{W}* = (w_2^*, ..., w_{J+t}^*)'$ such that pre-intervention matching is achieved with respect to the outcome variable as well as characteristics (or predictors), and we can use

$$\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}, \quad t \in T_0 + 1, ..., T, \tag{2}$$

as an estimator for α_{1t}. The term $\sum_{j=2}^{J+1} w_j^* Y_{jt}$ on the right-hand-side of (2) is simply the weighted average of the observed outcome of the control states for $t \in T_o + 1, ..., T$ with weights $\mathbf{W}^*$. The optimal weights placed on each unit are found by minimizing

$$(X_1 - X_0 W)' V (X_1 - X_0 W), \tag{3}$$

where X_1 is a $k \times 1$) vector of pre-event predictors for the treatment state (Alaska), X_0 is a $(K \times J)$ matrix of pre-event predictors for the control group of states, and W is a $(J \times 1)$ vector of weights that are assigned to controls in the donor pool that sum to one. Finally, V is a $(K \times K)$ diagonal matrix, where the diagonal elements describe the importance of each predictor.

6.1 Inference

Once an optimal weighting vector W* is chosen, the "synthetic" is obtained by calculating the weighted average of the donor pool. The post-intervention values of the synthetic control serve as our counterfactual outcome for the treatment state. The post-intervention gap between the actual outcome and the synthetic outcome, therefore, captures the impact of the intervention.

To begin, we follow Bohn et al. (2014)[5] and calculate a difference-in-difference estimate for the treatment state,

$$\Delta_{TR} = |\overline{Y}^{post}_{TR,actual} - \overline{Y}^{post}_{TR,synthetic}| - |\overline{Y}^{pre}_{TR,actual} - \overline{Y}^{pre}_{TR,synthetic}| \quad (4)$$

Where $\overline{Y}^{post}_{TR,actual}$ is the average of the post-intervention actual outcome of the treatment state,$\overline{Y}^{post}_{TR,synthetic}$ is the average of the post-intervention outcome of the counterfactual. Similarly, $\overline{Y}^{pre}_{TR,actual}$ is the average of the pre-intervention actual outcome of the treatment state, and the $\overline{Y}^{pre}_{TR,synthetic}$ is the average of the pre-intervention outcome of the counterfactual. If the outcome changed in response to the intervention in time T_0 we would expect $\Delta_{TR}>0$. Taking the absolute values in Eq.(4) makes sure that the estimate is neutral to the direction of change.

7 Sample definitions

- We describe the different samples that we analyze and the rationale for including them before discussing each spending category individually. In each of these samples, we find the best matches for Alaska's expenditures and re-conduct the analysis to determine the sensitivity of our results. The different samples are the following:
  - All payers: the full sample which includes all payers and uses all the data from 1991 to 2014. These results can be found in Table 5.
  - Oil states: The great recession between 2007 and 2009 was very severe and affected government, household, and business expenditures. This decline in economic activity has the potential of reducing health expenditures. Therefore, it is possible that some of the effect we are estimating in the full sample is due to a slowdown in spending in the states that experienced housing recessions. To address these

concerns, we analyze a subsample that restrict the donor pool to states whose economies depend on oil. These states were much more resilient to the decline in economic activity during the great recession and have an industrial structure that is much more similar to that of Alaska.Table 6 shows the results for this sample.

- Affordable Care Act: In addition to the great recession, the Affordable Care Act could have resulted in an uneven increase in expenditures and could at least partially explain the deviation between the actual and synthetic we observe when using the full sample that extends to 2014. To address this concern, in Table 7 we restrict our analysis to 2011 which allows us to eliminate the period of time after the passage of the ACA.
- Only Government payers: An additional concern could be that we are not capturing the effect of the 80th percentile rule but some other change that occurred in Alaska. To address that question, we evaluate just government payers who are not affected by the rule change implemented in 2004. In theory, the 80th percentile had no direct effect on payments by government payers and therefore should not influence these categories. Table 8 and Table 9 show the results for Medicare and Medicaid separately.
- Non Medicare/Medicaid: in Table 10, we remove Medicaid and Medicare expenditures from the analysis and re-develop a synthetic for Alaska's expenditures excluding these payers. Ideally, we would have had private payers separately but unfortunately that series is only available from 2001-2014 which that does not represent a long enough pre-intervention period for us to develop a proper counterfactual.

8 Results

8.1 Summary

In this section, we lay out the structure of our analysis before we discuss the different outcome variables and subsamples in detail in the subsections below. The full sample uses both the combined health care expenditure categories (Personal health expenditures) as well as the subcategories [12] and uses the rest of the country (49 states plus D.C) as the donor pool.[13] These results are presented in figures 2 to 11 and Tables 5 to 9. The figures show the impact of the 2004 intervention on personal health care expenditures, hospital care, physician and clinician services, other professional services, dental care, home care, nursing expenditures, prescription drugs, durable goods, and other health expenditures.[14] Each figure labeled A shows the actual and synthetic outcome, the ones labeled B show the difference between the actual and synthetic, and the ones labeled C show placebos of all the states with Alaska always in black bold. Table 4 contains the weights that the donor states contribute in the construction of the synthetic control for each of the variables of interest for the full sample. Table 5 presents the main statistical results for the full sample along with the permutations or randomization tests. These randomizations tests rank how the gap in the post- and pre-intervention mean differences between actual and synthetic outcomes of the treatment unit (Alaska) and compare them to those from the placebo runs for each of the donors (rest of the U.S). In Table 6, we present summary results when we restrict the donor pool to just states whose economies are driven by a reliance on oil. We rely on Snead(2009)[6] who identifies a group of 13 states who clearly outperformed non-energy states during the depth of the recession. Therefore,

[12] Hospital care, Physician and clinician services, Other professional services, Dental care, Home care, Nursing, and Prescription drugs

[13] Donor pool means all the states that are considered when constructing the synthetic or counterfactual.

[14] All variables are converted to base ratios. A base ratio in our case is defined as the expenditure in a given category divided by the level of spending in the first year of data which happens to be 1991. This allows us to measure the level of spending in any given year relative to the baseline. It also is an easy way to think about the growth of spending and makes the matching procedure, construction of a counterfactual, easier.

this group of states are less likely to have experienced severe income shocks during the great recession between 2007-2009 that could explain lower healthcare spending levels. Table 7 shows the results when we restrict the time period to 2011 to avoid any shocks stemming from the encatment of the Affordable Care Act. In Table 8 and Table 9, we examine if the changes we are capturing in the all payer analysis could be driven by government payers. We isolate Medicaid and Medicare and assess if expenditures in those categories evolved differently than the rest of the country post-2004. Finally, in Table 10, we subtract the two government payers from the full sample and analyze the Non-Medicaid/Non-Medicare sample separately.

8.2 All health expenditures

This outcome includes all health expenditures by Alaska residents. It consists of payments to hospitals, physicians, other professional services, dental care, prescription drugs, home care, nursing homes, prescription drugs, durable goods, and other health expenditures. From Table 5, column 1, we see that that the gap pre intervention (D1)[15] was -0.14% which means that we achieve a good pre-intervention match, and the post intervention difference (D2)[16] is 1.66%. The gap between D2 and D1 tells us that Alaska's personal health expenditures would have been 1.52% lower in the absence of the rule. Graphically, Figure 2(a) shows Alaska's -the continuous line- expenditures relative to 1991 and those of the -dashed line- counterfactual. It is important to note that both lines are equal to 1 in 1991 and that the counterfactual tracks Alaska's growth very closely. We see, however, a divergence after the passage of the regulation. Figure 2(b) is the difference between the two lines in Figure 2(a) and makes it clear that the Alaska's growth rate diverges post 2004. Figure 2(c) shows the gap between the actual and synthetic in Alaska (thick black line) relative to the gap in the other donor units. From this graph, Alaska's effect is considerably more pronounced than the others. From Table 6, we see that the results are still statistically significant but are much

[15]D1 is the difference in means from 1991 and 2004 between the actual and the synthetic
[16]D2 is the difference in means from 2005 and 2014 between the actual and the synthetic

smaller in magnitude when we compare Alaska to just oil states. For this sample, we can only attribute about 0.58% of the yearly increases to the rule's introduction. Table 8 and Table 9 show that these differences we capture are not driven by Medicaid and Medicare. For Medicare, we find no statistical differences between Alaska and its synthetic, and for Medicaid we find that Alaska's expenditures grew slower. In Table 10, we show that the results from the Non-Medicare/Medicaid sample are larger than the ones obtained than we have all payers in the sample.

8.3 Hospital Care

Hospital Care (NAICS 622) reflects spending for all services that are provided to patients and that are billed by the hospital. From Table 5, column 2, we see that that the gap pre intervention (D1) was -0.23% which means that we achieve a good pre-intervention match, and the post intervention difference (D2) is 0.07%. The gap between D2 and D1 tells us that Alaska's personal health expenditures would have been -0.15% lower in the absence of the rule but is not statistically significant as it is ranked 17th out of the 51 units. Figure 3(c) shows the gap between the actual and synthetic in Alaska (thick black line) relative to the gap in the other donor units. From this figure, Alaska's effect is not more pronounced than the others. From Table 6, we find that when we compare Alaska to just oil states, we find that Alaska's expenditures actually grew slower. Table 8 and Table 9 show that the differences we capture are not driven by Medicaid and Medicare as none of the results are statistically significant. In Table 10, we show that the results from the Non-Medicare/Medicaid sample are weakly significant and small in magnitude.

8.4 Physician and clinician services

Physician and Clinical Services include expenditures for services provided in establishments operated by Doctors of Medicine (M.D.) and Doctors of Osteopathy (D.O.), outpatient care

centers, plus the portion of medical laboratories services that are billed independently by the laboratories. From Table 5, column 3, we see that that the gap pre-intervention (D1) was 0.38% which means that we achieve a good pre-intervention match, and the post intervention difference (D2) is 2.94%. The gap between D2 and D1 tells us that Alaska's physician and clinician services would have been 2.56% lower in the absence of the rule. Graphically, Figure 4(a) shows Alaska's -the continuous line- expenditures relative to 1991 and those of the -dashed line- counterfactual. We see that the counterfactual tracks Alaska's growth very closely before the rule change. After 2004, we see there is a divergence after the passage of the law which continues growing over time. Figure 4(b) is the difference between the two lines in Figure 4(a) and makes it clear that the Alaska's growth rate diverges post 2004. Figure 4(c) shows the gap between the actual and synthetic in Alaska (thick black line) relative to the gap in the other donor units. From this graph, Alaska's effect is considerably more pronounced than the others. From Table 6, column 3, we see that the results are still statistically significant but smaller in magnitude when we compare Alaska to just oil states. For this sample, we can only attribute about 1.06% of the yearly healthcare growth increases to the rule's introduction. Table 8 and Table 9 show that the differences we capture are not driven by Medicaid and Medicare. For Medicare, we find no statistical differences between Alaska and its synthetic, and for Medicaid we find that Alaska's expenditures grew slower. In Table 10, we show that the results from the Non-Medicare/Medicaid sample are larger than the ones obtained when we have all payers in the sample.

8.5 Other professional services

Other Professional Services include expenditures for services provided in establishments operated by health practitioners other than physicians and dentists. These professional services include those provided by private-duty nurses, chiropractors, podiatrists, optometrists, and physical, occupational and speech therapists, among others. We find mixed evidence for this

category of spending as the size of the effect and the statistical significance vary considerably across samples.

8.6 Dental care

Dental Services include expenditures for services provided in establishments operated by a Doctor of Dental Medicine (D.M.D.), Doctor of Dental Surgery (D.D.S.), or Doctor of Dental Science (D.D.Sc.). These establishments are classified as NAICS 6212-Offices of Dentists. Figure 6(a) shows that we achieve a good fit with the counterfactual tracking Alaska very closely. It is also clear that the divergence happens much later than 2004. Figure 6(c) shows the gap between the actual and synthetic Alaska (thick black line) relative to the gap in the other donor units. From this graph, Alaska's effect does not appear to be more pronounced than the others. In Table 2, column 5, we see that it is ranked 15th out of the 51 units in terms of magnitude and is therefore not significant.

8.7 Home care

Home Health Care services include expenditures for medical care services provided in the home by freestanding home health agencies (HHAs) that are classified in NAICS 6216-Home Health Care Services. In this category as we can see in Figure 7(a-c), the match between Alaska and its synthetic is imperfect. In particular, we see Alaska expenditures diverging from the synthetic in Figure 7(a) well before the rule change. Also, the Alaska series is very noisy with non-negligible fluctuations. The bad match coupled with the significant volatility makes interpreting the effect of the rule problematic.

8.8 Nursing

The nursing category includes expenditures for Nursing Care Facilities and Continuing Care Retirement Communities include spending for inpatient nursing care services, rehabilitative

services, and continuous personal care services to persons requiring nursing care that are provided in freestanding nursing home facilities. We see from Figure 8(a-b) that Alaska's nursing expenditures grow more slowly than the synthetic but similar to the home care expenditure category, the divergence happens before the rule change. We do not attribute this difference in spending to the passage of the 80th rule as it is likely due to demographic factors.

8.9 Prescription drugs

Prescription Drugs include expenditures for the "retail" sales of human-use dosage-form drugs, biological drugs, and diagnostic products that are available only by a prescription. Other Non-Durable Medical Products include expenditures for the "retail" sales of non-prescription drugs and medical sundries. Figure 9(a) shows Alaska's -the continuous line- and those of the -dashed line- counterfactual. We see that the counterfactual tracks Alaska's growth very closely before the rule change. After 2004, we see there is a divergence after the passage of the law. The prescription drug growth expenditures in Alaska is much lower than the prescription growth rate in the counterfactual. The differences between Alaska and the counterfactual are significant in all subsamples except the Non-Medicaid/Medicare payers. The results we find could be due to the passage of Medicare part D which went into effect in 2006.[17] This law change could explain the faster growth in the rest of the states that have a much higher share of people over the age of 65. We do not believe these differences in spending levels post 2004 are due the passage of the 80th percentile rule.

[17]Medicare Part D is a voluntary outpatient prescription drug benefit for people on Medicare that went into effect in 2006. All 59 million people on Medicare, including those ages 65 and older and those under age 65 with permanent disabilities, have access to the Part D drug benefit through private plans approved by the federal government

8.10 Durable goods

Durable Medical Products include expenditures for the "retail" sales of items such as contact lenses, eyeglasses and other ophthalmic products, surgical and orthopedic products, hearing aids, wheelchairs, and medical equipment rentals. Figure 10(a) shows that we achieve a good fit with the counterfactual tracking Alaska very closely. Figure 10(c) shows the gap between the actual and synthetic Alaska (thick black line) relative to the gap in the other donor units. From this graph, Alaska's effect does not appear to be more pronounced than the others. In Table 2, column 9, we see that it is ranked 23rd out of the 51 units in terms of magnitude and is therefore not significant.

8.11 Other Health

Other Health, Residential, and Personal Care services include those for care provided in residential care facilities, ambulance services, and for services provided in non-traditional settings. From Table 5, column 10, we see that that the gap pre intervention (D1) was 0.01% which means that we achieve a good pre-intervention match, and the post intervention difference (D2) is 5.13%. The gap between D2 and D1 tells us that Other Health Expenditures would have been 5.11% lower in the absence of the rule. Graphically, Figure 11(a) shows Alaska's -the continuous line- and the -dashed line- counterfactual. We see that the counterfactual tracks Alaska's growth very closely before the rule change. After 2004, we see there is a divergence after the passage of the law which continues growing over time. Figure 11(b) is the difference between the two lines in Figure 11(a) and makes it clear that the Alaska's growth rate diverges post 2004. Figure 11(c) shows the gap between the actual and synthetic in Alaska (thick black line) relative to the gap in the other donor units. From this figure, Alaska's effect is considerably more pronounced than the others.

From Table 6, column 10, we see that the results are still statistically significant but smaller in magnitude when we compare to just oil states. In this sample, we can only attribute

about 1.96% of the yearly healthcare growth increases to the rule's introduction. Table 8 and Table 9 show that these differences we capture are not driven by Medicaid and Medicare. In Table 10, we show that the results from the Non-Medicare/Medicaid sample are about the same magnitude as the ones obtained when we have all payers in the sample but are not statistically significant.

All the analysis we provide above is based on expenditures which are a product of both prices and quantity of services obtained. To showcase the role of availability, we provide descriptive statistics showing how the healthcare market has grown, and how the health of Alaskans has changed over the last two decades.

9 How has the health care market changed since the implementation of the 80th percentile rule?

In order to provide context to our results, we describe how the Alaska health care market has evolved.[18] We show in Figure 12 that Alaska has considerably more physicians, and more doctor offices than it did in the early 2000's. The number of Physician offices, for example, increased from 368 in 1998 to 569 in 2015. Those of physical therapists increased from 37 in 1998 to 134 in 2015. This increase in availability and variety of healthcare facilities has made it easier for Alaskans to obtain medical services. While we do not observe usage rates, it is safe to assume that added availability translates into additional consumption of services which influences health care expenditures. In 2016, there were 264.32 physicians for every 100,000 Alaskans which is higher than the 240.21 per 100,000 in 2004.[19] We also note in the table below that the share of primary doctors has decreased over time. Even though the number of physicians has increased, the state still lags the national average which has 291.98 per 100,000. In the next section, we show how the health of Alaskans has changed over the

[18]This information is from County Business Patterns which classifies businesses based on NAICS codes.
[19] This data is compiled from the Alaska Physican Worforce Profiles available online.

last two decades.

Snapshot of Alaska's physician workforce over time

Year	All specialties	Primary care	Primary care share	Alaska population	Physician per 100,000
2004	1,580	732	46.33%	657,755	240.21
2012	1,813	750	41.37%	731,449	247.86
2014	1,883	772	41.00%	736,732	255.59
2016	1,961	806	41.10%	741,894	264.32

10 Are Alaskans Healthier?

We use Behavioral Risk Factor Surveillance System (BRFSS) to examine how the health of Alaskans evolved over the last two decades. The table below shows that the share of Alaskans who think of themselves in Good Health or better went from 87.07% in 1995 to 84.78% in 2010. There does not appear to be a strong relationship between the self-assessment of health and the size of the healthcare market during this period. Of course, there are dimensions of welfare which could have improved due to the better access and availability stemming from the larger market. Also, we are not measuring the counterfactual of how the health of Alaksans would have changed if the market had remained small. It is not clear how much delay of care was occuring before the expansion of the market and if individuals were foregoing procedure for fear of large out of pocket bills.

How healthy are Alaskans?

	Excellent	Very Good	Good	Fair	Poor
Year					
1995	25.02	35.67	26.38	7.48	3.09
1996	24.75	35.63	28.03	6.34	3.66
1997	26.82	31.03	27.82	9.74	3.0
1998	25.44	31.64	29.67	9.16	3.83
1999	21.24	34.47	28.58	9.20	2.86
2000	23.01	32.15	31.21	7.57	4.45
2001	23.53	32.52	29.14	8.97	4.39
2002	22.17	30.95	30.50	9.95	5.43
2003	22.83	31.54	31.32	8.71	5.05
2004	19.72	34.35	31.16	9.85	4.43
2005	21.34	31.18	31.36	9.61	5.30
2006	19.73	35.85	29.68	9.06	5.22
2007	20.56	31.35	30.27	10.05	5.39
2008	18.32	34.62	30.10	11.04	4.58
2009	19.2	35.31	31.35	9.60	3.76
2010	18.92	34.11	31.75	8.44	4.1

11 Conclusion

We analyze the effect of the 80th percentile on Alaska's health expenditures. We find Alaska's health care expenditures are between 8.61 and 24.65% higher as result of the 80th percentile rule. These increases represent a combination of higher prices and increased usage from the improved access and richness of the healthcare market. The category of expenditures for which we find the most consistent increases is Physician and Clinician services. For this category, we find that the 80th percentile explains between 15% and 39% of the growth rates. This means the yearly growth would have been between 1.06% and 2.74% lower in the absence of the 80th percentile rule. We find no evidence that hospital expenditures would have evolved differently in the absence of the reimbursement rule.

These findings have significant limitations as the data does not allow us to address the extent to which the regulation has reduced the out-of pocket burden for households. Additionally, we are not able to conduct specialty specific analysis, and are unable to quantify the extent to which the higher expenditure are due to higher prices or higher usage and therefore

it is best to think about our estimates as upper bounds given that spending is the product of prices of and quantity consumed.

They do, however, provide us with the first quantification of how the introduction of the 80th percentile rule has changed health spending in Alaska. They also make it clear that while a tremendous amount of attention has been reserved to the 80th percentile rule, it is far from the only source of health care cost increases. In fact our results show that even in the absence of the rule, health care expenditures would have grown at between 4.95% and 6.15% a year which is as high as Alaska's GDP growth which has averaged 5.4% between 2004 and 2014. Recent growth rates of GDP are considerably smaller as a result of the decrease in oil prices.

The study also points to the perils of simple comparisons of neighboring states' health expenditures as none of the states that produced the best matches in our analysis are the ones typically used when conducting comparisons. The synthetic control method allows us to construct comparison units that are more -similar to the treatment states, particularly in terms of pre-treatment outcomes.

Future work should focus on disentangling how the introduction of the 80th percentile rule has affected usage and prices. Specifically, there should be an emphasis on identifying the specialties or segments of the market with the highest out-of network participants and how those have evolved relative to the rest of the market. It would also be important to understand how the 80th percentile has benefited consumers, and assisted in the growth of the healthcare market.

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Personal Health Expenditures: Personal health care (PHC) by State of Residence are based on State of Provider estimates adjusted for the flow of residents between states in order to consume health care services. These estimates present health spending on behalf of residents in the 50 States and in the District of Columbia.

Figure 2a: Actual and synthetic Personal Health Care Expenditures

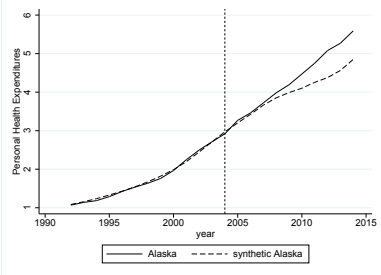
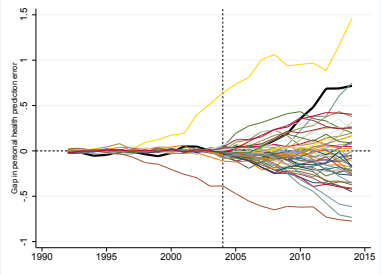


Figure 2b: Actual minus synthetic Personal Health Care Expenditures

Figure 2c: Placebos Personal Health Care Expenditures



Hospital Care Hospital Care (NAIICS 622) reflects spending for all services that are provided to patients and that are billed by the hospital.

Figure 3a: Actual and synthetic in Hospital care

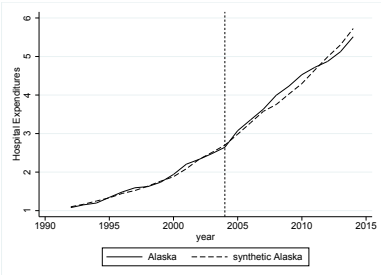


Figure 3b: Actual minus synthetic in Hospital Care

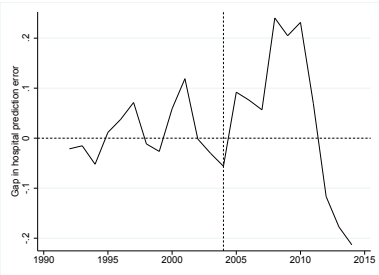
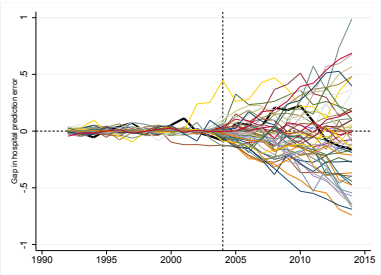


Figure 3c: Placebos in Hospital Care



Physician and clinician services: Physician and Clinical Services include expenditures for services provided in establishments operated by Doctors of Medicine (M.D.) and Doctors of Osteopathy (D.O.), outpatient care centers, plus the portion of medical laboratories services that are billed independently by the laboratories.

Figure 4a: Actual and synthetic physician and clinician services

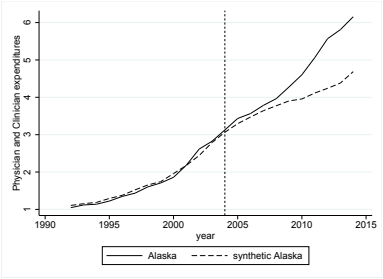


Figure 4b: Actual minus synthetic physician and clinician services

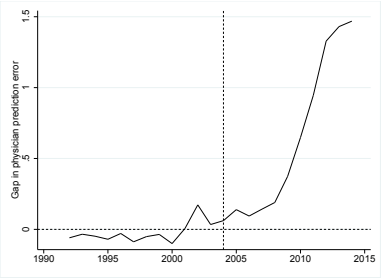
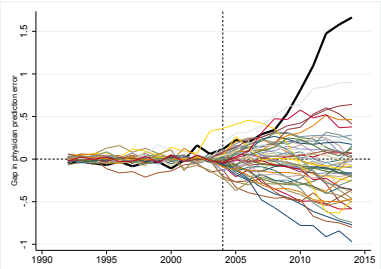
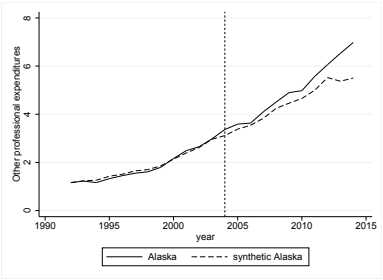


Figure 4c: Placebos physician and clinician services

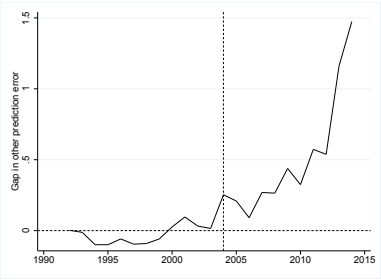


Other professional services: Other Professional Services include expenditures for services provided in establishments operated by health practitioners other than physicians and dentists. These professional services include those provided by private-duty nurses, chiropractors, podiatrists, optometrists, and physical, occupational and speech therapists, among others. These establishments are classified in NAICS 6213-Offices of Other Health Practitioners.

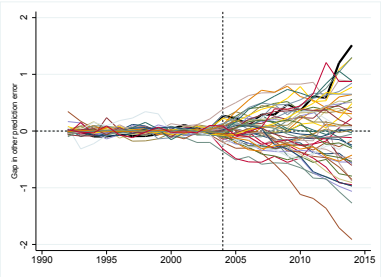
: Figure 5a: Actual and synthetic other professional services



: Figure 5b: Actual minus synthetic other professional services

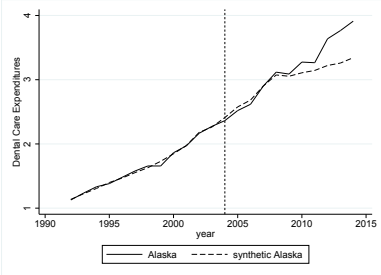


: Figure 5c: Placebos other professional services

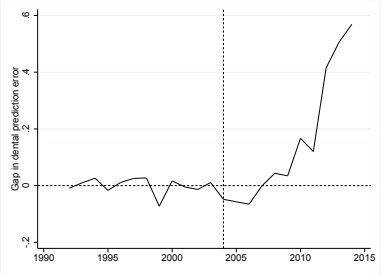


Dental Care Dental Services include expenditures for services provided in establishments operated by a Doctor of Dental Medicine (D.M.D.), Doctor of Dental Surgery (D.D.S.), or Doctor of Dental Science (D.D.Sc.). These establishments are classified as NAICS 6212-Offices of Dentists.

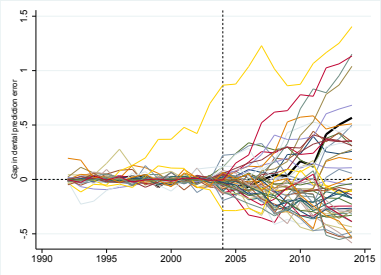
: Figure 6a: Actual and synthetic dental care



: Figure 6b: Actual minus synthetic dental care

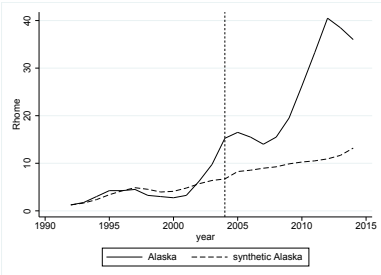


: Figure 6c: Placebos dental care



Home Care Home Health Care services include expenditures for medical care services provided in the home by freestanding home health agencies (HHAs) that are classified in NAICS 6216-Home Health Care Services.

: Figure 7a: Actual and synthetic home care



: Figure 7b: Actual minus synthetic home care

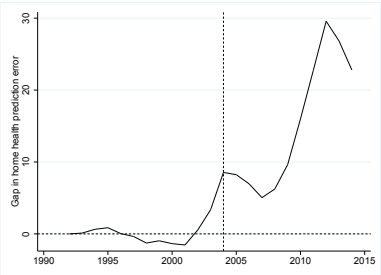
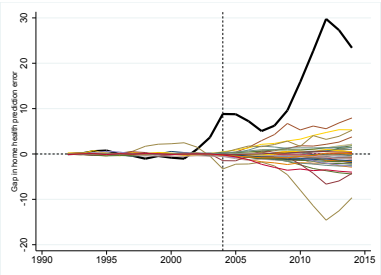


Figure 7c: Placebos home care



Nursing: Expenditures for Nursing Care Facilities and Continuing Care Retirement Communities include spending for inpatient nursing care services, rehabilitative services, and continuous personal care services to persons requiring nursing care that are provided in freestanding nursing home facilities.

Figure 8a:Actual and synthetic nursing

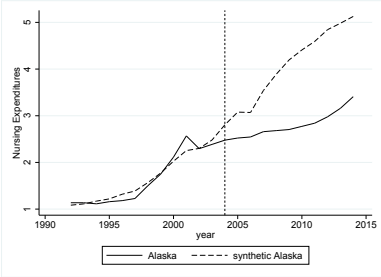
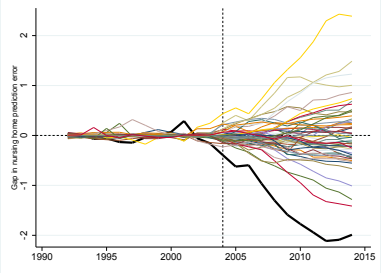


Figure 8b: Actual minus synthetic nursing

Figure 8c: Placebos nursing



Prescription drugs: Prescription Drugs include expenditures for the "retail" sales of human-use dosage-form drugs, biological drugs, and diagnostic products that are available only by a prescription. Other Non-Durable Medical Products include expenditures for the "retail" sales of non-prescription drugs and medical sundries.

Figure 9a: Actual and synthetic drugs

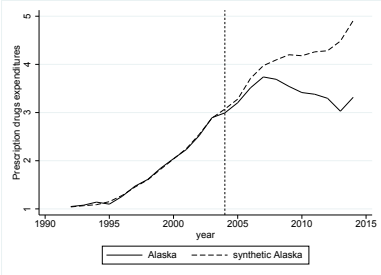


Figure 9b: Actual minus synthetic drugs

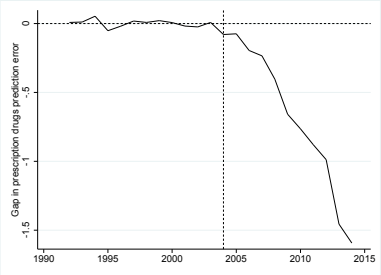
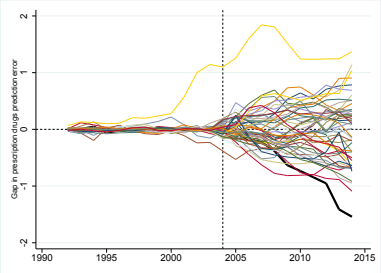


Figure 9c: Placebos drugs



Durable:Durable Medical Products include expenditures for the "retail" sales of items such as contact lenses, eyeglasses and other ophthalmic products, surgical and orthopedic products, hearing aids, wheelchairs, and medical equipment rentals.

Figure 10a: Actual and synthetic durable

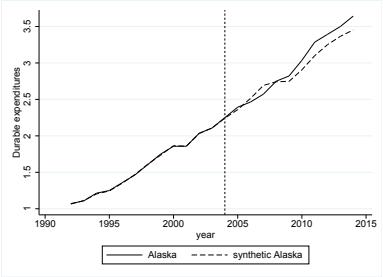


Figure 10b: Actual minus synthetic durable

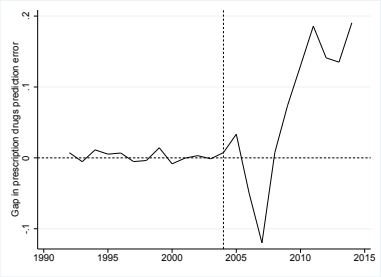
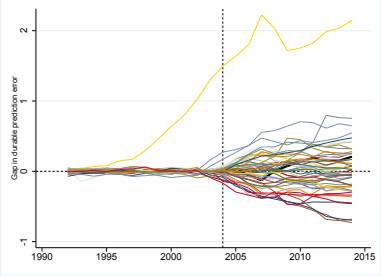


Figure 10c: Placebos durable



Other health: Other Health, Residential, and Personal Care services include those for care provided in residential care facilities, ambulance services, and for services provided in non-traditional settings.

Figure 11a:Actual and synthetic other health

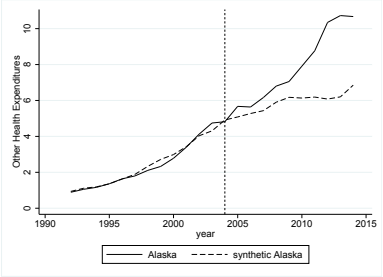


Figure 11b: Actual minus synthetic other health

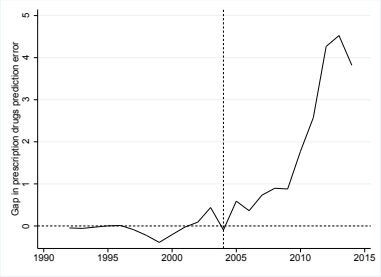


Figure 11c: Placebos other health

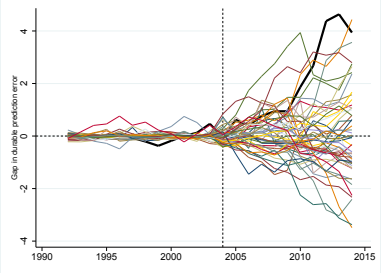


Table 4: Donor weights for each expenditure category using the full sample

State Name	Personal Health Expenditures	Hospital	Physician and Clinician services	Other prof	Dental care	Home	Nursing	Drugs	Durable	Other health
Alabama	–	–	–	–	–	–	–	–	–	–
Arizona	–	–	–	–	–	–	–	–	–	–
Arkansas	–	–	–	–	–	–	–	–	0.054	–
California	0.154	–		–	0.31		–	0.335	–	–
Colorado	–	–	–	–	–	–	–	0.017	–	–
Connecticut	–	–	–	–	–	–	–	–	–	–
Delaware	–	–	–	–	0.012	–	0.357	0.023	–	–
D.C	–	–	–	–	–	–	–	–	0.257	–
Florida	–	–	–	–	–	–	–	–	–	–
Georgia	–	–	–	–	–	–	–	–	–	–
Hawaii	–	–	–	0.181	0.247	0.359	–	–	–	0.014
Idaho	–	0.615	–	–	0.163	–	–	0.011	0.458	–
Illinois	–	–	–	–	–	–				
Indiana	–	–	–	–	–	–	–	–	–	–
Iowa	–	–	–	–	–	–	–	–	–	–
Kansas	–	–	–	–	–	–	–	–	–	–
Kentucky	–	–	–	–	–	–	–	–	–	–
Louisiana	–	–	–	–	0.183	–	–	–	–	–
Maine		0.34	–	–	–	–	–	0.28	–	0.762
Maryland	–	–	–	–	–	–	–	–	–	–
Massachusetts	–	–		–	–	–	–	–	–	–
Michigan	–	–	–	–	–	–	–	–	–	–
Minnesota	–	–	–	–	–	–	0.022			
Mississippi	–	–	–	–	–	–	–	–	0.094	0.224
Montana	–	–	0.26	0.152	–	–	–	0.334	–	
Nebraska	–	–	–	0.652	–	–	–	–	–	–
Nevada	0.384	0.294	0.487	–	–	–	0.621	–	–	–
New Hampshire	–	–	–	0.015	–	–		–	–	–
New Jersey	–	–	–	–	–	–	–	–	–	–
New Mexico	–	–	–	–	–	0.641	–	–	–	–
New York	–	–	–	–	–	–	–	–	–	–
North Carolina		0.091	–	–	–	–	–	–	–	–
North Dakota	–	–	–	–	–	–	–	–	0.126	–
Ohio	–	–	–	–	–	–	–	–	–	–
Oklahoma	–	–	–	–	–	–	–	–	–	–
Oregon	–	–	–	–	–	–	–	–	–	–
Pennsylvania	–	–	–	–	–		–	–	–	–
Rhode Island	–	–	–	–	–	–	–	–	–	–
South Carolina	–	–		–	–	–	–	–	–	–
South Dakota	–	–	–	–	0.086	–	–	–	–	–
Tennessee	–	–	–	–	–	–	–	–	–	–
Texas	–	–	–	–	–	–	–	–	–	–
Utah	–	–	–	–	–	–	–	–	–	–
Vermont	0.122	–	0.254	–	–	–	–	–	–	–
Virginia	–	–	–	–	–	–	–	–	–	–
Washington	–	–	–	–	–	–	–	–	–	–
West Virginia	–	–	–	–	–	–	–	–	–	–
Wisconsin	–	–		–	–	–	–	–	–	–
Wyoming	–	–	–	–	–	–	–	–	–	–

Table 5: Estimation statistics (Full sample)

	Personal Health Expen-ditures	Hospital	Physician and Clin-ician services	Other prof	Dental care	Home	Nursing	Drugs	Durable	Other health
SCM results and permutation tests										
Pre-intervention difference (D1)	-0.14%	-0.23%	0.38%	0.80%	-0.14%	10.97%	-0.86%	-0.10%	0.02%	0.01%
Post-intervention difference (D2)	1.66%	0.07%	2.94%	1.71%	1.88%	2.99%	-3.33%	-3.60%	0.59%	5.13%
DID=$\|D2\| - \|D1\|$	1.52%	-0.15%	2.56%	0.91%	1.74%	-7.98%	2.47%	3.50%	0.58%	5.11%
P-value:DID	0.04	0.34	0.02	0.08	0.30	0.02	1	1	0.46	0.04
DID rank	2	17	1	4	15	1	51	50	23	2

Table 6: Estimation statistics (Relative to Oil States)

	Personal Health Expen-ditures	Hospital	Physician and Clin-ician services	Other prof	Dental care	Home	Nursing	Drugs	Durable	Other health
SCM results and permutation tests										
Pre-intervention difference (D1)	0.27%	0.99%	1.04%	0.93%	-0.03%	10.48%	-0.26%	-0.13%	0.09%	0.49%
Post-intervention difference (D2)	0.85%	0.0%	2.10%	1.14%	1.66%	3.05%	-0.61%	-3.29%	0.88%	2.45%
DID=$\|D2\| - \|D1\|$	0.58%	-0.99%	1.06%	0.21%	1.63%	-7.44%	0.35%	3.16%	0.79%	1.96%
P-value:DID	0.08	0.08	0.08	0.08	0.08	0.08	1	1	0.38	0.08
DID rank	1	1	1	1	6	1	13	13	5	1

Table 7: Estimation statistics (Pre-ACA)

	Personal Health Expen-ditures	Hospital	Physician and Clin-ician services	Other prof	Dental care	Home	Nursing	Drugs	Durable	Other health
SCM inference:permutations test										
Pre-intervention difference (D1)	-0.14%	-0.23%	0.38%	0.80%	-0.14%	10.97%	-0.86%	-0.10%	0.02%	0.01%
Post-intervention difference (D2)	1.91%	0.81%	3.12%	0.56%	0.91%	5.45%	-5.67%	-2.92%	0.87%	5.81%
DID=$\|D2\| - \|D1\|$	1.78%	0.58%	2.74%	0.239%	1.04%	5.5%	4.8%	2.8%	0.9%	5.8%
P-value:DID	0.04	0.2	0.02	0.16	0.34	0.02	1	0.96	0.54	0.06
DID rank	5	10	1	17	6	1	51	48	27	3

Table 8: Estimation statistics (Medicare)

	Personal Health Expen-ditures	Hospital	Physician and Clin-ician services	Other prof	Dental care	Home	Nursing	Drugs	Durable	Other health
SCM results and permutation tests										
Pre-intervention difference (D1)	0.81%	0.28%	3.31%	6.15%	N.A	6.01%	0.07%	N.A	4.54%	6.53%
Post-intervention difference (D2)	-0.70%	0.73%	-1.57%	0.11%	N.A	7.62%	-2.26%	N.A	-3.84%	-0.71%
DID=$\|D2\| - \|D1\|$	-0.11%	0.44%	-1.74%	-6.04%	N.A	1.60%	2.19%	N.A	-0.71%	-5.82%
P-value:DID	0.28	0.22	0.12	0.14	N.A	0.02	0.88	N.A	1	0.12
DID rank	14	11	6	7	N.A	1	44	N.A	50	6

Table 9: Estimation statistics (Medicaid)

	Personal Health Expen-ditures	Hospital	Physician and Clin-ician services	Other prof	Dental care	Home	Nursing	Drugs	Durable	Other health
SCM inference:permutations test										
Pre-intervention difference (D1)	-0.90%	0.89%	-0.69%	N.A	N.A	12.92%	-0.79%	-0.20%	1.81%	-2.45%
Post-intervention difference (D2)	-1.27%	-0.50%	-2.50%	N.A	N.A	7.31%	-6.06%	-14.80%	-1.08%	-3.16%
DID=$\|D2\| - \|D1\|$	0.38%	-0.39%	1.81%	N.A	N.A	-5.61%	5.27%	14.60%	-0.73%	0.70%
P-value:DID	1.02	0.56	0.76	N.A	N.A	0.06	1	0.98	0.42	1
DID rank	51	28	38	N.A	N.A	3	50	49	21	50

Table 10: Estimation statistics (Non Medicaid and Medicare only)

	Personal Health Expen-ditures	Hospital	Physician and Clin-ician services	Other prof	Dental care	Home	Nursing	Drugs	Durable	Other health
SCM inference:permutations test										
Pre-intervention difference (D1)	0%	0.30%	0.53%	0.88%	-0.15%	8.23%	-0.86%	-0.73%	0.13%	0.22%
Post-intervention difference (D2)	2.41%	0.49%	4.12%	1.87%	1.93%	18.51%	-3.33%	-1.94%	0.38%	5.45%
DID=$\|D2\| - \|D1\|$	2.41%	0.19%	3.59%	0.99%	1.79%	10.28%	2.40%	2.47%	0.25%	5.22%
P-value:DID	0.04	0.10	0.04	0.12	0.34	0.06	1	0.96	0.42	0.12
DID rank	2	5	2	6	17	3	51	48	21	6

Figure 12: Number of healthcare establishments in Alaska relative to 1998

12 Appendix: Definitions and relevant terms

12.1 Relevant terms

- Synthetic: Weighted average of states which best track the evolution of Alaska's expenditures before the passage of the 80th percentile rule.
- Donor pool: The states from which we construct the synthetic or alternative Alaska. In this case, it is the rest of the U.S states plus the district of Columbia.
- Donor weights: the relative contribution of each state to the creation of the synthetic Alaska.
- Statistically significant means that there is less than a 10% chance of finding that result by chance.
- Placebos: The application of a "fake" intervention in other states to see if their evolution is as pronounced as that of Alaska.
- Rank : determines where Alaska's effect is relative to the other units.

12.2 Personal health expenditures

Total health care expenditures [20] include spending for all privately and publicly funded personal health care services and products (hospital care, physician services, nursing home care, prescription drugs, etc.) by state of residence. Hospital spending is included and reflects the total net revenue (gross charges less contractual adjustments, bad debts, and charity care). Costs such as insurance program administration, research, and construction expenses are not included in this total.

[20] All the health expenditure definitions can be found at Centers for Medicare and Medicaid services.

12.3 Hospital care

Hospital Care (NAICS 622) reflects spending for all services that are provided to patients and that are billed by the hospital. Expenditures include revenues received to cover room and board, ancillary services such as operating room fees, services of hospital residents and interns, inpatient pharmacy, hospital-based nursing home care, care delivered by hospital-based home health agencies, and fees for any other services billed by the hospital. The value of hospital services is measured by total net revenue, which equals gross patient revenues (charges) less contractual adjustments, bad debts, and charity care. It also includes government tax appropriations as well as non-patient and non-operating revenues. Excluded are expenditures of physicians who bill independently for services delivered to patients in hospitals. These independently-billing physicians are included in the physician sector.

12.4 Physician and Clinician Services

Physician and Clinical Services include expenditures for services provided in establishments operated by Doctors of Medicine (M.D.) and Doctors of Osteopathy (D.O.), outpatient care centers, plus the portion of medical laboratories services that are billed independently by the laboratories. This category also includes services rendered by a doctor of medicine (M.D.) or doctor of osteopathy (D.O.) in hospitals, if the physician bills independently for those services. Clinical services provided in freestanding outpatient clinics operated by the U.S. Department of Veterans' Affairs, the U.S. Coast Guard Academy, the U.S. Department of Defense, and the U.S. Indian Health Service are also included. The establishments included in Physician and Clinical Services are classified in NAICS 6211-Offices of Physicians, NAICS 6214-Outpatient Care Centers, and a portion of NAICS 6215-Medical and Diagnostic Laboratories. State expenditures for Physician and Clinical Services are estimated in three pieces: (1) expenditures in private physician offices and clinics and specialty clinics;12 (2) fees of independently-billing laboratories; and (3) expenditures in clinics operated by the U.S. Coast Guard, Department of

Defense, Indian Health Service, and the U.S. Department of Veterans Affairs. Expenditures in private physician offices, clinics, and specialty clinics are based on business receipts/revenues for taxable and tax-exempt establishments as reported in the 1977, 1982, 1987, 1992, 1997, 2002, 2007, and 2012 Economic Census. For taxable establishments (NAICS 6211 and 6214), expenditures for non-Census years through 2006 are estimated using growth in business receipts of sole proprietorships, partnerships, and corporations.9 For non-Census years from 2008 forward, taxable expenditures are extrapolated using growth in wages and salaries paid in Offices of Physicians (NAICS 6211) and Outpatient Care Centers (NAICS 6214).8 For tax-exempt establishments (NAICS 6214), expenditures for non-Census years are estimated using growth in the resident population. Estimates of expenditures for independently-billing laboratories are based on business receipts for taxable establishments of Medical and Diagnostic Laboratories (NAICS 6215) as reported in the 1977, 1982, 1987, 1992, 1997, 2002, 2007, and 2012 Economic Census.4 For non-Census years, laboratory expenditures are estimated using growth in taxable physician offices and clinics expenditures. Estimates of expenditures for clinics operated by the U.S. Coast Guard, Indian Health Service, and the U.S. Department of Veterans Affairs are estimated using state level data from the federal agencies that administer such facilities. Data for Indian Health Service and Department of Veterans Affairs clinics are available for each year 1980-2004. For 2005 forward, the 2004 distributions of state to total expenditures for each type of federal clinic are held constant. For estimates of expenditures for clinics operated by the Department of Defense, program data are available through 2005, and the 2005 distributions by state are held constant thereafter. The separate spending estimates by state for physician and clinical services, independently-billing laboratories, U.S. Coast Guard clinics, Department of Defense clinics, Indian Health Service clinics, and U.S. Department of Veterans Affairs clinics are each controlled to national totals as reported in the NHEA. Some physicians may receive professional fees paid by hospitals. These professional fees are included with hospital expenditures and not with physician expenditures; therefore,

they are subtracted from the physician estimates. The estimates of professional fees by state are based on professional fee expenses from the AHA Annual Surveys for 1980, 1985, and 1990-1993. Using AHA community hospital revenues, professional fees are interpolated and extrapolated for intervening years and for 1994-2014.

12.5 Other Professional Services

Other Professional Services include expenditures for services provided in establishments operated by health practitioners other than physicians and dentists. These professional services include those provided by private-duty nurses, chiropractors, podiatrists, optometrists, and physical, occupational and speech therapists, among others. These establishments are classified in NAICS 6213-Offices of Other Health Practitioners. State expenditures for Other Professional Services are estimated in two pieces: (1) employer-based expenditures, and (2) non-employer expenditures. Employer-based expenditures for the services of licensed professionals (such as chiropractors, optometrists, podiatrists, and independently practicing nurses) are based on business receipts for taxable establishments of Offices of Other Health Practitioners (NAICS 6213) as reported in the 1977, 1982, 1987, 1992, 1997, 2002, 2007, and 2012 Economic Census.4 An estimate of optical goods sales that occur in optometrist's offices are removed from NAICS 6213 taxable receipts and are counted in Durable Medical Products. For non-Census years prior to 1997, expenditures are estimated using growth in business receipts of sole proprietorships, partnerships, and corporations.9 For non-Census years subsequent to 1997, expenditures are estimated using growth in wages and salaries paid in Offices of Other Health Practitioners. Non-employer expenditures for Other Professional Services are based on data from the Census Bureau's Non-employer Statistics program for 1997 through 2013.13 For years prior to 1997, the 1997 distributions of state non-employer expenditures to total expenditures are held constant. For 2014, non-employer expenditures are estimated using the growth in aggregate non-employer expenditures of Other Professional Services. Separately,

employer and non-employer-based spending estimates by state for Other Professional Services are controlled to national totals as reported in the NHEA.

12.6 Dental Care

Dental Services include expenditures for services provided in establishments operated by a Doctor of Dental Medicine (D.M.D.), Doctor of Dental Surgery (D.D.S.), or Doctor of Dental Science (D.D.Sc.). These establishments are classified as NAICS 6212-Offices of Dentists. State expenditures for Offices of Dentists are based on business receipts for taxable establishments as reported in the 1977, 1982, 1987, 1992, 1997, 2002, 2007, and 2012 Economic Census.4 For non-Census years before 2013, expenditures are estimated using growth in business receipts of sole proprietorships, partnerships, and corporations. For 2013 and 2014, expenditures are estimated using growth in wages and salaries paid in dental establishments.8 Finally, the dental spending estimates by state are controlled to national totals as reported in the NHEA.

12.7 Home Care

Home Health Care services include expenditures for medical care services provided in the home by freestanding home health agencies (HHAs) that are classified in NAICS 6216-Home Health Care Services. The HHAs included in this category are private sector establishments primarily engaged in providing skilled nursing services in the home along with a range of the following: personal care services; homemaker and companion services; physical therapy; medical social services; medications; medical equipment and supplies; counseling; 24-hour home care; occupation and vocational therapy; dietary and nutritional services; speech therapy; audiology; and high-tech care, such as intravenous therapy. Medical equipment sales or rentals not billed through HHAs and non-medical types of home care (e.g., Meals on Wheels, chore-worker services, friendly visits, or other custodial services) are excluded. Also excluded

are hospital-based home health agencies. State expenditures for Home Health Care services are estimated in two pieces: (1) employer-based expenditures, and (2) non-employer expenditures. Employer-based expenditures for private freestanding home health agencies are based on business receipts/revenues for taxable and tax-exempt establishments as reported in the 1987, 1992, 1997, 2002, 2007, and 2012 Economic Census. Because government-supplied home health services are not surveyed by the Economic Census, an add-on is developed for estimates of government-owned home health agencies by state using Medicare statistical data. For non-Census years prior to 1992, employer-based home health expenditures by state are estimated using growth in Medicare and Medicaid home health spending. For non-Census years subsequent to 1992 expenditures are estimated using growth in private wages and salaries paid by home health care establishments. Non-employer expenditures for Home Health Care services are based on data from the Census Bureau's Non-employer Statistics program for 1997 through 2014. For years prior to 1997, the distributions of state non-employer expenditures to total expenditures are held constant at the 1997 level. Separately, employer and non-employer-based spending estimates by state for Home Health Care Services are controlled to national totals as reported in the NHEA.

12.8 Nursing

Expenditures for Nursing Care Facilities and Continuing Care Retirement Communities include spending for inpatient nursing care services, rehabilitative services, and continuous personal care services to persons requiring nursing care that are provided in freestanding nursing home facilities. These establishments are classified in NAICS 6231-Nursing Care Facilities and NAICS 623311-Continuing Care Retirement Communities with on-site nursing care facilities. These services are generally provided for an extended period of time by registered or licensed practical nurses and other staff. Expenditures for care received in state and local government facilities and nursing facilities operated by the U.S. Department of Veterans Affairs are also

included. Excluded are nursing home services provided in long-term care units of hospitals. State expenditures for Nursing Care Facilities and Continuing Care Retirement Communities are estimated in three pieces: (1) private freestanding nursing care facilities and continuing care retirement communities; (2) state and local government nursing homes; and (3) nursing homes operated by the U.S. Department of Veterans Affairs.

Expenditures for private freestanding nursing care facilities (NAICS 6231) and continuing care retirement communities (NAICS 623311) are based on business receipts/revenues for taxable and non-taxable establishments as reported in the 1977, 1982, 1987, 1992, 1997, 2002, 2007, and 2012 Economic Census.4 For non-Census years, nursing home expenditures by state are estimated using growth in wages and salaries paid in private nursing home establishments. For all years 1980-2014, expenditures for state and local government-owned nursing homes are estimated by inflating wages and salaries paid in state and local nursing home establishments using the ratio of private nursing home revenues to private nursing home wages and salaries. Expenditures for nursing homes operated by the U.S. Department of Veterans Affairs (DVA) are estimated using state level data furnished by the DVA for each year 1980-2014. Separately, spending estimates by state for private freestanding nursing care facilities and continuing care retirement communities, state and local government nursing homes, and nursing homes operated by the U.S. Department of Veterans Affairs are controlled to national totals as reported in the NHEA. Prescription Drugs and Other Non-Durable Medical Products Prescription Drugs include expenditures for the "retail" sales of human-use dosage-form drugs, biological drugs, and diagnostic products that are available only by a prescription. Other Non-Durable Medical Products include expenditures for the "retail" sales of non-prescription drugs and medical sundries. State expenditures for Prescription Drugs and Other Non-Durable Medical Products are estimated in two pieces: (1) expenditures for prescription drugs, and (2) expenditures for other non-durable medical products (non-prescription medicines and sundries). For both pieces, expenditures are based on retail sales data as reported in the 1977, 1982, 1987, 1992,

1997, 2002, 2007, and 2012 Census of Retail Trade, Merchandise Line Sales. Expenditures for prescription drugs in non-Census years are estimated using data from the IMS Health Retail Prescription Method of Payment Report.11 Expenditures for other non-durable medical products in non-Census years are estimated using growth in personal income per capita. Separately, spending estimates by state for Prescription Drugs and Other Non-Durable Medical Products are controlled to national totals as reported in the NHEA.

12.9 Prescription drugs

Prescription Drugs include expenditures for the "retail" sales of human-use dosage-form drugs, biological drugs, and diagnostic products that are available only by a prescription. Other Non-Durable Medical Products include expenditures for the "retail" sales of non-prescription drugs and medical sundries. State expenditures for Prescription Drugs and Other Non-Durable Medical Products are estimated in two pieces: (1) expenditures for prescription drugs, and (2) expenditures for other non-durable medical products (non-prescription medicines and sundries). For both pieces, expenditures are based on retail sales data as reported in the 1977, 1982, 1987, 1992, 1997, 2002, 2007, and 2012 Census of Retail Trade, Merchandise Line Sales. Expenditures for prescription drugs in non-Census years are estimated using data from the IMS Health Retail Prescription Method of Payment Report.11 Expenditures for other non-durable medical products in non-Census years are estimated using growth in personal income per capita. Separately, spending estimates by state for Prescription Drugs and Other Non-Durable Medical Products are controlled to national totals as reported in the NHEA. Durable Medical

12.10 Durable Medical Products

Durable Medical Products include expenditures for the "retail" sales of items such as contact lenses, eyeglasses and other ophthalmic products, surgical and orthopedic products, hearing

aids, wheelchairs, and medical equipment rentals.

State expenditures for Durable Medical Products are estimated in two pieces: (1) durable goods sold in retail outlets, excluding those sold in Offices of Optometrists, and (2) expenditures for optical goods sold in Offices of Optometrists (NAICS 621320). Expenditures for durable goods sold in retail outlets, excluding those sold in Offices of Optometrists, are based on retail sales of optical goods as reported in the 1977, 1982, 1987, 1992, 1997, 2002, 2007, and 2012 Census of Retail Trade, Merchandise Line Sales. Expenditures for optical goods sold in Offices of Optometrists (NAICS 621320) are based on business receipts for taxable establishments as reported in the 1977, 1982, 1987, 1992, 1997, 2002, 2007, and 2012 Economic Census. For Census years, expenditures by state for durable goods sold in both retail and non-retail establishments are summed. For non-Census years, these expenditures are interpolated and extrapolated using growth in per capita personal income. Finally, spending estimates for Durable Medical Products by state are controlled to national totals as reported in the NHEA.

12.11 Other Health, Residential, and Personal Care

Other Health, Residential, and Personal Care services include those for care provided in residential care facilities, ambulance services, and for services provided in non-traditional settings. State expenditures for Other Health, Residential, and Personal Care services are estimated in three pieces: (1) private residential facilities for the intellectually disabled and residential mental health and substance abuse facilities, as classified in NAICS 62321-Residential Facilities for the Intellectually Disabled, and NAICS 62322-Residential Mental Health and Substance Abuse Facilities; (2) private expenditures for ambulance services, as classified in NAICS 62191-Ambulance Services; and (3) services provided in non-traditional settings. Private spending by Residential Facilities for the Intellectually Disabled (NAICS 62321), and Residential Mental Health and Substance Abuse Facilities (NAICS 62322) are based on busi-

ness receipts/revenues for taxable and tax-exempt establishments as reported in the 1997, 2002, 2007, and 2012 Economic Census.4 For non-Census years subsequent to 1990, expenditures by state are estimated using growth in wages and salaries paid in private residential establishments.8 For non-Census years prior to 1990, expenditures by state are estimated using the distribution of state to total spending for Nursing Care Facilities and Continuing Care Retirement Communities. Private spending by Ambulance Services (NAICS 62191) are based on business receipts/revenues for taxable and tax-exempt establishments as reported in the 1997, 2002, 2007, and 2012 Economic Census.4 For non-Census years subsequent to 1990, expenditures by state are estimated using growth in wages and salaries paid for private ambulance providers.8 For non-Census years prior to 1990, expenditures by state are estimated using the distribution of state to total spending for Medicare ambulance services. Services provided in non-traditional settings include spending for worksite healthcare, school health, and other types of miscellaneous care funded by federal or state programs. The largest component of spending in this category is home and community-based waivers under the Medicaid program. Under this program, states may apply for waivers of some of the statutory provisions in order to provide care to beneficiaries who would otherwise require long-term inpatient care in a hospital or nursing home. Examples of types of services provided are habilitation, respite care, and environmental modifications. This care is frequently delivered in community centers, senior citizen centers and through home visits by various kinds of medical and non-medical personnel. Expenditures by state for this program are developed using data from CMS-64 reports that are filed by state Medicaid agencies for all years 1980-2014. For other types of funding classified in Other Health, Residential, and Personal Care, distributions by state are obtained using data from the CMS-64's and other program funding. Medicaid make up the majority of this funding but other examples include care funded by the Indian Health Service, Maternal and Child Health Bureau, Department of Veterans Affairs, Children's Health Insurance Program, school health programs, worksite healthcare, and Substance Abuse and Mental

Health Services Administration. Separately, spending estimates by state for residential care facilities, ambulance services, and for care provided in non-traditional settings are summed and controlled to national totals as reported in the NHEA.