MACROECONOMIC CONSEQUENCES OF FISCAL AUSTERITY: EVIDENCE FROM THE ALASKA PERMANENT FUND

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Abstract

How does fiscal austerity affect the macroeconomy? Since 1982, every Alaskan resident has been eligible to receive a yearly dividend check from the Alaska Permanent Fund. On June 29, 2016, Alaska Governor Bill Walker exercised a line-item veto that cut the size of that year's Alaska Permanent Fund dividend check from about $2,000 to about $1,000. This $1,000 reduction in the dividend check was roughly equal to 1.3% of Alaska's 2016 GDP. I find that Alaska's act of fiscal austerity decreased real private industry GDP per capita by 5%, or around $3,000, six quarters later. Furthermore, total nonfarm employees per capita dropped 2%, 18 months later. Finally, I find that the percentage of Alaskans who receive SNAP benefits spiked by more than 4 percentage points less than 18 months after the cut in the size of the Alaska Permanent Fund dividend check.

I Introduction

The effect of fiscal austerity has become an increasingly talked about issue, especially in the aftermath of the Great Recession and the COVID-19 recession. A fiscal policy generally can regarded as being an act of fiscal austerity if the policy either increases taxes or decreases government spending with the hopes of lowering the deficit. In this paper, I will investigate the macroeconomic consequences of a quasi-experimental instance of fiscal austerity in Alaska in 2016.

Previous papers such as Alesina et al. (2015) have evaluated the negative impact of fiscal austerity on the economy in European countries in the aftermath of the Great Recession. Papers like Romer and Romer (2010) use narrative records to identify instances of fiscal austerity and identify their negative impacts on the economy.

In this paper, I will use synthetic control to establish an appropriate control group, thereby creating an appropriate counter-factual. I can then estimate treatment effects by calculating the difference between the outcome variable for Alaska and Synthetic Alaska.

To start, I will review some of the previous literature and its findings and explain the institutional background of the Alaska Permanent Fund and its dividend. I will then give a brief mathematical overview of the synthetic control method. Next, I will present the data used for my analysis along with the results. Finally, I will wrap up with a discussion and explanation of my results. Unlike most of the previous literature regarding fiscal austerity, my paper will attempt to find the effects of fiscal austerity at the state level. My contribution to the literature will be to help the expansion of the literature into state-level analysis to potentially identify any differences between the behavior of fiscal austerity at the nationwide level and the state level.

II Literature Review

The literature surrounding fiscal austerity fall into essentially two categories. Some papers argue that fiscal austerity can be expansionary by way of decreasing the probability of default. Other papers, however, show evidence that fiscal austerity can be very contractionary.

Giavazzi and Pagano (1990) find some evidence that expenditure-based fiscal austerity actually lead to higher levels of output. Analyzing evidence after a period of fiscal austerity in Europe during the 1980s, Giavazzi and Pagano found Ireland and Denmark actually grew faster after a period of lower government spending.

Looking at European countries who implemented fiscal austerity policies in the aftermath of the Great Recession, Alesina et al. (2015) find that not all fiscal austerity plans are equal. They find that whether or not fiscal austerity comes from an increase in taxes or comes from a decrease in government spending matters a large amount. The paper finds that four years after a tax-based fiscal austerity policy is implemented, GDP drops by 2%, compared to an expenditure-based fiscal austerity plan which has no noticeable effects four years later, but caused a temporary quarter of a percentage point decrease in GDP one year after the fiscal austerity plan.

Using narrative sources such as speeches and congressional records, Romer and Romer (2010), attempt to find truly exogenous instances of fiscal austerity, specifically when it comes to increases in taxes. Using this identification strategy, their paper finds that an exogenous tax increase of 1% of GDP lowers real GDP by about 3%.

Expanding upon these narrative sources as a method of identification of fiscal austerity, Guajardo et al. (2014) find a possible explanation for the difference in outcomes between tax-based and expenditure-based fiscal austerity. Their paper finds evidence that expenditure-based

fiscal austerity is followed by more expansionary monetary policy compared to tax-based fiscal austerity which may help to explain the difference in outcomes between expenditure-based and tax-based fiscal austerity.

More generally, the literature of fiscal austerity is similarly related to literature on fiscal multipliers. Steinsson and Nakamura (2014) exploit regional variations in military spending to estimate an "open economy relative multiplier" of about 1.5. Auerbach and Gorodnichenko (2012) find a large difference in spending multipliers depending on if an economy is in a recession or expansion. They estimate a spending multiplier of between 0 and 0.5 in expansions and a spending multiplier of between 1 and 1.5 in recessions.

With this in mind, my paper will situate itself in the literature as an attempt to estimate the effect of fiscal austerity using a specific case of fiscal austerity in Alaska in 2016.

III Alaska Permanent Fund

III.A Alaska Permanent Fund Background

In the 1970s, the discovery of the Prudhoe Bay Oil Field led to a large increase in tax revenues for the Alaskan state government. Furthermore, Alaska received direct royalties from these oil operations because these oil fields were located on state property. In response to this newfound wealth and upon realization that this revenue was derived from a non-renewable resource, the citizens of Alaska in November of 1976 voted to add Article IX, Section 15 to the Alaska Constitution. This constitutional amendment established a permanent fund which would store revenues from oil-related economic activity; see Goldsmith (2001) for more information about the history and establishment of the Alaska Permanent Fund.

According to the Alaska Permanent Fund Corporation—the entity set up to control the portfolio of investments undertaken by the fund—the Alaska Permanent Fund had a total value of around $81 billion, with a principal amount of around $64 billion as of March 2022 (Alaska Permanent Fund Corporation). The Permanent Fund invests in a variety of different assets including real estate, infrastructure, bonds, equities, and more. Because of this diversification, the performance of the Alaska Permanent Fund is not any more correlated with the Alaskan economy or the price of oil than any other fund.

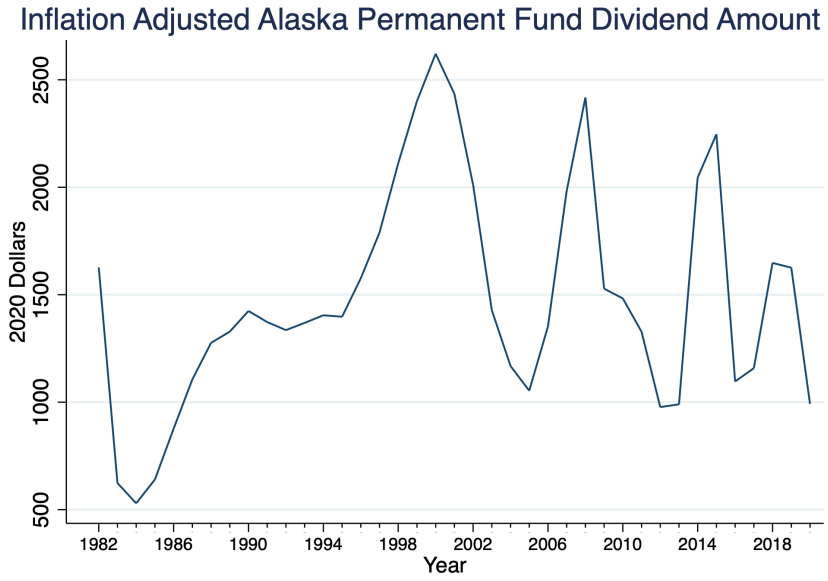
III.B.i Alaska Permanent Fund Dividend

After the constitutional establishment of the Alaska Permanent Fund, in 1982 Alaska introduced the Alaska Permanent Fund dividend which would take a certain percentage of the Alaska Permanent Fund's income and distribute a check of equal size to every Alaskan resident regardless of age or income. Except for very few exceptions, each Alaskan would be entitled to this dividend check if they had been a resident of Alaska for one calendar year. As a result of the universality of the dividend check, many Alaskans have grown to view the dividend check as an entitlement as compared to a government expenditure; see Goldsmith (2001) for more details about the inception of the dividend.

III.B.ii Size

Figure 1 displays the inflation-adjusted size of the Alaska Permanent Fund dividend check over time. Adjusted for inflation, the size of the check has been as low as about $500 in 1984 to as high as over $2,500 in 2000. Since the dividend check is given regardless of age, a family of four (with Alaskan residency for one calendar year) would have received over $10,000 in the year

Figure 1



2000. The Alaskan Permanent Fund dividend can be a large source of income for an individual or a family, especially for those who earn the least.

The Alaska Permanent Fund dividend check size is, in general, extremely predictable. This is because the size of the check is calculated using a pre-determined formula. While the exact formula is not necessarily trivial, in general, the size of the check can be roughly calculated as one-half of the five-year average of realized earnings from the Alaska Permanent Fund divided by the number of total dividend applicants (Goldsmith, 2001). The easily predictable nature of the size of the dividend check means that Alaskans can determine for themselves what the size of the dividend check should be before it is even announced. Additionally, since the size of the check is a five-year average, Alaskans should also be able to partially anticipate the size of their dividend check in the future.

III.B.iii Awareness

The Alaska Permanent Fund dividend check distribution is a widely publicized and talked about event. In recent years, the Governor of Alaska usually holds a press conference to officially announce the dividend check on live TV. Alaska Statute 43.23 establishes the application period for all Alaskans to apply for the dividend check to take place between January 1 and March 31 of the same year. Furthermore, the same law requires that the size of the dividend check be publicly announced at the latest on October 1 before being sent out to Alaskans at least by December 31. To actually receive the check, Alaskans must apply each year regardless of how many years they had previously received a check, meaning that Alaskans must remain somewhat cognizant of the dividend check each year. The Alaskan government provides the name of every individual who has applied for a dividend check. In 2021, over 665,000 individuals applied to receive a dividend check, which accounts for more than 90% of Alaska's 730,000 population. Many newspapers also publicly remind Alaskans to apply for their dividend check such as (Lockett, 2022). These facts help support the idea that Alaskans overall are extremely well aware of the dividend check.

III.C.i June 29, 2016 Announcement

On June 29, 2016, Alaska Governor Bill Walker, in a 19-minute speech, announced a veto of the fiscal year 2017's budget which, in effect, would reduce the Alaska Permanent Fund dividend check from an estimated $2,000 (using the formula described above) to around $1,000 (Anchorage Daily News). Walker stated that the recent collapse in government revenues forced him to reduce spending. Furthermore, the Governor argued that without the veto, the Alaska Permanent Fund would run out of money within four years. Ultimately, Governor Walker reduced Alaska's budget by $1.29 billion, $650 million of which came from the $1,000 reduction

in the dividend check. Walker's other reduction to the state budget came in the form of spending cuts to infrastructure projects and education along with a deferral of tax credits for the oil and gas industry. Alaska's fiscal year 2016 budget was about $12.1 billion (Office of Management and Budget), meaning that Governor Walker's dividend check reduced Alaska's budget by approximately 5%.

III.C.ii Reaction

Governor Walker's veto was not popular with Alaskans. Despite being one of the most popular governors in the United States at the start of his term with an approval rating of about 62% (Ballotpedia), Walker soon became one of America's least favorite governors. By the first quarter of 2017, Governor Walker's approval rating dropped to 43% with a net approval rating of -10%. Governor Walker continued to slide until he dropped out of his 2018 re-election bid and ended his term in the fourth quarter of 2018 with a 27% approval rating and a -24% net approval rating.

Finally, the veto also led to an effort to recall Governor Bill Walker. The Anchorage Daily News summarized the outrage in their piece published on July 11, 2016 quoting Joe Miller, a former Alaska Senate candidate:

> "'There's a lot of outrage, and people have come together who want to do something about a governor who ran on a platform of protecting the PFD and not using that to pay down the budget. He's done the opposite,' Miller said."
> (Shedlock, 2016)

III.D Identification

Governor Walker's veto serves as a quasi-experiment. Just as easily as Walker signed the veto, the Governor could have decided to not sign the veto. Since most Alaskan politicians, regardless

of party, disapproved of Walker's veto and because Walker was a registered Independent, there is no obvious correlation between Alaska's political landscape and Walker's veto. With this in mind, this paper will be able to use the veto as a treatment for all Alaskans. The rest of this paper is dedicated to determining the macroeconomic consequences of Alaska's fiscal austerity.

IV Method

IV Synthetic Control

Since the Alaska Permanent Fund dividend check is universally given to all Alaskans, there exists no control group within Alaska. To overcome this issue, this paper will use the synthetic control method. For a more in-depth and mathematical breakdown of the synthetic control method see Abadie et al. (2010). I will briefly describe the method here:

Let $N+1$ be the total number of states in a panel dataset indexed by state n. Let each observation at a specific time be indexed by time t and let the total number of time periods equal to T. Let the state that received the treatment be Indexed as state $n = 0$. Establish t_0 as the time t in which the treatment began and let T_0 represent the total number of time periods before the treatment. From this information, let the variable D_{nt} represent whether or not a certain state n is receiving treatment in time t:

$$\mathrm{D}_{nt} = \begin{cases} 0 & \text{if } n \neq 0 \\ 0 & \text{if } n = 0 \text{ and } t \leq t_0 \\ 1 & \text{if } n = 0 \text{ and } t > t_0 \end{cases}$$

In its purest and most basic form, a control group should be exactly the same, in every possible way, to the treatment group before the treatment is applied. The goal of synthetic

control, therefore, is to find a column vector of weights $\mathbf{W}^*$ in $\mathbb{R}^N$ such that $\mathbf{W}^*$ is the solution to the minimization of:

$$||\mathbf{X}_{n=0,t\leq t_0} - \mathbf{X}_{N,t\leq t_0}\mathbf{W}^*||$$

where $\mathbf{X}_{n=0,t\leq t_0}$ represents a $(M_{t\leq t_0} \times 1)$ matrix where $M_{t\leq t_0}$ is the number of outcome variables at certain times $t \leq t_0$ that are desired to be synthetically controlled for in state $n = 0$ and where $\mathbf{X}_{N,t\leq t_0}$ represents a $(M_{t\leq t_0} \times N)$ matrix for states $n \neq 0$ for time $t \leq t_0$.

A counterfactual can be extrapolated for the period $t > t_0$ from the product $\mathbf{X}_{N,t>t_0}\mathbf{W}^*$ where $\mathbf{X}_{N,t>t_0}$ represents a $(M_{t>t_0} \times N)$ matrix where $M_{t>t_0}$ represents the the same outcome variables in $M_{t\leq t_0}$ for every time period t after t_0 until T for states $n \neq 0$. Furthermore, $\mathbf{W}^*$ is restricted to having all positive entries and the sum of all entries equal one.

Since the vector $\mathbf{W}^*$ finds the optimal set of weights of the states $n \neq 0$ to match as closely as possible to the outcomes described in $M_{t\leq t_0}$ for the state $n = 0$, then this synthetic control method has found a weighted set of states that best satisfies the conditions of a control group: the treatment and control group should be similar in every way possible before the treatment is applied. The best-case scenario that can be achieved from this synthetic control method is that the synthetic control and treatment group match very closely in the pre-treatment period. If a close match is established, then the difference between the treatment group and the extrapolated synthetic control group in the post-treatment period can be attributed to the treatment.

Define the treatment effect in the post period at time t as $\hat{\alpha}_t$ which can calculated as:

$$\hat{\alpha}_t = Y_t^{D_{nt}=1} - Y_t^{Synth}$$

where $Y_t^{D_{nt}=1}$ is equal to the variable of interest at time t in the post-treatment period $t > t_0$ for the treatment state $n = 0$ and Y_t^{Synth} is equal to the variable of interest at time t in the post-treatment period $t > t_0$ for the extrapolated synthetic control group described above. The statistical significance of each treatment effect estimate can be found through a series of placebo tests. For a more in-depth discussion of how to perform these placebo tests see Abadie (2021).

V Data

V.A GDP

First, I will evaluate the impact of the cut in the size of the dividend check on GDP per capita. My analysis will focus on three different industry-specific measures of GDP per capita including private industry GDP per capita, manufacturing GDP per capita, and retail trade GDP per capita. GDP data comes from the Bureau of Labor Statistics and the frequency of the data is quarterly. Tables 1 and 2 show the value of GDP per capita in thousands of dollars broken down by certain industries for the pre-treatment and post-treatment period in Alaska, respectively. Figure 2 shows that Alaska had been experience a general decline in private industry GDP per capita even before the Alaska Permanent Fund dividend check was cut.

Table 1

	Private-Industry	Manufacturing	Retail Trade
Mean	59473.38	2205.073	3039.372
SD	623.7599	330.1894	100.2633
Min	58650.68	1768.645	2900.644
Max	60573.61	2764.634	3201.17
N	13	13	13

Table 2

	Private-Industry	Manufacturing	Retail Trade
Mean	60840.31	2476.803	2925.733
SD	837.9927	129.1173	40.9913
Min	59562.4	2256.102	2856.957
Max	61969.25	2669.567	2972.889
N	7	7	7

Figure 2

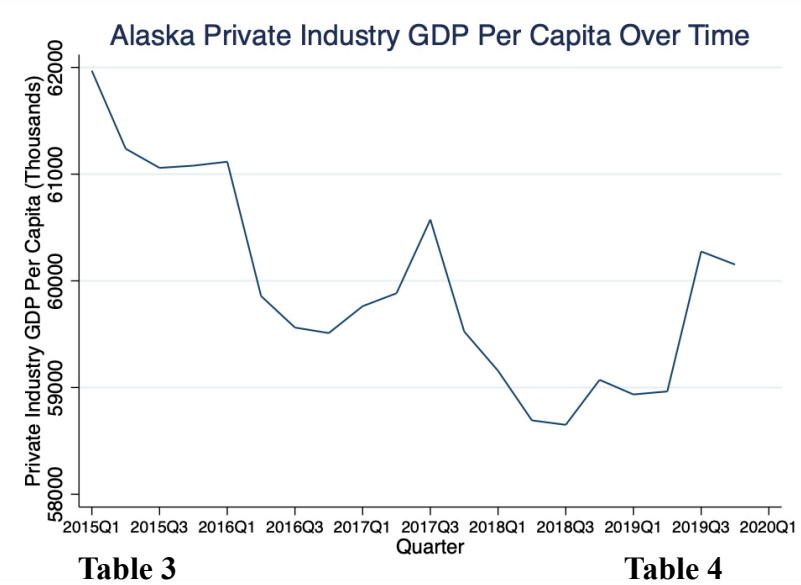


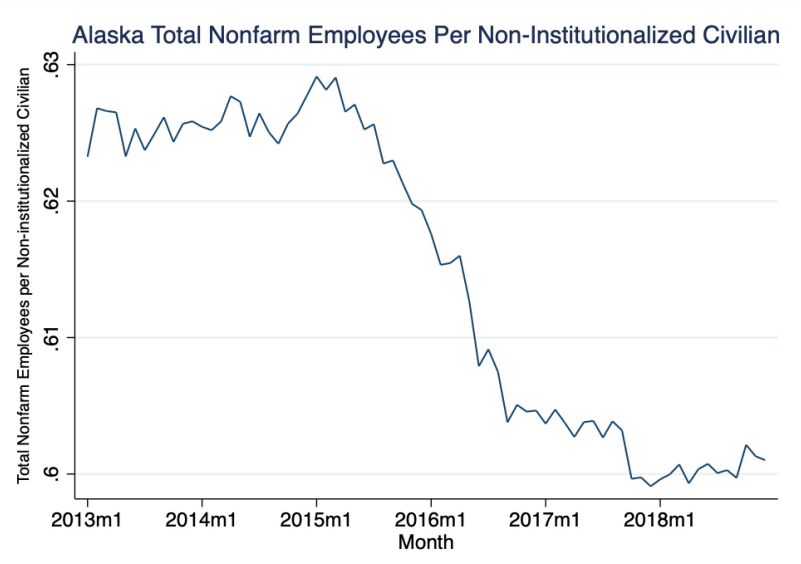
Table 3

	Total Nonfarm	Mine-Log-Construct	Retail
Mean	.6237153	.0634673	.0678346
SD	.0046143	.0024891	.000943
Min	.6079011	.0559789	.0660259
Max	.6291306	.0671881	.0691994
N	42	42	42

Table 4

	Total Nonfarm	Mine-Log-Construct	Retail
Mean	.6023596	.0524217	.0664116
SD	.0025254	.0012486	.0008234
Min	.5991016	.05052	.0654097
Max	.6091408	.0557587	.067961
N	30	30	30

Figure 3



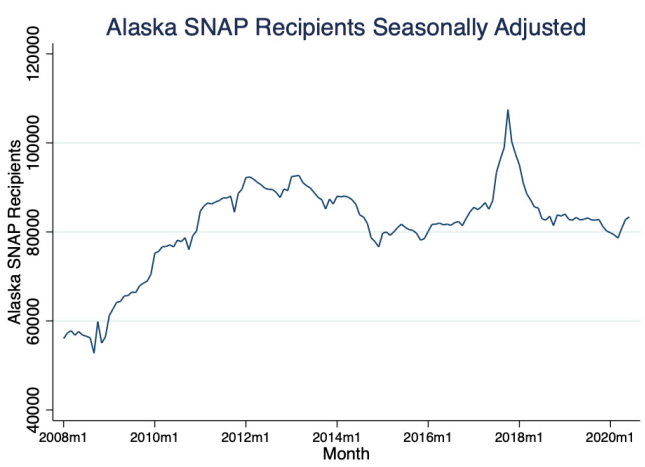
V.B Employment

Second, I will look at the impact of the cut of the dividend check on employment in Alaska. I will look at the following four measures of employment: total nonfarm employees, total mining, logging, and construction employees, and total retail employees. Furthermore, I will normalize the data by dividing the employment numbers by each states' respective non-institutionalized civilian population which I will refer to as being "per capita" after this section. Employment data comes from the Bureau of Labor Statistics and exists at a monthly frequency. Tables 3 and 4 show the value of total employment per non-institutionalized civilian broken down by certain industries for the pre-treatment and post-treatment period in Alaska, respectively. Figure 3 shows that Alaska's total nonfarm employees per capita had been decreasing even before the cut of the Alaska Permanent Fund dividend check cut, similar to Figure 2.

V.C SNAP Recipients

Finally, I will take a turn toward SNAP recipients. SNAP stands for the Supplemental Nutrition Assistance Program, a federally funded, state-administered program which provides low-income

Figure 4



individuals with money to spend on food. Because SNAP is designed for low-income individuals, the number of individuals receiving SNAP benefits may be particularly sensitive to unexpected shocks in the size of the Alaska Permanent Fund dividend check. For this reason, examining the number of individuals who receive SNAP benefits can be a particularly good indicator of whether or not Alaska's fiscal austerity had any macroeconomic consequences. Data for the number of Alaska SNAP recipients appears to show some cyclical pattern; see (**APPENDIX.A**). I also address this issue in (**APPENDIX.A**). The result of this work can be seen in Figure 4 showing a smooth, seasonally adjusted curve displaying the number of Alaskan SNAP recipients over time.

VI RESULTS

Recall from above that the treatment effect estimate at a certain time t after the treatment period t_0 previously defined as $\hat{\alpha}_t$ can be found by:

$$\hat{\alpha}_t = Y_t^{D_{nt}=1} - Y_t^{Synth}$$

For each of the figures presented below, the treatment effect estimate, $\hat{\alpha}_t$ can be found by subtracting Alaska's value of the variable of interest at time t by Synthetic Alaska's value of the variable of interest at time t. Each figure will be accompanied by a table showing the statistical significance of the results along with the optimal set of state weights.

VI.A.i PRIVATE INDUSTRY GDP

Figure 5 shows the results of the synthetic control analysis on private-industry GDP per capita. Before the treatment period, indicated by the red line there is a very close match between Alaska and Synthetic Alaska. After the treatment period, there exists a large divergence between Alaska

and Synthetic Alaska. Figure 5 shows that around late 2018 and early 2019, approximately a year and a half after the size of the dividend check was cut, Alaska's level of private-industry GDP per capita is about $3,000 per capita (or 5%) less than Synthetic Alaska. Table 5 shows that these results are statistically significant and Table 6 shows the optimal set of synthetic control weights.

VI.A.ii Manufacturing GDP

When looking at manufacturing GDP per capita in Figure 6, while the initial match is not as good as the match from the private-industry example, a very large divergence occurs after the treatment period. Approximately six quarters after the treatment period, Alaska's manufacturing GDP per capita is approximately $800 lower, or approximately a 30% decline compared to the synthetic control group. From Table 7, this result is significant at the 5% significance level. Table 8 shows the optimal synthetic control weights.

VI.A.iii Retail Trade GDP

Figure 7 shows that the same phenomenon that exists for private-industry GDP and manufacturing GDP does not exist for retail trade GDP. The cut in the size of the dividend check had little to no effect on retail trade GDP. Table 9 shows that at no point during the post-treatment period is there any quarter that is statistically different from Synthetic Alaska. Table 10 provides the optimal synthetic control weights.

VI.B.i Total Nonfarm Employment

Switching gears towards analyzing the effects of the dividend check cut on employment, I find that Alaska's fiscal austerity had a large effect on total nonfarm employment per capita. Figure 8 shows a close match between Alaska and Synthetic Alaska in the pre-treatment period followed by a large divergence in the post-treatment period. Approximately 18 months after treatment,

Alaska's total nonfarm employment per capita is 2% lower than Synthetic Alaska. Considering that Alaska's total civilian non-institutionalized population at this time is around 550,000, a 2% reduction in total nonfarm employment per capita represents approximately 11,000 Alaskans who otherwise would have had a job if not for Alaska's fiscal austerity. Table 11 shows that these results are statistically significant at the 5% level and Table 12 provides the optimal weights.

VI.B.ii Total Mining, Logging, Construction Employment

Figure 9 also shows a fairly close match between Alaska and Synthetic Alaska in the pre-treatment period and a large divergence in the post-treatment period when looking at total mining, logging, and construction employment per capita. Table 13 shows that these results are statistically significant at the 5% level. At the peak in approximately the first month of 2018, Alaska experienced a 1% lower level of total mining, logging, and construction employment per capita compared to Synthetic Alaska. Given Alaska's civilian non-institutionalized population at the time to be approximately 550,000, this result shows a reduction of mining, logging, and construction employment of approximately 5,500 workers. Table 14 shows the optimal weights.

VI.B.iii Total Retail Employment

Much like the example of retail trade GDP from above, Figure 10 shows that total retail employment per capita does not seem to be affected by Alaska's fiscal austerity. Both Alaska and Synthetic Alaska match closely in the pre-treatment and post-treatment periods. Table 15 confirms that there is no statistically significant difference between Alaska and Synthetic Alaska.

VI.C. SNAP Recipients

Figure 11 and Table 17 show that there exists strong, statistically significant, evidence that Alaska's fiscal austerity had a large impact on the number of Alaskans who received SNAP

benefits. Most noticeably, Alaska exhibits a huge spike in the number of SNAP recipients per capita approximately 18 months after Alaska's act of fiscal austerity. At its peak, Alaska had an approximately 4% higher level of SNAP recipients per capita compared to Synthetic Alaska.

Having a total population of around 735,000 at the time, this result means that, at the peak, Alaska had approximately 29,400 more SNAP recipients compared to Synthetic Alaska. Figure 12 also shows that the initial spike was temporary. Approximately two years after Alaska's fiscal austerity, Alaska had a 2% higher level of SNAP recipients per capita, about 14,700 more individuals, compared to Synthetic Alaska. Considering that the cut in the dividend check will affect the poorest Alaskans the most, and considering that the number of SNAP recipients is especially sensitive to the number of poorer Alaskans, this result provides strong evidence that Alaska's act of fiscal austerity had a strong macroeconomic consequence.

VI.D Figures and Tables

Figure 5

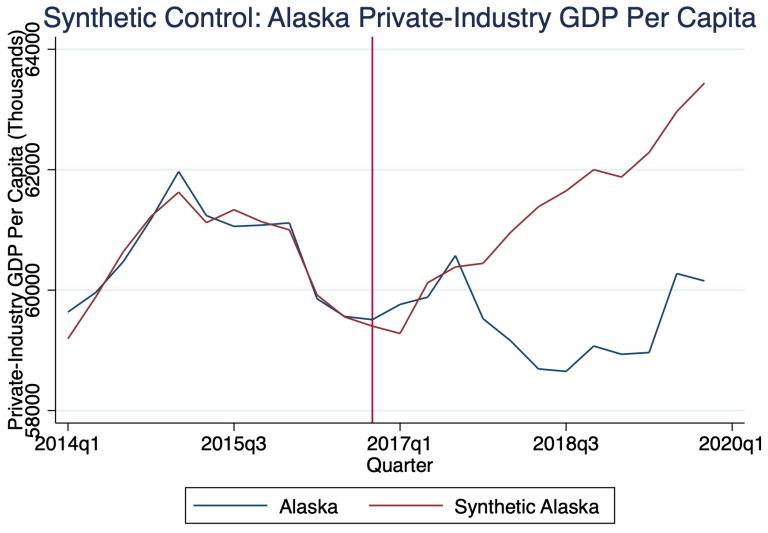


Table 5

Quarter	P-Value
1	0.306
2	0.633
3	0.735
4	0.249
5	0.122
6	0.082*
7	0.061*
8	0.082*
9	0.061*
10	0.041**
11	0.143
12	0.082*

Note: The value for Quarter represents the number of quarters since the treatment began. Significance levels: *** p≤0.01, ** p≤0.05, * p≤0.10.

Table 6

State	Weight
California	0.104
Deleware	0.005
D.C.	0.11
Montana	0.098
New Jersey	0.22
North Dakota	0.041
Pennsylvania	0.055
Wyoming	0.367

Private Industry GDP Per Capita Optimal Synthetic Control Weighting

Table 8

State	Weight
Florida	0.385
Montana	0.274
New Mexico	0.316
New York	0.025

Manufacturing GDP Per Capita Optimal Synthetic Control Weighting

Table 10

State	Weight
Idaho	0.055
Illinois	0.058
Kentucky	0.235
Maine	0.044
North Dakota	0.115
Oklahoma	0.097
Oregon	0.214
Rhode Island	0.115
Wyoming	0.068

Retail GDP Per Capita Optimal Synthetic Control Weighting

Figure 6

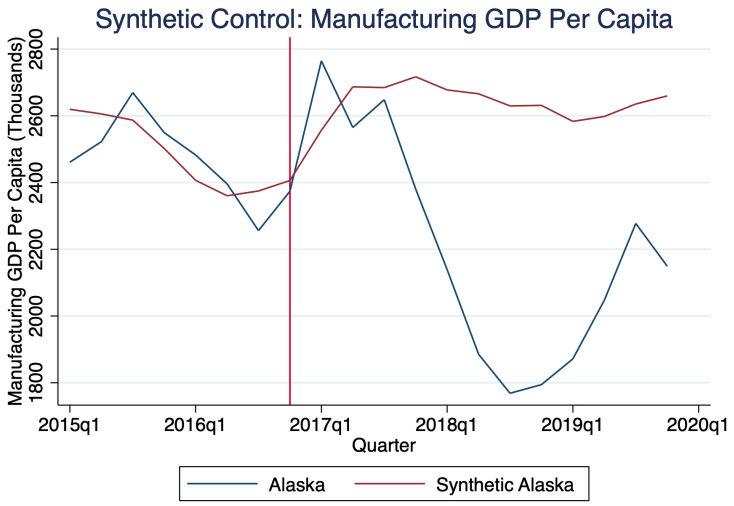


Table 7

Quarter	P-Value
1	0.234
2	0.510
3	0.851
4	0.319
5	0.191
6	0.043**
7	0.064*
8	0.128
9	0.149
10	0.234
11	0.404
12	0.319

Note: The value for Quarter represents the number of quarters since the treatment began. Significance levels: *** p≤0.01, ** p≤0.05, * p ≤0.10.

Figure 7

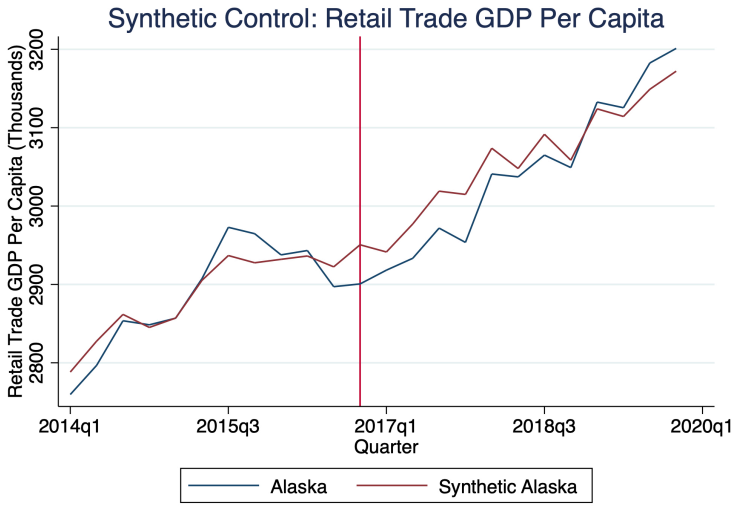


Table 9

Quarter	P-Value
1	0.52
2	0.28
3	0.38
4	0.24
5	0.64
6	0.9
7	0.78
8	0.88
9	0.96
10	0.94
11	0.76
12	0.86

Note: The value for Quarter represents the number of quarters since the treatment began. Significance levels: *** p≤0.01, ** p≤0.05, * p≤0.10.

Table 12

State	Weight
D.C.	0.064
North Dakota	0.049
Oklahoma	0.456
West Virginia	0.247
Wyoming	0.184

Total Nonfarm Employment Per Capita Optimal Synthetic Control Weighting

Table 14

State	Weight
Montana	0.092
Nevada	0.526
Wyoming	0.382

Total Mining, Logging, and Construction Employment Per Capita Optimal Synthetic Control Weighting

Table 16

State	Weight
Arkansas	0.284
D.C.	0.056
Florida	0.216
Idaho	0.019
Montana	0.24
North Dakota	0.185

Total Retail Employment Per Capita Optimal Synthetic Control Weighting

Figure 8

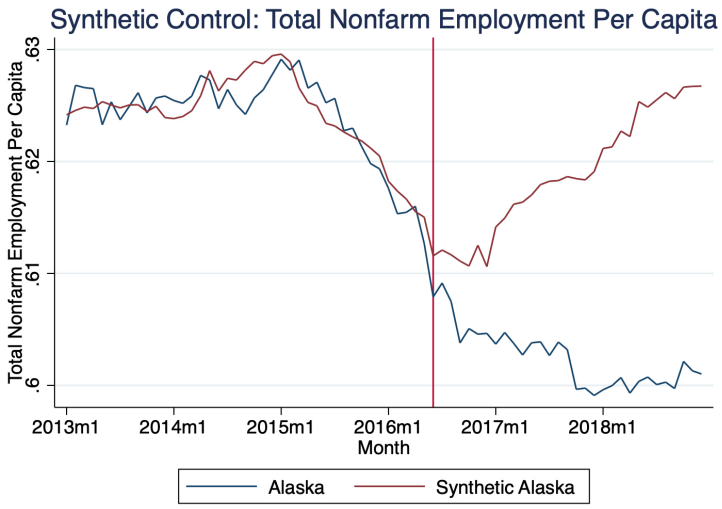


Table 11

Month	P-Value	Month	P-Value
1	0.2	16	0.04**
2	0.12	17	0.04**
3	0.08*	18	0.04**
4	0.08*	19	0.04**
5	0.08*	20	0.04**
6	0.08*	21	0.04**
7	0.14	22	0.04**
8	0.14	23	0.04**
9	0.12	24	0.04**
10	0.1*	25	0.04**
11	0.1*	26	0.04**
12	0.08*	27	0.04**
13	0.08*	28	0.04**
14	0.08*	29	0.04**
15	0.08*	30	0.04**

Note: The value for Month represents the number of months since the treatment began. Significance levels: *** p≤0.01, ** p≤0.05, * p ≤0.10.

Figure 9

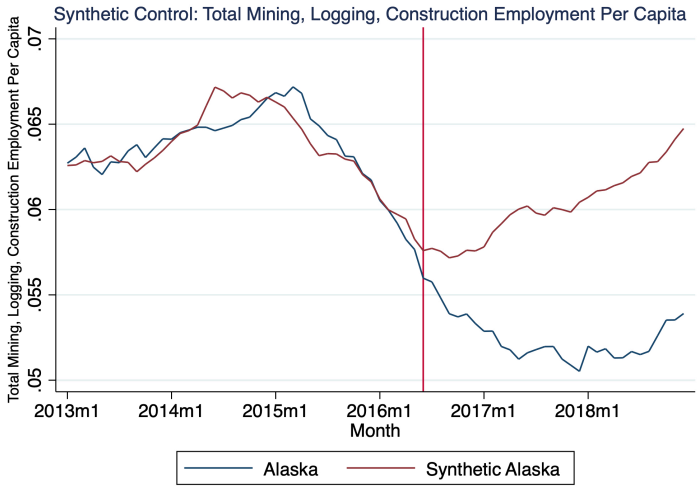


Table 13

Month	P-Value	Month	P-Value
1	0.08*	16	0.04**
2	0.02**	17	0.04**
3	0.02**	18	0.02**
4	0.02**	19	0.04**
5	0.02**	20	0.02**
6	0.04**	21	0.02**
7	0.04**	22	0.02**
8	0.04**	23	0.02**
9	0.02**	24	0.000***
10	0.02**	25	0.02**
11	0.02**	26	0.02**
12	0.04**	27	0.04**
13	0.04**	28	0.04**
14	0.04**	29	0.04**
15	0.04**	30	0.02**

Note: The value for Month represents the number of months since the treatment began. Significance levels: *** p≤0.01, ** p≤0.05, * p ≤0.10.

Figure 10

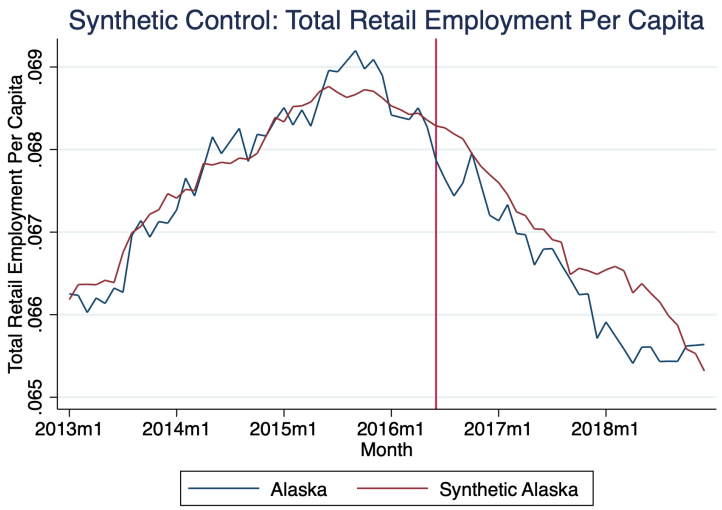


Table 15

Month	P-Value	Month	P-Value
1	0.12	16	0.66
2	0.12	17	0.72
3	0.2	18	0.36
4	1	19	0.46
5	0.52	20	0.34
6	0.34	21	0.32
7	0.48	22	0.34
8	0.88	23	0.38
9	0.76	24	0.5
10	0.8	25	0.48
11	0.56	26	0.56
12	0.74	27	0.66
13	0.84	28	1
14	0.64	29	0.94
15	0.9	30	0.8

Note: The value for Month represents the number of months since the treatment began. Significance levels: *** p≤0.01, ** p≤0.05, * p ≤0.10.

Figure 11

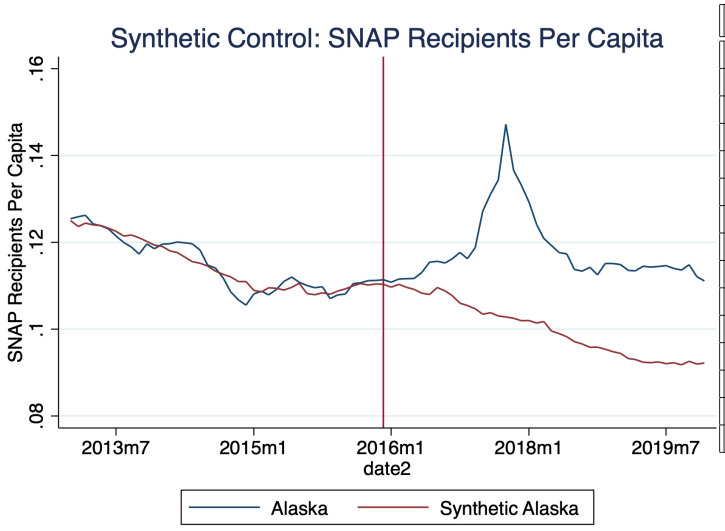


Table 17

Month	P-Value	Month	P-Value
1	0.6	16	0.02**
2	0.64	17	0.000***
3	0.68	18	0.02**
4	.6	19	0.02**
5	0.48	20	0.02**
6	0.28	21	0.02**
7	0.14	22	0.04**
8	0.22	23	0.02**
9	0.18	24	0.04**
10	0.16	25	0.04**
11	0.06*	26	0.04**
12	0.1*	27	0.04**
13	0.04**	28	0.04**
14	0.02**	29	0.04**
15	0.02**	30	0.02**

Note: The value for Month represents the number of months since the treatment began. Significance levels: *** p≤0.01, ** p≤0.05, * p≤0.10.

Table 18

State	Weight
Louisiana	0.072
Maine	0.238
New Mexico	0.102
West Virginia	0.036
Wyoming	0.552

Total SNAP Per Capita
Optimal Synthetic Control
Weighting

VII Discussion And Conclusions

To understand the impacts of the fiscal austerity that cut the size of the Alaska Permanent Fund dividend check, I will tackle two questions:

1. Why does cutting the dividend check create heterogenous treatment effects across industries?
2. What is the mechanism through which cutting the size of the Alaska Permanent Fund dividend check causes these macroeconomic consequences?

VII.A Heterogeneous Effects

One interesting finding from my results is that certain industries are hit harder than other industries. A similar phenomena is found in Romer and Romer (2010) who look at the effect of tax increases on the macroeconomy. They find that while, in response to a 1% increase in taxes as a percentage of GDP, consumption drops by about 3%, investment drops by about 11%.

Relating back to my paper, recall that I found no statistically significant effect of the dividend check being cut on retail trade GDP per capita and total retail employment per capita, whereas there exists strong effects in the manufacturing industry, the mining, logging, and construction industry, as well as the economy overall in both GDP and employment.

Because the strength of the retail industry is heavily dictated on consumption, the retail industry serves as a proxy measurement for consumption. Similarly, because the manufacturing industry and the mining, logging, and construction industry serve as vital input goods for investment, this industries serve as a proxy measurement for investment. It is then entirely consistent with Romer and Romer (2010) that I find, by proxy, a small effect of the dividend check cut on consumption but a very large effect on investment.

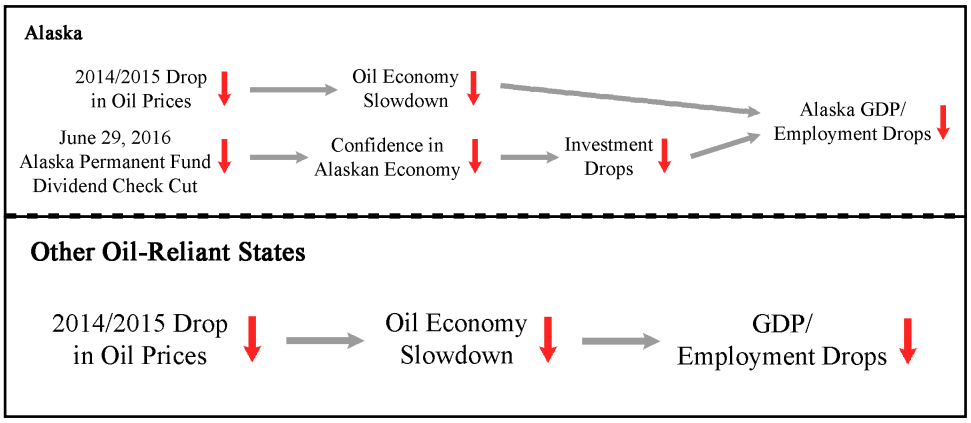
Romer and Romer (2010) note that a strong negative effect of increasing taxes on investment is consistent with a variety of literature that shows that investment is particularly sensitive to cash flow and overall economic conditions.

VII.B Mechanism

An important distinction commonly made in the fiscal austerity literature is that tax-based fiscal austerity is generally more damaging to an economy than expenditure-based fiscal austerity. Considering this distinction in the literature and considering Romer and Romer (2010) who find strong negative effects on investment from tax increases, it is important to identify what kind of macroeconomic shock Governor Walker's veto was. While it is true that cutting the dividend check reduced government expenditures, it is best to classify Alaska's 2016 fiscal austerity as tax-based fiscal austerity. From the view of an Alaskan, the dividend check cut was *as if* the government decided to unexpectedly tax every Alaskan an extra $1,000.

Expectations played in important role when trying to piece together what happened in Alaska after 2016. When Alaskan citizens have come to expect a dividend check of a certain size, which for forty years has been equal to the formula required by law, and that expectation is broken by the veto of the Governor, each Alaskan's expected income is now higher than the income that they will actually receive. In the previous two years to 2016, the size of the dividend check was over $2,000 (see Figure 1) which is about the same amount as what was expected in 2016 before the Governor's veto. From the long-standing expectation of the check being equal to the formula set out by state law, and from the fact that the past two year's check were essentially the same amount as the expected check in 2016, Governor Walker's veto was a true shock to expectations.

Figure 12



It is this difference between expected and actual income which is the mechanism through which this particular case of fiscal austerity caused such large macroeconomic consequences. While the mismatch between expected and true income possibly could have caused some small drops in consumption, the main macroeconomic consequences came in the form of less investment. Romer and Romer (2010) say that investment is sensitive to overall the overall economic condition. Governor Walker's veto decreased confidence in the Alaskan economy that led to a decrease in investment which permeated throughout the Alaskan economy in the subsequent years in the form of decreased employment and decreased GDP particularly in industries that serve as proxies for overall investment.

I find that the maximum treatment effect of cutting the dividend check occurred around the start of 2018. Consider also the poor macroeconomic landscape in the years before the dividend check was cut. In 2014 and 2015, the price of oil had dropped from over $100 per barrel to around $40 per barrel; see Figure 15 (**APPENDIX.B**). In Alaska and other states that are heavily reliant on oil income, this had devastating consequences.

Consider Figure 12 which describes how both in Alaska and Oil Economy States, the drop in oil prices can lead to a drop in GDP and Employment. From the model described in Figure 12, and as expected, when the price of oil dropped in 2014 and 2015, Alaska and other

oil-reliant states experienced a recession; see Figure 16 (**Appendix.B**). Whereas the rest of the oil-reliant states were recovering from their recession as the prices of oil started to rise in 2016 and thereafter, see Figure 15 and Figure 16 (**Appendix.B**), Alaska's act of fiscal austerity served as a second dose of negative economic shock which kept the Alaskan economy at a depressed level compared to other states who did not implement such large fiscal austerity.

I can compare my results to those of Romer and Romer (2010) who find that a 1% of GDP increase in taxes causes approximately a 3% decrease in GDP. In this paper, my estimate of a $1,000 reduction in the size of the dividend check equatable to *as if* it were a increase in taxes equal to 1.3% of GDP causing about a 5% decrease in private industry GDP, an implied multiplier of 3.8, matches reasonably well with what was found in Romer and Romer (2010).

VII.C Conclusions

Governor Walker vetoed Alaska's budget in 2016 and reduced the size of the Alaska Permanent Fund dividend check with the intention of helping to fix Alaska's deficit from falling oil revenues. Instead of helping the Alaskan economy, his act of fiscal austerity lowered confidence in the Alaskan economy which cut investment which prolonged Alaska's recession, lowered GDP, cut employment, and increased the number of Alaskans who received SNAP benefits. I find that the dividend check cut serving *as if* it were a 1.3% as a percentage of GDP increase in taxes caused a 5% drop in private industry GDP, a close match to the estimate found in Romer and Romer (2010).

References

Abadie, Alberto. 2021. "Using Synthetic Controls: Feasibility, Data Requirements, and Methodological Aspects." *Journal of Economic Literature*, 59 (2): 391-425.

Abadie, Alberto and Diamond, Alexis and Hainmueller, Jens. 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program," *Journal of the American Statistical Association*, American Statistical Association, vol. 105(490), pages 493-505.

Alaska Permanent Fund Corporation. (n.d.). Our Performance. https://apfc.org/performance/

Alberto Alesina, Omar Barbiero, Carlo Favero, Francesco Giavazzi, Matteo Paradisi, Austerity in 2009–13, *Economic Policy*, Volume 30, Issue 83, July 2015, Pages 383–437.

Anchorage Daily News. (2016, June 29). Gov. Bill Walker announces vetoes [Video]. YouTube. https://www.youtube.com/watch?v=kYMoQ5yTjXE

Auerbach, Alan J., and Yuriy Gorodnichenko. 2012. "Measuring the Output Responses to Fiscal Policy." *American Economic Journal: Economic Policy*, 4 (2): 1-27.

Bollotpedia. (n.d.). Gubernatorial approval ratings (2015–2019). https://ballotpedia.org/Gubernatorial_approval_ratings_(2015–2019)#Q4_2018

Federal Reserve Bank of St. Louis, Spot Crude Oil Price: West Texas Intermediate (WTI) [WTISPLC], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/WTISPLC

Giavazzi Francesco Pagano Marco (1990). 'Can severe fiscal contractions be expansionary? Tales of two small European countries' , in Blanchard J. Olivier Fischer Stanley (eds), *NBER Macroeconomics Annual 1990* , pp. 75 – 122.

Goldsmith, S. (2001). The Alaska Permanent Fund Dividend Program. Working Paper.

Guajardo Jaime Leigh D. Pescatori A. (2014). 'Expansionary austerity? International evidence' , *Journal of the European Economic Association* , 12 , 949 – 68.

Lockett, M. S. (2022, March 23). Deadline approaching to apply for PFD. Juneau Empire.

Nakamura, Emi, and Jón Steinsson. 2014. "Fiscal Stimulus in a Monetary Union: Evidence from US Regions." *American Economic Review*, 104 (3): 753-92.

Office of Management and Budget. (n.d.). FY 2016 Budget – Office of Management and Budget. State of Alaska. https://omb.alaska.gov/category/fy-2016-budget/

Romer, Christina D., and David H. Romer. 2010. "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks." *American Economic Review*, 100 (3): 763-801.

Shedlock, J. (2016, July 14). Group gathers in downtown Anchorage to begin efforts at recalling Alaska Gov. Walker over slashed PFD. Anchorage Daily News. https://www.adn.com/politics/2016/07/11/group-gathers-in-downtown-anchorage-to-begin-efforts-at-recalling-alaska-gov-walker-over-slashed-pfd/

U.S. Bureau of Labor Statistics, All Employees: Total Nonfarm in Alaska [AKNA], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/AKNA

U.S. Bureau of Labor Statistics, All Employees: Total Nonfarm in Wyoming [WYNA], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/WYNA

Appendix

Appendix.A

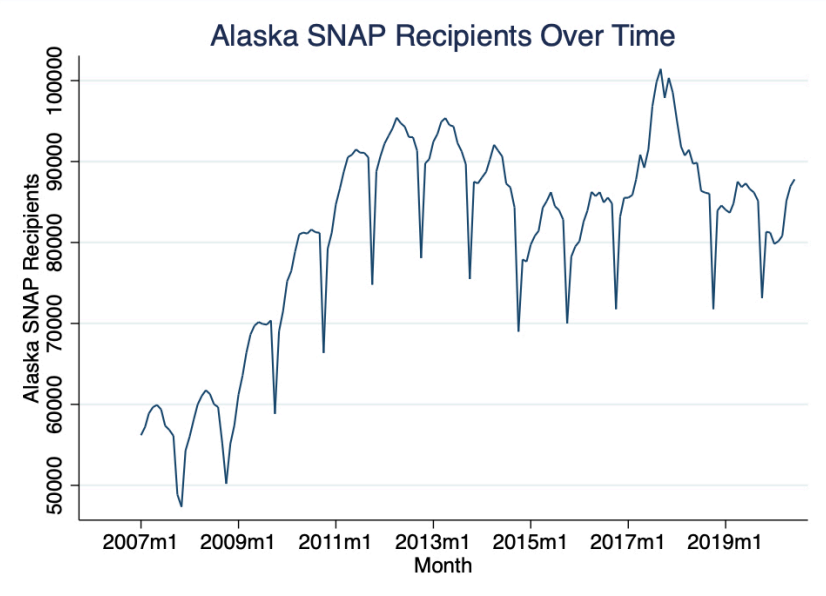
Figure 4 shows the raw data for the number of Alaska SNAP recipients over time. There is clear seasonal pattern in the data with large dips in the number of SNAP recipients occurring at regular intervals.

In order to seasonally adjust the data, I use the following model:

$$\mathbf{SNAP}_m = \delta_m + u_m$$

where SNAP_m is the number of SNAP recipients in Alaska in a certain month m, δ_m is a month fixed effect, and u_m is the error term. Table 19 shows that the cyclical dips occurring in Figure 13

Figure 13



happen in October. I seasonally adjust the data by subtracting Alaska's unseasonably adjusted data by the results of the regression shown in Table 19 for each corresponding month. For example, I will subtract 4,118.846 for every datapoint measured in May in the unseasonably

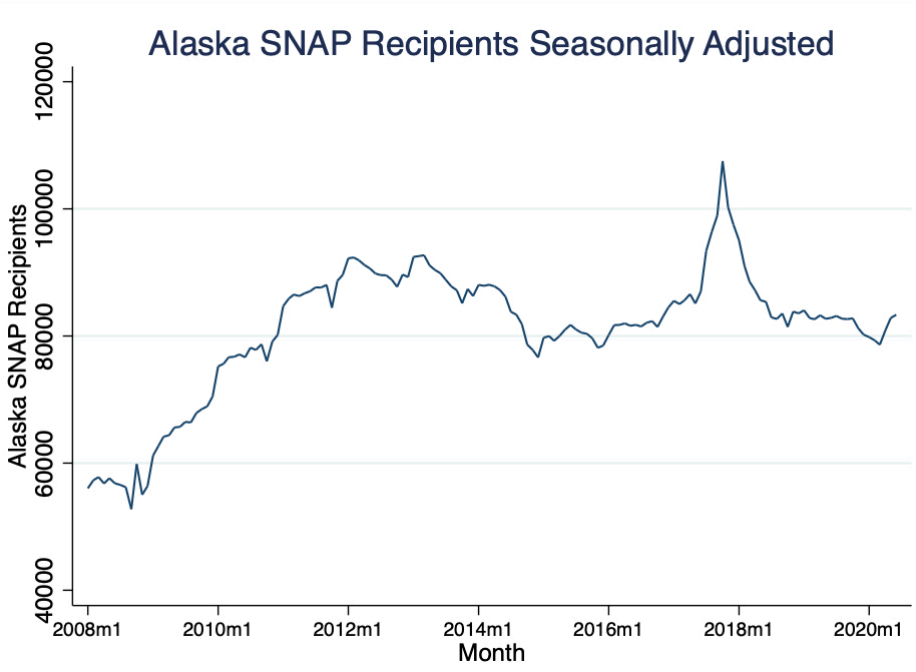
adjusted data. The result is Figure 14 which I feature in my paper as Figure 4. This method of seasonal adjustment seems to have worked fairly well in this case and there exists no major seasonal patterns in the resulting data.

Table 19

Month	Coefficient	std. err.	t	P> |t|
February	846.9231	4378.686	0.19	0.847
March	2195	4293.997	0.51	0.610
April	4262.615	4271.184	1.00	0.320
May	4118.846	4163.821	0.99	0.324
June	4462.308	4185.05	1.07	.288
July	3449.667	4368.084	0.79	0.431
August	3459.833	4441.269	0.78	0.437
September	2490.417	4615.356	0.54	0.590
October	-9653.833	4581.017	-2.11	0.037
November	112.8333	4566.399	0.02	0.980
December	1017.417	4402.357	0.23	0.818

Notes: Dependent variable is number of Alaskan SNAP recipients. Time period from 2008-2020.

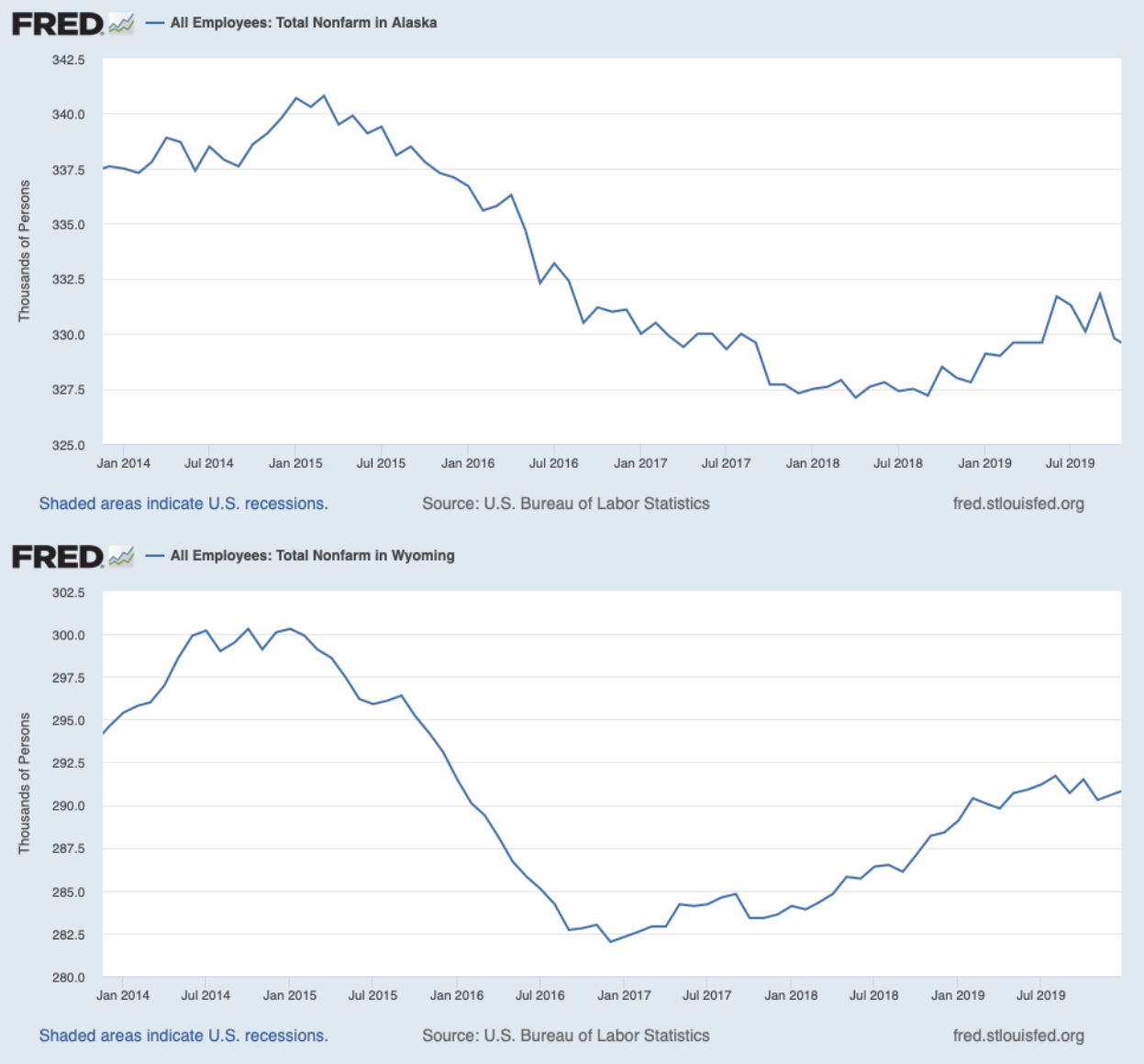
Figure 14



APPENDIX.B

Figure 15

Figure 16


FRED
All Employees: Total Nonfarm in Alaska
Thousands of Persons
342.5
340.0
337.5
335.0
332.5
330.0
327.5
325.0
Jan 2014
Jul 2014
Jan 2015
Jul 2015
Jan 2016
Jul 2016
Jan 2017
Jul 2017
Jan 2018
Jul 2018
Jan 2019
Jul 2019
Shaded areas indicate U.S. recessions.
Source: U.S. Bureau of Labor Statistics
fred.stlouisfed.org
FRED
All Employees: Total Nonfarm in Wyoming
Thousands of Persons
302.5
300.0
297.5
295.0
292.5
290.0
287.5
285.0
282.5
280.0
Jan 2014
Jul 2014
Jan 2015
Jul 2015
Jan 2016
Jul 2016
Jan 2017
Jul 2017
Jan 2018
Jul 2018
Jan 2019
Jul 2019
Shaded areas indicate U.S. recessions.
Source: U.S. Bureau of Labor Statistics
fred.stlouisfed.org