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# Alaska Permanent Fund Dividend and its impact on Education: Do we study for the money?

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[1]The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

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# The Alaska Permanent Fund Dividend and its effect on Education: Do we study for the money?

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**Abstract**

Universal Basic Income (UBI) has been featured in political discussions over the last years. Both people in favour and against its adoption, have provided numerous arguments to support either its positive or negative impact. Empirical literature on the topic is scarce since, with few exceptions, not many experiments have been conducted so far to empirically assess its effects. I use the Alaska Permanent Fund Dividend, a UBI-like programme, to assess the implications of unconditional cash transfers on educational decisions. I use data from various governmental sources, and predominantly Consumer Population Survey (CPS) data from the Integrated Public Use Microdata Series (IPUMS), to construct a panel dataset of 2,091 state-year observations. Using a synthetic control approach, I investigate how college enrolment and bachelor completion have been affected since the implementation of the dividend. The results show that college enrolments have no significant change with the implementation of the dividend but there is a significantly negative effect on bachelor degree completion.

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# 1 Introduction

Getting a college degree in the United States is anything but cheap. Student loan debt has reached $1.5 trillion in 2019 and is second only to mortgages (Friedman, 2019). Despite the large costs associated with obtaining a college degree, there is a plethora of positive effects that college education provides. For example, Montenegro and Patrinos (2014) find that higher educated individuals enjoy on average higher wages and better economic prospects. We would, therefore, expect people to want to obtain a university degree. However, due the high costs of attending college, obstacles such as credit constraints and financial instability could potentially reduce the socially optimal number of individuals who seek college education.

This paper aims to understand whether receiving a Universal Basic Income (UBI) leads to more people attending college, by helping on alleviating such financial constraints. The Alaska Permanent Fund Dividend (APFD) was first handed out in 1982 as a way to redistribute the state's oil proceeds. Using the APFD, which could be regarded as a small scale UBI, I investigate how education decisions regarding college attendance and bachelor completion have been affected. Given the UBI-like structure of the dividend, where every citizen of Alaska receives it unconditionally, I expect that it will induce more people to attend college, as it could potentially cover for a significant part of the costs of attending college. On average, in real terms, the amount of the dividend is approximately $1,500 per year. Although this does not seem much, in a family of four it sums up to around $6,000. Moreover, would a household decide to save that amount for its children's tertiary education, starting at the age of 10, a single child would save about $12,000, excluding any interest accumulation, by the time she turns 18. This covers more than a year's tuition at a public university in Alaska[1].

Implementing a synthetic control method as used by Abadie et al. (2010) and Jones and Marinescu (2018), I construct a synthetic Alaska to test how college enrolment and bachelor completion were affected by the dividend. The synthetic control uses pre-intervention outcomes from the pool of the remaining 50 states and assigns weights to each one in order to create a counterfactual Alaska. Based on the assigned weights, it creates a hypothetical scenario of how the outcomes of interest would have looked like in Alaska in the absence of the intervention. It therefore allows to test whether the dividend had any impact in the educational decisions of the people.

[1] Average tuition fees for the academic year 2016-2017 in Alaska were $7,210 for public 4-year college and $18,876 for a private 4-year college (NCES, 2017).

In order for the methodology to work, it requires that the remaining states in the pool could not have been affected by the policy implemented in Alaska, an assumption which strongly holds. The transfer was only given to residents of Alaska who stayed in the state for the whole year prior to the date of the transfer and could not claim any benefits or residency in any other state or country. Given the geographical location of Alaska, it is hard to imagine that any person would move there for the benefits, while commuting to another state for work.

Results indicate a mixed outcome. Firstly, regarding college enrolment, there seems to be no change induced by the introduction of the dividend. The share of the population 19 years old or older with at least some college education, has not been affected since people started receiving more money. However, this outcome is not mirrored when testing for bachelor completion. Results show that the share of people 23 or older who have obtained at least a bachelor degree, is significantly lower after the introduction of the dividend compared to what it would have been in its absence. A possible explanation of the combination of the results could be that, while people are still interested in pursuing a degree, having this extra income secured might disincetivise them from completing it if it proves to be more difficult than what they initially expected.

The remaining of the paper is structured as follows: Section 2 gives a brief summary of the APFD and its history. Section 3 discusses relevant literature on the topics. Sections 4, 5 and 6 discuss the data used, methodology and the results respectively. Lastly, section 7 provides a conclusion.

## 2 The Alaska Permanent Fund Dividend

Residents of Alaska have agreed that the petroleum reserves found in the state belong not only to the current residents but to future generations of Alaskans as well. They have thus voted, in November 1976, to amend the Constitution and establish the Alaska Permanent Fund (O'Brien & Olson, 1990). According to the amendment:

> At least twenty-five percent of all mineral lease rentals, royalties, royalty sale proceeds, federal mineral revenue sharing payments and bonuses received by the State shall be placed in a permanent fund, the principal of which shall be used only for those income-producing investments specifically designated by law as eligible for permanent fund investments. All income from the permanent fund shall be deposited in

the general fund unless otherwise provided by law[2].

The rationale of establishing the Fund was based on both economic and political arguments (O'Brien & Olson, 1990). For example, it was hoped that the Fund could accumulate enough wealth to assist in diversifying the economy of Alaska by investing in other sectors, while at the same time ensuring that future generations would also benefit from the finite natural resources. Another aim of the Fund was to help smooth out government spending, since it was believed that by the late 1990s the North Slope petroleum reserves were going to decrease. Similarly, the residents were fearful that the Alaska government was going to spend the money in the short term and the Fund offered a way to limit that spending.

In his 1976 State of the State Address, former Governor Hammond referred to all the citizens of Alaska as the shareholders of the Fund (O'Brien & Olson, 1990). He proposed to give an annual dividend to the citizens of Alaska from the proceeds of the Fund. The first distribution was in 1982 where each citizen received a dividend of $1,000. In later years, the amount fluctuated according to the returns the Fund received, with the latest dividend payment for 2018 being $1,600. The amount that is to be distributed is the half of the five-year average of the Fund's realised earnings, which is then to be divided equally amongst the eligible citizens (Goldsmith, 2001). The requirements an individual needs to fulfil in order to be eligible for receiving the dividend revolve around the fact that she is, and intents to stay, a permanent resident of Alaska and she was not incarcerated in the year she is applying for benefits[3].

A 2017 representative survey found that the dividend has proved to have helped Alaskans financially in a substantial way (Harstad, 2017). More than 80% of the respondents claimed that the dividend has positively helped with Alaska's economy and has improved their quality of life. When given the option of either keeping the dividend and keep paying income taxes or end the dividend and do not pay income taxes, the majority of people (64%) would prefer the former to the latter option indicating the positive impact it has on the community. Moreover, the majority of Alaskans surveyed (67%) said that receiving the dividend has helped people to save for college.

[2]Amendment to Alaska Constitution, Article IX, Section 15

[3]More information can be found at: https://pfd.alaska.gov/Eligibility/Requirements

# 3 Literature Review

## 3.1 APFD as a UBI

Universal Basic Income has become a "hot topic". UK's Labour party promised to try a UBI experiment if it had got elected in the January 2020 general election (Press Association, 2019). Moreover, experiments have been conducted in Finland, Canada, Kenya while a UBI-type-programme is currently being implemented in Iran. Although UBI has both many supporters and opposers, it is out of the scope of this paper to take a side. The main question of this section is whether one can consider APFD as a UBI programme.

Hoynes and Rothstein (2019) define a UBI programme as one which (a) provides a large enough cash benefit that a person can live on without relying on other means, (b) does not diminish, or does so only very slowly, with income and (c) targets the whole population or a very large part of it and not specific groups. Ghatak and Maniquet (2019) define it as (a) a cash transfer and not in-kind benefits, (b) is universal instead of group-specific and (c) unconditional and therefore not requiring the recipient to fulfil any specific criteria.

What both papers have in common is that they agree on the need for the transfer to be unconditional and universal. Banerjee et al (2019) and Van Parijs and Vanderborght (2017) also argue that unconditionality and universality are key parameters of a UBI. Although it is tempting to classify APFD as a UBI programme, I would argue that it does not cover the "Basic" term. At their current rate, APFD's amount is certainly not enough for a person to fully support their living. As such, I classify it as a UBI-like programme as it covers all the other key parameters of a UBI programme.

Two recent papers, Jones and Marinescu (2018) and Yonzan, Timilsina and Kelly (2020), have used the APFD as a UBI programme to investigate the effect it had on employment (the former) and on fertility (the latter). Both papers used a similar strategy to this paper, that of constructing a synthetic counterfactual and comparing the predicted effects in the absence of the APFD with the observed effects. Regarding effects on labour participation (one of the main criticisms of a UBI programme is that people might choose to work less), Jones and Marinescu (2018) find that APFD had no effect on full time employment while there was a slight increase in part-time work. Testing for fertility changes, Yonzan et al. (2020) find a positive effect on fertility rates, especially for females aged between 20 and 44.

### 3.2 Human capital and income

There is hardly any literature on the effect of unconditional cash transfers on tertiary education. However, there is theoretical and empirical literature which shows positive financial returns to education, implying that the more educated a person is, the higher her salary would be.

Mincer (1958, 1974), Becker (1964) and Becker and Chiswick (1966) have laid down the foundations of assessing the returns to human capital. The Mincer equation helps explain how higher education is associated with higher wages. Since then, various papers have built on the work of these authors and have empirically proven Mincer's model. Heckman and Lochner (2003), comparing high-school completion and college completion, find returns to education close to Mincer returns (lower, higher or equal depending on the model specification and the cohort used). Montenegro and Patrinos (2014) and Patrinos (2016), also find that, worldwide, there are positive returns to education and these are the highest for tertiary education.

Moreover, the literature has built upon, and updated, the assumptions used, to account for other factors that affect these returns. For example, one of Mincer's key assumptions was that the return of another year of education is linear, i.e. a person will get the same percentage increase on her wage going from 10th to 11th grade as going from one year of college to two. Heckman et al. (2008) suggest that these returns are not linear and are even higher for college education than what Mincer would have predicted, especially when using more recent data. This implies that the opportunity cost of forgoing college is even higher than what the Mincer equation would predict. One could therefore assume that people who are able to get admitted to college, would want to do so since their future returns will be higher.

### 3.3 Effects of credit constrains on tertiary education

A possible explanation as to why people who fulfil the admission requirements for college do not attend, could be due to the existence of borrowing constraints. Some people may want to attend college but are not able to finance the costs, despite high returns to education. One way to empirically show that credit constraints affect educational decisions and outcomes is by proving that Instrumental Variable (IV) estimates are higher than OLS estimates (Card, 2001). The argument behind this lies in the interpretation. When using IV estimates, we assume that people are more likely to change behaviour if induced by the instrument. Therefore, if the estimations show higher returns using the IV compared to using an OLS estimation, we can assume that credit constraints exist.

Carneiro and Heckman (2002) investigated whether this hypothesis is correct. They argue that the instruments used in the literature are either biased or invalid and therefore credit constraints are not a practical barrier to attend college. Instead, they argue that the main issue is that children cannot choose the environment in which they grow up to ensure higher ability growth. Their conclusions are empirically corroborated by Cameron and Taber (2004) who used four different specifications to investigate the existence of credit constraints on college decisions. They find that borrowing rates across families of different income levels and different backgrounds differ very little. In all four models they investigate, they find that borrowing constraints do not affect college decisions.

Other papers find that borrowing constraints have a negative effect on college attendance. Belley and Lochner (2007), using two different cohorts form the National Longitudinal Survey of Youth (NLSY), find that for the '79 cohort borrowing constraints do not have such a large effect, whereas for the '97 cohort they do. They argue that most papers which find an insignificant effect of borrowing constrains on college attendance and completion use the '79 cohort, implying that the issue occurred more recently. In a review of the relevant literature, Lochner and Monge-Narajno (2012) find that borrowing constraints have become a more prominent issue in more recent years, which explains part of the division in the literature on the topic.

Stinebrickner and Stinebrickner (2008) use a different specification to investigate the effect of credit constraints. Using students who already attend Berea college, an institution that offers favourable conditions (e.g. no tuition fees) for low-income students to attend higher education, they defined the credit-constrained students as those who, if they had the opportunity, would have borrowed more money at reasonable interest rates to cover daily expenses. They found that these students were more likely to drop out of college compared to those who were not credit constrained.

Although there seems to be no consensus in the literature regarding the effect of borrowing constraints on education, it could be argued that the issue has manifested in more recent years. This paper aims to use these findings of the literature and investigate whether a universal and unconditional transfer would have induced more people to attend college and obtain a degree.

## 4 Data

The variables of interest are the share of the population with at least some college education and the share of the population with at least a bachelor degree. Since these variables were not readily available, they had to be computed. I was able to find such data using the Current Population Survey (CPS) and more precisely, the Integrated Public Use Microdata Series (IPUMS) CPS provided by the Minnesota Population Center (Flood et al., 2018). I used annual data on highest educational attainment completed. Since the dataset did not offer data on college enrolment, I calculated the share of the population aged 19 and above with at least one year in college as a proxy[4]. To note here that up until 1991, the data was gathered based on years of education, e.g. after "Highschool diploma or equivalent" it went to 1 year of college, 2 years of college, etc. From 1992 onwards, it was collected based on the status of education, e.g. after "Highschool diploma or equivalent" it went to "Some college but not degree", "Associate's degree", "Bachelor's degree", etc. Therefore, to construct the proxy for college enrolment, I used the share of the population with at least 1 year of college up until 1991 and the share of the population with at least some college but no degree thereafter. Therefore, whenever college enrolment is mentioned, it refers to the share of the population aged 19 or above with at least one year of college education or some college but no degree.

The second calculation made was the share of the population with at least a bachelor degree. Due to the change in the way the data was collected mentioned above, as a proxy to bachelor degree completion I use the share of the population aged 23 and above with at least four years of college until 1991 and the share with a bachelor degree thereafter.

Most of the control variables used were obtained from the IPUMS database as well. Using the education variable I also calculated the share of the population aged 18 or above with at least a highschool diploma and the share of the population aged 45 or above with at least a year of college. The latter category allows to capture the effect of the older generations at any given time. I also calculated the share of females, share of the population above poverty line, and the share of the population aged between 19 and 22 for each year. Moreover, I calculated the share of the population working in oil related industries, construction, mining, agriculture, forestry and fisheries.

Data on annual GDP per capita at the state level was obtained from the U.S. Department of

[4]The relevant transformations have been made, e.g. multiplied by 100, to represent percentage points. This holds for all the variables that are presented as shares.

Commerce - Bureau of Economic Analysis. Data on unemployment rate from the U.S. Bureau of Labour Statistics and lastly data on the minimum wage per state from the U.S. Department of Labour.

Regarding the minimum wage, state and federal minimum wage can differ. In that case, the higher one prevails (Bradley, 2019). In 1977 there were 47 states with minimum wages equal to or less than the federal level. This number has been declining over the years and in 2017 there were only 21 states with equal to or less than the federal level.

Data for Alaska on the IPUMS database was only available starting in 1977 and therefore my sample was restricted to the years 1977-2017. In order to perform the Synthetic Control Method (SCM), I need state-year panel data. Since IPUMS data are available on the individual level, I calculated annual weighted averages for each state. After correcting for missing data, I used 5,475,033 observations to calculate 2,091 state-year averages. Furthermore, I adjusted for inflation for the GDP and minimum wage and transformed the averages into their natural logarithm to normalise the annual changes.

## 5 Methodology

The aim of this paper is to investigate the effect of the Alaska Permanent Fund Dividend on educational decisions. Ideally, I would have constructed a controlled experiment where I would randomly divide the population in two groups, give the dividend to one of them and then use a Difference-in-Differences approach to measure the effect. However, since the dividend has been given to everyone in the state of Alaska, as explained in Section 2, I will need to compare Alaska with a control group from the rest of the US.

Given the nature of the dividend, I can only compare aggregate data between states. Since there is no single state that can be used as a counterfactual, I will need to "construct" a counterfactual Alaska. In order to do so, as Jones and Marinescu (2018) did, I will use the SCM of Abadie et al. (2010) which, by assigning weights to each state based on the predictor variables observed in Alaska, it constructs a synthetic Alaska for comparison purposes. A detailed and mathematical explanation of the method is described in the paper of Abadie et al. (2010). I will, therefore, focus on a general explanation of how the SCM works following Jones and Marinescu (2018).

Suppose there is a panel of $S + 1$ states observed for a total of T periods. State $S_0$ receives treatment in period $T_0$ while the remaining $S$ states remain unaffected from the intervention. We also assume that the intervention has no effect on $S_0$ before $T_0$. Then, let $i_{st}$ indicate if state $s$ in period $t$ receives treatment or not. It will, therefore, take the following values:

$$i_{st} = \begin{cases} 0 & \text{if } s \geq 1 \\ 0 & \text{if } s = 0 \text{ and } t \leq T_0 \\ 1 & \text{if } s = 0 \text{ and } t > T_0 \end{cases} \tag{1}$$

Following Abadie et al. (2010) and similar with Jones and Marinescu (2018), I will also adopt a potential outcomes framework as in Rubin (1974):

$$\begin{aligned} y_{st}(0) &= \delta_t + \theta_t Z_s + \lambda_t \mu_s + \epsilon_{st} \\ y_{st}(1) &= \alpha_{st} + y_{st}(0) \end{aligned} \tag{2}$$

where $y_{st}(0)$ is the outcome of interest if there was no intervention and $y_{st}(1)$ the outcome with the intervention, in our case the introduction of the dividend. $\delta_t$ is an unknown common time-varying factor across states, $\theta_t$ is a $(1 \times r)$ vector of unknown parameters, $Z_s$ is a $(r \times 1)$ vector of observed covariates[5]. $\lambda_t$ is an $(1 \times Q)$ vector of common time-varying factors, $\mu_s$ is a $(Q \times 1)$ vector of unobserved factor loadings and $\epsilon_{st}$ is the error term consisting of mean-zero, unobservable, state-specific transitory shocks.

We are interested in the parameter $\alpha_{st}$ which represents the effect of treatment for the treated state, i.e. $\alpha_{st} = y_{st}(1) - y_{st}(0)$ for $t \in \{T_0 + 1, T_0 + 2, ..., T\}$. It is not possible, however, to observe a unit as both treated and untreated at any time $t$. Moreover, since the effect is at state level, it becomes very hard to find a single state to serve as the counterfactual for this analysis. In order to solve this issue, it is possible to assign weights in the pool of states we have as controls to create a synthetic Alaska to serve as counterfactual, i.e. what the outcome would have been if the treatment did not take place. Let $\mathbf{W}$ be a $(S \times 1)$ vector of positive

[5] In our case, for the first specification regarding college enrolment, this will be ln(GDP per capita), share of females, share of the population above poverty line, unemployment rate, ln(minimum wage), lagged values of share of the population aged 18 and above with a high school diploma for the years 1977, 1978 and 1979 and the share of the population between the ages of 19 and 22. For the second specification for the share of the population aged 23 and above with at least a bachelor degree, this will be ln(minimum wage), share of females, unemployment rate, share of the population working in oil related industries, construction, mining, agriculture, forestry and fisheries, share of the population aged 18 and above with a high school diploma, share of the population between the ages of 19 and 22 and share of the population aged 45 and above with at least some college education.

weights summing up to one, i.e. $\mathbf{W} = (w_2, w_3, ..., w_{S+1})'$ with $w_s \geq 0$ for $s = 2, 3, ..., S+1$ and $w_2 + w_3 + ... + w_{S+1} = 1$. This means that each value of $\mathbf{W}$ is a synthetic control constructed by the weighted average of the available control regions.

Following Abadie et al. (2010) and Jones and Marinescu (2018), I will choose a set of weights that solves:

$$\mathbf{W}^*(V) = \arg\min_{W} \left( \mathbf{X}_0 - \sum_{s=1}^{S} w_s \cdot \mathbf{X}_s \right)' \mathbf{V} \left( \mathbf{X}_0 - \sum_{s=1}^{S} w_s \cdot \mathbf{X}_s \right) \tag{3}$$

where $\mathbf{X}_s$ is a $(K \times 1)$ vector consisting of all or some of the elements of $(\mathbf{Z}_s', y_{s1}, ..., y_{sT_0})'$, and $\mathbf{V}$ is a positive definite and diagonal $(K \times K)$ matrix. The vector $\mathbf{X}_s$ contains a set of variables $\mathbf{Z}_s$ as observed in the pre-intervention period, 1977 until 1982 in our case. Here it should be mentioned that although the first dividend was introduced in June 1982, the data I use to measure education attainment is collected every March. Therefore, we will observe the results of the dividend on the educational attainment in the 1983 outcomes and thus 1977 until 1982 is considered to be the pre-intervention period.

The matrix $\mathbf{V}$ is chosen through an iterative process as follows:

$$\mathbf{V}^* = \arg\min_{V} \frac{1}{T_0} \sum_{t=1}^{T_0} \left( y_{0t} - \sum_{s=1}^{S} w_s^*(V) \cdot y_{st} \right)^2 \tag{4}$$

After we have arrived at a set of weights, our estimator for $\alpha_{0t}$ is:

$$\hat{\alpha}_{0t} = y_{0t} - \sum_{s=1}^{S} w_s^*(\mathbf{V}^*) \cdot y_{st} \tag{5}$$

for $t \in \{T_0 + 1, ..., T\}$. What the estimator shows is the average difference between the treatment unit and the synthetic control, i.e. synthetic Alaska, during the treated period:

$$\hat{\alpha}_0 = \frac{1}{T - T_0} \sum_{t=T_0+1}^{T} \hat{\alpha}_{0t} \tag{6}$$

### 5.1 Comparison with other methods and discussion of the assumptions

Following Doudchenko and Imbens (2016), we can classify the SCM in the same group as the Difference-in-Differences (DiD) estimation. As the authors discuss in their paper, the synthetic control method and the DiD method are very similar regarding the counterfactual outcome:

$$\hat{y}_{0t} = \mu - \sum_{s=1}^{S} w_s \cdot y_{st}. \tag{7}$$

The difference in the methods lies on the assumptions made in each case in equation 7. The first assumption of the SCM is $\mu = 0$ (the **no-intercept** assumption according to Doudchenko and Imbens (2016)). According to the authors, this is a valid assumption as long as there is no systematic difference between the outcome of the control and the treated unit. Since we are constructing a synthetic control group, which should imitate the treatment group in all the aspects before and after treatment in the absence of treatment, it is implied that there should be no systematic differences between the two. The main difference here with the DiD estimator, is that the latter allows for these differences to exist as long as the trend in the control outcomes are the same (Doudchenko & Imbens, 2016). In this case, since the aim is to compare Alaska with a synthetic Alaska, there should be no systematic difference between the two in the period before the intervention and the difference should only occur because of it.

The second assumption that Doudchenko and Imbens (2016) discuss, is the **adding up** assumption which states that the sum of the weights should equal one, i.e. $\sum_{s=1}^{S} w_s = 1$, and which, as the authors claim, is a common assumption in matching strategies. The authors continue by saying that, as with the first assumption of **no-intercept**, it is not plausible if the unit of interest is an outlier compared to the control units. In our case, as shown in the Appendix (figures A.1 and A.2), Alaska (black line) is not an outlier compared to the other states in the pre-intervention period[6], so both assumptions are deemed plausible. In the case of a DiD, $w_s = \overline{w} = 1/S$ meaning that all control regions have the same weight (Jones & Marinescu, 2018).

The third and last assumption required for the SCM, and an important restriction to it according to Doudchenko and Imbens (2016), is the **non-negativity** assumption, ensuring that the weights are equal or larger than zero, i.e. $w_s \geq 0$ for $s = 2, ...S + 1$. It helps regularising the estimation and ensuring that, in cases with possibly many control regions, there is a unique solution. At the same time, it limits the sum of the squared weights in the equation helping

[6]In both cases it is in the upper bound, as shown in the graphs, but it is not an outlier.

controlling for precision in the estimation.

### 5.2 Robustness of the methodology

Obtaining a synthetic control for Alaska does not guarantee that it is a good fit. Jones and Marinescu (2018) and Abadie et al. (2010) discuss ways to evaluate the obtained results. First, I want to evaluate how the pre-intervention outcome ranks compared to placebos of the remaining states. This can be done by comparing the Root Mean-Square Prediction Error (RMSPE), i.e. the square root of (4), of Alaska with the placebo estimates of the remaining 50 states. In both estimations, the chosen specifications rank high relative to the other states, at the top 12th percentile for college enrolment and at the top 16th percentile for at least a bachelor degree.

Moreover, in order to assess the significance of the obtained results, I use a permutation method as suggested by Abadie et al. (2010) and used by Jones and Marinescu (2018). I will firstly calculate the synthetic control for the remaining 50 states in my control pool assuming each time that the intervention happened to them. Then I will compare the outcome in the post-intervention period between Alaska and the remaining states. A first indication of significance would be if the post-intervention gap is larger, i.e. more extreme, compared to the remaining states. On the contrary, in the case that the Alaska outcome falls within the outcomes of the placebo tests, it will be an indication that the outcome is not significant.

Furthermore, a more quantitative approach of testing the significance of the results used by Abadie et al. (2010; 2015) is to compare the ratio of the post-intervention RMSPE to the pre-intervention RMSPE of Alaska to the ratios of the placebo tests. Relying only on the figure I obtain after performing the synthetic control methodology could result in false conclusions. For example, it might be the case that, performing the placebo tests, I observe that after the year of the intervention there are many states which, similar to what we observe in Alaska, show large gaps between their synthetic controls and the observed values. This would suggest that there are other factors at play which might influence the change in educational outcomes. On the other hand, this could also happen because the state was not well matched in the pre-intervention period, implying that the gap between the real and synthetic outcome is probably due to error. Therefore, a way to assess whether or not the outcomes of Alaska are significant, would be to calculate the likelihood, based on the placebo estimates, of obtaining a ratio of post-intervention RMSPE to pre-intervention RMSPE as large as Alaska. The lower this probability, the higher the significance of the obtained results.

Lastly, as a final check, I will employ a DiD approach to assess the robustness of the results obtained from the SCM. I will firstly perform a naive model, then a model with time fixed effects, a model with time fixed effects and the control variables used to estimate the synthetic Alaska in each case and lastly a model with time fixed effects, control variables and state fixed effects. I will do that for all remaining states and for only those states that are used to create the synthetic Alaska in each specification.

# 6 Results

There are two main specifications I aim to investigate. The first is whether the APFD has affected college enrolments and the second whether there was any effect on bachelor degree completion. Furthermore, I will present a number of robustness checks to assess the accuracy of my findings.

## 6.1 College enrolment

This first section aims to investigate the share of the population enrolled in college. Figure 1 shows the college enrolment in Alaska compared to the remaining 50 states. The dotted line marks the year 1983[7] where I assign the beginning of the intervention. As we can observe in the graph, Alaska's trend differs compared to the average of the remaining 50 states in the pre-intervention period and thus is will be naïve to use that as the counterfactual. Therefore, a synthetic Alaska will be a better counterfactual to analyse how education decisions would have been affected if the dividend had not taken place.

The predictor variables chosen for this specification are ln(GDP), the share of females in the population, share of people above poverty line, unemployment rate, ln(minimum wage), share of population aged between 19 and 22 and lagged variables for the years 1977, 1978 and 1979 of the share of people 18+ with at least a highschool diploma. Table 1 presents the weighted average values of Alaska, synthetic Alaska and the remaining 50 states of these predictor variables. As we can observe, with the exception of unemployment rate and ln(minimum wage), the synthetic Alaska is a closer and better approximation of the actual observed values. Three states were used

[7] A reminder to the reader that, as has been discussed previously, the first dividend was distributed in June 1982. However, the CPS survey for the ASEC data is distributed in March and we will therefore expect to see any results in the next available survey, which will be March 1983.

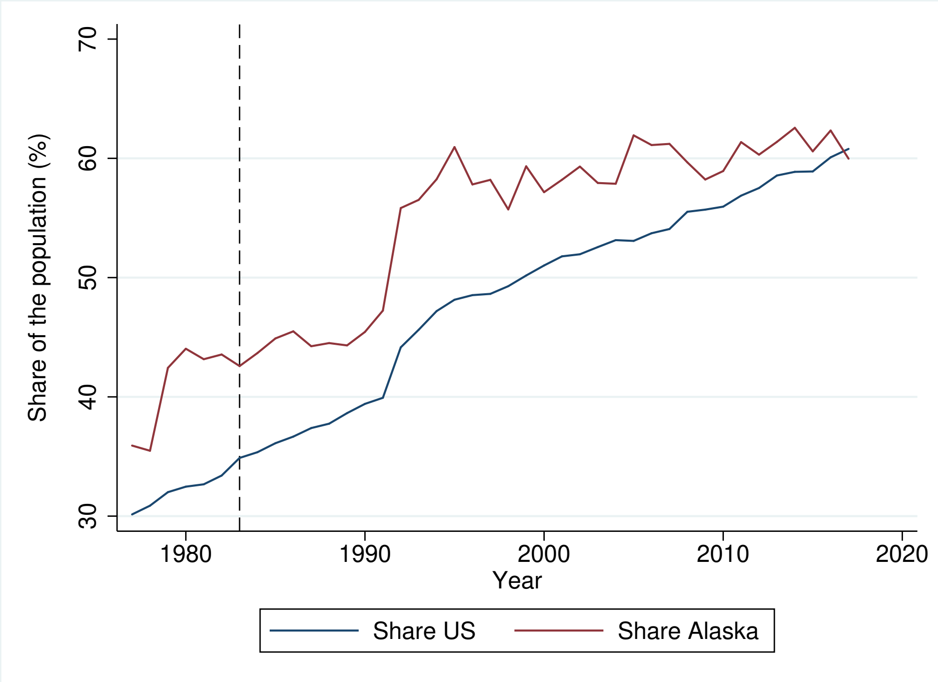


Figure 1: College enrolment - Alaska and remaining 50 states

to create the synthetic control: Colorado, Delaware and Wyoming[8]. Table A.1 in the Appendix shows the weights for each state.

Table 1: College enrolment - predictor values

| | Alaska | | |
|---|---|---|---|
| | Real | Synthetic | Remaining 50 States |
| ln(GDP) | 10.650 | 10.280 | 10.19 |
| Share of females | 47.9% | 50.7% | 52.3% |
| Share of people above poverty line | 91.6% | 91.4% | 89.4% |
| Unemployment rate | 9.78% | 5.72% | 7.26% |
| ln(MinimumWage) | 2.25 | 2.07 | 2.08 |
| Share aged 19-22 | 11.4% | 11.5% | 11.2% |
| Share 18+ with highschool diploma (1977) | 39.5% | 39.7% | 33.0% |
| Share 18+ with highschool diploma (1978) | 38.6% | 40.3% | 33.7% |
| Share 18+ with highschool diploma (1979) | 45.7% | 44.4% | 34.7% |

Figure 2 shows how the share of the population who has at least enrolled in college has changed after the introduction of the dividend. As we can observe from the graph, the synthetic Alaska closely follows the real Alaska in the pre-intervention period. After the intervention, the

[8] The weights are calculated automatically by the *synth* command available for Stata, R or Matlab.

dividend seems to have no effect on college enrolments. We do observe, though, a slight increase in the mid 1990s, compared to the synthetic control, which faded out in the 2000s. Moreover, during the last decade, we also observe that there are slightly fewer people enrolling in college, compared to what it would have been in the absence of the dividend. Nevertheless, given the overall outcome, we can conclude from the graph that the dividend seems to have an insignificant effect in overall college enrolments in Alaska.

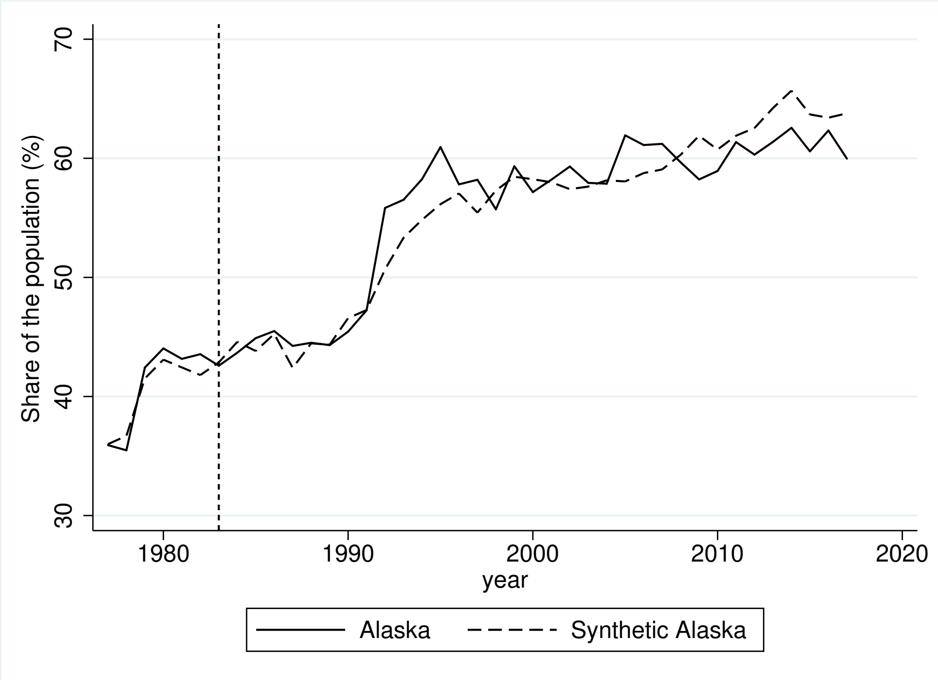


Figure 2: College enrolment - Alaska and Synthetic Alaska

To assess the quality and the significance of these results, one method is to compare how well the pre-intervention RMSPE, the difference between the actual and synthetic control outcomes, fits compared to the other states. The RMSPE for Alaska is better than 88% of the sample, meaning that the synthetic control captures the observed values in the pre-intervention period better than 88% of the other states and it is indeed a good fit for our variable of interest. Furthermore, another way to assess the significance of the results is by creating placebo synthetic controls using the remaining 50 states of the donor pool and see how the results of Alaska differ compared to the placebo estimates. Figure 3 depicts how the post-intervention difference between our synthetic control and the observed outcome in Alaska (solid black line) compares to the difference between the synthetic controls and the observed outcomes of the remaining 50 states. As expected, we can see that the gap of Alaska falls within the remaining placebo tests. Two deviations are present, in the mid-1990s and after 2010, as previously discussed. In those periods we do observe some more extreme results for Alaska but are still within the grey lines, meaning that there is not enough evidence to assume that there is a significant difference.

Finally, another method used in both Abadie et al. (2010) and Abadie et al. (2015) to assess whether or not the observed outcome is significant, is to compare how the ratio of the post-intervention RMSPE over the pre-intervention RMSPE compares to the remaining placebos. The probability of getting a ratio at least as large as the one for our variable of interest could be conveniently considered as the p-value. The lower this probability, the higher the significance of our results. In our case, the probability to get a post-pre ratio at least as large as Alaska's is 32%, therefore indicating that the deviations we see in the graph are not significant.

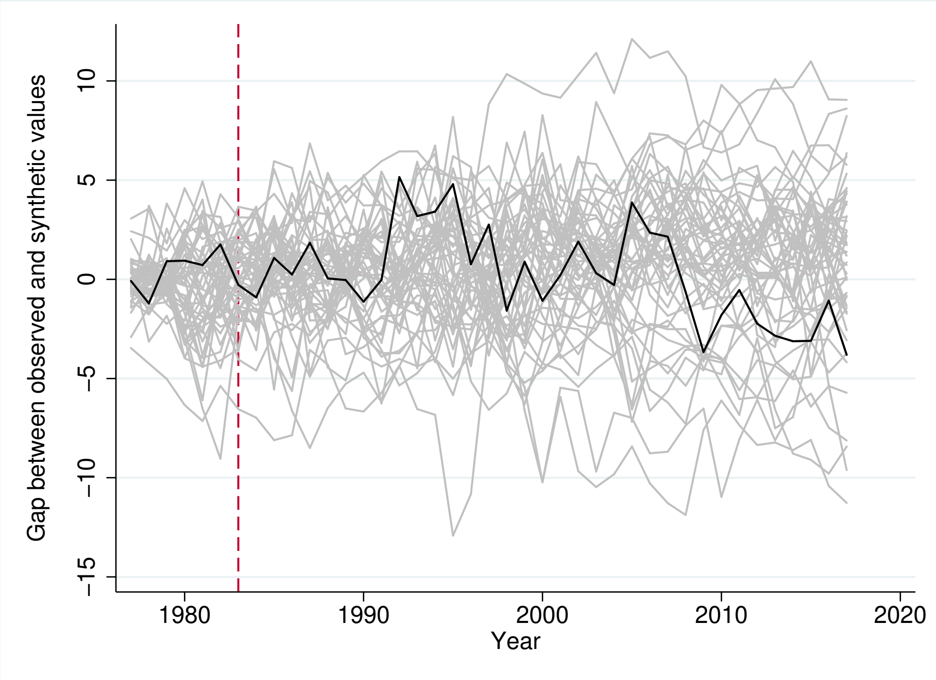


Figure 3: College enrolment - gap in Alaska and 50 control states

## 6.2 Bachelor degree

This section will focus on how the share of the population age 23 or older with at least a bachelor degree has changed since the introduction of the dividend. Figure 4 shows how this share differs between Alaska and the average of the remaining 50 states. The vertical dashed line marks the introduction of the dividend in 1983. The graph shows that in the first 20 years of our data, Alaska outpaced the rest of the country in terms of bachelor completion, while, since the 2000s, it has slightly fallen behind the rest of the country. It is clear that, especially in the years prior to the introduction of the dividend, Alaska and US had very different trends in terms of bachelor completion and thus, as with the previous analysis, using the remaining states as the counterfactual would be a naïve comparison. Therefore, a synthetic Alaska will constitute a better counterfactual.

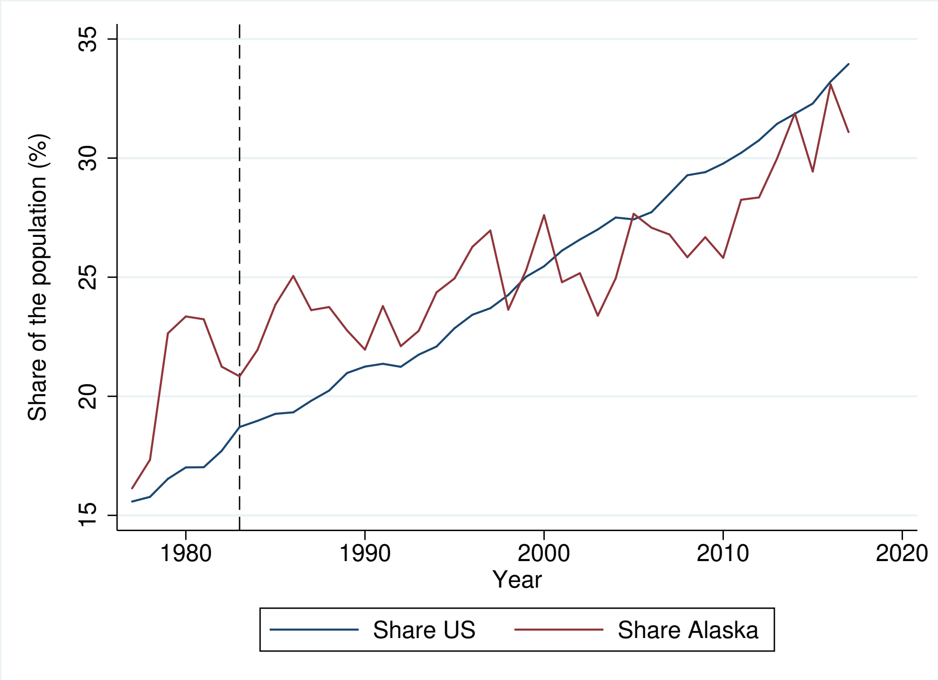


Figure 4: Bachelor degree - Alaska and remaining 50 states

Some of the predictor variables for this specification differ compared to the previous ones. Here, I used ln(minimum wage), the share of female population, unemployment rate, the share of the population working in oil related industries, construction, mining, agriculture, forestry and fisheries, the share of the population over 18 with at least a highschool diploma, the share of the population between the ages of 19 and 22 and lastly the share of the population over 45 with at least a bachelor degree. Regarding the industry share, these specific industries were chosen to capture a share of employment which does not particularly require higher education but has a relatively large share in Alaska compared to the rest of the US. The share of the population over 45 with at least some college education aims at capturing the likelihood of previous generations of attending college.

Table 2 presents the weighted average values of the predicting variables for the years 1977 to 1982 for Alaska, synthetic Alaska and the remaining 50 states. As we can observe, the synthetic Alaska can match the actual values better than the average of the remaining states with the exception of the unemployment rate. The synthetic Alaska was constructed by weighting Colorado, Hawaii, Oregon and Wyoming. Table A.1 in the Appendix shows the weights for each state. Compared to the results of section 6.1, Colorado and Wyoming are used to construct the synthetic counterfactual in both specifications, although Wyoming has a very low share of 0.7% in the case of bachelor completion.

Table 2: Bachelor degree - predictor values

| | Alaska | | |
|---|---|---|---|
| | Real | Synthetic | Remaining 50 States |
| ln(MinimumWage) | 2.25 | 2.09 | 2.08 |
| Share of females | 47.9% | 50.7% | 52.3% |
| Unemployment rate | 9.8% | 6.3% | 7.3% |
| Industry share | 12.1% | 9.9% | 7.7% |
| Share 18+ with highschool diploma | 44.4% | 43.1% | 34.8% |
| Share aged 19-22 | 11.4% | 10.7% | 11.2% |
| Share of people 45+ with at least some college education | 29.9% | 26.4% | 22.3% |

Figure 5 shows the evolution of the share of the population 23 years or older with at least a bachelor degree in Alaska and its synthetic counterpart. The dotted line marks the start of the intervention in 1983. As we can observe from the graph, compared to Figure 4 where the US had very different outcomes compared to Alaska, the synthetic control closely follows the real Alaska in the pre-intervention period and it therefore constitutes a better counterfactual compared to the average of the remaining 50 states.

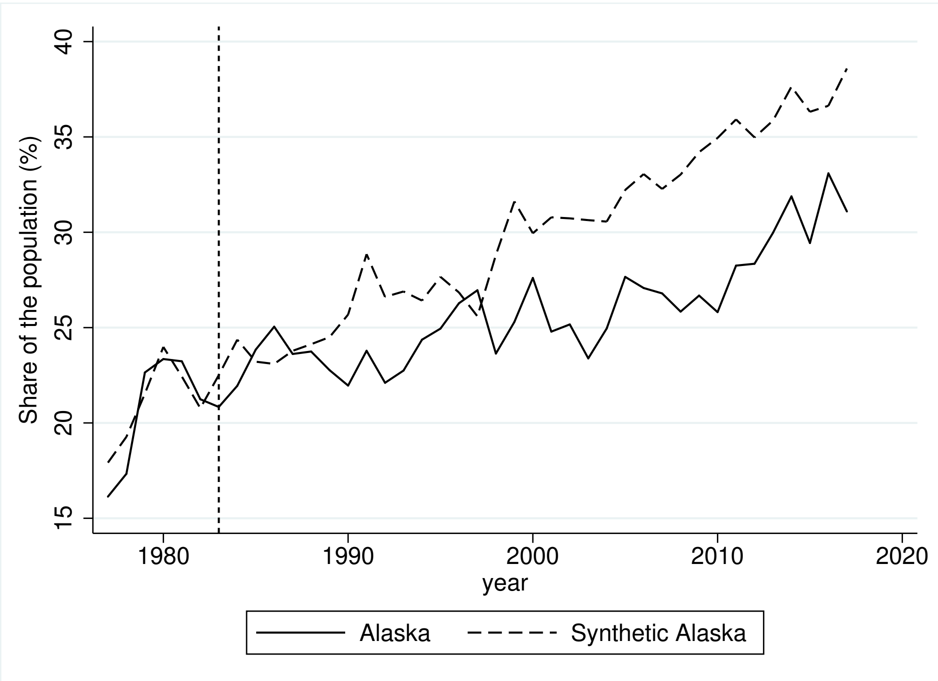


Figure 5: Bachelor degree - Alaska and Synthetic Alaska

The gap between the two lines is substantial and it indicates that, if the intervention had not occurred, a higher share of Alaskans would have had at least a bachelor degree. Looking more closely to the graph, we can observe that until the late 1980s, the dividend did not have a large effect on motivating or demotivating people from pursuing graduate studies. Since then, however, and especially after 2000, we can observe that the gap between the observed values and the synthetic control, has widened. This also helps explain Figure 4 where the US seems to have caught up with Alaska, or better yet, Alaska has fallen behind its trend.

The pre-intervention RMSPE for Alaska is better than 84% of the placebo states, indicating that again we have a good fit. Furthermore, Figure 6 shows how the gap between Alaska and synthetic Alaska (bold black line) in both the pre- and post-intervention periods compares to the gaps of the remaining 50 states in our donor pool. As we can see from the graph, there is a clear downward trend which, however, remains within the grey lines. This does not mean that our results are not significant. It is very likely that certain states show a very large post-intervention gap because of a very poor match in the pre-intervention period. Therefore, in order to assess whether our results are significant, we can compare the ratio of the post- to pre-intervention RMSPE. The ratio for Alaska is the largest, meaning that the likelihood of obtaining a share as large as Alaska's is $1/51 = 0.02$ indicating that our results are strongly significant.

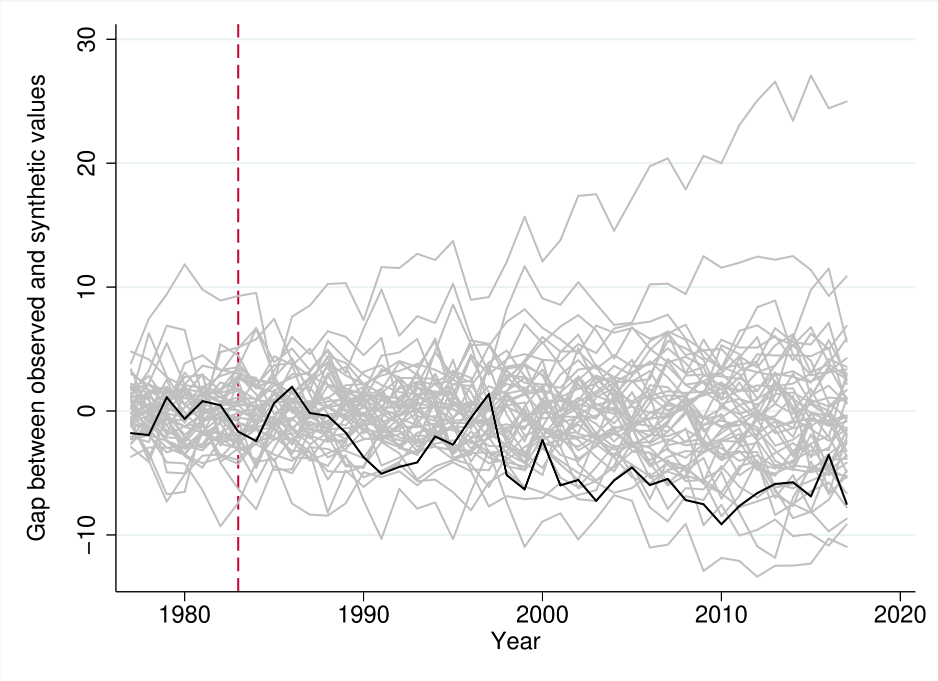


Figure 6: Bachelor degree - gap in Alaska and 50 control states

### 6.3 DiD Robustness Checks

In addition to the synthetic control robustness checks discussed above, I will perform a last check to my results by using a DiD approach as used in Yonzan et al. (2020). The synthetic control method forces the pre-treatment outcomes to match exactly. A DiD estimation relaxes this assumption but it assumes that the trend of the pre-treatment period is parallel for both groups.

I calculated two sets of results. Columns (1) - (4) show specifications using all the remaining states while columns (5) - (8) only those states that had positive weights. In column (9) I predict the same specification as in (8) for bachelor completion but I only use the states with higher than 10% weight in the model (in essence this implies that Wyoming with only 0.7% weight is excluded). Table 3 shows the results for both college enrolment (Panel A) and bachelor degree (Panel B).

Looking at the results, we can confirm that the synthetic control predictions are robust. In the case of college enrolment, when using all the available states, we see that the results are insignificant when controlling for state and year fixed effects and when taking into account the control variables used in the specification above. When restricting the sample only to the states with positive weights, we see that no matter whether we control for different factors or not, there is no effect before and after the introduction of the dividend.

When testing for the effect on the share of the population aged 23 and above with at least a bachelor degree, we see that there is a strongly significant and negative effect when using all the available states, irrespective of whether control variables are used or not. The effect becomes insignificant, although still negative, when the sample is restricted only to the states that have a positive effect on the synthetic control. However, this effect seems to be driven by the inclusion of Wyoming which only contributed to the construction of the synthetic control with a weight of 0.7%. Running the specifications again with only the states that have a positive weight of more than 10%, the results become significant in all the cases. Here I only present the specification of interest (9), where I control for year and state fixed effects and for the characteristics used in the construction of the synthetic control[9]. The results show that due to the introduction of the dividend, there has been a decrease of 1.76 percentage points in the share of the population with at least a bachelor degree.

[9] I have also run the other three specifications with only using these states and in all cases the results were significant.

Table 3: Difference in Differences results

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| Panel A: Some college | DiD with all States | | | | DiD with SC states | | | | |
| DiD Estimate | -2.59*** | -2.37*** | 7.25*** | -0.98 | -0.54 | 0.41 | 2.35 | -0.12 | |
| | (0.576) | (0.602) | (1.616) | (1.065) | (0.976) | (0.824) | (2.514) | (0.787) | |
| R-Square | 0.315 | 0.766 | 0.874 | 0.970 | 0.316 | 0.743 | 0.814 | 0.975 | |
| Constant | 32.45*** | 30.5*** | -120.09*** | -73.66* | 39.61*** | 35.25*** | 337.97 | 55.71 | |
| N | 5,475,033 | 5,475,033 | 5,475,033 | 5,475,033 | 286,215 | 286,215 | 286,215 | 286,215 | |
| Panel B: Bachelor Degree | | | | | | | | | |
| DiD Estimate | -4.05*** | -3.95*** | -5.48 | -3.90*** | -3.07 | -2.63 | -2.38 | -1.14 | -1.76** |
| | (0.367) | (0.395) | (0.769) | (0.355) | (1.609) | (1.431) | (1.193) | (0.553) | (0.346) |
| R-Square | 0.204 | 0.557 | 0.834 | 0.957 | 0.190 | 0.466 | 0.871 | 0.933 | 0.953 |
| Constant | 16.77*** | 15.67*** | -43.93** | -10.66* | 20.21*** | 17.29*** | 54.81* | 32.42 | 48.51*** |
| N | 5,475,033 | 5,475,033 | 5,475,033 | 5,475,033 | 366,905 | 366,905 | 366,905 | 366,905 | 305,397 |
| Time FE | | x | x | x | | x | x | x | x |
| Control Variables | | | x | x | | | x | x | x |
| State FE | | | | x | | | | x | x |
| Clustered SE | x | x | x | x | x | x | x | x | x |

Notes: Columns (1) - (4) present results for DiD estimations using all US states. Columns (5) - (6) restrict the sample to only the states with positive weight during the synthetic control estimation. Column (9) shows the estimation for only the states with weights higher than 10% for Panel B. Control variables are the same as the ones used to create the synthetic control. DiD coefficients represent percentage points.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## 7 Discussion and Conclusion

The aim of this paper was to investigate whether a Universal-Basic-Income-like policy such as the Alaska Permanent Fund Dividend has any effect on educational decisions. I used annual data from CPS to create a synthetic counterfactual which mimics how Alaska would have been in the absence of the dividend. I based my approach on two specifications. Firstly, I calculated how college enrolment is affected. Secondly, I investigated the effect of the dividend on bachelor completion.

The results vary. Firstly, there seems to be no significant effect on college enrolment. The SCM shows that the share of the population with at least a year of college remains the same as with the observed outcomes. This implies that the same amount of people would have enrolled in college even in the absence of the dividend. However, the same cannot be said for bachelor completion. It seems that the introduction of an extra source of income has a significant and negative effect on the incentives of people to finish their degree.

The implications of the results are non trivial. The APFD is definitely not large enough in terms of amount of money provided to be considered as a true UBI programme. It has, however, many of the characteristics that would classify it as a UBI. The decrease in bachelor completion, even with an amount not enough to sustain a person's living costs, seems to imply that when people have alternative sources of income, they choose not to complete their degrees. Taking into account the results of the previous specification, where college enrolment was not affected by the introduction of the dividend, a possible explanation (and definitely not the only one), could be that this extra source of income disincetivises people from finishing their studies if things become more difficult than expected. Moreover, considering Jones and Marinescu results (2018) which show that full time work was not affected, while part-time work increased, it would not be an extreme assumption to state that people might drop out from college and start working on lower paid jobs, or part-time jobs, while complementing their income with the APFD.

A caveat of this research is the small number of data points before the introduction of the dividend for the construction of the synthetic control. The availability of more data would have allowed for an even better construction of the counterfactual. Nevertheless, given the robustness checks, it would be safe to assume that the results would have led to very similar outcomes as shown here. Another possible caveat is the omission of people who follow online courses. The availability and range of online courses has increased over the past years and since the data captures people with a completed degree, those who followed some courses online but did not obtain a degree would not be captured. This could have caused an overestimation on the negative effect of the dividend, but it is unlikely that the results would have changed significantly if these people were also included.

Future research could focus on whether there are any trends regarding the type of degrees that might be affected. It would be interesting to research whether people following certain degrees are more likely to drop out because of the dividend compared with people who pursue a different study path. Another interesting avenue of research would be to investigate other potential uses of the extra income from the APFD. For example, it could be the case that a number of people use their dividend to fund a business idea or to save for retirement.

To conclude, the debate around UBI certainly does not end here. More research needs to be done on the topic and more experiments to be funded before concluding on its adoption or not. Economic arguments of how to fund it are still present and will also need to be addressed. What this paper has shown is that when people get an annual constant income boost without putting any effort for it, they will still enrol in college but are more likely to drop out than when they do not have this extra income.

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# Appendix

## A Tables and Figures

Table A.1: Synthetic Alaska Weights

| State | College enrolment | Bachelor |
|---|---|---|
| Colorado | 0.585 | 0.486 |
| Delaware | 0.22 | |
| Hawaii | | 0.389 |
| Oregon | | 0.118 |
| Wyoming | 0.195 | 0.007 |

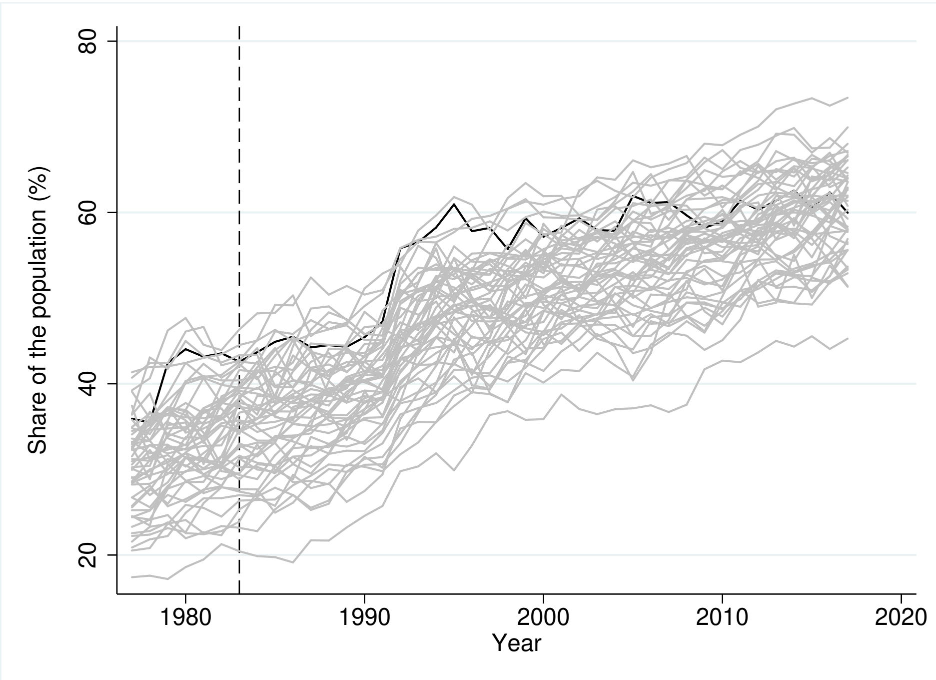


Figure A.1: College education - Alaska and the remaining 50 states


Figure A.2: Bachelor degree - Alaska and the remaining 50 states