pollution-free electricity by 2035. Achieving a net-zero emissions economy by 2050" (*National Climate Task Force* 2024). Subsidy solutions that have been passed by congress in recent history would only make one particular kind of car less expensive, yet nowhere near affordable enough for those in lower income groups.

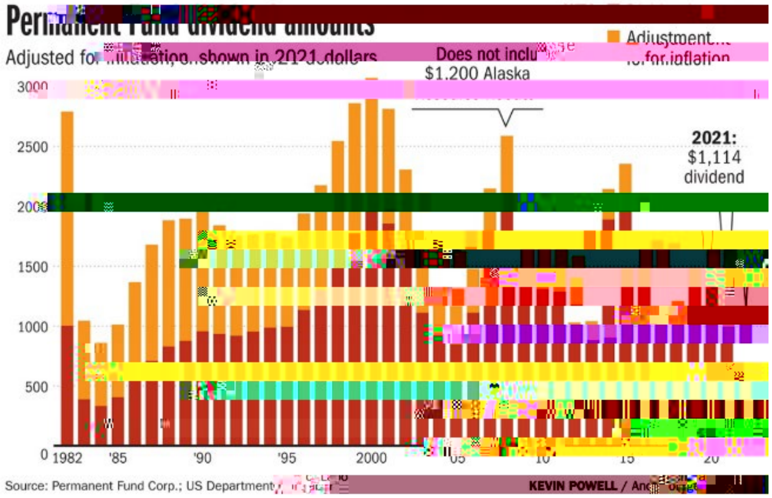
An alternative solution instead of subsidizing more environmentally friendly options, would be to make producing carbon intensive products more expensive. One aforementioned federal solution to increase cost of emission, that has been introduced but never implemented, is the carbon tax. However, this solution has a major flaw: it increases the substantial income

provide concluding remarks and findings, as well as how this essay could further the conversation on making the United States more livable by way of a reduction of Carbon Dioxide in the atmosphere as well as retaining, or even improving, the buying power of people in all income groups.

**Section 2: Alaskan Permanent Fund Dividend**

Alaska's Permanent Fund Dividend was first conceived in 1976. The first payments were made four years later in 1980, when each Alaskan resident received $50 for each year they had been living in the state since its conception in 1959. However, this first payment was deemed unconstitutional, as it violated the 14th amendment and made it impossible for new residents to ever make as much from the Dividend as old residents. In 1982, Alaska shifted the payout method, instead of paying out $50 for each year an individual has lived in the state, to any individual can receive a fixed Dividend amount so long as they have residency for at least six months. Since 1982, the Permanent Fund Dividend decided on Dividend amounts by yearly investment earnings on the tax revenue of Alaskan mining royalties (*State of Alaska*, 2024). The Alaskan Government entrusts the investment fund to be managed privately by the Permanent Fund Dividend Corporation so as to preserve the interest of Alaskan individuals:

> Section 15. Alaska Permanent Fund.
>
> 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-




Alaska's Permanent Fund Dividend would decrease inequality in Alaska, or make the income distribution more equal, this essay will show that a flat rate dividend will decrease the value of the Gini coefficient. It is important to note that the Permanent Fund Dividend is paid out to each individual, regardless of age, while income usually refers to each household. So, when calculated the effect on the Gini coefficient, in reality, some households may receive more than others depending on the number of children and retired persons living there along with the wage earners. In order to be considered a resident, a person must: 1) be considered a resident in the previous year, 2) have the intent of being a resident permanently, 3) have not claimed residency in another state in the past year, and 4) not be convicted of a felony or incarcerated in the last year. There is also a stipulation which states if a resident is absent for more than 180 days of the previous year on an "allowable absence," then they must have spent at least 72 consecutive hours in the state (*State of Alaska*, 2024). With these stipulations, it may be that Alaska's primary goal with the Dividend is not to reduce income inequality, but more likely to increase population.

The state of Alaska has added one-time payments in the past. For example, in 2008 Alaska implemented the Alaska Resource Rebate to the dividend, and similarly in 2022 and 2023, they added Energy Relief Payments to the dividend. The Resource Rebate was added only one time in 2008 as an additional $1,200 on top of the Permanent Dividend payment of that year, $2,069, assumedly to support Alaskan citizens as the economy downturned.

**Section 3: Lorenz curve and Gini coefficient**

In previous research, it has been found that the Gini coefficient and Lorenz curve are helpful tools in measuring the tax progressivity, or in this case the rebate regressivity, in a population (Mathews, 2014). In the case of this paper,

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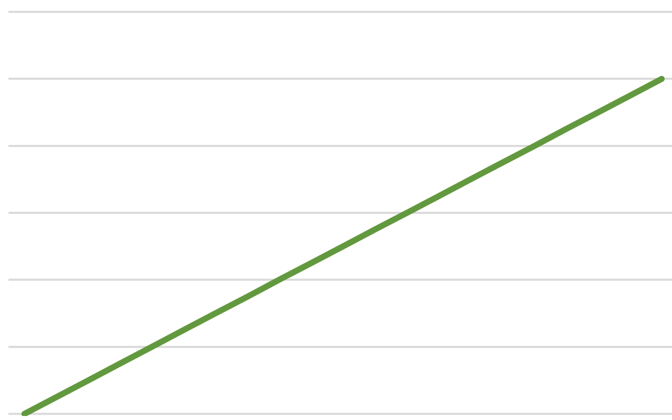
Once the Lorenz curve is found, a Gini coefficient can be calculated for the population.

The Gini coefficient is the differenc]TJ-03 (hci)-f ation. GiniulfThe Gfsion. (er)004 1 (f)-1 (iby)-4 (f)5 (f)e

$$\frac{-_{,}\ (\ \ _{0})}{} = [\int \quad (\ \ ) \quad + \quad ][\int \ ^{0}\frac{1}{} \quad ] - [\int_{0}\ ^{0}(\quad (\ \ ) + -) \quad ]$$

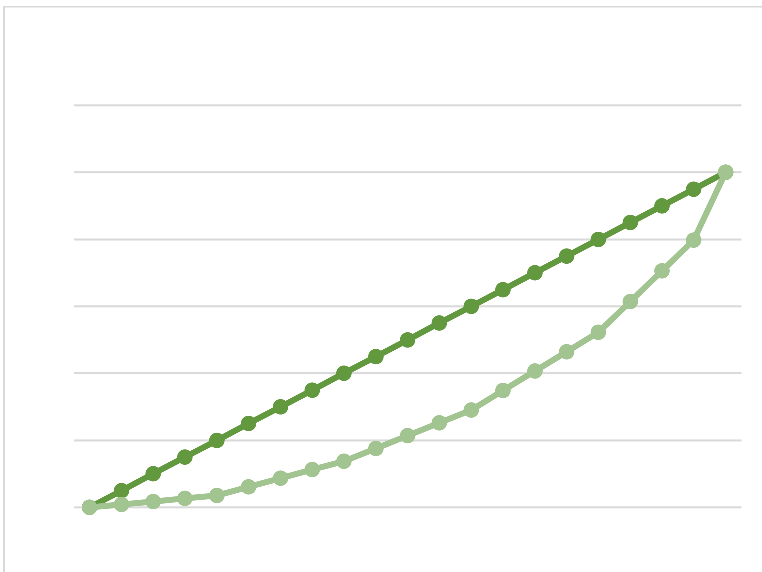
Dividend amount must be subtracted from income. However, a challenge arises because federal income tax is per household, where the Permanent Fund Dividend pays out to each individual, even dependents and retirees. In order to account for this difference, before subtracting the flat dividend rate from each quintile, the amount must first be increased by the rate of average size of household, which in Alaska is 2.67. By multiplying the Dividend amount in 2022: $3,946 by the household size: 2.67, the total amount subtracted from each household's income becomes $10,535.82. In reducing each income quintile by this amount, a simulation is conducted which reduces of the flat rate across the population and demonstrates a noticeable increase in the Gini coefficient, from 0.41 to 0.46, making it more closely resemble that of the United States as a whole, 0.47. The similarity goes to prove that a flat dividend or rebate to every individual in the United States would effectively decrease inequality.

Now that it has been shown that the inequality in Alaska is less than that of the entire United States, most of the differences in both Gini coefficient rates back to individuals. The minimum amount the Permanent Fund Dividend has paid out in the past has been $331.29 in 1984, the maximum being 2022’s $3,946. The Gini coefficient for the maximum has previously been observed as 0.41, however for the minimum Dividend amount the inequality is minimally affected, showing a Gini coefficient of 0.45, recall that without any payout it is 0.46.



The average Permanent Fund Dividend amount over the entirety of its existence is $1,260.47. Adding this average amount times the average household size to the base Alaskan inequality gives a Gini coefficient of 0.44.

The research shows that because the Permanent Fund Dividend is a flat rate, the greater the amount paid out to every individual in the population will lessen the income inequality. There is no wealth redistribution by way of taxation, or average payouts without the cutoff, more similar to the 0.41 of maximum payout without cutoff. The Pechman-Okner coefficient, or the percentage decrease in value of the Gini, for the Fund Dividend in 2022 is 10.87%. The minimum amount results in a percentage decrease of 2.17%, the average a decrease of 4.35%, and finally with the cutoff of 40% of the population, a percentage decrease in the Gini of Alaska of 8.70%. Notice the percentage decrease with the cutoff at 40% creates an increase in the percentage decrease amount compared to the 4.35% decrease caused by distributing the average universally. Even though both programs would cost the same amount, implementing a cutoff point doubles the decrease in the Gini coefficient.



The cutoff problem mentioned previously is accounted for in these measurements, as United States and Alaskan income data is provided in quintiles, up until the final 20% which is given as 15% and a final 5%, to account for the sharp increase in income. In order to account for the final 5% while retaining equal portions for the Lorenz curve, each quintile is stretched into four 5% groups with the same value. In order to keep measurements simple, with a lack of data available, an assumption is made that each household in each quintile has an income equal to the mean income found in the data for the portion. For example, every household in the United

States in the bottom 20% of the population makes the same $20,537 in income. In making this crude assumption, as long as the Permanent Fund Dividend amount does not exceed any difference between break points, quintiles, in the data, then there will be no need to reorder the population.

The examples with the various Alaskan Dividend amounts demonstrate Lorenz curve dominance with a universal flat rate payout or a directed flat rate payout to a cutoff percentage of the population. Each increase results in a higher, flatter Lorenz curve, in turn recalculating the Gini coefficient to be smaller, which means a more equal distribution of income. No matter the Permanent Fund Dividend payout that Alaska chooses per year, any payout will decrease the income inequality in the state. Compared to the larger United States, it goes to show that any universal rebate or payout of any kind, whether it be a rebate to offset the increased inequality caused by a carbon tax, or any kind of universal basic income, the rebate or payout on its own will always decrease inequality in a population.

**Section 5: Concluding Remarks**

This essay makes assumptions which require breaks in continuity so as to not have to reorder the Lorenz curve, should payout to a lower income group push them to earn more than the next highest, the Lorenz curve no longer functions and cannot be compared because the ordering had changed. In future research, it would be ideal to obtain continuous, per capita data to capture more accurate changes in income inequality. If in the future this data can be found, in order to reorder the Lorenz curve there would be some kind of horizontal integration to account for the benefits cliff created. Future research may also address how a carbon tax on high carbon

because they retain a dollar value as a level of comparison. This essay utilizes the Permanent Fund Dividend to simulate how a potential carbon rebate would benefit the United States. A flat rebate system, or universal basic income of a similar nature, may actually be less costly for the federal government, as it decreases the amount of costly bureaucracy of other welfare programs, while still achieving some goals of decreasing income inequality, and in turn increasing buying power of lower-earning United States citizens.

"U.S. Census Bureau Quickfacts: Alaska." *United States Census Bureau*, www.census.gov/quickfacts/fact/table/AK/PST045222. Accessed 29 Feb. 2024.

"Zobel v. Williams, 457 U.S. 55 (1982)." *Justia Law*, supreme.justia.com/cases/federal/us/457/55/. Accessed 29 Feb. 2024.