Indiana University - Bloomington

Emissions & Equity
Examining the effect of a carbon tax on Indiana households

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I. Abstract

This paper aims to determine if a proposed $40/ton carbon tax, similar to the Baker-Schultz Carbon Dividends Plan, will have a disproportionate effect on Indiana households at varying income levels. In other words, will households with lower incomes be forced to pay a higher percentage of their income towards the tax compared to households in high-income brackets? Carbon taxes and other market-based environmental strategies are becoming increasingly viable options to mitigate the effects of climate change as countries prepare to meet the ambitious goals of the Paris Climate Agreement. Using data from the Energy Information Administration (EIA), a state electricity portfolio for the state of Indiana was created to find the state's energy mix or carbon emitting energy sources. Once this was found, the average household consumption by income level from the EIA Residential Energy Consumption Survey (RECS) was manipulated to find the average tons of carbon emitted per household. Finally, the $40/ton of carbon tax was applied to each income level to see how much each income level's energy expenditures would be increased. It was determined that low-income households are more affected by a carbon tax because a higher percentage of their income will go towards such a tax.

II. Keywords

Carbon tax, Indiana, household energy expenditures, coal, natural gas, petroleum, climate change, progressive and regressive taxes

III. Introduction

Over the past few decades, the world has seen an increase in the occurrence and severity of natural disasters like hurricanes, floods, and droughts, as well as rising sea levels, and surface temperature changes. A paper by Bressler warns that increasing rates of carbon dioxide in our atmosphere will not only have catastrophic effects on the environment but could also cause many people to prematurely lose their lives (Bressler, 2021). The study found that the hottest and poorest parts of the world are likely to see the worst effects of rising atmospheric carbon levels, even though they often contribute the least to global carbon emissions. Additionally, despite a momentary decrease in carbon emissions because of the COVID-19 pandemic, the Scripps Institution of Oceanography and the National Oceanic and Atmospheric Administration has found that atmospheric carbon dioxide levels are at their highest levels since accurate measures were first taken in 1958 (Monroe, 2021).

It is becoming more evident that action needs to be taken to mitigate the effects humans have on the environment. Carbon taxes and other market-based environmental strategies are becoming increasingly viable options to mitigate the effects of climate change as countries prepare to meet the ambitious goals of the Paris Climate Agreement (Eberhard, 2017). Many countries around the world, such as Peru, Thailand, Canada, and France have implemented carbon taxes with the hopes of decreasing the tons of emissions released or, at the very least, collecting a tax that can then be put towards mitigating climate change.

There is currently no carbon tax policy that has been implemented at the state or federal level in the United States. It should be noted that some U.S. states do have cap-and-trade policies which are seen as another efficient solution to decrease atmospheric carbon levels (Knittel, 2019). However, the current cap-and-trade systems in the U.S., most notably in California and the Northeast, might be losing their effectiveness and not decreasing carbon emissions rapidly enough (Busch, 2017). Regardless, the U.S.'s temporary withdrawal from the Paris Climate Agreement under President Trump put the U.S. further behind in the climate fight (Pickering, 2017). With the U.S. back in the Paris Climate Agreement since President Biden has taken office, any further setbacks the US might face as a result have been lessened. However, proposals from the right, including replacing the clean power plan and lifting bans on oil and natural gas extraction are alarming indicators of the future of climate and other environmental policies in this country (Baker, 2020). Additionally, it suggests that the fight to pass climate policies is a long, uphill political battle between opposing political parties.

As a result of the lack of policies to tackle climate change in the U.S., various carbon tax plans have been proposed. One such policy is known as the Baker-Schultz Carbon Dividends Plan. Named after a former White House Chief of Staff and a former Director of the Office of Management and Budget, respectively, it has support from many high-ranking economists, policy makers, and environmentalists. Additionally, it has the support of large U.S. corporations, NGOs, and energy companies ("Founding Members"). The plan consists of the following four pillars, as defined by the Climate Leadership Council ("The Four Pillars of Our Carbon Dividends Plan"):

I. **A gradually rising carbon fee**: an economy wide fee on carbon emissions that will start at $40/ton and increase every year at 5% above inflation.

II. **Carbon dividends for all Americans**: returning all net proceeds from the tax to U.S. households which could increase as the carbon tax increases and, for some Americans, could total more than what they pay in energy costs.

III. **Significant regulatory simplification**: streamlining or removing regulations that are no longer necessary upon the implementation of a carbon tax. This includes all current and future federal carbon source regulations which will no longer be necessary.

IV. **Border carbon adjustment**: carbon-intensive exports to countries without comparable carbon tax systems will receive rebates for carbon taxes paid, while carbon-intensive imports from such countries will face fees on the carbon content of their product.

The purpose of a carbon tax is to "internalize externalities associated with anthropogenic climate change" (Metcalf and Weisbach, 2009); however, carbon tax policies that have been implemented around the world have shown that they may also bring about unintended consequences. The CLC sides with economists (Akerloff et al. 2019) who believe that an increasing carbon tax "offers the most cost-effective climate policy solution" ("The Four Pillars of Our Carbon Dividends Plan"). Therefore, it could be argued that the first pillar will have the largest direct impact on American households so studying its impact could yield the most meaningful results. As described below, multiple case studies from countries around the world have found that carbon taxes tend to be regressive and disproportionately affect low-income households compared to the higher income brackets. Previous research suggests that carbon tax policies are optimal when they are progressive and an undue burden is not placed on low-income households because "such a tax will avoid hurting lower-income households and be more effective at curbing the less elastic demand of the high consumers" (Casal, 2012).

It should be mentioned that the second pillar of the Baker-Schultz Carbon Tax Dividends Plan, a carbon dividend given back to American households, has the potential to make up for this lack of tax uniformity across income brackets. The Climate Leadership Council (CLC) outlines their plan for a carbon dividend in their second pillar of the Baker-Schultz Carbon Dividends Plan where "all net proceeds from the carbon fee will be returned to the American people on an equal and quarterly basis" ("The Four Pillars of Our Carbon Dividends Plan"). The CLC calculates that a family of four has the potential to receive about $2,000 in just the first year. Preliminary studies have shown that a carbon dividend on a $50/ton carbon tax made the policy progressive, minimized redistribution among households in similar income levels, and benefited most people, including 84% in the bottom half of the income distribution (Fremstad and Paul, 2019). However, the second pillar will not be analyzed in this paper due to a resource and time constraints.

This study will investigate how Indiana households are impacted by the first pillar of the Baker-Schultz Carbon Dividends Plan. This plan was specifically chosen to be studied through the lens of Indiana because it has been proposed in the Indiana State Senate (Senate Resolution 8, 2021). Additionally, after conducting preliminary research, there has yet to be a published analysis of the effects of a carbon tax on Indiana households and this paper could provide unprecedented insight into how Indiana households would be affected by a carbon tax. Since a $40/ton carbon tax is a flat tax on carbon emissions across income brackets, it is expected that the tax will be regressive in nature due to the lack of variance in the tax amount across income levels. Using demographic data from the U.S. Census Bureau and household energy consumption data from the EIA, the average increase in annual energy expenditures was found for Indiana households at different income levels. The percentage of each household's income that goes to the carbon tax will determine whether the proposed carbon tax is regressive or progressive.

IV. Literature Review

Examining Elements of Existing Carbon Tax Policy Plans

In response to the Paris Climate Agreement and general global warming concerns, countries around the world have created nationwide carbon tax plans with the hopes of decreasing carbon emissions. The countries that will be examined in this section include France, Canada, Peru, and Thailand. Various policy briefs and analyses have examined carbon taxes from other countries that highlight the benefits and shortcomings of carbon tax plans. The following section provides a brief overview of the current literature regarding carbon taxes to highlight the core strengths of carbon taxes while also detailing some potential drawbacks.

Carbon Tax Policy Brief

A policy brief by Kolstad, an environmental economist, aims to better understand whether individual consumers, households, or businesses ultimately end up paying for environmental policies like carbon taxes (Kolstad 2014). The author points out that costs associated with policies intended to reduce emissions are often passed down to consumers or buyers of intermediate products. More specifically, the author focused on three different variables to measure how a $15/ton tax on carbon emissions would impact the economy, consumers, and producers: 1) industry, 2) geography, and 3) income. The author's findings were troubling regarding consumer income and showed that "households in the lowest 10% of the income distribution [would pay] roughly three times what the richest 10% pays". Certain industries will also be negatively affected, but the four that are most affected (cement, manufacturing, electricity production, and fertilizer) only account for 1% of the total gross output of the U.S. economy. Kolstad finds that carbon emission taxes are meant to target large corporations, but customers are left covering most of the taxes through increased prices.

Case Study of a French Carbon Tax Policy

France enacted a carbon tax policy in 2014. The French policy is similar to the proposed Baker-Shultz carbon tax policy because both include a carbon tax that gradually increases over time. However, due to protests by activists and high fuel prices, the gradual increase in France was temporarily abandoned and has remained at the same level since 2018. In a paper by Douenne, the French carbon tax policy was examined to highlight some key findings and important terms that will be helpful in this research (Douenne, 2020).

First, the paper states that public support for carbon pricing is low which means that most carbon tax proposals or similar policies will likely be faced with backlash and protests from the community. Secondly, the paper mentions that low-income households are not the only sector likely to be negatively affected by a carbon tax; houses in rural areas that rely more heavily on fossil fuels like natural gas and coal will also face disproportionally high tax rates. This is an important factor to consider for this paper since Indiana has a high concentration of rural households that are likely to face the same issue.

The Case for a Carbon Tax in Canada

Since 2019, every province in Canada has had a tax on carbon emissions ("Carbon pollution pricing systems across Canada"). According to the Canadian government's outline of the carbon tax plan, the country offers flexibility in their price on carbon emissions. Individual provinces can set their own carbon price to fit their needs or abide by the one set by the federal government. As of April 2021, the minimum carbon tax has been set at $40/ton of carbon emissions, an increase from $10/ton of carbon emissions when it was first introduced (Sevunts, 2021). The $40/ton on carbon emissions is also seen in Baker-Schultz tax plan and both plans feature a gradually increasing tax.

In the proposal for Canada's carbon tax, the benefits of a carbon tax were outlined. In the proposal, Rivers explained that industries and households are incentivized to change their behavior and decrease their carbon emissions because it will result in paying less in taxes (Rivers, 2014). Additionally, market-based instruments have been found to be more cost effective than technological standards. The transparency and simplicity of carbon tax policies have also been heralded since other carbon emissions policies are convoluted and lengthy texts that are too complex for the average person to fully digest. Finally, Rivers outlines that carbon taxes drive innovation. When faced with low carbon emission standards, companies will be encouraged to invest in low energy alternatives to their current methods.

The data collected by Rivers in this proposal was published before Canada's carbon tax was put in place. To get a better understanding of how the country has fared since the nation-wide carbon tax was introduced in 2019, we must look to a case study of a carbon tax in a Canadian province. Liu et al. researched the province of Saskatchewan, Canada which is described as an "emission-intensive economy" (Liu, et al. 2018) or one that is heavily reliant on industries that release carbon emissions. They hoped to find how a carbon tax would affect Canada and, more specifically, the direct and indirect socioeconomic impacts of a carbon tax. Their results found that the country's GDP was changed due to decreases in consumption. Additionally, because decreases in coal and petroleum product production had the greatest impact on emission levels, Liu et al. suggests that a move towards technologies that are less reliant on coal and petroleum "may be the crucial issues for realizing both national and provincial environmental and economic objectives". With all of this in mind, the paper voices support for the application of a carbon tax in Canada and believe it is an effective way to decrease carbon emissions in the country.

A Carbon Tax in Peru

To better understand how to lessen the disparities felt by low-income households when faced with a carbon tax, Malerba et al. looked at a carbon tax policy in Peru that used a carbon dividend, also called revenue-recycling, to avoid severe adverse effects of a carbon tax. Revenue recycling involves returning some of the revenue from a carbon tax back to low-income households; this paper suggests that such a practice is a vital part of a carbon tax policy. However, a key shortcoming of this policy feature is the likelihood of high exclusion error, which means not enough low-income households can obtain the necessary monetary resources or resources are not evenly distributed among households (Malerba et al., 2020). Also mentioned in the paper is the discussion of whether carbon tax policies are regressive or progressive; unfortunately, many carbon tax plans that have been passed are regressive, which only worsens the effects on low-income households. The authors recommend that a more progressive tax structure would help alleviate some discrepancies between household income levels and the amount collected by a carbon tax.

Effects of a Carbon Tax in Thailand

A paper by Saelim provides an example of a carbon tax policy currently in place in Thailand (Saelim, 2019). The paper simulates different carbon tax scenarios and estimates the taxes' effects. The author studied Thailand to determine if a carbon tax would affect individual spending habits because of increased prices, as well as "household welfare, income inequality, and poverty rates" (Saelim, 2019). The paper also mentioned a different end-source for carbon dividends which could be beneficial in an American context: carbon tax dividend through pensions given to the elderly population. In Thailand, this was shown to "reduce the poverty rate and improve the welfare of households" in the lowest income bracket (Saelim, 2019). This could be a tempting policy proposal for US policy makers since some of America's social services, including Social Security, are rapidly losing funding. Experts warn that the dwindling revenue stream for services like Social Security checks could be exhausted by as early as 2037 (Goss, 2010). Another interesting point this paper brought up is that which economy sector is taxed can greatly affect how consumers respond. For example, some sectors like electricity are more inelastic while others like transportation and fuel are more elastic and will respond more to price changes. Finally, this paper will be beneficial to this research because it outlines ways in which a carbon tax policy proposal can be analyzed. Through varying lenses of effectiveness, equity, and social implications, a policy analyst can determine if a carbon tax plan can reduce emissions in a way that does not disproportionately harm low-income consumers.

V. Data Collection and Methods

This research paper aims to conduct a carbon tax analysis on Indiana households. As stated above, the projected carbon tax amount being analyzed in this research paper is a $40/ton tax on carbon emissions. It is important to note that only household energy emissions were included in this analysis. Other sources of carbon emissions like transportation, food, or manufacturing were not included in the calculations. Therefore, how much households end up paying towards a carbon tax could be more than what is found in this paper. For the purposes of this research, how much people pay towards the tax depends on how much carbon their household emits and how much carbon their household emits depends on the fuel source. Assuming that household energy use and behavior does not change, and energy producers pass the cost of the tax fully onto individuals through higher prices, how much more an individual will likely pay for household energy because of this proposal will be calculated.

The main sources of data used in this research paper were two survey data collections from the U.S. Energy Information Administration (EIA). The data sets include the 2015 Residential Energy Consumption Survey (RECS), the Electric Power Sector Consumption Estimates for Indiana (Table CT8). RECS is a "nationally representative sample of housing units [that] collects energy characteristics on the housing unit, usage patterns, and household demographics" and combines it with data from energy suppliers to estimate energy costs and usage for heating, cooling, appliances, and other end uses ("About the RECS"). This data set is valuable for many reasons including projecting future energy demand, determining the demographics with the highest usage, and improving efficiency and building design. The RECS data breaks down energy consumption by many factors, including the type of household, square footage, and main heating fuel, among others. Since the purpose of this study is to determine if different income levels are disproportionately affected by a carbon tax, average emissions given by income level found in the RECS was the data set that was used, which can be seen in Figure 1.

The RECS data is valuable, but the 2015 data set only gives data by Census region due to a low response rate for that year. Indiana is in the Midwest Census region which is made up of twelve states in the northern middle part of the U.S. ("Census Regions and Divisions of the United States"). The assumption that households across the Midwest region have similar household energy consumption based on income was required and might make the overall findings less accurate. However, this data set is the most robust data set available and its use was vital in determining household emissions based on income.

Figure 1: Annual household site consumption and expenditures in the Midwest by 2015 annual household income

2015 Annual Household Income	Per household energy consumption (million Btu)
All homes	94.3
<$20,000	67.2
$20,000 to $39,999	84.7
$40,000 to $59,999	88.7
$60,000 to $79,999	99.3
$80,000 to $99,999	105.4
$100,000 to $119,999	113.9
$120,000 to $139,999	124.8
$140,000+	143.8

Source: U.S. Energy Information Administration Residential Energy Consumption Survey (2015)

While the EIA data regarding household emissions by income gives a well-rounded picture of how much energy is consumed at the household level in the Midwest, sources of household energy specific to Indiana is required to get a more accurate understanding of how households will be impacted by a carbon tax; this is where data from the EIA's Table CT8 was used. Table CT8 estimates the amount of British thermal units (Btu) each energy source (coal, natural gas, petroleum, wind, and solar) uses at the household level in the state of Indiana. Using this data, a state electricity portfolio or fuel mix for Indiana was found. A fuel mix of an area is "the percentage of overall generation attributed to a specific fuel type (i.e., coal, gas, hydro, solar)" ("Power Profiler", 2019). Only fuels that release carbon are of interest for the purpose of this research so only coal, natural gas, and petroleum were measured. The fuel mix was created by dividing the total amount of Btu of each energy source, found in the EIA's Table CT8, by the total amount of Btu consumed overall in the state of Indiana. Then, these figures were converted to percentages for each energy type. Indiana's energy profile can be found in Figure 2.

Figure 2: Indiana's energy profile

Coal	Natural Gas	Petroleum	Nuclear Electric Power	Hydro-electric power	Wood & Waste	Geothermal	Wind	Solar
80.93%	12.92%	1.22%	0.00%	0.35%	0.40%	0.00%	4.07%	0.15%

As stated before, the average household carbon emissions from RECS are given in million Btu but the Baker-Schultz carbon tax is a tax on *tons* of emissions; therefore, the data will need to be converted to the appropriate units. With Indiana's energy mix in mind, the average number of Btu released by each household in the form of coal, natural gas, and petroleum in the state of Indiana was calculated by using the percentages found in Figure 2. Once this was found, the process of converting Btu to tons began. The steps taken for each type of fossil fuel can be found in the following sections.

Coal

A large portion of the energy used in Indiana comes from coal. As Figure 2 states, in 2015 more than 80% of the energy used by Indiana households can be traced back to coal. The first step in converting coal from Btu to tons is to multiply the percentage of coal in Indiana's household energy mix by the million Btu per household for each income bracket based on the data given in Figure 1. According to the EIA, 1 short ton of coal equals 18,856,000 Btu ("Energy conversion calculators"). The EIA also provides a calculator that converts energy from Btu to tons of coal which was used to simplify these calculations. The tons of carbon from coal each income bracket emits can be found in Figure 3.

Natural Gas

A much smaller yet still considerable amount of natural gas is used by Indiana households. The same first step that was used to convert coal from Btu to tons was used: the percentage of natural gas used by Indiana households was multiplied by the Btu per household for each income bracket based on the data given in Figure 2. Unlike coal, an intermediary step is required to go from Btu to tons of natural gas. The same EIA calculator was used to convert Btu of natural gas to cubic feet of natural gas. According to the EIA energy conversion calculator, 1 cubic foot = 1,037 Btu. A paper by Knittel states that "combusting 1000 cubic feet of natural gas leads to roughly 0.058 tons of carbon dioxide," (Knittel, 2019). Therefore, another calculation was required to get to the unit desired. The tons of carbon from natural gas each income bracket uses can be found in Figure 3.

Petroleum

An even smaller percentage of petroleum is used as a fuel source by individual households. Regardless, it is still a carbon emitter and of importance to this study. Like natural gas, a two-step calculation is required to convert Btu of petroleum into tons. Once again, the percentage of petroleum used by Indiana households was multiplied by the Btu per household for each income bracket based on the data given in Figure 1. The EIA energy conversion calculator states that 1 gallon of petroleum (including diesel fuel and heating oil) equals 137,381 Btu. The EIA Energy Conversion Calculator was used for this conversion. The second step required a data set from the Environmental Protection Agency (EPA) which states that there are 22.26 pounds of CO_2 per gallon of petroleum ("Carbon Dioxide Emissions Coefficients", 2021). Simple multiplication of 22.26 by the number of gallons per petroleum for each income bracket finds how many pounds of CO_2 each household consumes. A final calculation is needed to convert pounds to tons and can be done by dividing the quantity from the previous step by 2000. The tons of carbon from petroleum each income bracket uses can be found in Figure 3.

Figure 3: Per household carbon emissions by fuel source

Income Bracket	Tons of Carbon from Coal	Tons of Carbon from Natural Gas	Tons of Carbon from Petroleum
Less than $20,000	2.88	0.49	0.07
$20,000 to $39,999	3.64	0.61	0.08
$40,000 to $59,999	3.81	0.64	0.09
$60,000 to $79,999	4.26	0.72	0.10
$80,000 to $99,999	4.52	0.76	0.11
$100,000 to $119,999	4.89	0.82	0.11
$120,000 to $139,999	5.36	0.90	0.12
$140,000 or more	6.17	1.04	0.14

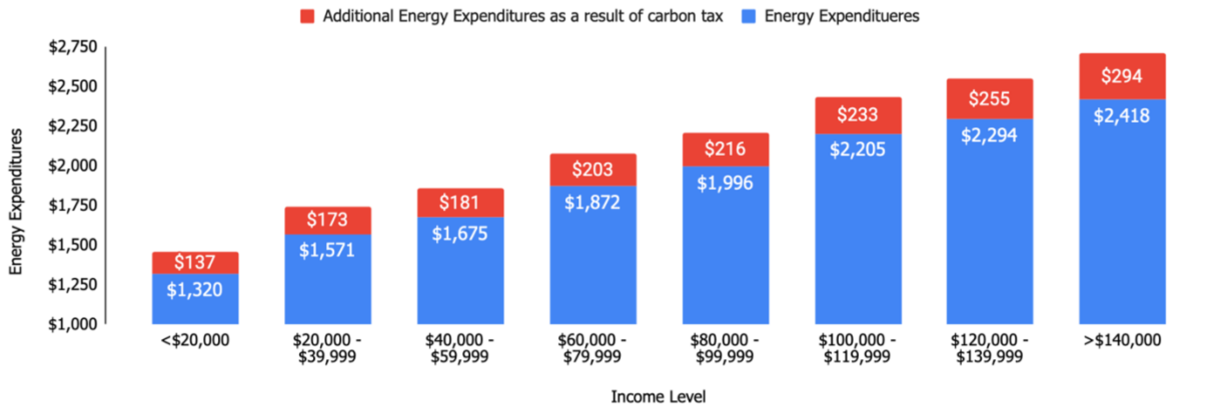
Applying the Carbon Tax

Once the different types of carbon producing energy sources have been converted to the correct units, scenarios for different types of carbon taxes can be applied. For example, the Baker-Schultz carbon tax recommends a $40 tax per ton of carbon emitted. Therefore, the total amount of tons of carbon emitted per household will be multiplied by $40. Then, that dollar amount will be divided by the low and high end of the income bracket to find the percentage of income that the carbon tax will take up. Finally, the additional dollar amount each household will be required to pay because of the carbon tax will be divided by the upper income tier and the lower income tier within each bracket to find the percentage of the overall household income that goes towards energy expenditures.

VI. Results & Discussion

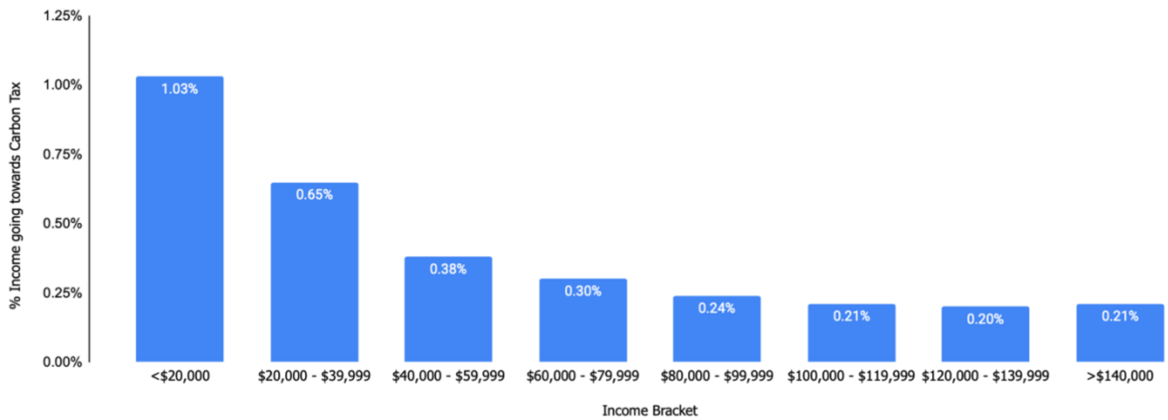
Using EIA data on household energy expenditure for each income bracket, the additional energy costs associated with a carbon tax was found. The results of these findings are summarized in Figure 4. The blue section of the stacked bar graph shows the average amount each income bracket paid for their household energy in 2015 which was obtained from the EIA. The red section of the stacked bar graph shows the carbon tax data collected from this paper's research. This confirms the expected result that households in higher incomes will pay more in a carbon tax because, in most cases, they have larger houses that require more energy. However, a more interesting trend to examine is the percentage of each household's income that will go towards a carbon tax, which can be seen in Figure 5.

Figure 4: Additional energy expenditures as a result of a Carbon Tax



The results found in Figure 5 confirm the hypothesis that lower income households will face a larger tax burden when a carbon tax based on household emissions is implemented. As Figure 5 shows, as household income increases, the percentage of income that goes towards the tax decreases. Therefore, a larger financial burden is placed on low-income households, defined as a household's percentage of income paid to the tax. Even though these households emit fewer carbon emissions and pay a smaller carbon tax, the amount they pay towards the tax represents a larger percentage of their income. Families in the lowest bracket of household income (<$10,000 per year) could pay as much as 1.3% of their income towards a carbon tax. While this is a very small percentage, it could make a huge difference to low-income households that struggle to make ends meet and afford necessities like food and housing. Additionally, when comparing income levels there are vast differences in the percentage of income that will go towards this proposed carbon tax. Households in the highest income brackets ($100,000 and above) will only be slightly inconvenienced by the presence of a carbon tax because the tax only represents about 0.2% of their total income.

Figure 5: Carbon tax burden on households



An increase in energy expenditures of only 0.2% to 1% might not sound like a big increase overall. However, this analysis only looked at household emissions and a carbon tax would result in an increase in prices across the economy. As Kolstad mentioned in his carbon tax policy brief, when faced with a tax, producers often pass their increase in production costs onto the consumer (Kolstad, 2014). Since many aspects of the U.S. economy are heavily reliant on carbon emitting sources of energy, it is likely that consumers will see an increase in costs across different sectors of the economy. Once again, this is likely to negatively affect low-income households at a greater intensity as many struggle to pay for necessities with energy prices where they are today.

While this research only focused on households in Indiana, the same pattern is likely to be seen if this carbon tax analysis is extrapolated to explore how households across the United States are affected by a carbon tax. As stated before, only one pillar of the Baker-Schultz carbon tax plan was studied due to the limited scope and time constraints of this research. However, the second pillar of the tax plan, a dividend for all American households, would likely fix some of the discrepancies seen in these results. Further research is needed to see if a carbon tax dividend would be beneficial for Americans. Regardless, it has been proven that when households of all income levels are required to pay the same dollar amount per ton of carbon there are vast inequalities in the proportion of income that goes towards a carbon tax.

VII. Conclusions & Implications

The overall findings of this study support the hypothesis that low-income households in Indiana will be disproportionately affected by a carbon tax of $40/ton of carbon released into the atmosphere. As stated in previous sections, there are several limitations to this study. For starters, the individual household carbon emissions data from the RECS was given for the Census-designated Midwest region of the U.S. While for the most part all of these states have a similar climate (hot summers, cold winters) and would require a similar amount of energy for heating and cooling a house, there are still variations between the northern and southern parts of this region in terms of average temperature. Additionally, Indiana is the third largest consumer of coal in the entire U.S., only behind Texas and Missouri ("Indiana - State Energy Profile Overview"). While other states have moved away from coal and now use renewable energy sources like solar, wind, and hydroelectric energy, Indiana still heavily relies on fossil fuels for energy production. Therefore, it could be assumed that individual households in Indiana have higher carbon emissions than the average found in the RECS data set due to this reliance on coal.

Another limitation to this study is the annual household income brackets that were given in the RECS survey data. As seen in Figure 1, the lowest income bracket is an annual household income of less than $20,000 and the highest bracket goes up to $140,000 and above. However, comparing the energy consumption and expenditures of some of the highest earners in Indiana (with an average household income totaling over $250,000) with some of the lowest income households in the state could be of interest for future research. More specific measurements were not able to be found due to the limited data available. Despite these limitations, this study was worthwhile and offers a valuable perspective regarding carbon tax policies in Indiana and how they will affect individual households. There has been very little research done on how carbon taxes will affect Indiana households. As policy makers begin to look for ways to mitigate carbon emissions and its effect on climate change, it is important to build up a literature of sources that do just this by offering an analysis of the benefits and downfalls of an environmental policy.

It was mentioned previously that there are four pillars to the Baker-Schultz carbon tax plan but only one pillar was examined in this study. While a full analysis into all four pillars of this plan would be the most useful in determining its effectiveness, only the first pillar was evaluated in this study due to the constrained time and resources. The second pillar of the Baker-

Schultz carbon tax plan does include a carbon dividend for individual households which would help mitigate the unwanted economic effects of an additional tax. Prior research has argued that the presence of a carbon tax dividend that returns money to individual households is a characteristic of a tax plan that is progressive instead of regressive (Knittel, 2019). However, examining how that pillar will affect individual U.S. households is outside the scope of this research paper.

There are many ways in which future research can strengthen the preliminary data found in this paper. As described above, a limitation of the data used from the EIA was the difficulties and inaccuracies in finding average household carbon emissions data for the state of Indiana. A future study could be dedicated to doing just this. Then, such a data set could be manipulated to reflect various possible policy options to find a carbon tax rate that does not disproportionately affect one group over another. Until that data exists, the assumptions and limitations of this study will have to suffice.

Currently, there is no perfect formulation when creating a carbon tax plan and even when careful consideration is taken, unintended consequences can occur. Circling back to the Baker-Schultz carbon tax plan, it is refreshing to see a “green policy” with bipartisan support be taken seriously among policy makers. However, there are many changes and improvements that should be made to the tax plan before it is implemented in the state of Indiana and other states throughout the country. While many economists agree that carbon emissions should be taxed, there is little to no consensus as to what price the carbon tax should be set at (Kaufman et al., 2020). There are certain directions policy makers can take to find a starting price point for a carbon tax that will lessen the negative effects felt by families as a result.

For starters, all revenue from a carbon tax should be recycled back to American families, especially the most financially vulnerable, to account for their increased energy expenditures. Additionally, if a carbon tax is enacted, it should be a graduated tax to increase the policy’s equity. It is unfair to expect the lowest U.S. earners to pay the same rate for a carbon tax as the country’s highest earners when they are contributing less to the overall carbon emissions in this country. Implementing at least some amount of a carbon tax will encourage the behavior change and energy use reduction that a carbon tax aims to catalyze. It is also worth mentioning that many Americans have not fully recovered from the financial impacts of the COVID-19 crisis. Early research on the pandemic’s effects on energy security has shown that households at or below 200% of the federal poverty line as well as Black and Hispanic households are some of the most at-risk populations of getting their utilities disconnected (Memmott et al. 2021). Implementing this tax before financial recovery can be achieved would be damaging to these households.

Regardless of the policy implications, this study highlights important implications regarding individual action and behavior. When looking at individual household energy consumption data, households and other individual activities are large sources of carbon emissions. The World Health Organization suggests that individuals should only release approximately 2 tons of carbon per year ("Reducing Your Carbon Footprint"). Currently, the global average is 4 tons of carbon per year but highly industrialized and countries like the U.S. emit about 20 tons of carbon per person per year, high above the recommended level. The introduction of a carbon tax on household emissions could lead to changes in behavior in the home. With that being said, policy makers need to ensure to the best of their ability that the carbon taxes they are implementing are equal across different socioeconomic levels like income and race. Once that is achieved, the U.S. will be one step closer to mitigating the anthropogenic effects of climate change and accomplishing the goals set out in the Paris Climate Agreement.

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