The Political Economy of a Carbon Tax: A County-by-County Investigation

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January 2018

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The authors thank the Alliance for Market Solutions for financial support of this paper. All views expressed here represent only the views of the authors.

Key Findings

This report investigates the impact of a revenue-neutral carbon tax whereby revenues raised from a $25/ton carbon tax are used to reduce the tax rate on wage income by a commensurate amount. Recognizing that such a reform is not revenue-neutral for every single taxpayer, nor even revenue-neutral in every county, we investigate the degree of spatial variation across all counties and sort results by the historical partisan preferences of those counties. Key findings include:

1. The net impact of a federal $25/ton carbon tax offset by a reduction in wage taxes is modest across most counties. The average taxpayer in the median county experiences less than a $100 change in net tax liability.
2. We find that the average net impacts among Republican-leaning counties, swing counties, and Democratic-leaning counties are relatively similar. For example, the difference between the average impact in Republican-leaning counties and Democratic-leaning counties is just $100 per year.
3. Among 2,467 Republican-leaning counties, 2,238 will experience a net impact that is negligible (less than 0.5 percent of income) or positive.
4. Total positively affected counties from the tax swap represent 40 percent of the U.S. population. Of these, 39 percent are Republican voters.
5. Incorporating the domestic social cost of carbon (SCC) and the projected county-level climate change risk yields additional economic benefit throughout many counties, primarily in Florida, Louisiana, and Texas.
6. When including the SCC effect, total positively affected counties represent 58 percent of the U.S. population. Of these, 43 percent are Republican voters.

Introduction

Numerous academics and policy researchers have advocated that the United States adopt a carbon tax, and this chorus includes many conservative and right-leaning experts. To date, however, such a policy has not found strong support among federal lawmakers, with support among elected Republicans proving especially scarce.

Conventional wisdom suggests that Republican lawmakers are less inclined to embrace a carbon tax because their constituents may be adversely and disproportionately affected. This is because conservative voters are thought to be larger consumers of carbon. Is this true? There has been some research on this question, but the siloed nature of existing studies obscures the effects of climate change on economic welfare and the strength of the relationship between the distributional impact of climate change abatement policies and political affiliation. We seek to fill this void in economic and political science literature by modeling the effect of a federal revenue-neutral carbon tax at the county level, where political affiliation, carbon utilization, and climate risk can be identified.

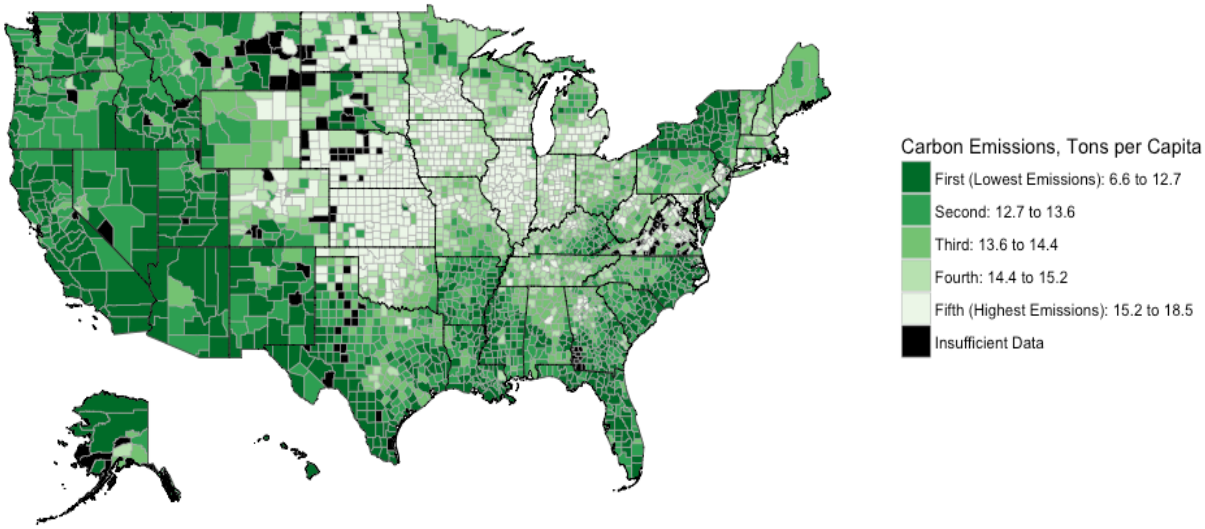
We model a revenue-neutral carbon tax, which is an emerging policy proposal that may gain more political traction among Republican lawmakers because of the strong economic growth and efficiency arguments supporting it. While reducing carbon emissions, a revenue-neutral carbon tax would use revenues raised by a tax on carbon to offset the revenue loss associated with a reduction in other taxes.

In our modeling exercise, we analyze a reduction in the tax rate on wage income. Overall, this tax "swap" would generate no net increase (or decrease) in the aggregate federal tax burden. While revenue-neutral in the aggregate, this policy may have disparate effects on certain subpopulations or within certain geographic areas, and understanding these potential consequences is essential to answering a key political question: how would each of the more than 3,000 counties in the United States be affected by a revenue-neutral carbon tax? In addition, we examine the political slant of each county based on voting behavior in recent elections. We also consider the local social cost of carbon within each county.

Background

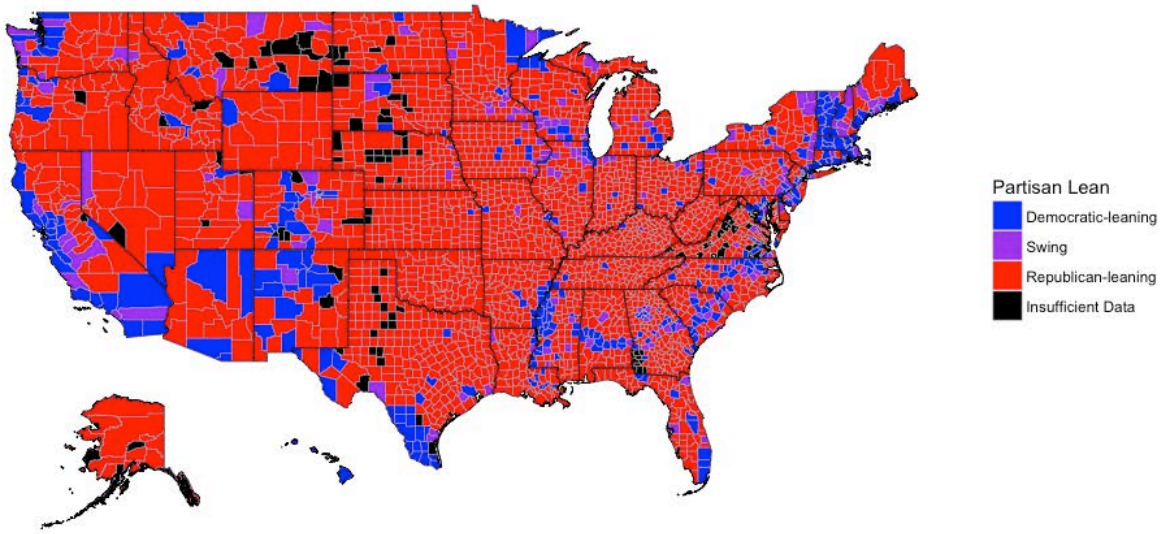
To set the stage for our analysis, we present three county-level maps of the United States showing average carbon emissions per capita, political leaning, and average per-capita income.

Chart 1. Carbon Emissions per Capita, Quintiles



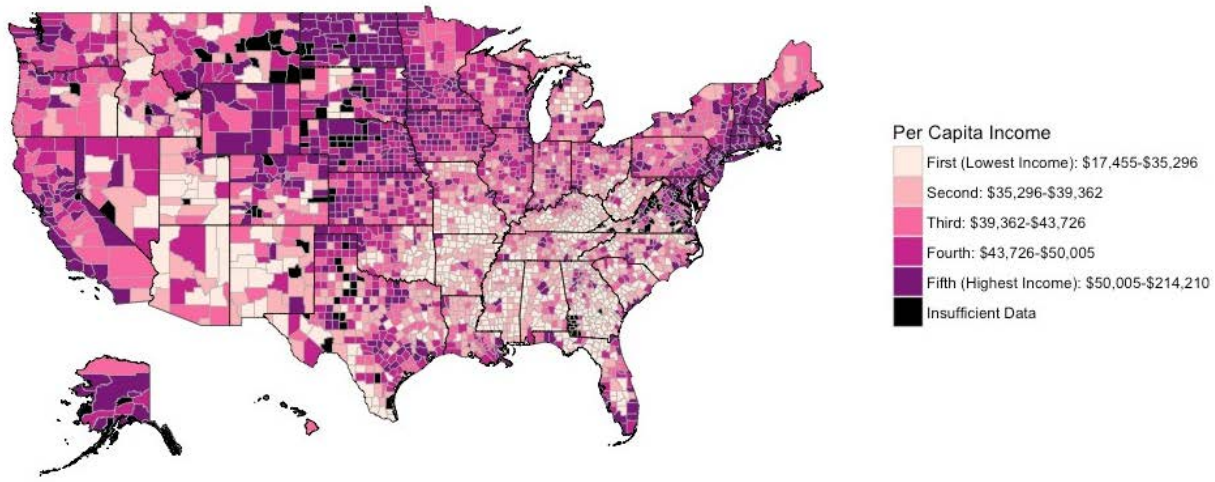
Source: Jones and Kammen (2014) and authors' calculations.
Note: Carbon emissions comprise household greenhouse gas emissions associated with consumption of electricity, gas, food, housing, and transportation, among other categories. See Jones and Kammen (2014) for more detail.

Chart 2. Partisan Lean by County



Source: Leip (2017) and authors' calculations.

Chart 3. Projected 2018 Income per Capita, Quintiles



Source: BEA (2017) and authors' calculations.
Note: Per capita income in 2016 adjusted to 2018 using CBO (2017) inflation assumptions and USDA (2017) real GDP growth projection.

A cursory examination of these maps explains the common belief that Republican voters would be hurt more by a carbon tax – most carbon-intensive areas are Republican leaning. But, a slightly closer look shows that the story is more nuanced. While carbon intensity is generally high in many Republican strongholds, it is relatively low in other traditionally GOP communities, including much of the West and many parts of the Southeast. The nature of the relationship between partisan affiliation and the impact of a carbon tax warrants a more thorough analysis.

Moreover, per capita incomes vary significantly by county, and the burden of a carbon tax relative to income is very different than the burden of a carbon tax in isolation. For example, the counties in Texas where carbon emissions are relatively high tend to be the counties where incomes are higher as well. These also tend to be counties with a Republican lean.

On top of this, it is certainly insufficient to eyeball the effects of a *revenue-neutral* carbon tax. Therefore, we undertake a county-by-county investigation using the following methodology.

Methodology

In our model, the cost of a carbon tax to an individual depends on the carbon intensity of their consumption. We rely on the recent work in Jones and Kammen (2011, 2014) for estimates of carbon consumption by household and zip code, which we aggregate to the county level and then apportion among the number of people in each county. We scale estimated per capita carbon emissions in order to equal 2018 emissions projections in Resources for the Future (RFF) (2017).

We measure the average income in each county and the composition of that income (that is, wage vs. capital) and estimate the net impact of using carbon tax revenue to cut taxes on wage income. It should be noted that the revenue could be used to cut other taxes – for example, taxes on capital income or payroll taxes – but we focus on one tax swap here for the sake of simplicity.

We derive the proportion of income in each county attributable to labor by combining national trends in the proportion of income attributable to labor by income group reported in the Congressional Budget Office (CBO) (2016) and applying them to county-level distributions of income estimated in Sommeiller et al. (2016).

We consider the per capita impact of any tax change relative to per capita income. For example, a $100 per capita tax cut or increase in a low-income county is considered a larger change than the same $100 tax change in a higher-income county.

In addition, we estimate the local social cost of carbon based on projections of long-term damage from climate change by county reported in Hsiang et al. (2017), which estimates quantiles of percent change in county income associated with climate change in 2080–2100. We first calculate the mean percent change in GDP associated with climate change for each county. We then estimate the expected dollar loss, apply this distribution of losses to a recent estimate of the social cost of carbon in Gayer (2017) and EPA (2017), and divide by the county's population.

Ultimately, we assume a $25-per-ton carbon tax and a $10-per-ton domestic average social cost of carbon. We assume, based on the E3 Carbon Tax Calculator in RFF (2017), that a $25/ton tax with an annual growth rate of 3 percent above inflation would reduce CO_2 emissions by 18.8 percent on average in 2018–2027.

In a final step, we differentiate political affiliation in each county based on voter preferences in the two most recent presidential elections (2012 and 2016, weighted 25 percent/75 percent). We group counties into three categories: Democratic-leaning, Republican-leaning, and swing counties. Swing counties are defined as those with Democratic or Republican advantage that is less than 5 percentage points above or below the national average partisan preference.

Results

We present results in three stages. First, we examine the economic incidence of a revenue-neutral carbon tax where the revenue pays for a wage tax cut. Next, we look at this tax swap when factoring in the social cost of carbon. In each of the first two stages, we also look at the economic incidence in conjunction with voters' partisan preferences. Finally, we assess the net impact of the two scenarios by percent of income at the county level.

1. Tax Swap

In the first stage of our analysis, we estimate the per capita cost of a carbon tax and the spatial redistribution of revenue from the tax based on estimates of wage income. As stated above, we model a carbon tax of $25 per ton of carbon emissions. The tax is assumed to increase at a rate 3 percent higher than inflation. Consistent with RFF (2017), we assume that this tax reduces carbon emissions by 18.8 percent in 2018–2027.

As Chart 4 shows, the economic impact of a carbon tax paired with a wage tax cut is generally higher in the Southeast than in the Northeast or Northwest, but the incidence is relatively small even at its highest (–1.4 percent of per capita income annually). For the middle three quintiles, the per capita change in income is less than 0.5 percent. To place this number in context, 0.5 percent of national median per capita income is approximately $155.

Chart 4. Carbon Tax and Wage Tax Cut as a Percent of Income by County, Quintiles

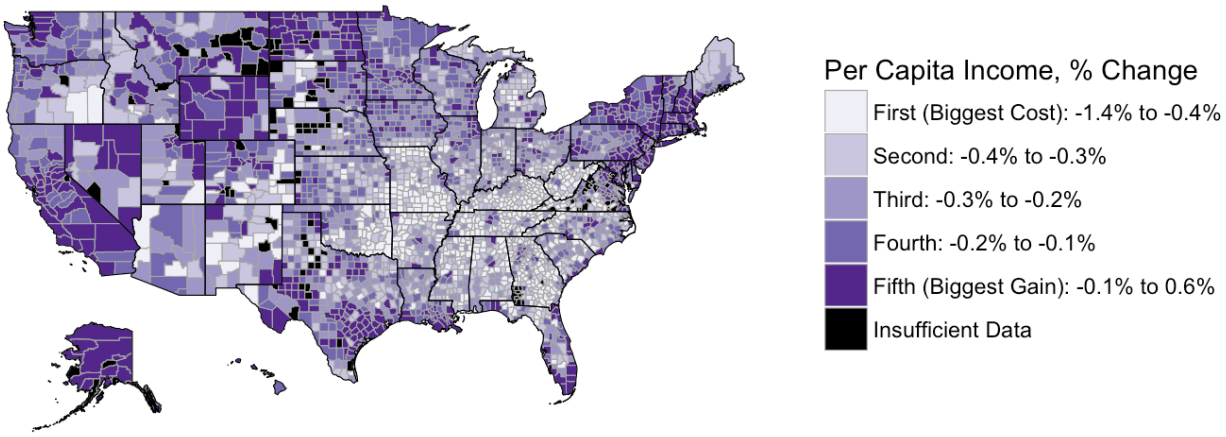


Table 1 identifies the 20 counties that would experience the largest gains, as a percent of income, under the carbon-wage tax swap. Nine Republican-leaning, one swing, and ten Democratic-leaning counties are listed with gains ranging from 0.28 percent to 0.58 percent of average annual income.

Table 1. Counties with Largest Gains: Carbon Tax and Wage Tax Cut

State	County Name	Per Capita Income, % Change	County Type
ND	Divide County	0.58	Rep
WY	Teton County	0.46	Dem
ND	Dunn County	0.39	Rep
NY	New York County	0.36	Dem
CA	Santa Clara County	0.36	Dem
ND	Burke County	0.35	Rep
ND	Mountrail County	0.35	Rep
MT	Richland County	0.35	Rep
CA	San Francisco County	0.35	Dem
VA	Arlington County	0.34	Dem
NJ	Hunterdon County	0.33	Rep
NJ	Morris County	0.32	Rep
NY	Westchester County	0.32	Dem
ND	Williams County	0.31	Rep
TX	Karnes County	0.31	Rep
MA	Norfolk County	0.30	Dem
CA	San Mateo County	0.30	Dem
CA	Marin County	0.29	Dem
NY	Nassau County	0.29	Swing
VA	Alexandria city	0.28	Dem

Looking at the results by partisan preference, Chart 5 presents a scatterplot in which the x-axis represents the degree of partisan lean for each county in the United States and the y-axis measures the percent change in average income resulting from the tax swap. Most counties experience an impact (positive or negative) of less than 0.5 percent, and there is little discernable trend across political lines; there are winners and losers across the political spectrum.

Chart 5. Partisan Preference, Carbon Tax, and Wage Tax Cut

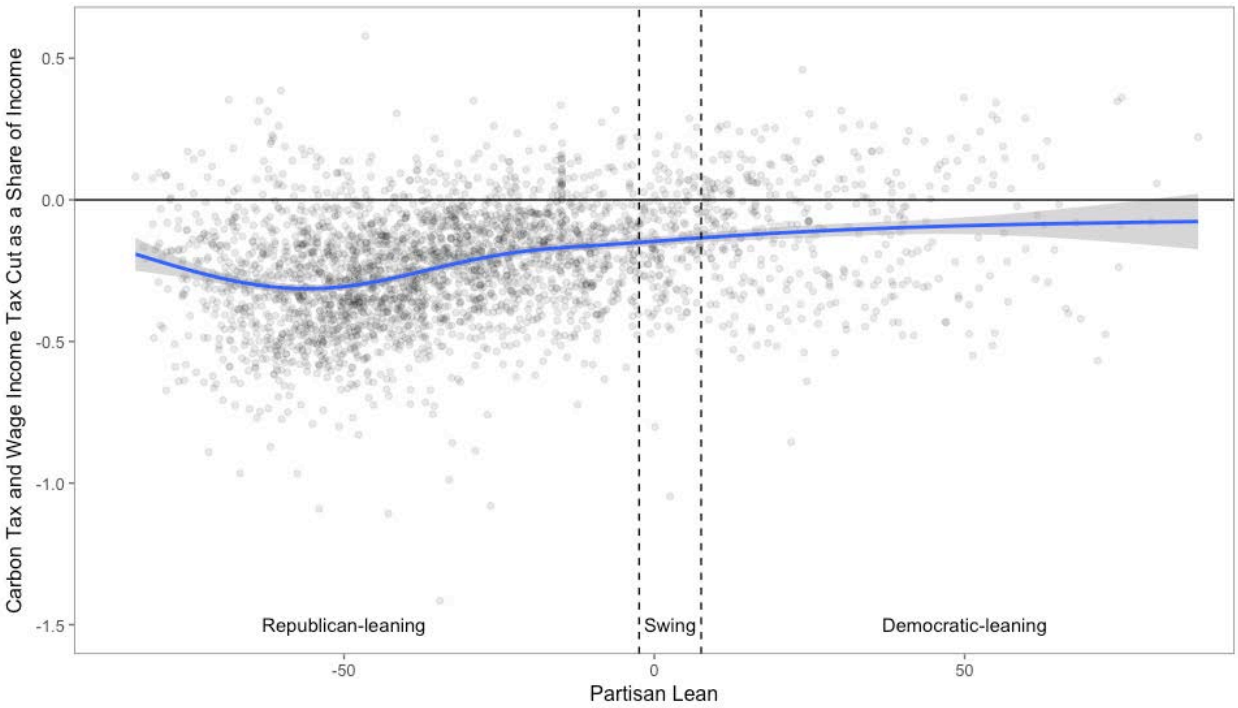
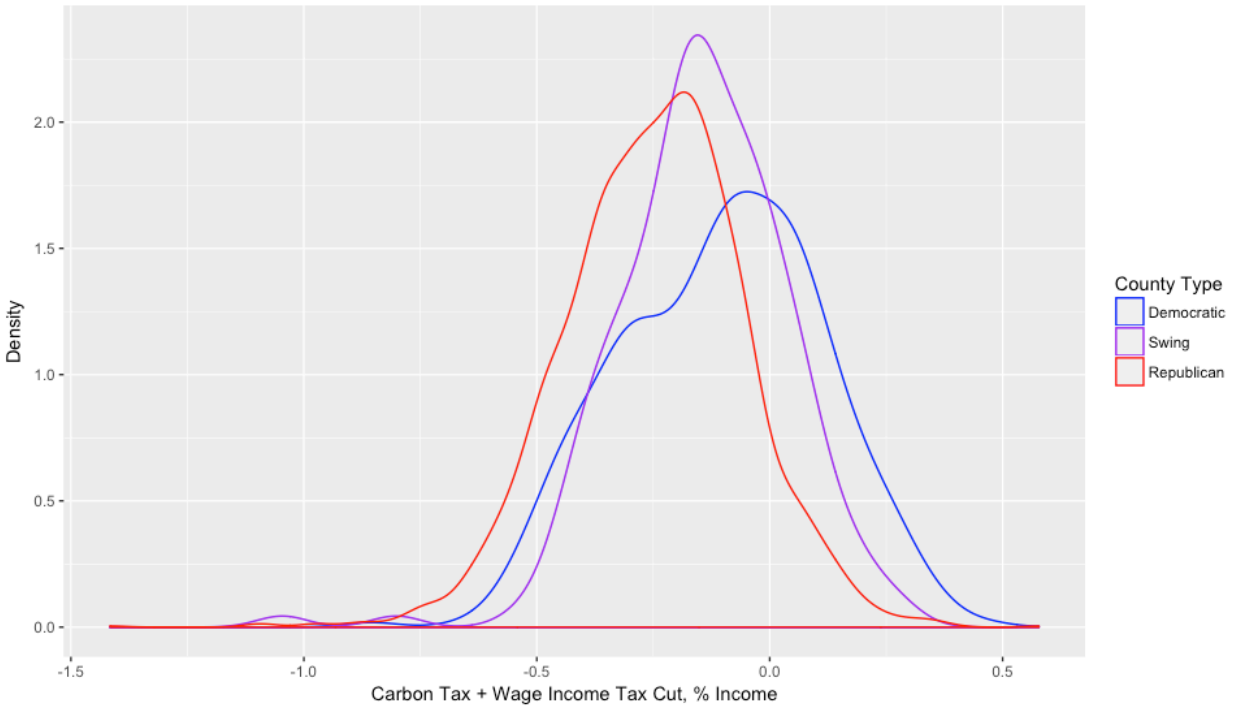


Chart 6 presents density plots for the counties, categorized by political leaning. These curves, which (unlike Chart 5) are weighted to reflect the population of each county, indicate that the average impact is only slightly more positive for Democratic-leaning counties than for swing or Republican-leaning counties. Moreover, one-eighth of the population living in Republican-leaning counties would experience a more positive net impact than the impact in the population-weighted median Democratic-leaning county. In short, the direct impact of a revenue-neutral carbon tax does not clearly segregate across partisan lines.

Chart 6. Carbon Tax and Wage Tax Cut as a Share of Income, County Population Weighted

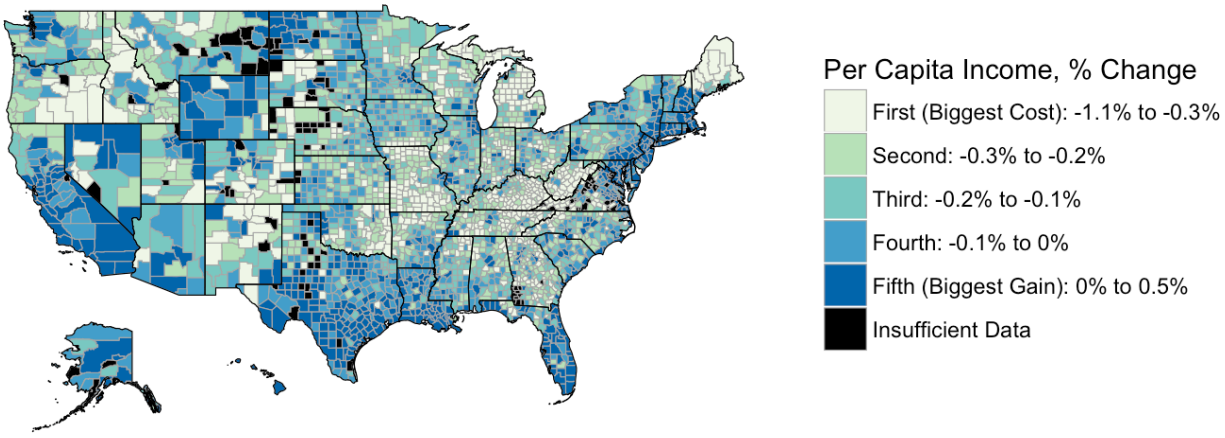


2. *Tax Swap and Social Cost of Carbon*

The second stage of our analysis incorporates the local social cost of carbon (SCC) into the previous tax swap. The IWG (2010) defines the SCC as "an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year." The SCC accounts for agricultural, health, and property costs, among other factors. As described in the methodology section above, we assume that the SCC is $10 per ton of CO_2; we convert this cost to income loss per county and distribute the cost at the county level depending on a county's risk profile.

As Chart 7 shows, factoring in the SCC improves the situation of the Southeast, where the risks associated with climate change are the highest. As before, the impact is relatively slight, with the three middle quintiles again seeing effects less than 0.3 percent of per capita income.

Chart 7. Carbon Tax, Wage Tax Cut, and Social Cost of Carbon as a Percent of Income by County, Quintiles



In a shift from the tax-swap scenario, 13 of the 20 counties with the largest gains are Republican when incorporating the SCC, as Table 2 shows.

Table 2. Counties with Largest Gains: Carbon Tax, Wage Tax Cut, and Social Cost of Carbon

State	County Name	Per Capita Income, % Change	County Type
TX	Karnes County	0.54	Rep
ND	Divide County	0.54	Rep
TX	DeWitt County	0.47	Rep
WY	Teton County	0.45	Dem
NY	New York County	0.37	Dem
VA	Arlington County	0.37	Dem
ND	Dunn County	0.37	Rep
CA	Santa Clara County	0.36	Dem
CA	San Francisco County	0.36	Dem
TX	Reagan County	0.35	Rep
MT	Richland County	0.35	Rep
NJ	Hunterdon County	0.34	Rep
FL	Sumter County	0.34	Rep
FL	Monroe County	0.33	Rep
NJ	Morris County	0.33	Rep
ND	Burke County	0.33	Rep
TX	Martin County	0.32	Rep
NY	Westchester County	0.32	Dem
TX	Kendall County	0.32	Rep
VA	Alexandria city	0.32	Dem

Looking at the results by partisan preference for all counties, Charts 8 and 9 are similar to the previous scenario, showing a substantial overlap of the impact on Republican-leaning and Democratic-leaning counties. In the scenario that incorporates the social cost of carbon, more counties on both sides are better off.

Chart 8. Partisan Preference, Carbon Tax, Wage Tax Cut, and Social Cost of Carbon

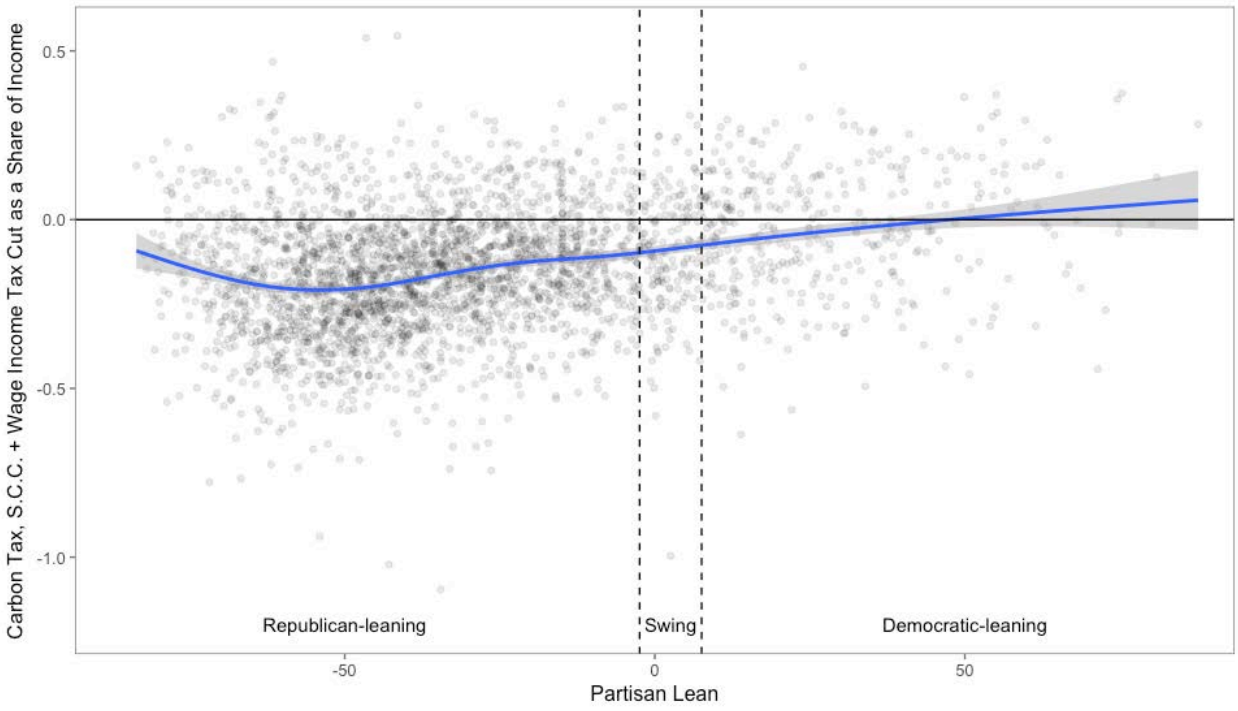
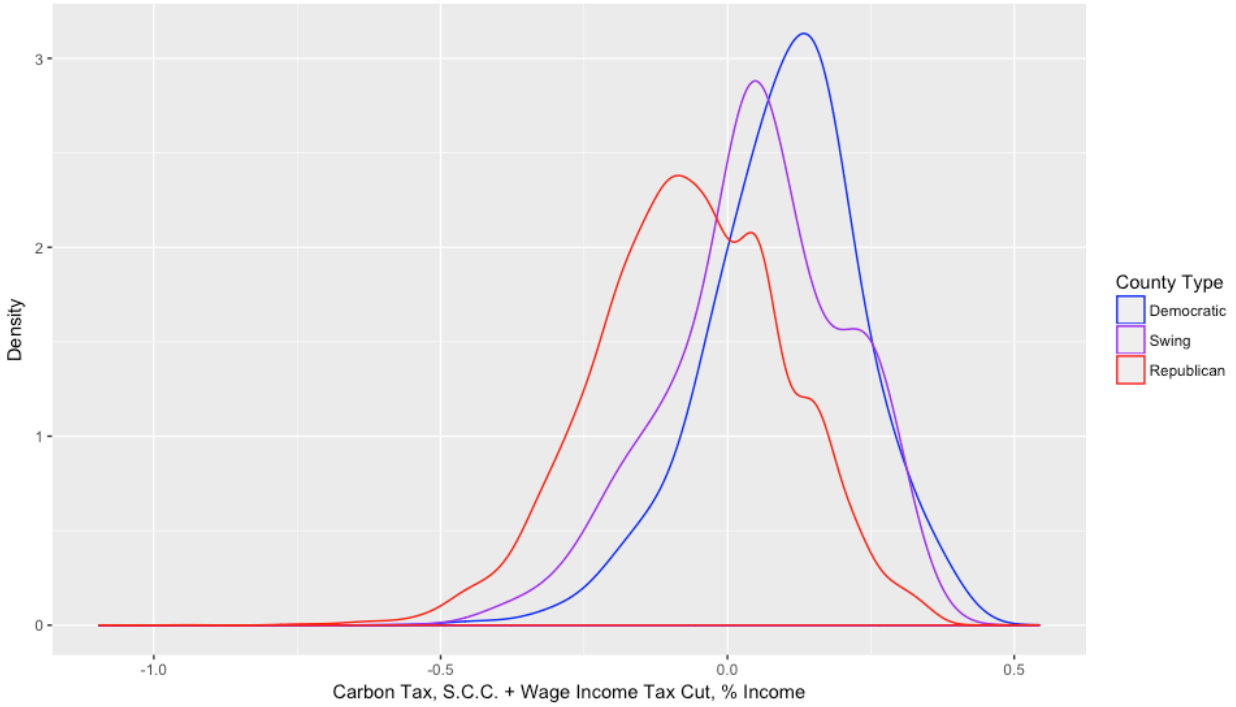


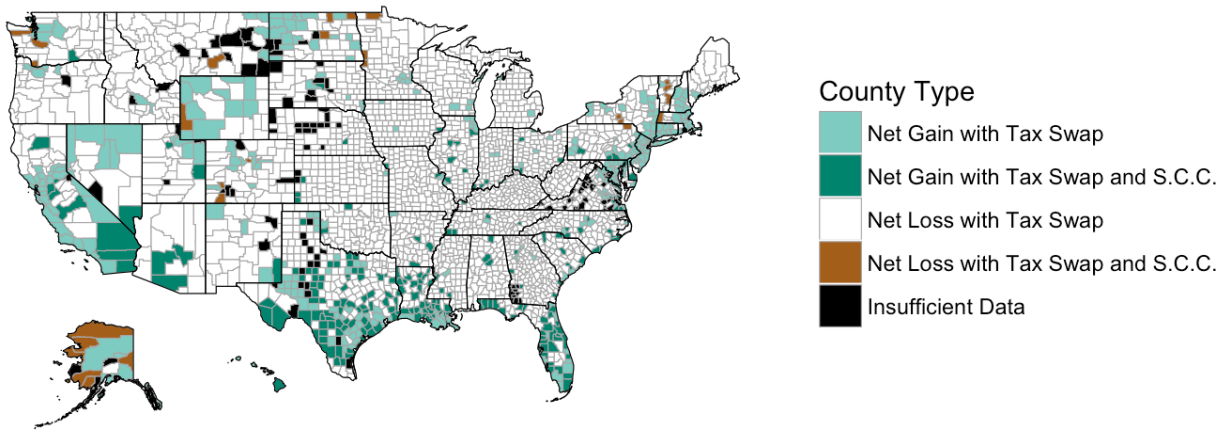
Chart 9. Carbon Tax, Wage Tax Cut, and Social Cost of Carbon as a Share of Income, County Population Weighted



3. Net Impact

In the final stage of our analysis, we look at the results in a binary fashion – that is, whether the tax swap alone or the tax swap combined with the social cost of carbon results in a net gain for a county. Chart 10 shows that the counties with a net gain under the tax swap alone (light green) are primarily in the Northeast, Northwest, and West. The counties that experience a net gain when also considering the social cost of carbon (dark green) are predominantly in the Southeast and Southwest, particularly in Florida, Louisiana, and Texas.

Chart 10. Net Impact of Carbon Tax, Wage Tax Cut, and Social Cost of Carbon as a Percent of 2018 Income by County



While only a minority of counties are “winners” under either scenario, those positively affected counties when considering only the tax-swap effect represent 40 percent of the U.S. population. Of these, 39 percent are Republican voters. With the additional consideration of the social cost of carbon, the share of the population that is a net winner rises to 58 percent, 43 percent of whom are Republicans. Charts 11 and 12 capture this impact visually with a density plot. Unlike Charts 6 and 9, which illustrate the distribution of impact for each county sorted by Republican-leaning, swing, and Democratic-leaning, Charts 11 and 12 are weighted by the partisan vote share within each county. For example, the population in a county with a 6 percent Republican lean would be split, with 53 percent contributing to the national population of Republican voters and 47 percent contributing to the national population of Democratic voters. The estimated distributional impact for Democratic and Republican voters is very similar.

Chart 11. Carbon Tax and Wage Tax Cut as a Share of Income, Weighted by County-Party Population

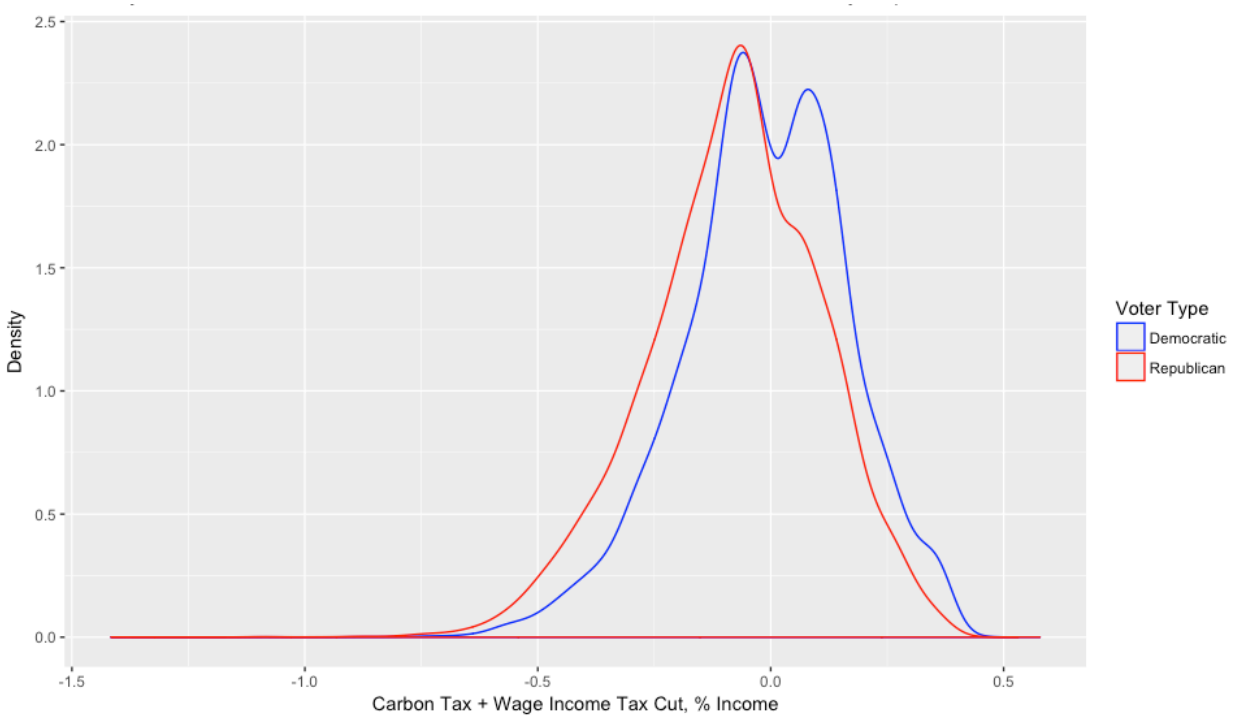


Chart 12. Carbon Tax, Wage Tax Cut, and Social Cost of Carbon as a Share of Income, Weighted by County-Party Population

Political Implications of a Revenue-Neutral Carbon Tax

Across the 2,998 U.S. counties analyzed, the net change in tax liabilities arising from a revenue-neutral carbon tax ranges from +0.58 percent to –1.42 percent. For all but five counties, the net impact is less than 1 percent. This "static" analysis underestimates these impacts, as reductions in the marginal tax rate on wage income would yield modest additional labor supply and an increase in economic growth. Such an effect, a dynamic macroeconomic response, is beyond the scope of this paper. In addition, the paper does not take into account the impact of a carbon tax on the local economy. Counties that rely heavily on income derived from carbon-intensive sources will appear better off in our study than they would likely fare under a carbon tax, while those that derive income from cleaner-energy sources will appear worse off in our study.

Sorting counties based on the political preference of voters yields a few important results. First, the average difference between Republican-leaning and Democratic-leaning counties is small for all the scenarios modeled here. There are outliers – that is, counties with very large net impacts – but the partisan leaning of counties does not correlate with or predict these outliers.

Second, contrary to conventional wisdom, there are a number of Republican-leaning counties that would gain as a result of a revenue-neutral carbon tax (and some strongly Democratic-leaning counties that would lose). The top Republican-leaning counties that would be net-neutral or net-positive

beneficiaries of a revenue-neutral carbon tax are listed in Table 3 and include counties in Florida, North Dakota, and Texas, among others.

Table 3. Republican Counties with Largest Gains: Carbon Tax and Wage Tax Cut

State	County Name	Per Capita Income, % Change
ND	Divide County	0.58
ND	Dunn County	0.39
ND	Burke County	0.35
ND	Mountrail County	0.35
MT	Richland County	0.35
NJ	Hunterdon County	0.33
NJ	Morris County	0.32
ND	Williams County	0.31
TX	Karnes County	0.31
WY	Sublette County	0.28
NJ	Monmouth County	0.27
VA	Goochland County	0.26
TX	Reagan County	0.26
NY	Putnam County	0.26
WI	Ozaukee County	0.23
TX	DeWitt County	0.23
NY	Saratoga County	0.22
TX	Kendall County	0.22
FL	Monroe County	0.22
SD	Union County	0.22

Third, the risk of climate change is greatest in the South, particularly Texas, Louisiana, Arkansas, Mississippi, Alabama, Georgia, South Carolina, and Florida. When considering the disproportionate gains from mitigating climate change risk for the counties in these states, more Republican-leaning counties become net winners as a result of a revenue-neutral carbon tax. The top winners under this framework among Republican-leaning counties are listed in Table 4 and include more counties in Florida and Texas than the tax swap without the social cost of carbon.

Table 4. Republican Counties with Largest Gains: Carbon Tax, Wage Tax Cut, and Social Cost of Carbon

State	County Name	Per Capita Income, % Change
TX	Karnes County	0.54
ND	Divide County	0.54
TX	DeWitt County	0.47
ND	Dunn County	0.37
TX	Reagan County	0.35
MT	Richland County	0.35
NJ	Hunterdon County	0.34
FL	Sumter County	0.34
FL	Monroe County	0.33
NJ	Morris County	0.33
ND	Burke County	0.33
TX	Martin County	0.32
TX	Kendall County	0.32
ND	Mountrail County	0.31
TX	Chambers County	0.31
TX	Lavaca County	0.30
ND	Williams County	0.30
NJ	Monmouth County	0.29
FL	Collier County	0.29
VA	Goochland County	0.29

Conclusion

We set out in our analysis to test the conventional wisdom about the impact of a carbon tax on Republican voters. Our findings indicate that the conventional wisdom is not true; while some Republican voters would be marginally negatively impacted by a revenue-neutral carbon tax, some would see a net gain. On top of this, some Democratic voters would experience a net loss. This topic warrants further study, but we can safely say for now that political discourse around a carbon tax should move away from firmly entrenched ideas about the partisan impact.

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