Crafting a Fair and Equitable Climate Policy: A Closer Look at the Options

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When comprehensive federal climate policy is finally enacted, it will impose potentially significant costs on the U.S. economy. Total cost, however, is just part of the story. Policymakers are rightly concerned about how those costs will be distributed. One criterion to be considered in designing a program is the extent to which it disproportionately burdens any one segment of the population, especially low-income households. Another criterion to consider is regional differences in the cost of the policy, especially because this can have important political implications

Today, a carbon cap-and-trade program is the most likely approach to be adopted and is already the focus of the Regional Greenhouse Gas Initiative in the northeastern states, California, and the European Union. For households, the distributional effect is two-fold. First, the introduction of a price on carbon dioxide (CO_2) would be fairly regressive, meaning that it would disproportionately affect lower-income households, which spend a larger portion of their income on energy expenditures. Second, the assignment of the value from the CO_2 price—either the value of emissions allowances, if allocated for free, or the government revenue collected under an allowance auction—has a major influence on how the burden is ultimately shared.

Similarly, the economic costs will not be uniform across various regions. Different parts of the country have both different levels and patterns of energy expenditures. In the Northeast and the Mid-Atlantic area, home heating contributes importantly to expenditures, but not so in the South. In contrast, electricity and gasoline expenditures are substantially greater as a percentage of income in the South than for other regions on average. Moreover, the CO_2 emissions associated with electricity use varies greatly in different parts of the country because the fuel used to generate electricity varies.

Most existing research on the distributional ramifications of climate policy examines only the effects of putting a price on CO_2, and a few studies examine a handful of options about how the value of CO_2 would be distributed in the economy and the impacts at a national scale. We recently evaluated the effect of a set of 10 policy scenarios. Households were sorted into annual income deciles and 11 geographic regions, and effects anticipated for 2015 were estimated based on policies enacted in 2008. The policies we looked at fall into four broad categories:

"Cap-and-dividend" options

- Per-capita (taxable) dividend of allowance revenues to households (for example, income taxes would be paid on those dividends)
- Per-capita (nontaxable) dividend of allowance revenues to households

Adjustments to preexisting taxes

- Reduction in income taxes
- Reduction in payroll taxes
- Expansion of the Earned Income Tax Credit (EITC)

Energy and fuel sector options

- Free allocation of allowances to consumers in the electricity sector (accomplished by allocation to local distribution companies, namely, retail utilities)
- Exemption of transportation sector from the cap-and-trade program
- Exemption of home heating sector from the cap-and-trade program
- Investment in end-use energy efficiency

Free allocation to emitters

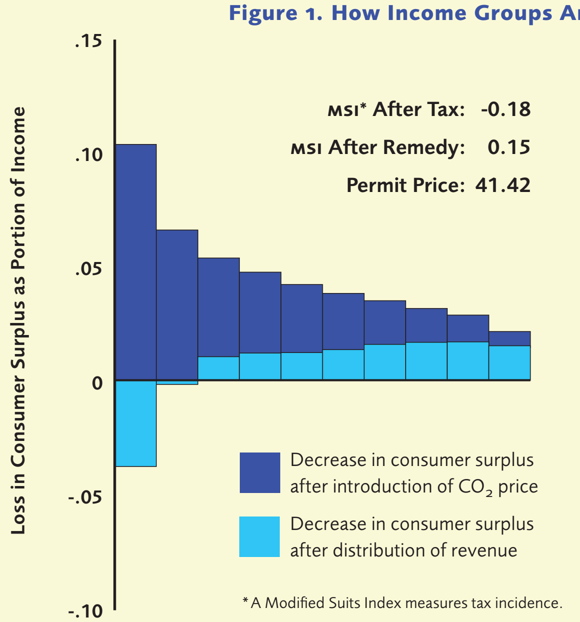
- Grandfathering to incumbent emitters.

Our measure of the incidence (the distribution of costs) of a policy looks beyond simple changes in expenditure to account for changes in consumer surplus from reduced demand. (Consumer surplus accounts for "changes in well-being" resulting from changes in expenditure, allowing for adjustments in spending patterns when prices change. It is larger than the change in expenditure in our analysis.) We assume almost all price effects are passed on to the consumer (the electricity sector being the major exception). Our incidence measure accounts for changes in direct fuel and energy costs along with the prices of consumer goods and services. It also accounts for the net effect of the policy, after redistribution of either the auction revenues or the value of allowances if they are given away for free.

To measure regressivity, we constructed a special index that provides a summary measure of the distribution of the policy's burden as we move up the income ladder. Similar indices have been widely used to measure income equality and tax incidence (the Gini coefficient and the Suits Index, respectively). Positive values of the index indicate progressivity and negative values indicate regressivity. Thus the lower the value of the index, the more regressive the policy. At a national level, before accounting for the distribution of the value of the emissions allowances, the value for our "Modified Suits Index" (MSI) for a CO_2 price of \$41.50 a ton is -0.18, which is modestly regressive.

To illustrate the importance of the use of the revenue, the bar graph in Figure 1 shows how income groups are affected by the policy. The bar with darker shading and the greatest vertical height represents the loss in consumer surplus as a share of after-tax income before accounting for the value that is created by putting a price on CO_2. The bar with the lighter shading represents the incidence of a "complete policy scenario" after accounting for the value of allowances—here as revenues raised in the

Figure 1. How Income Groups Are Affected by a Cap-and-Dividend (Taxable) Policy



*A Modified Suits Index measures tax incidence.

	Loss of Welfare for Bottom Two Deciles		Average Loss of Welfare	
	DOLLARS	PERCENT	DOLLARS	PERCENT
Southeast	-99	-1.41	748	1.32
CA and NV	-295	-3.25	851	1.24
TX	-342	-3.80	829	1.41
FL	85	0.43	847	1.56
Ohio Valley	85	0.46	1,072	1.78
Mid-Atlantic	-3	-0.37	949	1.44
Northeast	151	1.23	1,150	1.65
Northwest	-262	-3.08	625	1.02
NY	-81	-1.36	844	1.26
Plains	-76	-1.22	1,093	1.73
Mountains	-165	-1.97	828	1.44
National	-145	-1.97	809	1.39

Note: Negative numbers reflect gains in welfare.

cap-and-dividend policy that is returned directly to households as a taxable per-capita dividend. Households in the lowest deciles see a dramatic improvement in their well-being as a result of the lump sum dividend of allowance revenues.

The table below shows the incidence of 10 policy scenarios at the national level; all of the options achieve the same targeted level of emissions but with different costs. Our results show that three types of policies are modestly progressive: expansion of the Earned Income Tax Credit, investments in efficiency, and the cap-and-dividend program that directly returns revenue to households. Because of its simplicity, we treated cap-and-dividend as a benchmark. When policies do not use all of the revenue, the remainder is distributed as (taxable) per-capita dividends.

In contrast, three policies appear severely regressive, even more so than before accounting for the use of the revenue. These include grandfathering (free allocation to incumbent emitters), reducing income taxes, and reducing payroll taxes. The latter two may have important efficiency advantages—many public finance economists have argued for the merits of using revenues from auctioned allowances or emissions fees to reduce other distortionary taxes. Our results thus highlight the tensions that may exist between efficiency and equity in climate policy.

Free allocation to emitters poses no such tension. Our results show that this option is regressive, and many economists have emphasized the efficiency disadvantages of this approach. One reason is that free allocation directs about 10 percent of the allowance value overseas to foreign owners of shareholder equity. Additionally, this option is decidedly regressive because the value of the free allowances accrues primarily to higher-income households, which own a relatively higher portion of shareholder equity.

Other policies we analyze may be progressive but relatively inefficient. The exclusion of personal transportation or home heating fuels leads to higher allowance prices because greater emissions reductions would have to be achieved in other sectors. The same is true if allowances are used to compensate electricity consumers, and the ramifications are even greater. Although all three of these options appear progressive once the allowance revenue is returned as a dividend, this increased progressivity comes at the expense of a higher allowance price and lower efficiency. Moreover, the outcomes are less progressive than cap and dividend.

One option that might have the potential to be both equitable and economically efficient is investment in energy efficiency. Our results show that option to be one of the most progressive we examined. Also, it would lead to lower allowance prices, indicating that less cost would be imposed on other sectors. However, whether this actually is efficient or constitutes a subsidy to the consumption of electricity services hinges on the effectiveness of energy efficiency programs that reduce the cost of meeting the cap in the electricity sector, and whether this is the highest-valued use of the revenue. Im-

Permit Prices, CO_2 Emissions, and Modified Suits Index* (MSI) by Policy

* A Modified Suits Index measures tax incidence

Scenario	Permit Price ($/ton)	Per-capita CO_2 Emissions	MSI after CO_2 Price	MSI after revenue is distributed
Cap-and-dividend (nontaxable)	41.52	17.06	-0.18	0.05
Cap-and-dividend (taxable)	41.52	17.06	-0.18	0.15
Invest in efficiency	37.20	17.06	-0.18	0.16
Exclude home heating	42.80	17.06	-0.18	0.13
Exclude transportation	43.25	17.06	-0.17	0.06
Expansion of EITC	41.52	17.06	-0.18	0.23
Free allocation to emitters	45.65	17.06	-0.18	-0.73
Free allocation to electricity consumers	46.95	17.06	0.17	0.11
Reduce income tax	41.52	17.06	-0.18	-0.79
Reduce payroll tax	41.52	17.06	-0.18	-0.33

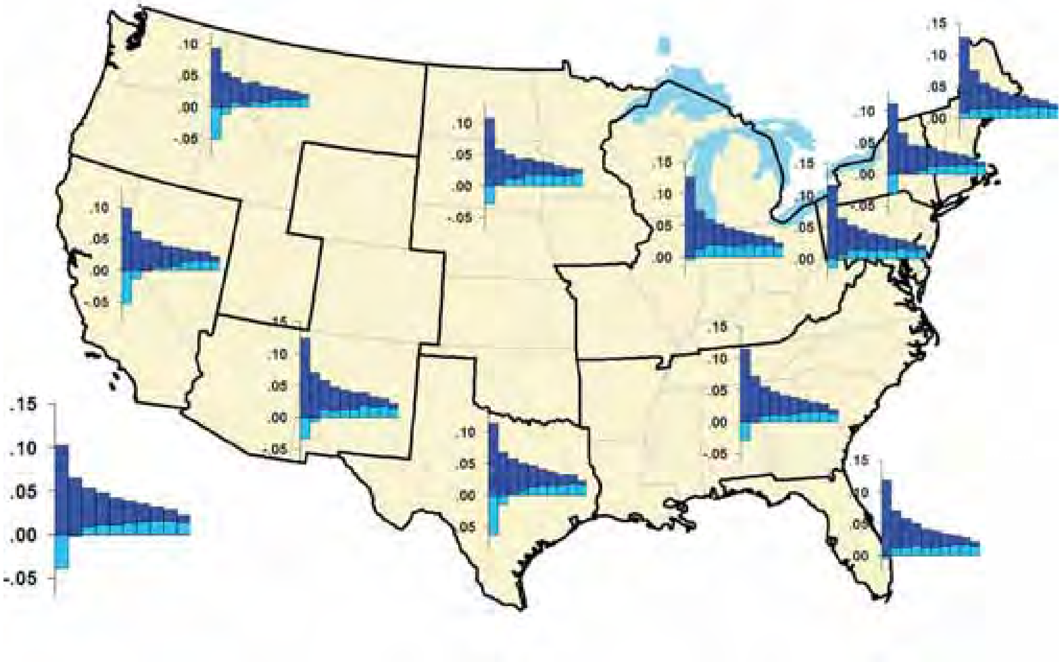


Figure 2.
Regional Incidence of a CO_2 Cap-and-Dividend Policy (Taxable)
Consumer Surplus Losses as a Portion of Income

Decrease in consumer surplus after introduction of CO_2 price

Decrease in consumer surplus after distribution of revenue

plementation of energy efficiency programs has proven uneven in the past, and without additional research into this issue our results merely highlight the potential of this option.

While the case for equity across income groups is straightforward, interregional equity is more complicated due to differences in preexisting policies, incurred costs, energy prices, resources, and lifestyle choices. Some regions, including California, have already enacted policies to reduce their carbon footprint.

Nonetheless, important differences emerge, and the biggest regional differences affect poor households. Low-income households in Texas, California, Nevada, and the Northwest experience large net gains, while these households in the Northeast, Florida, and the Ohio Valley are consistently among the most harmed. The table on the right-hand side of Figure 1 shows these effects as numerical values for the cap and (taxable) dividend scenario. These results highlight important regional differences in the impacts of climate policy. These differences hold up under almost all of the policy scenarios we analyzed and low-income households in the Northeast, Ohio Valley, and Florida are consistently among the most harmed.

Geographically, the range of impacts on average households across regions can be as high as about \$550. For example, under a cap-and-dividend policy (with dividends that are taxable) the average household in the Northeast experiences a consumer surplus loss of \$1,150 per year while the average household in the Northwest loses only \$625 per year. (Note our measure of the change in surplus exceeds the change in expenditures.) However, when expressed as a fraction of income, these differences are small.

To illustrate how interregional differences can complicate the efforts to address income equity, Figure 2 demonstrates the impacts of the cap and (taxable) dividend policy across regions. Again, the bars with darker shading and the greatest vertical height represent the loss in consumer surplus as a share of income due to putting a price on CO2, and the bars with the lighter shading represent the net loss after distributing the value of allowances as a per capita dividend. The figure for the nation is replicated in the lower-left corner, and the region-specific figures are displayed for each of the 11 regions we model. The map indicates that the regional differences come into consideration for the lower-income groups and for the average consumers, but there is relatively little variation among the upper-income groups across regions.

Our research suggests the incidence of climate policies can vary greatly across income groups and across regions. Although climate change is a long-run problem, climate policy has an important short-run political dynamic. Therefore, delivering compensation or finding ways to alleviate disproportional burdens of the policy seem especially important in the early years of climate legislation. Similarly, if all politics are local, then the local and regional effects of policy may be fundamentally important to building the political coalition necessary to enact climate policy. ■