Upgrading California's Climate Policy:
How SB775 could make carbon pricing more equitable

Max Henrion, PhD and Tony Sirna

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Summary

California Senate Bill SB775, recently proposed by State Senator Bob Wieckowski and Senate President pro tem Kevin De León, would provide a major upgrade to California's pioneering climate policies to reduce greenhouse gas emissions. It retains the key elements of the existing cap and trade scheme, namely a cap on emissions declining by 40% from 2020 to 2030, and auctions of tradable allowances that put a price on carbon emissions to provide market incentives to reduce emissions. SB775 reinforces the cap. It ends the distribution of free allowances and the use of carbon offsets, and abolishes the banking of allowances which permit industry to buy allowances cheaply in early years and deploy them to exceed caps in later years.

A key innovation of the bill is to return most of the revenues from the sale of allowances as a per capita dividend to every California resident. These quarterly checks will compensate Californians for the higher costs of electricity, natural gas, gasoline, and all products whose prices increase in proportion to their associated emissions. It would change what is now a regressive policy that puts a larger relative burden of carbon costs on low-income households into a more equitable policy, in which most low-income households receive a dividend that is greater than their share of carbon costs. The State will still retain revenues to invest in clean energy and low-carbon projects at current or larger levels.

Introduction

California is considering a major upgrade to its pioneering cap and trade scheme to reduce greenhouse gas emissions. The existing policy, based on the California Global Warming Solutions Act of 2006, known as AB32, must be reauthorized by 2020. To this end, State Senator Bob Wieckowski and Senate President *pro tem* Kevin De León introduced Senate Bill 775 on May 1st.

SB775 retains key elements of the current cap and trade mechanism: A cap on greenhouse gas emissions that ratchets downward to 40% of 1990 levels by 2030, and quarterly auctions of tradable allowances to emit a metric tonne of carbon dioxide or its equivalent in other greenhouse gases, such as methane. This market mechanism incentivizes industry to find cost-effective ways to reduce emissions through energy efficiency and less carbon-intensive electric power generation such as solar, wind, and biofuels. However, emissions reductions from cap and trade have fallen short of expectations because certain structural features of the existing system have kept the price of allowances too low.

SB775 would address these structural issues. It ends the allocation of free allowances to favored industries. It adds more effective measures to keep carbon-intensive California industries on a level economic playing field with out-of-state competitors, which reduces the pressure on California industry to shift operations out of state, a phenomenon known as "leakage." It reinforces the emissions cap in three ways: It steadily increases the price ceiling on allowances (Figure 1). It disallows the use of carbon offsets, which are of questionable effectiveness in reducing emissions. And it ends the banking of allowances for use in later years; already, industry has banked enough allowances so that California could exceed its emissions cap in the 2020s [Busch, 2017].

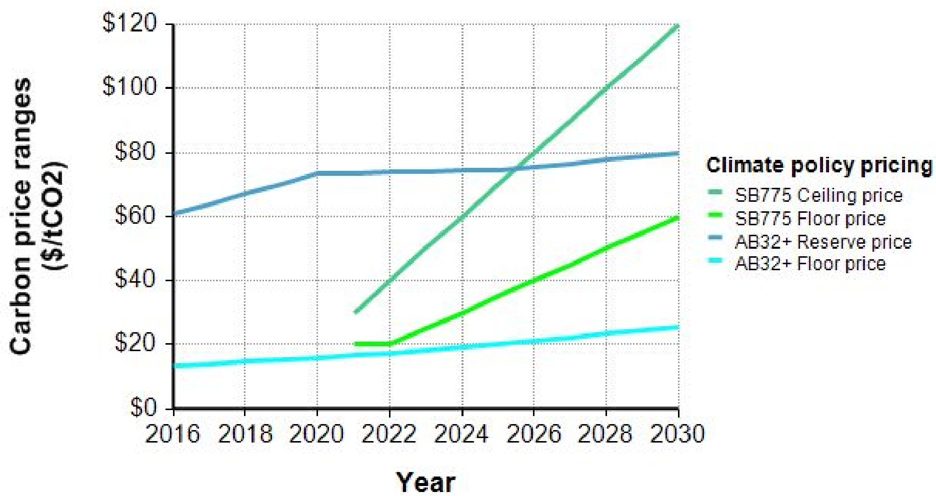

Figure 1: Floor and ceiling (or reserve) prices for emissions allowances per tonne of CO_2 equivalent for SB 775 and ARB Scoping Plan proposal for extension of current policy (AB32+).

Carbon pricing, absent a dividend, tends to be regressive

With no dividend, carbon pricing is regressive – that is, it places a greater relative burden on lower-income households. A key innovation of the SB 775 is that it returns most of the revenues from selling carbon allowances back as an equal quarterly dividend check for every California resident. It even provides a mechanism to distribute dividends to the homeless and people without bank accounts. The result is a more equitable sharing of the costs and benefits.

The average California household is projected to have a priced carbon footprint of about 20 tonnes of carbon dioxide emission per year (TCO_2/y) in 2021 when SB775 would take effect, assuming California emissions are at the SB32 cap and 85% of emissions covered by allowances . If the allowance price is \$25/CO_2 (midway between SB775's initial floor and ceiling of \$20 and \$30/CO_2), the average household would pay just over \$500/year total due to increased prices for electricity, gasoline, and other products to the extent they are made with fossil fuels. Wealthier people buy more stuff, and so tend to have higher carbon footprints, which drive higher carbon expenditures, as shown in Figure 2. Top quintile (20% highest-income) households have over twice the average carbon footprint (28 CO_2) of the bottom quintile (20% lowest-income) households (13 tCO2), and so over twice the carbon cost (\$700 vs. \$325).

These numbers assume that producers will pass on all cost increases from carbon pricing to consumers as higher prices for goods and services.

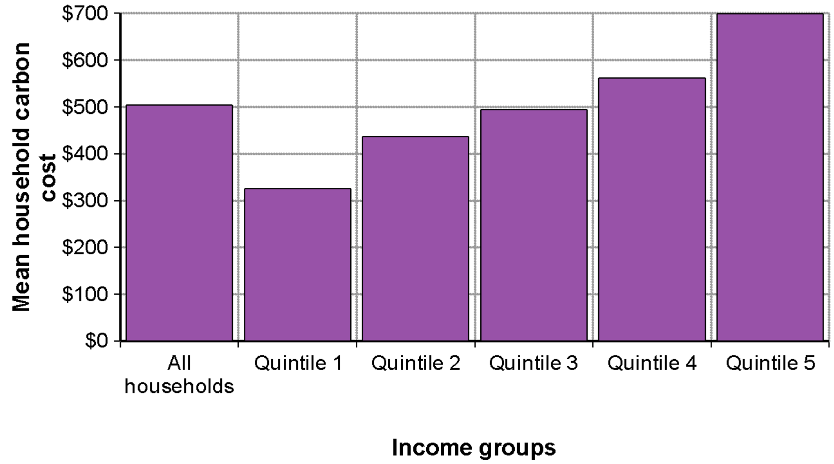

Figure 2: Average household cost of carbon pricing for all California households (left) and for the five income quintiles -- equal groupings by household income. Assumes carbon price \$25/CO_2, estimated for 2021.

Although the absolute carbon cost to lower quintile households is smaller, the *relative* impact as a percent of income is much larger. The average household income for the bottom quintile is less than one eleventh of the income of the top quintile (\$18,240 vs. \$204,400). So, carbon cost as a percentage of household incomes is more than five times as much for bottom quintile homes as for top quintile homes (Figure 3).

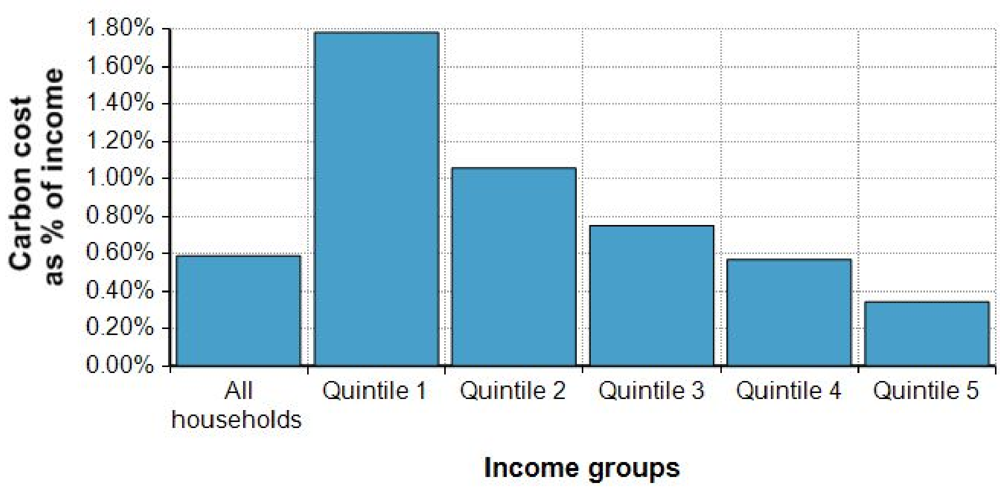

Figure 3: Average carbon cost per household as a percentage of household income, over all households (left) and for lowest to highest quintile household income. Assumes carbon price \$25/tCO2, estimated for 2021.

Dividends make carbon pricing progressive

Returning the proceeds from allowance sales to residents as a dividend can make carbon pricing progressive. SB775 does not yet specify what percentage of allowance revenues should be returned as dividend. For illustration, we assume a 90% dividend share. (We explore the effect of alternative percentages below.) Figure 4 shows the average carbon cost, dividend, net benefit, or cost per capita, averaged for all households and by quintile of household income from lowest to highest group. The carbon costs (black bars) range from an average of $102 per capita for households in bottom income quintile up to $295 per capita for top quintile households. The dividend (green bars) are the same $158 per capita for all residents.

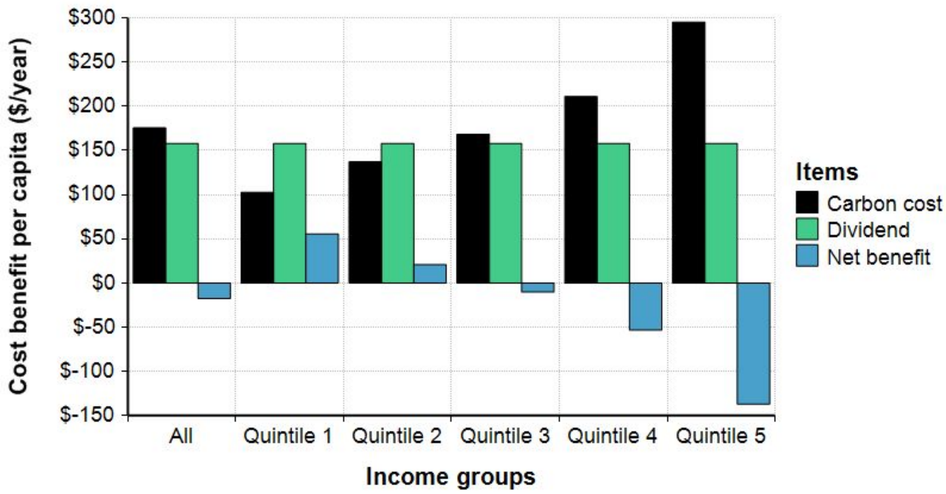

Figure 4: Carbon cost, dividend, and net benefit (or cost) per capita for 2021, assuming a carbon price of $25/tCO2, averaged for all households and by household income groups from lowest to highest quintile. Note that these amounts are per capita to highlight the equal dividend per capita, where figure 2 shows costs per household.

The lower two quintiles have a net benefit (in blue) because their dividend is greater than their carbon cost. People in households with higher incomes have a net cost (blue bar below $0) because of their higher average carbon cost. Note that by *net benefit or cost* we mean only the difference between dividend received and the increased cost of gasoline, electricity, and all other goods due to the carbon price. This analysis ignores any benefits of carbon pricing from reduced air pollution or climate change, and value derived from investment of non-dividend revenues in research and infrastructure for low-carbon technologies.

These numbers are for 2021, assuming an allowance price of $25/tCO2. By 2030, it is plausible that allowance prices will increase substantially over time to reflect the 40% cut in the emissions cap. If prices reach the SB 775 ceiling of $120/tCO2 by 2030, carbon cost per capita would range from $290 to $825, with a dividend of $442. You can multiply these by four for a household of four people.

Comparing SB775 with other Extensions of AB32

SB775 retains the same emissions cap trajectory as the cap and trade policy in the Scoping Plan of the California Air Resource Board. However, it is possible that that the use of banked allowances from pre-2020 period in later years and the use of offsets in the latter scheme may result in lower market prices than SB775, and greater likelihood that emissions within California will exceed the cap. SB 775 starts with the same coverage as the latter scheme, but its border adjustment of imports by carbon content creates some future uncertainty about the total emission covered. For purposes of comparison, we assume that both policies result in emissions equal to the cap and the same market price of $25/TCO2. Even though half of the allowances are distributed free under AB32, their tradable value is the same, which is what drives the implicit cost of carbon in California sales of products and services. With these assumptions, the carbon costs to California households would be the same for both policies.

From the point of view of California residents, the main difference between them will be in the funds they receive to help defray these costs. AB32 currently returns 25% of the value of allowances to consumers via the California Climate Credit. This credit appears twice a year as a line on their gas and electricity bills, as an equal amount for all residential customers of each utility (it varies by utility). Some Climate Credit is returned to commercial accounts depending on actual consumption, some of which we may assume is passed on to households. It is uncertain whether all landlords will rebate the credit to their tenants. But for simplicity, let us treat the Climate Credit as an equal rebate to each household, which may slightly overstate its size and equal distribution.

Figure 5 shows the average carbon cost per household by quintile (black bars), the Climate Credit amount under a policy similar to AB32, labelled AB32+ (purple bars), and the household dividend under SB775 (blue bars). As before, the carbon cost increases with household income. By assumption, the Climate Credit is the same for all households, about $126/year. The SB775 dividend by household reduces slightly with increasing income because the dividend is per capita and the average household size reduces with income. The key point is that the Climate Credit under AB32 is much less in all cases, on average 25% of the carbon price and 28% of the dividend under SB775. Looking at the net benefits or costs relative to income (as in Figure 3), it is clear that SB775 will results in a substantially more progressive distribution of effects by household income group.

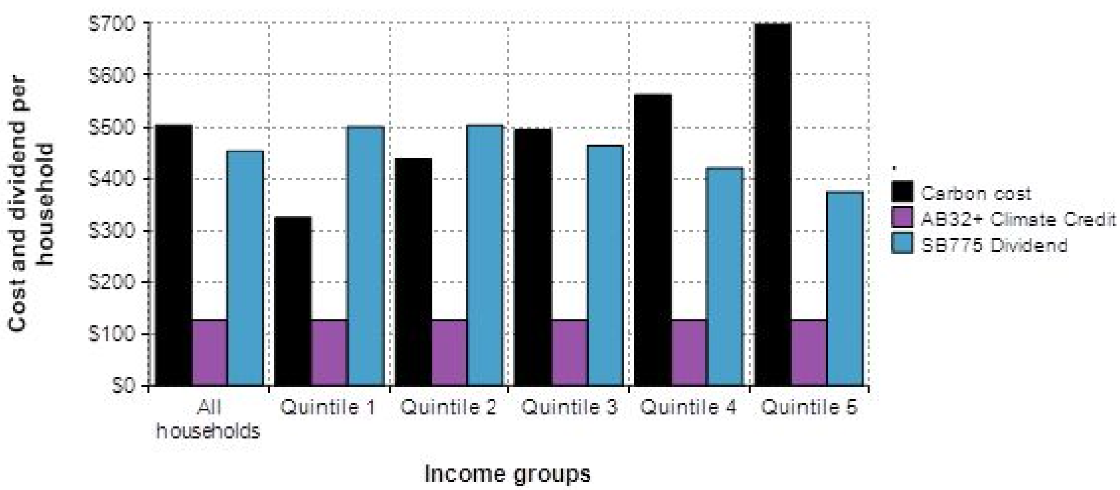

Figure 5: Carbon cost (black), Climate Credit in dollars per household for 2021 (purple), and dividend under SB775 (in blue), for 2021, assuming a carbon allowance price of $25/TCO2.

Percentage of households with net benefit

While on average lower income households have smaller carbon footprints, there is considerable variation. Some lower income households are in rural locations that may entail a lot of driving. Some high-income households can afford their own solar generation and electric cars to reduce their carbon footprint. Figure 6 shows the percentage of households with positive net benefit (dividend greater than carbon cost) or minor loss (less than 0.2% of household income) by income quintile. Considering all households, 63% have a net gain or minor loss. Over 70% of the lowest income quintile have a net benefit, plus 4% with minor loss. Even in the top quintile, over 50% of households have a net gain or minor loss.

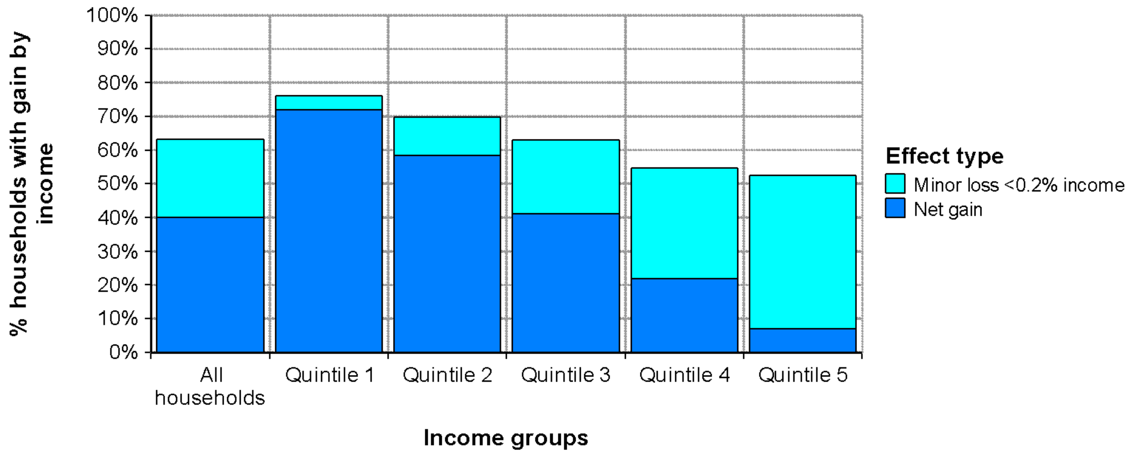

Figure 6: Percentage of households that have a positive net benefit (their dividend exceeds their carbon cost) or minor loss (the difference is less than 0.2% of their household income) for all California households and for lowest quintile (20%) of household income up to highest quintile income group.

Effects by voting district

There are considerable variations in net benefit by location in California, reflecting variations in income distribution, consumption patterns, and climate. Figure 7 shows a map of the forty California Senate voting districts. The color indicates the percentage of households in each district with a positive net benefit or minor loss. The colors vary from white (50%) to purple (75%). No districts are pink or red indicating that all districts have at least half of their households with net benefit or minor loss. Deeper purples in Central Valley districts reach show higher levels, from 65 to 75%.

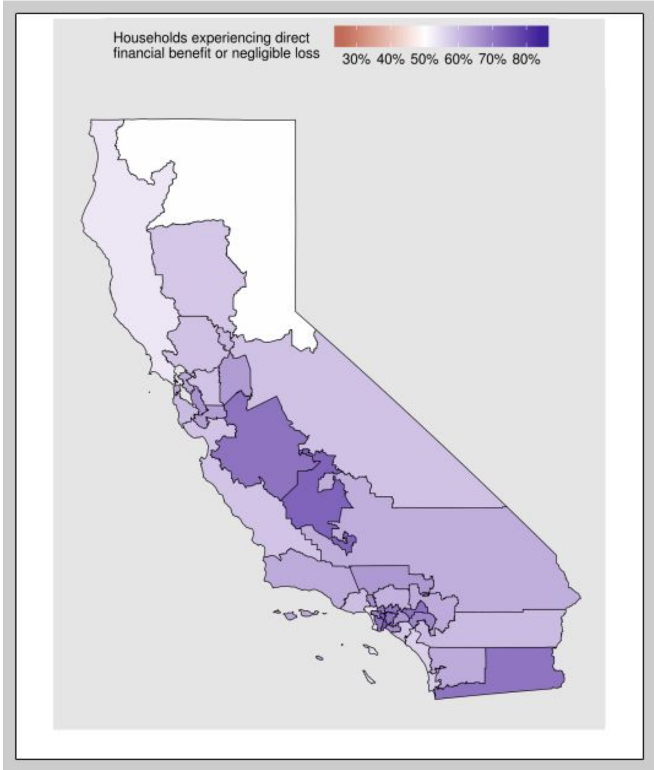

Figure 7: California Senate voting districts. Color indicates percentage of households that have a positive net benefit or minor loss.

Effect of share of revenues allocated to dividend

The results so far assume that 90% of revenues are allocated to the California Climate Dividend Fund — the "dividend share". The remaining percentage is allocated to funds established for clean energy research and infrastructure development. SB775 does not specify the dividend share as yet, so it is useful to look at the implications of other percentages. Figure 8 shows the percentage of California households with net positive or minor loss as a function of dividend share ranging from 60% to 100%. As you might expect, the percentage of households with a net gain or minor loss increases with dividend share, reaching almost 70% at a dividend share of 100%.

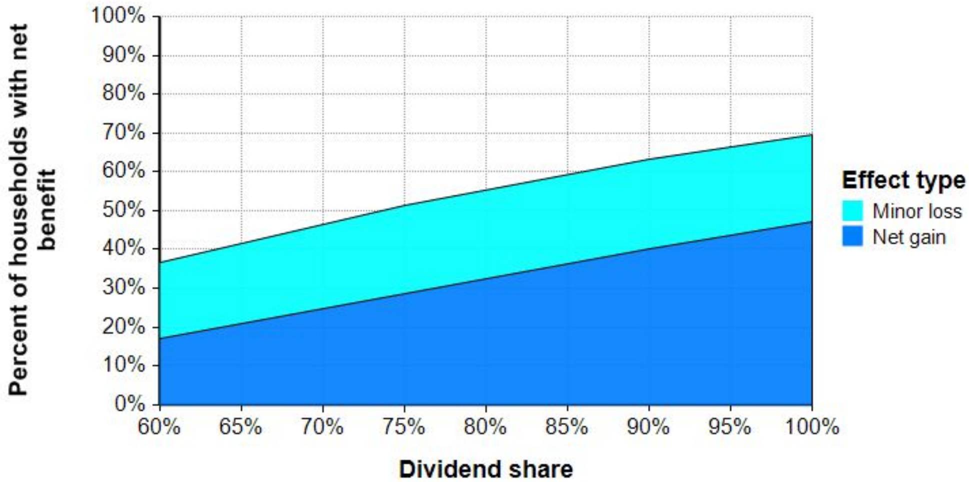

Figure 8: The percentage of California households that have a positive net benefit or minor loss (less than 0.2% of income) increases with dividend share – the percentage of revenues allocated to a per capita dividend.

Should children get a smaller dividend?

SB775 currently proposes an appealingly simple way to allocate the dividend share: An equal amount per capita for every California resident. Citizens Climate Lobby (CCL), for its national policy, recommends a half share dividend for each child under 18, up to two children per household. Figure 9 compares these two strategies in terms of percent of households with positive net benefit or minor loss as a function of dividend share. The CCL method has a slightly higher percentage than the equal per capita, reaching 75% vs 70% for a dividend share of 100%. One reason is that children have lower carbon footprints than adults. Giving them a half share increases the per capita dividend available for adults, and matches household dividends more closely with their carbon cost, so that more households end up with a net benefit.

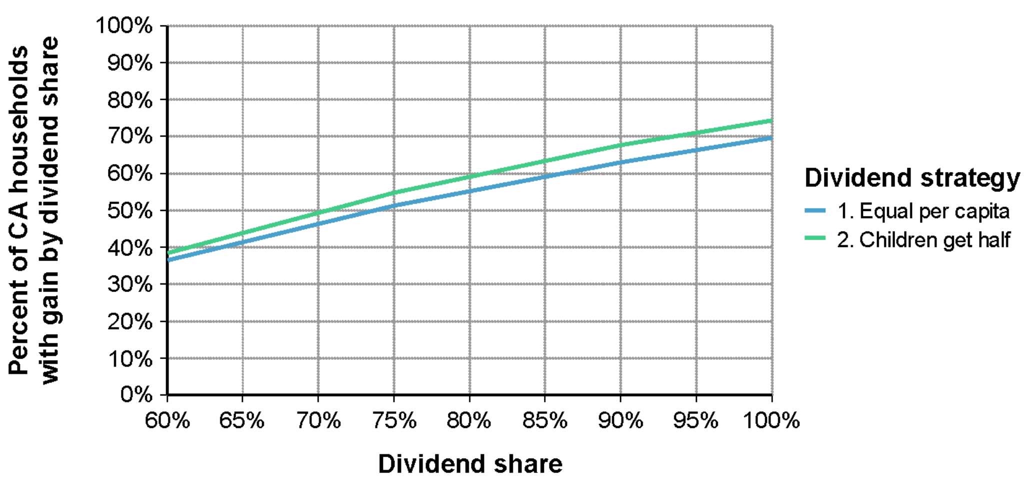

Figure 9: Percentage of California households with a positive net benefit or minor loss as function of dividend share – the percentage of revenues allocated to per capita dividend.

Appendix: Modeling approach and assumptions

In this section, we outline our approach to modeling and key assumptions behind the numbers. These results are based on runs of a microsimulation model using a representative sample of 630,000 California households from the American Community Survey (2008-2012), as summarized in Ummel (2017). Households are weighted to create representative samples at the zip code level. They were then gridded and aggregated to California voting districts for Senate and Assembly. The simulation estimates the carbon footprint of each household based on the Consumer Expenditure Survey of the U.S. Bureau of Labor Statistics adjusted for consistency with the Personal Consumption Expenditures component of the U.S. Bureau of Economic Analysis (BEA). It uses the BEA's economic input-output tables to estimate the effect of a carbon price on the consumer price of goods and services for 48 different household expenditure categories. See working paper (Ummel, 2016) for a full description of the underlying methodology, core assumptions, and caveats.

We adjust the household sample for changes in population and household size using demographic projections by the California Department of Finance. The results assume an effective price of \$25TCO$_2$e under a statewide, consumption-based GHG cap of 431 MMTCO2e in 2020. Results for 2021 (when SB 775 would take effect) and subsequent years scale results assuming that household carbon footprints reduce in proportion a linear decline in emissions from 2020 to 2030 and based on further population projections from the California Department of Finance.

The model was run for 12 scenarios: Four levels of dividend share, 60%, 75%, 90%, or 100%, and three dividend strategies: Equal per capita as specified in SB775, half share for children according to CCL national-level policy, and with per capita dividend declining as a function of household size to reflect average effect per additional household member on carbon footprint. While altering the assumed carbon price and/or cap alters the absolute size of the tax burden and dividends, it does not alter the relative distributional effects of the policy — e.g. the percent of households with net benefit overall, or by district and quintile.

We assume that 85% of California emissions are subject to allowance pricing, as in AB32 and proposed extensions. For SB775, we assume 100% of allowances are auctioned. The results assume that government (state, federal, or local) retains 20% of revenues from allowance auctions to cover the increased prices, reflecting that government purchases 20% of the State's products and services. Otherwise government would need to increase in taxes or reduction in government services to cover these costs. The dividend share percentage is applied to the revenues after subtracting this 20% retention. This assumption reduces both both dividends and carbon costs by the same 20%, so has no effect on the percentage of households with net benefits.

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