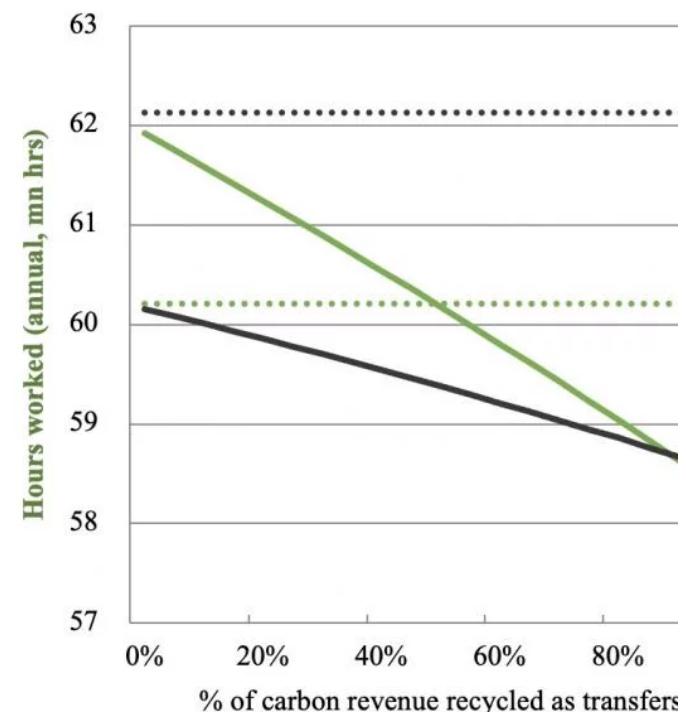


Panel b



VOXEU COLUMN ENVIRONMENT POLITICS AND ECONOMICS

Carbon tax recycling and popular support in Germany

Miguel Tovar, Frederick van der Ploeg, Armon Rezai / 2 Nov 2021

Carbon pricing disproportionately hurt poorer households, but cash disbursals from the revenue it raises can compensate these households and lower income inequality. This column evaluates the effects of carbon taxes by employing utility-based measures of whether a household is better off. The transparency of such a policy increases political support if a substantial majority of the population benefit from the carbon tax plus cash disbursal. However, endogenous behaviour blunts the effectiveness of such transfers; for Germany, it diminishes political approval from 60% to 30%. Using revenue for lowering income taxes as well for dividends increases popular support back to above 50%.

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Carbon taxes are unpopular because the poor are disproportionately hurt. But revenue from carbon taxation can be returned to all citizens via lump-sum payments ('climate dividends') to lower energy prices. Policymakers have taken up such 'tax-and-distribute' policies. The central argument is that these maximise fairness and political viability since cash transfers disproportionately benefit the poor, lower inequality, and help make carbon taxes politically acceptable.

Economists have argued for carbon taxes for decades, but politicians often avoid them as they fear the loss in purchasing power of ordinary people. Handing money directly back to citizens has the benefit of a visible and transparent increase in income for all. This especially helps lower-income groups compared to when the revenue is used to lower government debt or increase most types of spending.

Empirical studies find that most households benefit from ‘carbon-tax-cum-dividend’ policies. In the US, 70% of the lowest-income households benefit from such a policy (Horowitz et al. 2017); in Germany, roughly 67% of households benefit (Edenhofer et al. 2019). The double dividend of green taxes and lower income inequality also suggest that a carbon-tax-cum-dividend policy is politically superior to other forms of carbon tax schemes.

To assess carbon-tax-cum-dividend policies properly, one must take account of behavioural changes of households and firms in response to carbon taxes and the resulting changes in prices and government transfers. For example, a carbon tax depresses purchasing power, labour supply, and taxable income. The government thus sees a deterioration of the tax base, so has fewer funds for lump-sum rebates or must raise labour income taxes at the expense of income inequality. If labour income taxes are increased to fund the dividend, labour supply and the income tax base drop even more, thus further reducing the financial means for handing out climate dividends.

A carbon tax also encourages households and firms to substitute dirty consumption goods for clean ones. If demand for carbon-intensive products reacts strongly to carbon taxes, emissions fall a lot but then there is little carbon tax revenue and less scope for rebating climate dividends. However, if the price sensitivity is low, carbon pricing is a blunt instrument to green the economy but is effective for raising public revenue. The carbon tax then finances substantial lump-sum carbon revenues, thus lowering inequality.

Behavioural effects alter the political arithmetic of carbon taxation. If *all* revenue is used for lump-sum rebates, labour supply and income taxes fall by more than the increase in carbon tax revenue. The dividends must then be *negative*, which increases inequality. Hence, part of carbon tax revenue must be used to lower income taxes to sustain or boost labour supply, because this finances climate dividends. Carbon tax revenue must be used to simultaneously cut labour income taxes and hand out climate dividends to improve both efficiency and equity.

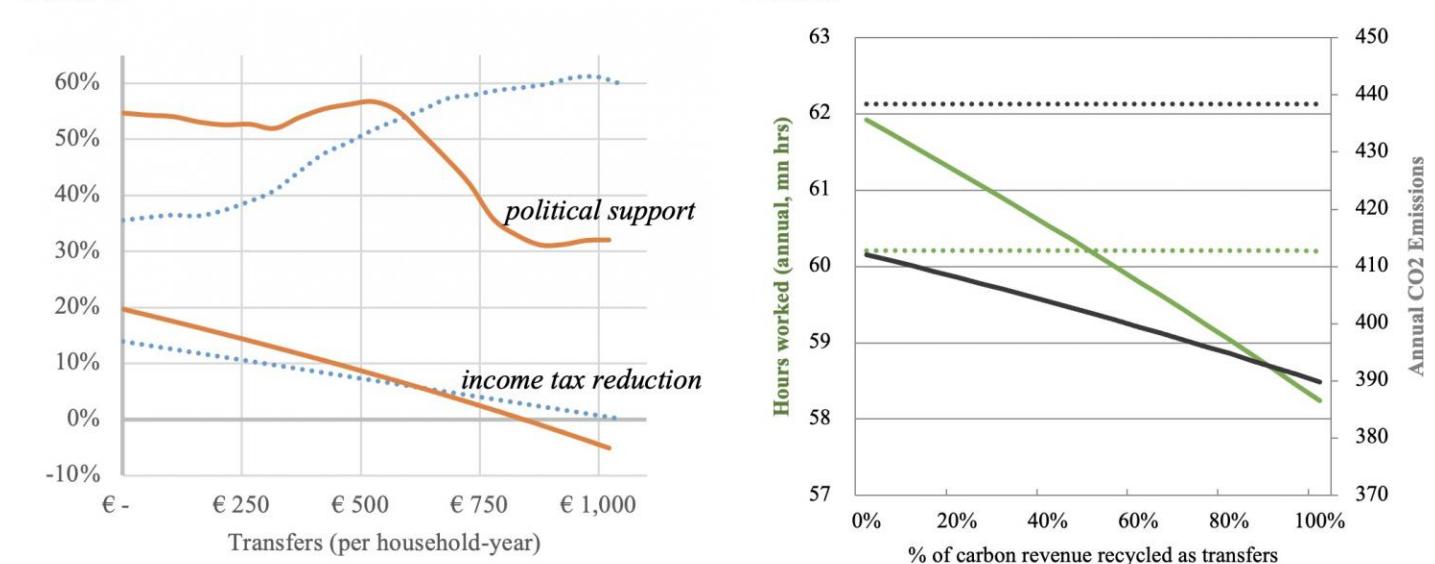
We quantify these effects using detailed microdata on German household expenditures (van der Ploeg et al. 2021). We find that only 30% of people benefit from a simple carbon-tax-cum-dividend policy. There is, in contrast to earlier findings, *no* political majority for carbon taxation. However, if half the carbon tax revenue is used to cut income taxes and the other half to fund climate dividends for all, more than 50% of people benefit from carbon taxation. The government can, with the right communication, get a political majority for carbon taxation.

Majority support contingent on carbon tax recycling schemes

To evaluate the effects of carbon taxes, we employ utility-based measures of whether a household is better off. Such a measure takes account of the value of the bundle of consumption goods and leisure time and how this value is affected by carbon taxes, climate dividends, and lower income taxes. Earlier studies note that carbon-tax-cum-dividend proposals are repeatedly rejected. Behavioural aspects are critical in framing and conveying the true benefits of a climate tax proposal. Although individual behaviour can be studied carefully in experiments and tested quantitatively in surveys, combining personal information with voting patterns is infeasible. Hence, we focus on utility outcomes since this allows us to combine detailed information of individual households with the effects of different policy packages on their utilities.

Without broad political support, no policy package will be supported regardless of its effects on equity, efficiency, or emissions. Figure 1 plots the share of the population that benefits from a carbon tax of €100 per tonne of CO₂ against the share of carbon tax revenue used for climate dividends instead of lowering income taxes. The dashed blue and solid orange lines indicate the share without and with behavioural effects in consumption and labour supply.

Figure 1 Political and economy-wide effects of revenue recycling schemes



Popular support rises in the share of carbon tax revenue distributed as climate dividends if behavioural effects are ignored. However, if behavioural changes are accounted for, support is roughly stable at around 55% as the share of carbon tax revenue handed out as dividends rises to 50%. For higher shares of dividend rebates, support falls rapidly to 30% as many households flip from being in favour to against.

The lower part of panel a in Figure 1 plots the reduction in income taxes that is needed for a given climate dividend. As the share of revenue distributed as dividends increases, so does the size of the dividend and the percentage reduction in taxes. Without behavioural responses, the maximum climate dividend is €1,150 annually. With behavioural responses, households choose cleaner consumption and the maximum climate dividend that can be paid out drops to €1,020.

If revenue is used to lower income taxes, taxes can be reduced by at most 15% without any behavioural effects. However, with such effects, taxes can be cut at most by 20%, as lowering taxes boosts employment and efficiency. The additional tax revenue leads to a cut in taxes by a further 5 percentage points.

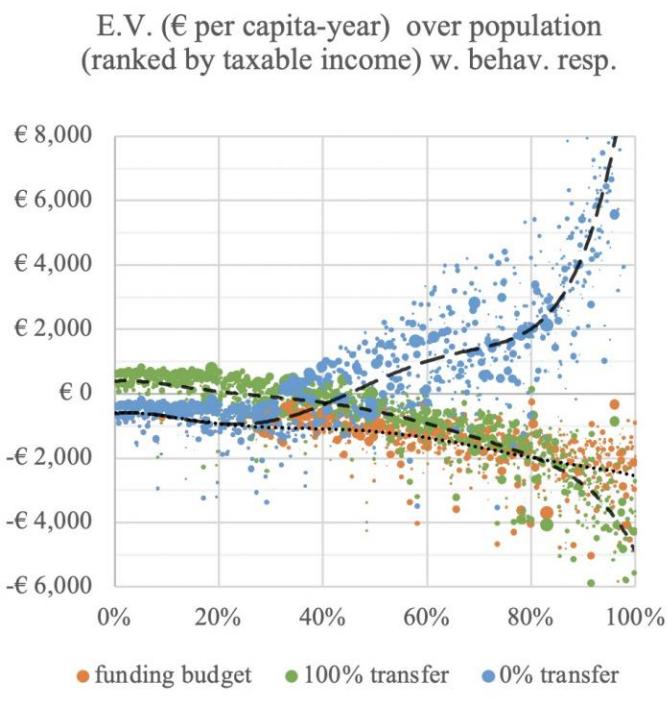
Since carbon taxes increase consumer prices, households find consumption less attractive and prefer to work less (Figure 1, panel b). This cuts tax income so the government must raise taxes to compensate if the same level of services is to be guaranteed. Hence, taxes at their current level can only fund a rebate of 80% of overall carbon-tax revenue. Higher levels require *increases* in the income tax of up to 5%.

Benefits across income distribution and policy packages

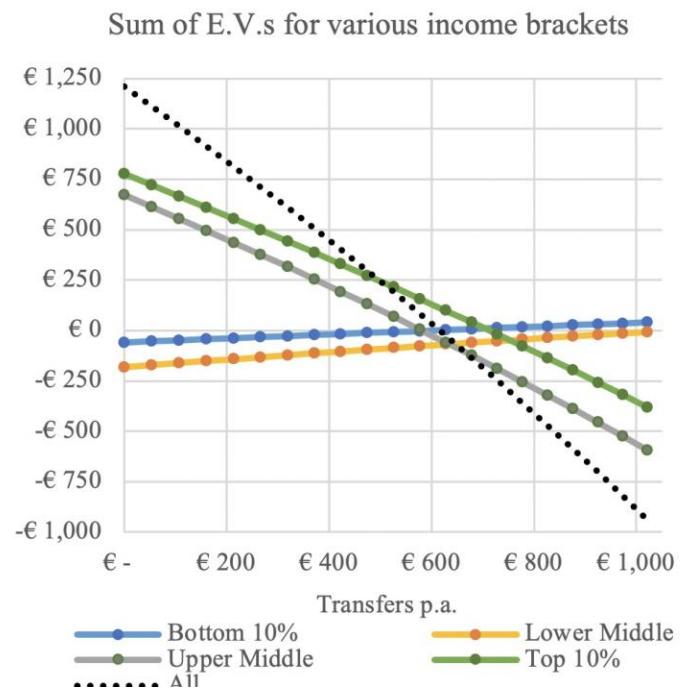
Looking at the fraction of the population that gains conceals which households gain and which lose. We therefore calculate the equivalent variation for each household: how much a household is willing to pay to see a policy package implemented. Figure 2 plots the distribution of winners and losers of various policy scenarios across the income distribution (ranking by taxable income). Sizes of dots capture the relative weights in the population.

Figure 2 Winners and losers from a carbon tax of €100/CO₂ change with recycling scheme

Panel a



Panel b



In the case of a carbon tax where no revenue is handed back at all (in orange), every household loses, with all dots and the dotted trend line below the zero axis. The next scenario (in blue) uses proceeds to cut income taxes. Households whose income is too low to pay income taxes remain in the same position as before, visible by the dashed trend line following the dotted one for the bottom 30%. The higher the income of households, the larger the benefits of lower tax rates, with the top 15% gaining significantly.

Recycling carbon taxes as dividends (displayed in green) flips the distribution of winners and losers. Most lower-income households gain while most higher-income households lose under this policy. The lower revenue from carbon tax magnifies the distributional effects at the top and middle parts of the income distribution. If revenue is used to lower income taxes, more households benefit and those at the top, who benefitted before, gain even more.

Conversely, a carbon-tax-cum-dividend scheme benefits the poor relatively more and increases the percentage of the population losing out. As a result, the majority favour using carbon tax revenue to lower income taxes (Figure 1).

The effects of carbon taxation vary greatly even when we control for income differences, as illustrated by the large variance in the data clouds of Figure 2. Incomes are, however, important to understand the distributive effects of carbon pricing. In general, the bottom half of the population prefers to avoid carbon taxation unless revenue is recycled back to them via dividends. The opposite holds for the upper 50% of the income distribution.

Given the large variation of equivalent variations even within income groups, the analysis of the top and bottom half of the population is only indicative of the support dynamics shown in Figure 1. The top 10% are significantly better off than the next 40% and the rest of the population.

The climate dividend is commonly set to the revenue generated from carbon taxation. However, this does not account for the knock-on effects of taxation nor the changes in the value people attach to money. Using a household's equivalent variation as a measure and summing them across all of society overcomes both these shortcomings. If this sum is positive, it shows that the willingness of people to pay for a particular policy is larger than the willingness of those who would prefer to avoid it. In that case, those better off can compensate those worse off.

The dashed black line in Figure 2 shows that this possibility depends on the policy package. Only if less than 60% of tax revenue are disbursed as transfers is the sum of equivalent variations positive. For such a policy to be implemented, the top 50% has to compensate the bottom 50%.

Concluding remarks

Carbon pricing needs to be expanded and become more stringent if the temperature targets of the Paris Agreement are to be met. Such reform efforts face political obstacles such as the *gilets jaunes* in France. Direct transfers or climate dividends are considered more appealing to citizens than using carbon tax revenues to fund the general budget or to lower income taxes. While the idea is straightforward, it ignores behavioural responses and can lead to misleading policy conclusions.

If households' labour supply is endogenous, more than half the households are worse off if carbon is taxed and the revenue is entirely used to finance climate dividends. However, if part of the carbon tax revenue is used to lower income taxes, labour supply and the income tax base expand, and thus more people will see an increase in their net utility. If a large-enough part is rebated via lower income taxes, we have found using German data that more than half the population will be in favour of the policy package.

However, using a similar methodology on UK data leads to a more pessimistic policy conclusion: rebating carbon tax revenue as higher social security payments, lump-sum rebates, or lower income-tax rates implies that only, respectively, 35%, 19%, and 11% of the households are better off (Paoli 2021, Paoli and van der Ploeg 2021). Policy conclusions for one country thus do not necessarily carry over to other countries.

One needs to realise that salience matters. People perceive an increase in carbon taxes much more intensely than a cut in income tax. People may reject a carbon tax with judicious recycling even if they are better off as indicated by utility. Survey evidence indicates that the French largely reject a carbon-tax-cum-dividend policy since they wrongly think this policy is regressive and ineffective from a climate perspective (Douenne and Fabre 2020).

Furthermore, information campaigns have little effect. Even though a certain policy package may benefit the middle class, they may not be in favour on ethical grounds due to the adverse impacts on lower-income groups. A more realistic analysis needs to abandon median voter reasoning and take account of salience and ethical aspects too.

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