Hacienda Pública Española/Review of Public Economics 254-(3/2025): 45-57

https://dx.doi.org/10.7866/HPE-RPE.25.3.2

Recycling CO_2 Tax Revenue and the Carbon Dividend: A Guide to the Literature

LEA FRICKE*
University of St Gallen and *ifo Institute*
CLEMENS FUEST**
ifo Institute and *University of Munich*
DOMINIK SACHS***
University of St Gallen and *ifo Institute*

Received: January, 2025
Accepted: June, 2025

Abstract

This paper discusses the seemingly contradicting implications of the carbon dividend concept and the double dividend idea for the use of revenue from carbon pricing. We provide an introduction to a number of key contributions to this debate in the literature and explain how their findings and results can be reconciled. Some existing studies on the effects of revenue recycling through the carbon tax may be too optimistic regarding the impact because they neglect the interaction between the carbon dividend, labour supply, and the rest of the tax system.

Keywords: Corruption, Public spending, Sustainable development, MMQR.

JEL Classification: Q56, Q48, H50.

1. Introduction

Climate change is one of the most pressing environmental issues of our time. CO_2 emissions caused primarily by burning fossil fuels are a key factor driving global warming. The view is widespread that CO_2 pricing is the most important instrument to reduce these emissions. In the debate on CO_2 pricing, a central issue is how the revenue should be used.

Recently, the concept of the carbon dividend has attracted widespread attention. The idea is to use the revenue collected through higher carbon taxes to make a lump sum payment to every

* ORCID ID: 0000-0003-2452-9112.
** ORCID ID: 0009-0008-7698-8648.
*** ORCID ID: 0009-0007-2523-0565.

citizen. This proposal has received a lot of support including by economists. In the US, a group of prominent economists issued a statement calling for the introduction of a carbon dividend in the U.S. as an element of a climate policy package which includes a tax on CO_2 emissions and carbon border adjustment: "To maximize the fairness and political viability of a rising carbon tax, all the revenue should be returned directly to U.S. citizens through equal lumpsum rebates. The majority of American families, including the most vulnerable, will benefit financially by receiving more in "carbon dividends" than they pay in increased energy prices."[1]

This statement is remarkable for at least three reasons. First and most importantly, it seems to be in conflict with a literature about the use of environmental tax revenues which emerged in the 1990s. This literature argues that environmental taxes can yield a "double dividend": The first dividend is the protection of the environment and the second is a reduction in tax distortions. The second dividend requires that the revenue generated through environmental taxes is used to cut other, distortionary taxes like, for instance, income taxes. Goulder (1995) puts this as follows:

"A weak double dividend claim is that returning tax revenues through cuts in distortionary taxes leads to cost savings relative to the case where revenues are returned lump sum. This claim is easily defended on theoretical grounds and (thankfully) receives wide support from numerical simulations."[2]

Second, the carbon dividend supporters argue that the majority of American families, especially the most vulnerable, which means the poorest, would be overcompensated, so that the carbon dividend would exceed the increase in energy costs expected from the carbon tax. Third, the statement claims that a carbon dividend would maximize the fairness and the political viability of a rising carbon tax. The distributional implications of carbon taxes have been an important part of the climate policy debate for a long time. These two aspects raise the questions of how redistributive policies are affected by increasing carbon pricing. It would be surprising if, from the perspective of optimal tax policy, a carbon dividend was the optimal response in terms of distributive policies. But if it is not, it is important to clarify what should or what will be done instead.

In the literature, the issue of the double dividend of environmental taxation has been analysed in a large number of studies. For surveys of this literature see Goulder (1995) and Schöb (2003). Freire-González (2018) provides a meta-analysis of studies of the double dividend hypothesis based on CGE models and reports that 55% of the studies confirm the double dividend hypothesis, suggesting that views regarding the existence of a double dividend of environmental taxation are divided. Further *et al.* (2024) use an ex-post evaluation approach to examine the double dividend hypothesis. They find that the implementation of carbon taxes is associated with a 1.32% reduction in effective labour tax rates on average, providing empirical support for the existence of a double dividend. Van der Ploeg (2023) offers a review of political economy aspects of environmental taxation and revenue recycling.

The carbon dividend is a more recent idea. Research on how public support reacts to carbon taxes is surveyed in Carattini *et al*. (2018), who also mention revenue recycling through

lump sum transfers as one instrument.[3] To what extent the carbon dividend can generate public support has been investigated recently in experimental studies. Woerner *et al*. (2023) analyse the carbon dividend in an experiment with a representative population sample from Germany and find that revenue recycling through a carbon dividend increases support for carbon taxation. A possible explanation they propose is that citizens do not trust the government to hand the revenue back to the citizens and like the carbon dividend because it is transparent. In another experimental study Bachler *et al*. (2024) find that an asymmetric dividend, with larger payments to poorer households, gains even more support. Budolfson *et al*. (2021a, b) make a strong case for using the carbon dividend as an instrument to protect the poor against the burden of carbon taxes. Their argument is based on a climate policy simulation model used to investigate the effects of revenue recycling through an equal per capita payment. Van der Ploeg *et al.* (2021) also provide a quantitative analysis of the carbon dividend concept and arrive at a more critical result; they find that the carbon dividend is not a revenue recycling instrument that will generate political support for carbon taxes. As will be explained further below, the key difference is that Van der Ploeg *et al*. (2021) take into account other taxes, in particular labour income taxes, while Budolfson *et al*. (2021a, b) abstract from the rest of the tax system in their analysis. Fricke *et al*. (2024) investigate the optimal revenue recycling in an optimal tax model. Their approach and the emerging results will also be discussed in the following sections.

This paper has the objective to provide an introduction to the debate of the carbon dividend concept and its relation to the double dividend idea. The rest of the paper is structured as follows. Section 2 proposes a simple, stylized model which allows to discuss some key efficiency and distributional aspects of environmental taxes and revenue recycling. Section 3 focuses on the special case of homogeneous households to illustrate the basic idea of the double dividend view. Section 4 turns to the case of heterogeneous households and discusses the question of whether a carbon dividend would make a majority of taxpayers better off. Section 5 considers the case of optimal revenue recycling in a world where governments need to raise revenue to finance public goods, want to redistribute income and in addition, face a constraint for the allowed amount of carbon emissions. Section 6 concludes.

2. Efficiency and Distributional effects of recycling carbon revenue - a simple model

To illustrate the distributional effects of a carbon dividend, it is helpful to consider a stylized model of an economy with distortionary taxes and pollution, which follows the setup used in Bovenberg and de Mooj (1994), extending it to a heterogeneous household model. Consider an economy with n households, which differ with respect to their labour productivity and, hence, their wages w_i, $i = 1 \ldots n$. The utility function is the same for all households and is given by

$$U = U(c, e, L) - H(E) \tag{1}$$

where U is a utility function with the usual neoclassical properties, c is consumption of 'clean' goods, e is consumption of a good which gives rise to carbon emissions, L is labour supply,

and $H(E)$ is a convex function describing environmental damage of polluting consumption: $E = \sum_{i=1}^{n} e_i$. Each individual household takes E as given and neglects the link between its individual consumption and environmental damage. The government has three tax instruments: a proportional tax on labour income t, a lump sum transfer T and a 'carbon tax' q per unit of e. The goods c and e are produced by firms operating in perfectly competitive markets and the marginal and average cost of producing these goods is normalised to unity. Given this, the budget constraint of household i is given by

$$w_i L_i(1-t) + T = c_i + (1+q)e_i \tag{2}$$

Maximization of 'private' utility U leads to standard consumption demand and labour supply functions. The first-order conditions for household optimization imply

$$\frac{U_c(c,e,L)}{U_e(c,e,L)} = \frac{1}{(1+q)} \tag{3}$$

and

$$\frac{.-U_L(c,e,L)}{U_e(c,e,L)} = \frac{w_i(1-t)}{(1+q)} \tag{4}$$

where we have dropped the index i in the utility function for notational simplicity. The purpose of the carbon price is primarily to steer consumption away from polluting and towards 'clean' goods c. This is reflected by equation (3), which captures the trade-off between clean and polluting consumption: the marginal rate of substitution between polluting and 'clean' goods must equal their relative price. A higher carbon tax q increases the effective price of the polluting good, implying that households require a higher marginal utility of polluting consumption and therefore consume less of it, given the marginal utility of clean consumption. Similarly, equation (4) governs the trade-off between leisure and polluting consumption. A higher carbon tax q increases the relative price of the polluting good, creating incentives to substitute polluting consumption by leisure.

The government budget constraint is given by

$$t\sum_{i=1}^{n} w_i L_i + q\sum_{i=1}^{n} e_i - nT = G \tag{5}$$

where G is a fixed revenue requirement.

Total differentiation of the government budget constraint yields

$$dt\sum_{i=1}^{n} w_i L_i + t\sum_{i=1}^{n} w_i\, dL_i + dq\sum_{i=1}^{n} e_i + q\sum_{i=1}^{n} de_i - ndT = 0 \tag{6}$$

which can be rearranged to

$$dT = \frac{1}{n}\left[dq\sum_{i=1}^{n} e_i + q\sum_{i=1}^{n} de_i + dt\sum_{i=1}^{n} w_i L_i + t\sum_{i=1}^{n} w_i dL_i\right]. \tag{7}$$

This simple setup offers a number of insights into the effects of revenue recycling and the links between the ideas of the double dividend and the carbon dividend. Equation (7) illustrates how the lump sum transfer and the labour income tax can be jointly adjusted to rebate carbon revenue back to the households in a revenue neutral way. The second and the fourth term in the right hand side of (7) remind us that the revenue from a carbon tax change which is available for recycling depends on the value of q and t from which the carbon tax change starts. In particular, if one plausibly assumes $t > 0$, the revenue effect depends on the labour supply reaction, i. e. the sign of dL_i. This will play an important role in what follows.

3. Homogeneous households

Consider first the special case of homogeneous households. To keep notation simple, we normalize the number of households to unity ($n = 1$) for the analysis of this case. The double dividend idea claims that revenue generated by an increase in the carbon price should always be used to cut a distortionary tax. This implies that paying a carbon dividend is inefficient. To see this, note that the effect on the welfare of the representative household of an increase in T, financed by a higher carbon price q, can be expressed as

$$dU = U_c(dT - dqe - wldt) - H_e de \tag{8}$$

Using the total differential of the government budget constraint in (7), this can be rearranged to

$$dU = (U_c q - H_e)de + U_c twdL \tag{9}$$

The first term on the right hand side of (9) is the environmental effect of the increase in q. If we consider the introduction of a small carbon price starting from zero, there is a benefit from reducing the externality associated with polluting consumption e. In contrast, things are different if the reform starts from the 'Pigovian' carbon price

$$q = H_e/U_c \tag{10}$$

which just internalizes the environmental damage caused by private consumption e. Substituting the, Pigouvian' carbon price into (9) shows that the change in utility resulting from a further reduction in e, driven by a further increase in q, is zero in this case. More generally, the first term on the right hand side of (9) describes the first dividend of environmental taxation, the internalization of the costs of pollution.

The second term on the right hand side of (9) is crucial for the existence of the second dividend of environmental taxation. Whether it exists depends on the impact of the overall reform on employment. If leisure is a normal good, the increase in T will reduce

employment through an income effect. This leads to a decline in welfare, given that $t > 0$. Additionally, the increase in the carbon price will also tend to reduce employment because it increases the price of polluting consumption relative to the implicit price of leisure, as explained in the context of equation (4). The income effect of a higher carbon price increases labour supply but will dominate the entire effect only under strong assumptions. A decrease in t on the other hand increases employment as long as the slope of the labour supply curve is positive.

If all revenue is rebated via a carbon dividend, i. e. $dt = 0$, a positive employment effect could nevertheless arise if polluting consumption was a strong complement to leisure. In this case, the decline in polluting consumption caused by the higher carbon price would increase the supply of labour. The optimal second-best tax system would favor higher taxes on polluting consumption compared to taxes on clean consumption, irrespective of the environmental effect of the tax, as suggested by the Corlett-Hague (1954) rule for optimal tax systems. However, this is a rather special case.

If one assumes that, abstracting from environmental issues, uniform taxation of consumption goods is optimal (as in Bovenberg and de Mooij, 1994 and Bovenberg and von der Ploeg, 1994), a combination of an increase in the carbon price, starting from a Pigovian level as defined by equation (10), and the distribution of the additional revenue through a carbon dividend, reduces welfare because it reduces employment. This is why they conclude that the optimal Pigovian tax in a second best environment is lower than the Pigovian tax. Schöb (1996) and Fullerton (1997) have pointed out that this result critically depends on the assumption of an existing labour tax. A tax system with a proportional labour income tax is equivalent to a tax system with a uniform consumption tax on all goods including environmental goods. Given this, the optimal overall tax burden on polluting goods exceeds the Pigovian tax. In the literature, this is also referred to as the normalization issue.

Irrespective of the question whether the optimal pollution tax is higher or lower than the Pigovian tax, the key result here is that, in a model which abstracts from inequality across households and assuming that the direct environmental effect is already internalized through a Pigovian tax, using tax revenue from a marginal increase in pollution taxes to pay a lump sum transfer reduces welfare. In contrast, if the revenue is used to cut the labour income tax t, the impact on labour supply is positive for a wide range of preferences. In this case (private) welfare increases, so that a second dividend of environmental taxation arises.

Put differently, the inefficiency of the carbon dividend in this setting directly follows from the fact that cutting a lump sum transfer and using the revenue to reduce a labour income tax increases welfare.

However, while it is important to note that a carbon dividend is inefficient in a world with homogeneous households, the key argument proposed by its supporters is related not to its efficiency properties but to its *distributional effects*. Therefore, the carbon dividend concept can hardly be rejected on the basis of an analysis which abstracts from distributional issues by considering homogeneous households.

4. Heterogeneous households and the distributional effects of the carbon dividend

Considering differences between households is important for discussions of carbon tax policies because distributional issues play a key role in this debate, in particular for the carbon dividend debate. However, in the literature, most contributions analysing distributional issues related to environmental taxes do not consider the carbon dividend idea. The focus is rather on the level of the environmental tax and its relation to the Pigovian tax. For instance, Jacobs and de Mooij (2015) consider optimal pollution taxes in a model where households have different incomes and find that, for linear carbon Engel curves and linear income taxes, the optimal pollution tax follows a first-best rule, it is equal to the Pigovian tax. Jacobs and van der Ploeg (2019) also argue that the optimal tax exceeds the Pigovian tax if environmental damage hurts the poor disproportionally but should be lower if the poor spend more on polluting goods. Cremer *et al*. (2003) also emphasize the fact that the share of spending on polluting goods declines as household income rises. In their study, which allows for nonlinear income taxes, they also focus on the optimal pollution tax. The show that the optimal tax level generally depends on which tax instruments are available to the government. But they also show that, due to distributional reasons, the optimal pollution tax may be far below the Pigovian tax.

The debate about the carbon dividend has a different focus. Rather than discussing the optimal level of the carbon tax, it focuses on the recycling of the revenue through a lump sum transfer. This specific approach has received less attention in the literature. What are the distributional effects of revenue recycling in the form of a carbon dividend in a setting with heterogenous households? The statement supporting the carbon dividend cited above claims that a "majority of... families... will benefit financially by receiving more in 'carbon dividends' than they pay in increased energy prices".[4] The stylized model considered here allows to describe conditions for this claim to hold. Consider first a situation where no labour income tax exists ($t = 0$). Assume further that, in the initial equilibrium, there is no carbon tax ($q = 0$). Now consider an increase in the carbon tax by a small amount eq. (7) implies that the carbon dividend (the increase in the lump sum transfer) is equal to

$$dT = \frac{1}{n}\sum_{i=1}^{n} e_i dq\,. \tag{11}$$

If the carbon price is introduced, starting from a situation without any taxes, the increase in the lump sum transfer dT is equal to the increase in spending on the carbon price faced by the average household. Assume that spending on polluting consumption e is a normal good, i. e. it is strictly increasing in income. If spending on e of the median household is lower than average spending, then a majority of households do indeed benefit financially from the combination of the increase in the carbon dividend financed by the introduction of a carbon price. Note that, in this case, there is no conflict with the double dividend view because there are no distortionary taxes which could be reduced using the carbon tax revenue.

So what happens if pre-existing taxes are taken into account, in particular labour taxes? In this case, the increase in T that can be financed by the introduction of a small carbon price is given by

$$dT = \frac{1}{n}\left[dq \sum_{i=1}^{n} e_i + t \sum_{i=1}^{n} w_i dL_i\right]. \tag{12}$$

If leisure is a normal good, a higher T will reduce labour supply. The increase in the carbon price has an ambiguous effect on labour supply; taxing consumption creates incentives to substitute leisure for consumption, but the income effect of the tax increase raises labour supply. The combination of the lump sum transfer and the carbon price is likely to reduce the labour supply of most households. If aggregate labour supply declines, less revenue is available for the carbon dividend. It may then easily happen that the carbon dividend is too small to compensate the median household for the increase in the carbon dividend.

What if the reform starts from a positive carbon tax ($q > 0$)? In this case, the increase in the lump sum transfer T that can be financed by a further increase in the carbon price is

$$dT = \frac{1}{n}\left[dq \sum_{i=1}^{n} e_i + t \sum_{i=1}^{n} w_i dL_i + q \sum_{i=1}^{n} de_i\right] \tag{13}$$

There is now the additional term $q \sum_{i=1}^{n} de_i$ which is likely to be negative as polluting consumption declines in response to the higher carbon price. Since the reform is now assumed to start from a positive carbon price, the additional revenue available for the carbon dividend is now even smaller because the fall in e erodes carbon tax revenue.

Van der Ploeg *et al.* (2021) is one of the few contributions in the literature analysing the carbon dividend in a consistent theoretical framework taking into account in particular income taxation, with an empirical application.[5] They use a model with heterogeneous households, and profit maximizing firms. They use German household data to analyze how different CO_2 pricing reforms affect the utility of different household types, their labour supply and aggregate inequality as measured by the Gini coefficient of gross and net income (the latter is equivalent to expenditure in this one period model). They consider the introduction of a CO_2 price of 50 Euros per ton and look at three scenarios for using the revenue: the first is a scenario where the additional revenue is not returned to households, i. e. it is used to repay government debt or spending it, assuming in both cases that no other variable of interest in the model is affected by the use of the revenue. In the second scenario, the revenue is returned as a carbon dividend, and in the third scenario it is used to cut the income tax.

The key results of the three scenarios are as follows: The increase in the carbon price without revenue recycling reduces emissions as well as labour supply. Inequality of gross and net income remains roughly at the same level. All households are worse off.

In the second scenario, where the revenue collected is paid out as a carbon dividend, aggregate emissions and labour supply also decline but consumption spending increases slightly, driven by higher prices. Inequality in gross incomes is hardly affected but inequality in expenditure declines as households with lower incomes receive a compensation which is higher relative to the burden of a higher price for polluting consumption.

Results are rather different for the third scenario. In this scenario, the revenue is used to cut the income tax rates for all households by 8 per cent. In this case, labour supply increases strongly, by 1.6 per cent (compared to a reduction in labour supply in the carbon dividend scenario by 0.7 per cent). The increase in employment allows for an increase in consumption by 3.6 per cent (compared to 0.7 per cent in the carbon dividend scenario). However, this comes at the price of increased inequality of consumption spending.

The model also allows to compare the impact of the different reforms on overall welfare of the different household types. Unsurprisingly, in the case of no revenue recycling, all households lose. The most important result is that in the carbon dividend scenario, only 29 per cent of all households benefit. The reason is that the negative impact of the reform on labour supply reduces the level of the lump sum payment by so much that only a minority benefits. This finding contradicts the claim of the supporters of the carbon dividend according to which this revenue recycling instrument would increase political support for the introduction of carbon pricing.

In the third scenario, where the carbon tax revenue is used to reduce income taxes, 55 per cent of the households benefit. This implies that a carbon tax reform which builds on the double dividend idea would find the support of a majority if voters decide on the basis of how their welfare is affected by the reform. In this sense it would be politically feasible, in contrast to the carbon dividend reform. However, it should be borne in mind that the combination of a carbon tax with an across the board income tax rate cut would primarily benefit the richer households, and many poor households would lose.

Of course, the assumption that the income tax cut takes the form of a uniform across the board reduction in the income tax rate by 8 per cent is arbitrary. This raises the question of what the optimal form of revenue recycling would look like. Another issue is that revenue recycling itself has an impact on emissions. In the scenario with income tax cuts, consumption increases significantly, and this drives up emissions. The implication is that a form of revenue recycling which favors employment will require a higher carbon price increase to achieve a given emissions objective. This constraint should be taken into account.

5. Optimal revenue recycling

So far, we have considered the options of a carbon dividend and a labour income tax cut as two distinct options, and we have not discussed how exactly the income tax schedule should change, and whether an income tax cut could be combined, for instance, with transfers to poor households. In this section we discuss the optimal revenue recycling in a setting with heterogeneous households and, hence, a tax policy which needs to take into account both efficiency and distributive aspects of tax reforms. The discussion in this section is based on the analysis in Fricke *et al*. (2024).

In general, the way in which the tax and transfer system should use revenue which becomes available as a result of higher CO_2 pricing depends on the prevailing redistributive

preferences, often summarized on 'social welfare functions' which give welfare weights to different types of households. Since economic analysis is agnostic regarding which social welfare function should be used, making general statements about the optimal use of CO_2 pricing revenue is difficult.

To avoid making arbitrary assumptions regarding the welfare function, Fricke *et al*. (2024) use the so-called inverse-optimum approach.[6] This approach starts from the observation that, while the social welfare function is unobservable, we do observe governments making redistributional choices. Given empirical estimates of relevant behavioral response to taxes and transfers, observed patterns of redistribution allow us to infer implicit welfare weights given to different groups of the population. If we assume that the current policies are optimal, we can use existing tax-transfer policies to derive the implicit underlying welfare function. If this welfare function does not change as carbon prices increase, we can derive the optimal use of the revenue including the distribution across different household types without making arbitrary assumptions about the redistributional preferences of societies.

Of course, one could object that this approach makes a strong assumption: that observed policies are the result of a maximization of a social welfare function, rather than the outcome of a political process where different groups simply have different amounts of power and influence. This leads to an alternative possible interpretation of the inverse optimum approach: assume that the implicit welfare weights reflected in observed tax and transfer policies do indeed reflect the political influence of different groups, and assume further that the distribution of influence across groups does not change as carbon prices increase. In this case the inverse optimum approach generates a (positive) prediction about how governments will react, rather than a normative statement about the optimal reaction.

Fricke *et al*. (2024) consider a model where household differ with respect to their ability and, hence, their labour income. The government uses an income tax and consumption taxes to raise revenue and to redistribute income. They compare the standard optimal tax policy to the optimal tax policy emerging if, in addition, the government faces a fixed constraint for carbon emissions. Carbon emissions are caused by consumption, where different goods are allowed to have different carbon footprints. They then quantify the model for the case of the German economy. The experiment they consider is a tightening of the carbon constraint, which requires an increase in the carbon tax. It turns out that the optimal way of using the revenue is to increase redistribution, but the optimal rebate function is not a carbon dividend. The optimal rebate is increasing in income, with the richest household receiving almost four times as much as the poorest household. However, the richest household also faces a carbon tax burden that is eight times higher than that of the poorest household.

The finding that the optimal rebate function is increasing in income is related to the double dividend idea because it implies that the rebate effectively reduces marginal income tax rates. However, the difference to the double dividend idea is that there is now also an increase in redistribution, even if this does not go as far as the carbon dividend. The reason is that there is an important link between the carbon constraint and optimal redistribution. In the standard optimal tax model with its tradeoff between redistribution and efficiency, the decline in

labour income is the main factor making redistribution costly. In the presence of a constraint on carbon emissions, the decline in labour come helps to comply with the carbon constraint, so that the cost of redistribution falls, at the margin. This is why the optimal rebate function does not just neutralize the effect of the carbon price on labour supply incentives but extends the amount of redistribution by some degree.

6. Conclusions

This paper started from the observation that there is a stark contrast between two views regarding the use of revenues from carbon pricing. The first is the idea of introducing a carbon dividend, where the revenue is used to make a lump sum payment to every citizen. The second is the double dividend idea, which implies that carbon revenue should be used to reduce distortionary tax like, for instance, income taxes.

From the perspective of the double dividend idea, a carbon dividend would be highly inefficient because reducing tax distortions is always more efficient than handing out lump sum payments. However, the main argument put forward by supporters of the carbon dividend idea is that the carbon dividend has desirable distributive features. The double dividend idea was developed in models with representative households, which focus on efficiency issues and abstract from distributive questions.

More recent contributions have brought the two aspects together and show that the optimal way of recycling revenues is probably a mixture of the carbon dividend idea and a policy which focuses on reducing tax distortions exclusively. It is true that there are redistributive policies already in place, so that the case for redistributing more because more revenue becomes available through CO_2-pricing seems weak. However, if the additional carbon pricing revenue comes about due to a tightening of constraints on carbon emissions, it has to be taken into account that a declining labour supply leads to a decline in consumption including consumption of goods with a carbon footprint, making it easier to comply with the carbon emissions constraint. Therefore, the decline in labour supply, which is the main cost associated with more redistribution, becomes slightly less costly for the economy as a whole. As a result, a slight increase in redistribution becomes optimal. Nevertheless, some of the existing studies on the carbon dividend may be too optimistic about this form of revenue recycling because they neglect the impact of a carbon dividend on labour supply and, hence, on revenue from existing taxes, in particular labour taxes.

Of course, the discussion in this paper is based on the assumption that governments do intend to give the revenue raised through carbon pricing back to the taxpayers. In many countries governments see public investment and subsidies to companies related to decarbonization efforts as an important part of climate policy, while cutting taxes or making climate policy related transfers to citizens seems to be less of a priority. The analysis discussed in this paper also abstracts from behavioral issues like the idea that the simplicity and the visibility of the carbon dividend may increase political support for higher carbon taxes, in particular if citizens do not trust governments which announce that carbon tax revenue will be given back

to citizens through cutting other existing taxes (Woerner *et al*., 2023). In addition, as pointed out by van der Ploeg (2023), intergenerational distributional issues may need more attention in the analysis if carbon tax policies because the benefits of reduced carbon emissions today mostly accrue to future generations. These are important avenues for future research.

Notes

1. Economists' Statement on Carbon Dividends (Climate Leadership Council), accessed 4 December 2024). https://www.econstatement.org.
2. Goulder (1995), p. 157.
3. The issue of winning public support for carbon taxes and the role of how the revenue is used are also discussed in Carattini (2019).
4. Economists' Statement on Carbon Dividends (Climate Leadership Council), accessed 4 December 2024). https://www.econstatement.
5. As mentioned in the introduction, Budolfson *et al*. (2021b) also use a simulation model to assess carbon tax revenue recycling through the carbon dividend, but their model does not take into account other taxes and therefore neglects the impact on labour income tax revenue.
6. The inverse optimum approach can be seen as a revealed preference argument, see Bourguignon and Spadaro (2012). For an application of the inverse optimum approach in the context of adjustment to fiscal pressure see Ayaz *et al*. (2023).

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Resumen

Este artículo analiza las implicaciones aparentemente contradictorias del concepto de dividendo del carbono y la idea del doble dividendo para el uso de los ingresos procedentes de la fijación de precios del carbono. Presentamos una introducción a varias contribuciones clave al debate en la literatura y explicamos cómo se pueden conciliar sus conclusiones y resultados. Algunos estudios existentes sobre la recaudación del impuesto sobre el carbono pueden ser demasiado optimistas en cuanto a su impacto, ya que no tienen en cuenta la interacción entre el dividendo del carbono, la oferta de mano de obra y el resto del sistema fiscal.

Palabras clave: corrupción, gasto público, desarrollo sostenible, MMQR.

Clasificación JEL: Q56, Q48, H50.