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Feasibility of a Fair Carbon Tax Scheme

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1 Introduction

For decades climate change is considered the greatest challenge nature and humanity have to face. There is no doubt that without a change in our current system the global temperature will rise, followed by natural catastrophes, death of humans and animals resulting in political disasters. To tackle this global problem many possible solutions have been discussed. The approaches differ not only among experts but also have altered over time. When it became clear that climate change needs to be mitigated, the early-stage debate was mostly about the fair distribution of emissions per period. In 2007, scientists revealed that carbon dioxide in the atmosphere degrades really slowly. Until then, not the additional carbon dioxide per period, but the cumulative amount of carbon in the atmosphere mattered. It became obvious that a transition to a non-carbon energy regime is an indispensable step in order to fight climate change. Therefore, the current question of climate justice is not about the fair distribution of emissions anymore, it considers who has to take over responsibility for the transition to a non-carbon energy regime (Shue 2014, 50-52).

But not only the normative questions of climate change need to be considered by ethicists, politicians all over the world debate about the right political instruments to induce carbon mitigation. As an essential piece of climate policy carbon taxation is one of the most discussed political instruments to address climate change. In his writing *Carbon Taxes and Economic Inequality* Shi-Ling Hsu calls carbon taxation the "policy keystone" (Hsu 2021, 4) for mitigation and states that a transition to a non-carbon economy "will not happen without a carbon price" (ibid). In contrast, Lukas Tank claims in *The Unfair Burdens Argument Against Carbon Pricing* that "the most politically relevant forms of carbon pricing should be considered unfair" (Tank 2020, 612. In addition, Tank argues that all forms of carbon pricing that include fair burden-sharing are not feasible (ibid, 624).

Therefore, this essay aims to examine whether carbon taxation is a fair and feasible instrument to address climate change or not. To be more specific, the following writing deals with two questions: Can a carbon tax be considered fair? And is a fair carbon tax scheme feasible? The first chapter defines "fairness" in the context of this essay. As part of the definition, the link between climate change and increasing inequality as well as the most crucial principles of burden-sharing justice are pointed out. The following chapter refers to the question of whether a carbon tax can be considered fair or not. Being more specific, it examines if a carbon tax has a progressive distributional effect and is environmentally effective. After that, a rough description of how such a fair carbon tax scheme could be designed is given. The fourth chapter discusses the feasibility of this outlined scheme. Lastly, the conclusion summarizes the most important points and answers the mentioned guiding questions.

Through this short introduction, it becomes clear that the scope of this writing is extremely limited. While this essay only focuses on the impact of a carbon tax within a country, carbon pricing is a wide topic that needs to be considered on an international level as well. Also, topics like the consequences of climate change or economic inequality are discussed from a national point of view. In addition, it is a consensus among scientists and politicians that a carbon tax alone is not a sufficient political instrument to reduce emissions. Even supporters like Hsu admit that a carbon tax always needs to be part of a broader approach (Tank 2020, 613). The

last limitation that should be pointed out is that the whole field of climate justice expands the short introduction given as part of this writing. Besides principles of burden-sharing, avoiding harm justice or intergenerational justice are important aspects that cannot be further considered.

2 Definition of Fairness

The question of fairness and justice underlies almost all ethical debates, including this writing. Before implementing a political instrument, it needs to be examined if this investigation can be considered fair. Not only about society in general, but also regarding different kinds of social groups. Society can be divided in many groups, for example according to gender, age, race, or ethnicity. All of them are affected differently by political actions. As part of this writing, the differentiation of social groups by income plays a major role. Not only considering the followings of climate change and its specific harm to low-income groups, but also discussing the implementation of a carbon tax and the burdening of less affluent households. The definition of a fair carbon tax that is given at the end of this chapter especially refers to social justice in terms of income inequality.

2.1 Burdens of Climate Change

The direct followings of climate change, emission mitigation and adaption bring numerous consequences with them that burden individuals on many levels. First, it is necessary to have a look at the direct sufferings from climate change. Namely, rise in temperature, air pollution and natural disasters like floods, erosion, salinity, and mudslides that lead to the death of humans and animals (Hsu 2021, 2). Needless to say, that the effects of climate change harm our earth and humanity in general. But the direct sufferings from climate change are spread unevenly. Less affluent and disadvantaged groups are more affected by adverse followings of climate change than affluent groups (Islam & Winkel 2017, 2). One reason for this is that poor individuals often live in areas that are particularly vulnerable to climate change because they cannot effort to live in safer districts. This applies to rural regions where less affluent people are more likely to live in coastal areas as well as in urban regions where slums are often located in low-lying areas. Due to this, low-income groups are more frequently subject to natural hazards than high-income groups (ibid, 12-13). In addition, a high proportion of less affluent groups are living in extremely dry areas and are often dependent on agricultural production. Therefore, the same problem can be named in the context of greater exposure to drought, heatwaves, and water scarcity (ibid, 14).

Moreover, low-income groups do not only have to deal with a higher level of exposure but also are generally more susceptible to damage from climate hazards (ibid, 15). For example, imagine less affluent and affluent groups would be hit by the same heatwave. The poor individuals would be harmed more intensively because they have fewer adaptation possibilities. It is more comfortable to deal with immense heat if one is working in an air-conditioned office, whereas less affluent are more likely to work outside, lack access to air-conditioning and cool spaces (Hsu 2021, 2-3). Additionally, droughts lead to water and food shortage resulting in the abbroachement of water rights by the rich. Rising prices for water and food and allocating

essential resources through market forces hurt especially the poor (ibid, 3). Moreover, health issues can be named as a following from air pollution. Due to missing health insurance in some countries and a lack of access to expensive medicine, less affluent people suffer the most from diseases. Another important aspect to mention is how climate change affects certain groups in the long run. Due to fewer resources and missing insurance poor groups recover really slow from the adverse impacts of climate change. Because of the slower recovering rate from climate change hazards, less affluent groups are burdened for a longer time period than the affluent (Islam & Winkel 2021, 19).

Besides the direct and indirect effects of climate change, a frequently discussed burden caused by climate change is the financial burden of mitigation and adaptation. The costs of ending climate change are estimated between $300 billion and $15 trillion (Adler 2021, 1). Some reasons why climate change mitigation is that costly will be given in the following. First, prevention of destruction through natural hazards and construction measures after such a catastrophe are really expensive. Secondly, a transition to a non-carbon regime needs great investments in non-fossil energy sources like renewable energy. And third, a huge sum of money needs to be spent on CO_2-reducing technologies and other mitigation instruments. Especially companies and emitting industries need to make immense and costly adjustments which could harm economic growth.

However, climate change mitigation and adaptation burdens not only companies but also individuals. For example, pricing carbon is a needed step to initiate a transition to a non-carbon regime leading to higher prices for carbon-intensive goods because companies could pass on the costs to the consumers resulting in a high financial burden for individuals. Especially, energy and fuel prices are affected by such a tax. Only having a look at the pricing itself, poor individuals have to shoulder a bigger burden due to carbon pricing because they spend a bigger share of their budget on carbon-intensive goods (Hsu 2021, 10).[1] Even if the named examples are only a small extract of the financial followings of climate change, they are sufficient to outline the extent of the monetary burden linked to mitigation and adaptation efforts. These burdens must not only be shouldered by companies, but also by individuals, inter alia the poor.

Having a look at the burdens of climate change and their uneven distribution it becomes clear that climate change and social inequality are closely linked. Besides environmental followings, the exacerbation of inequality can be seen as one of the most troubling consequences of climate change (Hsu 2021, 2). Putting this in the light of economic justice it becomes more than obvious that climate change needs to be arrested as much as possible (ibid, 3). Applying this to the definition of fairness discussed in the scope of this essay, it can be concluded that a fair carbon tax needs to be effective to reduce climate change. Not only considering economic justice but also referring to climate justice. The principles of climate justice which show that it is extremely unfair that especially the poor suffer from the followings of climate change and have to shoulder the burdens of the problem will be outlined in the following chapter.

[1] See also Klenert, D. & Mattauch, L. (2015), p. 101.

2.2 Principles of Burden-Sharing

As clearly outlined in the previous chapter, climate change caused an immense burden that goes beyond the monetary dimension. It also became clear that less affluent are affected stronger by the followings of climate change than affluent individuals leading to an increase in inequality. According to typical principles of justice, this can be considered unfair, and it is obvious that the harm of climate change needs to be reduced. How the burden of combating the problem should be shared fairly among the duty-bearers, is one of the most discussed questions in climate justice. Referring to pricing carbon and the implementation of a carbon tax explicitly, Tank argues as part of his *Unfair Burdens Argument* that: "If a carbon mitigation policy burdens more affluent individuals less than less affluent individuals, it is unfair." (Tank 2020, 613) He substantiates this argumentation with three well-known principles of climate justice that concern the distribution of the burden of climate change. Although burden-sharing justice is not the only important part of climate justice and philosophers like Simon Caney called this approach "atomist" and "isolationist", this essay only refers to principles of climate justice that concern the distribution of responsibilities in solving a particular problem (Caney 2012, 260).[2]

The first principle that can be named is the Polluter Pay Principle (PPP). Roser and Seidel define the PPP in the following way: "A distributive principle according to which agents should bear the burdens of addressing a problem in proportion to their contribution to causing the problem." (Roser & Seidel 2017, 225)[3] Putting it in other words, the PPP says that those who had a bigger share in creating the problem of climate change should bear a bigger share of the burden. Now, having a look at emissions caused by different income groups, it becomes clear that the PPP supports Tank's statement that the less affluent should not be burdened more than the affluent. The richest 10 per cent of individuals are responsible for half the global emissions (Tank 2020, 617-618).[4] Therefore, according to the PPP it is obvious that the richest have to bear the biggest burden.

In literature, no strong opinion against applying the PPP can be found. Only some critics claim that this principle should be combined with other principles of burden-sharing justice, for example, the Beneficiary Pay Principle (BPP) (ibid, 619). This approach can be used to substantiate Tank's argumentation as well. The BPP says that "The countries benefiting the most from greenhouse emitting activities in the past bear the greatest responsibility of climate justice." (Page 2008, 562)

In opposite to the PPP, the BPP refers to the effects of emissions, rather than to the causes of the problem. On a global level, the rich countries benefited the most from emissions, for example, through economic growth and increasing wealth. But this principle cannot only be applied to burden-sharing among countries, it can also be applied within countries. On an individual level, the BPP holds the view that the poor should be less burdened than the rich because they did not benefit from emissions linked to economic wealth as much as the

[2] Quoted by Tank, L. (2020), p. 613.
[3] Quoted by Tank, L. (2020), p. 619.
[4] See also Millward-Hopkins, J. & Oswald, Y. (2021), p. 2.

affluent did (ibid). Those individuals who benefited most from emissions have to bear a proportional burden.

The third principle Tank names to support his reasoning is the Ability to Pay Principle (APP). In general, ability is often defined in a monetary way like Henry Shue states: "Among a number of parties, all of whom are bound to contribute to some endeavour, the parties who have the most resources should contribute the most to the endeavour." (Shue 1999, 537)[5] In this sense, it is needless to say that higher-income groups have a higher ability to pay than low-income groups.

But as Tank argues the term ability is not only about resources and money, rather it is about excess capacity (ibid). It is not only necessary to ask who has the greatest ability to pay the price, it is also necessary to ask who has the greatest capacity to bear the burden of climate change mitigation. Obviously, the answer is not "the poor".

Having a look at the effect of a price increase caused by instruments to reduce emissions, it becomes clear that the poor's well-being is threatened more than the rich's. Higher prices lead to the necessity of lifestyle changes because people can no longer afford their previous lifestyles. Problematically, the poor cannot substitute the products as easily as the rich. Also, the types of goods different income groups have to cut out differ from each other. While more affluent might have to cut out the second holiday in a year or have to switch from a sports car to a less emitting model, poor individuals might not be able to buy basic goods like food or shelter anymore. Therefore, what affluent people lose can be considered as less important for a person's well-being than what the less affluent lose. Being not able to satisfy basic needs can be seen as a bigger burden than not being able to maintain a luxurious lifestyle.

Consequently, it can be argued that the rich not only have more resources and, therefore, the ability to bear the burden of climate change mitigation, they also have the higher capacity to deal with this burden in terms of substitution and adaption to the price increase (Tank 2020, 616). Applying the APP to a carbon tax, it says that the affluent should not shoulder a smaller burden than the less affluent in a monetary sense. But it is also important to make sure that the burden the poor have to bear is bearable for them beyond the financial aspect.

All in all, there is no single principle or approach at present that identifies less affluent individuals as the entities that should shoulder the burden of mitigation and adaptation (Page 2008, 573). Because a carbon tax itself without having a look at the use of revenue burdens the less affluent more than the affluent, a fair carbon tax scheme needs to be designed in the way that the poor get compensated so that they, firstly, not bear a bigger burden than the rich, and, secondly, can shoulder the burden of a carbon tax. A tax scheme that forces higher-income groups to pay more than the low-income groups is called progressive. But as Tank points out in his writing, a fair carbon tax scheme does not only mean that the rich have to pay a higher amount of money. Rather, it needs to be progressive in the way that the poor have the make smaller lifestyle changes than the rich (Tank 2020, 623).

To sum the whole chapter and the definition of fairness as part of this essay up, a fair carbon tax scheme needs to meet two aspects: First, it has the be environmentally efficient because climate changes and its followings itself lead to increasing inequality and burdens the

[5] Quoted by Page, E. A. (2008), p. 561.

less affluent more than the affluent due to certain circumstances. And second, it has to be a progressive carbon tax that compensates the less affluent in the way that they are able to bear the burden of increasing prices and have to make fewer changes in behaviour than the rich. In the end, the less affluent need to be less burdened than the affluent by a carbon tax because they did contribute to pollution in a smaller proportion, benefited less from emissions and have a smaller ability to shoulder the burdens of climate change mitigation and adaption. How a scheme has to be designed to meet the stated criteria is part of chapter three.

3. A Fair Carbon Tax Scheme

Before examining if a carbon tax scheme can be progressive and environmentally effective, it is necessary to give a short introduction about the functionalities of a carbon tax. In general, a carbon tax can be described as the following:

> "A carbon tax is a tax levied on one or several greenhouse gas (GHG) emissions associated with the combustion of fossil fuels (...) that aims to internalize the cost of the externalities into the market price in order to achieve a reduction in GHG emissions and hence to mitigate climate change." (Wang et al. 2016, 1123)

In other words, a fixed price of carbon dioxide per ton is set by a central authority. This leads to a price increase of carbon-intensive goods resulting in a change in consumer behaviour. The payments in form of a tax generate revenue for the central authority which can be spent differently (Tank 2020, 614). In practice, many variations of carbon taxation exist. They differ in who the taxpayers are, what the basis of the tax is, the size of the tax rate, when the tax is imposed, the use of the revenues and the enforcement of the tax (Wand et al. 2016, 1125). Because a detailed design of a carbon tax scheme needs to consider many regional factors, this chapter gives only a rough overview of some aspects that need to be taken into account implementing a fair carbon tax scheme.

3.1 Progressiveness

Even though a carbon tax is known as an efficient instrument to mitigate climate change, many countries hesitate to implement such a tax. Much resistance against carbon pricing arises from the concern that it has "regressive distributional effects in terms of income or consumers' purchasing power" (Baranzini et al. 2017, 7). Many people fear that due to higher prices low-income households get more burdened than high-income households. One reason for this is the fact that less affluent people spend a larger fraction of their budget on fossil fuel-intensive energy than affluent households (Hsu 2021, 10).[6] With a rise in energy prices especially poor households would be hurt. Studies show that this concern is justified, especially taxes on domestic energy caused an overall weak regressive effect in European countries that implemented the tax (Baranzini et al. 2000, 405). Even Hsu admits as part of this writing that a carbon tax without revenue recycling makes poor households worse off (Hsu 2021, 12). But Hsu also argues that well-designed recycling of the revenues should be able to outweigh the economic harm from higher energy prices and lead, in the end, to a progressive distributional effect (ibid, 10).

[6] See also Klenert, D. & Mattauch, L. (2015), p. 101.

Two options of relieving the poor from the burden of a carbon tax exist: First, ex-ante approaches that disburden vulnerable groups through lower tax rates or exemptions. Secondly, ex-post approaches that compensate vulnerable groups by reducing other distortionary taxes or transfer payments coming from the general national budget or more specifically from the revenue generated by the carbon tax itself (Wang et al. 2016, 1125).[7] Because the latter is more frequently used in practice to reach a progressive distributional effect, the further examination will focus on different designs of revenue recycling and its distributional impact.

As in the introduction of this chapter shortly shown, the design of a carbon tax scheme includes numerous factors. Therefore, carbon tax systems differ from country to country. Even only considering revenue recycling many approaches exist. As part of this essay, the different revenue recycling schemes are categorized into three types: The first one is called "fiscal reform". In this case, the revenues become part of the overall national budget and are used to decrease other taxes, for example, labour, property, personal or corporate income taxation. In the end, the national budget remains the same and taxation is shifted from economic "goods" to environmental "bads". The second approach, named "earmarked", uses revenues to finance environmental programs. For example, research and development activities to reduce emissions, infrastructure programs to expand renewables or other environmental projects. Lastly, the revenues can be used to compensate those who are most affected by the tax. With the "compensation measures" carbon tax proceeds get returned to households on a lump-sum or modified per-person basis (Hsu 2021, 13).[8]

Every carbon tax scheme brings its advantages and disadvantages with it. While reducing corporate income tax or the tax on capital would lead to the highest economic growth, fiscal reforms are less favourable in compensating the poor because the affluent owners of firms and capital would benefit from the revenues the most (ibid, 13 and 16). The same holds for the second type of revenue recycling. Investments in environmental programs might be most effective to reduce emissions, nevertheless, they have a regressive impact as well (Baranzini et al. 2000, 400-401).

Depending on the study and the local circumstances of different countries, slightly different recommendations for implementing a carbon tax scheme are given. But all experts and studies agree on one fact: Aiming a progressive effect of a carbon tax the lump-sum scheme is the most effective type of revenue recycling. To be more specific, a uniform lump-sum scheme is recommended by most experts (Baranzini et al. 2017, 7).[9] While poorer households spend a higher share of their budgets on carbon-intensive products, the total costs of richer households are higher. Consequently, a uniform lump-sum payment would be higher than the costs of poor households for energy and lower than the costs of rich households. By this per-person or per-household payment less affluent would be overcompensated and more affluent undercompensated resulting in a redistributive effect. Implementing a carbon tax of $30 per ton, "households in the three lowest quintiles of income would, on average, be better off" (Hsu

[7] See also Tank, L. (2020), p. 622.
[8] See also Baranzini, A., et. al. (2000), p. 400.
[9] See also Hsu, S. (2021), p. 13. and Fried, S., Novan, K. & William, B. P. (2016), p. 6.

2021, 13). But it is necessary to underline the term "on average". With no system, every single individual can be insulated from the burden of a carbon tax (ibid).

Additionally, the given studies state that the less affluent get less burdened than the affluent by a uniform lump-sum scheme in a monetary sense. As part of the research in the scope of this essay, there are no studies found which examine the lifestyle changes one have to make due to carbon taxes. Tank argues that

> "Take, for instance, a slightly progressive emissions trading scheme that makes the very affluent pay double the price per unit of emissions than the least affluent, with a progressive rise in prices for those in between. This might still result in more affluent people having to make smaller changes in behaviour than less affluent people. As long as wealth is more unevenly distributed than financial burdens under carbon pricing, the more affluent will be burdened less. The fact that a pricing scheme can be considered progressive is therefore not a sufficient condition for it being fair." (Tank 2020, 623)

The statement that the higher the unequal distribution of income in a country, the higher the regressiveness of a carbon tax, can be substantiated by other studies (Andersson & Atkinson 2020, 1).

Nevertheless, the research and already implemented schemes show that a carbon tax scheme with a uniform lump-sum transfer can be considered progressive (Baranzini et al. 2017, 7).[10] If the compensation is sufficient to avoid strong lifestyle adjustments of the poor, might depend on the size of the transfer and cannot be further examined as part of this essay. However, the poor likely suffer more from the followings of climate change than from a uniform lump-sum carbon tax. Additionally, there is no doubt that a uniform lump-sum scheme is the most progressive way of implementing a carbon tax. Because climate change increases inequality heavily, a slightly progressive carbon tax that includes some behavioural changes of the poor can be considered acceptable if it is the most effective instrument to reduce climate change and its harmful followings. If this condition is given will be examined in the following section.

3.2 Environmental Effectiveness

Implementing a carbon tax is considered the most efficient way to reduce emissions (Baranzini et al. 2000, 405). But as explained in chapter two, fair climate change mitigation is not about efficiency. First of all, it needs to be effective in reducing the harmful followings of climate change. Therefore, this chapter deals with the question of whether implementing a carbon tax is an environmental effective tool to reduce emissions or not. Being more specific, it examines whether the uniform lump-sum scheme can be considered fair because it is progressive and effective at the same time. What environmental effectiveness means exactly is a debate on its own. To find out if a carbon tax is the most effective way to reduce emissions, all political approaches to climate change mitigation would need to be compared. As part of this essay, effectiveness means having a significant impact on reducing emissions in comparison to emission reduction without a carbon tax.

[10] See also Hsu, S. (2021), p. 13. and Fried, S., Novan, K. & William, B. P. (2016), p. 6.

Since 1995 many countries introduced a carbon tax from Finland, Poland, Sweden, Norway, Denmark, and Slovenia over Switzerland up to China and South Korea. Besides numerous research modellings and forecasts, some ex-post studies have been conducted (Wang et al. 2016, 1123). One of these studies is the survey of Andersen who analysed twenty Nordic countries that already implemented a carbon tax and compared the result with business-as-usual forecasts. For example, this study shows success in Norway with a reduction in household emissions of 3 to 4 % between 1991 and 1993, a decrease in industrial emissions of 7 % in Denmark between 1991 and 1997 as well as a 9 % decline in emissions in Sweden between 1990 and 2007 (ibid). Having a look at Andersen's results, it becomes clear that a carbon tax can be environmentally effective.

In contrast, an evaluation done by Chinese researchers using the "difference in difference" statistical method showed less promising results. In order to overcome methodological difficulties and correct the data, they compared five countries that already implemented a carbon tax with a control group that did not. Out of these five countries only in one country, a statistically significant emission reduction could be discovered, namely in Finland. In Sweden, the Netherlands and Denmark a decrease in emissions were visible as well but not in such a way that it could have been considered statistically significant (Baranzini et al. 2000, 408).[11]

In general, it can be said that discovering the causal link between implementing a carbon tax and a reduction in emissions is really difficult. It is linked with many complexities and methodological difficulties. Also, depending on the countries and implemented schemes the success of a carbon tax differs. Nevertheless, all studies show that implementing a carbon tax scheme can lead to emission reduction and environmental effectiveness. The aim of this section should be to examine the most effective approach. But, comparing different types of a carbon tax to examine the most effective one is proving difficult because the impact of a carbon tax is strongly linked with many regional factors. However, some key success factors of an environmental effective carbon tax can be outlined.

First of all, the size of a carbon tax plays a big role. It ranges from 10-30 $ per ton of CO_2 which is the most common price range in European countries up to $130 per ton in Sweden. (Patt 2015, 77) As Anthony Patt explains more detailed in his book *Transforming Energy. Solving Climate Change with Technology Policy,* the price increase caused by a carbon tax aims to lead to a change in consumer behaviour. But due to the low elasticity for carbon-intensive goods like gasoline (-0.31 in the long run), the price has to rise a lot to make a difference. With a carbon tax of $10 to $30 per ton, the price increase for gasoline is between 2 and 7 per cent per litre (ibid, 86). Normal price fluctuations are much higher. To be more specific, as high as a tax of $258 per ton of CO_2 would have been induced (ibid, 80). To cause a significant change in consumer behaviour of 10 per cent demand fall, a carbon tax of minimum $157 per ton would need to be implemented (ibid, 85-86).

As the comparison between Sweden and Finland shows, the environmental effectiveness of a carbon tax is not only dependent on the price, but also on the question of who has to pay the tax. One crucial reason why the carbon tax in Finland is more effective than in Sweden is

[11] See also Patt, A. (2015), p. 78.

the small number of firms that are exempt from the tax. In Sweden, many high emitting companies are excluded from paying the carbon tax. The fact that the tax in Finland is more effective than the one in Sweden with a higher tax rate shows that the number of involved companies can make a huge difference in terms of effectiveness (Patt 2015, 78).

The same reasoning can be applied to households and individuals. A uniform lump-sum scheme that prevents low-income groups from lifestyle changes and has a progressive distributional effect might be considered fair in the sense of progressiveness, but it is not the most effective scheme to reduce emissions. If only the rich have to change their behaviour and the less affluent are not touched by lifestyle changes at all, this scheme is really likely to be inefficient in mitigating climate change. Even if not everybody needs to stop emitting, a carbon tax is only environmental successful if the majority of society is influenced by mitigation policy (Tank 2020, 623). This argument can be summarised by a short statement from Tank:

> "Using some of the revenue from carbon pricing to refund less affluent people can play a role in a fair and effective carbon pricing scheme, but too-generous refunds might threaten its effectiveness if they allow too many individuals to keep on emitting like before." (ibid)

Additionally, some studies support this statement by showing that the most environmentally effective type of using revenues is to subsidise renewables or invest in energy savings and research and development (Baranzini et al. 2000, 406).

Summing the previous chapters up, it seems that implementing a carbon tax is a trade-off between compensating poor households and environmental effectiveness. In the end, a fair carbon tax needs to be high enough to induce a significant price increase resulting in a behaviour change. In addition, as many companies and individuals need to be included and forced to behavioural changes as possible to reach environmental effectiveness. Investing revenues in environmental programs is favourable for emission reduction as well. In contrast, the less affluent have to be compensated insofar that the burden of the price increase is bearable, and their lifestyle changes are less significant than those of the rich. A uniform lump-sum scheme is the best way of revenue recycling in terms of progressiveness. But still, some changes in the behaviour of the poor are needed to achieve a successful mitigation policy. How this equilibrium of compensating the poor and reducing emissions can be achieved in specific, needs to be examined in studies that refer to a specific national case. While examining this, one needs to keep in mind the long-run effects of climate change and emission reduction. It is necessary to weigh up the burden the poor living in the present have to bear due to climate change mitigation and the increasing inequality as well as the harm caused by climate change the poor in the future will suffer from. But in the end, this is a question of intergenerational justice that cannot be adequately examined in the scope of this writing.

Honestly, just describing the criteria of a fair carbon tax reveals how complex and difficult the implementation of a fair carbon tax scheme is. Unfortunately, it sounds more like a utopia than a real political instrument that can be implemented. Especially, having in mind that this writing only refers to two important variables out of numerous aspects that need to be considered. Narrowing this inaccurate description of a fair carbon tax scheme down to a political approach that could be implemented in a specific country, is linked with many further challenges. Furthermore, real implementation brings up numerous additional issues. In the next

section, some specific problems that might occur while implementing such a fair carbon scheme will be pointed out.

4. Feasibility of a Fair Carbon Taxation

The previous chapters showed that designing a carbon tax scheme that can be considered fair is extremely difficult and complex itself. Nevertheless, it is not impossible. Also, Tank does not deny that some forms of carbon taxation can be named fair. But he claims that fair carbon taxation is really unlikely to be politically feasible. (Tank 2020, 624) The numerous cases of failed tax initiatives like the energy tax in the US in 1993, the French carbon tax in 2010 or the abolition of the tax in Australia, show that carbon pricing often faces political opposition from industry and the public (Wang et al. 2016, 1124). Therefore, this chapter aims to answer the question of whether the previously outlined carbon tax scheme would be politically feasible or not. Feasibility in this examination is defined as "being likely to happen".

One reason why the implementation of a carbon tax often leads to opposition is that such market-based instruments create relatively direct negative, economic effects, whereas the positive impacts of a carbon tax are harder to pin out (Patt 2015, 80). For example, a lump-sum scheme is a more favourable choice in terms of a progressive distributional effect but considering economic growth or macroeconomic variables in general it can have negative effects (Baranzini et al. 2000, 405). In addition, implementing a carbon tax in only one country could cause a huge competitive disadvantage resulting in the relocation of businesses (Patt 2015, 97). Comparing these relatively direct effects with a future positive effect through climate change mitigation, it can be hard to convince why such an instrument should be implemented. Also considering the distributional effect of a carbon tax, the outweigh between some lifestyle changes right now and having an immense increase of inequality in the future caused by climate change, is hard to explain to the public.

This so-called "Golden Rule" of climate policy which means that "lots of people support doing something about climate change, but almost nobody supports doing something that will cost them anything substantial in the short term" (ibid, 80) is reflected in public polls as well. Implementing a carbon tax has a really bad public reputation because many people only see the price increase and financial burden that would come with it (Hsu 2012, 4-9). Even if a fair carbon tax scheme with a positive distributive effect would be implemented, good political communication and educational work is needed. And even with a uniform lump-sum scheme that compensates the poor, to achieve environmental effectiveness lifestyle changes of the majority of society are indispensable. Without the willingness of society to make some behavioural changes, a carbon tax that reduced emissions will not be feasible. The aspect of public reputation becomes more difficult having in mind that an effective carbon tax scheme includes a high tax rate. Without a significant price signal, no lifestyle changes will be induced.

Finally, the last and biggest problem of implementing a fair carbon tax is the fact that in the end the rich have to bear the burden of climate change mitigation to consider the tax fair. Examples like Sweden show that even if the public is willing to implement a carbon tax that in theory is high enough to reduce emissions, lobbying enables companies to be exempted. In

Sweden, many industrial sectors do not have to pay which leads to less effective emission reduction (Patt 2015, 81). And Sweden is only one example: In many countries, energy-intensive industries managed to receive favourable treatment even if the tax is not as high as in Sweden (Baranzini et al. 2017, 8). Political opposing voices not only from companies but also from wealthy individuals are likely to destroy the implementation of a tax that effectively burdens the affluent and compensates the less affluent. They will argue: If we have to bear the biggest burden, why do others get compensated?

Therefore, as part of this essay, it can be argued that is quite unlikely that such a recommended fair carbon tax will be implemented. Either the tax will not be high enough and/or too many companies will be excluded so that the tax will not be environmentally effective and, therefore, not fair. Or an effective tax is aimed to be implemented by the government which would burden the majority of society and, therefore, also the poor. Even if this could be tolerated by a normative point of view having the whole picture in mind, it is likely to result in a strong opposition of the public.

5. Conclusion

The aim of this essay is to answer two main questions: Can a carbon tax be considered fair? And is a fair carbon tax feasible? Before referring to both of them, the term fairness has been defined. First, a fair carbon tax needs to reduce emissions effectively because climate change is closely linked to increasing inequality and harm to the poor. Secondly, a carbon tax scheme can be considered fair if it has a progressive distributional effect. The less affluent have to be burdened less than the affluent, in a monetary sense and terms of lifestyle changes.

The third chapter stated that in theory a carbon tax scheme can be considered fair if it is designed in the following way: To reach a progressive distributional effect, revenues need to be recycled in form of a uniform lump-sum scheme so that the poor get overcompensated, and the rich get undercompensated. In terms of environmental effectiveness, the tax rate has to be high enough to induce a sufficient behavioural change. Moreover, almost all companies and individuals have to be affected by the price increase so that they reduce their emissions. Additionally, the most effective way of mitigation is to reinvest a part of the revenues in environmental programs. Having a look at this description it becomes clear that designing a fair carbon tax scheme is a trade-off between compensating the poor or reducing emissions. From a normative point of view, the first can be neglected if the emission reduction prevents more harm and inequality than the missing compensation causes. But in the end, this is a question of intergenerational justice that cannot be addressed in the scope of this essay.

Lastly, the feasibility of such a fair carbon tax system has been questioned. Besides the numerous difficulties that come along with concretising the imprecise description given as part of this essay, some other problems are likely to occur. The most important issue is that most people are not willing to change their behaviour in the short term to prevent long-term consequences. Especially the affluent who have the power to implement such a carbon tax, will not fight for a tax that burdens them the most. This shows that putting a fair carbon tax scheme into practice is not impossible but also far from “likely to happen”. Therefore, as the conclusion of this writing. it can be said that a fair carbon tax scheme is not feasible.

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