
FAIRNESS OF EQUAL PER CAPITA EMISSION RIGHTS AND POPULATION GROWTH

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Abstract

Preventing climate change requires greenhouse gas emissions to be reduced. One way to do this is by allocating tradeable emission rights equally per capita. This thesis will discuss multiple arguments to define the fairness of this approach. Climate change and population growth negatively influence each other. Accordingly, population growth will be taken into the discussion of equal per capita emissions – contrary to most current debates. In particular, this thesis will argue that population growth leads to more inequality within the climate change debate. And therefore, it cannot be compatible with an equal per capita approach. Due to this incompatibility, population growth should be addressed in another way. This thesis aims to extend this debate by arguing for non-coercive population policy.

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Introduction

The IPCC has described climate change as a risk for the places where people live, how they live and what might happen to both people and other parts of nature when no adequate action is taken (IPCC, 2022). To reduce this risk the world community has agreed to keep temperature increase below 1.5 to 2 degrees. As greenhouse gas emissions are one of the main factors that induce climate change, this commitment means that the world can only emit a certain amount of greenhouse gases, the so-called carbon budget.

One way to stay within this carbon budget is by using tradeable emission rights. Distributing emission rights entails that it is decided what the total number of global emissions should be and these emission rights are distributed to all nations. This raises the moral question what a fair distribution is of this remaining carbon budget. This thesis will discuss the fairness of one proposal in particular: equal per capita, i.e. that each world inhabitant is allocated an equal share of the carbon budget (Bode, 2004) (Gupta & Bhandari, 1999) (Saltzman, 2010).

Specifically, this thesis will investigate if we ought to distribute emission rights on an equal per capita basis, when taking into account the current tendency of population growth. The reason population growth is taken into this discussion is because the more people there are, the more greenhouse gas will be emitted if not restricted. Population is, thus, one of the main drivers of climate change. Moreover, if population grows unevenly across the world this could have problematic implications for dividing emission rights equally to everyone. Therefore, the research question to be answered is three-fold. First, is an equal per capita allocation of emission rights a fair approach? Second, to what extent is an equal per capita approach of emission rights compatible with the current growth of the world population? Third, if an equal per capita approach and population growth are not compatible, then how should population growth be addressed?

The setup of the thesis will be as follows. What will come first is a discussion of the fairness of equal per capita allocation. Then we can move on to the matter of population growth. This section of the thesis will include current tendencies of population growth and future population prospects. What will be needed for the sake of this thesis is a discussion of (1) why population size is relevant for climate change in general, (2) why the debate about population growth is relevant for an equal per capita scheme and (3) whether population growth and the equal per capita approach are compatible. Since the argument will be that an equal per capita approach and population growth are incompatible, the third and final chapter will discuss how population growth should be reduced. This will

include what kind of population policy is accurate as well as an argument why this would lead to a fair approach.

1. The fairness of equal per capita allocation

In this chapter, I will explain how fair allocating emission rights on an equal per capita basis is. I take a fair approach to be based on principles of justice and to include that all equals should be treated equally, that all have an equal right to live a basic human life, and that benefits and burdens are distributed equally (Velasquez & Andre, 1990). The first argument I will discuss is based on the idea that the atmosphere, and with it greenhouse gases, are common goods. The second argument is that all people should have a certain threshold standard of living. These two arguments are used as a defence of the fairness of an equal per capita division. For both these arguments, I will also discuss criticisms. Then I will also go into the discussion of responsibility for human-induced climate change, in which I will argue that historical emissions should be taken into account to have a fair approach. And finally, I will discuss how the development of nations needs to be secured to have a fair distribution of benefits and burdens.

1.1 Common's argument

One of the most heard reasons for why emissions rights should be allocated on an equal per capita basis is the so-called common's argument (Caney, 2012) (Starkey, 2011) (Bode, 2004). The main premise of this argument is that the atmosphere is a common good, and therefore every global citizen should be able to use it equally. With 'using' the atmosphere in this case it is meant to emit greenhouse gases. The basis for this argument is left-libertarianism, in which one cannot claim private ownership over natural resources (Steiner, 2009). Since natural resources have no moral standing and cannot be derived from beings with moral standing, they should on this view be considered as either unowned or commonly owned (Vallentyne, Steiner, & Otsuka, 2005). Hence, left-libertarianism is a view in political philosophy, that values individual freedom and regards all agents as full self-owners, but holds that all natural resources should be divided collectively and equally (Van der Vossen, 2022). Therefore, on a left-libertarian account all people are entitled to an equal per capita share of natural resources and, for this argument, of using the atmosphere.

To develop this argument, Starkey (2011) has found that this argument is made in two different ways in the existing literature – both versions are used by left-libertarians. It is important to understand both ways to grasp what the argument entails and how it argues for an equal per capita allocation of emission rights. The first version of the argument is based on the premise that the atmosphere has always

been commonly owned and that this still remains the case (Starkey, 2011). That the atmosphere would be commonly owned is to denote that it is *equally* owned, hence to an equal extent by all people. How this view leads to an equal per capita allocation of emission rights, is explained by looking at what a commonly owned atmosphere means for emissions. Since if the atmosphere is equally owned by all, then all have an equal right to release emissions into the atmosphere. Hence, all people should be allocated an equal amount of emission rights (Starkey, 2011).

The second version of the common's argument is not the common ownership of the atmosphere, but the idea that the atmosphere is unowned. The position here is not so much that the atmosphere *cannot* be privatised, but more so that it *has never been* acquired and therefore remains unowned. If the atmosphere is unowned, then too all would have an equal right to emit greenhouse gases into it (Shue, 2014) Since according to left-libertarianism natural resources should be divided collectively in such a way that no one would be able to claim a right to, because no one individually has a right to it (Van der Vossen, 2022). Greenhouse gas emissions should be divided in such a way that everyone can use it. Therefore, emission rights should be granted equally (Starkey, 2011).

The main critique to be discussed here is one provided by Caney (2012). He argues that the common's argument is not a good basis for an equal per capita allocation of emissions rights, since there are more common goods besides the atmosphere. He provides a list of goods or resources that can be said to be common goods, e.g. the absorptive capacity of the oceans or the global fish stock, and that the atmosphere's capacity to absorb greenhouse gases is just one of these global resources (Caney, 2012). Following Caney's argument, the problem of the common's argument would be that it focuses on merely one of the various common goods and is in that sense arbitrary. This critique could be used against both versions of the common's argument, though the responses can be different. For the first version it is important to question whether the other common global resources are commonly owned, i.e. whether they can or cannot be privatised. When it comes to the oceans and its fish stock, these are things that are officially undivided. However, there are regulations in place to divide responsibility of the oceans. Perhaps this means that it cannot be fully privatised and hence the critique is in place. On the other hand, oceans are officially unowned but as far as these regulations are in place you cannot say they are in fact unowned. In both cases, one could argue that there is some sort of allocation in place for the resources. Perhaps the main response to this criticism should be that there should indeed be an allocation of all global common goods. By taking left-libertarianism as the basis of the common's argument, it is relevant to take this theory into account for the response to this criticism as well. Left-libertarians argue that all natural resources cannot and should

not be claimed as private property. Therefore, all natural resources are common goods to the same extent as the argument that has been provided. Hence, the question is not what allocation there is in place for these resources, but that they are all common goods. The argument, thus, goes for all natural resources and not just for greenhouse gas emissions. The question remains then whether different natural resources should be included in a theory on the allocation of emissions rights, or whether it is unproblematic taking emissions in isolation.

Moreover, an isolationist view of emission rights could be regarded as problematic because it disregards different needs. What this means is that due to some people being poorer than others, some people need more emission rights to have the same decent human life. Moreover, developed countries have emitted more in the past, through which they have been able to develop (Torpman, 2021). Developing countries are yet to do this and will, therefore, want to claim their ability to develop and it is questionable if an isolationist view of emission rights makes this possible. This criticism will be resolved in the following paragraphs.

1.2 Sufficiency argument

The following argument that is used to defend an equal per capita approach is, unlike the common's argument, not based on a left-libertarian view. It can, however, be based on a more moderate form of libertarianism that allows for a sufficiency standard (Wendt, 2017). On a sufficientarian libertarian view, the libertarian focus on property rights are combined with providing a standard for everyone to have enough resources.¹ In this way there is also a focus on people's needs, as opposed to a strictly equal division of natural resources (Wendt, 2019).

The so-called sufficientarian argument can be used to defend an equal per capita allocation of emission rights. The argument needs to be viewed within the framework of everyone having an equal right to emit greenhouse gases. This argument adds to this framework that justice requires all people to attain a certain threshold standard of living (Caney, 2012). This would mean that people need to be able to keep themselves warm or to cook food for their families. To do that, it is assumed that everyone has a equal basic need to emit greenhouse gases. Therefore, everyone would need to be able to emit greenhouse gases and this would need to be divided equally so that everyone can live up to this standard of living.

¹ Regarding the term 'sufficientarian libertarianism', this can represent different views. It would be too extended for this thesis to discuss the differences, since the general idea suffices. For a full account on sufficientarian libertarianism see Wendt, 2019.

There are a few problems with this argument (Caney, 2012). The first is that the sufficiency standard needs to be defined, i.e. how high is the basic need to emit greenhouse gases. Another more relevant objection to the argument would be that there are other energy sources to keep oneself warm or to cook food. Hence, the question is whether there should even be a standard for emitting greenhouse gases. Moreover, if you combine these problems, it also becomes clear that you would have to define how much emission is even possible before it becomes a serious threat to the climate. The equal per capita view in principle already defines a cap on total emissions, and therefore this problem is taken into account on the basic notion of an equal per capita division of emission rights. The reason this problem is nonetheless mentioned here is that it might conflict with the sufficiency standard. The final problem is that it can also be said that there simply is no equal basic need to emit greenhouse gases, since different people across the world have various needs when it comes to the quantity of emissions (Caney, 2012). One option to solve this is that, when the sufficiency standard has been defined, a part of the emission entitlements are held back to be able to secure this standard. However, by having tradeable emissions this should in large part already be accounted for. Thus, the cap and trade system is necessary to secure the basic standard of living.

The sufficientarian argument also provides an answer to an often mentioned problem of emissions rights, namely that the benefits and costs of climate change mitigation will differ. It is questionable whether all human beings will benefit from climate change mitigation to the same extent. This becomes clear by seeing that developed countries emit the most greenhouse gases, but the consequences of climate change are more visible in less developed countries. Therefore, climate change mitigation will be more beneficial for the less developed countries. If those are not the countries that emit the most, then the question is why emission rights would be relevant to the mitigation of climate change. Moreover, cutting in emissions brings different costs for different people – even within developed countries. Some countries are, for example, colder than others and will therefore emit more to warm their houses, something that is usually considered to be necessary for people to live a decent human life (Torpman, 2021). On a left-libertarianism account, different needs are not relevant. However, in line with the sufficientarian view, this can be a matter of an equal per capita approach that should be taken into account. A possible solution for the problem of different needs would be emission trading, which the equal per capita view makes possible, but still then some countries would be able to profit more from the emission trading scheme.

1.3 Taking history into account

In current climate negotiations it is often questioned who can be held responsible for human-induced climate change. Within equal per capita schemes, there is a distinction between historical and unhistorical approaches. In historical theories on how to resolve the climate problem and how to divide emission rights, a fair distribution is considered to be one where the countries that are responsible for climate change should also carry the heaviest burden in resolving the problem (Saltzman, 2010). A common example for this is the Brazilian proposal, in which the effort in reducing greenhouse gas emissions is based on historical responsibility (La Rovere, de Macedo, & Baumert, 2002). The Brazilian proposal holds that developed countries (i.e. the countries that have historically emitted the most greenhouse gases) should contribute to emission reduction based on their historical responsibility. Hence, the burden for reducing emissions would be brought to the countries that contributed most to greenhouse gas emissions in the past and, therefore, to global temperature increase (La Rovere, de Macedo, & Baumert, 2002). Simplified this means that developing countries, that have hardly emitted any greenhouse gases in history, do not have the responsibility to reduce emissions (Höhne & Blok, 2005).

As opposed to theories like these and often to the current climate negotiations, there are also theories within an equal per capita allocation of emission rights that do not provide an answer to the responsibility question, since they argue taking historical emissions into account is not possible to achieve the current need to reduce emission (Singer, 2010). This can be a great advantage to equal per capita allocations in the sense that it would not *need* to know who can be held responsible for the climate crisis. The reason for that is that this allocation focuses on equally distributed emissions in the future, in such a way that emissions are cut back to reach the international targets. However, the argument that developing nations are not responsible comes back so often that it seems logical that any theory on reducing greenhouse gas emissions has to provide some kind of answer to that question.

Moreover, on a left-libertarian approach equality is the basis for implementing an equal per capita allocation of emission rights in the sense that every inhabitant of the world has an equal right to emit greenhouse gases. As has been explained, this theory has served as the basis of the aforementioned common's argument. This equality would be made possible by an equal per capita scheme of tradeable emissions rights (Hayward, 2007). However, left-libertarianism justifies an historical approach of emission rights where developed countries are entitled to less emissions in the future due to their high emissions in the past. The problem with taking historical responsibility into account is, though, that it is difficult to

assign this responsibility to certain people. The reasons for this are that the people who emitted that much are in large part already dead and that whether people or countries can be held responsible if they could not foresee the consequences. The latter is often solved by dividing the carbon budget on the basis of the emissions in 1990, the year that the first IPCC report was released. Hence, even if historical responsibility is taken into account, it is difficult to decide who exactly should be held responsible.

Since by not holding the developed countries responsible for human-induced climate change, this can lead to critique from developing countries. During climate negotiations the developing nations often point out that not only do they suffer the most from the consequences of climate change, they are also in large part not responsible for it. Therefore, the argument usually is that the responsible countries *should* solve the problem. Moreover, apart from developing countries not or hardly being responsible for climate change, they also consider it unfair that they are being held back in their development if they also need to cut back on emissions (Saltzman, 2010). An interesting example of a country that usually criticises plans for cutting back on emissions is China. China is both the largest emitter in the world and the country with the largest population (Pan, Teng, & Wang, 2014). At the same time, it is also a country that is somewhere in between being a developing and a developed country. If it was fully in the developing stage, it would not be the largest emitter and the economy would be worse off than it is. Nonetheless, China's main goal now in relation to climate measures is that it can meet its developmental goals (Wang, Lu, Lu, & Nie, 2021). When looking at the past, China was a developing country for much longer than the US or the EU and they are – in that sense – less responsible for the consequences of human-induced climate change. Therefore, China's position in climate negotiations is often that it should not suffer too much from the measures being taken and they should have the ability to develop (Zhang, Wang, & Liu, 2022). In large part the same goes for India, being a country with a high population that also still needs a lot of developmental work to be done (Pan, Teng, & Wang, 2014).

A possible response from supporters of an equal per capita allocation is that with the cap and trade approach it becomes possible to both cut back on emissions on an international scale as well as leave room for developing countries to develop (Gupta & Bhandari, 1999) (Van den Berg, et al., 2020). The key to that is the division of population on a global scale compared to current emissions. China and India might be large emitters, but they also have large populations. In general it can be said that developing countries have large populations in relation to their emissions. With a cap and trade scheme of equal per capita allocated emissions, this means that developing countries – due to their relatively large populations – will be

allocated more emission rights than they currently need. Since emission rights would be tradeable and developed nations would need to cut back more than they initially can, developed countries would be able to buy some of the emission rights from developing countries. Hence, developing countries could emit more than they initially will do and they can trade their 'spare' emissions. This entails that developing countries would receive a kind of income from the emission rights they trade. This increase in budget could then in turn lead to a general improvement of the economy as well as a budget to work on their development in an efficient way (Gupta & Bhandari, 1999). Moreover, with this approach it would still lead to the developed countries having to give in more to reach the emission targets, but with the advantage that it is irrelevant and unnecessary to argue for their responsibility of the climate crisis.

1.4 Developmental rights

In this paragraph I will discuss whether there is a right to development, which entails that developing countries should be able to develop and this will be connected to the right to live a decent human life, which will also be discussed in more detail in the following chapters. The connection between these two rights is such that it would be essential to develop to live up to a certain sufficiency standard. Hence, this can be taken to be included in a sufficientarian libertarian framework. I will argue that taking development into account is crucial to make an equal per capita approach of emission rights politically feasible. Moreover, there is also a connection between development and the number of population. Therefore, taking into account developmental rights is necessary for both the equal per capita discussion and population policy.

As a starting point, some believe there is such a thing as a right to development. Actually, as Paul Baer argues, 'there is a fairly broad consensus among both the philosophers who write about climate change and the majority of the climate-policy community that efforts to reduce greenhouse gas emissions should not harm the ability of poor countries to grow economically and to reduce as rapidly as possible the widespread poverty their citizens suffer' (Baer, Athanasiou, Kartha, & Kemp-Benedict, 2010, p. 215) (Cafaro, 2012). Moreover, the focus of developing countries will be on their development and they will, therefore, not accept any proposal that does not allow for their development. In other words, taking into account the right to development is necessary for any proposal tackling climate change to be politically feasible. Thus, it is important to see how this can be made possible in an equal per capita proposal as has been discussed in this thesis.

As we have seen, an equal per capita approach divides emission rights on the basis of the number of global citizens. This means that countries get a certain amount of emission rights based on their population, and what they do with these emission rights is to be decided on the national level. In general, what you will see is that developed or industrialised countries need to cut back on their emissions to meet the carbon budget. Developing nations, however, will often have more emission rights – based on their number of citizens – than they would currently need. This gives rise to two situations. The first is that developing nations are actually under the equal per capita scheme allowed to increase their emissions. This can be helpful ‘as they strive to meet their developmental aspirations’ (Gupta & Bhandari, 1999, p. 734). In other words, they are allowed to develop in such a way that requires their emissions to increase. On the other hand, the equal per capita scheme has been described as a so-called ‘cap and trade’ system. This entails that emission rights can be traded, as has been described in more detail before. The possibility of trading emission rights is important, since this will benefit developing countries in their national incomes. They can use the incomes from the trade of emission rights to achieve their developmental tasks. (Pan, Teng, & Wang, 2014). Therefore, this trade-system also allows for the development of poorer countries, which makes the equal per capita scheme politically feasible.

1.5 Conclusion

Now that these points have been discussed, it is important to see whether the equal per capita allocation of emission rights is a fair approach. Every forementioned paragraph discusses an argument that contributes to the fairness of the approach. The first is that due to the atmosphere being either unowned or commonly owned, all people have the same right to emit greenhouse gases. Though the emission of greenhouse gases needs to be reduced in general, this would then mean that equality should be taken into account here. Second, this point can be extended to stating that everyone has the right to live a decent human life. Hence, people have a right to emit greenhouse gases to the extent that these emissions are necessary to have a basic standard of living. This standard would be decided using the cap of emissions. What the threshold of emissions is to have a decent human life is difficult to ascribe. More research would have to be done for this. What the threshold is, is not necessary to know for the sake of this thesis. However, that there could be such a threshold of emissions to have a basic standard of living is relevant. What this might be relevant for is the distinction between developed countries and developing countries. Since developed countries are mostly responsible for both the high current emissions and the consequences of climate change, but at the same time the developing countries suffer from the consequences most, it seems reasonable to take this into account in an equal per capita account. This entails taking historical

responsibility into account in some way, because this would be the only way to politically take global action when it comes to decreasing emissions. As I have tried to describe, what this should entail at least is that the right to development is being secured. Since if developing countries are able to develop, this would improve the global situation in climate change mitigation and the standard of life of all people in the world. Securing the right to development also seems to be necessary for implementing a politically feasible climate policy, since developing countries tend to focus more on their development than on bringing their national emissions down. This is also due to the general idea that developing countries are not the ones to be held responsible for the effects of climate change.

What is relevant for the fairness of the equal per capita approach is that emissions rights are divided in a cap and trade scheme. The ultimate goal of the emissions policy would be that greenhouse gases are reduced, to a certain determined level. Hence, due to implementing a cap on emission rights, there would be a maximum in global greenhouse gas emissions. A just policy would be one where the total amount of emission rights is divided equally. The reason for this is the earlier determined idea that everyone has an equal right to emitting greenhouse gases. In other words, by dividing emission rights equally across all global citizens – an equal per capita allocation scheme – it is secured that everyone has equal rights. Moreover, by allowing emission rights to be traded, you would give nations the possibility to on the one hand use as much emissions as they can, and on the other hand using the money gained from trading as a means for mitigating the impacts of climate change or for developing. Due to this trade system which can help developing nations develop, these countries can also make sure they won't need to emit as much in the future as the current developed nations do. This is because they can invest in more sustainable ways of using energy or food. But since developing nations are hit hardest by the consequences of climate change, they can also use the money earned from this trading system to adapt to these consequences. These two results of the trading system are necessary, since the developing nations cannot reduce their greenhouse gas emissions to the extent that developed countries can without threatening their development. Therefore, to have a just policy, meaning that equality is secured and burdens are divided alike, an equal per capita allocation of emission rights in the form of a cap and trade system would be the right approach.

2. Equal per capita allocation and population growth

In this chapter, I will first provide an explanation of the relevance of population for climate change in general and for the equal per capita approach specifically. As will be clear, an extending population can have serious negative effects on climate change. Then I will argue that population growth leads to unfairness when combining this with an equal per capita allocation of emissions rights. There are a few arguments for this unfairness. The first is that because population is one of the main factors that defines the amount of emissions, an equal per capita approach could possibly lead to more population growth. The reason for this is that countries could benefit from having a bigger population in order to receive more emission rights. Second, population growth in one part of the world leads to less emission rights in another part of the world, which risks the standard threshold of living. After this, I will also discuss the main response to these problems, which is to determine a demographic reference year on the basis of which emission rights are to be divided. I will argue that this helps in defending the equal per capita approach, but it is not enough when it comes to taking population growth into account properly.

2.1 Why does population matter for climate change?

Before I can argue that we need to slow down population growth and what the implications of this are for the equal per capita approach of emission rights, it is important to explain why population is a relevant factor in climate change and greenhouse gas emissions. This relevance is captured by: ‘All else equal, a larger population entails more emissions and therefore more mitigation to achieve a given climate target, and it also means more future people will be vulnerable to climate-related impacts.’ (Scovronick, et al., 2017, p. 12338) To see why this is the case, we can come up with a few examples where this becomes clear. Think for example about the floods in Pakistan in August 2022. The bigger the population of Pakistan is, the more people who will suffer from the floods. This will mean more casualties as well as simply more people losing their homes and because of the latter possibly more climate refugees. At the same time, the Horn of Africa is experiencing extreme drought. Since the start of 2022, nine million more people have come into a situation of severe food insecurity in Ethiopia, Kenya and Somalia (Reliefweb, 2022). This food insecurity may be caused by extreme drought, but it is not the only relevant factor. The more people there are to feed, the sooner there will be a situation of severe food insecurity (Gardiner, 2011). Hence, the number of people matters in crises like these that will become more common due to climate change. Philip Cafaro (2012) adds to this point nicely by saying that: ‘*More* people consuming *more* goods and services *per capita* generate *more* pollution. We use

more land, more water and other resources, leaving less suitable habitat and fewer resources for other species.’ (Cafaro, 2012, p. 45) In other words, more people means more people are affected by climate change, while at the same time more people leads to more emissions causing climate change. Hence, climate change and growing populations affect each other negatively. The interesting point in the current examples above is that the countries mentioned have an increasing population, as can be seen in the table below (United Nations, 2022). The expected population increase, especially in Somalia, shows that food security will not become better, regardless of how the droughts develop.

Country	Current Population, as of July 2021 (thousands)	Estimated Population, in July 2050 (thousands)	Increase, in terms of percentage
Ethiopia	123380	214812	74,1%
Kenya	53006	85212	60,8%
Pakistan	231402	367808	58,9%
Somalia	17066	36463	113,7%

Apart from the examples that show that population influences the outcomes of the effects of climate change, there is also a ground for taking population into account. To understand this, we have to look at the so-called Kaya Identity. This is a tool, developed by Yoichi Kaya (1990), which climate scientists use to understand and measure the changes in CO₂ emissions and their underlying drivers. It states that the total level of CO₂ emissions is the product of four factors, namely economic output per capita, total population, energy used to generate each unit of the total Gross Domestic Product (GDP), and greenhouse gases emitted per unit of energy (Cafaro, 2012). The IPCC uses this Kaya Identity in the context of policy making, where the CO₂ emissions and its four factors are often defined as follows (IPCC, 2022, p. 355):

CO₂ Emissions

$$= \text{Population} \times \text{GDP Per Capita} \times \text{Energy Intensity} \times \text{Carbon Intensity}$$

Hence, by using the Kaya Identity as a tool, climate scientists – and the IPCC – acknowledge population as one of the factors that determine the global CO₂ emissions. Though this tool is specifically for CO₂ emissions as it is the biggest greenhouse gas, it could in theory be used for other greenhouse gases as well.

As mentioned, the IPCC uses the Kaya Identity and thereby acknowledges the relevance of population (IPCC, 2022). It is important to see in what way they use the Kaya Identity for their mitigation strategies. The IPCC holds that population is one of the driving factors of human-induced greenhouse gas emissions, but at the same time they hold it as a variable that cannot be changed (IPCC, 2022). They do not consider any policy regarding population growth. Their position is that growth in population attributes to greenhouse gas emissions – specifically CO₂ emissions – and that population growth, therefore, demands decarbonization (IPCC, 2022). In other words, there needs to be a change in carbon intensity – namely CO₂ emissions need to be zero by 2050 – because population growth cannot be changed and therefore requires another change. What will be clear in the following chapters is that the IPCC makes a mistake here, and that decreasing population growth by form of policy is not only possible, but also necessary. To make this clear, a discussion of rights will be needed. Therefore, I will first explore the question whether there is a right to have children. Then I will explain why a lack of population policy can lead to a violation of rights, before returning to the topic of greenhouse gas emissions and the relevance of population control.

2.2 Growing populations and the equal per capita approach

The relevance of population for an equal per capita approach is that ‘per capita’ means ‘for every head of the population’. In other words, emission rights are distributed exactly on the basis of number of people living in the world and citizens per country. However, this in itself does not show the relevance of possible population growth or decline for the equal per capita view. To make this clear it is important to recall that the idea of the equal per capita view is to divide emissions rights or permits to nations on the basis of the number of people living in that nation. So emission rights are divided on the basis of the total global population and then equally distributed over nations, in such a way that every head of the global population would end up with the same amount of emissions rights. In practice this entails that nations receive the rights to emit and they can choose how to divide that within the country. Whatever they have left as unused emissions, they can trade with the result of being able to spend that money on other (e.g. developmental) goals. Hence, you could say that it would be best for every nation to get as much emission rights or permits as possible – either to use or to sell. And this is where the relevance of population growth comes in. Since to get as much emission rights as possible, means having the biggest population possible. Therefore, it is important to analyse what the most beneficial is for a country.

To make this analysis, I will compare the current situation – regarding population and emissions – in the United States and in China. China is the country with the largest population in the world, while it is also the biggest emitter (Ritchie,

Roser, & Rosado, 2020). That is reasonable, since more people typically mean more emissions due to population being one of the key factors that are relevant for emissions.² However, if an equal per capita approach would be implemented now China would likely, due to its large population, receive more emission rights than it needs (Ritchie, Roser, & Rosado, 2020). Thus, China would be able to trade emission rights. One country they could sell it to would be the United States. The US has a relatively large populations but it emits so much that they would need to buy emission rights from other countries if they want to keep the current amount of emissions. If the US would get a bigger population without needing to increase their emissions, they would profit from that since they would have to buy less emission rights. However, it seems reasonable to think that with a growing population the US emissions would also increase. The same goes for China to some extent. If their population grows, they would be likely to emit more. However, having a bigger population also leads to more emission rights on the equal per capita approach, so they would be allowed to emit more. Therefore, China would as a nation benefit from having an even larger population if an equal per capita approach would be implemented. This does not seem fair as the objective is to reduce emissions. The reason for this benefit is that China is not a fully developed country and, hence, emits less than a developed country would per head of the population. Moreover, the argument that China profits from having a growing population under an equal per capita approach goes for other less developed nations like India or Ethiopia (Pan, Teng, & Wang, 2014).

This seems to be a problem if it is generally problematic to have an increasing population, since on the long term more people lead to more emissions, which leads to more change in the planet's climate. Moreover, since there is a cap on total emissions this would eventually lead to less emissions per capita. Since the areas with the largest populations are also the areas that need to have these emission rights to spend on developmental and mitigation options, it would on the long term be most problematic for those areas to have less per capita emission rights. Developmental and mitigation options are necessary for developing countries to secure a basic threshold of living. Therefore, on the long term a decent standard of living would be more difficult to achieve for everyone and the profit for less developed nations will only be on the short term. Hence, an equal per capita approach could only work by addressing this problem and making sure that it does not lead to more benefit for nations that – possible actively – increase their population, even if this benefit will only last temporarily. Besides a bigger population leading to the benefit of more emission rights, it would in general be unfair that countries encourage population growth. As had been mentioned, bigger populations lead to more negative effects for climate change as a whole. And eventually it will also lead to negative effects regarding development and poverty,

² As was clear from the Kaya Identity.

but this will be taken into account in the next chapter. Thus, the focus of this chapter is the connection between population growth and emission rights.

2.3 Inequality in emission rights

The last paragraph discussed why especially developing nations might be encouraged to increase their population due to short term benefits, while this would on the long term lead to a risk in the decent standard of life within these same countries. What this paragraph will explain is that this will also lead to inequality on the global scale.

If populations are increased in one part of the world – which would most likely be developing countries as has been explained – then this would lead to a reduction in total emissions. Since the total amount of allowed emissions will have been established within a cap and trade system, the total number of emission rights would not increase even if the global population would increase. This also has been mentioned in the previous argument. If some countries are encouraged to increase their population, this would also have consequences for other parts of the world. Because even if other countries do not increase their populations, they would also receive less per capita emission rights. However, if the argument is that mostly developing countries would be encouraged to increase their population, then the other countries in this argument would be the developed countries. This is relevant, since the previous argument was related to development being at risk. Hence, if it is not a matter of development being at risk, it must be established why this is still unfair.

One reason for this unfairness is still that the standard threshold of living is at risk. Not necessarily because of developmental options being threatened, but because greenhouse gas emissions are currently used to secure a decent life by being used for food production or to keep houses warm. Regardless of that this system would need to be changed in order to reduce the effects of climate change, in this discussion of emissions rights the reason why emission rights would be less in this argument would be an unfair reason. This includes that also developed countries would need to be able to mitigate and adapt to the effects of climate change. Hence, what is at stake in this argument is that due to the actions in some countries, all people would be affected. This leads to unequal benefits and burdens, both on the short and on the long term. As was clear from the previous argument, increasing populations would on the short term be a benefit. This entails that the burden is placed by the countries in which populations are not increased, which would be an unequal division.

2.4 Freezing the population

Since the effects of an equal per capita approach of emission rights are determined by changes in population and the inequality that this brings with it, there are authors who argue for something that we can call ‘freezing’ the population. What this entails is that a demographic reference year would be determined. This year would be reasonably considered a good year to take as the population baseline. Hence, in this reference year the population would be so-called frozen and an equal per capita account would take that fixed number of population as the population where emissions rights should be distributed towards. Or as the German Advisory Council on Global Change – the WBGU – puts it: ‘the *demographic reference year* determines the national share of the global greenhouse gas budget based on the country’s relative demographic weight for the given year’ (WBGU (German Advisory Council on Global Change), 2009, p. 24). The WBGU supports this way of freezing the population for the allocation of the greenhouse gas budget, and they propose two options when it comes to deciding on the demographic reference year. The first option focuses on historical responsibility, where 1990 is considered a good reference year. The reason for this specific year is that it was the year where the first IPCC report was released and that, therefore, it can be reasonably considered that every country from that point onwards knew about climate change and (part of) its effects. The other option focuses more on future responsibility. Since the WBGU report was written in 2009, they considered the reference year for this option to be 2010. Hence, this could be the current or the next year. They also mention that it can be the year of the first future climate agreement. However, to get developing countries on board with the option of future responsibility and reach political consensus, it might be necessary to add a compensation for historical responsibility within the budget. This could entail compensating developing countries – who are hardly responsible for climate change historically – in the form of financial transfers that can be focused on adaptation to the effects of climate change (WBGU (German Advisory Council on Global Change), 2009).

Since the WBGU is a good example of a council that actually wants to implement dividing the greenhouse gas budget on the basis of a fixed population, it is important to explore their reasons for this. Their argument is that having a demographic reference year serves as an incentive for demographic change since high population growth after the reference year ‘would stretch the allocated budget, effectively reducing emissions per capita’ (WBGU (German Advisory Council on Global Change), 2009, p. 24). In other words, freezing the population helps with reducing population growth since countries would otherwise have considerably less emission rights per capita. And this would then work best with an early reference year due to the population growth that has already taken place. Yu et al. objects to this argument that there will be a significant increase in the world population and that is partly due to non-climate change related factors, and ‘these anticipated

population growth are entitled to their deserved emission rights' (Yu, Gao, Ma, & Zhai, 2011, p. 84). This could perhaps be interpreted along the lines of the arguments for population policy that have been proposed earlier. What I take this to mean is that 'freezing' the population is only justified when also reducing population growth due to non-climate change factors. An example of this is related to the policy of making sure all people in the world have access to contraception. If contraception is unavailable – as it currently is in some parts of the world – you cannot take away those new people's emission rights.³ People can never be held responsible for their own coming into existence, since it was not their decision. So even if contraception was available, you cannot take away these people's emission rights. But for an argument of population growth due to non-climate change factors, it is most important to see that population growth can be decreased by taking other measures along with having tradeable emission rights. I will come back to ways in which population growth can be taken into account in the next chapter.

It is important to see here why freezing the population would not solve the inequality of population growth. First, since population grows due to non-climate change related factors, this means that countries can do little about population growth. Population growth is highest in areas in which, for example, contraception is not available, meaning that there is no choice to stop population growth – at least not without the help of other, more developed countries. Therefore, it would be unfair to choose a demographic reference year if countries can do little about population growth. Second, this would lead to different amounts of emission rights in different parts of the world. If population unintentionally grows in some part of the world and there would be a demographic reference year, this would entail that those countries would end up with less emission rights per capita. However, in parts of the world where there are options to control population growth, countries would not have less emission rights per capita. What this leads to is a difference in amount of emission rights simply on the basis of where someone is born. This is incompatible with the idea that everyone should be treated equally. Therefore, freezing the population is unfair.

2.5 Conclusion

Population is one of the factors that determines the amount of greenhouse gas emissions and, therefore, the impact on the climate. Moreover, the consequences of

³ The 'new people' here are the people that are being born because there was no access to contraception and that would not have been born otherwise.

climate change (e.g. droughts, floods) would lead to more food scarcity and more climate refugees with a bigger population. That is because more people would be impacted. Hence, climate change and a growing populations negatively influence each other. Moreover, an equal per capita approach divides emission rights on the basis of the total population and is in that sense determined by the changes in population. This combination of the negative effects of population growth and the relevance of the number of population for the equal per capita approach, makes population growth and equal per capita allocations incompatible.

In this chapter I have discussed different reasons why population growth makes an equal per capita approach unfair. First, some countries can be encouraged to increase their populations due to short term benefits, while on the long term this leads to less developmental and mitigation options. This would risk the standard threshold of living that was to be secured by the equal per capita approach. Second, the decrease of per capita emission rights also leads to more burdens and less means to secure the standard of living in other parts of the world. Hence, some countries are negatively impacted by population growth in other countries. The solution that is often offered is to choose a demographic reference year on the basis of which emission rights are to be divided. I have argued that this does not solve the unfairness of population growth in combination with an equal per capita approach. Because there are non-climate change related reasons for population growth that countries – at least some countries – can do little about and everyone has an equal right to emit greenhouse gases, it would be unfair to let these countries receive less per capita emission rights. This would also lead to inequality, because the amount of per capita emissions would then be based on where someone is born. Therefore, freezing the population does not solve the unfairness of population growth in combination with an equal per capita approach.

3. Reducing population growth

In this chapter I will discuss how population growth needs to be addressed, considering that an equal per capita approach of emission rights is not compatible with population growth. To do this, I will first consider various forms of population policy and then argue why non-coercive measures should be adopted. Then I will discuss two reasons for implementing non-coercive measures, connected to the previous discussion of climate change and equal per capita emissions. The first reason is related to population growth due to non-climate change factors. The second reason is that non-coercive population measures leads to more rights being respected. For this second reason a discussion of rights is required.

3.1 Population control

To see how population growth needs to be addressed, taking unlimited population growth as something to have many negative consequences for climate change and to be incompatible with an equal per capita approach, it is important to discuss various ways of implementing population policy.

I will begin by explaining what population policy is and what it can be taken to entail. This includes clarifying that there are many different policies possible to control population growth. A clear distinction between various policies is put forth by Elizabeth Cripps (2015), who argues there are three different types of policy to slow birth rates. The first one is choice-providing measures, which includes increasing the availability of birth control and information on family planning around the world. The second is incentive-changing measures, which can entail educational campaigns or financial stimulation to not have children. The last category is that of directly coercive policies, such as forced abortion or sterilisation. There is an enormous agreement that the last policy category should be avoided. Even though it can be said that the Chinese one child-policy belongs to directly coercive measures, still it can be said that it is an undesirable policy and it should only be implemented if there is for some reason no other way out. Moreover, it can be said that coercive measures do violate human rights, like bodily integrity (Cripps, 2015). Even if there would be no such thing as a right to have children, this does not entail that we can simply undermine one's right to bodily integrity (Conly, 2016). Therefore, as the situation is right now, there is no accurate reason to have coercive measures when it comes to having children. This does entail that we can try to influence people's choice without violating any right. There are scholars, like Cripps, who state that to avoid these directly coercive measures it is important to implement measures that belong to the other two categories of population policy. There is high consensus that choice-providing measures are entirely non-coercive,

whereas the opinion on incentive-changing measures differs. Hence, it is important to say that incentive-changing measures can differ from non-coercive campaigns to negative financial incentives – such as removing child allowances or even receiving fines – that can be viewed as more coercive. Since the latter are debateable in general and do not seem to be necessary yet to decrease population growth, I will argue that mere non-coercive measures are to be used when addressing population growth

With the term population control, people tend to think of coercive measures. Hence, I should make clear that when I use the term population control in the following, I intend to talk about the non-coercive measures – such as providing low-cost birth control or legalizing abortions. When viewing the strictly non-coercive measures, the choice-providing measures, it is important to see that these will actually have an effect on population growth. According to a likely scenario for 2100, slowing down population growth with non-coercive measures like the ones mentioned could reduce greenhouse gas emissions by 37-41% (O'Neill, et al., 2010). The difference in percentages is based on the different scenarios of population growth, aging and urbanization, since these are factors that are difficult to project exactly. The point is, however, that slowing down population growth will have great effects regardless of what scenario will turn out to be right. In fact, non-coercive population measures save more annual emissions than any measure we currently have. Whether it is completely putting a stop to deforestation or increasing wind energy capacity massively, these measures will never save the same (circa) 40% as slowing population growth (Cafaro, 2012). Therefore, what I wish to make clear here is that population control is effective for reducing global greenhouse gas emissions and anyone who wants to reduce emissions should take population control seriously. Even individually this is the case. One can choose to take less flights or drive a more fuel-efficient car – or even no car for that matter – to reduce their carbon footprint.⁴ But choosing to not have a child, compared to having a child, is the most effective way to reduce one's carbon footprint (Cafaro, 2012). That is to show that having a child can be seen as the worst lifestyle choice when one wants to take the environment into consideration and emit less greenhouse gases. The reason for this is that food, clothes and other products need to be produced for another human being. Hence, the production of basic human needs leads to more emissions than one can likely save by making other lifestyle choices. Moreover, it cannot be said that one's child will implement the same emission-saving choices and it should, thus, also be considered that each child will emit more by driving a car or taking a flight. I hope to have shown that population growth matters for climate change and greenhouse gas emissions – both collectively and individually – and that population control, therefore, should be taken into account

⁴ Usually we speak of a carbon footprint, as CO₂ is the biggest greenhouse gas – especially as the one that individuals most emit with their lifestyle choices. Hence, this can be taken as a general comment regarding greenhouse gas emissions.

in these discussions to secure a decent human life for all. Anyone who would seriously want to mitigate the effects of climate change, should consider the impacts of population growth and, as a result, possibilities to control population growth.

3.2 Factors in population growth

Now that it is clear that non-coercive population policy is the only acceptable way to address population growth in relation to climate change, it is crucial to discuss in more detail why this would be justified. The first reason for implementing non-coercive population measures is related to the aforementioned factors that lead to population growth. The factors, as have been discussed also in the previous chapter, are not related to climate change and include lack of knowledge about family planning or lack of contraceptive measures. The reason for this is often that the areas in the world where this is relevant, do not have the financial or intellectual means to distribute this knowledge or these contraceptives (Yu, Gao, Ma, & Zhai, 2011). As has also been described in the previous chapter, this is unfair, because countries can do little about this. A solution for this, however, would be non-coercive population policy. Since by providing contraception or information about family planning, along with other similar measures, population growth would be reduced (O'Neill, et al., 2010).

Foreign aid could help in providing these measures, and therefore, reducing population growth. With a reduction in population growth, there would also be a more equal distribution of burdens within the equal per capita framework. Since emission entitlements would not become less per capita if the population stays the same, the consequences of this – less developmental options or inequality across the world – would be diminished. At the same time, the need for freezing the population in the form of choosing a demographic reference year on the basis of which emission rights are to be divided, would become irrelevant. If the unfair consequences of population growth would disappear, then there is no need to freeze the population since future equal emission rights would not diminish. It would be excessive because the reason for implementing a demographic reference year would be to trigger countries to reduce population growth, but that this is already taken care of by having non-coercive population measures in itself. This would then also solve the consequence of choosing a demographic reference year that one's emission entitlements would be based on where someone is born. Therefore, non-coercive population measures secure future emission entitlements and equality among people in different parts of the world.

3.3 Population policy and human rights

Before discussing what the implications of non-coercive population policy is for rights, it is important to distinguish what a right is. Having a right, first of all, means that one has an entitlement to do or not do something (or be in a certain state) or that others can or cannot perform certain actions (Wenar, 2021). Having a right to do something entails that that action is just and that you have the freedom to do so. Although the internal structure of rights is complex and is not possible to fully uncover for the sake of this argument, it can in general be said that rights are in place to uphold a certain standard of living (Wenar, 2021). To extend on this a bit further, it is important to make a distinction between positive and negative rights (Berlin, 1969). Negative rights are those rights to be free to do something or not – to perform some kind of action or to refrain from performing that action. The negative rights that people have oblige others to refrain from action, or in other words, to not interfere. Positive rights, on the other hand, are those rights that provide something that people need to secure their well-being. An example of this would be the right to food, which will come back in the following discussion. In this sense positive rights do oblige action, since for everyone to have food it needs to be made sure there is enough food. Positive and negative rights can also conflict. In case negative and positive rights do not conflict, both type of rights should not be violated (Wenar, 2021). I have already mentioned that coercive population measures violate at least the right of bodily integrity, while also interfering with the freedom that people have in deciding whether they want to have children or not. I have also tried to explain that the latter would merely be improved by non-coercive population measures. Moreover, I will argue that there are positive rights that would be more respected when implementing non-coercive policy.

Since population impacts climate change and greenhouse gas emissions so much, as I have tried to show before, there are consequences of population growth that impact human rights. This entails that having children to some extent has an influence on the ability of others to live a decent human life. Having a basic threshold standard of living improves equality and well-being. An example of this is the access to food. Having food is a positive right and a necessity to live a decent human life. But the more people there are, in combination with more droughts and more floods due to climate change, the less food security there will be (Molotoks, Smith, & Dawson, 2021). To some extent, therefore, the choice to have children impacts the food security for different people around the globe. As mentioned, it is population growth *in combination with* climate change that undermines human rights. It can be said that climate change itself would be enough to undermine the ability to have a decent human life, because consequences of climate change like droughts and floods in itself have an impact on this (Caney, 2020). Especially the combination of both factors threaten the basic human right to live a decent life. It seems, therefore, to make sense that both factors should be taken into account

properly to secure this right. Moreover, by implementing non-coercive population policy a choice would be provided to people in if they want to have children or not. And with this, they can choose to improve their standard of living. Therefore, the right to live a decent life and related rights like ability to food would be respected *more* with non-coercive population measures.

Connected to the right to live a decent life is the right to develop, since development makes it at least easier to live a good life due to less diseases and deaths and a higher standard of living. Therefore, with the policy to be implemented this right to develop must also be secured. Both these rights can only be achieved by a collective action, which is the reason that it needs a global policy. Moreover, the development of the world population is made difficult by climate change and vice versa. Hence, developed nations should be willing to help developing nations in methods of adaptation and development, as well as the accessibility of population reducing measures. To be clear, this entails help in the form of the spreading of knowledge, since the financial means would already come from the trade of emission rights. It has also already been discussed in the debate about fairness of the equal per capita allocation of emission rights in general. To extend on this a bit further, the reason that a right to development is supported is to minimise poverty. Hence, the question is not always about development, but sometimes even about bare survival (Baer, Athanasiou, Kartha, & Kemp-Benedict, 2010). However, to reduce poverty as much as possible entails again that focusing on the effects of climate change is not enough. That is since poverty is also increased by a rapidly growing population, as I have hoped to make clear in the foregoing of this thesis. Therefore, to have a full account of global justice and to have a full right to development, one must acknowledge the role of population growth in the increase of poverty. This is noted best by Philip Cafaro, by stating: ‘Those committed to “greenhouse development rights” – or more generally, those who support a universal right to develop, or a universal right against poverty – must reject a right to unlimited procreation and support humane measures to reduce the global human population’ (Cafaro, 2012, p. 54). If one wants to support the right to development, which is in itself not necessary for the isolationist nature of the equal per capita approach, but is highly agreed upon, then one should also take into account how development and poverty reduction are influenced by an ever-growing population. That is to say that increasing population is simply not just when it comes to the right of development, and with that the right of having a decent human life. Hence, it is relevant to see what the effect of non-coercive population policy would be on the right to development. Since non-coercive measures would reduce population growth and, therefore, would also reduce (e.g.) poverty and food scarcity, this would improve development. Therefore, the right to develop would also be respected *more* by implementing non-coercive population policy.

3.4 Conclusion

What I have argued for in this chapter is, first of all, that non-coercive population policy would be the only justified way of implementing population control. At this point in time, not only would coercive measures be irrelevant, they would also in basis violate people's rights like bodily integrity. Moreover, coercive measures would take away the freedom of people to make their own choices. Thus, population policy should consist of non-coercive measures. This is especially the case since non-coercive population measures cannot be taken to violate any right. Moreover, by implementing non-coercive measures like global access to contraception the standard of life and the free choice of people will only be improved (United Nations, 2019). The only way that this can be made possible is with the help of developed nations – or at least places where this is available, but developed countries is the easiest way to put it since that is where availability is well-organized. Since when it comes to implementing non-coercive measures, it needs to be mentioned that many developing countries cannot do this by themselves, in a similar way that they cannot adapt to climate change properly by themselves. This is then also one of the main reasons for having population policy, namely that (developing) countries can do little about their current population growth. By implementing global policy, this would be resolved – leading to more equality across all people in different parts of the world and, therefore, to a more fair approach.

In fact, reducing population growth in developing countries would only be of advantage for development to take place. In other words, people in developing nations would be better off with population policy than without it. Since, as has been mentioned before, a reduction in population growth reduces, for example, food scarcity and would similarly provide a higher standard of living. Moreover, by providing people a choice in if they want to have children or not, they have the option to improve their ability to live a decent life. Especially since people's standard of life are already in danger due to the effects of climate change, non-coercive population is necessary to have the rights to live a decent human life and to develop be respected more. Therefore, non-coercive population measures would lead to a more fair approach with more rights being respected, a more equal distribution of benefits and burdens, and more equality in general.

On the other hand, the collective advantage of such a policy would be that less people also mean less climate damage. This means that consequences of climate change like droughts can be dealt with better, there would be less deaths and less climate refugees. In other words, there would nearly only be advantages by implementing population policy. However, it must be said that it is still considered controversial to implement such policy. My argument is, nevertheless, that coercive measures must be avoided but non-coercive measures will lead to benefits both for individuals and for the collective. And, moreover, by

implementing such measures, emissions could be reduced more easily and adapting to climate change is easier. Therefore, an equal per capita approach of emission rights could also be more successful when it is combined with a population policy consisting of non-coercive measures.

Conclusion

Preventing climate change requires a reduction in emissions. An equal per capita division of tradeable emission rights is one option to do this. In the first part of this thesis I have tried to answer the question if this a fair approach. The first argument is that an equal per capita approach treats people equally by viewing natural resources and greenhouse gas emissions as common goods, because all people have an equal right to emit greenhouse gases. Moreover, all have an equal right to not come below a certain threshold standard of living, meaning that the well-being of people is secured equally. An equal per capita approach can account for this, mostly by allowing trade to be possible which means that everyone should be able to emit what is necessary to secure their well-being. But insofar as this is not enough, within a cap and trade approach there can be a certain amount of emissions rights reserved to secure that everyone is able to have a similar standard of living. If an equal per capita approach also takes historical emissions into account, the burden of emission reduction is placed on those countries that have the biggest responsibility in high emissions and with it the effects of climate change. Thus, an equal per capita approach that takes historical emissions into account leads to more equality. Finally, the equal distribution of benefits and burdens also needs to be secured by respecting the right to development. An equal per capita approach does this by allowing emission rights to be traded, leading to financial means for developing countries to develop.

The second part of the thesis was devoted to the question whether an equal per capita approach of emission rights is compatible with the current tendency of population growth. I have argued that this is not the case, since population growth leads to inequality and unfairness within the equal per capita framework. There are a few arguments as to why this is the case. First, present equal per capita proposals give an incentive to governments to increase their populations, because bigger populations would on the short term lead to more emission rights and this could seem to be beneficial for these governments. On the long term, however, this lowers the amount of emission rights per capita, because to effectively reduce total emissions there would be a cap on emissions, so total emissions would not be increased because of larger populations. This would then risk providing a basic standard of living for all people, because lower emissions per capita lead to less developmental options, while this is needed most in the areas with high populations. This is unfair, because this would mean that not all people have an equal right to emit greenhouse gases and these countries would not be able to develop, which risks having equal burdens. Moreover, if population grows in one part of the world this would also lead to less per capita emission rights in other parts of the world, because there would be a cap on total emissions, which entails that total emission rights would not be higher regardless of the number of population. This would be unfair, because then the burden would be placed by those countries that did not

increase their populations to the extent that this could risk their standard threshold of living.

Within the second chapter, I have also discussed a policy that is often considered to solve this unfairness. This policy is the so-called freezing the population, which means that a demographic reference year is chosen to divide emission rights. This would be used as an incentive for countries to not let their population grow, as this would lead to less per capita emissions for those countries that let their population grow the most. However, poorer countries can do little about their population growth, since it is also a matter of non-climate change related factors. Since not all countries have the means to reduce their population, it would not be fair for those countries to receive less emission entitlements per capita. Moreover, this policy of freezing the population would in the future lead to people with different amounts of emission rights, depending on where someone is born, which is incompatible with treating all people equally. Therefore, an equal per capita approach with a frozen population also leads to unfairness when combined with population growth.

Since an equal per capita approach of emission rights and population growth are incompatible and combining the two leads to inequality and unfairness, the third part of this thesis described how population should be addressed. Because coercive population measures lead to the violation of rights, the only option is non-coercive population policy. Poor countries can do little about their population growth. Foreign aid for non-coercive population policy could reduce population growth. This would ensure that future equal emission entitlements do not diminish and freezing population in a base year becomes unnecessary. But non-coercive population measures are also desirable in its own right for non-climate change related benefits. There are two main arguments in favour of having non-coercive population policy. First, there are reasons for population growth that have nothing to do with climate change, while population growth needs to be reduced to tackle climate change. Since both governments and individual people can do little about population growth due to these other factors, especially in areas where population growth is increasing the most, this is unfair. This can be solved by taking measures that provide a choice for people to have children or not (e.g. contraception, information about family planning), leading to a reduction in population growth and a more equal distribution of burdens. Second, non-coercive population policy leads to more rights being respected, and with that to more equality. The first right is the right to live a basic human life (i.e. have a certain threshold standard of living). This right would be respected more, because with non-coercive population measures people can choose to increase their standard of living by choosing how much children they want. The second right is the right to development. This would also be respected more, because non-coercive population measures would reduce poverty and food scarcity, which is necessary to improve development. Therefore, non-coercive population measures lead to more fairness.

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