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ARTICLE

Why we need future generations: a defence of direct intergenerational reciprocity

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Abstract

In this article I argue that the non-reciprocity problem does not apply to intergenerational justice. Future generations impact, here and now, on the well-being of people now living. I firstly illustrate the economic-synchronic model of direct intergenerational reciprocity (DIR): future generations allow people now living to maintain the economic system future-oriented and capital-preserving. The rational choice for people now living is to guarantee transgenerational sufficiency to future generations. I then analyse the axiological-synchronic model of DIR: future generations give meaning and value to many of the activities that people now living carry out, and this is a compelling reason for the latter to worry about the former. I argue that only the economic-synchronic model of DIR can consistently explain why we need future generations. I conclude by discussing the limits of indirect intergenerational reciprocity.

Keywords: Collective afterlife; intergenerational justice; non-reciprocity problem; rational choice; sufficiency

1. Introduction

Most of the philosophical work on intergenerational justice has been so far devoted to two main questions: What do we owe to future generations? And what is our moral responsibility towards future generations? Future generations, that is, tend to be treated, from a normative point of view, as subjects we have to take care of even if this represents a net cost for us. Accounts of justice that are reciprocity-independent usually do not encounter major problems in motivating intergenerational responsibilities, because according to their normative framework, A's duty of justice towards B does not (necessarily) presuppose that B is in a position to do something for A. The typical example is utilitarianism, whereby every individual is a potential driver of utility maximization, regardless of the time position she occupies – and the only normative obstacle to taking proper account of the welfare of future individuals is the discount rate that (eventually) needs to be applied to future utility (but the same could be said of

prioritarianism, sufficientarianism, and also of capability-based approaches). Conversely, reciprocity-based accounts encounter a significant theoretical difficulty in extending duties of justice to future generations because of the so-called 'non-reciprocity problem' (Page 2006: 99–131): those who will live in the future cannot impact on the well-being of those who live now, so the people who live now can freeride on those who will live later, without any risk of sanction. It would follow that 'rational and mutually disinterested' individuals (Rawls 1999: 12) living now and those who will live in the future cannot yield a 'cooperative surplus' (Gauthier 1986: 141), so intergenerational relations are beyond the scope of justice as reciprocity.[1] The non-reciprocity problem could also be proposed in game-theoretical terms, recurring to Stephen Gardiner's famous notion of the 'pure intergenerational problem' (Gardiner 2011: 36–37): although it is collectively rational for generations to cooperate (excluding the first one), each generation has an incentive to freeride on the later generation because of temporal asymmetry of power: i.e. 'between present and future generations there is neither repeated interaction (by definition, there is no interaction at all), nor mutual benefit (there is no way for future generations to benefit present generations)'.

When faced with the 'non-reciprocity problem' (NRP), there are three possible reactions. The first reaction is to accept both the empirical premise and the normative fallout of NRP. This could either entail that we should give up on a reciprocity-based theory of intergenerational justice (Reglitz 2016), or that reciprocity-based theories are fine, and we should simply accept that future generations fall outside the scope of justice (Barry 1989*a*: 189–202; Arrhenius 1999). The second reaction consists in accepting the empirical premise of NRP while resisting the normative fallout. Usually, those who take this argumentative strategy tend to maintain that indirect reciprocity can (at least partly) replace direct reciprocity in a practice-dependent theory of intergenerational justice. Indirect reciprocity could either be descending or ascending (see Gosseries 2009; McCormick 2009). Descending indirect reciprocity holds that at *t2* the present generation (G2) owes something to the future generation (G3), because the past generation (G1) gave something to the present generation (G2) at *t1*.[2] Ascending indirect reciprocity holds, instead, that G2 owes something to G1 at *t2*, because G2 expects to receive something from G3 at *t3*. This is, according to some, the

[1]Even though neither John Rawls nor David Gauthier recognize the non-reciprocity problem as a decisive reason to deny the existence of intergenerational normative obligations. As is well known, Rawls (1999: 251–258) argues that the parties to the social contract agree on a sufficientarian principle, the just savings principle, to guarantee the diachronic continuity of just institutions, effectively bypassing the non-reciprocity problem. Gauthier (1986: 298–302), instead, proposes a solution based on indirect reciprocity between overlapping generations, which I will discuss in its most recent formulations in the last section of the article.

[2]More elaborate versions of indirect reciprocity are those that add moral or ontological premises to intergenerational relationships. For example, it can be argued that natural resources do not belong to anyone and therefore succeeding generations act as mere stewards, or that resources are initially owned by humanity at large and therefore no generation can take more than they are entitled to, at least without compensating other generations (see Gosseries 2009: 128–130; Dennis 2014), or it can also be argued that what one generation 'gives' to the other one becomes part of the identity of the latter and this makes the 'gift' too large not to share it with others (see Fritsch 2018: 107–153).

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rational principle that enables continued compliance with pension obligations: the generation now active in the labour market honours its pension obligations towards the generation no longer active, even though the latter cannot sanction freeriding, because the active generation expects to receive the same treatment, once it too has become inactive, from the next generation (see Heath 2013).

I maintain that both the first and the second reactions are unduly defensive. Regardless of what we think of reciprocity-based justice, it is possible to make it pass the test of intergenerational normativity in its direct version, i.e. we can adopt a third stand with respect to NRP: rejecting both the empirical premise and the normative fallout. This is a philosophically relevant objective since the second reaction to the NRP is conditioned by a series of empirical contingencies which are not always given, and I will discuss this in the final part of the article. Accordingly, I will firstly defend an economic and synchronic model of direct intergenerational reciprocity (DIR): the people now living (NLs) have an interest in giving something to the unborn (UBs) now (at *t2*), to secure some economic advantages in return from the UBs, now as well (at *t2*). More specifically, my thesis is that NLs need UBs – i.e. the reasonable expectation that at least a certain number of UBs will exist and will be above a certain well-being threshold – to continue all those forms of capitalization and investment on which the realization of some of the economic objectives of NLs depends (e.g. job opportunities, research and development funding, investments in artistic, cultural and political activities, and so forth). Although initially presenting the model with respect to overlapping generations, I will then explain why the economic interconnection between overlapping generations creates an intergenerational chain of cooperation that places even non-overlapping generations in a relationship of mutual vulnerability.

After presenting the economic-synchronic model of DIR, I will discuss how it differs from the axiological-synchronic model of DIR. The latter model holds that the people now living (NLs) have an interest in giving something to the unborn (UBs) now (at *t2*), to secure some axiological advantages in return from UBs now as well (at *t2*). As with the economic model, the axiological model is synchronic in that UBs benefit NLs in the present (i.e. before UBs take an active role in society or even before they are born). Samuel Scheffler's famous 'afterlife conjecture', for example, holds, that the capacity of the members of the present generation to find meaning and value in many of the activities they perform here and now (at *t2*) depends, among other things, on the reasonable expectation that there will be other generations after (at *t3*) (Scheffler 2013, 2020). I will argue that the collective afterlife conjecture is correct, as long as it posits that if NLs were to lose a long-term horizon that goes beyond their lives, many of their actions would consequently suffer a loss of value and meaning (think not only of those who work on projects that will yield concrete results in the future, but also of those who carry out activities that gain value if framed in a long and uninterrupted process of evolution and transformation, such as making art, philosophy, politics, etc.). Yet the collective afterlife conjecture, at least in its axiological version, is not sufficient to place generations in a relationship of mutual benefit and vulnerability that would justify robust and extensive intergenerational reciprocity. This is so because the value and meaning

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that actions and projects acquire when they are embedded in a long-term horizon that spans generations is in fact only one of the reasons why these actions and projects are important to individuals, and therefore why they are worth participating in. Other reasons, instead, relate to the economic benefits that individuals gain from participating in actions and projects involving several generations. And in some cases, perhaps in most cases, the latter reasons play the predominant role.

An alternative to both synchronic models is the diachronic model of DIR. The latter is based on the notion of posthumous interests: there are some things that UBs can do in the future (at *t3*) that will have an impact (at *t3*) on the well-being of NLs, even though NLs will already be dead (by *t2*) (Partridge 1981; Feinberg 1987: 70–104; Pitcher 1993; Thompson 2009). It therefore follows that NLs have reasons to be concerned about the welfare of UBs. Unlike the two synchronic models discussed above, in the diachronic model the exchange between NLs and UBs is diachronic in that UBs reciprocate in the future (in other words, the cooperation between NLs and UBs consists of two exchanges that take place at two different points in time). In this article I will not dwell much on the diachronic model of DIR, I will just point out some simple ethical and empirical reasons why it cannot serve as a broad justification for duties of intergenerational justice. In the final section, however, I will address more extensively the concept of indirect reciprocity and explain why it cannot be left to it to explain why we need future generations – and consequently what we owe to future generations as a matter of practice-dependent justice.

2. The economic and synchronic model of DIR

If we suddenly ceased to have the reasonable expectation that there will be future generations, we could no longer maintain the economic system as future-oriented and capital-preserving. If this were to happen, the ability of a large share of the members of the present generation to obtain the means to satisfy their needs, especially those of wage earners and the self-employed, would be impaired. This demonstrates, I shall argue, that the empirical premise of the non-reciprocity problem is misplaced. Future generations contribute substantially to increasing the well-being of the living generations, by offering the latter a reasonable expectation that their transgenerational actions will be continued.

Andina (2018: 369–371) defines transgenerational actions as that peculiar category of collective actions extending over a longer time horizon than the lives of the people taking part in them: i.e. actions involving two or more generations. The notion of transgenerational actions is, at least in my reading, a very broad one, encompassing both what Scheffler (2020: 46–48) defines as 'meliorative activities', i.e. 'long-term' and 'goal-oriented' actions that aim at making the world a better place, and all the other activities that present individuals carry out mainly in their own interest but pulling in also future individuals. So, for example, a political leader who fights for a school reform takes part in a transgenerational action, which consists precisely in the maintenance and development of the school system, so as an artist who realizes a performance art

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piece takes part in the transgenerational action of the continuous evolution of the artistic tradition and of the definition of the concept of 'artefact', and so on. However, also a government that tries to stimulate employment by issuing long-term public bonds is entertaining a transgenerational action, as it is made possible by the fact that people not yet born guarantee that the credit will not go unpaid. The philosophical point that Andina (2018: 371) is primarily interested in making is that transgenerational actions oblige us to consider future generations as social agents in their own right and thus also to include them in our ontology: and this is primarily demonstrated by the fact that future generations are 'functional' to the realization of transgenerational actions initiated or continued by present generations (Andina 2022: 117–118). Transgenerational actions therefore imply a relationship of trust between present and future people, which in turn depends on the representation that present people have of future people, based on the information available now (Andina 2022: 120).

Moving from similar ontological premises, I will argue that through transgenerational actions, present generations expand their economic activities, with benefits spread into the present as well. On the one hand, the reasonable expectation that there will be future generations allows us to use capital not only to satisfy short-term needs, but also to invest in future consumption. On the other hand, the same expectation allows us to finance present consumption through debt that will be repaid in the future. My reasoning on intergenerational reciprocity will be mainly based on overlapping generations. From now on I will therefore use the expression 'people now living', NLs, to refer to members of overlapping and now living generations and the term 'unborn', UBs, to indicate members of future generations: more specifically, the UBs are all those people who will be born starting from the moment you read this text (the group of UBs therefore changes every second). In the final part of this section, however, I will argue that at least part of my normative claims can also be extended to non-overlapping generations.

More generally, if I prove to be right, and we couple the previous ascending claim (UBs can exert influence over the well-being of NLs) with the undisputed descending claim that NLs can significantly impact on the well-being of UBs (think of all the decisions on climate, investment in infrastructure, public finance, and so on), we reach the conclusion that NLs and UBs can establish a cooperation that is mutually beneficial. Social-contract theorists, or at least contemporary ones, rely on the concept of 'cooperative surplus' to justify distributive justice as an alternative to unrestrained maximization of individual profit (Gauthier 1986; Barry 1989*b*; Rawls 1999). If the wealth produced jointly by A and B is greater than the sum of the individual wealth that A and B would produce working alone, then both have an economic interest in cooperating, and also in agreeing on how to share the cooperative surplus. Whether the rules of cooperation should be chosen by bargaining from equal positions, e.g. behind a Rawlsian veil of ignorance, or from real positions, is a question that goes beyond this article (see Buchanan 1990). What I am interested in pointing out is that it is in A's interest to grant B at least a part of the cooperative surplus, at least that which is needed to keep B at the bargaining table – and vice versa,

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obviously. The point of agreement between A and B on the division of the cooperative surplus establishes a principle of distributive justice, more or less fair depending on the moral premises of the bargaining.

Before discussing the merits of what is rational for NLs to grant to UBs, I need to clarify how UBs contribute to keeping NLs' economic system future-oriented and capital-preserving. I will focus on four aspects of the economic cooperation linking NLs and UBs. Firstly, a relevant part of companies' investments is based on the creation of long-term value (Wibbens and Siggelkow 2020; Di Sibio 2021). The reasonable expectation that there will be future generations, and therefore that the intergenerational chain will not be broken, multiplies the economic activities of NLs: companies do not only invest in producing goods and services to be consumed in the present, but they also invest in research and development of products and services that will be consumed in the future. The purpose of these long-term investments is to increase the value of the company. In a sense, R&D is a gamble for shareholders. If the company succeeds in innovating, perhaps by inventing a new product or introducing a new technology, then it will be worth sacrificing the maximization of quarterly dividends for some years in order to achieve larger gains in the future. Many people obviously agree that the companies that innovate the most are the ones that gain the greatest long-term advantage, either because they capture existing market shares or even create new markets (Henderson 2020; Kurznack *et al.* 2021). According to a McKinsey study (Brennan *et al.* 2020), some $2.9 trillion was spent on R&D in 2019, and many companies in sectors such as pharmaceuticals, medical, automotive, and aerospace reinvested more than 20% of their profits in R&D.

The crucial point is that the UBs present an economic justification for R&D research; that is, they represent future customers who will provide, or so companies hope, returns on past investments. More generally, UBs allow the company to have a longer existence than the people who from time to time inhabit and manage it, and this in turn determines a company time horizon that spans generations. Without this broad time horizon there would be no point in investing in R&D, or at least not as much as is normally the case (see also Dernis *et al.* 2019; NASDAQ 2021). If the reasonable expectation that UBs will be born is lost, the value of any investment in R&D would be considerably reduced. Both because a substantial part of the company's customers who might pay for the results of the R&D would be missing, and because any R&D investment would no longer be an intermediate link in a long transgenerational chain of investments aimed at increasing the value of the company over time; it would become the final link in this chain. In essence, UBs allow companies to direct their economic activities beyond merely meeting the needs of NLs, and this creates a vast number of job opportunities that would not otherwise be possible (Knott 2017). Simplifying, we could say that a considerable number of NLs engaged in transgenerational activities work for a clientele that does not yet exist, so UBs act as amplifiers of NL's economic activities.

Secondly, and partially related to the first aspect, many companies base their fortunes on value investors instead of growth investors. The second type of investor chooses to buy stocks of companies that are already well placed in the market and therefore offer immediate gains with prospects for further growth in

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the medium term. The first type of investor, instead, decides to bet on companies whose market value is currently below what the investor imagines to be the company's future growth potential (see Betermier *et al.* 2017; Greenwald *et al.* 2020). In other words, we could say that the value investor considers the market value of the company stocks to be lower than their 'intrinsic' value. This can be either because the company has not yet succeeded in establishing itself in the market or because it is facing a negative period, also as a result of a scandal or bad publicity. If the investor wins her bet, the prospects for profit are obviously high. On the other hand, from the company's point of view, value investment represents a kind of loan on trust, which in many cases is indispensable for consolidation. For there to be value investors, however, there needs to be a long-time horizon ahead of the company, and this is impossible without the reasonable expectations that the UBs will be born. If, for example, a forward-looking investor had invested a few thousand euros in Amazon shares in the second half of the 1990s and resold them today, she would see a million-dollar entry in her bank account (Schen 2017). Those who bought shares at Amazon's initial public offering (IPO) in 1997, at $18 each, were not primarily interested in what Amazon was doing in 1997 but in what it could have done in the decades to come. These investors were betting on the consumption of Amazon's services and products by UBs - if an Amazon share is worth more than $3000 today, it is largely by virtue of the demand, now or in the future, of people who were not yet born at the time of the IPO (see also Ritcher 2021). This means that Amazon, as well as many other companies, got credit by betting on future actions by UBs.

Thirdly, UBs make it possible to finance major infrastructure projects through the issuance of debt, whether private or public. In this case, UBs perform two functions. On the one hand, they are a guarantee that there will be someone to take over this debt. On the other hand, as users, they help to repay the debt by consuming the goods and services which the debt issuance was intended to deliver. In short, through the guarantee they provide against debt, UBs allow some NLs to obtain financial resources from other NLs, for the purpose of transgenerational works and projects. Consider, for example, the emblematic case of the Channel Tunnel project, the famous 50 km undersea tunnel linking Great Britain to France. The tunnel was realized between 1988 and 1994, it involved more than 15,000 workers, and it cost £9.5 billion. The project was privately financed (80% debt, 20% equity) by a Paris-based company, the Eurotunnel Group (now renamed Getlink), against a guaranteed 55-year concession, later extended to 99 years (see Global Infrastructure Hub 2020; Schueler 2007). Although the Eurotunnel Group was founded in 1986, it paid the first dividends in 2009 – also due to a series of financial vicissitudes (France24 2009). The Channel Tunnel story suggests that people who had not been born at the time the project was approved both made the funding possible and the concession economically worthwhile (with the expectation that they would be born), on the one hand, and helped to repay the debt (by going through the tunnel and paying the fare), on the other hand. To simplify, we could say that the 15,000 workers involved in the project were paid in advance

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by the UBs, or more precisely thanks to the UBs, as the latter envisaged future profits for the entrepreneurs of the time.

Fourthly, many public activities find justification in the public interest; and the public interest transcends, from a temporal point of view at least, the private one, since the state remains while individuals pass away. When a public authority decides to make an investment, it normally assesses the costs, the expected benefits, the time frame over which these benefits will materialize and the social discount rate of future utility (see Simonelli 2017). For the investment to justify the costs, the benefits must outweigh the costs, and the benefits to UBs are often the decisive justification for many investments. If UBs were not expected to be born, it would not be possible to imagine a long-term time horizon for the state, and without it, public finance would not be able to support a series of activities and works that have a transgenerational impact. Moreover, as in the case of private investment described above, without UBs it would not be possible to issue public debt, and without public debt a number of often-funded projects and activities could no longer be funded – the proof of this is in the high level of public debt in many countries.

Most of the arguments I have posed refer to overlapping generations, and obviously they are even more stringent with respect to adjacent generations. It is fair to ask at this point if at least some of these arguments apply also to non-overlapping generations. Put more directly, can the non-overlapping UBs affect the well-being of the NLs? To properly answer this question, I would propose the following case. Imagine that astrophysicists make a shocking discovery: in 2100 the sun will explode, making the entire solar system unlivable. Would this news have economic repercussions for millennials – i.e. people born from the early 1980s to the mid-1990s? On the one hand, it is true that millennials can make do with people born in the 21st century both to have a valid reason to invest in transgenerational activities and projects and to issue debt. The transgenerational continuity of the activities of millennials is in fact guaranteed by generation Z, i.e. the people born from the second half of the 1990s until 2010, and by generation Alpha, i.e. the people born from 2010 onwards (let us assume until 2030).[3] On the other hand, however, without the generations following generation Alpha, including people born in the 22nd century, any transgenerational economic guarantee from generation Alpha to the millennials would be weakened.

Suppose it is 2070, 30 years until the end of the world. Many millennials are already dead. The first members of generation Z are quite old, and members of generation Alpha are between 40 and 60 years old. It is also presumable that the members of generation Alpha had few children, given the dramatic end that would have awaited them in 2100. A first major problem that generation Alpha would face is the great difficulty in obtaining transgenerational credit, since the world will end 30 years thereafter. This could lead to members of this generation no longer having any interest in maintaining the transgenerational

[3]The people who are being born as I write this article belong to generation Alpha, we can assume here that generation Alpha ends in 2030, although there are no established definitions yet about the next generation and when it starts.

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financial system: if you can't get credit, why honour the debt contracted by the previous generation? If, however, the transgenerational commitment of generation Alpha is not credible, this also has an indirect impact on millennials. The latter are no longer reasonably confident that generation Alpha will honour the debt contracted by its predecessors. And, therefore, the whole financial system loses credibility: if a millennial invests in a bond in 2040, she knows that in 2070 the bond could become unmarketable, so she might rather consume than invest, or simply invest in activities that give an immediate return.

The second problem has to do with investment, both public and private, in R&D and with transgenerational public projects. Generation Alpha will have no reason to invest in future consumption – or at least these reasons will be increasingly smaller as the end of the century approaches. At the same time, the time horizon of public interest will become much narrower. This implies that many of the people who normally draw an income (a wage or pay for performance) from public and private capital will find themselves without valid job opportunities. It is possible to think that eventually, given the looming apocalypse, the whole capitalist system based on private property will collapse, and then a revolutionary redistribution of capital will take place – but even this scenario exposes unforeseeable risks. The important point here is that if the disruption of the transgenerational chain reduces income opportunities of generation Alpha, then also the millennials will have to take into account the future economic difficulties of their successors. And this implies that millennials will be rational to invest less in future consumption in the sunburst scenario than in a business-as-usual scenario.

In a nutshell, the interruption of the transgenerational chain, when known, as in the case I have described, has cascading effects even on generations that do not overlap with the one immediately following the interruption. This shows, in my opinion, that at least part of NLs' possibility of maximizing their own wellbeing relies on the reasonable belief that non-overlapping UBs will be born, although the economic relations between non-overlapping generations is mediated by the generations in between. If we also consider that many of the decisions by NLs have an impact on non-overlapping UBs – just think of the global warming projections for the end of this century – we can conclude that also NLs and non-overlapping UBs can entertain an intergenerational cooperation that is mutually beneficial.

3. Transgenerational sufficiency

I have argued so far that UBs make a major contribution to the welfare of NLs, allowing the latter to expand productive activities far beyond their own interests and needs. I will now investigate what this means in terms of intergenerational justice, and I will do so by analytically positing the points made so far.

(1) The people now living (NLs) can either increase or decrease the well-being of the unborn (UBs) through (possibly any of) their actions.

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(2) The reasonable expectation that UBs will exist and will be able to carry on the transgenerational actions of NLs, gives NLs the opportunity to increase their well-being. It allows NLs to keep the economic system future-oriented and capital-preserving.
(3) Given 1-2, NLs can engage in a synchronic cooperation with UBs that is mutually beneficial, i.e. NLs and UBs can yield a cooperative surplus which none of them has any interest in giving up.
(4) It would follow that it is in NLs' interest to find a point of 'agreement' with UBs, instead of acting selfishly and pursuing the maximization of individual utility (or it would be more correct to say generational utility).

Point 4 implies that when rational and mutually disinterested NLs have to decide on the basic norms of society, they will have an interest in opening a 'bargain' with the UBs. Obviously, it is a different 'bargain' than that between contemporaries, as UBs cannot refuse the 'offer' they receive (since they are not yet born). The rational strategy for NLs is to satisfy some of the interests of UBs in order to obtain synchronic economic benefits in return. Depending on how much NLs give to UBs, they will reap more or fewer economic benefits from UBs. The risk NLs run in not 'bargaining' is to leave UBs less than is needed for NLs to have the reasonable expectation that UBs will be able to carry on the transgenerational actions initiated or prosecuted by NLs. I define as transgenerational sufficiency the minimum level of welfare of UBs necessary for NLs to have the reasonable expectation that the transgenerational actions in which NLs are involved will continue in the future.

This has obvious implications in terms of justice as reciprocity. There are two main types of theories of justice as reciprocity. One is justice as self-interested reciprocity (see Gauthier 1986): 'justice is simply rational prudence pursued in contexts where the cooperation (or at least forbearance) of other people is a condition of our being able to get what we want' (Barry 1989*a*: 6). Another is justice as fair reciprocity (see Rawls 1999: 102): 'the first principles of justice ... are those which rational persons concerned to advance their interests would accept in [a] position of equality to settle the basic terms of their associations'. In both cases, the principles of justice are the result of a rational choice. The difference lies in the fact that the principles of justice as self-interested reciprocity are chosen by individuals who 'have full knowledge of their situation' (Page 2006: 105), whereas the principles of justice as fair reciprocity are selected by individuals bargaining 'under conditions free from morally irrelevant bargaining advantages and disadvantages' (Barry 1989*a*: 8).

From the perspective of both theories of justice as reciprocity, NLs have an interest in bargaining with UBs. For the UBs, the more the NLs transfer to them, the better. NLs, for their part, would be rational in transferring to UBs the minimum necessary to get the maximum possible from UBs. Transgenerational sufficiency is the arrangement that allows both parties to maximize their gain in the bargain, given their respective claims. If, therefore, the principles of justice as reciprocity are those on which 'rational and mutually disinterested' individuals (Rawls 1999: 12) agree in a (more or less fair) bargaining situation, it follows

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that intergenerational justice as reciprocity consists in NLs guaranteeing transgenerational sufficiency to UBs.

We can turn these latter considerations into two further normative claims:

(5) Justice as reciprocity demands that NLs guarantee transgenerational sufficiency for UBs.
(6) Transgenerational sufficiency can be upheld as a principle of intergenerational justice as reciprocity only in so far as the costs associated to it are not greater than the benefits NLs obtain by having the reasonable expectation that the transgenerational actions in which they are involved will continue in the future.

Going on to the heart of claim 5, it is not enough that future persons exist, but they should also be in a position to continue what the NLs started (see also Blumenthal-Barby 2016). For example, if NLs had reasons to be convinced that the UBs that will be born in 40 years from now will not be in a position to appreciate art or to invest their own resources in pursuing certain lines of scientific research, then NLs could not use their capital to finance artistic foundations or geospatial discoveries, because in the case of private capital, this would have no return, and in the case of government budget, it would be politically unjustifiable to channel resources towards projects that will not produce any tangible results in the medium or long term.

If the economic benefits of transgenerationality are to be fully preserved, transgenerational sufficiency must always be maintained: the NLs must ensure that the UBs are put in the necessary conditions to continue all the transgenerational actions initiated or prosecuted by NLs – whether and how the UBs will decide to carry on these actions and with how much effort is obviously a decision for UBs. I put this principle of justice in terms of sufficiency, rather than equality, because two societies might even be slightly unequal and yet be able to carry on the same transgenerational actions. And more generally, equality is not the focus of NLs' rational choice: once the minimum conditions of point 5 are secured, NLs have no reason to divert resources from their own consumption to invest in reducing inequality relative to UBs. Moreover, sufficiency is transgenerational because it is not quantifiable a priori, for example in relation to universal human needs, but it must be calculated from time to time on the basis of the level of transgenerationality of the economic activities put in place by the NL.

In pre-industrial and pre-financial societies, for example, the use of large public resources for war campaigns, aimed at conquest and expansion, and also for the construction of infrastructures and the commissioning of religious buildings and art pieces was made possible by the expectation that UBs could continue the political, economic and religious projects of NLs. However, it is fair to imagine that the non-agreement point between NLs and UBs was different in antiquity than it is today. I believe that the non-agreement point is higher today than in the past because the degree of transgenerationality of contemporary societies is greater – i.e. in the pre-modern world most of the economic activities of private

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individuals had a rather narrow time span. It is just as logical to expect the non-agreement point to change and become even higher in the future.

Lastly, claim 6 maintains that transgenerational sufficiency remains valid as a principle of justice (as reciprocity), i.e. as the point of agreement that both NLs and UBs have an interest in reaching, only as long as the costs incurred by NLs are not higher than the benefits they obtain by having the reasonable expectation that UBs do not fall below transgenerational sufficiency – if this condition does not hold, the rational strategy for NLs would be to maximize their own utility. However, one might wonder whether in certain situations, such as the climate crisis for example, the costs of guaranteeing transgenerational sufficiency outweigh the benefits of intergenerational cooperation – if this were the case, NLs could maximize their well-being by letting the climate get out of control (see Fiala 2010). My answer is negative. As things stand at present, the benefits of transgenerationality are so relevant for NLs that they could never be lower than the costs of climate mitigation – not least because climate mitigation will yield economic benefits in its turn (think, for example, of the reduction in energy costs that would result from investments in energy efficiency).

It could be argued, however, that there are situations in which the trade-off should not be considered with respect to the existential threat to humanity (e.g. an out-of-control climate that could eventually bring to the end of humanity), but rather compared with a scenario slightly below transgenerational sufficiency. One might ask, e.g. whether the costs of staying within the limits of a global warming of 1.5°C above pre-industrial levels (instead of 2°C) are greater than the benefits that UBs living in a world 1.5°C warmer could give us compared with UBs living in a world half a degree Celsius warmer.

The main difference between intra- and inter-generational bargaining is that temporal asymmetry allows the NLs to make whatever 'offer' they wish to the UBs, without the latter being in a position to 'refuse' it. Whether this 'offer' will be higher or lower than the non-agreement point (i.e. the point below which cooperation ceases to be mutually beneficial) can only by discovered a posteriori. If the economic losses of half a degree Celsius of global warming difference are so high that it does not allow for transgenerational sufficiency for UBs, then it means that the point of agreement has not been reached. This does not entail, however, that UBs will give nothing to NLs, i.e. that UBs withdraw from the bargaining table (as would happen in intra-generational bargaining), but only that UBs give to NLs less than they could give. That is, UBs cannot give the NLs a reasonable expectation that they can continue all NL's transgenerational actions, because they will have to divert many resources into climate adaptation and loss and damage compensation, hence they will only be able to continue some of the transgenerational actions they inherit. At this point, however, if the costs saved by avoiding the more ambitious mitigation target outweigh the lost opportunity for full transgenerationality (guaranteed by transgenerational sufficiency), we should conclude that NLs have no interest in keeping global warming below the 1.5°C threshold and thus the non-reciprocity problem leads the '2°C-vs-1.5°C' issue out of the realm of justice. This would mean that the theory of intergenerational justice I am proposing is not applicable to the largest

real case of intergenerational externality – a rather poor result for a theory of intergenerational justice.

I believe, however, that the economic-synchronic model of DIR can fully cover cases like the climate one just raised. Half a degree Celsius less of global warming makes a substantial economic difference for the UBs, and the wealthier the UBs are expected to be, the firmer the expectation that UBs will be able to continue transgenerational projects. Global average GDP per capita is expected to be 5% lower, by 2100, under 2°C warming relative to 1.5°C (Pretis *et al.* 2018). And in many tropical and sub-tropical countries the loss in GDP per capita could even oscillate between 10% and 20% (Burke *et al.* 2018: 552). It could be argued, however, that such an economic loss, albeit considerable, would have limited consequences in terms of transgenerationality. We can imagine, for example, that only some transgenerational projects would be put apart as a consequence of 0.5°C global warming variation. However, NLs cannot know how many and which of their projects will be abandoned by UBs, once transgenerational sufficiency is lost. This leads to an uncertainty that multiplies the negative effect of transgenerational sub-sufficiency: since nobody knows which projects will have to be abandoned by future generations, all forms of long-term investment will be at risk, as will those activities that aim to preserve capitalization over time. For example, a recent climate stress test conducted by the European Central Bank (2021: 53) shows that the probability of default for European companies exposed to a high risk of climate-induced natural disasters increases by 37% in a scenario of no climate mitigation, between now and 2050. This obviously will have knock-on effects on the banking system, and therefore on society as a whole. This demonstrates, in my view, that both the uncertainty as to which transgenerational actions will be abandoned in the case of sub-sufficiency and the interconnection between the actions most exposed to climate risks and all other actions, make it rational for NLs to ensure transgenerational sufficiency for UBs.

4. The axiological and synchronic model of DIR

In the seminal book *Death and the Afterlife*, Scheffler (2013, see also 2020) puts forward a novel philosophical argument, 'the afterlife conjecture', that can take on the function of an alternative synchronic model of DIR. Many of things (actions and projects) that the NLs do now, at *t2*, Scheffler (2013, 2020) maintains, have the meaning and value that they have, at *t2* as well, as long as NLs have the reasonable expectation that UBs will come to life, at *t3*. Accordingly, if there was an imminent interruption of the transgenerational chain, 'people would lose confidence in the value of many sorts of activities, would cease to see reason to engage in many familiar sorts of pursuits, and would become emotionally detached from many of those activities and pursuits' (Scheffler 2013: 44). It follows that we have reasons to care for future generations.

Although Scheffler does not want to pose the question of intergenerational relations in terms of self-interest, and he is rather concerned to show that for the present generation the future of humanity is intrinsically important (2020: 53–57),

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the axiological theory he proposes can also be used, in my opinion, to show that NLs need UBs for instrumental reasons. After all, the same Scheffler (2020: 73) recognizes that apart from reasons of love, interest and valuation, we have reasons of 'evaluative reciprocity' to worry about future generations. In his own words: 'we stand in relations of genuine mutual dependence with future generations and ... it is in virtue of those relations that we have reasons of reciprocity for taking their interests seriously' (Scheffler 2020: 71–72). This is mainly because 'their [of future generations] survival is a causal precondition both of our emotional equanimity and of our confidence in the value of our activities' (Scheffler 2020: 73–74).

If we want to reinterpret Scheffler's thought in terms of self-interest, we should first of all start from the premise, which I believe is shared by many, that a 'value-laden' life (Scheffler 2020: 73) is, at least in some respects, preferable to a value-poor life. To this we must then add Scheffler's conjecture about the collective afterlife, namely that the transgenerational actions in which NLs participate gain value and meaning from the belief that UBs will come to existence.[4] From here we can then elaborate a self-interest-based axiological claim:

> (2b) The reasonable expectation that UBs will exist and will be able to carry on the transgenerational actions they inherit, gives NLs the opportunity to increase their wellbeing. It gives value and meaning to many of the transgenerational actions performed by NLs, as UBs' existence and contribution is a necessary condition for transgenerational actions to either come to a final outcome or to continue over time. If this condition is not met, transgenerational actions would cease to be important for NLs and the latter would therefore no longer be sufficiently motivated to take part in them.

If claim 2b were correct, it could replace claim 2 in the normative sequence of claims supporting transgenerational sufficiency (1–6) that I presented before. And at that point my reasoning about the economic reasons underlying DIR would be redundant, at best, and useless, at worst. My aim in this section is therefore to explain why the economic claim 2 cannot be replaced by the axiological claim 2b – or at least not always. More specifically, I will highlight the limitations of the axiological-synchronic model of DIR and I will explain why the economic model I have proposed better explains intergenerational reciprocity: we need UBs not so much because they give value and meaning to transgenerational actions, but because they expand our economic horizon, and in so doing create widespread economic benefits in the present.

In order to test the collective afterlife conjecture, Scheffler (2013: 38–49; 2020: 55) introduces the now famous thought experiment of the 'infertility scenario'. Let us imagine that a pandemic virus has rendered everyone sterile, so there will be no future generations. The people now living will not see any of their loved ones die from the virus, but from now on they will not see anyone born. How would NLs react to this scenario in which all the non-overlapping UBs are lost and many of the overlapping UBs will not be born? Scheffler thinks that this news

[4]Scheffler's afterlife conjecture also extends to some actions that are not transgenerational, i.e. that take place in the short term, as we will see later on.

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would raise four different types of problems. First, people would lose interest in long-term and goal-oriented activities, that Scheffler (2020: 48) names 'meliorative activities'. This both because some long term-projects are expected to be accomplished only in the future, and examples include research into technologies that are not yet available and usable, or research into treatments for diseases that are not yet fully curable, and because some of these projects can only start to provide concrete benefits to people once the final result has been achieved, e.g. a drug that cannot be marketed until the end of the testing period (Scheffler 2013: 41–42).

Second, almost all creative projects would lose a consistent part of their audience, potentially the largest share, that is the 'imagined future audience' (Scheffler 2013: 42). Think, for instance, of the act of writing a book in the infertility scenario. Assuming that the author does not almost completely lose interest in writing it (which Scheffler tends to argue), the book would cease to be a work of art and creativity which is part of a given literary tradition, but it could be (at most) a short-term consumer object, assuming of course that there are people willing to devote time to activities such as reading in the infertility scenario, something Scheffler also seems to be doubtful about. Third, all actions aimed at supporting and developing group practices, to which intrinsic value is attributed, would lose purpose (Scheffler 2013: 44). And this could refer to very small groups such as a club or an association, up to larger groups such as those of a nation. Fourth, Scheffler adds, also those actions that are supposed to lead to immediate gratification such as playing games, listening to music, making love, doing cultural activities, and so on, would become less pleasant for people. For example, Scheffler (2013: 58) writes, with respect to the possibility that games normally offer of entering for a few hours into a sort of fictitious parallel reality in which everything can be taken lightly (he gives the fitting example of monopoly): 'it might no longer seem important to us to seek relief from importance, when there was so little importance available in the first place'.

I believe Scheffler is right that in the infertility scenario many transgenerational activities would incur a loss of value, deriving precisely from their transgenerationality, i.e. from the fact that they are supposed to be larger than the lives of individuals that take part in them (see also Cholbi 2015). The emblematic case is the researcher working in finding a cure for cancer (Scheffler 2013: 26–27; 2020: 46–47). The researcher knows that her work will not necessarily lead to a result in the course of her career, and perhaps not even in her lifetime, but still her work (if good, of course) will take cancer research a step further and enable her to pass the baton to future researchers who will hopefully put the line of research to good use by patenting a cure or a drug. In the infertility scenario, the researcher would lose hope that her research will lead to a concrete result beneficial to society, and this, Scheffler says, would have a detrimental impact on her wellbeing: the research would no longer have a long-term collective purpose and this would lead to a motivational crisis for the researcher.

The limit of Scheffler's argument lies, in my opinion, in the stringent conclusion he wants to obtain from his axiological analysis: i.e. the mere loss of value and meaning of transgenerational actions in the infertility scenario is enough to

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make people no longer motivated to participate in these actions – in his own words, 'the imminent extinction of humanity would make many of these activities pointless, and so it would be instrumentally irrational for people to continue to engage in them' (Scheffler 2020: 55). And this in turn derives from a misconception of the balance of motivations that drive human beings to engage in productive activities. According to Goler *et al.* (2018), for example, the expectations of workers with regards to work can be grouped into three categories: 'career', 'community' and 'cause'. Although synthetic, I believe that this analysis is effective if briefly developed. 'Career' refers to: material incentives, such as salary, power, benefits; working conditions, such as flexibility, enjoyment of the workplace, pleasant and stimulating colleagues, and so on; everything that makes work meaningful for the worker. Regarding this very last point, to simplify, we could say that a job is more meaningful the more it is in line with the worker's personal development goals (Bowie 2017: 66–78). If your aim in life is to continuously increase your scientific knowledge and to spend most of your time with other scientists, then cancer research is most likely a meaningful job for you.

'Community' refers, instead, to the way in which others recognize the worker by virtue of what the worker produces; it is in a sense the social status the work gives to the worker. If you want others to recognize you as someone who is smarter than average, skilled in applied research, and who could perhaps have earned more money studying finance but instead decided to put her intelligence at the service of others, the job of medical researcher is still for you. 'Cause', on the other hand, indicates a meaning of work that goes beyond yourself, or as Scheffler (2020: 48) would say, that is larger than yourself. The 'cause' of a job is normally measured in terms of its worthiness, i.e. its positive impact on society (see Ciulla 2012). Not all meaningful jobs are worthy. For example, working as a lobbyist for an oil company might be an unworthy job (because of the impact the company has on the climate) but the job might still be meaningful for you – if, for example, your job duties allow you to follow the individual development path you have set for yourself. Alternatively, you might also be doing a worthy job that is not in line with your personal development goals, e.g. you dreamed of becoming a tax lawyer defending big companies accused of tax evasion and instead found yourself working as a social worker.

While it is true that all three categories of motivation are important, usually the first two are more important than the third one (Goler *et al.* 2018; PwC 2021). Many people are willing to give up a well-paid job for a more meaningful job (Hu and Hirsh 2017) or for a job that gives them a different social status, and many are also willing to give up a higher salary for a job that better suits their other personal needs (Vesoulis 2021). Conversely, few people would give up a well-paid and/or challenging job without an important cause for a low-paid and uninspiring job with a clear cause – although it is evident that, other things being equal, a job with a cause is preferred by many to a job without a cause (see Kunz 2020). In the infertility scenario Scheffler is right to say that the worker engaged in transgenerational projects loses something that is important to her, i.e. the expectation that her work will have a final and/or continuing impact on society in the future, but this cannot be taken to imply that she loses

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everything of interest to her in the project; indeed, one might say that she loses the part that is least relevant to many. If this is true, it means that transgenerational actions can continue to matter to the individual, and thus to contribute to her well-being, even in the face of the axiological loss resulting from the breaking of the transgenerational chain. It follows that the axiological-synchronic model is not sufficient to ground a solid theory of intergenerational reciprocity.

With a view to testing my argument, imagine this modified version of the infertility scenario. Suppose that our cancer researcher loves her work, both in terms of career, community and cause. One day, however, undercover aliens arrive on earth. They want to put an end to humankind, because they fear that in the future humans might have space expansionist aims – more precisely, they watched a *Youtube* video in which Sir Richard Branson talks about his space tourism plan for the near future (Sky News 2021). Accordingly, the aliens decide to inoculate an infertility virus, so that in a few months it will spread in a pandemic way (they could also inject a lethal virus, but on the one hand they are in no hurry and on the other hand they are not so bad). The virus is such an advanced (alien) laboratory product that it cannot be detected with the technology currently in use on our planet. However, the aliens decide to communicate the sad news to just one person, our researcher, because they also happened to read Scheffler's books and it seems to them a good opportunity to test the afterlife conjecture. In order to carry out the philosophical test accurately, i.e. by isolating the axiological loss resulting from knowing that the research will be useless in a transgenerational perspective from the other socio-economic considerations that might appear in the researcher's mind, the aliens also make a threat to the researcher: she will have to keep the virus information confidential (i.e. not public) for at least a year, otherwise the aliens will come back and kill her.

If you were this researcher, would you continue to do research on cancer in this alien-made infertility scenario? Even knowing that even if you made significant discoveries there would be no one to carry on your work, and therefore no human being would benefit? You have certainly lost the cause of your research, but both career and community are still there.

I assume that almost everyone would have preferred to do cancer research in a business-as-usual scenario, but from this it would be wrong to infer that all the reasons for continuing research have been lost. On the one hand, the researcher can still enjoy all the materialistic motivations she had before. Nothing would also change in the way others see the researcher and recognize her talent and work. Finally, the fact that the job lost its cause does not necessarily entail that it also lost individual meaningfulness. As Frankfurt (2013: 134) rightly observed, some people may enjoy taking part in transgenerational projects at the basis of 'meliorative activities' for reasons intrinsic to the projects themselves, i.e. because they get pleasure from the intellectual stimuli that working at the project offers. In the case we are examining, the cancer researcher might be driven, among other things, by the pleasure she gets when she addresses complex problems in mathematics or biology or even when she spends days rewriting an article after receiving enlightening reviews.

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It should also be noted that the case of the researcher working on a cure for cancer is an extreme case of transgenerationality, with each intermediate step only making intrinsic sense if an overall long-term result is achieved – i.e. the cure for cancer. However, in the great majority of other activities, the transgenerational aspect, although present, is certainly less relevant. Let us imagine a first continuation of the alien-made infertility scenario. The researcher cannot keep the terrible secret to herself and decides to share it with her best friend, an established historian[5] (making him swear, of course, that he will not tell anyone else). How does the historian's life change in the infertility scenario? On the one hand, the historian will discover that he will never have a share of the future readership he imagined, and at the same time he would realize that his historical works will not be discussed over time as he had hoped – this certainly reduces the cause of his work. On the other hand, however, the historian will be able to contribute to the understanding of the past events of people already born, and this should not be overlooked. The same applies, even more so, to all those activities that do not necessarily involve research and that are expressed in the achievement of short- or medium-term goals which make sense in their own right, regardless of transgenerational culmination.

In summary then, if the infertility scenario is known to a single person (as postulated in the alien-made version), the virus is not necessarily a decisive reason for this person to abandon the transgenerational actions and projects in which she/he participates. In fact, the motivations related to 'career' and 'community' remain in place. This indicates that the importance of transgenerational actions for NLs does not derive (or at least not primarily) from their ultimate fulfilment and/or continuation by UBs. It is based instead, as we shall see in the next section, on the economic short-term goals that NLs achieve through transgenerational actions.

5. The afterlife conjecture: economics, not axiology

So far, I have presented the economic-synchronic model of DIR and I have argued that claim 2b cannot take the place of claim 2 within a theory of DIR. Simply put, we need future generations primarily because they enable us to keep our economic system capital-preserving and future-oriented rather than because they give value and meaning to our transgenerational actions (although it is certainly true that we need future generations *also* for axiological reasons). I have therefore introduced the alien-made infertility scenario to argue that the removal of the long-term goal (cause) does not directly imply the removal of materialistic motivations, of pleasantness of working conditions and of individual meaningfulness (career), and not even of the social status that productive activities guarantee (community). What people really have to fear from the classic infertility scenario proposed by Scheffler is a narrowing of the collective economic horizon due to a widespread abandonment of transgenerational actions. Indeed, we may imagine a further evolution of the alien-made infertility

[5]Also Scheffler (2013: 54) addresses the case of the historian in the infertility scenario. More specifically, of an expert on Bulgarian military history.

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scenario (evolution 2). The historian feels unable to keep the secret, he is not convinced that nothing can be done to stop the virus, so he warns the authorities – a few days past the end of the first year after the first virus infection, so as not to expose the medical researcher friend to the threat of death from the aliens. Now everyone knows.

I ask you the same question again. If you were the cancer researcher, would you carry on your research? I think the answer is negative this time. You would completely lose your motivation and you would give up on your job, as I shall argue in a moment. If my answer is correct, however, it means that there is a difference between the alien-made infertility scenario and evolution 2 of the same scenario. In both scenarios, the researcher has lost hope in the extension of the generational chain, but only in evolution 2 she has decisive reasons to abandoning her research.

'Cause' was already lost from the start in the alien-made infertility scenario, so there is no reason to insist further. We said, however, that both 'career' and 'community' were not thwarted. Yet, the move by the historian in evolution 2 changes everything. People who have so far invested money in finding a cure for cancer will no longer have any reason to continue funding it. This is the case regardless of whether they are funding that research because they are genuinely interested in doing good, or rather because they simply want to make money, or a combination of the two. If it is a private investor, the matter is quite simple. Rather than investing capital in something that will not yield a profit – or if it does, it will be too late for anyone to enjoy it – then it is better to disinvest immediately and use up one's wealth. There are various ways to use it. One is surely to satisfy one's own needs, whims, desires. Another is to donate it to those in need. Yet another is to put in place preventive defensive measures in case with the passage of time the infertility scenario leads to the collapse of the capitalist system (see also Scheffler 2013: 47–48). In short, all the capital that will remain in the bank when the former investor dies will be worthless, and therefore wasted. Even if the investor is public, the argument is still the same. The use of public money to finance a project that will lead nowhere would be fiercely opposed by those who might claim that same public money to satisfy needs or even fulfil hitherto unfulfilled desires. All the more so in an infertility scenario where elderly people would no longer have young people to finance their pensions and welfare benefits, many people would find themselves unemployed due to the absence of young people – think of teachers, paediatricians, toy-makers, etc. – and so the state (if it still exists) would certainly have to increase public spending to support these people, with the additional difficulty, as seen before, of not being able to borrow on the financial market.

Materialistic career prospects would no longer be there, we can assume. It is possible, however, that the researcher can finance her own research and she is willing to do so because she does not want to renounce the pleasure she gets whenever solving complex medical issues. But even if this were to happen, others would no longer see her as she was before, but rather as someone who spends money and time on useless activities for ultimately selfish reasons – so the motivational aspects we have categorized as 'community' would also disappear. Accordingly, the balance of motivations of those who own capital, in

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the publicly known infertility scenario, definitely tilts towards disinvesting their money and using it for consumption. In an economy where individual labour is commodified, this would have devastating effects on the wage-earning class in the first place. As the population ages, no one will have any economic incentive in using their capital to produce goods, and therefore also to employ people. Even if in the infertility scenario money can continue to fulfil its function, those who have it will use it to obtain immediate gratification by appropriating as many of the existing goods as possible. And since no one will have the incentive to manage their finances wisely that comes from having children, it is possible to imagine a rapid economic and social regression. A few rich people will consume everything they have and those who do not have their own resources at their disposal will have great difficulty in obtaining access to them, either through an employment contract or through the individual production of consumer goods or services.

In sum, I believe that Scheffler (2020: 72–73) is right that 'even though future generations cannot have a causal impact on what happens to us during our lifetimes, there are nevertheless respects in which we are dependent on them'. Axiological concerns are surely some of these respects, yet not the main ones. If you like, what I am saying is that the implications of the afterlife conjecture (if interpreted in a broader sense, not simply axiological) are much more severe than the same Scheffler postulates. We need future generations not only (and not primarily) because we care for the final result of our transgenerational actions, but also (and mainly) because without future generations we cannot realize the economic short-term goals ('career' and 'community') related to transgenerational actions. This means that even those who live selfishly and are only interested in transgenerational actions for instrumental reasons can benefit from intergenerational cooperation.

6. The limits of indirect intergenerational cooperation

So far I have tried to show that NLs can establish mutually beneficial cooperation with UBs, both overlapping and non-overlapping – in the latter case because of the cascade effect that the interruption of the intergenerational chain by non-overlapping UBs would have on NLs. I have therefore presented an economic and synchronic model of direct intergenerational reciprocity (DIR) and defended it against an alternative synchronic model of DIR, based on axiological assumptions. There is, however, one critical observation and one objection that could be raised at this point. The observation is that it is also possible to defend the concept of DIR through a diachronic model, based on the notion of posthumous interests: there are some things that UBs can do in the future (at *t3*) that will have an impact (at *t3*) on the well-being of members of NLs, even though the NLs will already be dead (by *t2*).

Consider the following case. A director who makes movies that are considered commercial all her life, and who would very much like to be appreciated by critics, dies without receiving recognition. Yet, a few years after her death, some critics start to re-evaluate her work and after a short time her movies are anthologized and considered great masterpieces, misunderstood by the past generation. Can we

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say that the new generation of critics makes the director better off, even though she is already dead? Many philosophers believe that there is no reason why individual interests should be extinguished by the death of the person who nurtured them. And if we embrace, in this temporally extended version, a non-experientialist account of well-being, we could come to the conclusion that there exist many things that could happen after our death that can make us better-off (Feinberg 1987: 79–95; Pitcher 1993; see also Partridge 1981; Thompson 2009: 39–72).

The discussion would be long and there is no space to deal with it here. In general, if the diachronic model of DIR were valid, it would certainly strengthen the synchronic one. Both would show that it is in the interests of NLs not only to guarantee the mere existence of UBs, but also to guarantee a certain level of well-being, which is necessary for UBs to perform certain actions – to continue the transgenerational actions initiated by NLs in the case of the synchronic model and to realize the posthumous interests of NLs in the case of the diachronic model. The concept of transgenerational sufficiency could perhaps satisfy both needs, also because these often intersect. There are, however, two limitations inherent in the concept of posthumous interests which it is necessary to emphasize, without entering an in-depth discussion. The first is that they presuppose a non-hedonistic conception of welfare. This is an assumption that at least some people would find difficult to accept. The second is that not all people have relevant posthumous interests. Many people, perhaps I would say most people, end their lives knowing that death marks the end of their existence, and that what will remain of them will be the memory by loved ones and friends. But even this has a rather short end. Of course, many people die wishing that the things they hold dear could continue to flourish: think of children, the nation, but also political parties and even a football clubs. However, what happens after death is for many only a very small part of what marks their existence for better or worse (see also Page 2006: 128).

The objection to DIR models, both diachronic and synchronic, instead, is that they are either useless or redundant. The concept of indirect reciprocity between overlapping generations is sufficient to substantiate duties of intergenerational justice. Indeed, there is a vast philosophical literature on this, so it is opportune to respond more broadly to this objection in the final part of this article. The idea behind indirect reciprocity is that if we consider G1, G2 and G3 as overlapping birth cohorts, we should recognize that they stand in two different relationships of indirect reciprocity, one descending and one ascending. Both relationships are a consequence of the biological course of the human life and of temporal asymmetry. If at least one of the two relationships operates, this would imply that there is a chain of indirect reciprocity that extends through time and no generation has an interest in breaking it. This chain would extend across generations, thus also 'connecting' non-overlapping generations.

G1 has an impact on the well-being of G2, both because G1 transfers to G2 a transgenerational heritage (in the broadest sense of the term, from economic and financial assets to artistic, cultural, scientific, natural, infrastructural, etc. resources) and because G1 takes care of G2 in the childhood years. From the descending point of view, G2 can thus transfer the intergenerational heritage to G3 at *t2*, in conditions not inferior to those in which G1 gave it to G2 at *t1*, and

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G2 can also take care of G3 in childhood, at *t2* as well. If this happens, an indirectly descendent relationship of reciprocity has been achieved (G1→G2, G2→G3) and there are the conditions for it to replicate with G3 with respect to G4, by virtue of what G3 received from G2, and so on.

G2, however, is not only in a position to receive from G1 (when the members of G2 are young), but also to impact on the welfare of G1 (when the members of G2 are adults). In fact, when G2 is active in the economy, while G1 is old and no longer active, G2 will have to finance G1's income through, among other things, compliance with the pension obligation. In return, G2 expects to receive the same treatment from G3 in the future. If this is the case, G2 has given to G1 at *t2*, with the expectation of receiving the same from G3 at *t3*. This creates a long intergenerational chain of ascending indirect reciprocity (G2→G1, G3→G2) that potentially propagates over time and no one has an interest in breaking.

It would suffice that either the descending or the ascending chains of indirect reciprocity proved to be solid to demonstrate that the contribution requirement applies with respect to at least three overlapping generations and thus to maintain that intergenerational relations fall within the scope of justice as reciprocity. The problem, however, is that the descending chain only works if the initial benefactor remains in a position to sanction the intermediate beneficiary when the latter has to decide whether to act in turn as benefactor towards the final beneficiary. The ascending chain, on the other hand, presupposes that the cost of the fair play of the first benefactor towards the intermediate beneficiary is not higher than the benefits that the first benefactor expects to receive from the second benefactor in the future. Both assumptions are contingent and therefore not sufficient to formulate a solid normative argument.

Let us consider the case of descending sanction. Imagine a grandmother who works hard during her life to leave a good heritage to her daughter, when she will die. Assume, however, the daughter starts behaving irresponsibly and wastes in crazy parties a good part of the money she will one day inherit, so risking to leave her own daughter on poverty. In this scenario, the grandmother is in the position to prompt her daughter to behave responsibly towards her granddaughter. The grandmother could say to the daughter, for example: 'dear, if you do not assure me that part of what I am supposed to give to you will arrive intact to my granddaughter, I will disinherit you'. Here the rational strategy for the daughter is to refrain from maximizing her own wellbeing in parties, or in other words it is in her interest to 'cooperate' with her daughter so as to obtain the cooperation of the grandmother.

However, the effectiveness of descending reciprocity is contingent on the fact that G1 remains in a position to 'sanction' G2 in case of freeriding, and as such it is insufficient to cover the entire realm of intergenerational relations (see McCormick 2009: 455–456). Imagine, for example, that the daughter starts squandering money after the grandmother has already transferred the inheritance to her, or after the grandmother had died. In the first case, the only threat the grandmother can use to foster cooperation between daughter and granddaughter is moral persuasion, while in the second case also this is precluded. If we take into account that the majority of intergenerational

coordination problems, as climate change, are impersonal, we can easily understand why G2 obtains a net benefit by freeriding on G3.

Ascending indirect reciprocity, instead, has a more limited range of application because some of the biggest intergenerational problems, such as climate change and high public debt, have a descending structure. However, ascending reciprocity has an easy application to the case of pension funds and, on a more theoretical level, can serve to demonstrate that there can exist a form, albeit limited, of intergenerational justice even accepting the empirical claim of the non-reciprocity problem. Heath (2013) provides a refined game-theoretical argument of ascending reciprocity. The reason why G2 honours its contractual obligations towards G1, when G1 is no longer active in the job market, is that at some point in the future G2 will also become inactive, so G2 will need G3 to play fair on old G2. Accordingly, if G2 breaks the chain of intergenerational cooperation at *t2*, because it is in G2's immediate interest to do so (why, after all, should G2 use public money to pay pensions instead of increasing wages?), then, at *t3*, G3 will have no reason to play fair on a freerider, and above all G3 could start considering the risk that at *t4* also G4 will freeride. In sum, the first freeriding by G2 would trigger a general mistrust that would in the end bring everyone in an intergenerational Hobbesian-style state of war of everyone against everyone. Thus, playing fair is good for everyone.

I think that Heath is right in the way he presents this model. Yet, I also agree with Reglitz (2016) that ascending reciprocity is highly contingent on demography. Let us imagine a case, very realistic in early industrialized countries, in which there is a constant demographic decline, such that G1 is a very large group of inactive people, G2 is an active group of people smaller than G1, and G3 is a group of people, much smaller than G2, who will be active at *t3*. In these circumstances, G2 might consider it worthwhile to betray the (costly) pension bond with G1 and organize its own retirement, aware that G3 will be too small a group to adequately care for G2. Accordingly, I believe that ascending reciprocity, although working well among generations sufficiently homogeneous from a numerical point of view, cannot be used as a general theory of intergenerational reciprocity (see also McCormick 2009: 456–457).

Many may counter-object to my remarks that I exaggerate the role of the sanction. Indirect intergenerational reciprocity would be based on a sense of fairness that goes beyond self-interest. The fact that G1 gives a heritage to G2 is sufficient to motivate G2 to pass this heritage on to G3 (see also Fritsch 2018; Syropoulos *et al.* 2020). After all, there are many situations in which human beings give up maximizing their own benefit in order to benefit others, without expecting anyone else to return the benefit – the typical case is that of the tourist who tips, where it is not compulsory, in a restaurant to which he may never return in his life, out of a simple desire to reward the waiter's kindness and professionalism.

I do not deny that the simple desire to give others what they deserve or not to act as a freerider can motivate people not to maximize their own gain, but my aim in this article is to show that even individuals primarily interested in maximizing their own gain have reasons to play fair towards future generations. Moreover, even if it were possible to imagine indirect intergenerational reciprocity without sanctions, a

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number of normative problems would arise with respect to the moral principle that if G1 has given something to G2, this is a sufficient reason for G2 to have a duty to give to G3 something as equivalent as possible to what G2 received from G1. Imagine that I invite you for lunch, with the reasonable expectation that the next time you will reciprocate the invitation. Yet, a few days after I have to flee the city forever because someone is trying to kill me. Is my unavailability sufficient to substantiate a duty on your part to return my invitation to lunch to a third person chosen at random? I think not (see also Barry 1989*b*: 232–233; Gosseries 2009: 126–130).

Secondly, many of the things G1 realizes are pursued with the main aim of immediate use, rather than for intergenerational reasons. Thus, it could be said that many of the things G2 receives are not 'given' by G1, rather they 'arrive' to G2 for the mere reason that these things 'live longer' than the people who created them. If this is true, then the duty from the part of G2 to 'give' to G3 is quite lightened (see also Thompson 2020: 542–543). Think for example of infrastructures. When we ponder about whether to build a bridge, a motorway, a railway line, we do not ask ourselves, first of all, what is of most use to future generations, but instead we ask ourselves what is of most use to us now. Obviously, these things will reach future generations, but it would be an overstatement to say that those who decided to build the first railway lines did so in order to 'leave something' to those who would live in 2021. On the contrary, when you ask G2 to invest in long-term sustainability projects you are asking G2 to do something in the immediate interest of G3, and it cannot be argued that this distributive duty, if it exists, draws normative force solely from what G1 has 'unwittingly' left to G2. Lastly, descending reciprocity is exposed to the risk of the domino effect of freeriding (see also Gosseries 2008: 64; Thompson 2020: 542; Karnein 2015: 50–51). Assume that G2 falls short of fixing the climate problem and leaves a world on fire to G3. If the measure of what G3 owes to G4 is given by what G2 gave to G3, then G3 has no duty of justice to invest in climate mitigation more than G2 did. It is easy to see how this way of reasoning will lead to world destruction.

It is important to highlight, in the end, that the theory of DIR I have proposed can only replace descending indirect reciprocity but not the ascending one, in that it postulates direct reciprocity between NLs and UBs, but not between young NLs and old NLs. More precisely, economic-synchronic reasons posit that older NLs need young NLs, but not that young NLs need old NLs. Therefore, if we take both the economic-synchronic model of DIR and my observations on indirect reciprocity at face value, then the relationships between the young and the old remain within the scope of justice as reciprocity only as long as demographic proportions allow the maintenance of the ascending indirect reciprocity described by Heath (2013). If a sudden demographic crisis were to further reduce the number of young people in a given country, the maintenance of the pension bond, to take one example, would have to be justified with arguments other than those of reciprocity – if one does not want to accept that honouring pension obligations would no longer be an obligation, but an act of beneficence.

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7. Conclusions

I maintained that the non-reciprocity problem (NRP) is false both in the premise and in the normative conclusion. The people now living (NLs) stand in a relation of direct reciprocity with the unborn (UBs). The reasonable expectation that there will be UBs, allows NLs to set the economic system as future-oriented and capital-preserving. This brings widespread benefits to NLs, both to those who have capital to invest, those who could benefit from these investments and those who seek an employment contract. The point of non-agreement, i.e. the bargaining point beyond which the cooperative surplus is lost, corresponds to transgenerational sufficiency for UBs: the condition whereby UBs are in a position to continue all the transgenerational actions initiated and/or prosecuted by NLs. The rational choice for NLs is to always guarantee transgenerational sufficiency for UBs. This is the basis of direct intergenerational reciprocity (DIR) and of intergenerational justice (as reciprocity).

In the second part of the article, I argued that a sound theory of DIR cannot be based on the axiological benefits that UBs give to NLs. If in fact it is true, as Scheffler explained, that the value and meaning of transgenerational actions (and not only) depend on the future existence of UBs, the axiological loss that would derive from the breaking of the transgenerational chain is not sufficient to trigger the motivational crisis that Scheffler imagines in the infertility scenario. The reasons that drive people to take part in transgenerational actions cannot be reduced to the final accomplishment or continuation of these actions over time, but also include the economic benefits that people obtain through participating in transgenerational actions (job opportunities, funding for research and artistic, cultural and political activities, financial services, and so on). In many cases, the economic benefits, which I discussed in the article as 'career' and 'community', are the main sources of motivation for people to take part in productive activities, including transgenerational ones.

In the final part of the article, I addressed two further questions. One is whether there can also be a diachronic model of DIR, based on the concept of posthumous interests. In the article I did not go deep into the subject, I merely pointed out the empirical (not all people have relevant posthumous interests) and theoretical (a non-experientialist conception of well-being) limitations of the diachronic model of DIR. The other question is whether the concept of indirect intergenerational reciprocity makes it redundant (or even unnecessary) to discuss DIR. My answer is negative. Both descending and ascending models of indirect reciprocity work, from a rational choice perspective, only on condition that certain contingencies are given. The descending model only works as long as the first benefactor remains in a position to sanction the first beneficiary if she/he refuses to reciprocate towards the second beneficiary. The ascending model, instead, presupposes that the advantages which the first benefactor expects to obtain in the future from the second benefactor are not inferior to the advantages which she/he is supposed to transfer to the first beneficiary.

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