

COMMENTARY

Confronting the dilemma of growth. A response to Warlenius (2023)

Tim Jackson^{a,*}, Jason Hickel^b, Giorgos Kallis^b^a Centre for the understanding of Sustainable Prosperity, University of Surrey, Guildford GU2 7XH, UK^b Institute of Environmental Science and Technology (ICTA-UAB) and Department of Anthropology, Autonomous University of Barcelona, Barcelona, Spain

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ABSTRACT

This commentary responds to a recent article in this journal (Warlenius, 2023) purporting to identify the ‘limits to degrowth’. We first clarify and set in context the tensions between growth rates and decoupling rates on which the argument is based. In particular, we show how failing to achieve sufficient decoupling appears to leave society torn between missing our climate targets and crashing our economies. This dilemma highlights the tough choices inherent in the climate transition. But it does not imply that critics of growth endorse economic collapse. On the contrary, the intention of postgrowth scholars is clearly to prevent this collapse by offering structural and social reforms, alongside technological options, as a way of meeting climate targets. Specifically we dispute the claim that growth is the best way to achieve high rates of decoupling. Counter to this, we present several mechanisms through which a growth-critical approach may be better aligned with the climate transition than an economic ideology founded on ‘growth at all costs’.

1. Introduction

In a recent article in this journal Warlenius (2023) takes issue with the emerging literature on degrowth (Jackson, 2009, 2017, 2021a; Kallis, 2018; Hickel, 2020; Hickel et al., 2022) and declares instead his preference for a ‘growth-based, forceful and fast transition’ towards a net zero carbon economy. His case is based on three main components:

- An exploration of the relationship between economic growth rates and rates of ‘decoupling’;
- A claim that degrowth scholars espouse certain maximum feasible rates of decoupling; and
- A contention that decoupling is likely to be faster under growth than under degrowth.

This *Commentary* responds to these arguments. We show first how an analysis of the relationship between growth rates and decoupling rates can indeed provide a powerful lens through which to arbitrate competing claims about possible futures. Counter to Warlenius’ claims, however, this analysis does not imply that postgrowth scholars endorse economic collapse. Nor does it prove that decoupling is best achieved through growth – an assertion which is relatively common among proponents of ‘green growth’ but for which there is limited evidence. Counter to this claim, we identify several reasons why a postgrowth

(growth-critical) position may be more likely to achieve sufficient levels of absolute decoupling than a growth-at-all costs approach.

2. The postgrowth case

Before setting out the details of our argument, it is worth clarifying briefly the ‘postgrowth case’: that is the advantages that postgrowth scholarship can bring to ecological economics – and specifically to the challenge of making a just transition to a net zero carbon economy.

The principal object of scrutiny for postgrowth scholars is the *physical* scale of the economy, measured in terms of the material and energy throughput of economic activity. This focus on physical scale has been central to ecological economics since the pioneering work of Herman Daly (1973). Degrowth is therefore most often defined as ‘a planned reduction of energy and resource use’ in advanced economies (Hickel, 2020; Hickel et al., 2022). It does not seek to reduce GDP as an objective. Nor does it treat GDP decline as a climate mitigation lever. Nonetheless, postgrowth scholars typically do accept that, as a result of the structural and social changes needed to meet climate targets, continual GDP growth may not be possible.

Consequently, a core component of postgrowth scholarship is concerned with understanding the stability and resilience of economic systems when positive growth rates cannot be taken for granted. As Jackson (2019a) has pointed out in this journal, growth rates have been

* Corresponding author.

E-mail address: t.jackson@surrey.ac.uk (T. Jackson).

declining already for some decades, particularly in the advanced economies, and some countries are already effectively operating in a post-growth environment. Learning to live in this new reality – to enable human societies to thrive within planetary boundaries with or without economic growth – is going to be imperative. Postgrowth scholarship contributes to this task.

At its simplest, the postgrowth case is very straightforward. Loosening the assumption of growth-at-all-costs offers more degrees of freedom in solving the problem of living within planetary boundaries. Alongside technological efficiency and structural change as means of reducing the carbon intensity of economic output (let's call this economic decoupling), postgrowth scholars add the possibility of reducing the economic intensity of human wellbeing (let's call this social decoupling). A great deal of postgrowth scholarship is dedicated to the broader question of social decoupling (Jackson, 2009, 2017; Jackson, 2021a; Hickel 2020; Kallis 2018).¹ Most of the rest of this paper – like the article to which it responds – is concerned with economic decoupling defined as reducing the carbon intensity of economic output.

3. The unforgiving arithmetic of growth

In his *Prosperity without Growth*, Jackson (2009, 2017) set out to understand what rates of economic decoupling would be needed in a world committed to achieving its climate goals. His analysis used the following formula (based in its turn on the well-known IPAT relationship (Erllich and Holdren, 1971):

$$C = P \times GDP/P \times c \quad (1)$$

where P represents the size of the population, C represents the annual emissions of carbon dioxide and the technological factor c (T in the IPAT equation) is the carbon dioxide intensity of the economy, given by:

$$c = C/GDP \quad (2)$$

By defining three out of the four terms in formula [1] at the end of a target period, it is straightforward to deduce the reduction in carbon intensity required by that date and from there to use an inverse algebra to identify the annual decoupling rate required to meet the goal on that timescale.²

In one scenario, for example, Jackson (2017, pp. 98–100) adopted the population projections of the United Nations, imposed a carbon cap equivalent to a 95% reduction in global emissions by 2050 to define C , assumed per capita income growth of 2% per annum in high income countries (in accordance with conventional expectations of income growth at that time) to project the GDP in 2050 and imposed in addition the requirement that income levels across the world converge to the same level as high-income countries by 2050, in order to satisfy a requirement for social justice. Under those assumptions, he showed that the carbon intensity of the economy would need to be more than 200 times lower in 2050 than it was in 2015, equivalent to a decoupling rate of between 14% and 15% year on year for 35 years, more than an order of magnitude higher than the average rate of decoupling in the preceding 35 years.

Numerous similar analyses have been carried out under differing assumptions by Jackson (2009, 2017, 2019b, 2021b) and others (Victor, 2008/2019, 2012, 2023; Parrique et al., 2019). Vogel and Hickel (2023)

find that the 11 high-income countries that achieved absolute decoupling during the period 2013–2019 (after the financial crisis and before the pandemic) would require a 10-fold increase in the rate of decoupling during that period to remain within their fair shares of the carbon budget for a 50% chance of staying under 1.5C. In short, much higher decoupling rates are needed than have hitherto been achieved.

Warlenius does not dispute the underlying argument. Rather, his results (op cit, Table 1) provide a limited form of 'sensitivity analysis' around Jackson's original calculations, by allowing growth rates to vary alongside decoupling rates.³ This analysis could usefully have been taken further. For instance, our Fig. 1 shows the relationship between 'allowable' growth rates and 'required' decoupling rates under different carbon targets.

This Figure can be interpreted in two related ways. On the one hand, for each line (each carbon target) on the graph and for any given rate of decoupling (shown on the x-axis) the y-value along the line shows the maximum allowable annual growth rate over the period, *if that particular target is to be met*. On the other hand, for any anticipated growth rate shown on the y-axis, the x-value along each line indicates the annual decoupling rate required for that target to be met.

So, for example, to achieve a carbon target of 95% reduction by 2050 (as defined by the green line in Fig. 1), decoupling rates must be above 10.5% for any positive growth rate to be allowable over the period. The green shaded triangle on the upper right of the Figure is thus the only regime on the diagram which can be said to represent 'green growth' under the 95% by 2050 target. At global growth rates of 3%, typical of conventional economic forecasts (IMF, 2023 eg), the required decoupling rate would need to be above 13.5%. A more stringent target (as shown for example by the (lowest) purple line in Fig. 1), would require annual decoupling rates in excess of 16.5% before a positive 'green growth' rate could be achievable.

4. Are there limits to decoupling?

The same analysis allows us to interrogate what might be needed to meet any given carbon target if desired decoupling rates are *not* achieved. For instance, let's suppose that annual decoupling rates of only 7% were achievable during the period between now and 2050. Then, unless the economy contracted by 3% annually over that period, the carbon target would not be met. The cumulative impact of such a contraction (Fig. 2) would mean that by 2050 the GDP would be 65% smaller than at the beginning of the period. If decoupling rates were limited to only 4% then the economic contraction would be even greater. GDP in 2050 would be 85% smaller than at the start.

The two Figures provide a graphic illustration of what Jackson (2009) has called the 'dilemma of growth': on the one hand, continual economic expansion is unsustainable; on the other, economic collapse is likely to be unstable. Nonetheless, analyses of this kind are useful. What they make clear is that *any binding carbon target* sets up a non-negotiable relationship between the desired size of the economy and its consequent need for decoupling – or equivalently between the potential for economic decoupling and the allowable size of the economy. The bigger the economy (as measured by its GDP), the faster the decoupling rate needs to be; the slower the potential decoupling rate is, the smaller the allowable size of the economy – *if the carbon target is to be met*.

Ecological economists and postgrowth scholars have been pointing

¹ Postgrowth scholarship also tends to take a broader view on structural change. Green growth protagonists confine their attention to structural changes that align with growth. Postgrowth scholars also consider structural changes that are not necessarily growth aligned.

² The analysis assumed a constant % rate of decarbonisation. Clearly that is not the only possible way in which a decarbonisation scenario might develop, but it has the advantage that the highest carbon emission reductions happen in the earlier years of the scenarios – in accordance with the goals defined by climate science.

³ Note that Warlenius' result doesn't quite achieve the desired 95% by 2050 goal because he has assumed a time period of 30 years to achieve it, whereas 2050 is now only 27 years away. It is also worth noting that a target defined by a reduction percentage and a date is insufficient to ensure that global temperature rises remain within specific boundaries. Rather, cumulative carbon emissions must over time remain within allowable budgets. See Jackson 2019b & 2021b, Vogel and Hickel, 2023 and Victor, 2023 for analyses of required decoupling rates based on this method.

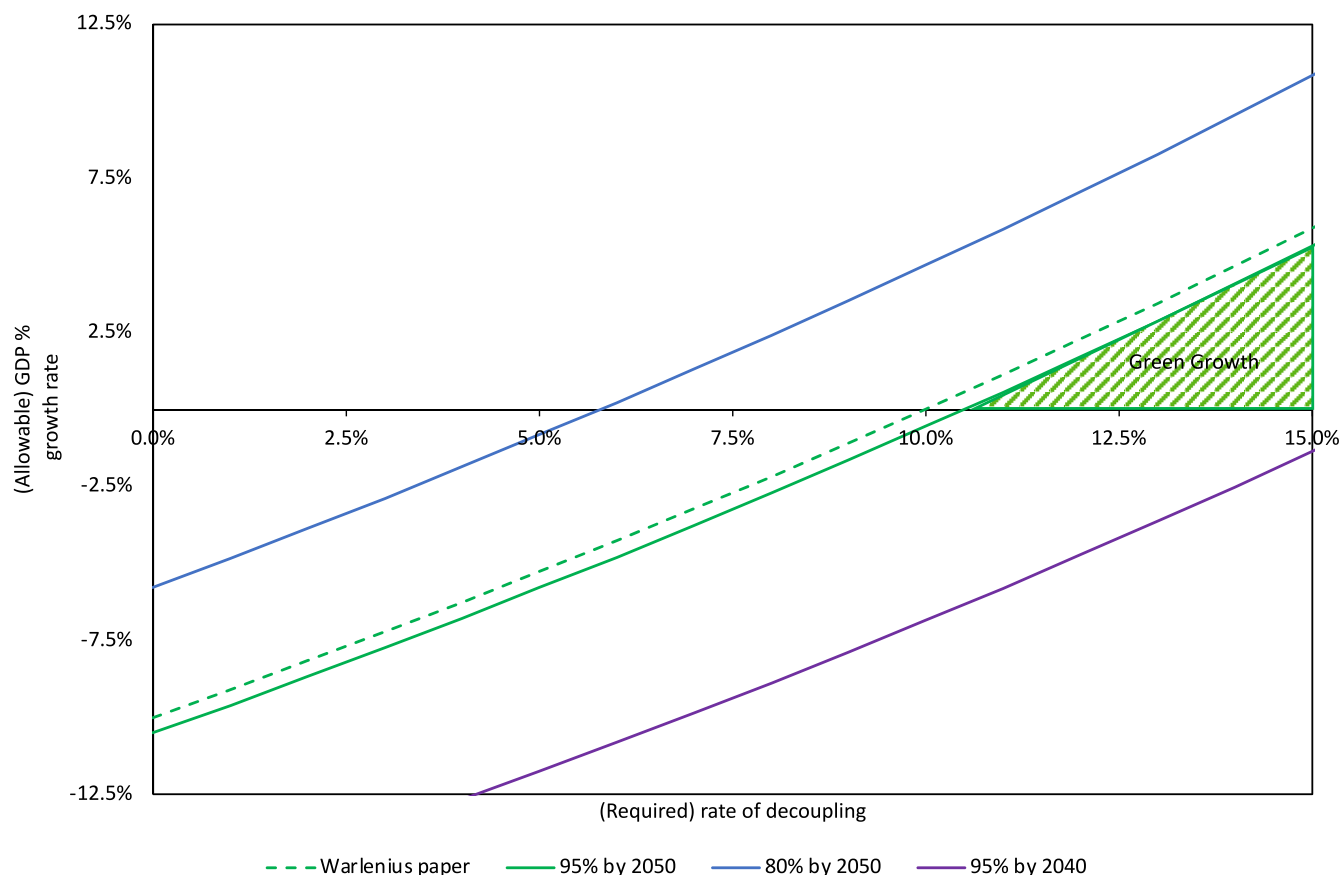


Fig. 1. Growth rates vs. decoupling rates under different carbon targets, Source: Authors' calculations using formula [1] to establish the carbon intensity required in 2050 to meet various carbon emission reduction targets and inverse algebra to infer the allowable growth rate for each decoupling rate, if the target is to be met. The numerical values reported in Table 1 of Warlenius (2023) are indicated by the dotted green line in Fig. 1. The solid green line represents the set of growth and decoupling rates which would deliver a 95% reduction on today's emissions by 2050. The blue line represents a weaker target of 80% reduction by 2050, while the purple line represents a stronger target of 95% reduction by 2040. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

to this punishing arithmetic for at least 15 years (Latouche, 2007; Victor, 2008/2019, 2012; Jackson, 2009, 2017, 2021a, Parrique et al., 2019, Hickel and Kallis, 2020, Vogel and Hickel, 2023) and probably much longer. Ecological economics itself was founded at least partly on concerns for economic scale in the face of finite planetary boundaries (Costanza, 1989; Daly, 1990). The broad lines of the argument have been known for more than half a century (Meadows et al., 1972, Daly, 1973).

It is important to note, however, that this arithmetic does not, in itself, say very much at all about the limits to decoupling. Nor can it be taken as an endorsement for any particular rate of economic growth – or degrowth. Most postgrowth scholars readily accept the need for high levels of decoupling. None that we know of suppose there are clearly definable limits to decoupling. Nor do they propose or endorse massive economic contractions, counter to the claim made in the Warlenius paper. But it may be useful to explore that claim in more detail.

Specifically, Warlenius contends that Hickel and Kallis set a '4% decoupling limit' in their 2020 paper *Is Green Growth Possible?* Jackson (2009) is supposed to have dismissed a decoupling rate of 7% as 'incredible' in his book *Prosperity without Growth*. As shown in Fig. 2, such limits would imply that carbon targets could only be met by economic contractions of the order of 85% and 65% (respectively). On this basis, degrowth is accused of a 'decoupling pessimism' that is 'mystifying' the climate transition.

As it turns out, neither of these specific accusations is correct. Hickel and Kallis (2020) nowhere identify a maximum limit to decoupling. They mention the figure of 4% only as the global rate of decoupling used

in a certain set of optimistic growth-oriented modelling scenarios developed by others. The point of their analysis is purely to compare this assumption with the much higher rates of decoupling required to limit warming to 1.5 °C or 2 °C, if global economic growth continues at projected rates.

Counter to Warlenius' accusation, Hickel and Kallis conclude by arguing that it is 'empirically feasible to achieve green growth within a carbon budget for 2 °C [ie broadly consistent with the 80% by 2050 target in Fig. 1]... if the [global] growth rate is very close to zero and if mitigation starts immediately'. They make absolutely no endorsement of – and nowhere imply – massive contractions in GDP of the kind Warlenius claims they do.

The case against Jackson is also tenuous. The 7% number refers to the level of decoupling required in Jackson's baseline scenario (Jackson, 2009, p80) and represents the annual decoupling rate required to achieve an 80% reduction in carbon dioxide emissions by 2050 if growth rates in income and population in various regions of the world followed historical patterns (at the time). Having established this baseline, Jackson (2009: 81–2; 2017 98–101) then explored two additional scenarios designed to achieve something like global equity in living standards. In one of these, the GDP per capita of the developed nations was held constant while the developing nations 'caught up'. In another, he

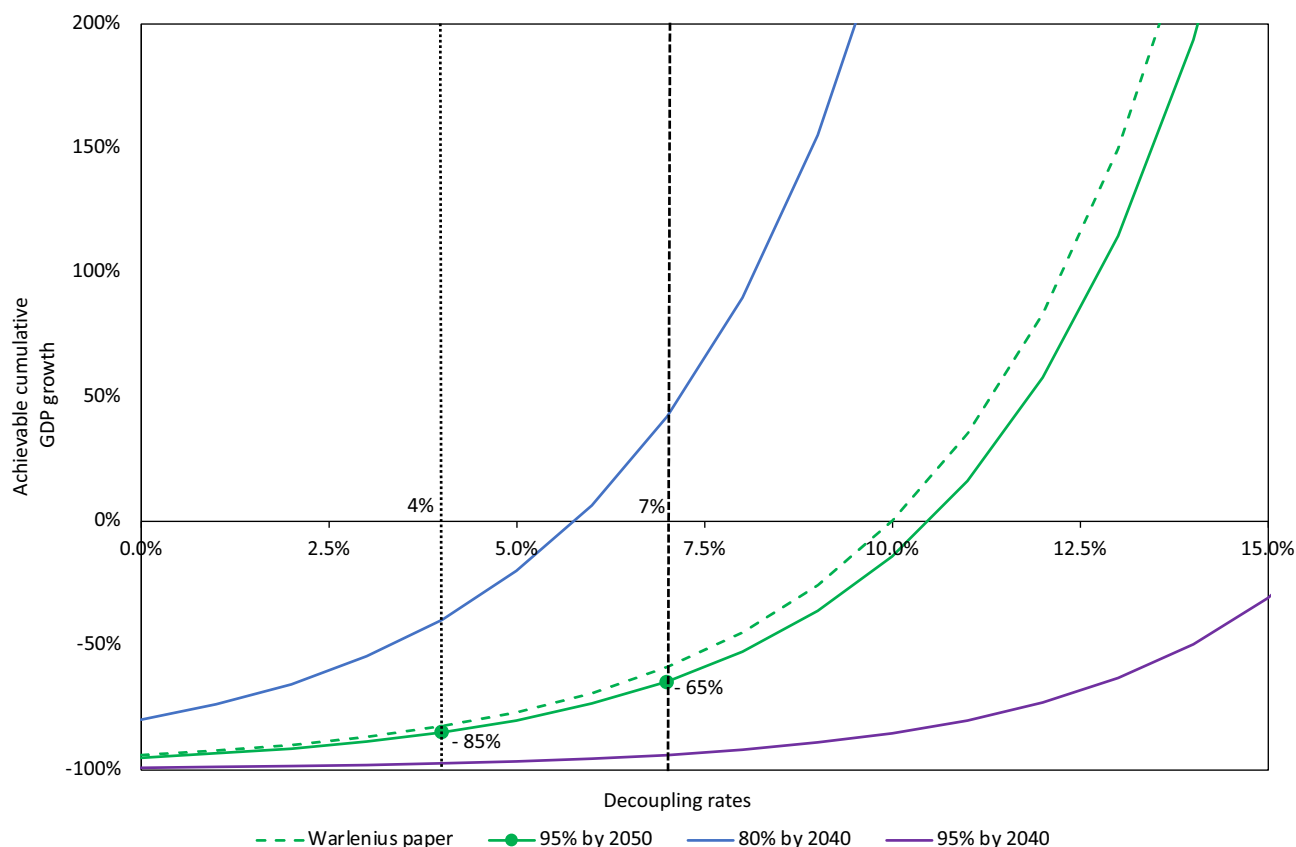


Fig. 2. Accumulated GDP growth under different decoupling rates, Source: Authors' calculations using growth rates from Fig. 1.

included the possibility of growth in the developed nations, at a level consistent with mainstream economic assumptions at the time.⁴

Nowhere does Jackson describe even these much higher decoupling rates as 'incredible'. On the contrary, he argues that 'the technological opportunities are legion' and 'the potential for change is massive'. The critical point (Jackson, 2017, p102, emphasis added) is 'not whether the complete decarbonisation of our energy systems is technically feasible, but *whether it is possible in our kind of society*'. If there are limits to decoupling, in other words, they lie at least partly in the structure of our existing economic system.

Warlenius' charge seems to be drawn from a point later in the book where Jackson argues that there is in the literature 'no credible, socially just, ecologically sustainable scenario of continually growing incomes for a world of 9 billion people' (Jackson, 2009, p 86; see also Jackson, 2017, p 102) a conclusion that is still justifiable more than a decade after it was first drawn. But the use of the word 'credible' in this context clearly doesn't imply that 7% decoupling rates (or indeed the much higher rates required Jackson's other scenarios) are 'incredible'.

Errors in scholarship aside, what Warlenius appears to be criticising is the increasingly popular position of 'environmental collapse' which does indeed argue that technological transformation is 'too little, too late' and that only economic collapse can save the planet (Alvarez, 2022, eg). It may be a tempting position in the face of unreasonable economic allegiance to the doctrine of economic growth. But it is specifically not the position of the postgrowth authors Warlenius attacks and in our view is likely to lead to immense human suffering. It is precisely this belief which motivates our work on postgrowth economics.

⁴ This scenario is similar to one discussed above, in which a 95% reduction in emissions is associated with a roughly 3% annual growth rate over the period and the required decoupling rates were in the order of 13–14%, although the precise numbers differ because a different baseline is used.

5. Beyond growth and collapse

There is a curious point in Warlenius' paper where, having carried out the IPAT analysis and corroborated the harsh arithmetic of growth, he appears to recant on the value of the analysis entirely, arguing that 'the static relations between growth and environmental impacts that is suggested by... the IPAT equation seems fraudulent'.

It is an odd claim since [1] is neither a model nor even, strictly speaking, an equation. Rather, it is what mathematicians call an 'identity'. The term on the left-hand side of [1] is formally equivalent to the term on the right-hand side. This is easily seen by cancelling out the population term P which appears both on the top and on the bottom of the right-hand side of [1] and using the definition in [2]. What remains is:

$$C = c \times GDP = C/GDP \times GDP = C \quad (3)$$

Two things follow from this. On the one hand, the formula has nothing at all to say about the causal relationship between growth rates and the potential for decoupling. On the other hand, its logical power cannot be held in dispute, either by growth advocates or by degrowth advocates. It is a tautology, held true by definition. That is, moreover, precisely what makes it useful. It provides an infallible sense check on heroic claims about future growth and decoupling rate forecasts.

But Warlenius uses the claim of 'fraudulence' to argue that the IPAT analysis should be replaced with what he calls a 'realist, dynamic theory of decoupling'. The paper does not elaborate this theory. But we can gain some hint of the direction of travel from the subsequent assertion that 'growth is *probably more likely* than degrowth to enable the conditions for intense climate transitions' (Warlenius, op cit p8 [emphasis added]). Without more detail it's difficult to know precisely what the author has in mind here. But it is worth pointing to several reasons why such a claim may be misguided.

Firstly, as Fig. 1 makes clear, the growth-based economy starts from behind in the race for sufficient decoupling and must run considerably faster in order to catch up. The required rate of decoupling must be increased by whatever the growth rate is if the economy has a chance of meeting any given target. The higher the growth rate the greater this increase in the required rate of decoupling. Note too that this must remain the case in perpetuity while the economy continues to grow. A little like the Red Queen in Lewis Carroll's *Alice Through the Looking Glass*, the growth-based economy ends up running faster and faster just to remain (at best) in the same place (Jackson, 2021a: 40).

Secondly, the prioritisation of economic growth tends to side-line social and environmental goals and sometimes even the goal of financial and economic stability. At its most damaging, this tendency was exhibited in the recent, very short lived, Truss-Kwarteng government in the UK which managed to increase the national debt, prolong inflation, raise interest rates and depress the housing market in a matter of weeks during its short tenure. But the same tendency to prioritise GDP growth over long-term sustainability or wellbeing outcomes has been visible for decades (Stiglitz, 2009). Even when investments in low carbon or renewable technology offer clear positive rates of return, investment finance for the transition must still compete with unregulated financial markets which favour speculation or short-term gain and end up externalising both ecological and social costs (Christophers, 2021). The reasons for this are complex and multifaceted (Jackson, 2021a: Chapter 2). But at the centre of them lies the legitimisation of highly unsustainable investment and spending decisions on the grounds of protecting economic growth.

Thirdly, the growth-based economy generates a very particular dynamic which sets up a positive feedback loop between consumer expectations on the one hand and the maximisation of profit on the other (Jackson, 2017: 103–117). This feedback loop creates a 'growth imperative' at the heart of the modern economy which has unfavourable implications for the possibilities of decarbonising technologies and dematerialising consumer lifestyles. It systematically pulls materials and energy through the economic system and releases them into the environment. Ironically, it is also poorly aligned with our understanding of human wellbeing.

It is this dynamic Jackson has in mind when addressing the question of 'whether [sufficient decoupling] is possible in our kind of society'. A part of the attraction of the idea of 'green growth' is that it appears to offer a technological way to bypass this dilemma. But in doing so, it leaves the underlying dynamic – and its implications for sustainability and climate transition – completely unexplored. By contrast, postgrowth scholarship – by virtue of letting go of the allegiance to growth – has been far more attentive to ways in which it is possible to correct the underlying dynamic (Latouche, 2007; Jackson, 2017; Jackson, 2021a; Kallis, 2018; Victor, 2008/2019, 2023; Hickel, 2020).

Finally, it is as a result of this deeper analysis that the postgrowth position expands the opportunities available to the climate transition. Under growth-oriented conditions, as Vogel and Hickel (2023) explain, green growth relies on 'replacing existing infrastructure and technology ... with low-carbon or low-energy alternatives'. They note that 'This type of transition cannot be done at just any desired speed, nor promptly accelerated at any desired rate, given available production facilities, know how, labour, material resources, existing infrastructure, and so on.' They conclude that the large, near-instantaneous acceleration of decoupling that would be required for high-income countries to achieve growth while also decarbonizing fast enough to stay within fair-shares of Paris-compliant carbon budgets is unlikely to be feasible.

By contrast, the postgrowth position does not exclude the technological change or the infrastructure transition proposed by green growth. But it offers in addition the possibility of restructuring the economy and shifting modal consumption patterns – for instance by scaling down energy and carbon intensive forms of production, switching from private to public transit, shifting from material-intensive goods to labour-intensive services and focussing on better indicators of

wellbeing. Postgrowth scholars argue that reducing unnecessary forms of production also frees up productive capacity that can be mobilised – for instance through public works and a job guarantee – to accelerate the transition further, leading to faster economic decoupling than could be achieved in a growth-oriented scenario alongside social decoupling. (Jackson, 2017; Kallis, 2018; Hickel, 2020; Hickel et al., 2022; Jackson et al., 2023; Vogel and Hickel, 2023).

It is worth noting that the impact of such changes on the size of the GDP is not straightforward to determine. It depends entirely on what sectors change, which products and services are reduced or increased, how provisioning systems are transformed, and how prices, demand, investment and returns change as a result. None of this can be predicted from the Ehrlich-Holdren formula [1]. But neither does the arithmetic itself imply that a massive collapse in the GDP is implicit in the postgrowth position. On the contrary, there are already several postgrowth macroeconomic models and scenarios suggesting that deep decarbonisation is possible *without* massive economic collapse (Jackson and Victor, 2020; D'Alessandro et al., 2020; Barrett et al., 2022; Negawatt, 2022; Millward-Hopkins and Oswald, 2023). It is a shame that Warlenius fails to engage with, or even cite, this emerging literature.

6. Concluding remarks

In short, there are no grounds to accuse postgrowth scholars of endorsing economic collapse. On the contrary, the postgrowth perspective *expands the range of options* open to society in navigating the climate transition. It includes those technological efficiency options favoured by growth advocates. It extends the possibilities for structural change to include changes not necessarily aligned with the pursuit of growth. It also offers an opportunity to follow the 'path less travelled' in human progress, an invitation to relationship and meaning alongside material sufficiency as the destination for human flourishing (Jackson, 2021a; Kallis, 2018). This approach stands, in our view, as a vital counterpoint to the narrow pursuit of material affluence embodied by the growth-at-all-costs position.

There is no doubt that the climate transition is daunting. But that does not justify flinching from hard truths. Confronting the dilemma of growth will require a rigorous attention to the ecological limits that define our world and to the economic and social structures that shape and constrain our societies. The contribution of a growth-critical ecological economics has been central to those tasks over more than four decades. It will remain so over the next.

CRedit authorship contribution statement

Tim Jackson: Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Jason Hickel:** Writing – review & editing. **Giorgos Kallis:** Writing – review & editing.

Declaration of Competing Interest

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Data availability

Data will be made available on request.

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