

BEYOND GREEN GROWTH, DEGROWTH, POST-GROWTH AND GROWTH AGNOSTICISM

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Whether economic growth is compatible with environmental sustainability has been a point of debate for at least 50 years. This article tries to move the debate forward by two means. First, it argues that debate is often hamstrung by lack of conceptual and terminological precision; and that clearer use of language can illuminate areas of agreement and difference and highlight the existence of middle ground positions. Second, it shows that it is mistaken to assert – or to use language that can be reasonably understood to assert – that the broad categories of positive and negative economic growth have any fixed relationship with environmental sustainability.

Even *specific* rates of positive or negative economic growth do not have a fixed environmental impact. This is because the environmental impact of economic growth depends on factors that vary with context and are subject to ongoing change in any context. These factors include: (1) *what* goods and services are being produced; (2) *how* those goods and services are being produced; (3) the strength and effectiveness of any environmental protections that are in place; and, more broadly, (4) the social and technological facts on the ground in any given place and time. The *specific rate* of growth (rather than the more general characteristic of whether economic growth is either positive or negative) is the fifth analytically useful variable; but the environmental implications of specific rates of negative or positive economic growth are heavily dependent on the form taken by variables (1) - (4) above. In other words, while the rate of growth is always relevant, it is *never* determinative.

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This position is best summarised as a *contingent* ('it depends') approach to understanding the relationship between economic growth and the environment. Making the case for this contingent approach, this article begins by discussing key terms. It then outlines six different positions on the relationship between economic growth and environment, showing what is at issue in debates around green growth, degrowth, post-growth and growth agnosticism. This is followed by consideration of the five variables that shape the contingent relationship between economic growth and the environment. Finally, the article makes the case for greater unity in pushing for policies that directly address the causes of environmental stress, rather than remaining divided and distracted by analyses that focus on the rate of economic growth in an overly narrow or rigid manner.

Terminological and conceptual problems

Because much of the literature on economic growth and the environment uses terms in ways that cause ongoing misunderstanding, a necessary first step is to clarify the key concepts, starting with terms that have established meanings before turning to more problematic cases.

Economic growth

Economic growth is the obvious lynch-pin concept. As a marker of social progress, it is a shallow and facile metric full of well-known limitations. Nonetheless, it does at least have the virtue of possessing a precise, stable and widely agreed definition: the increase in the monetary value of final goods and services produced and sold in a geographic area (usually a country) in a given period (usually one year). It can be measured in 'nominal' terms or 'real' (inflation-adjusted) terms, with real GDP being the variation that is of interest to us here. Because economic growth is synonymous with an *increase*¹ in gross domestic product (GDP), the two terms can be used interchangeably.

¹ GDP is a *stock* variable and, as such, measures the accumulated *size* of the economy. For example, in 2023, Australia's GDP was US\$1,742 billion. By contrast, an *increase* in economic growth (GDP) is a *flow* variable that varies change over a given period time. For example, in 2023, the Australian economy grew by 1.5% (US 17 billion), a figure obviously very much smaller than GDP itself.

It is important to recognise that GDP is an aggregate of distinct components. When measured in terms of expenditures, it is the sum of consumption, investment, government expenditure and net exports (exports minus imports). Crucially, a fall in one of these components can potentially be more than compensated for by a rise in another. For example, a fall in the amount of final goods and services purchased by consumers may be more than counterbalanced by increases in government spending on things such as public transport, business investment in renewable energy, or environmental restoration work, perhaps conducted under the auspices of a ‘green new deal’ policy package. Such expenditures could result in GDP increasing even amidst falling consumption. The classic example of this was the USSR where, at least for a time, recording-breaking rates of economic growth were powered by high levels of state investment, accompanied by a meagre provision of consumption goods and services for ordinary citizens (Krugman 1994).

Change in GDP is measured in numerical terms, either as percentage change or monetary change. It may be positive, negative or zero, with positive and negative change occurring at different magnitudes. Any rate of GDP above zero is positive economic growth and any contraction of GDP below zero is negative economic growth. These things may seem too obvious to state, yet it is necessary to do as it is often unclear in the literature when authors are referring to positive or negative growth. Furthermore, what differentiates low from high growth may not be clearly stipulated (see, for example, Slameršak *et al.* 2024). This lack of precision and/or consistency in the literature matters a lot because economic growth is a compounding process: over time, small differences in the rate of growth can produce dramatically different outcomes.

The latter point is illustrated in Table 1, which shows the number of years it takes for GDP to double at different rates of positive growth and to halve at different rates of negative growth. Notice that the doubling times decrease *markedly* with increases in the rate of economic growth, with the most dramatic difference in doubling occurring between 0.25% (277 years) and 0.5% a year (139 years). The cumulative impacts of low and higher growth rates lead to major divergencies: for example, an economy growing at 1% a year will double in size every 70 years, whilst an economy growing at 5% a year will double in size every 14 years.

Table 1: Years to double or halve GDP at annual GDP growth rates²

Positive Rate (%)	Years to Double GDP	Negative Rate (%)	Years to Halve GDP
0.25	277	-0.25	277
0.5	139	-0.5	139
1	70	-1	69
2	35	-2	35
3	23	-3	23
4	17	-4	17
5	14	-5	14
6	12	-6	12
7	10	-7	10
8	9	-8	9
9	8	-9	8
10	7	-10	7

If we temporarily employ a *ceteris paribus*³ assumption, a positive economic growth rate of 1% or less looks hard to criticise for being obviously environmentally unsustainable. It is similarly hard – under *ceteris paribus* assumptions – to defend growth rates of 5% and above as likely to be environmentally sustainable. Note also that the strong

² Calculations utilised the ‘Rule of 69.3’ with results rounded to the nearest year.

³ *Ceteris paribus* means ‘keeping all other relevant variables constant’ namely: the exact types of goods and services being produced; *how* those goods and services are being produced; the strength and effectiveness of environmental protections in place; and, more broadly, the social and technological facts on the ground in any given place and time. This article later explains the importance of these variables in shaping the environmental impact of growth, but they are ‘frozen’ here in order to analyse growth rates in isolation.

differences between different rates of positive economic growth mean that any *blanket* condemnation (or defence) of economic growth's environmental implications makes for a position that is astonishingly lacking in nuance. Using terminology such as degrowth or green growth can easily be understood as making such blanket claims – whether that is the intention or not. Therefore, such terms – if they are to be used at all – need always to be defined fully and clearly.

The impact of negative economic growth on material living standards also needs consideration. A significant period (usually three months or more) of negative economic growth is, by common understanding, a recession. If continued for a period of some years, it may be classified as a depression. Negative GDP also means a reduction in average real income.

There are few, if any, ifs and buts about any of this when seen from the perspective of a national statistical organisation, especially if the population size is stable. While it is possible that redistribution of incomes and/or a more equal distribution of whatever employment exists could enable the median income to rise in a recession; that would require significant institutional change beyond what is in immediate prospect. For this reason, spruiking negative GDP as non-recessionary, particularly in any short-term context, is problematic. Note also that claiming, or at least appearing to claim, that lower (rather than negative) rates of growth are recessionary (*e.g.* Slameršak et al. 2024) is also mistaken, as *any* positive rate of growth, however modest, avoids recession.

It might be argued that it is unreasonable to tie negative GDP together with terms like 'recession', 'depression', and 'declining real incomes' that have downbeat connotations, because negative GDP might also be consistent with beneficial environmental and/or social progress – at least in some circumstances. These are matters to explore and assess, but not by means that involve problematic reinventions of long-established and accepted concepts. Otherwise, there is a danger of undermining the foundations for reasoned analysis, discussion and debate. It can become very difficult to understand what claims are being made and whether they have logical, internal coherence.

Throughput

Following its development and application by Herman Daly in the 1960s, throughput is a key concept in ecological economics. It may be defined in

various ways. The definition adopted here treats it as the extraction of materials from the environment and the waste subsequently put back into the environment. Energy use may be automatically included via its material impact on extraction and waste generation or treated as a distinct add-on as in ‘material and energy throughput’.

Throughput is thereby understood to be the key marker of increased environmental impact and thus antithetical to environmental sustainability, which is a situation where biodiversity and overall ecological balance are maintained.

Relative and absolute decoupling

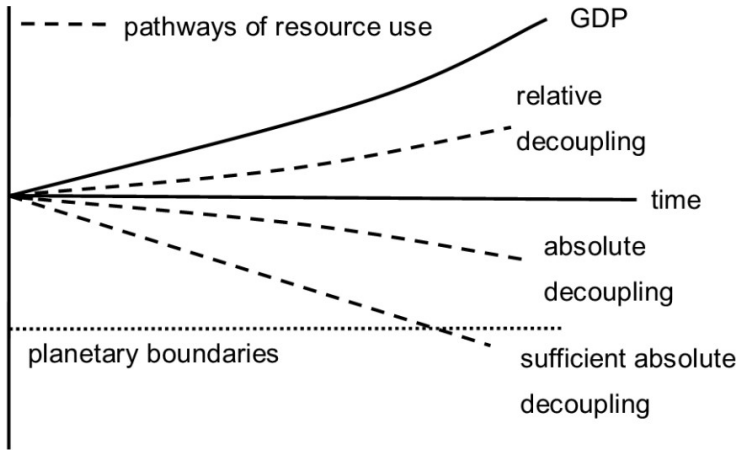
Relative decoupling occurs where each unit of economic growth (say, each percentage increase) causes ever decreasing (but still positive) rates of environmental damage.

Absolute decoupling occurs when there is economic growth without any increase in environmental damage.

Sufficient absolute decoupling occurs when GDP operates within planetary boundaries.

Figure 1 below illustrates these three types of decoupling. If sufficient absolute decoupling cannot be achieved, as a matter of logic, economic growth itself must be reduced to zero, or below zero, to achieve environmental sustainability. Not surprisingly therefore, the question of whether and when sufficient absolute decoupling can be achieved is a hot debate in the literature.

There is evidence that absolute decoupling of carbon emissions has been achieved in 23 countries (Hubacek *et al.* 2021), although, of course, *global* emissions are still much higher than they should be. It must also be emphasised that reducing carbon emissions is only one facet of achieving environmental sustainability; and that absolute decoupling and *sufficient* absolute decoupling are two different matters.

Figure 1: Decoupling Scenarios

Source: Adapted from Raworth (2017).

Six positions on economic growth and environment

Rather than there being a simple dualism of being for and against economic growth on environmental grounds, at least six positions can be identified in the literature, including the preferred position put forward later in this article. These positions are listed in Column A of Table 2. Others *could* be developed, but these are the readily identifiable existing positions.

Whilst the positions shown in Column A are distinct and mutually exclusive, this is not the case with Column B which lists the terms commonly used to describe each position. For example, 'post-growth' appears in two separate rows, as does 'degrowth'. An open-ended, vague or shifting use of terminology like this runs the risk of creating confusion in people's minds, as well as being a sure-fire recipe for ongoing misunderstandings between people. Moreover, if one term describes multiple positions, it inevitably generates complaints of misrepresentation when it is used only in relation to one of those positions. These problems have become so pervasive and intense in the literature that there is a danger that some terminology has become irreparably damaged.

Table 2: Six positions on economic growth and the environment

Column A: Position in Relation to Economic Growth and Environment	Column B: Terms Used to Describe the Position
1. Ongoing economic growth is compatible with environmental sustainability	Green growth
2. Active contraction of economic growth to zero or below zero is required	Degrowth; Post-growth
3. A long-term rate of economic growth that mildly oscillates around zero is required	Steady-state economy
4. The future relationship between economic growth and environmental sustainability is currently unknowable	Growth agnosticism
5. There is no clear and consistent position, or such a position cannot be discerned	Post-growth; Degrowth; Alternative economic futures
6. The relationship between economic growth and environment always depends on what goods and services are being produced, how those goods and services are being produced, the strength and effectiveness of environmental protections, the social and technological facts on the ground, and the <i>specific rate</i> of growth	Growth contingent ('it depends')

Attempting clarification of these positions and their relationships to each other is the next necessary step.

Position 1: Ongoing economic growth is compatible with environmental sustainability

This is the most straightforward position and goes by the widely used term of *green growth*. Its proponents often posit a 'green new deal' as a necessary requirement, though that term may also refer to a package of pro-environmental and social policies that is not necessarily linked to green growth.

There is considerable internal diversity within the ‘green growth’ position, with unity resting on a common belief in the viability and desirability of some ongoing economic growth and an explicit rejection of zero or negative rates of growth. According to Robert Pollin, for example:

The fact of the matter is, degrowth is not a solution, just in terms of simple mathematics. Right now, the globe generates about 33 billion tons of CO₂ emissions. Let’s say we cut global GDP by 10 percent, which would be a bigger depression than the 1930s. What happens? We cut emissions by 10 percent, from 33 billion tons to 30 billion tons. It’s no solution at all (Pollin *et al.* 2020: 4),

On the right flank of green growth advocacy are the ecological modernists, such as those people associated with the US-based Breakthrough Institute. They place nearly all their bets on technological progress, favouring market solutions and the private sector with only a limited role for the state (for more information and critique, see Baer and Singer 2023). More nuanced and politically middling positions are taken by Daily *et al.* (2019); UNEP (2011), and UNIDO (2015). Further along the spectrum are the social democrats and democratic socialists, such as Noam Chomsky and Robert Pollin with their *Global Green New Deal* (2020); although Chomsky’s support for a pro-economic growth policy package ‘in the here and now’ needs to be distinguished from his general position on economic growth which we will later see is contingent. Also on the left are some, but certainly not all, eco-socialists who advocate a socialist system of some form while strongly favouring green growth over degrowth (see, for example, Huber 2019).

A significant issue within this broad green growth position is whether, and to what extent, economic growth is seen as *bounded*. Green growth proponents are not always clear about what (if any) upper bounds on growth are necessary. This is a substantial problem, given the earlier point that even small differences in annual growth rates can matter a lot. Do green growth advocates usually believe that a faster rate of economic growth is *always* better than a slower rate of growth? Do they think that economic growth can or should continue *indefinitely*? It may be that some (perhaps even most) green growth proponents *do* think that there needs to be some upper bounds on the rate and duration of economic growth; but, because such bounds are seldom explicitly specified, there is scope for critics to characterise green growth as being unlimited growth – and then to say that this is an impossible or insane position because the planet’s resources are finite. If there is a spectrum of positions among green growth

proponents on this question of ‘boundedness’ it suggests the need for developing new categories for clearer demarcation. That could improve mutual understanding and create clearer lines of analysis and critique. It may also uncover higher levels of agreement than are usually assumed to exist.

Position 2: Active contraction of economic growth to zero or below zero is required to achieve environmental sustainability

Advocates of this second position contend that GDP must decline (rather than just stop growing). It is most associated with the term *degrowth*, as is apparent in the previous quote from Pollin and in statements by prominent self-identified degrowth proponents. Ted Trainer, for example, says: “The limits to growth literature has long since made it clear that the extent to which we have exceeded the limits means that enormous reductions in GDP must be made if sustainability is to be achieved” (Trainer 2021: 2). That the term degrowth has been used and understood in this way is unsurprising, given that the prefix ‘de’ is usually understood to denote the reversal of something rather than just its moderation – think of defibrillate, defang or deduct, for example. Therefore, degrowth’s connection with the active reversal of economic growth, rather than its moderation, has a strongly intuitive basis.

Post-growth is a term also used sometimes to describe Position 2, or at least could reasonably be assumed to be describing Position 2. For example, Hickel *et al.* (2021: 767) state that ‘post-growth scholarship calls for high-income nations to shift away from pursuing GDP growth’. Again, deploying the term post-growth to describe this position is unsurprising, given that the use of ‘post’ is usually understood to refer to what has occurred *after* something else: for example, post-Keynesianism coming after Keynes. ‘Post’ may also signify that something is a *reaction against* something else. For example, ‘post-modernism’ is not just something that occurred after modernism but was also a reaction against it.

Because the terminology of both degrowth and post-growth is also associated with other positions, as shown in Column B of Table 2, there is a case for terminological reform to stem the continuing torrent of unnecessary confusion, misunderstanding and bewilderment, particularly for anybody coming anew to this literature. Inadvertently, a terminological quagmire has been created. Restricting either degrowth or postgrowth to

only Position 2 would be an improvement, but it could be better still to create some third term. If the choice is restricted to only post-growth or degrowth, however, then post-growth would seem the better option. Whilst degrowth may have the edge in terms of being the more intuitive match for a position advocating negative or zero growth, it is a poor descriptor for mobilising people to achieve progressive change. As Drews and Antal (2016: 192) argue, degrowth, linguistically speaking, ‘is a missile term that backfires’. However, for post-growth to become the singular substitute for degrowth, the multiplicity of its own meanings would have to be reined in.

If an alternative term is to be used, it would need to be capable of delineating sub-categories regarding: (a) a requirement for zero growth; (b) a requirement for negative growth; or (c) a requirement for either zero *or* negative growth. Furthermore, just as green growth proponents need to be clearer about any *upper* bounds to positive economic growth, degrowth and post-growth proponents need to be clear about any *lower* bounds in relation to negative economic growth.⁴ Complying with these definitional requirements should not be difficult. Even in the absence of satisfactory and agreed terminology, one’s position regarding issues (a), (b) and (c) can be readily staked out in a sentence or two.

Position 3: A long-term rate of growth that oscillates (weakly) around zero is required

The position is singularly associated with the term *steady state economy*. This is an economy that does not exceed ecological limits, has a stabilized population, and a stable level of *per capita* consumption. Birth rates equal death rates, investment in productive capacity is just sufficient to deal with depreciation, and waste is minimised to allow substantial levels of production and consumption to continue. The steady state can be reached via a period of either positive or negative economic growth but, once reached, economic growth neither expands nor contracts, tending instead to fluctuate around zero (CASSE 2024). Notions of some type of steady state have a long and evolving presence within the history of economic thought, but it is the books and articles by the ecological economist Herman Daly (see Daly 2015) that principally established the basis for

⁴ This is especially so because, as Table 1 shows, small difference in the rate of negative growth also make a big difference over time to the size of GDP.

modern steady state advocacy within ecological economics. Notably, this is only one of the two terms in Column B of Table 2 that does not have the word ‘growth’ baked into it in some way or another. Nonetheless, growth is certainly a key concern, with definitions of the steady state almost invariably assuming a long-term average growth rate of zero.

Position 4: The future relationship between economic growth and environmental sustainability is currently unclear

This position is associated with the ecological economist Kate Raworth, who argues that: ‘if we reorient ourselves to the economic destination that we do want – an economy that is regenerative and distributive by design – then new questions about growth come to the fore. What might happen to GDP as we transition towards that destination? And what is GDP likely to do once we get there? It is not possible to predict definitively one way or the other whether GDP will go up or down in high-income countries as they create regenerative and distributive economies that engage the household, market, commons and state alike’ (Raworth 2017: 89). Raworth uses the term ‘growth agnosticism’ as the descriptor for this position, which is obviously very apt.

Position 5: There is no clear and consistent position, or it cannot be obviously discerned

Within the literature there are positions where, for one reason or another, a clear position on economic growth and the environment is elusive. Three examples of this syndrome will now be examined.

Slamersak *et al.* (2024) put forward a distinction between ‘low growth’ scenarios and ‘post-growth’ scenarios, with the latter characterized by ‘interventions intended to improve mitigation capacity, equity, and social outcomes’. Economies are classified as low-growth or post-growth according to whether they meet thresholds for improved mitigation capacity, equity, and social outcome rather than on their rate of GDP. No numerical *ranges* are specified to demarcate low from high growth, nor is mention made of a seemingly necessary middle-ground category of moderate growth, although modelling assuming +0.9% annual economic growth is classified as low and modelling assuming +1.8% annual economic growth is classified as high. Low growth may also be understood

to encompass negative growth because it is stated that low growth is linked to recessions and recessions, by definition, entail negative growth. Furthermore, because there are no stated threshold values for improved mitigation capacity, equity, and social outcomes, determining whether an economy growing at 0.9% is to be classified post-growth or low-growth is not currently operationally possible – and it would be a challenge for it to ever be so.

Note also that a ‘post-growth’ rate of +0.9% annually, though low, is still a *positive* growth rate. This post-growth embrace of low economic growth is notable in three respects. First, it makes post-growth as a descriptor look somewhere between non-intuitive and misleading. Second, by accepting low but positive rates of economic growth, this conception of post-growth has an *overlapping* rather than fully oppositional stance in relation to green growth. Third, many countries today have annual growth rates of around 1% but can make little if any claim to be more environmentally sustainable than countries with higher growth rates. This third point provides support for the growth contingent position outlined in the second half of this paper.

A second example of where the growth-environment position is specified problematically comes via a recent assertion from Jason Hickel that degrowth refers to the reduction in material throughput, not GDP:

When people say ‘growth’ they normally mean growth in GDP, so one might reasonably assume that degrowth is likewise focused on reducing GDP. Proponents of degrowth are therefore condemned to perpetually clarify that degrowth is not about reducing GDP, but rather about reducing material and energy throughput (Hickel 2021: 2).

Defining degrowth in this manner deftly insulates it from critiques of any position that advocates the reduction of GDP. However, this definition of degrowth is operationally absent in the literature, including Hickel’s own work which has a recurrent focus on critiquing green growth. Indeed, immediately following the degrowth definition just quoted comes the author’s insistence that a particular position regarding GDP must *also* be accepted. He says: ‘Of course, it is important to accept that reducing throughput is likely to lead to a reduction in the rate of GDP growth, or even a decline in GDP itself’ (Hickel 2021:2). So, a definite stance in relation to GDP is evident, despite claims to the contrary. Notably, this definition of degrowth is also disputed by other prominent degrowth advocates (see, for example, Trainer 2021); and the degrowth literature in general shows a deep preoccupation with, and critique of economic growth

that goes all the way back the term's origins in the 1970s. While there is strong focus on the reduction of material throughput, this is always tightly linked with a need to reduce GDP or at the very least, move to notably low rates of GDP growth. Combined with degrowth's inherent suggestion of being anti economic growth, these features likely explain Hickel's complaint about being 'condemned to perpetually clarify that degrowth is not about reducing GDP'. This author has many important and useful things to say, including on the sorts of policy measures and reforms the world needs to make but, unfortunately, this definition of degrowth adds to the terminological (and thus analytical) quicksand that afflicts the literature.

The final example of a position on growth and environment that is resistant to any obvious categorisation is provided by the ecological economist Peter Victor. The title of his book *Managing without Growth* (2019) initially suggests alignment with Position 2, as does his statement: "I think we will find that, by the traditional measure, growth can't continue if total material and energy flows are going down". In general, Victor has done extensive work exploring what non-growing economies might look like and how we might transition towards them. However, Victor also argues that 'the real area we need degrowth is in material and energy flows and land use. What the economy is capable of doing within those constraints remains uncertain' (Victor, in Chang n.d.), a statement entirely consistent with Raworth's 'growth agnosticism' (Position 4). Victor has also explored *both* 'green' (environmentally benign) and 'brown' (environmentally damaging) growth (Victor 2019: 206-7). Such intellectual openness is to be applauded – even though it is somewhat surprising to find in a book called *Managing without Growth: Slower by Design Not Disaster*. Victor personally prefers the term 'alternative economic futures' to degrowth (Victor, in Thornton 2018), which has several advantages over terms like degrowth or post-growth, including that it avoids sending any particular signals, whether intended or unintended, in relation to economic growth. This seems appropriate, given the regularly open and *exploratory* orientation of Victor's approach.

Interim conclusions

This survey of the terminology and positions on the relationship between economic growth and the environment shows strong grounds for seeking

greater precision, consistency and clarity. This is not just the responsibility of authors, but also of editors and referees – who have either not recognised the definitional and terminological problems or not realised their seriousness. It would benefit *all* parties if readers could follow the many *good* strands of analysis without becoming bewildered while trying to understand the various positions and how they do and don't relate to each other.

Greater clarity about *causation* in the economic growth-environment relationship seems particularly desirable. Specifically, is economic growth the central cause of environmental problems and, if so, is reversing or moderating the rate of economic growth the *means* to achieve environmental sustainability? Regular statements from degrowth advocates such as the earlier quotation from Ted Trainer seemingly suggest this *is* the causation process that they posit. Their heavy, sometimes exclusive fixation on critiquing positive GDP in a way that has little, if any nuance or qualification lends further support to this hypothesis. Also, critics of degrowth regularly assume that degrowth advocates *are* positing this causation – as is evident in the earlier quotation from Robert Pollin. However, degrowth and post-growth proponents also call for a wide range of ambitious pro-environmental policies. This suggests that degrowth advocates regard zero or negative economic growth as being the *outcome* of effective pro-environmental policies. In other words, a reduction in GDP is not the *cause* but the *consequence* of achieving environmental sustainability. Which of these two analytical positions do degrowth and post-growth advocates subscribe to? Perhaps the answer to this question is that they unknowingly alternate between the two positions without realising the analytical problems this creates?

Eliciting greater clarity about causation may have a profound effect on the growth-environment debate. Why? Because there appears to be a broad consensus on what sorts of environmental policies are needed. For example, shifting rapidly to renewable energy and investing in public transport and energy efficiency are matters on which there is clear agreement (Dale 2019). Could it therefore be that we're in the somewhat absurd situation where *disagreement is primarily about the consequences of agreed upon actions*? If so, an acknowledgement of such a reality should take much of the heat – and some of the significance – from the debate, thereby freeing more energy for trying to achieve an agreed policy agenda. This seems entirely in keeping with Stratford's (2020) persuasive plea for unity, and Raworth's (2017) call to 'worry less about growth'.

Taking a contingent stance on growth and the environment

The remainder of this article provides a fuller rationale for the contingent approach to economic growth listed as Position 6 in Table 2. This is the position that the environmental impact of economic growth depends on a specific range of factors, all of which vary with context and are subject to change in any context. The five principal factors are *what* goods and services are being produced, *how* those goods and services are being produced, the strength and effectiveness of environmental protections, and more broadly, the social and technological facts on the ground in any given place and time. The specific *rate* of economic growth (*i.e.* whether it is minus 2% or positive 3%, for example) is the fifth and final variable. However, it is to be emphasised that the environmental impact of any specific rate of economic growth is always going to depend *heavily* on the other four variables that have just been listed. Given this, *it is a major analytical error to conduct arguments about rates of growth without close reference to these other four variables.*

The word ‘contingent’ in the descriptor of this position is intended to signify that ‘it depends’, rather than the interpretation of contingency as ‘subject to chance’. The contingent position treats the environmental impacts of economic activities as dependent on variables that can be analysed in a way that can yield some understanding and some degree of predictability. This makes growth contingency different to the growth agnosticism discussed earlier: saying that ‘it depends’ is quite different to saying ‘it is not possible to know’. Indeed, if we know the details of the relevant key variables in any specific place and time, we will know a lot about the economy-environment relationship in that context. So, let’s look now at those key variables more carefully.

Variable 1: What types of goods and services are being produced?

An increase in GDP tells us nothing about *what* goods and services are being produced. It could result from more solar panels being produced or from more mining and burning of coal or oil. To predict the environmental impact of any increase in GDP, we need to know which goods or services there are more of and which there may be less of. In other words, rather

than the question being ‘growth or not?’ It is ‘growth of what?’ As Chomsky (in Chomsky and Pollin 2020: 87) notes:

A shift to sustainable energy requires growth: construction and installation of solar panels and wind turbines, weatherization of homes, major infrastructure projects to create efficient mass transportation, and much else. Accordingly, we cannot simply say that ‘growth is bad.’ Sometimes, sometimes not. It depends on what kind of growth. We should of course all be in favour of the (very rapid) ‘degrowth’ of energy industries, largely predatory financial institutions, the bloated and dangerous military establishment, and a lot more that we can list. We should be thinking about how to design a liveable society [...] that will involve both growth and degrowth, raising many important questions. *How it balances out depends on a wide range of particular choices and decisions* (emphasis added).

The last sentence is emphasised because it signals that Chomsky’s position on economic growth and environment is also a *contingent* position. As he says, it *depends* on a wide range of choices and decisions.

The composition of what is produced is crucial. Contrary to the widespread view that economic production is primarily about making *things*, providing *services* is now a bigger part of GDP in many countries, In Australia, services constitute 80% of GDP and 90% of employment (Productivity Commission 2021). This is important because provision of services usually entails a much lighter material throughput than making a physical product of equivalent monetary value. For example, \$120 might be spent on purchasing a tankful of petrol, getting treatment by a physiotherapist, or paying somebody to plant trees. The environmental impact of these activities ranges from strongly negative, to near neutral, and strongly positive; but all are associated with adding \$120 to GDP. Public policies can shape the mix of environmentally negative, neutral and positive goods or services, using policy instruments such as quotas, rationing, taxes, subsidies, product bans and other regulations that seek to shift the composition of production in a more environmentally friendly direction.

The official GDP data is limited in what production it tracks, usually ignoring between a quarter to a third of economic production (Stretton 1999). Omissions include production that occurs within households and in some non-profit organisations, where non-monetary and non-market production is a central feature. Because GDP includes only part of the total economic value that is created, measured GDP could potentially fall whilst

the total production of goods and services is increasing or remaining constant. For example, GDP might fall if you choose to cook a meal at home rather than eating out, but the environmental impact may be no different – or better or worse, depending on the efficiency and environmental credentials of your home-cooking equipment and processes. Home-based and non-market based economic production processes are often assumed to be *inherently* less environmentally problematic, but this is not necessarily so. Indeed, non-market activities may be more problematic to the extent that they are harder for government to monitor, regulate, tax or subsidise.

Variable 2: How are goods and services being produced?

Changes in GDP also tell us nothing about changes in *how* items were produced – with renewable energy or fossil fuels? wastefully or within a circular economy that *mandates* high rates of reuse, repair and recycle? Technological changes broaden the array of production possibilities, of course. So too can conscious strategies that promote more ecologically sustainable methods of production. For example, recent analysis estimates that, in Australia, the adoption of circular economy principles (reuse, repair, recycle) occurs in only about 4% of economic activities, when – without any changes to the structure of the economy – it could be up to 32% (Miatto *et al.* 2024). Seen in this way, the scope for reducing environmental impacts is enormous – and without necessarily reducing GDP. Indeed, because recycling, repair, and facilitating re-use are all services, their expansion would be an accelerant force on GDP.

Variable 3: What environmental policies are in place?

It hardly needs to be said that the extent of relative and absolute decoupling already achieved falls well short of what is needed for achieving sustainability. However, the reason for this relates more directly to lack of ambition to drive the necessary environmental protections than in anything that is inherent to particular rates or ranges of GDP growth. Making

progress on environmental protection is primarily⁵ about the design and implementation of effective policy measures. As Michael Jacobs notes:

Almost all the progress in environmental technologies and consumption patterns over the past thirty years has come about as a result of government policies. Energy efficiency standards, pollution regulations, renewable energy mandates, conservation orders, product bans, green taxes, emissions trading schemes, research and development subsidies: it is the panoply of state interventions in markets that have driven such progress as we have had. And it is much more far-reaching interventions that will be needed if fossil fuels are to be squeezed out of the global economy and investment in green solutions increased to the levels required (Jacobs 2021: 2).

Potential policies can include measures like carbon allowances (Fuso Nerini *et al.* 2021) and climate clubs (Nordhaus 2015). The precision and potential efficacy of these policy instruments (when appropriately designed and implemented) stands in dramatic contrast to the idea of operating on environmental problems indirectly via the rate of growth.

Consider an example where a specific environmental problem was targeted directly via policy measures – tackling the depletion of the earth’s ozone layer by human-made chemicals. The increase in the production of these damaging chemicals correlated positively with growth in global GDP for a long period of time, as they were once critical to various processes of industrialisation. However, after policymakers had come to understand the adverse effects that these chemicals were having on the ozone layer, they acted to curtail the production of them. They did not simply say to themselves: ‘hmm, the production of these chemicals is clearly correlated with economic growth, so we need to reduce economic growth’. That they did not approach the issue in this way is hardly surprising, considering how difficult it would have been to implement a growth-limiting strategy and how inefficient and ineffective it would have been in reducing the production of the chemicals. Instead, they designed and implemented a suite of policies to stop the production of these chemicals and, as a result,

⁵ The important exception to this is environmental commons being managed largely by social governance along lines described by Elinor Ostrom (2010), though even here state governance through regulation and policies to encourage and support such governance is often important. Note also that ambitious environmental reforms necessarily will need to be accompanied by social and economic reforms (Stratford 2020).

the production of ozone-damaging gases has fallen by 99% since their peak in 1989, during which time global GDP has more than tripled.

Of course, it could be objected that a principal reason why sufficiently strong environmental policies have not been put in place more often is that policymakers have been worried about consequential reduction in the rate of economic growth, perhaps even the triggering of a recession. Certainly, sectional interests wanting to prevent or delay new environmental policies commonly mount such arguments, but the claims are usually baseless, especially when supplementary policies are put in place to encourage the production of different goods and services that compensate (or more than compensate) for the reduction in production of the problematic good or service in question. Such outcomes can be achieved via Keynesian green new deal packages that combine pro-environmental policies with a pro-growth agenda (see, for example, Harris 2023; Chomsky and Pollin 2020). There is immense scope to replace production of environmentally problematic goods and services – and problematic production processes – with less harmful (and actively environmentally helpful) alternatives *without* leading to a contraction of economic growth. It is a largely a matter of policy ambition, rather than something constrained by inexorable laws supposedly embedded in the nature of GDP growth. Note also that extrapolating trends from the last few decades faces the considerable problem that policy responses have, thus far, been largely lacking in ambition, making the past less of a useful reference point than it might first appear to be.

Variable 4: What are the technological and social facts on the ground?

Technology has a major role in the growth-environment relationship. In other words, how scientific knowledge is applied to change what is made, how it is made, and how it is transported and subsequently disposed of is crucial in shaping environmental outcomes. For example, if the energy sector adopts technologies that use renewable energy sources rather than technology based on the use of fossil fuel, it significantly lessens adverse environmental impacts.

For those who are sceptical about the viability of ongoing economic growth, there is nearly always entrenched pessimism about what future technological progress might deliver. Also, there can be a giddy techno-optimism amongst some green growth advocates, particularly eco-

modernists who strongly favour market-based solutions, rather than socially progressive and economically interventionist green new deals.

There is a good case for avoiding extremes of both pessimism and optimism regarding technology. There are nearly always exciting pro-environmental technologies appearing on the horizon. Recently, these have included advances in battery technology and solar technology – both in greater efficiency and using more abundant, less toxic, and more recyclable material. There are also more readily biodegradable plastics, synthetic meat substitutes, more environmentally sensitive building materials and much else in prospect. However, knowing if and when specific technological developments will become operational is inherently speculative; and we cannot count on them until they are in operation.

Given this, we can only ever roll out the better technology that is available as fast as we can and support appropriate research and development. Future positive technological changes need to be seen as potential windfall gains rather than dependable certainties. Forecasting is hazardous, as was shown by the International Energy Agency's under-estimation for many years of the growth in renewable energy. While we cannot depend on what is yet to happen, neither should we be slow off the mark in recognising what *is* happening and just how *fast* it can happen, given the enormous potential of technology to mediate the relationship between economic growth and the environment in either helpful or harmful ways.

Social facts 'on the ground' that are relevant in shaping environmental outcomes is an admittedly broad category that includes the size of the population, total and *per capita* ecological footprints, the level of education, the general level of socio-economic development, dominant industries, formal and informal institutions (*i.e.* rules), firm-level routines and the individual habits of citizens. These general social facts are relevant because not everything is fully controllable via government policy, nor always needs to be. The underlying social facts may also constrain how ambitious environmental and social policies can be at any point in time.

Variable 5. What is the exact rate of economic growth?

As pointed out earlier, the fifth variable that effects the environmental impact of economic growth is its actual rate, considered in conjunction with the other four variables. The best way to think about this is to revisit the data in Table 1 which shows that, *ceteris paribus*, an economy growing

at 3% doubles its size every 23 years. Without changes to the composition of goods and services, the way goods and services are made, environmental protections, technology and social facts on the ground, then that 3% rate of economic growth *is* highly likely to be environmentally unsustainable – at least if the starting point is the type of economy we have today. However, if we then relax those *ceteris paribus* assumptions, the possibility of an economy maintaining a 3% growth rate becomes more plausible. In other words, *it all depends* on those other four key variables in the growth-environment relationship and on how ambitiously and judiciously they are shaped to facilitate the higher rate of growth.

The nature of this contingent relationship between economic growth and environment – and its evolving character – can be illustrated by looking afresh at the global challenge today. Facing currently massive and growing environmental stresses, a massive surge of investment in environmental remediation, renewable energy, and energy efficiency measures could well be the best thing that can be done for that planet. If so, this amounts to a green Keynesian strategy of the sort could be expected to drive strong GDP growth, perhaps well above 3% p.a. for about a decade.

Following that green growth surge, however, a much slower growth rate of around 1% p.a. in already wealthy countries could enable avoidance of recession, whilst also increasing policymakers' degrees of freedom to reduce environmental impact. Longer term, further technological progress and changes to other variables might then make it possible to step up to higher⁶ rates of growth – presuming that was seen as viable, desirable and necessary in a quite different type of future economy and society.

In other words, insisting on zero (or another specific rate) of economic growth as a short-, mid- or long-term requirement seems misconceived.

Avoiding zero or to negative values of economic growth

No inherent or ideological opposition to zero or negative economic growth is being put forward here. Rather, the argument is that *practical* constraints

⁶ Given how important small changes in the rate of economic growth are, and that judgements as to what is high or low being somewhat arbitrary and conditioned by recent historical norms, it is seen as conceptually problematic to create ranges for 'high' and 'low' growth. However, reference can obviously be made to a specific rate of growth rate being higher or lower than another and being negative or positive.

currently make such options non-starters. First and foremost, negative or zero economic growth is not currently an electorally saleable idea in democratic countries, and perhaps not in non-democratic countries either. If and when this seemingly undeniable fact changes, so does the scope to consider negative or zero economic growth as a viable option. In the meantime, campaigning on a platform of reducing a country's environmental footprint via means other than creating an extended recession or depression has a compelling logic, particularly as many of the policy measures can be presented as ways for citizens to reduce their costs of living, with any subsequent rebound effects from such savings being channelled into environmentally benign pathways via good policy design.

Second, negative or zero rates of economic growth seem to be unnecessary, given that low (but positive) growth rates of around 1% (and perhaps a notch or two higher – particularly in the short and medium term) can create significant latitude to manage growth in an environmentally supporting way.

Third, negative economic growth may well be incompatible with capitalism (Cahen-Fourot *et al.* 2016). If so, sustainability requires transition to a post-capitalist system. This transition may well be both desirable and ultimately necessary; but requiring a post-capitalist transition on environmental grounds is nonetheless a problem, if only for the fact that, even on optimistic assumptions, it would presumably take at least a decade or two and, by that time, it'll be too late for the world to start getting its environmental house in order. As Chomsky puts it:

We should recognize that if global warming is an automatic consequence of capitalism, we might as well say goodbye to each other. I would like to overcome capitalism, but it's not in the relevant time scale. Global warming basically has to be taken care of within the framework of existing institutions, modifying them as necessary. That's the problem we face (Chomsky 2020: 3).

Although Chomsky is essentially correct, it could also be added that his call to 'modifying existing reforms as necessary' could be understood as progressive stepping stones to another system, or at least substantial reform of the existing system.⁷

⁷ Eric Olin Wright's (2019) analysis of how reforms *within* capitalism can lead to more transformative change is also relevant in this context

Conclusion

This article has sought to analyse the current state of debate on the economic growth-environment relationship. In its first half, the focus was mainly on identifying some unclear and confusing aspects of the existing literature and on making recommendations to remedy terminological, conceptual and analytical problems. The second half of the article has focused on trying to identify a better basis on which progress may be made. The principal argument has been for taking a *contingent* ('it depends') position on economic growth and the environment, pointing to our need for further specific, contextual information in assessing what impact any rate of economic growth is likely to have on the environment. That information is centred around what goods and services are being produced; how they are being produced; what environmental protection policies are in place; the general social and technological facts on the ground; and the *precise* rate of growth – not just whether it is positive or negative.

Although the article has presented several practical arguments against zero or negative growth as viable political economic options in the short or mid-term, it does not rule them out over longer time periods. Rather, it shows various scenarios in which different rates of positive economic growth could be appropriate at certain times and in different contexts. Taking an explicitly contingent approach to economic growth makes clear that, while the rate of growth is always relevant, it is *never* determinative. Therefore, rather than being dragged into the confusing and sometimes confused positions in the current literature on economic growth's relationship with the environment, the primary task is to get good environmental and social policy designed and implemented. Confused understandings of the relationship between economic growth and environment can too easily distract and divide us from the pursuit of this most urgent, important, substantial and multi-faceted of tasks.

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