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Climate policy versus growth concerns: Suggestions for economic research and communication

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ABSTRACT

Climate change has revived the old debate on growth-vs-environment. In view of lack of definitive evidence for polarized pro- and anti-growth positions, I propose a different take on the debate which may provide new insights for designing climate policy to garner sufficient socio-political support. To this end, I explain a third position of being indifferent about economic growth – known as 'agrowth' – and argue it merits serious attention in education and research. In addition, I pay attention to how support for climate policy and views on growth-versus-environment are connected in a dynamic way. Better understanding of this may help to reduce resistance against climate policy that is motivated by growth concerns. To this end I propose a new framework, namely the policy-support cycle, which can be formally elaborated through a set of connect models and procedures. I end with providing a set of recommendations for the economic profession regarding participation in current debates on climate policy versus economic growth. Behavioural considerations will appear throughout the discussion as opinions about economic growth and climate policy by all stakeholders – citizens, journalists, scientists and policymakers – tend to be mediated by a variety of behavioural biases.

1. Introduction

Climate change has revived the debate on growth-versus-environment (Antal & van den Bergh, 2016; Fankhauser & Jotzo, 2018; Jakob et al., 2020). This debate may intensify in coming decades or even years as the time window to limit global warming to 1.5–2 °C closes. It is therefore important to connect research on climate-policy design (Aldy et al., 2010; Rogge et al., 2017; van den Bergh et al., 2021) with the environmental-limits-to-growth debate (Mishan, 1977; de Mooij & van den Bergh, 2002), particularly its application to climate change and decoupling CO_2 emissions from growth. A key question here is how we can increase support for, and thus the political feasibility of, effective climate policies to considerably reduce greenhouse gas emissions, notably those taking the form of regulation and pricing. Currently, concerns about economic growth contribute to not achieving majority support for such policies. Indeed, decisions by many voters and politicians indicate that they regard stringent climate policy as a high risk to future growth, i.e. an increase in real GDP (Gross Domestic Product).

The debate about climate policy versus economic growth is relevant for not only high-income but also middle-income countries – for various reasons. Whereas the current high atmospheric CO_2 concentration is mainly due to emissions by high-income countries, an increasing share of future emissions will arise in middle-income countries – recognizing that a considerable part of this will relate to production for exports to high-income countries. Hence, both types of countries matter for mitigating climate change, even though it is evident that high-income countries carry a larger responsibility. In addition, in middle-income countries the friction between climate goals and growth, aimed at reducing inequality and poverty, may become fiercer over time. Hence, the debate on growth vs climate policy may play out differently than in high-income countries (Hussein et al., 2013; Caetano et al., 2020; Soergel et al., 2021). Many middle-income countries are also expected to be hit hard by climate change due to their geographical location in arid zones and limited economic and institutional capacity for adaptation (Burke et al., 2015; Dell et al., 2012, 2014; Lemoine & Kapnick, 2016; Kalkuhlab & Wenz, 2020). This means climate change may severely depress their economic growth (Bowen et al., 2012; Millner & Dietz, 2015). While in middle-income countries it may be possible to forego growth to prioritize climate targets, the story is different for low-income countries as here poverty relief and meeting basic needs will inevitably

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go along with GDP growth (Adams, 2004; Škare & Družeta, 2016).

There is a rich literature on the factors driving support for climate policy (Tobler et al., 2012; Rhodes et al., 2014, 2017; Drews & van den Bergh, 2016a; Kyselá et al., 2019). It suggests three types of factors: (1) social-psychological factors like political orientation, worldviews, knowledge about climate change, risk perceptions, and emotions like interest and hope; (2) the perception of (current or hypothetical) climate policy performance (regarding effectiveness, fairness or costs), and preferences regarding policy design, such as pull versus push measures; and (3) contextual factors, such as trust, norms and participation, economic and geographical context, and information obtained from media and peers. Recent studies of policy acceptance concentrate on the relationship between carbon-tax support, use of tax revenues, and fairness perceptions of distribution impacts (Klenert et al., 2018; Carattini et al., 2019; Maestre-Andrés et al., 2019; Savin et al., 2020); others adopt a broader view, considering communication strategies or presence of other policies (Rhodes et al., 2014; Carattini et al., 2018; Hagmann et al., 2019; Douenne & Fabre, 2020; Maestre-Andrés et al., 2021).

The previous literature on climate-policy support has not given systematic and profound attention to the specific role of growth-vs-environment positions underlying climate-policy support and instrument preferences, nor to the associated co-dynamics of policy design and public opinion. This is surprising given that opinions tend to change over time and perceptions of tensions between climate and growth goals are common in public and political debates – reinforced by economic downturns, such as recently triggered by the COVID-19 epidemic and the invasion of Ukraine. It is important, therefore, that we deepen our understanding of how growth positions relate to climate-policy preferences, and which information and strategies can alter them. Attention to the role of growth positions in the study of climate-policy support is warranted also as a low-carbon transition will be complicated if we fail to weaken policy resistance driven by growth concerns. Rather than assessing which growth position is right about decoupling CO_2 emissions from growth, it is useful to study how growth-vs-environment beliefs relate to dynamic support of climate policy and views on policy instruments.

The relationship between positions in the growth debate and opinions on climate policy is not trivial. One can observe that many citizens/voters, policymakers and politicians profess optimism about the possibility of green growth. To illustrate, EIB (2022) finds that 56, 57 and 67 % of Europeans, UK and US citizens, and Chinese, respectively, express support for green growth. However, this often comes down to merely paying lip service to green growth – witness the limited actual support given to stringent environmental and climate policies. Such behaviour poses challenges for research as it easily evades scrutiny and criticism, in contrast to explicit resistance against climate policies or outright denial of climate change. As illustrated by Victor and Jackson (2012), another form of paying lip service is found in research, namely when the terms "green growth" and "green economy" are used to denote scenarios that never reach sustainable or zero-emission outcomes.

2. Growth positions

The renewed battle between pro- and anti-growth proponents, driven by the urgency of climate solutions in a growing economy, is taking place in academic journals, newspapers and social media platforms. Although the confrontation results in interesting reading, it may undercut democratic support for effective climate policy.

The debate on growth versus the environment can be traced back to the writings of Malthus (1798) on food limits to wellbeing and population growth. In the 20th century industrialization and mass consumption in the U.S.A. inspired Galbraith (1958) to write about social influence and status-seeking as a zero-sum game in terms of social welfare. A little later, the limits-to-growth model study by Meadows, Meadows, Randers, and Behrens (1972) put resource and pollution limits clearly on the agenda. Recent writings on degrowth have shifted the attention to persistent inequality at both national and global levels. In essence, different contributions to this debate try to answer one or more of three key questions (De Mooij & van den Bergh, 2002): (1) Is economic growth desirable (i.e. are there social/psychological limits)? (2) Is economic growth feasible (i.e. are there physical/biological limits)? (3) Is economic growth controllable (i.e. are their limits to governance)? Since these questions have binary (yes/no) answers, in principle one can distinguish 2^3=8 positions. However, some combinations of answers do not make much sense. Hence, de Mooij and van den Bergh identify five core positions in the debate, labelled as: the immaterialist/moralist, pessimist, technocrat, opportunist/sceptic and optimist. Recently, this debate has been revived by the policy challenges of avoiding extreme climate change. In this context, three positions dominate: growth-optimist or a belief in green growth, anti- or degrowth, and "agnostic agrowth" (for a detail comparison see van den Bergh 2017).

Growth-optimism, i.e. belief in green growth or decoupling emissions from growth, is often motivated by the fact that much growth in the past was fuelled by innovations improving product quality or creating new functions, both encouraging purchase, i.e. being commercially attractive (e.g., Stern 2008, Bowen et al. 2012, Hallegatte et al. 2012, GCEC 2014). This may not apply to low-carbon innovations, however, as these tend to be factor (i.e. energy/carbon) saving, which is less attractive to commercial markets (van den Bergh, 2013). Moreover, many so-called cleaner activities, including those driven by computer/internet technology, indirectly rely on energy-intensive sectors. Even production of renewable energy and electric-vehicle equipment will for the time being remain highly dependent on fossil-fuel energy, i.e. until renewables dominate energy production (King & van den Bergh, 2018). Furthermore, a large-scale shift in R&D and capital investments to low-carbon research will crowd out investment in labour-productivity improvements – the very basis of economic growth. So at least during a transition phase, economic growth could possibly result to be lower, although this also depends on a series of other mechanisms (Smulders et al., 2014). Finally, global growth is significantly driven by low- and middle-income countries with a relatively high carbon intensity of production. In addition, the hypothesis of secular stagnation is relevant, i.e. mature economies showing decreasing growth rates over time due to a slowdown in technological progress and diminishing marginal returns to human capital of education and labour division (Gordon, 2015, 2016; Teulings & Baldwin, 2014). An additional explanation may be that energy-return-on-investment (EROI) of energy sources, another production factor, is decreasing (Hall, 2017). This could, in combination with the importance of energy for the economy (Ayres et al., 2013), translate into higher energy costs and lower growth.

Some of these considerations have catalysed anti-growth sentiments. Popular accounts of it have recently been gathered under the label of "degrowth" (Kallis, 2011; Schneider et al., 2012; Klein, 2014; Hickel, 2021). They suggest the need for "income and consumption degrowth", "downsizing the economy" or "downscaling of production and consumption", strategies that likely would result in GDP decline. In fact, since degrowth proponents are sceptical of decoupling of GDP and greenhouse gas (GHG) emissions, they consider GDP decline as inevitable for achieving climate goals (Hickel & Kallis, 2020). The evidence on decoupling is mixed, though, suggesting that for both production- and consumption-based emission indicators, a non-trivial number of (mainly developed) countries have decoupled in recent years (Haberl et al., 2020; Hubacek et al., 2021). Of course, since decoupling may be temporary, empirical studies can never deliver definite proof for the (im)possibility of decoupling (Stern, 2004), which explains continuing debate (e.g., Hickel and Hallegatte 2021). Another reason to be cautious about claiming that decoupling is impossible or too slow, and suggest anti-growth strategies in response, is that we have not yet tried out serious climate policies during an extended period of time, notably stringent regulation and pricing with comprehensive emissions coverage. Past studies, therefore, have limited relevance to clarify a

future with such policies, which means one must be modest in making any claims about the future. Moreover, degrowth policies (Hickel et al., 2022) seem rather ad hoc and lack good evidence on their effectiveness and systemic effects (Savin & van den Bergh, 2023).[1] Next, degrowth is often presented as an end instead of a means, which underrates the role of other than scale factors co-determining emissions, such as technology, input mix, sector structure and demand composition. The feasible balance of all these factors can only be explored by trying out serious climate policies. This is not to deny reverse causality, i.e. negative growth as a potential outcome of inevitable climate policies – which differs from degrowth as an end in itself. Finally, in the political spectrum of most countries, support for anti-growth and anti-capitalistic messages plays a marginal role – even among left-wing parties. Nevertheless, general calls for less consumption or moving away from capitalism, appeal to many people – witness frequent expressions of this kind in popular and social media (e.g., Twitter – notably by Jason Hickel). The problem with these is that they are vague and do not guarantee effective ways of reducing emissions, while they may have many unforeseen negative social and economic effects. For effective emissions reduction with minimal negative socio-economic side-effects policies are needed that specifically target emissions and set systemic limits to them to avoid rebound. In addition, the response of degrowth to unsolved climate change lacks a certain logic as the main problem is not that we are in doubt about effective policies (we know from theoretical and empirical studies what works) but such policies still lack sufficient voter and political support. To respond to this by suggesting radical and thus less politically feasible solutions, such as a move away from capitalism (whatever this precisely means), lacks logic. Instead, one should investigate social-political support of policies and try out different designs or policy sequencing (Meckling et al., 2017). This is, however, not a topic receiving serious attention in "degrowth research" so far (Savin & van den Bergh, 2023).

In sum, while unconditional pro-growth may be regarded as taking a risk with the climate, categorical anti-growth is considered by many to be taking a risk with the economy. According to Jakob and Edenhofer (2014), this relates to either position not being embedded in a welfare framework. Since, as argued, they also lack definite empirical support, ultimately both positions very much rely on hope.

3. Agrowth and beyond-GDP metrics

A decade ago, I proposed a third position called "agrowth", where "a" denotes being "agnostic" about growth, motivated by GDP being far from a robust indicator of welfare and progress (van den Bergh, 2011a). This position moreover recognizes deep uncertainty impeding definite answers to key questions in the environmental limits-to-growth debate, in turn complicating a rational ending of it. For example, there is uncertainty about the feasibility and speed of decoupling GDP and certain environmental pressures (Jackson & Victor, 2019). Rather than denying such uncertainties, it aims to tackle them head-on, through balancing precaution towards both climate and economy (van den Bergh, 2017, 2018). An agrowth position means one can be concerned or critical about growth without this translating into a strict anti-growth position. Instead, one rejects "unconditional/always growth" – what some call "growthmania" (Mishan, 1967) or "growth fetishism" (Stiglitz, 2009). Under an agrowth strategy, periods with high, low or even negative growth may alternate as long as there is progress in welfare terms.

In terms of public policy, and climate policy in particular, agrowth is not about proposing different policies or instruments but about getting support for, or weakening resistance to, (effective and stringent) climate policies that have already received much attention in academia and can count on considerable theoretical support and empirical evidence. By removing the constraint of "unconditional or always growth", an agrowth position is likely to weaken public and political resistance against climate and other environmental policies. Indeed, the removal of the constraint means the growth-test is no longer decisive for policy support.

It would be useful to know whether different stakeholders (citizens, experts/advisers, journalists, policymakers, NGOs) are open to change their opinions on growth vs climate policy. In particular, if their opinion is pro- or anti-growth, whether understanding of an agrowth strategy could entice them to discard their current position; and to what extent this depends on knowledge, opinions and preferences about climate policy as well as opinions of peers. This would require analysis of opinion dynamics. Whereas general factors of opinions like political views have received much attention already, belief in green growth is found across the political spectrum, from right to left (Drews & van den Bergh, 2016b); moreover, growth opinions are not identical among stakeholder groups (Drews & van den Bergh, 2016b; Drews & van den Bergh, 2017). For these various reasons, growth opinions may well be easier to change by policies than factors like political views, likely depending on other moderating factors.

Empirical studies show that agrowth thinking can count on considerable support from citizens (Drews & van den Bergh, 2016b; Tomaselli et al., 2019), and more so from scientists (Drews & van den Bergh, 2017), and other experts at the science-policy interface (Lehmann et al., 2022). It, moreover, is consistent with ideas proposed by others, e.g. Daly (1977), Victor (2019) and Jackson (2009, 2021). Indeed, while these authors are critical of growth, they do not embrace a degrowth position. Daly's "steady state" seems not inconsistent with the agrowth perspective as it constrains the physical scale of the economy, not its monetary GDP dimension. However, from an environmental economics' position constraining the physical size of the economy is a rather blunt strategy, less environmentally effective and less economically efficient than regulating with detailed standards and incentives. To illustrate, enforcing less consumption overall will not guarantee the best approach to reduce emissions as some types of consumption contribute relatively much or little, so targeting these with specific instruments is more effective. In addition, Herman Daly's proposal of an alternative measure (ISEW) to replace the GDP matches well with an agrowth perspective stressing to ignore GDP information (for more discussion of comparison of agrowth with Daly's and other ideas in ecological economics, see Section 3.4 in van den Bergh 2023). More recent writers on growth vs environment, such as Victor (2019), stresses low growth; and Jackson (2021) recommends "post-growth" as balancing limits and aspiration. Others employ this term as well – sometimes with a meaning close to agrowth (Petschow et al., 2021; Lehmann et al., 2022), and in other cases as a synonym for degrowth (Hickel et al., 2021).

Agrowth thinking denies the relevance of GDP (per capita) as the main indicator of societal welfare and progress (van den Bergh, 2009), which logically translates into ignoring GDP information, rather than striving for GDP to continually rise, decline or stay constant ("zero growth"). Agrowth means we would – without being aware, due to ignoring GDP – sacrifice some GDP growth in exchange for a better environment, more equality or more leisure. To weaken preoccupation with GDP patterns, some suggest replacing GDP with a "beyond-GDP" metric, i.e. a progress indicator (set) that is as appealing as GDP but more inclusive regarding environmental and social dimensions of progress (O'Neill, 2012; Neumayer, 2000; Costanza et al., 2014; Hoekstra, 2019; van den Bergh, 2022). A well-known example is the ISEW indicator developed by Daly and Cobb (1989). The argument is that by thus shifting attention away from GDP, one automatically becomes

[1] Oberholzer (2023) show that worktime reduction, a common advice from degrowth proponents (Hickel et al., 2021, 2022), means a threat to macroeconomic stability, while Malmaeus et al. (2020) finds that a universal basic income, another popular policy among degrowth proponents, is less compatible with a labour-intensive local self-sufficiency economy than with a capital-intensive, high-tech economy. In addition, Sorman and Giampietro (2013) argue that degrowth studies ignore indirect effects of voluntary restraint.

agnostic and indifferent about its growth, or at least will give less weight to it in evaluating societal progress. This facilitates political support of stringent climate and social/equity policies because they are no longer subject to the "GDP-growth test". While there is a considerable literature on methodological scrutiny and comparison of beyond-GDP metrics (Bleys, 2012; Munda, 2013; Blanchet & Fleurbaey, 2013; van den Bergh & Antal, 2014; Hoekstra, 2019), what is missing is research on their communicative appeal as well as their potential for inclusion in policy modelling, along with perceived implications for evaluation of growth strategies and climate policy. In order to decide in which beyond-GDP indicator to invest, policy-makers would do good to know more about which of these can count on positive responses from relevant stakeholders. In addition, they should have information about which of these indicators are well understood, and whether they can genuinely replace GDP and thus reduce its subtle dominance in political debate and decisions. So more research on these issues is urgent as it may well be the case that ambitious climate policies are impossible until we "dethrone" GDP (Costanza, 2014). Only then we can implement an agrowth strategy. Table 1 provides a list of motivations to support it. For a systematic comparison – on multiple statements or criteria – of agrowth with pro-growth and degrowth, see Table 1 in van den Bergh and Kallis (2012).

Table 1
Main reasons to support an agrowth position.

1. GDP is not a good measure of social welfare and progress. It thus should not increase or decrease; instead, it should be ignored, which automatically leads to the agrowth position.
2. The previous point implies "against growth fetishism" but not "against growth", a subtle but important distinction. Sometimes growth may be an outcome of good policies in social, economic and environmental domains, in other situations not. There is no need for dogma, whether of an anti-, pro- or zero-growth type. It is more rational to be indifferent about growth and focus on well-being, distribution and environment.
3. A beyond-GDP indicator is likely to sketch a very different picture, irrespective of whether GDP grows much or little or whether it stagnates. It is unlikely to generally suggest growth or degrowth as a good welfare strategy for a society.
4. There is high uncertainty about whether we can achieve an absolute decoupling of GDP and environmental pressure (also accounting for climate solutions shifting environmental problems). Pessimism is understandable given little progress on environmental and climate solutions, but we still have not tried out serious policies (supported by scientific arguments, theory, modelling and evidence), which is a reason for moderate optimism.
5. There are socio-economic risks associated with radical degrowth solutions as we have no experience with them and little scientific rigorous study to understand their implications. Instead, it seems wiser to focus on traditional policies (regulation and pricing) that are shown by theory and empirics to work well. This suggests focusing attention on how to increase political support for these. It may require more cooperation among the various policy sciences to assure that experts and advisors start speaking with more shared knowledge and unanimity.
6. Many developed economies show secular stagnation, and generally the growth rate seems to steadily go down the more mature is an economy. In view of this, we may want to temper our expectations about future growth, for specific countries as well as for the world as a whole. Such a position of "relax about growth" is consistent with agrowth.
7. An agrowth position will reduce resistance against climate and other environmental policies as the growth-test is no longer decisive. This means the search space for societal progress and associated social, economic and environmental policies will be larger. As opposed, growth targets restrict this space.
8. Green growth has turned out to be cheap talk as it has not led to stringent policies – many of its proponents pay only lip-service to the concept as their revealed preferences do not show a deep belief in it. So, embracing green growth is no guarantee for solving urgent environmental problems. It just hides genuine motivations of giving priority to the economy. An agrowth position instead allows better to balance economy and environment.
9. Degrowth talk is likely to scare most citizens and voters as it suggests that we must make a huge sacrifice for environmental sustainability. Most people will be unwilling to do this – witness majority voting around the world. One can also not expect people or individual countries to support big sacrifices – this denies the public-good nature of climate solutions which invites for free riding. Hence, degrowth is not a strategy that can create large political support for effective climate policy. It is important to gradually move people away from dogmatic growth targets (=agrowth) but it is unrealistic to expect that a majority of voters support an anti-growth perspective.

4. Dynamics of linked opinions on climate policy and economic growth

Climate policy and growth opinions are connected in various ways. Preferences for instruments may correlate with those for growth positions: e.g., bans or personal carbon allowances seem to be popular among degrowth proponents, whereas adoption subsidies tend to receive more support from pro-growth proponents (Fuso Nerini et al., 2021). In addition, some climate policies may be perceived as affecting economic growth differently than others: e.g., regulatory policies tend to be seen as limiting production or making it more expensive, hence constraining growth; but innovation policies are widely considered as initiating new technological pathways that contribute to economic growth. A third connection is that preferences about general climate solutions, such as demand-side changes or technological innovation, likely depend on how they affect growth and emissions; but their ultimate impacts vary with the type of policy triggering the changes. To illustrate, the effectiveness of energy-efficiency improvements depends strongly on whether a policy is in place to limit energy/carbon rebound effects (Freire-Gonzáles, 2020); if not, one must count on considerably higher macrolevel energy use and emissions (Brockway, Sorrell, Semieniuk, Heun, & Court, 2021). Another example relates to renewable energy, which is a more effective climate solution if it substitutes for fossil fuels rather than drives growing energy demand. However, this requires not only pull measures like adoption subsidies and innovation support but also serious regulation and pricing of fossil fuels (Gugler et al., 2021). In fact, the historical absence and weakness of the latter explains the finding of York (2012) that globally over the previous fifty years, energy use from non-fossil-fuel sources displaced on average less than one-quarter of fossil-fuel energy use. Against this broad background, developing a good understanding of stakeholder positions on growth vs climate policy, including perceptions of the effectiveness of specific policy instruments, will help to find a balance between effectiveness (emissions reduction) and support.

To move beyond subjective opinions and speculation, there is a clear need to develop empirical models that allow comparison between pro, de- and agrowth strategies and related policy proposals. This could be realized by designing models in such a way that they generate a variety of beyond-GDP metrics. We can then use the models to test if combinations of growth strategies and climate policies perform differently on these metrics. Current climate policy studies lack such metrics, and moreover often assume continued growth. Moreover, few models have systematically and in a robust manner studied degrowth proposals (D'Alessandro, 2020; Keyßer & Lenzen, 2021). Among others, this requires including both markets and social networks in models as distinct policies operate through different channels, which may moreover drive synergistic effects (Konc et al., 2021). Ultimately, one could model what I call the "policy-support cycle" (PSC) as visualized by Fig. 1. It covers policy design, impact measured by beyond-GDP metrics, opinions/support, and finally adaptation of the current policy. Through modelling the PSC one could identify pathways of opinion dynamics that guarantee support for pathways of policy dynamics resulting in stringent effective policy to reduce emissions considerably.

Note that this PSC differs from the "policy cycle" notion of policy sciences (which has a variety of interpretations; see Jann and Wegrich 2007). The latter is more about the administrative phases of agenda setting, implementation/administration and evaluation. The PSC also differs from policy dynamics, experimentation and learning as elaborated in transition studies (Sengers et al., 2019; van Mierlo & Beers, 2020), energy policy research (Schimidt & Sewerin, 2019) or policy sciences (Howlett et al., 2018). PSC links a bit to the idea of "policy sequencing" to garner political support (Meckling et al., 2017). Different policy phases are further distinguished in sustainability transition studies (Geels et al., 2017; van den Bergh et al., 2020). Evidently, other

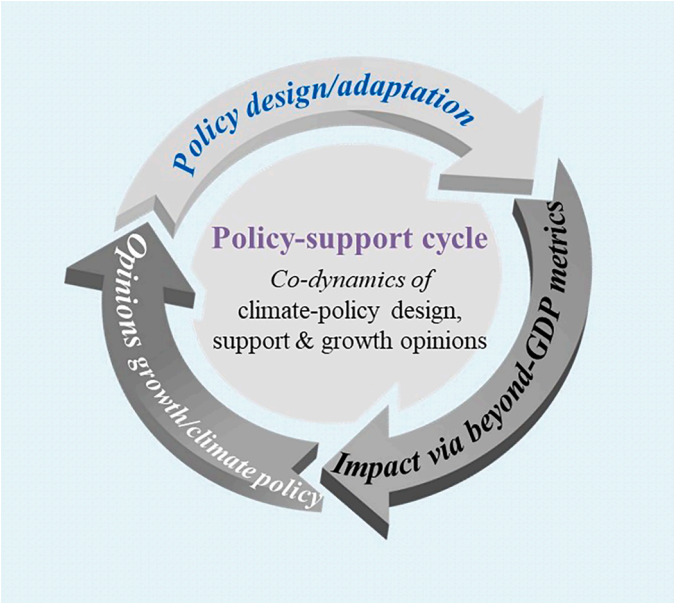

Fig. 1. A schematic representation of the policy-support cycle.

aspects matter to policy support and political complexity, such as consensus building, community mobilization, temporal dominance of non-environmental topics, power issues or sector lobbying (Ingram et al., 2007; Bardach, 2011; Cairney, 2021).

To elabore or operationalize this PSC, one first needs to assess the socio-economic and emission impacts of the three growth strategies and associated climate policies using distinct beyond-GDP metrics (Bleys, 2012; van den Bergh, 2022). Comparative analysis of beyond-GDP metrics is a logical response to progress indicators being contested as part of the growth-vs-environment debate (Botzen & van den Bergh, 2014; Jakob & Edenhofer, 2014; Bleys & Whitby, 2015; Millward-Hopkins et al., 2020; van der Slycken & Bleys, 2020). The result is insight into the differential performance of growth strategies, and associated climate policies, on specific beyond-GDP metrics used to measure something that approximates genuine progress better than GDP. Such work can build on previous model studies of low growth impacts (Victor, 2008,2019; Jackson & Victor, 2020; D'Alessandro et al., 2020; Keyßer & Lenzen, 2021).

A second step would be to develop a model of opinion dynamics, likely using agent-based modelling (ABM) with a social network (Castro et al., 2020; Will, Groeneveld, Frank, & Müller, 2020), to study opinion dynamics about growth and climate policy, and their interdependence. This could be done for one stakeholder (e.g., voters) or multiple (e.g., also NGOs, business lobbies, journalists and policy-makers). Such a model could describe a process of opinion initialization informed by exogenous emission, economic, and social impacts of a policy, based on (heterogenous) individual weights for each impact; followed by repeated and mutual social influence in a network until opinions converge. First exercises of this type were undertaken by van den Bergh et al. (2019) and by Konc et al. (2022). The innovation would be to include the information influence of beyond-GDP indicators on opinions. This approach will also allow to study how income distribution affects opinion dynamics, in two ways: first, through impacts on overall consumption and emissions which are mediated by income distribution as low and high income housholds consume differently; this then affects the input to the opinion dynamics; and second, through correlation of income and social influence, which affects the opinion dynamics themselves (Pena-López et al., 2021). An illustration of the impact of income distribution is found in Konc et al. (2022), who find, among others, that transfers to low-income households often result in limited policy support as social influence is mainly driven by households with many social contacts which often have relatively high incomes. Finally, the choice of social network topologies (small world, scale-free, etc.) in the analysis would be different for distinct stakeholders and can rely on insights of previous studies on opinion dynamics (Jackson, 2010; Acemoglu & Ozdaglar, 2011; Moussaïd et al., 2013; Grabisch & Rusinowska, 2020), voting (Gilens & Page, 2014), lobbying (Grey, 2018) and norms (Allo & Loureiro, 2014).

A final step is to design policy-adaptation rules, to test what works best for maintaining effectiveness and support. This can involve strengthening or weakening initial policies such as standards or levies, but also adding instruments such as information provision and adoption subsidies, or revenue recycling to specific social groups to break policy resistance or extend support. Research could identify what policy adaptation has been popular in the past (e.g., Schmidt and Sewerin 2019). In addition, through interviews with relevant policy-makers, it could assess what options there are for future policy adaptation and longer term dynamic policy paths. The resulting approach could be used to test which beyond-GDP metrics are able to foster a co-dynamic path of opinions and policy design that results in a stringent and effective climate policy needed for deep decarbonization.

5. Biases in opinion formation

Bounded rationality and social influence affect all stakeholders, whether citizens, voters, journalists, lobbyists, business managers, policymakers or politicians. The resulting behavioural regularities of stakeholders matter in many ways for the debate on climate policy versus economic growth. For example, it is easy to overestimate the importance of GDP and growth, to overestimate average past growth, or to misunderstand how distinct policy instruments perform on criteria like effectiveness, efficiency, equity and potential for global harmonization. It becomes even more complex if one considers policy mixes or packages that involve complementarity and positive or negative synergy among instruments. Since the literature does not offer a coherent view (Jaffe et al., 2005; Antal & van den Bergh, 2013; Kern & Rogge, 2018; Geels, 2020; van den Bergh et al., 2021; Fitzpatrick et al., 2022), this issue is difficult to judge for stakeholders, including journalists and policymakers. For all these reasons, the connection between climate policy and economic growth may be easily misinterpreted.

Scientists in their role as policy advisor are supposed to reflect the most rational and logical side of humans and thus should aim – through frank interaction and ongoing debate – to minimize biases and fallacies in their work. Unfortunately, one can identify various behavioural biases and logical fallacies that apply to human judgment in general (Dhami & Sunstein, 2022; Hamblin, 2004) as well as in scientific debates (Grimes, 2021), including about economic growth and climate policy. I illustrate this below focusing on carbon pricing.

One can easily detected confirmation bias and cherry-picking in writings on both green growth and degrowth, or in opinion or even research papers on climate policy. An illustration of the first is the view commonly expressed by degrowth proponents that evidence shows that decoupling of GDP and CO_2 emissions is impossible. However, one can imagine it is possible if we go large scale into renewables (even though during a transition these will require still considerable fossil-fuel support to create the renewable infrastructure). Moreover, the evidence is supposedly the lack of decoupling in the past – but this is without stringent and effective climate policies. Until we have experimented well with such policies, one cannot say decoupling has been disproven. The empirical evidence only shows that decoupling is not possible with weak policies – hardly a surprise. One underexamined complication may be that of environmental problem shifting, i.e. climate mitigation leading to reinforcement of other environmental problems through solutions that themselves involve polluting practices or depend on materials that are harmful in mining, use or waste phases (van den Bergh et al., 2015).

An example of cherry-picking is the reiteration by critics of carbon pricing that resulting prices have remained low and inequitable – which

ignores the high prices of the EU-ETS and literature recommendation as well as recent practice (e.g., several provinces in Canada) to use revenues for inequity compensation. Many critics also ignore the rich literatures on theoretical and empirical studies of carbon pricing as well as the older related literature on energy taxes (van den Bergh & Savin, 2021). They further suggest that political feasibility is low as if it concerns an absolute law, downplaying the many studies that show carbon-pricing design, rising-tax or falling-cap schedules, revenue schemes and information provision can help raising support. Critics often are considerably less critical, or even optimistic, about certain other policies rather than apply the same set of evaluation criteria consistently to all policies or instruments. In addition, they often seem to expect that a narrow focus of climate policy, such as on innovation policy or regulation through standards, can result in deep decarbonisation. They do this without providing evidence, which – ironically – they (incorrectly) argue is missing for carbon pricing. This optimistic view is also reflected in neglecting that other instruments than carbon pricing tends to result in higher rebound effects. In addition, behavioural biases like loss aversion and endowment effect tend to contribute to more support for (adoption) subsidies than (carbon) taxes, since "losses loom larger than gains" (Kahneman & Tversky, 1979; Kahneman et al., 1990).

Disciplinary bias sure also plays a role due to discipline-specific mental models of the world, such as giving less importance to markets than to social movements. Social norms in one's network of colleague researchers may play a role in this regard as such norms – backed by negative/positive reactions from colleagues – can impede individuals to adopt an opinion that goes against the majority in the discipline. Many scientists tend to be unsystematic and incomplete in accounting for how instruments compare and perform on multiple criteria (efficiency, effectiveness, equity and global harmonization). They also tend to neglect indirect emission and systemic effects.

A recurring argument of critics, namely that carbon pricing is not well implemented and lacks sufficient political support, overlooks that unfounded criticism can in fact weaken such support. One could therefore ask the critics to fight for better implementation of, and creating more support for, carbon pricing rather than succumb to non-systemic and thus ineffective instruments. Finally, it is worth mentioning the anecdotal fallacy as echoed by giving a lot of weight to the singular Yellow Vest protest, or as reflected in studies by researchers from the USA focusing on resistance to carbon pricing at home while ignoring success stories in other countries.

One also gets the impression that both strong beliefs in green growth and degrowth are founded on a lack of deep understand of challenges and policy features to solve climate change. For instance, it is easy to believe in green growth until one sees the challenges in terms of annual improvement of carbon or energy productivity versus past achievements. Or it is easy to believe that less consumption is the key, until one realized that it is a vague concept (less in money, volume, kgs?) and that instead policies should discourage high-carbon consumption. This requires more education and information about traditional climate policy instruments – notably regulation and pricing. Many degrowth proponents show instead more interest in radical solutions or strategies that are more oriented towards welfare and justice than effectiveness of emissions reduction (e.g., worktime reduction, free public transport or universal basic income). But they do this before giving a chance to more traditional instruments and looking into the wide theoretical and empirical support for these. It would also be interesting to know what distinct stakeholders think about the agrowth position and "agrowth measures", such as good practices in education, journalism, policymaking and politics regarding the acceptance of GDP shortcomings, moderating (excessive) growth expectations, avoiding misuse of terminology (GDP growth as "progress", new technologies as "zero-carbon"), and resisting the automatism of giving priority to growth over climate and inequality.

Making these various potential biases and fallacies of critics on carbon pricing explicit may seem confrontational. But perhaps it is the only way to become aware of them and improve the quality of science and scientific debate. I call for the participants in climate-policy and growth debates to avoid quick judgments (Kahneman, 2011), interact more with other disciplines and become better informed about the basic theoretical and empirical literature supporting instruments. It is moreover vital that everyone is transparent about the key criteria they employ and how in this light they judge the performance of the main types of policy instruments.

6. Recommendations for the role of the economic profession in relevant debates

Economists could do a better job in debates on climate policy versus economic growth and in motivating climate policy, notably carbon pricing. To start with the latter, they could discuss a broader set of arguments rather than focusing on efficiency and cost-effectiveness – not denying the importance of these. Among others, economists could stress more that the aim of carbon pricing is not generating public revenues but changing behaviours towards low-carbon choices, namely by regulating or altering relative prices of high- and low-carbon alternatives in the entire economy. The reason is that many non-economists misunderstand the difference between regulating and revenue-generating taxes or pricing, and in line with this think the main purpose of carbon pricing is generating revenues to finance so-called "climate projects" to reduce emissions (Maestre-Andrés et al., 2021). Economists should also stress more that carbon pricing can function as the most effective instrument for emissions reduction, due to its systemic impact which discourages both direct and indirect emissions in the complex web of economic production and consumption relationships, with the crucial consequence that all kinds of rebound effects are limited as the cost rise due to pricing discourages decisions underlying these effects.

With regard to climate policy versus economic growth, economists could take more distance from pro- and green growth stories. The evidence for these is, like the evidence for decoupling not being possible, weak. Hence, an agnostic position in the form of agrowth is warranted. Many economist and climate policy experts have expressed sympathy with it in personal communication, resulting recently in writing together an EU research proposal. For a less polarized debate it would be good if more economists would become aware of this third position and express their views on it. This is especially timely given widespread perceptions of strong friction between continued growth and climate solutions – and as discussed in previous sections, perceptions matter for public support of climate policies. An agrowth position, being less radical and recognizing both economic and environmental risks, might contribute to less concern about economic growth and thus less opinion polarization; this could help getting a political majority for tough climate policies. Post-growth is a too cryptic and geographically biased concept (e.g., most popular in Germany, less so in other countries); it easily lends itself to multiple interpretations, including degrowth and agrowth (Jackson, 2009; Antal, 2014; Petschow et al., 2021; Lehmann et al., 2022), which is not helpful for transparent and productive debate. This does, of course, not deny that there may be useful ideas in publications using the term post-growth.

Regarding behavioural dimensions, economists could give more attention to the diverse bounded rationalities of the various stakeholders, such as consumers, voters, policymakers, journalists, NGOs and business lobbies. Public choice theory offers basic insights, but these would need to have to be applied with relevant details to the context of climate policymaking. Developing more insights about this could possibly benefit other areas of policy studied by economists, such as related to labour, health, transport, safety and well-being in general (Walker et al., 2021).

Finally, it would be good if climate policy and the complicated challenges and debates, including about growth-versus-environment, occupy a more central role in economic education. It seems this topic

is still at the margin, whereas future generations will be confronted with climate change as the most serious and overwhelming crisis to manage. It may well dominate short- and long-term decisions of private and public actors, starting likely soon already.

7. Conclusions

Climate change has revived the old debate on growth-vs-environment, characterized by polarized pro- and anti-growth perspectives. This debate seems never-ending due to a lack of definitive evidence for either position, resulting from the future being uncertain and not necessarily resembling the past. I have proposed a different take on the debate which may provide new insights for designing climate policy to achieve critical voter and stakeholder support. To support this, I have argued that both pro- and anti-growth concerns undercut – in different ways – support for necessary climate policies.

I suggest economists participate more in the current debate and suggest ideas for how they might approach the problematic relationship between climate policy and economic growth. To this end, I explain a third position of being indifferent about economic growth – known as 'agrowth'. I argued it merits serious attention in education and research, such as in scenario development and analysis. In addition, I paid attention to how support for climate policy and views on growth-versus-environment are connected. Better understanding of this may help to reduce resistance against climate policy that is motivated by growth concerns. Notably we need a dynamic theory of how policy design, impacts and support interact and change over time. In addition, we should work harder on getting a genuine beyond-GDP measure in place to weaken the influence of GDP on media and politics. In this context, we need to study how distinct measures of this type are judged by different stakeholders, to know which measure stands a chance to improve public debate and political decision-making.

I recommend that economists give more attention to the policy performance criteria of global harmonization potential and systemic effectiveness at national and global scales in motivating particular instruments, putting less emphasis on efficiency as this has turned out to little motivate most stakeholders. Effectiveness of emissions reduction is the challenge of our time. Harmonization is critical as it will allow more policy stringency and weaken fears of negative competitiveness and growth effects. Behavioural biases merit more attention in studying opinions about economic growth and climate policy as all stakeholders – citizens, journalists, scientists and policymakers – tend to show them.

Data availability

No data was used for the research described in the article.

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