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ORIGINAL PAPER

Can the Market Economy Deal with Sustainability?

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Abstract
The central question in this paper is whether a market economy can theoretically and empirically deal with sustainability. A system analysis of the current neoclassical theory shows that the system components (goal function, interaction mechanisms, actors and outcomes) are predominantly defined in terms of economic growth and facilitated by market exchange. This fosters (over)production and consumption of private goods, crowding out public goods and preservation of the commons. The one size fits all 'economic mechanism design' cannot deliver social outcomes regarding sustainability. The explicit recognition that an economy has different domains (ecological, social, economic) broadens the options for incorporating sustainability within the economic system. This richer framework allows us to analyse the economic problem at hand: an efficient economic system in an inclusive society within biophysical boundaries. We show that the alternative for market economics does not only have to be government intervention but can also include private forms of collective decision-making.

Keywords Market economy · Economic growth · Inequality · Social inclusion · Environment · Commons · Well-being

JEL Classification E61 · H41 · I31 · O11 · O43 · O44

1 Introduction

The challenge of transforming the world economy toward a more sustainable system has become more pressing. The global agreements of 2015, such as the UN Sustainable Development Goals (SDGs) (United Nations, 2015) and the Paris Climate

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Agreement (UNFCCC, 2015), indicate that policymakers understand the urgency of the challenges. However, the agreements do not have the needed effects, and rising temperatures have visible effects on ecosystems, land, and human life (IPCC, 2022), and biodiversity is under threat (IPBES, 2019).

These goals are not in sight, with a world economy consuming ever more natural resources and increasing carbon emissions while inequality is still high globally. Moreover, COVID-19 is a real setback to the progress made in the last few years (Naidoo & Fisher, 2020), whereas the goal of policymakers is still to create a more sustainable economy. This can be defined as stated by the Brundtland report in terms of sustainable development, defined as development that '*seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future'* (WCED, 1987, p. 31). Sustainability's ecological (environmental) and social (inclusiveness) sides are targeted with sustainable development. On the ecological side, it entails trying to correct economic activities to remain or retreat within our planetary boundaries (Steffen et al., 2015). On the social side, sustainable development encompasses combating poverty and inequalities and promoting health, education and social cohesion (Sachs, 2015).

This paper starts with a relatively simple question: can the market economy deliver progress for society, enhancing the well-being of individuals in communities and future generations? Standard neoclassical textbook economics – here called market economics – tells us that the market interaction of households and businesses should lead to optimal outcomes for humans (e.g. Samuelson & Nordhaus, 2009). Nevertheless, there is clear evidence that the outcomes are not working for all of us and not for future generations (O'Neill et al., 2018).

Part of the story is that market conditions, which can be called invisible hand conditions (Kelly & Snower, 2021), such as perfect competition, symmetric information, diminishing returns to scale and scope, clearing markets and no externalities, do not hold in reality. Moreover, even if they hold, there is no guarantee that the outcome will deliver optimal societal outcomes, as the ecological and social goals are poorly specified in market economics.

The follow-up question is, what can we do if the market economy cannot deal with sustainability: which changes are needed to fit sustainability within an economic system? Although 'a' market economy does not exist (Bowles & Carlin, 2021; Hall & Soskice, 2001; Witt & Jackson, 2016) and different countries score diverse on aspects of sustainability (O'Neill et al., 2018), markets as interaction mechanisms more or less dominate all institutional setups. The role of the government differs, ranging from facilitating markets to producing public goods, but advanced economies, even China, are generally market-based (Sperber, 2019). Therefore, we analyse the mainstream theoretical market economy to highlight the underlying assumptions and how they relate to sustainability.

Sustainability as a concept is rather complex regarding goals, processes and governance (Frank, 2017). However, sustainability is not substantially visible in the different institutional setups of market economies (Magnin, 2018), where sustainability is partly seen as a public good (clean air) that the government should provide. The standard approach in economics to achieve sustainability is to define property rights, correct market failures (e.g., via Pigouvian taxes) and implement redistribution

policies (Besley & Ghatak, 2010). The central tenet is that the market economy stimulates economic growth as a proxy for well-being, which trickles down to the lower classes (Aghion & Bolton, 1997; Kuznets, 1955) and enables investment in ecological preservation. However, national accounts-based income and production measurement is a poor indicator of well-being, which leads to several problems ranging from the distribution of income, the absence of stocks (e.g. of natural resources), to the lack of discrimination between activities that add to well-being versus activities that distract from it. These problems are at the heart of what goes wrong with the market approach in relationship with sustainability (Fix, 2019; Hoekstra, 2019).

This paper starts by analysing the facts that the world economy, with its current ordering, does not deliver sustainable outcomes and that the standard theoretical market assumptions do not include sustainability (Sect. 2). Then, from that conclusion and building on the governance framework of Ostrom (2010), we develop a broad perspective on an economic system's governance, including goal functions, interaction mechanisms, and outcomes, to explore possible options for achieving sustainable development (Sect. 3). We do this as a theoretical 'ideal-type' exercise to keep the line of reasoning clean.

Our analysis shows that solutions to sustainability challenges cannot be answered, as in current policy discussions, by measuring well-being better, for instance, by replacing GDP with broader measures 'beyond GDP' (Hoekstra, 2019). More profound transitions in the system are needed. The explicit recognition that an economy has different, interdependent, domains (ecological, social, economic) broadens the options for incorporating sustainability within an economy with still a role for market economics. While it creates a more complex economic framework, it brings the framework closer to the economic problem at hand: an effective and efficient economic system in an inclusive society within biophysical boundaries (ecological boundaries).

It also opens the toolbox for policymakers (Sect. 4). Instead of only talking about externalities, it is easier to offer different solutions to 'fit' sustainability within the economy: broaden the goals of the domains, change the actors and change the interaction rules. We show with this analysis that the alternative to market economics does not only have to be government intervention but can also include private forms of collective decision-making. The final Sect. (5) concludes.

2 A Non-Sustainable Market Economy

This section first sets out the main sustainability challenges. Next, it highlights that sustainability challenges are never fully part of the conceptual framework and analyses why standard market economics does not live up to its promises.

2.1 Unmet Sustainability Challenges

Back in the early 1970s, the Club of Rome raised awareness about the unsustainability of the economic system by publishing different future scenarios in their book

Limits to Growth (Meadows et al., 1972). The limits to growth's main message was that continuous growth in industrial output could not be sustained indefinitely. Effectively, humanity can choose its limit or, at some point, reach an imposed limitation, at which time a decline in human welfare will become unavoidable. A vital point of the analysis was the plural of "limits", in the analysis of the Club of Rome early 1970s with 66 "continuous critical problems", which were all interconnected. Still, the root cause was growth: the exponential growth of energy use, material flows, food production and population against the earth's physical limits (Meadows & Meadows, 2007).

Several developments reinforce the general message about an unsustainable economic system: the sustainability challenges have become more visible in real life; environmental research has advanced dramatically, indicating tangible and measurable limits to economic activities; and policymakers have set several sustainability goals. Carbon emissions are higher than ever in modern times, leading to rising temperatures that have visible effects on ecosystems, land and human life (Masson-Delmotte et al., 2018). Biodiversity is under threat, with already 1 million species facing extinction and 75 per cent of the land facing significantly altered (IPBES, 2019). Natural inputs into the economic system, such as land, non-renewable and renewable resources, keep increasing in volume. This makes the economic system less 'circular', i.e., using fewer resources that can or are reused (Haas et al., 2015). Although the limits to this system, both in terms of inputs and outputs, become more and more visible, policymakers keep having an 'empty world view' (Daly & Farley, 2011). An empty worldview implies that all that is not priced is considered free without acknowledging longer-term consequences.

The Brundtland Report (WCED, 1987) is widely regarded as the report that has put sustainable development at the centre of policy attention (Sachs, 2015). The rising burden of economic activity on the environment over the last decades has been accompanied by numerous agreements and policy actions, culminating in 2015 in the UN Sustainable Development Goals (SDGs) (United Nations, United Nations) and the Paris climate agreement (UNFCCC, 2015). However, up till now, these goals are nowhere near in sight (SEI, IISD, ODI, E3G and UNEP, 2020). On the contrary, the world economy consumes more resources and carbon emissions increase on a trajectory that – in the most favourable case, given current policies – will lead to temperature increases of about three degrees above the preindustrial level in 2100 (IPCC, 2022). In addition, the progress on the world's sustainability agenda, the SDGs, has been halted for the last two years (Sachs et al., 2022). The only notable success of policies and agreements over the last decade was protecting the ozone layer by the declining production and consumption of ozone-depleting substance chemicals by the Montreal Protocol (Downie, 2015).

In the meantime, academia has created a scientific underpinning of the concept of planetary boundaries (Steffen et al., 2015). Many scientists from different fields have made the undisputed claim that five are under serious threat from the nine planetary boundaries they distinguish. In climate research, the scientific consensus has become more extensive that carbon emissions have adverse effects on climate with unknown non-linear impacts on ecosystems (Ripple, Wolf and Newsome, 2019).

The history over the last fifty years indicates that (1) ever-increasing economic activity (economic growth) is every year a more significant threat to our natural environment, (2) scientific evidence has become available that there are ecological boundaries to economic activity, and (3) policymakers up till now generally have failed to implement a solution. The following Sect. 2.2, analyses why we have an economic system that does not address planetary boundaries: a flawed theory that is seen as the real economy.

2.2 Lacking Sustainability in Market Economics

In market economics, the economy is considered a "*self-contained structure of relation of production, distribution and consumption of goods and services within a geographical space*" (Mitchell, 1998). Sustainability is missing from the economy's definition – it is defined as an externality. This idea can be seen as the preanalytical vision of market economics (Daly, 1996): it excludes sustainability from the analysis framework. "*Since analysis cannot supply what the preanalytical framework omits, it is only expected that macroeconomic texts would be silent on the environment, natural resources, depletion and pollution*" (Daly, 1996, p. 47). We use the wrong model to steer the real world.

According to the market economics model, 'the economy' has become equal to the world's global accounting system: the System of National Accounts.[1] The leading summarising indicator of this system is the gross domestic product (GDP), where success is measured in terms of growth in GDP. Higher GDP is connected to higher (material) well-being, higher employment and more affluent societies. The definition of the economy's boundaries is closely aligned with (normative) accounting judgements on measuring an economy. The national accounts are based on sometimes questionable boundary choices. For instance, they exclude unpaid domestic work, environmental degradation, social bads, resource depletion, and ecosystem services (Hoekstra, 2019). Hence, unintended and not priced adverse effects of economic activities are called externalities; they are external to (i.e. outside the boundaries of) the self-defined economic system and not deducted (from GDP) in one way or another. Within those boundaries, market economics uses specific values, the role of actors and interaction mechanisms, all directed at the outcome of the economic process: more material well-being, while other values, such as solidarity (contribution to the collective) and agency (ability to act), are not valued.

One of the most crucial shortcomings in economic growth calculus is the *boundary problem* (Fix, 2019). Only market transactions and government activities translated into pseudo-market activities count. Everything else, from household work, sharing or care activities to environmental degradation and social bads, resource depletion and ecosystem services, are not valued. Boundary problems are not unique to economic growth: for every social science, the question arises of what the

[1] See: https://unstats.un.org/unsd/nationalaccount/sna.asp. Later elaborations of the SNA have also environmental accounts: SEEA (https://seea.un.org/), but they do not have the same status nor are used in the same way as the SNA.

boundaries are of the process under consideration. This boundary problem is absent in biophysical processes, where natural laws determine the limits of a natural process more precisely. It is widely acknowledged that national accounts' boundaries, what we count as the economy, are partly politically determined. For instance, government expenditure is counted as a positive in GDP, which was highly disputed by one of the inventors, Simon Kuznets (1937).

Another shortcoming of market economics is the *capital problem*, which refers to the fact that GDP only measures monetary flows and not changes in stocks (Hoekstra, 2019). It omits environmental degradation and generally fails to account for the evolution (loss or gain) of manufactured, social, and human capital. This can work in two ways: it values the transaction of ownership and might sometimes overestimate the value people extract from that ownership over the lifetime of a product. On the other hand, it only measures the building of a school, not the contribution the building has in facilitating education over the lifetime of the building. In general, all external effects of economic activity on different forms of capital are not measured.

Next, the *distribution problem* refers to the fact that GDP does not tell anything about the distribution of material well-being across society, not between different actors (government, households, firms, financial sector) and not within those sectors. If GDP only grows by increasing (registered) profits in a country, countries with a more favourable tax climate can see their GDP increase without anyone in that country will really benefit. If GDP growth is only caused by a higher capital share (i.e. capital owners gain) without a higher labour share, most people will not benefit. Moreover, if aggregate income rises, but only the top 5% gains, GDP growth can lead to more inequality, as has been the case over the last forty years in many countries (Piketty, 2014).

In sum, it is a problem that the most important social elements (distribution) and ecological elements (ecological boundaries), are left outside the scope of the analysis. Moreover, this conceptual analysis is the foundation for economic policy. The narrow analysis leads to underestimating the importance of both social and ecological values since they are not represented in the market economics model.

2.3 Market Economics: An Increasing Divergence Between Model and Outcome

Suppose the purpose of an economy is ultimate to deliver progress for society, enhancing the well-being of individuals in communities and future generations. So why are we failing, especially regarding social and ecological outcomes? After all, standard neoclassical textbook economics – here called market economics – tells us that those market interactions of households and businesses in an economy should lead to optimal outcomes for humans, now and in the future (e.g., Samuelson & Nordhaus, 2009).

Theoretically, market economics is a coherent story within a strong tradition. Since the Lucas critique on using relationships from historical data to derive policy advice (Lucas, 1976), macro theories and economic policymaking are microfounded. Goals can only be derived from the individual behaviour of actors in the economy. Market economics' core values are utility maximisation and strict

economic analysis assumptions (Moos, 2019). The market economics definition determines the economic system's underlying values: valuation depends on the relative scarcity of aggregate capital regardless of whether it is natural capital or manufactured capital (Zaman, 2012).

At the individual level, utility maximisation derived from the marginalist schools of thought is associated with pleasure or 'well-feeling' and its link with material consumption in the market (Kauder, 2015). In market economics, income or profit increases became synonymous with increasing utility or well-being. At the societal level, this translates into increasing GDP per capita as the measure of economic growth as a reflection of society's perceived underlying values (Temesgen et al., 2019). However, this conclusion only holds if the strict assumption about functioning markets holds. These market conditions can be called invisible hand conditions (Kelly & Snower, 2021). Given these conditions, economic actors make choices that maximise their utility. The Pareto criterion describes the optimal outcome: there is no improvement in utility possible without decreasing someone else's utility (Hochman and Rodgers, 1969). Market prices are the correct reflection of their subjective valuations of products and services. Hence, aggregating all different preferences can be done by monetising value from market transactions. Monetisation is precisely the way values are embedded in national accounts. All incomes earned, all products and services produced and sold and all demand in a specific geographical area over a certain period.

Under the same strict conditions, social welfare depends on future and current utility (Botzen & van den Bergh, 2014). Generalised and primarily used welfare functions depend mainly on weak sustainability, the idea that all forms of capital can be substituted for one another (Solow, 1974). In addition to that, these welfare functions have a strong assumption about intergenerational equity. As long as future generations can potentially be compensated for the losses of current generations, an event or policy measure increases (intergenerational) welfare. Together with substitutability, this allows, for instance, that depletion of non-renewable resources by current generations is possible, as long as it leads to investments to increase other forms of capital (for instance, manufactured or intellectual capital).

This market framework leads to the Friedman claim (Friedman, 1970) that if the business pursues only the interest of business, it would deliver optimal well-being and opportunities for individuals to pursue their interests. Friedman (1970) argues that the government should take care of externalities via regulation. But this conclusion only holds if all the invisible hand conditions under which businesses and households promote economic efficiency are met. These conditions are (1) perfect competition, (2) symmetric and perfect information, (3) diminishing marginal returns to scale and scope, (4) no externalities,[2] (5) private property rights, and (6) infinite substitutability between different forms of capital. In the end, these conditions only tell us something about efficiency in terms of transactions. Equity is left in the hand of politics; hence, increased inequality can be called a social externality. However, distributional consequences of (efficient) markets are relevant to discuss in

[2] An alternative specification of this condition is: governments can effectively regulate externalities.

terms of well-being since violating efficient market conditions shatters the idea that markets deliver optimal outcomes in terms of well-being.

Violation of every one of these conditions – market failures – is at the core of most economic research, and it is widely accepted that real-life markets have never been aligned with the theoretical model. Although the flaws have been widely known, the model is still perceived as an adequate description of the ideal state where governments strive to be optimal for societal well-being. This position led to policies that foster pro-market economic growth, including anti-trust policies to foster competition, ensure private property rights, enhance information and price transparency, and correct the distribution of market outcomes (Røpke, 2020).

In the last years, the evidence has piled up that the violations of the primary conditions are exacerbated due to globalisation, financialisation and technology – the so-called GFT-nexus (Kelly & Snower, 2021). Consequently, these violations relinquish the promised outcome: well-being for all, because most of these violations are categorised under the denominator market failures and distort the efficient outcomes of the market and increase sustainability problems (i.e. detract from a broader conception of well-being). In addition, the increasing scale of economic activity compared to the spatially fixed ecosystem led to extra violations of the assumptions, which were not that obvious when the assumptions were made. For example, ecosystems might collapse if they are stressed beyond a sustainable level (Dasgupta, 2021). These changes are non-linear, and also causality is often unknown. Therefore, the scale of the economy adds to the new problems. So, we propose to add the 'S' from scale to the nexus: GFTS.

The violations of the invisible hand conditions increasingly lead to unsustainable market outcomes, because it is still assumed that they hold in practice:

(1) *Imperfect competition:* There is extensive empirical evidence that there are increasing concentrations in market power, driven by globalisation and technology, resulting in a 'winner-take-all' economy, reducing economic growth, and suppressing careers and wages for workers on the one hand and raising profits and hence wealth for top-earners and shareholders on the other side (Autor et al., 2020; Eeckhout, 2021; Philippon, 2019). Monopolies over data provide companies with (excess) market power, leading to inefficient outcomes.

(2) *Imperfect information and limited foresight:* Due to data monopolies, algorithms, and artificial information, it is even harder to claim than before the 'information era' that market participants have symmetric information. Producers know the production cost of a good better than consumers (excluding externalities associated with production). However, algorithms are increasingly capable of differentiating prices depending on moment and place, so 'objective' price information is harder to get (Calvano et al., 2020; Sanchez-cartas, 2022).

    It has always been hard to claim that market participants have perfect foresight, but it becomes increasingly clear that market participants have very limited foresight, not considering the longer-term consequences of their market actions. This is demonstrated in financial markets, where returns weighted on short-term risk dominate the investment horizon of financial actors (Black & Fraser, 2002; Miles, 1995). Overcoming this 'tragedy of the horizon' (Carney, 2015)

becomes ever more critical given the longer-term nature of ecological sustainability problems, but also more difficult given that financial decisions become more important.

(3) *Increasing returns to scale and scope:* Globalisation and technology generate vast economies of scale. For instance, network externalities (implying that the value of a digital network rises disproportionately with the size of the network), economies of scope from platform externalities (from matching customers with complementary needs), economies of information from big data and machine learning, and locational economies leading to clusters, violate the diminishing returns assumption.

(4) *Increasing externalities*: Changes in the economy's structure, ranging from hyper-globalisation to technology and financialisation, have increased social and environmental externalities. Considerable negative social externalities are visible by weakening companies' geographic roots and loosening the social bonds to local communities. The combination of ICT disruption of work, international trade and changing institutional arrangements (less labour protection) weakens the link between work effort and job security, giving workers a profound sense of disempowerment. Furthermore, increases in market power have led to increasing top incomes and a cumulation of wealth (Wiedmann et al., 2020), with adverse effects on social cohesion and political stability (Piketty, 2020). Social externalities exacerbate environmental externalities: rich people use much more resources and therefore emit more carbon (Wiedmann et al., 2020), and more unequal societies seem to have more trouble dealing with environmental problems (Bakaki et al., 2022).

Meanwhile, a host of environmental externalities—including climate change, ocean acidification, topsoil erosion, decline of freshwater access, and loss of biodiversity—have also been on the rise. This is not new. Only the scale and threat are different to previous periods. Moreover, although market economics has its standard remedies in terms of proposing taxation of externalities (Besley & Ghatak, 2010; Tirole, 2017), it is, up to this moment, not successful (IPCC, 2022). This can be viewed as primarily a failure of political governance; it is too easy to say that markets are still the solution because, in the end, policymakers do not solve externalities.

(5) *Violating private property rights*: Private ownership (and therefore property rights) is crucial for efficient outcomes in market exchange. The easier it is to define those property rights (and be able to exclude others from use), the more efficient market exchange can be used as a transaction mechanism. There is a vast amount of literature on how coordination mechanisms can fail: market failures from incomplete contracts (Hart, 2017), incomplete markets or poorly defined property rights (Coase, 1974) and government failures (Furton & Martin, 2019) are studied extensively. However, market economics still believes that this can be solved from 'within the system'; better-defined property rights, pricing of externalities and a little different role for governments will overcome those problems. Given the increasing scale of the externalities associated with private property and the allocative efficiencies (underutilisation of assets) that

result from absolute ownership, instead of private property as a solution, private ownership becomes more and more of an impediment for efficient markets.

(6) *Finite substitutability between capitals*: Perfect substitutability is one of the core concepts of market economics: different forms of capital (human capital, social capital, natural capital, financial capital and produced capital) can be substituted for one another: manual labour can be replaced by produced capital (machines) in combination with natural capital (fossil fuel). But there is a limit to this process (Dasgupta, 2021): if ecosystems are at risk for collapsing, substitution no longer holds.

At its core, the goal of market economics is utility maximisation which leads, given all conditions, to the aspiration of maximisation of economic activity. Hence, the policy goal is economic growth. If all invisible hand conditions hold, economic growth would undisputedly lead to more potential well-being in the most efficient way, provided the distribution is also perceived as fair. However, increasing economic activities and the GFTS nexus increase social and ecological externalities. This problem violates the assumption that economic growth (maximising production and consumption) results in optimising (intergenerational) well-being. Economists, of course, notice this growing problem. In accordance with the theory, the proposed solution is to solve market failures and correct all violations of invisible hand conditions. The explicit policy goal (economic growth) is not up for discussion; solutions should be found in correcting the system according to the original theoretical assumptions. These solutions are incremental and consequently 'within-the-system'. However, up till now, the results are very meagre: violations are getting bigger instead of smaller, regardless of the dominance of economic advice in policy making. For example, for carbon emissions, about 15% of global emissions is under some form of pricing,[3] but prices are generally much lower than the needed price to curb carbon emissions (Dominioni, 2022).

Evidence shows that market economics misses sustainability in its preanalytical vision and that the theoretical assumptions underlying market economics are increasingly violated. This aggravates sustainability problems. As a consequence of this conceptual idea that in practice fails, sustainability challenges in the last fifty years have not been adequately addressed or solved. These market-based mechanisms lack the right kind of capabilities to deliver sustainability.

To address these problems, externalities should be internalised in the analysis, which is not always feasible in markets: using different interaction mechanisms such as collective decision-making, considering explicitly different goals (not only market-based efficiency and maximising production), and exploring new governance structures and business models for governments and businesses. We do this in the next section.

[3] Carbon Pricing Dashboard | Up-to-date overview of carbon pricing initiatives (worldbank.org).

3 An Encompassing Framework for Sustainability Economics

The previous section shows that market economics excludes sustainability in its preanalytical vision. The invisible hand conditions underlying market economics are increasingly violated and hamper sustainable development. Therefore, it seems prudent to start by expanding the definition and field of the economy. To this end, economics may be said to deal with substantive issues related to provisioning (Røpke, 2020): how do humans make a living, and how do provisioning and distribution influence the quality of human lives now and in the future? This can be studied in every human society and includes questions such as: what is the biophysical basis for a living? The focus is on provisioning and appropriation by various social groups, thereby relegating market exchange to a specific feature of particular societies and opening the door to other ways to create and exchange value, such as collective decision-making, either in social groups (households, clubs, religious institutions) or in politics.

Furthermore, economics involves the dynamics of stability and change over time concerning provisioning. It is becoming increasingly clear that biological processes are central to ongoing climate change and biodiversity loss. Therefore, clear-cut classical distinctions between physics, biology and the social sciences tend to fade as the subjects unavoidably merge (Røpke, 2020).

A solution for this is to define different interdependent spheres within society to differentiate between questions about provisioning that differentiate in scale, time and purpose. In an attempt to do so, several scholars (Daly, 1996; Goodland et al., 1991; Gunderson & Holling, 2002; Ostrom, 2010; Raworth, 2017) introduced domains. The inspiration was primarily drawn from the relationship between ecology and economy and ecology and social systems (Ostrom, 2010). We introduce three domains: an economic, social and ecological domain, where the economic domain has output as goal, the social domain is aimed at an inclusive society, and the ecological domain has as goal a flourishing planet. The economic, social, and ecological domains consist of different levels of cycles: economic systems within social systems and those within planetary boundaries (Fig. 1). Market economics concentrates on optimising the equilibrium within the economic system, disregarding changes in time and space. A more realistic interpretation of the economic system would be that state-changes are envisioned by creative destruction, as introduced by Schumpeter (1942). He described capitalism as a process of creative destruction, where the efficient static exchange between actors changes to find new and better options. This destruction leads some firms to go out of business while others gain market share.

The three domains interact. Changes in social institutions affect the economic process. Likewise, changes in the ecosystem can impact society and economic interaction. However, how and if they lead to changes varies considerably over time and space. This idea follows Panarchy (Allen et al., 2014; Holling, 2001), a concept that explains the evolving nature of complex adaptive systems. Panarchy is the hierarchical structure in which systems of nature and humans and combined ecological-human systems and social-nature systems are interlinked in never-ending adaptive

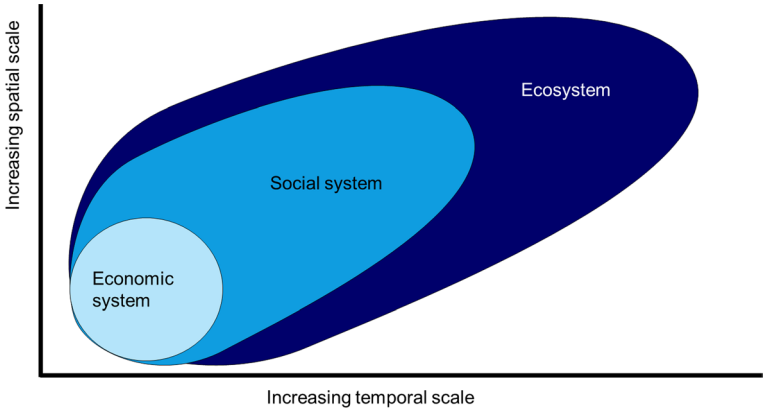

Fig. 1 Different temporal and scale dimensions of systems. *Source*: Authors, based on Gunderson and Holling (2002)

circles of growth, accumulation, restructuring and renewal (Holling, 2001, p. 392). Acknowledging that the economy is a nested part of a social system and, for that matter, also a subset of ecosystems means that we can no longer solve sustainability problems in a reductionist way as 'externalities' within the economic system. This nested structure dictates a hierarchy of the domains. Hence, the hierarchy considers sustainability as an 'internal' problem, whereas the market economics perspective regards sustainability as an externality.

In terms of Panarchy, it would mean that there are more equilibria possible (multistable equilibria), that the adaptive cycle is the fundamental unit of dynamic change, that not all adaptive cycles are the same and that a sustainable system (economy) requires both change and persistence (Gunderson & Holling, 2002).

Both time (temporal scale) and geographical area (spatial scale) can be long and extensive for ecosystems that impact the economic equilibrium. Depending on the ecosystem under consideration, changes can take minutes, hours, days, years, decades or millennia, and effects can range from only local populations of species or vegetation to planetary boundaries (Gunderson & Holling, 2002). The more extended the period, the larger the scale (expressed in land or water area affected): climate change is a global phenomenon, while deforestation or overfishing can be a local phenomenon.

For societies, these changes in scale and space are more extensive than for economic systems but smaller than for ecological changes – the average lifetime of civilisation (defined as a society with agriculture, multiple cities, military dominance in its geographical region and a continuous political structure) is 336 years (Krznaric, 2020) – with differences ranging from decades to centuries. Cultures and traditions do not change that fast (it can take centuries), while economic policies and contracts can change overnight. The scale – expressed in the number of people concerned can also differ markedly, but in general, the longer changes take, the more people are affected. Within that social system, economic interactions occur: market transaction,

redistribution and regeneration. These are generally short-term, directed chiefly at short-term interests and interacting with societal and ecological changes.

Economics should relate to these different fields and make clear how these different 'domains' (economy, society and ecology) interact and contribute to the well-being of humans now and in the future. The nesting of these domains is important to highlight.

Planetary boundaries (Steffen et al., 2015) are the hard boundaries for humanity. Therefore, biophysical integrity (a flourishing planet) should be economics' overriding guiding (or limiting) principle. As the second stage, inclusiveness (Acemoglu & Robinson, 2012) is the goal of the social domain, where inclusiveness consists of solidarity and agency. Third, the economic domain optimises output as efficiently as possible within this context. Without a flourishing planet and inclusiveness, efficient market interactions (the goal of the economic domain) make no sense.

To do this, we describe what a domain primarily aims to deliver (goal function), how actors interact in every domain, what the relevant criterion is to judge its success, how the value that is achieved is expressed and what the conditions are to be successful in achieving that. Of course, these domains are interlinked in how they provide human welfare. But *how* they achieve this differs per domain. We will discuss the domains and their features one by one (3.1–3.3). Table 1 summarises the three domains and their attributes.

3.1 Planet

In the *ecological domain*, the goal is a flourishing planet. According to Daly (1992), the ecological domain gets two other broad goals that lead to a flourishing planet:

1. Assessing and ensuring that the *scale* or magnitude of human activities within the biosphere is ecologically sustainable;
2. *Distribute resources and property rights fairly,* both within the current generation of humans, between current and future generations, and between humans and other species.

This last part of the second sentence opens the door to a discussion about values (IPBES, 2022): is it strictly anthropocentric (the value of nature for humans), or should we also care about the value of biodiversity and nature for itself? Going in that direction means that monetising ecosystems is impossible. Nevertheless, the general route taken in economics is to look at nature from an ecosystems perspective (Costanza & Daly, 1992; Costanza et al., 1997), where ecosystem services are the ecological characteristics, functions, or processes that directly or indirectly contribute to human well-being' (Costanza et al., 1997). However, whether these services can be monetised and seen as private goods is still questionable. Since not all relationships between and within ecosystems are known as well as the effects of changing something in the ecosystem to its long-term sustainability and resilience, pricing all ecosystem services is impossible (Dasgupta, 2021; IPBES, 2022). This impossibility poses a problem in a market economics framework: it is impossible to internalise externalities if they cannot be priced. Respecting ecological boundaries

Table 1 Domains and their attributes

Domain	Goal function	Actors	Interaction mechanism	Value expression	Criterion	Type of commodity
Planet	Flourishing planet	Groups of households and firms, including future generations	Collective decision-making	Biophysical boundaries	Preservation and regeneration	Common and public goods
Society	Inclusive society	Groups of households and firms	Collective decision-making	Output (public and club goods), fair distribution (including social foundations)	Solidarity and agency	Public and club goods
Economy	Output (and consumption)	Individual households and firms	Market exchange	Output (GDP)	Efficiency	Private goods

in such a way that humanity can survive in the long run is thus only possible with – in addition to market instruments where possible – additional measures, ranging from setting norms to prohibiting activities.[4] In addition to the actors mentioned before (households and firms either individually or in groups), future generations play a role and interaction is through collective decision-making.

Ecosystem services can be classified into different types of economic goods, depending on rivalry and subtractability of use (Ostrom, 2010). First, we distinguish between non-renewable resources and renewable resources. For non-renewable resources, it is, in most cases, relatively easy to establish property rights on extraction: that is what has been done with fossil fuels (oil, coal). The extraction has been given away in concessions (privatised), where states typically profit also from it as being the owner of the land. For metals and minerals, private companies are also commonly allowed to do the extraction. Sometimes it is harder to define property rights, for instance, on water quality or water management. What is often done is that public functions are delegated to private actors as a kind of market-simulating process.

For renewable resources where property rights can be clearly defined, real subsumption is what often happens: to increase agricultural production, biotechnological agricultural innovations are used to generate the returns required by the fact that private property rights, in most cases, also lead to a separation of the owner (or financier) and user. In a large class of renewable resources where it is hard to specify property rights (such as forestries and fisheries), marketisation is the route that is often taken to define property rights: quotas of fisheries, quotas for deforestation. Many environmental goods are common pool resources. Common pool resources include sufficiently large resources, so excluding potential beneficiaries from using them is non-trivial. However, individual consumptive use (for example, harvesting a truckload of forest products or withdrawing water from an irrigation system) reduces the available resource units for others (Ostrom, 2010). Without effective institutions to limit who can use diverse harvesting practices, highly valued, common pool resources are overharvested and destroyed.

The main criteria for this interaction mechanism are preservation and regeneration. By preservation, we mean that the burden of human activities on the ecosystem is kept within planetary boundaries (Steffen et al., 2015). By regeneration, we mean the capacity of the ecosystem to recover and restore itself and, in such a way, also deliver ecosystem services for future generations (Morseletto, 2020). So, the criterion by which the provisioning of goods should be judged is if they are in line with preservation or regeneration. If not, then they should not be provided.

The production in this domain is foremost (in-)formal regulation on different levels (international, national, local), for different areas (local, global) and over different time horizons (short-term regulations and long-term commitments). The value expression is biophysical boundaries achieved through the output of common and

[4] An example of such prohibition is the 1987 Montreal Protocol, that bans substances (chlorofluorocarbons) that deplete the Ozone Layer.

public goods, mostly related to the governance of ecological sustainability (preservation), but can also entail the production of nature services (regeneration).

The pioneering work of Ostrom (1990, 2010) sets conditions for the design of institutions for governing common pool resources. Rules can be thought of as instructions for creating an interaction in a particular environment (Ostrom, 2005, p. 17). The rules in the system can be either legal or voluntary, but all bind (inter-) action. Institutional rules are often self-consciously crafted by individuals to change the structure of repetitive situations they face to improve their outcomes. Biophysical conditions and social foundations reflect the assets or wealth of society and direct the needs of society. If ecological pressures are building up, more attention in decision-making goes to ecology because it will have more effect on well-being. These factors are state- and time-dependent and can alter the economic process.

Ostrom's rules are foremost intended to adhere to local common pool resources and more or less voluntary (non-governmental) governance. They can be generalised:

1. *Clearly defined boundaries*: Clear boundaries between legitimate users and non-users and boundaries that separate the common pool resource from the larger ecosystem.
2. *Membership rules*: Clearly defined appropriation rules congruent with social and environmental conditions and proportional to the distribution of costs and benefits.
3. *Collective choice arrangements*: Most individuals affected by a resource regime are authorised to participate in making and modifying its rules.
4. *Monitoring*: Individuals who are accountable to or are the users monitor the users' appropriation and provision levels and the resource's condition.
5. *Sanctions*: Sanctions for rule violations start very low but become more robust if a user repeatedly violates a rule.
6. *Conflict resolution mechanisms*: Rapid, low-cost local arenas exist to resolve conflicts among users or officials.
7. *Minimal recognition of rights*: The rights of local users to make the government recognise their rules or, if not appropriate, local governments make rules.
8. *Nested layers*: When a common pool resource is closely connected to a more extensive social-ecological system, governance activities are organised in multiple nested layers by government and non-government institutions.

In analogy with the invisible hand conditions for market exchange, we call these conditions the visible hand conditions for collective decision-making. In the same way as the invisible hand conditions for market exchange, the visible hand conditions for collective decision-making need to be in place to make the interaction effective. Trust is an overarching element or condition to make this work (Ostrom, 2010). Building trust in one another and developing institutional rules that are well matched to the ecological systems being used are crucial for solving social dilemmas. These conditions can also be applied to the provisioning of social goods.

3.2 Society

In the *social domain*, the goal is an inclusive society to optimise societal well-being. A core element to reaching that goal is that the primary interaction mechanism is not the market but collective decision-making. Three features are essential to attain that: Institutions, solidarity and agency. First, institutions govern who produces and redistributes what (private or public initiatives) and if it is seen as enough. Institutions are defined as: "*…customs and rules that proof incentives and disincentives for individuals. They entail enforcement of the self-enforcing variety through codes of behaviour or third party policing and monitoring.*" (North, 1986). It has been widely acknowledged that organisations are embedded into a broader social structure, and various institutions influence the decision-making of people and firms (Ioannou & Serafeim, 2012).

Next, solidarity and agency determine whether society is inclusive (Lima de Miranda & Snower, 2020). Inclusiveness is the goal of society, since Acemoglu and Robinson (2012) amongst others have shown that successful nations are inclusive. The criteria to evaluate the success of this domain are if there is enough solidarity and agency produced.Solidarity can be defined as contributing or belonging to a particular group or giving something (effort, tax payment) to the collective to have a fair distribution of income and wealth, resulting in a social foundation for society. Agency refers to the ability to act on behalf of what you value and have reason to value. If agency scores high, individuals are better at adapting to changing circumstances. A minimum subsistence level or social foundation is essential to promote agency. Translated to the macro level: if all individuals are (on average) better capable of adapting to their situation, this leads to a more resilient system. In some countries, based on culture, norms and institutions, this can lead to higher taxes and more public goods. In others, it can lead to lower taxes and more private social initiatives. While there might be a trade-off in some cases, it can also be the case that the social good is generally limited compared to market production, depending on social values and welfare attitudes (Arikan & Ben-Nun Bloom, 2015).

The individual actors (households, individuals) act in groups to achieve societal well-being through collective decision-making (either in public or private domain). This can be organised in families, local communities, municipalities, sports clubs, church communities, unions, local governments or semi-public institutions and, in the end, in national or supranational public institutions, but the core element is collective decision-making.

The value expression is the output of public, common and toll (club) goods, including a social foundation. The current approach to the right institutions for governing commodities is primarily based on the typology of characteristics of commodities. Samuelson (1954) based his typology on two different characteristics of commodities: the difficulty of excluding potential beneficiaries (excludability) and the degree of rivalrous in consumption of the commodity (rivalry). This fundamental division was consistent with the dichotomy of the institutional world into private property exchanges in a market setting (where exclusion of use is possible and rival), and government-owned property produced and governed by public institutions (for non-rival, non-exclusionary commodities).

However, Ostrom (2010) argues that there is not a strict dichotomy between rivalry and excludability and proposes subtractability in use (instead of rivalry) as a characteristic. Subtractability refers to the extent to which one individual's use subtracts from the availability of a good or service for consumption by others. This leads to the introduction of four ideal types of commodities: Public commodities (e.g., peace and security of a community, national defence, knowledge, fire protection, weather forecasts, lighthouses), private commodities (e.g., food, clothing, automobiles, labour, hospitality services), toll goods (e.g., theatres, private clubs, day-care centres) and common pool resources (e.g., groundwater basins, lakes, irrigation systems, fisheries, forests, clean air). Commodities can be highly heterogenous within those groups, resulting in very different 'right' institutional settings (Ostrom, 2010). In the social domain, the output consists of public and toll goods. In the ecological domain, the output consists of common pool resources. The production and use of these goods and resources have a collective decision-making process in common.

An optimal collective decision-making process must behave according to a few conditions that deliver optimal outcomes regarding solidarity and agency, which are generally the same visible hand conditions as are valid in the ecological domain. Note that this differs from the institutional quality derived from the public choice literature, which measures institutional quality by enhancing economic growth (Acemoglu et al., 2012; Kunčič, 2014; North, 2005). General conditions to satisfy optimal outcomes for the social domain are based on the public choice literature (efficient government) and the governance literature initiated by Ostrom (1990, 2005). First, the democratic process must lead to an inclusive (well-representative) democratic representation. Second, as all research on institutions holds, the quality in terms of no corruption or a 'delivering government' is paramount. Third, the provisioning of public social goods depends on culture and trust in society: trust is an important prerequisite for the quality of decision-making (Ostrom, 2005), and high-trust societies can provide them better and deliver more equality (Lous, 2020).

3.3 Economy

Drawing from market economics, the purpose of the *economic domain* is efficiently allocating resources (Daly, 1992), primarily via market exchange, as a nested function of the other domains. In market economics, the assumption is that everything valuable can be derived from market exchange (in the absence of market failures). Well-being is equated to (intertemporal) consumption. So, the value is expressed in monetary terms and measured as (market) output on a macro level in terms of GDP. The actors decide how they interact on the market on an individual (household, firm) level. The main criterion for this interaction is efficiency, and choices are steered by prices and the commodities traded in this domain are private goods.

Assumptions on utility and welfare optimisation (potential Pareto-optimality) make utility optimisation straightforward by maximising (intertemporal) consumption and hence maximising output. The conditions to let this work are in general, the invisible hand conditions (Sect. 2.2), but then changed to capture the dynamic

aspect of competition and to account for externalities. Competition can diverge from the optimal, static notion considering time and scale. Hence, there can be periods with the excess market power of firms. However, as long as competition policies and market forces make it temporary and market power also leads to societal gains (in terms of innovations that otherwise would not be invested in) and creative destruction erodes market power at regular times, this can be justified. The same holds for symmetric and perfect information. This theoretical condition needs real-world economics to be complemented with goals functions and policies to address the apparent failure of these assumptions (leading to externalities). Hence, we need policies to prevent nature stocks from becoming extinct and social policies to redistribute market outcomes. This also relates to the assumption that perfect substitutability between capitals (human, social, natural, financial and produced capital) should not be part of economics if it wants to deliver (social and ecological) sustainability.

4 Use the Full Range for Optimal Well-Being/Real-Life Conceptual Economics

Sustainability is not sufficiently part of market economics. Introducing different nested and interdependent domains, goal functions, interaction mechanisms, and criteria broadens economics. The application of a particular goal function and interaction mechanism depends on the current state, values, rules, and conditions. For example, does a society transgresses (global or local) ecological boundaries or does it lack employment and do people suffer in poverty? What are the rules (institutions), how do they function and what values are embedded in society? So, the best way forward is to analyse the current state and use the full range of instruments, interactions and goals to develop a sustainable economy.

Much effort and attention have, up till now, been drawn to replacing GDP as a solution to make economics more sustainable (Hoekstra, 2019; Stiglitz et al., 2009, 2018). Although GDP is an imperfect measure of well-being, replacing the goal is a necessary but not sufficient condition to reach a sustainable economy: it should address all elements of the system, from its goal, interaction mechanism and role of actors to criteria of evaluation when the interaction is a success.

There are different examples in the literature that try to come to such a synthesis of different domains or 'spheres' (Lima de Miranda & Snower, 2020). In addition, a strand of the literature shows the 'different varieties of capitalism' (Bowles & Carlin, 2021; Hall & Soskice, 2001; Magnin, 2018; Witt & Jackson, 2016). However, none systematically analyses how this relates to an optimal sustainable outcome for society. The framework from Ostrom (2005) comes close. She does analyse the relationship between different actors (participants), different ways of interactions, criteria and outcomes.

In our framework (Fig. 2), the economic process starts with the system factors—values and conditions—and starting position of the input variables—stocks of capitals. Values in society determine the goals for a (sustainable) society. Values also steer the balance between market exchange and collective decision-making and between collective decision-making using political processes or voluntary (free)

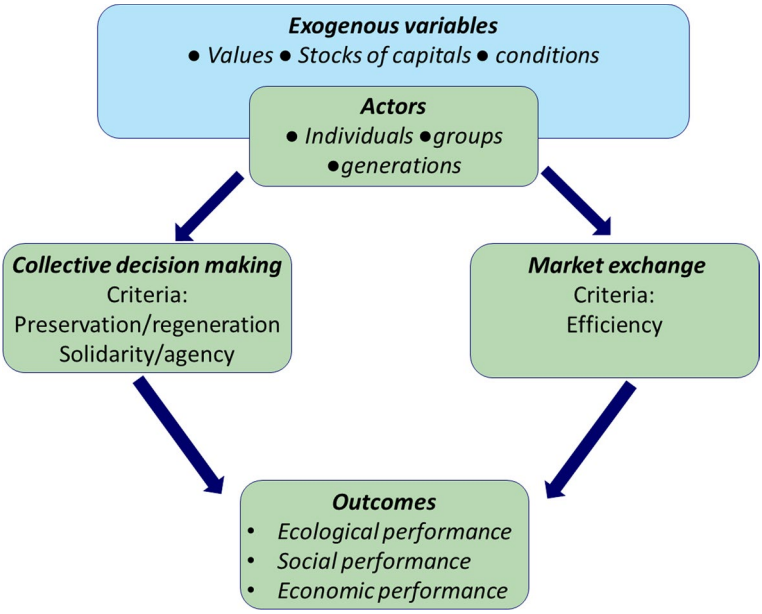

Fig. 2 A framework for governance to achieve a sustainable economy. *Source*: Adapted from Ostrom (2005), p. 15

social interaction. The conditions refer to the invisible and visible hand conditions that need to be in place to let interaction mechanisms work effectively. If the invisible hand conditions for markets don't work, they need to be adjusted, or it might be necessary to use collective decision-mechanisms. This also holds the other way around: if the visible hand conditions are violated, they need to be improved. Moreover, if that does not work, the market exchange might be an alternative but always given the associated goal.

Explicitly taking into account the starting position of society in terms of the level of wealth (stocks of capital: human, social, financial and natural) enables to account both for the structural effects on well-being levels of activity and also steers decision making in the direction where needs are highest: if ecological preservation is more important for society given the state of the natural environment, this will weigh more in decision-making.

Depending on these system factors and starting positions, actors set goals, which can be individual goals or goals for different groups. That aspiration level or intent determines the appropriate interaction mechanism. For example, efficiency is the dominant success criterion if the interaction is via market exchange. If it is by collective decision-making, the criteria for success depend on the target (either ecological or social). For both interaction mechanisms, the conditions (the invisible and visible hand conditions) need to be in place to let the interaction work effectively.

In their goal setting, actors are confronted with the hierarchical structure in which systems of nature and humans are interlinked. As discussed in Sect. 3, the economy is a nested part of the social system and also a subset of ecosystems. In that

way, actors can solve sustainability problems within the new governance framework depicted in Fig. 2.

In reality, goals, interactions and criteria are often mixed. For example, suppose the success of curbing carbon emissions is primarily judged by efficiency; every economist advises market exchange and Pigouvian taxes. However, if the success is judged against the relevant *goal*, it is clear that market exchange does not suffice: it is efficient but hard to implement because of distributional consequences between and within countries. Hence, more weight should be attached to collective decision-making.

The solution to market failures and the omission of sustainability in market economics is to do what implicitly already happens, but what is theoretically missing: put the different goals of the planet and society explicitly in the economic domain. However, then also consider consciously actors, interaction mechanisms and criteria (see Fig. 2). For instance, if short-termism and shareholder-driven companies have negative spill-over effects on society, such as inequality and pollution, a market economist would say: internalise externalities. Within this framework, it is clear that there are more options. For example, it is possible to use collective decision-making as an interaction mechanism, use different criteria or set different goals.

The modelling of the goals, interaction mechanisms and criteria is left for further research. The contribution of this paper is to clarify the need to expand the economic framework from the narrow market economics domain to the social and ecological domains.

5 Conclusion

We started this paper with the question: Can the market economy deliver progress for society and enhance the well-being of individuals in communities and future generations?

The answer is that because sustainability is absent in the preanalytical version of market economics, it is also impossible to bring it in as an objective. Moreover, because GFTS (globalisation, financialisation, technology and scale) increasingly violates invisible hand assumptions, the outcomes are increasingly unsustainable. The violations lead to (over)production and consumption of private goods, crowding out public goods and preservation of the commons. The one size fits all 'economic mechanism design' does not work. As long as social and ecological effects are treated as externalities (i.e., external to the governance framework), they cannot be solved within that framework.

To address this problem, we suggest using a nested domain approach: the planet (the ecological side of sustainable development) and the society (the social side of sustainable development) are added to the economic domain. Ecological, social or economic single-domain approaches cannot address the multiple-domain inquiries. Every domain has its goal, actors, interaction mechanism, conditions, success criteria and value expression. These goals are sometimes competing and have trade-offs: more GDP can adversely affect the planet and society, and vice versa. Therefore, this paper introduces a hierarchical structure (Panarchy) in which systems of nature

and humans are interlinked (Holling, 2001). Acknowledging that the economy is a nested part of a social system and a subset of ecosystems means that we need no longer solve sustainability problems in a reductionist way as 'externalities' within the economic system.

The main challenge of the new governance framework for sustainable development is balancing the different goals. Conceptually, this is more challenging than just maximising GDP, as current market economics tells us. However, different goals and interaction mechanisms for different domains provide a richer toolbox for policymakers to address the sustainability challenges.

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References

Acemoglu, D., & Robinson, J. (2012). *Why nations fail*. Crown Business.
Aghion, P., & Bolton, P. (1997). A theory of trickle-down growth and development. *Review of Economic Studies, 64*(2), 151–172.
Allen, C. R., Angeler, D. G., Garmestani, A. S., Gunderson, L. H., & Holling, C. S. (2014). Panarchy: Theory and application. *Ecosystems*, *17*(4), 578–589
Arikan, G., & Ben-Nun Bloom, P. (2015). Social values and cross-national differences in attitudes towards welfare. *Political Studies, 63*(2), 431–448.
Autor, D., Dorn, D., Katz, L. F., Patterson, C., & van Reenen, J. (2020). The fall of the labor share and the rise of superstar firms. *The Quarterly Journal of Economics, 135*(2), 645–709.
Bakaki, Z., Böhmelt, T., & Ward, H. (2022). Carbon emission performance and regime type: The role of inequality. *Global Environmental Politics, 22*(2), 156–179.
Besley, T., & Ghatak, M. (2010). Property rights and economic development. *Handbook of Development Economics, Volume 5* (pp. 4525–4595). Elsevier.
Black, A., & Fraser, P. (2002). Stock market short-termism—An international perspective. *Journal of Multinational Finance Management, 12*(2), 135–158.
Botzen, W. J. W., & van den Bergh, J. C. J. M. (2014). Specifications of social welfare in economic studies of climate policy: Overview of criteria and related policy insights. *Environmental and Resource Economics, 58*(1), 1–33.
Bowles, S., & Carlin, W. (2021). Shrinking capitalism: Components of a new political economy paradigm. *Oxford Review of Economic Policy, 37*(4), 794–810.
Calvano, B. E., Calzolari, G., Denicolò, V., & Pastorello, S. (2020). Artificial intelligence, Algorithmic Pricing, and Collusion. *American Economic Review, 110*(10), 3267–3297.
Carney, M. (2015). Breaking the Tragedy of the Horizon–Climate Change and Financial Stability. Speech at Lloyd's of London.
Coase, R. (1974). The lighthouse in economics. *Journal of Law and Economics, 17*(2), 357–376.
Costanza, R., & Daly, H. E. (1992). Natural capital and sustainable development. *Censervation Biology, 6*(1), 37–46.
Costanza, R., d'Arge, R., Groot, R. D., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R., Paruelo, J., Raskin, R., Sutton, P., Belt, M. V., & Den. (1997). Value of the world' s ecosystem services and natural capital. *Nature, 387*(May), 253–260.
Daly, H. E. (1992). Allocation, distribution, and scale: Towards an economics that is efficient, just, and sustainable. *Ecological Economics, 6*(3), 185–193.
Daly, H. E. (1996). *Beyond growth : the economics of sustainable development*. Beacon Press.
Daly, H., & Farley, J. (2011). *Ecological economics: Principles and applications*. Island Press.
Dasgupta, P. (2021). *The economics of biodiversity: The dasgupta review*. HM Treasury.
Dominioni, G. (2022). Pricing carbon effectively: A pathway for higher climate change ambition. *Climate Policy*, 1–9.
Downie, D. (2015). 'Still no time for complacency: Evaluating the ongoing success and continued challenge of global ozone policy. *Journal of Environmental Studies and Sciences, 5*(2), 187–194.

Eeckhout, J. (2021). *The Profit Paradox: How Thriving Firms Threaten the Future of Work*. (1st edition). Princeton University Press.
Fix, B. (2019). The aggregation problem: Implications for ecological and biophysical economics. *Bio-Physical Economics and Resource Quality, 4*(1), 1–15.
Frank, A. (2017). What is the story with sustainability? A narrative analysis of diverse and contested understandings. *Journal of Environmental Studies and Sciences, 7*(2), 310–323.
Friedman, M. (1970). The Social Responsibility of Business is to Increase its Profits. New York Times Magazine, 13 September 1970.
Furton, G., & Martin, A. (2019). Beyond market failure and government failure. *Public Choice, 178*(1–2), 197–216.
Gunderson, L., & Holling, C. (2002). *Panarchy: Understanding Transformations in Human and Natural Systems*. Island Press.
Haas, W., Krausmann, F., Wiedenhofer, D., & Heinz, M. (2015). How circular is the global economy?: An assessment of material flows, waste production, and recycling in the European union and the world in 2005. *Journal of Industrial Ecology, 19*(5), 765–777.
Hahn, T., McDermott, C., Ituarte-Lima, C., Schultz, M., Green, T., & Tuvendal, M. (2015). Purposes and degrees of commodification: Economic instruments for biodiversity and ecosystem services need not rely on markets or monetary valuation. *Ecosystem Services, 16*, 74–82.
Hall, P. A., & Soskice, D. (2001). *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford University Press.
Hart, O. (2017). Incomplete contracts and control. *American Economic Review, 107*(7), 1731–1752.
Hoekstra, R. (2019). *Replacing GDP by 2030*. Cambridge University Press.
Holling, C. S. (2001). Understanding the complexity of economic, ecological, and social systems. *Ecosystems, 4*(5), 390–405.
Ioannou, I., & Serafeim, G. (2012). What drives corporate social performance ? The role of nation-level institutions. *Journal of International Business Studies, 43*, 834–864.
IPBES. (2022). *Summary for policymakers of the methodological assessment regarding the diverse conceptualisation of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services.* IPBES, Bonn.
IPCC. (2022). *IPCC WGII Sixth Assessment Report*. New York.
Kauder, E. (2015). *History of marginal utility theory*. Princeton University Press.
Kelly, C., & Snower, D. J. (2021). Capitalism recoupled. *Oxford Review of Economic Policy, 37*(4), 851–863.
Krznaric, R. (2020). *The Good Ancestor: A Radical Prescription for Long-Term Thinking*. The Experiment.
Kunčič, A. (2014). Institutional quality dataset. *Journal of Institutional Economics, 10*(1), 135–161.
Kuznets, S. (1937). *National Income and Capital Formation, 1919–1935*. NBER Books.
Kuznets, S. (1955). Economic growth and income. *American Economic Review, 45*(1), 3–29.
Lima de Miranda, K., & Snower, D. (2020). Recoupling economic and social prosperity. *Global Perspectives, 1*(1), 1–29.
Lous, B. (2020). *On free markets, income inequality, happiness and trust*. CentER, Center for Economic Research.
Lucas, R. (1976). Economic Policy Evaluation: A Critique. In K. Brunner & A. H. Meltzer (Eds.), *The Phillips Curve And Labor Markets* (pp. 19–46). North-Holland.
Magnin, E. (2018). Varieties of capitalism and sustainable development: Institutional complementarity dynamics or radical change in the hierarchy of institutions? *Journal of Economic Issues, 52*(4), 1143–1158.
Masson-Delmotte, V., P. Zhai, H.O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, and S. Connors (2018). Global Warming of 1.5° C: An IPCC Special Report. Intergovernmental Panel on Climate Change.
Meadows, D. H., Meadows, D., Randers, J., & Behrens, W., III. (1972). *Limits to Economic Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*. Universe Books.
Meadows, D. H., & Meadows, D. (2007). The history and conclusions of the limits to growth. *System Dynamics Review, 23*(2–3), 191–197.
Miles, D. (1995). Testing for short termism in the UK stock market: A reply. *The Economic Journal, 105*(432), 1224. https://doi.org/10.2307/2235414
Mitchell, T. (1998). Fixing the economy. *Cultural Studies, 12*(1), 82–101.

Moos, K. A. (2019). The facts and the values of the Lucas critique. *Review of Political Economy, 31*(1), 1–25.
Morseletto, P. (2020). Restorative and regenerative: Exploring the concepts in the circular economy. *Journal of Industrial Ecology, 24*(4), 763–773. https://doi.org/10.1111/jiec.12987
Naidoo, R., & Fisher, B. (2020). Sustainable development goals: Pandemic reset. *Nature, 583*, 198–201.
Nordhaus, W. (2019). Climate change: The ultimate challenge for economics. *American Economic Review, 109*(6), 1991–2014.
North, D. (1986). The new institutional economics. *Journal of Institutional and Theoretical Economics, 142*(1), 230–237.
North, D. (2005). Institutions and the performance of economies over time. *Handbook of New Institutional Economics, 21–30,*. https://doi.org/10.1007/978-3-540-69305-5_2
O'Neill, D., Fanning, A., Lamb, W., & Steinberger, J. (2018). A good life for all within planetary boundaries. *Nature Sustainability, 1*(2), 88–95.
Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press.
Ostrom, E. (2005). *Understanding Institutional Diversity*. Princeton University Press.
Ostrom, E. (2009). A general framework for analysing Sustainability of Social-Ecological Systems. *Science, 325*(5939), 419–422.
Ostrom, E. (2010). Beyond markets and states: Polycentric governance of complex economic systems. *American Economic Review, 100*(3), 641–672.
Philippon, T. (2019). *The Great Reversal: How America Gave Up on Free Markets*. Harvard University.
Pigou, C. (1920). *The Economics of Welfare*. Macmillan.
Piketty, T. (2014). *Capital in the twenty-first century*. Harvard University Press.
Piketty, T. (2020). *Capital and Ideology*. Harvard University Press.
Raworth, K. (2017). *Doughnut Economics: 7 Ways to Think Like a 21st Century Economist* (first edit). Chelsea Green Publishing.
Ripple, W., C. Wolf, and T. Newsome (2019), 'World Scientists' Warning of a Climate Emergency', *Bioscience Magazine*, 2000(X): 1–20.
Røpke, I. (2020). Econ 101—In need of a sustainability transition. *Ecological Economics, 169*, 106515.
Sachs, J. (2015). *The Age of Sustainable Development*. Columbia University Press.
Sachs, J., Lafortune, G., Kroll, C., Fuller, G., & Woelm, F. (2022). *Sustainable Development Report 2022*.
Samuelson, P. (1954). The Pure Theory of Public Expenditure. *Review of Economics and Statistics, 36*(4), 387–389.
Samuelson, P., & Nordhaus, W. (2009). *Economics* (19th ed.). McGraw-Hill.
Sanchez-cartas, J. M. (2022). Artificial intelligence, algorithmic competition and market structures. *IEEE Access, 10*, 10575–10584.
Schumpeter, Joseph, A. (1942). *Capitalism, Socialism and Democracy* (Third edit). Harper perennial.
SEI, IISD, ODI, E3G and UNEP (2020), *The Production Gap Report: 2020 Special Report*, Stockholm.
Solow, R. M. (1974). Intergenerational equity and exhaustible resources. *Review of Economic Studies, 41*(5), 29–45.
Sperber, N. (2019). The many lives of state capitalism: From classical Marxism to free-market advocacy. *History of the Human Sciences, 32*(3), 100–124.
Steffen, W., Richardson, K., Rockström, J., Cornell, S., Fetzer, I., Bennett, E., Biggs, R., Carpenter, S., de Vries, W., de Wit, C., Folke, C., Gerten, D., Heinke, J., Mace, G., Persson, L., Ramanathan, V., Reyers, B., & Sörlinet, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science, 347*(6223), 736–747.
Stiglitz, Sen and Fitoussi (2009). Report by the Commission on the Measurement of Economic Performance and Social Progress. Paris.
Stiglitz, J. E., Fitoussi, J.-P., & Durand, M. (2018). *Beyond GDP Measuring What Counts for Economic and Social Performance*.
Temesgen, A., Storsletten, V., & Jakobsen, O. (2021). Circular economy—Reducing symptoms or radical change? *Philosophy of Management, 20*, 37–56.
Tirole, J. (2017). *Economics for the Common Good*. Princeton University Press.
UN (United Nations) (2015), 'UN Sustainable Development Goals (UN SDGs)—transforming our world: the 2030 Agenda for Sustainable Development', A/RES/70/1, New York.
UNFCCC (United Nations Framework Convention on Climate Change) (2015), 'Adoption of the Paris Agreement', Paris.
WCED. (1987). *Report of the World Commission on Environment and development*. United Nations.

Wiedmann, T., Steinberger, J., Lenzen, M., & Keyßer, L. (2020). Scientists' warning on affluence. *Nature Communications, 11*(3107), 1–10.
Witt, M., & Jackson, G. (2016). Varieties of Capitalism and institutional comparative advantage: A test and reinterpretation. *Journal of International Business Studies, 47*(7), 778–806.
Zaman, A. (2012). The normative foundations of scarcity. *Real-World Economics Review, 61*, 22–39.