

## ANALYSIS

## Economic growth dependencies and imperatives: A review of key theories and their conflicts

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## ABSTRACT

Despite evidence indicating that sustainability cannot be achieved without overcoming the economic growth paradigm, current societies continue to pursue destructive growth pathways. Theories on economic growth dependencies and imperatives (GDI) provide explanations for this behaviour by describing mechanisms that cause negative consequences for agents under conditions of zero economic growth. However, conflicting theories exist, impeding concerted efforts to make societal wellbeing independent from economic growth. To address this challenge, we provide a systematic review of 248 publications covering key theories of GDI. The review identifies 112 mechanisms, sorted into 21 clusters and six themes. We provide synthetic conceptual accounts of the diverse dimensions of GDI for each mechanism, such as how harm occurs without growth. We find that GDI mechanisms are more numerous and heterogeneous than previously thought. The analysis of conflicts between the theories shows that disagreements emerge from contradictory perceptions of the neutrality of fundamental social structures. These structures include the monetary economy, market competition, private property and the state. Furthermore, conflicts centre the specific roles of ideology, knowledge and culture. The findings of this comprehensive review highlight the importance of further theoretical and empirical research that deepens our understanding of GDI.

## 1. Introduction

Current societies' wellbeing depends on economic growth, while contemporary society-environment relationships are unsustainable and unjust (IPBES, 2019; IPCC, 2021). They are unsustainable, as their basis in perpetual economic growth erodes the material systems upon which life depends (Haberl et al., 2020; Ripple et al., 2024; Vogel and Hickel, 2023). They are unjust, as the impacts and causes of these ecological changes are highly unequally distributed (Chancel, 2022; Thiery et al., 2021; Tran et al., 2020). Additionally, the future of growth in early industrialised countries is uncertain given long-standing trends of secular stagnation, i.e. long term low economic growth (Jackson, 2019; Teulings and Baldwin, 2014). Yet, despite a growing scientific consensus on the structural unsustainability, injustice and uncertainty of continued economic growth in affluent countries, societies are locked into the pursuit of economic growth. Slow or negative growth within current economic structures result in recessions, socially harmful crises, rising unemployment, poverty and bankruptcies (Blauwhof, 2012; Lenzen

et al., 2020; Tokic, 2012). Many authors conceptualise this conjuncture as current societies being subject to 'economic Growth Dependencies and Imperatives' (GDI) which make social wellbeing dependent on economic growth (Cahen-Fourot, 2022; Corlet Walker et al., 2024; Richters and Siemoneit, 2019a; Wiman, 2024).

Numerous definitions of GDI exist. Richters and Siemoneit (2019a, p.129) differentiate between "growth imperatives" and "growth drivers". Imperatives are "exterior conditions that make it necessary for an agent (such as an individual, firm, or state) to increase their economic efforts as to avoid existential consequences". Growth drivers, on the other hand, comprise "two different mechanisms: (a) They reinforce existing growth imperatives. (b) Their coerciveness ranges from free will to social pressure, i.e., they impose a non-existential pressure or are attractive offers that are hard to refuse." Cahen-Fourot (2022, p. 2) defines macroeconomic growth imperatives as circumstances in which there is a "need for a society to grow its economy (in real GDP terms) to be socially and politically stable and to reproduce itself coherently over time, i.e., to foster social cohesion, and individual and collective

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wellbeing.” Similar issues are discussed under the concept of ‘growth dependency’, with Corlet Walker et al. (2024, p. 2) defining it as “[t] hose conditions that require the continuation of growth in order to avoid significant physical, psychological, social, and/or economic harms” (see also the preprint by Janischewski et al., 2024). Building on these definitions, in this article, we take a broad approach. We define GDI as mechanisms causing various negative consequences for the wellbeing of a group of agents under conditions of zero economic growth, i.e. stagnation, on various levels. This definition allows for the diverse aspects of wellbeing and captures the need for positive growth to avoid negative consequences, present in the previous definitions. We would like to stress two aspects about this definition. First, this definition means that for GDI mechanisms to be active, economic growth does not necessarily need to take place or to be actively pursued. The negative social consequences under stagnation are key, as pointed out for instance by Cahen-Fourot (2022). Second, this definition excludes mechanisms which would cause negative consequences only under negative growth rates. This is because these mechanisms would not require growth to avoid these negative impacts, hence not forming a GDI proper.

If growth leads to ecological destruction, but stagnation causes social crisis due to current social structures, the solution, following post-growth scholars, is to identify and transform these structures. Indeed, post-growth scholars have proposed heterogeneous proposals to address GDI (Alexander and Rutherford, 2014; Eversberg and Schmelzer, 2018; Schmelzer, 2014; Schmelzer et al., 2022). Proponents of post-growth aim to overcome GDI by directly pursuing socio-ecological justice and a good life for all, independently from economic growth (Alexander and Rutherford, 2014; Kallis et al., 2020; Schmelzer et al., 2022). However, beyond this basic consensus, substantial debate exists, including on a key question: What do the GDI of current economic and social systems consist of, precisely? Consequently, there is no consensus on how to make societal wellbeing independent from economic growth, impeding concerted efforts to overcome GDI.

For instance, debate surrounds the conditions under which markets and market economies exhibit GDI (see generally Lange, 2018 and Richters and Siemoneit, 2019a). More precisely, which mechanisms exist, how do the various mechanisms work exactly, and how do they interact? This concerns the question of the contribution of firm structure and ownership to GDI, with some seeing no contribution of private ownership (e.g. Lawn, 2011 and Richters and Siemoneit, 2019a) while others see private ownership as causing a GDI (see e.g. Lange, 2018; Leahy, 2018; Stratford, 2020). Despite the crucial relevance of the question of GDI, very few reviews on the topic exist (Lange, 2018; Richters and Siemoneit, 2017a, 2019a), each with its limitations. The review by Richters and Siemoneit (2017b) does not include more recent work (e.g. Lange, 2018; Exner, 2021; Cahen-Fourot, 2022; Nelson, 2022). Their methodology is not explicit, certain references and theories of GDI available at the time are not considered (e.g. Exner, 2014; Nelson, 2016). Finally, the theoretical disagreements between the clusters are not addressed explicitly. Similar issues apply to a later publication (Richters and Siemoneit, 2019a). Lange (2018) deals indirectly with GDI in current societies and only has a limited focus on financial markets, power and political economy. He thus does not consider the role of international dynamics, the state and non-market perspectives.

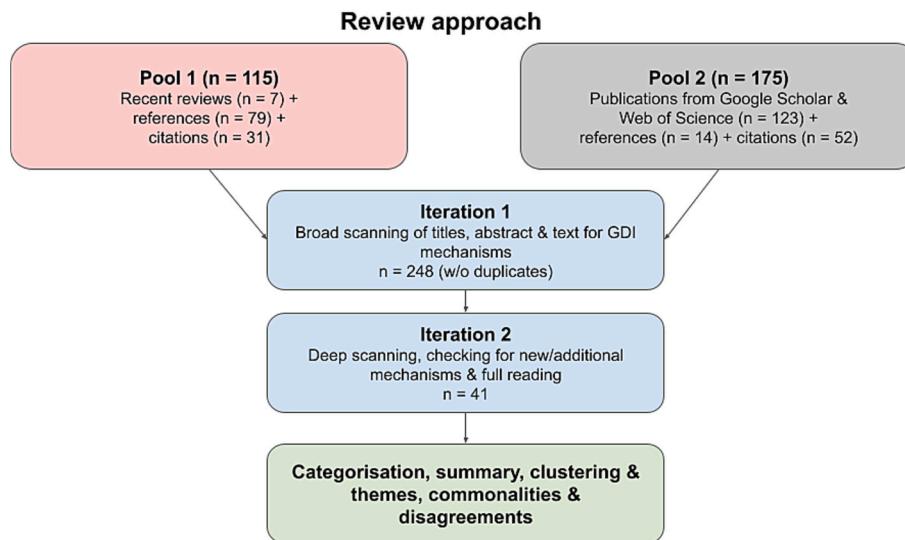
Since no comprehensive review of theories of GDI and their conflicts exists, this paper aims to answer the following research question. Which clusters of theories of GDI, in terms of their specific mechanisms, exist, and what are their principal theoretical disagreements and commonalities? By ‘mechanisms,’ we mean claimed causal phenomena which consist of elements and their interconnections that trigger empirical events under certain conditions (Mukumbang, 2023). To answer this question, we conduct a systematic literature review and categorisation of key theories of GDI. Importantly, this review does not aim to discriminate or prioritise between theories, but to collect and map key GDI mechanisms in the literature. This means that we also include mechanisms that have been heavily criticised in the literature, e.g. on

interest-bearing debt (see Section 3.3). We describe the methods employed in Section 2 and propose distinct clusters and themes of theories of GDI in Section 3.1 and 3.2. We map out the primary disagreements and commonalities between them in Sections 3.3 and 3.4. Finally, Section 4 discusses the main findings and limitations of this GDI review, and Section 5 concludes.

## 2. Methods

In this paper, we follow a systematic literature review approach, with an explicit research question, an initial literature sample, systematic searching of the literature using defined search terms and explicit inclusion criteria, as described by Sovacool et al. (2018, p. 23-24). We describe all the employed steps in detail below resulting in the pursuit of two pools of literature (see Fig. 1). We cover literature in English and German.

- 1. Pool 1:** Pool 1 includes recent reviews of the literature on degrowth, namely Kallis et al. (2018), Parrique (2019) and Schmelzer et al. (2022). It also includes recent reviews of GDI, namely Lange (2018) and Richters and Siemoneit (2017b), Richters and Siemoneit (2019b) and Richters and Siemoneit (2019a). We read them in full and include them in this review. Further, we screen the references within these reviews as well as publications citing the seven reviews via the databases Web of Science and Google Scholar. Including the seven references from Pool 1 as an initial sample is ultimately a personal choice subject to our biases.
- 2. Pool 2:** Additionally, we screen the 200 most cited publications out of the first 900 results on GDI from the database Google Scholar between 2012 and October/November 2023. For this, we use the python script by Wittmann (2024). We further scan the remaining publications with a minimum number of citations per year of five, if the total number of search results is below 10'000, or ten, if the total number of search results is above 10'000. This is done in order to alleviate the bias in favour of older publications, while maintaining feasibility. We choose different combinations of search terms to achieve two goals. Firstly, to also cover different but similar descriptors for the same concept, e.g. growth compulsion or coercion. Secondly, to further find publications from the diversity of positions within the degrowth and post-growth debates, following the categorisation of Alexander and Rutherford (2014), including reformist, socialist and anarchist strands. We also scan the database Web of Science using the same search terms, but without year restriction. Exact search terms, result numbers and search dates can be found in the Supplementary Material (SM) 1, Section 1. After obtaining a list of publications that we include in this review from this initial database search, we conduct two further steps: We screen the references of these publications, and we screen publications which cited them via the databases Web of Science and Google Scholar (in February 2024).
- 3. First iteration - Criterion of inclusion:** In iteration one, for both screening processes in pools 1 and 2, we scan title, abstract and, only in absence of an abstract, also relevant content of the full text. This scanning is done using a keyword search for terms like “economic growth”, “growth”, “grow”, “imperative”, “dependency”, “expansion”, “unemployment” or similar terms. We include publications which fulfil the following criterion. The publication needs to mention, discuss or put forward theories of GDI or similar concepts, but always with a reference to negative impacts on the wellbeing of agents. This includes forms of social coercion, existential consequences, reduced life satisfaction/happiness, social/political/economic/firm instability or crisis under conditions of zero growth of various growth variables. Our formulation excludes mechanisms that are only active under negative growth rates. However, it allows for mechanisms that show graduality, e.g. harm already beginning at insufficient positive growth rates with the harm increasing with



**Fig. 1.** An overview on the literature review approach taken within this study. For additional detail, see also Table S1 in the Supplementary Material (SM) 1, Section 3.

lower growth rates. This is in line with the definition in the introduction. The full list of references included in iteration one can be found in the SM 1, Section 2.

4. **Second iteration - Criterion for inclusion:** We then screen the publications included from the first iteration in greater depth. We only consider those in the further review which explicitly put forward or discuss in-depth theories of GDI that have not yet been proposed by previously included publications. We do this to maintain the necessary rigour of the review and due to time and space constraints, while still striving for maximum depth, diversity and coverage. This inclusion process however ultimately remains a personal judgement, introducing limitations to the findings. We also include publications from the grey literature when they meet the criterion for inclusion. Fig. 1 details the numbers of publications included from each of these steps (see also Table S1 in the SM 1, Section 3). Finally, we read the publications included from iteration two in full.
5. **Categorisation and summary:** We categorise as well as summarise each proposed/claimed GDI mechanism within each publication (see the SM 3, Section 2). This includes categories such as the growth variable, how and where social harm occurs without growth, details on the growth-harm connection and graduality, as well as the time frame until harm. This categorisation builds on recently proposed frameworks of growth dependencies by Corlet Walker et al. (2024) and Janischewski et al. (2024). We adopt the following categories: object of growth/unit of measurement (here growth variable), agent(s) being harmed and type of harm/relevant functions or properties (here harm how and where?) and level of growth (here growth level-harm connection and time frame until harm). The categorisation then forms the basis for Section 3.3 on theoretical differences.
6. **Clustering and themes:** Next, we group the mechanisms into clusters of similar proposed/claimed causal elements of the GDI mechanism, based on their respective mechanism description. In turn, we group the clusters into larger themes. Since mechanisms often include multiple causal elements, the clustering as well as grouping into themes is not clear-cut and multiple possibilities exist.

7. **Commonalities and disagreements:** We then discuss issues of theoretical commonality and disagreement between the mechanisms and clusters. This is grounded in interested pluralism in economics, as proposed by Dobusch and Kapeller (2012). We base the discussion on a conflict and a causal matrix (see SM 2, Section 2). An in-depth

assessment of commonalities and disagreements is however beyond the scope of this review paper.

### 3. Results

#### 3.1. Overview

This literature review yields 112 proposed/claimed mechanisms of GDI, grouped into 21 clusters, in turn attributed to six overarching themes (i.e. groups of clusters): “A. Fundamental economic structure”, “B. Configuration/Regulation of market competition”, “C. Financial system”, “D. Culture and ideology”, “E. The state, power and domination” and “F. Miscellaneous”. This result is based on 248 references from iteration 1 and 41 references from iteration 2 (see Fig. 1). Table 1 provides an overview of the themes, their clusters, mechanism names and references of each cluster. Depending on the precise interpretation, several clusters, e.g. “1) Accumulation”, could be attributed to other themes, as per the shading shown in Fig. 2. The chosen numbering of the mechanisms does not have meaning. Some clusters have significantly more mechanisms and references than others, indicating a focus of the literature on the largest clusters. The five largest ones in both dimensions are: “10) Working time / Labour-saving technological change”, “3) Economic class and private property”, “12) Private interest-bearing debt & money creation”, “6) Advantages of firm size” and “4) Market competition” (see Fig. 3). Following our analysis, the clusters also have connections and causal interactions, as shown in Fig. 2. The next sections provide summaries for each cluster.

A core result of this review is that the claimed mechanisms for GDI are more numerous than can be assumed based on previous literature reviews (Section 4.2). To provide more systematic detail, the SM 1, Section 3, presents figures indicating connections and causal interactions between the mechanisms for each theme (see also Fig. 2). The full list, with the detailed mechanism descriptions, references and all additional categories can be found in the SM 3, Sections 1 and 2.

#### 3.2. Summary of mechanism clusters

This section provides summaries of each cluster and most proposed/claimed GDI mechanisms that emerge from this review, structured by overarching themes. Related literature is cited in Table 1. It is important to note that we do not provide an assessment of the mechanisms' relative significance (see also Section 4.2). The following summaries can only be

**Table 1**

An overview on the themes, the clusters, corresponding mechanism numbers and names as well as the references of each cluster. For the full descriptions, including the linked references, see SM 3, Sections 1 and 2.

#	Cluster	Mechanism number & name	References
<b>A. Fundamental economic structure</b>			
1	Accumulation	1.1) Accumulation of interest revenues (macro) 1.2) Accumulation of money out of accounting profits (macro) 1.3) Accumulation of money out of income (macro) 1.4) Accumulation of money out of tax incomes (macro) 1.5) Accumulation of assets by any economic actor / continuous loss of assets by any actor (macro) 1.6) Unfavourable relation between interest rate, rate of profit, propensity to consume and propensity to save leading to instability (macro)	Richters and Siemoneit, 2017b; Richters and Siemoneit, 2017a; Lange, 2018; Binswanger, 2019; Richters and Siemoneit, 2019b; Cahen-Fourot, 2022; Hein and Jimenez, 2022
2	Income and wealth inequality	2.1 & 2.2) Income and wealth inequality, static & dynamic (macro) 2.3) Income and wealth inequality preventing zero savings rate (macro)	Richters and Siemoneit, 2017b; Lange, 2018; Kallis et al., 2018; Binswanger, 2019; Stratford, 2020; Hinton, 2020; Cahen-Fourot, 2022; Schmelzer et al., 2022
3	Economic class and private property	3.1) Accumulation via private property (macro) 3.2) Private property causing class conflict (macro) 3.3) Private accumulation/benefit preventing working time reductions (macro) 3.4) Private accumulation/benefit causing preference for long working times (macro) 3.5) Private land ownership leading to large mortgage payments for households, causing a preference for long working times (macro) 3.6) Private property in combination with debt-based money creation via private banks leading to asset-price-boom-bust dynamics which cause a high debt-to-GDP ratio (macro) 3.7) Shareholder-ownership structure punishing no-growth (micro) 3.8) Class conflict causing the need of pacification via consumption (macro) 3.9) Rent-seeking in sectors of low labour productivity growth causing cost-shifting (micro) 3.10) Private investors being able to reduce/stop investments following bad risk-return ratios, leading to crisis (macro) 3.11) Private property causing positional consumption competition (macro) 3.12) Private property causing positional consumption competition (micro)	Schweickart, 2010; Smith, 2010; Magdoff and Foster, 2010; Exner and Lauk, 2011; Blauwhof, 2012; Posse, 2015; Lange, 2018; Koch, 2018; Kallis et al., 2018; Binswanger, 2019; Stratford, 2020; Hinton, 2020; Schmelzer et al., 2022; Corlet Walker, 2023
4	Market competition	4.1) Market competition causing profit accumulation, with profits coming at the expense of labour without growth (macro) 4.2) Market competition causing profit accumulation with insufficient profits & investments without growth, leading to crisis (macro) 4.3) Market competition causing need to accumulate profits for net-investments in cost-competitiveness (micro) 4.4) Market competition causing need to accumulate profits for net-investments in innovation-competitiveness (micro) 4.5) Market competition causing need to accumulate profits to increase attractiveness for job seekers/workers (micro) 4.6) Market competition leading to uncertainty which causes need to accumulate (micro) 4.7) Uncertainty from market competition leading to accumulation and labour-saving technological change (macro) 4.8) Uncertainty from market competition leading to reductions of aggregate demand, causing crisis (macro) 4.9) Uncertainty from market competition leading to taking up of debt, causing financial crises over time (macro)	Magdoff and Foster, 2010; Blauwhof, 2012; Posse, 2015; Richters and Siemoneit, 2017b; Richters and Siemoneit, 2017a; Heinrich, 2018; Lange, 2018; Kallis et al., 2018; Alexander and Gleeson, 2019; Binswanger, 2019; Richters and Siemoneit, 2019a; Matkovic, 2020; Cahen-Fourot, 2022; Nelson, 2022; Schmelzer et al., 2022; Vogel et al., 2024
5	Monetary economy	5.1 & 5.2) Fundamental uncertainty causing the need to accumulate, macro & micro 5.3) Monetary economy causing competition, accumulation and deprivation without growth (macro) 5.4) Monetary economy causing competition, accumulation and need to reinvest profits (micro) 5.5) Monetary economy without growth necessitating authoritarian central state planning (macro) 5.6) Inherent store of value function of money leads to scarcity of money without growth (macro)	Exner and Lauk, 2011; Exner, 2014; Heinrich, 2018; Cahen-Fourot, 2022; Nelson, 2022
<b>B. Configuration/Regulation of market competition</b>			
6	Advantages of firm size	6.1) Economies of scale (micro) 6.2) Better reputation (micro) 6.3) Integration of part of the supply chain / power over suppliers (micro) 6.4) Power over government (micro) 6.5) Systemic interconnectedness of large firms (micro) 6.6) Financial independence and security (micro) 6.7) Exploitation of international wage, tax, and regulation differences	Schweickart, 2010; Smith, 2010; Posse, 2015; Richters and Siemoneit, 2017b; Lange, 2018; Kallis et al., 2018; Binswanger, 2019; Parrique, 2019; Hinton, 2020; Alexander and Gleeson, 2021; Nelson, 2022

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**Table 1 (continued)**

#	Cluster	Mechanism number & name	References
7	Cheap resources and energy	(micro) 6.8) Achieving (near) monopoly position (micro) 6.9) Advantages of firm size requiring net-investments which come at the expense of labour (macro) 6.10) Sales effort (micro) 7.1) Cheap/Abundant resources & energy enabling net-investments driving innovation- and cost-competitiveness (micro) 7.2) Cheap/Abundant resources driving labour-saving technological change, while meritocracy prevents redistribution (macro) 7.3) Wrong knowledge about natural technological progress keeps resources cheap, causing technological unemployment (macro) 7.4) Cheap/Abundant resources & energy enabling efficiency consumption (micro)	Richters and Siemoneit, 2017b; Richters and Siemoneit, 2019b; Richters and Siemoneit, 2019a
8	For-profit firms and profit maximisation	8.1) For-profit firm framework causing bankruptcies/take-over of stagnating firms (micro) 8.2) For-profit firm framework causing accumulation and inequality (macro) 8.3) Profit maximisation increasing effective cost of living (macro) 8.4) Profit maximisation causing cost-minimisation, unemployment and poverty (macro) 8.5) Profit maximisation reducing pension spending (macro)	Hinton, 2020; Vogel et al., 2024
9	Sales effort	9.1) Advertising / Sales effort causing consumerist culture (micro) 9.2) Planned obsolescence (micro)	Posse, 2015; Lange, 2018; Parrique, 2019; Binswanger, 2019
10	Working time / Labour-saving technological change	10.1 & 10.2) Incentives for labour-saving technological change, macro & micro 10.3) Full working time policy / Absence of working time reduction (macro) 10.4) Full working time social preference (macro) 10.5) Full working time in capital/investment goods sector (macro) 10.6) Industrial sector dominance (macro) 10.7) Dirty/Unsustainable sector dominance (macro) 10.8) Welfare state financing being threatened by technological unemployment (macro) 10.9) Incentives for labour-saving technological change in the housing sector (micro) 10.10) Efficiency consumption (micro) 10.11) Baumol's cost disease (micro) 10.12) Baumol's cost disease in the absence of increased taxes (macro) 10.13) Incentives for labour-saving technological change in the absence of redistributive policies (macro)	Antal and van den Bergh, 2013; Richters and Siemoneit, 2017b; Lange, 2018; Kallis et al., 2018; Richters and Siemoneit, 2019b; Binswanger, 2019; Richters and Siemoneit, 2019a; Schmelzer et al., 2022; Zu Ermgassen et al., 2022; Corlet Walker, 2023; Jimenez, 2023
11	C. Financial system Financial market depreciation	11.1) Depreciation of houses as financial assets without growth creating financial insecurity for homeowners (micro/meso) 11.2) Financial sector being dependant on housing as financial asset creating vulnerability (micro/meso) 11.3) Funded pension schemes causing vulnerability of pensions (macro)	Zu Ermgassen et al., 2022; Corlet Walker, 2023
12	Private interest-bearing debt and money creation	12.1) Private bank interest accumulation (macro) 12.2) Public debt via interest-bearing private financing (macro) 12.3 and 12.4) Interest-bearing debt servicing, macro and micro 12.5) Uncertainty causing interest-bearing debt servicing (micro) 12.6) Fractional reserve banking with interest (macro) 12.7) Re-lending of credit leading to scarcity of money in the absence of growth (macro) 12.8) Credit money leading to persistent underutilisation of economic capacity via liquidity preference (macro) 12.9) Compounding interest leading to unpayable debts without growth (macro)	Antal and van den Bergh, 2013; Posse, 2015; Strunz et al., 2017; Lange, 2018; Kallis et al., 2018; Alexander and Gleeson, 2019; Binswanger, 2019; Parrique, 2019; Alexander and Gleeson, 2021; Kimmich and Wenzlaff, 2021; Hartley and Kallis, 2021; Cahen-Fourot, 2022
13	D. Culture and ideology Consumerist culture	13.1) Positional competition (micro) 13.2) Happiness via consumption for social distinction and emulation (micro) 13.3) Rising consumer aspirations / habitual consumption (micro) 13.4 & 13.5) Identity consumption, macro & micro	Røpke, 2010; Schweickart, 2010; Posse, 2015; Richters and Siemoneit, 2017b; Lange, 2018; Koch, 2018; Büchs and Koch, 2018; Parrique, 2019; Binswanger, 2019; Schmelzer et al., 2022
14	Growthist ideology	14.1 & 14.2) Ideological colonisation of growth / growthist mental infrastructure, macro & micro 14.3) Dominant belief that positive GDP growth is a good indicator for economic health causing instability (macro)	Antal and van den Bergh, 2013; Koch, 2018; Büchs and Koch, 2018; Parrique, 2019; Schmelzer et al., 2022
15	Neoliberal ideology and policy	15.1) Ideology of balanced budgets leading to debt spiral and deprivation (macro) 15.2) Neoliberal state policy/Austerity causing deprivation (macro)	Corlet Walker, 2023; Olk et al., 2023; Vogel et al., 2024

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**Table 1 (continued)**

#	Cluster	Mechanism number & name	References
E. The state, power and domination			
16	Power and domination	16.1 & 16.2) Accumulation/Growth as economic & political power/ domination, macro & micro	Richters and Siemoneit, 2017b; Parrique, 2019; Alexander and Gleeson, 2021; Schmelzer et al., 2022
17	The state, elites and geopolitics	17.1) Economic competition among states/Mobile capital punishing no-growth (macro) 17.2) Lack of growth weakening geopolitical power and military strength of states (macro) 17.3) Political ruling class accumulates resources for own power and reproduction causing deprivation (macro) 17.4) Political dominator class causing statist military competition, necessitating growth for military defence (macro)	Blauwhof, 2012; Carter, 2013; Isendahl et al., 2014; Richters and Siemoneit, 2017b; Alexander and Gleeson, 2019; Alexander and Gleeson, 2021; Schmelzer et al., 2022
18	Welfare state financing	18.1) Political promises on social security requiring growth (macro) 18.2) Zero growth compromising welfare state financing (macro) 18.3) State debts compromising welfare spending without growth (macro)	Blauwhof, 2012; Richters and Siemoneit, 2017b; Kallis et al., 2018; Richters and Siemoneit, 2019b; Binswanger, 2019; Parrique, 2019; Richters and Siemoneit, 2019a; Schmelzer et al., 2022; Corlet Walker, 2023
F. Miscellaneous			
19	Miscellaneous	19.1) Needs exceeding productivity (macro) 19.2) Long supply chains and high degrees of specialisation causing higher vulnerability to low growth rates (macro)	Posse, 2015; Corlet Walker, 2023
20	Population structure	20.1) Demographic change increasing health costs (macro) 20.2) Demographic change causing reductions of unfunded pensions (macro) 20.3) Demographic change increasing adult-social care costs/demands (micro) 20.4) Population growth (macro) 20.5) Population growth without working time reduction (macro)	Richters and Siemoneit, 2017b; Lange, 2018; Petschow et al., 2018; Kallis et al., 2018; Corlet Walker, 2023
21	Technology and infrastructure	21.1) Consumption growth infrastructural lock-in (micro) 21.2) Agricultural transition driving inter-group competition and group selection (macro/micro) 21.3) Medical technology cost increases (macro) 21.4) Industrial system leading to increasing complexity and economic inputs (macro)	Ropke, 2010; Gowdy and Krall, 2013; Richters and Siemoneit, 2017b; Petschow et al., 2018; Lange, 2018; Schmelzer et al., 2022

strongly condensed due to space constraints. Therefore, if an explanation of a mechanism seems unclear, we recommend consulting SM 3 for the full detail as well as the links to the original sources.

#### Theme A: Fundamental economic structures

The first theme comprises five clusters that locate GDI within fundamental economic structures.

**“1) Accumulation”** mechanisms focus on the continuous net-accumulation of money from circulation at the macro level, i.e. a net-saving of assets by different actors. Money or other assets can be acquired from different sources (M1.5, i.e. mechanism 1.5 in Table 1 and SM 3), including interest revenue (M1.1), firm profits (M1.2), household incomes (M1.3) or taxes (M1.4). In the absence of sufficient growth to compensate for this net-removal, accumulation leads to a continuous loss of assets and amassing of liabilities for other actors. This causes a scarcity of money in circulation. In turn, such scarcity makes debt repayment impossible, causing financial instability, bankruptcies and poverty.

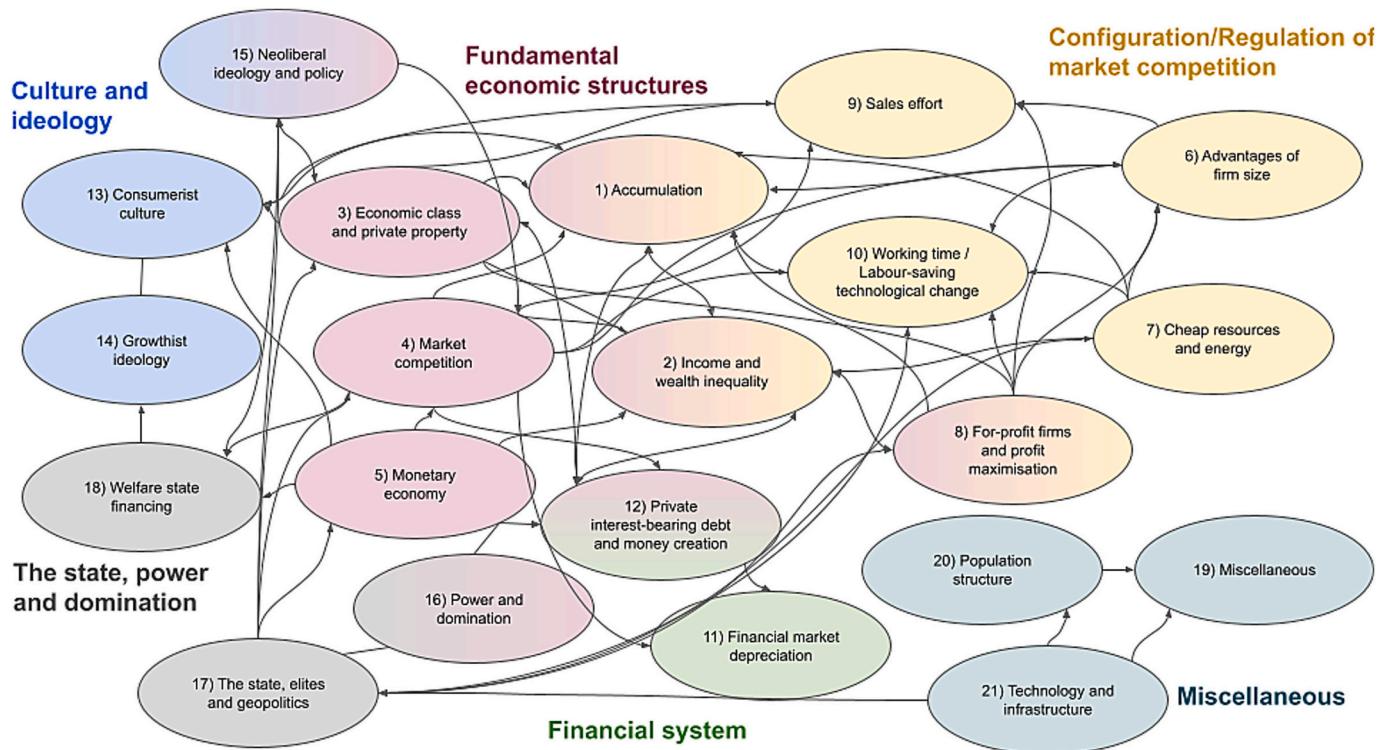
**“2) Income and wealth inequality”** mechanisms point to significant inequality in income and wealth leading 1) directly (M2.1) or 2) dynamically (M2.2) to deprivation among lower-income segments. This is because goods and services are appropriated by higher-income groups. Thirdly, inequality leads to a decreasing rate of consumption with higher income and wealth (M2.3). This means that the rich save a higher / consume a lower proportion of their income than do poor households. Money is hence accumulated and not put back into circulation via consumption. As in cluster 1, this causes financial instability.

**“3) Economic class and private property”** directly cause net-accumulation of income and wealth, by property owners / capitalists, as they benefit from this relationship of power, exploitation and domination (M3.1). They do this via manifold methods, including cost-shifting in sectors of low labour productivity growth (M3.9) and exploitation of workers. The latter works e.g. by preventing working time reductions (M3.3) or causing a preference for longer working times among workers since wages are kept low (M3.4). Capitalists thereby

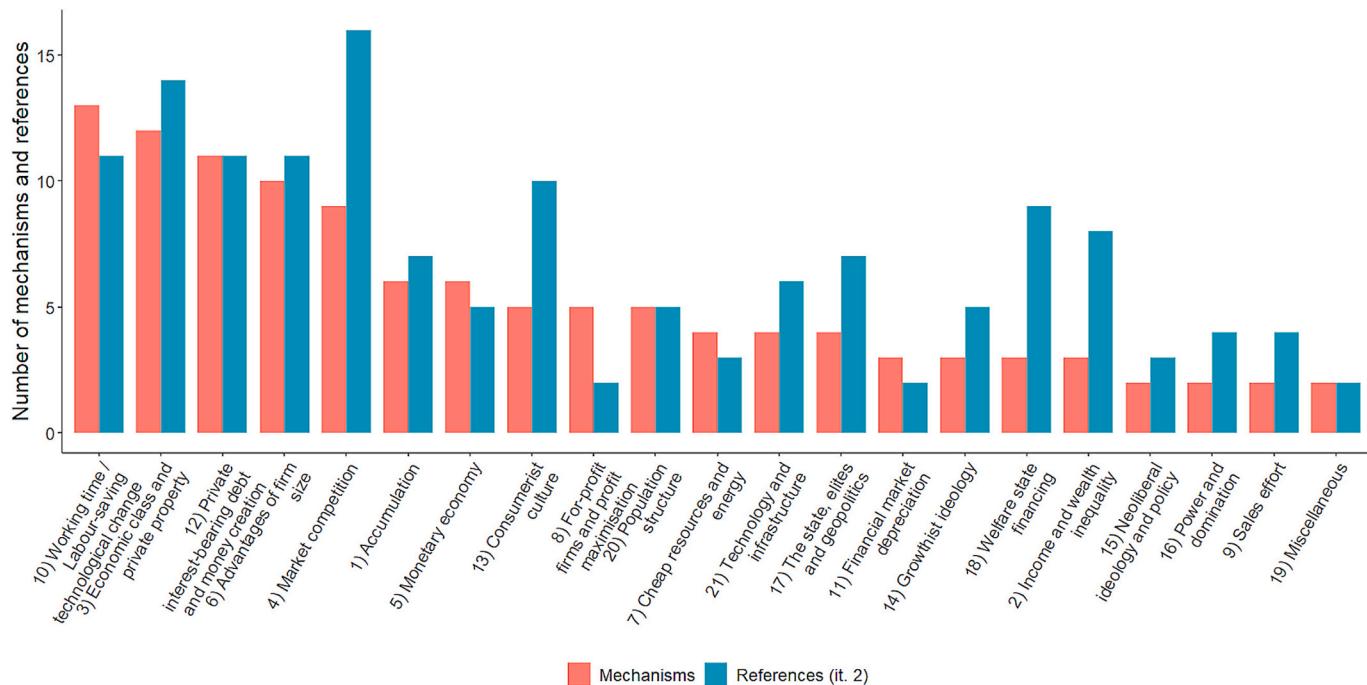
remove money from circulation at the cost of workers (see also cluster 1) and expose them to their replacement by labour-saving technological change (see also cluster 10). Under stagnation, this then causes unemployment, poverty and deprivation, as the compensating effect of growth is lacking. Several other mechanisms exist (M3.2, M3.5–8), but cannot be summarised here.

In **“4) Market competition”** mechanisms, firms directly need to increase their relative accounting profits and related net-investments to remain competitive. Investments drive 1) cost-saving changes (M4.3), 2) product innovation (M4.4), and 3) attractiveness to workers (M4.5). Non-growing firms fall behind in competition and risk going bankrupt. In the absence of GDP growth and with this dynamic leading to a need to increase the profit share, workers suffer from a decreasing wage share (M4.1). Furthermore, firms only invest under sufficient profit expectations, but profit expectations become low and risks high (M4.2), causing a spiral of reductions in investments, unemployment and further worsening expectations. “Market competition” mechanisms also emphasise fundamental uncertainty in any competitive market economy around future revenue. Firms then maximise profits in order to maximise security, implying increased uncertainty and risk of bankruptcy for non-growing firms (M4.6). In the absence of GDP growth, this dynamic results in 1) negative pressures on production costs and 2) net-accumulation of wealth and negative pressures on aggregate demand. The former causes technological unemployment (M4.7) and the latter economic crisis (M4.8).

**“5) Monetary economy”** mechanisms feature fundamental uncertainty around future income, tied to uncertain sales, input and output prices, atomistic production, competition and secrecy of firms, being part of any monetary economy. Consequently, economic agents maximise financial revenues to maximise security. Non-growing firms will not achieve security increases, thus becoming uncompetitive, e.g. during a crisis (M5.2). Without GDP growth, expectations of profits deteriorate, investment is held back, and money is hoarded (M5.1). The monetary economy also has numerous socio-cultural consequences. These include



**Fig. 2.** An overview of the clusters of GDI mechanisms, showing some selected key connections and causal interlinkages, as well as the overarching themes across the clusters. This figure gives an impression of the complicated connections and causal interlinkages across clusters. Connections here signify that mechanisms in different clusters share certain similar components or elements, e.g. clusters 13 and 14 share the important role of beliefs and ideology. Causal interlinkages signify that some mechanisms in a cluster claim to cause dynamics that are described by other mechanisms in another cluster. For instance, some mechanisms in cluster 5 claim to cause mechanisms in cluster 4. Not all existing causal interlinkages can be shown here for simplicity purposes. A matrix describing all interlinkages is in the SM 2, Section 2.



**Fig. 3.** The distribution of the number of mechanisms as well as the number of references from iteration 2 across the mechanism clusters. For the data see SM 2, Section 1.

1) isolation between humans, 2) prevention of relationships of reciprocal empathy, and 3) exclusion of people that lack purchasing power (M5.3 and M5.4). These characteristics result in generalised competition, social distrust and uncertainty. Additionally, money embodies social power and productivity. Hence, more money is inherently more powerful, safer, productivity-enhancing, and functions as an inherent store of value (M5.6). Non-growing firms thus face competitive disadvantages (M5.4). Further, absence of GDP growth increases the intensity of competition, worsening the exploitation of workers to extract remaining profits (M5.3). Stagnation then necessitates authoritarian central state planning to suppress resulting social conflict (M5.5), causing deprivation of freedom.

#### **Theme B: Configuration/Regulation of market competition**

The second theme comprises five clusters that locate GDI within the specific configuration/regulation of market competition.

**"6) Advantages of firm size"** mechanisms connect competitive advantages to firm size, with firm size being connected to net-investments. Uncompetitive, smaller firms will over time either go bankrupt, as they lose market share, or will be acquired by larger firms. Advantages of firm size include superior economies of scale (M6.1), reputation (M6.2), power over suppliers (M6.3), power over governments (M6.4), systemic interconnectedness (M6.5), financial independence and security (M6.6), possibilities for exploitation of international wage, tax, and regulation differences (M6.7), achievement of a (near) monopoly position (M6.8) as well as sales effort (M6.10). These various advantages lead to a necessity for firms to maximise and reinvest large parts of accounting profits. In the absence of GDP growth, this pressure to increase the profit-share comes at the expense of workers by depressing the wage-share. This in turn leads to rising unemployment and deprivation (M6.9).

**"7) Cheap resources and energy"** mechanisms enable firms to utilise net-investments to increase their relative competitiveness (M7.1). This works for cost reductions and product innovation, with both channels heavily incorporating resources and energy, e.g. via machinery or high-tech product features, making stagnating firms uncompetitive. However, this mechanism only becomes a macroeconomic growth imperative when redistributive policies are blocked politically, which can result from the societal value system of meritocracy (M7.2). Meritocracy ties economic reward to the degree of effort. Increases in labour productivity then lead to unemployment in the absence of real GDP growth, while meritocracy limits redistribution between workers and the unemployed, causing deprivation. Resource abundance is maintained due to flawed assumptions of unstoppable technological progress among policymakers, making them believe to be unable to change the direction of technological progress (M7.3). Lastly, abundant resources enable the availability of consumption options that increase time efficiency and flexibility (M7.4) for workers and consumers. Without growth in individual consumption, workers competing in the labour market will be unable to increase their efficiency via such products and the individual becomes uncompetitive.

**"8) For-profit firms and profit maximisation"** mechanisms allow firm owners/managers to pursue profit as a main business goal, in many cases for private benefit. This pursuit of profits in turn causes bankruptcies of firms that do not as aggressively pursue profits (M8.1). Without GDP growth, the pursuit of profits by owners/managers leads to dynamics of accumulation (see cluster 1) and inequality (see cluster 2), causing deprivation (M8.2). Additionally, in the absence of GDP growth, profit maximisation causes harm via the following three mechanisms. This applies to conditions of restricted welfare states that do not alleviate the resulting deprivation through e.g. universal basic incomes, basic services and/or job guarantees. Profit maximisation then leads to 1) rising effective costs of living, (M8.3), 2) minimisation of labour costs (M8.4), as well as 3) reductions to pension contributions. The latter applies especially to pay-as-you-go systems in which current contributions finance current expenditures. These three mechanisms in turn result in unemployment, poverty and insecurity among pensioners in the

absence of GDP growth.

The cluster "**9) Sales effort**" includes two mechanisms: advertising (M9.1) and planned obsolescence (M9.2). Advertising by firms causes consumers to desire certain products and to adopt consumerist values of deriving happiness from consumption. Planned obsolescence reduces the lifespan of products and requires increased consumption for the same level of individual satisfaction derived from consumption of goods. In both mechanisms, zero growth in individual consumption in the presence of planned obsolescence or advertising then leads to decreased happiness.

**"10) Working time/labour-saving technological change"** mechanisms rely on the presence of incentives to replace labour power with energy and materials, such as high labour costs. This in turn causes firms to pursue growth in net-investments to benefit from these incentives and stay competitive (M10.2). It also leads to efficiency consumption (M10.10). With labour productivity gains exceeding real GDP growth then, unemployment rises (M10.1). This leads to deprivation, especially if not compensated by redistributive policies (M10.13). If unemployment increases, the state's expenditures rise, e.g. due to unemployment benefits, while tax revenues, e.g. from labour taxes decline, causing a welfare state crisis (M10.8). The basic mechanism is active especially in the industrial (M10.6), ecologically dirty/unsustainable (M10.7) and housing (M10.9) economic sectors. It is also connected to "Baumol's cost disease". Here, sectors with high increases in labour productivity drive increasing average wages in the economy, including wages in sectors with low growth in labour productivity. Costs in these "slow" sectors in turn increase. This causes shrinkage and/or declining service quality within "slow sectors" in the absence of revenue growth (M10.11 and M10.12). Other mechanisms focus on the presence of the full working time policy or absence of working time reduction (M10.3) as causes,. This applies especially to the capital/investment goods sector (M10.5) and the social preference for long working times (M10.4).

#### **Theme C: Financial system**

The third theme comprises two clusters that locate GDI within the financial system.

**"11) Financial market depreciation"** mechanisms include absence of nominal growth in the housing sector, coupled with low demand for housing as a financial asset, being connected to housing prices becoming low. This means that housing depreciates as a financial asset. When a substantial proportion of the population is dependent on homeownership for financial security, this can mean indebtedness, especially for lower-income house owners (M11.1). Additionally, when the financial sector is tied to housing, depreciation leads to a reduction of lending by banks and investment, in turn increasing unemployment (M11.2). This is especially the case for smaller firms, which are more dependent on bank loans. Lastly, general depreciation of financial asset prices can cause investors of funded pensions to seek riskier investments for high rates of return (M11.3). Funded pensions are paid via a fund created from pensioners' contributions and that depends on a sufficient rate of return on financial markets to finance pension payments. Over time, this riskier investment behaviour results in an inability to provide sufficient pensions.

Lastly, the cluster "**12) Private interest-bearing debt and money creation**" encompasses M12.4 (see on this cluster also the short discussion in Section 3.3): If individuals/firms take on interest-bearing debt and do not achieve growth of income/revenues, they risk not being able to pay back the debt-plus-interest, causing financial insecurity. M12.3 entails that, without GDP growth, commercial banks creating money via interest-bearing debt leads directly to a scarcity of money in circulation. Other authors make that case only via compounding interest (M12.9) or via accumulation of interest revenues by banks (M12.1). The resulting scarcity leads to debtors borrowing more, in turn resulting in inflation, or the cutting back of investments, a downward spiral of reduced demand, increasing bankruptcies and unemployment. Creditors demand interest as compensation for risk, due to unavoidable uncertainty about future sales (M12.5) or inherent liquidity preference following from a

lower risk of wealth loss (M12.8). M12.8 also connects positive interest rates to a transfer of income to wealth owners, causing inequality. Additionally, both, inequality and positive interest rates, result in exacerbated underutilization of economic capacity and unemployment under no-growth.

#### **Theme D: Culture and ideology**

The fourth theme comprises three clusters that locate GDI within cultural and ideological factors.

The cluster “**13) Consumerist culture**” contains positional competition, i.e. competition around social status (M13.1). It posits that social status of individuals is tied to financial income and consumption of positional/status goods. People increasing their consumption of status goods then causes a zero-sum treadmill with increased consumption being necessary for others just to maintain their social status. The absence of growth in individual consumption then leads to a diminished social status, decreased happiness and fewer social connections. Secondly, authors point to a culture where individuals derive satisfaction from social distinction and emulation via consumption (M13.2). Initially, individuals increase their consumption for social distinction and once many people have reached the higher level of consumption, individuals on a lower level increase their consumption for social emulation. Hence, zero growth in individual consumption, either for distinction or emulation, leads to decreased happiness. Third, the continuous experience of increasing consumption causes expanding consumer aspirations and habit formation (M13.3), resulting in decreased happiness without individual consumption growth. Lastly, a culture of personal identification with and personal expression via consumption leads to decreased happiness under conditions of no-growth (M13.5 and M13.4).

“**14) Growthist ideology**” mechanisms cause the equation of economic growth with widely held social values such as progress, social improvement, or prosperity. This ideology also regards GDP as a good indicator for economic health. In turn, lack of growth on both the microeconomic level (M14.1) and as GDP growth (M14.2), is interpreted as a lack of individual and social progress and development. Individuals as well as populations that submit to this ideology suffer reductions in their satisfaction with life. Additionally, the ruling political party, its politicians and the economic system associated with the lack of growth lose legitimacy. The last mechanism centres the belief in positive GDP growth being a good indicator of economic health. Growth here is a reason for optimism and positive expectations about future economic returns. Yet, if GDP growth is absent, this causes the confidence of investors to decline, expectations to turn negative, investments to decline, unemployment to increase and incomes to fall (M14.3).

Finally, “**15) Neoliberal ideology and policy**” mechanisms involve the ideology of balanced budgets. This ideology holds that even monetarily sovereign states need to first tax or take on debt from banks and investors in order to finance their expenditure (M15.1). Monetary sovereignty here means that states can issue their own currency and not have foreign-denominated debt. Without GDP growth, then, the state's tax base stagnates or shrinks. There is then the choice between self-imposing limits on the debt-to-GDP ratio and directly establishing balanced budgets by cutting back on public welfare programs, or a debt spiral and eventual austerity. On the latter, if governments want to continue to finance budget imbalances via public debt, this comes with higher interest payments with higher debt-to-GDP ratios. This leads to a debt spiral, where states take on more debt to finance expenditures and interest payments, leading to higher interest payments and higher debts. The result is deprivation, following from eventual austerity politics that re-establishes balanced budgets and reduces public welfare programs. Secondly, a state pursuing neoliberal policy and austerity includes reducing net welfare transfers, public sector wages and regulations as well as privatising public services (M15.2). This can happen as a result of state capture by vested interests and in turn causes increasing poverty.

#### **Theme E: The state, power and domination**

The fifth theme comprises three clusters that locate GDI within

systems of the state and power.

“**16) Power and domination**” mechanisms have as their basic starting point an environment where more money means more social power, e.g. the ability to influence the rules of the larger social structures and advance one's own interests. This includes structures of the monetary market economy. Individuals or firms that do not achieve growth will be less powerful than their rivals that do (M16.2). Over time, they will hence be marginalised, dominated and commanded by others with superior power. This holds similarly for states or larger organisations without real GDP growth (M16.1).

“**17) The state, elites and geopolitics**” mechanisms include the importance of economic competition among states and international mobility of capital (M17.1). States without GDP growth have lower tax revenues to create attractive infrastructure compared to states with (more) GDP growth. International mobile capital will then prefer the country with higher GDP growth, resulting over time in increased unemployment and scarcity of capital within the non- or low-growing countries or regions. In an environment of competing states, absence of growth also means less resources to invest in a powerful military (M17.2), making the state less powerful than its growing rivals. Over time, these states are marginalised, dominated and invaded by other states with superior (military) power. Further, political elites/ruling classes, sitting at the top of the state hierarchy, are isolated from the economic base. They accumulate economic resources for their own political power, elite consumption and ideological projects (M17.3). Without economic growth, this leads to an overburdening of the lower strata of society, hampering societal subsistence, in turn causing economic decline and organisational collapse. Finally, the last mechanism sees military competition among states as emerging from their inherent class structure. This makes them necessarily expansionist and imperialist, such that political dominator groups benefit from the surplus produced by subordinate groups (M17.4).

“**18) Welfare state financing**” mechanisms involve political promises regarding social security, made by governments to the public to win elections, which can actually only be fulfilled with growth (M18.1). Without GDP growth then, the result is disappointment among voters leading to reduced life satisfaction, protests and the removal of involved politicians. The second mechanism proposes that absence of GDP growth compromises welfare state financing, as the state's tax revenues shrink and connected welfare spending declines. This leads to increases in poverty (M18.2). At last, indebted non-growing states will not receive the increased tax revenues from growth that are necessary to pay back its debts-plus-interest, while interest payments on the debt rise (M18.3). The state then needs to reduce its expenditures and/or increase taxes, causing a decline of welfare spending and/or a further hampering of economic activity through the increased taxes. This results in increasing unemployment, deprivation as well as poverty.

#### **Theme F: Miscellaneous**

The sixth theme comprises three clusters. We could not attribute these clusters to others, hence forming an own category.

The cluster “**19) Miscellaneous**” comprises mechanisms that we could not attribute to other clusters, hence they might seem like they do not fit together. Firstly, stagnation of labour, energy and material inputs into the economy causes problems when basic human needs grow faster than labour, material or energy efficiency/productivity (M19.1). The needs of a certain and growing part of the population will be increasingly unmet, resulting in suffering and deprivation among that part of the population. Lastly, long international supply chains and a high degree of economic specialisation (M19.2) lead to higher competition and larger requirements for expected financial returns. This creates large vulnerability and risks under zero growth.

“**20) Population structure**” mechanisms focus on conditions such as demographic change, i.e. increasing life expectancy and declining birth rates, which increases aggregate health expenditure over time. Without GDP growth, at some point health expenditures cannot be increased further without causing deprivation in some other sector, causing a

trade-off between different types of deprivation (M20.1). Similarly, demographic change under the predominance of pay-as-you-go/unfunded pension schemes causes a continuous increase of pension demands, while pension revenues simultaneously decline due to fewer contributors. This causes a trade-off between different types of deprivation (M20.2). Demographic change also causes increasing adult-social care costs/demands, leading to increasing deprivation among old-age adults without the respective growth in needs satisfiers (M20.3). Lastly, absence of GDP growth within an environment of population growth leads over time to two outcomes. The first is increasing deprivation, since fewer goods are produced/less money is available for more people (M20.4). The second is unemployment, if working times are not reduced. This is because there is a fixed amount of work to be done, while the supply of labour increases (20.5).

Finally, “21) Technology and infrastructure” mechanisms encompass infrastructural lock-ins necessitating increased consumption, e.g. due to car-dependency or smartphones being necessary for communication (M21.1). Individuals below a certain threshold of individual income and consumption cannot take part in society and/or experience other disadvantages without additional growth. These negative consequences include e.g. longer commuting, and in turn decreased happiness and material deprivation. Further, an environment of medical-technological progress increases aggregate health expenditures over time, due to advancing medical technology (M21.3). Without GDP growth, health expenditures cannot be increased further at some point without causing trade-offs between different types of deprivation. Another mechanism sees industrial technological systems as constantly increasing in complexity, hence requiring increasing material, energetic and economic resources to be maintained (M21.4). Without GDP growth, over time these systems deteriorate, causing harm to populations reliant on them. The last mechanism focuses on the role of agricultural societies, as the agricultural transition forms communities into social supergroups with certain imperatives (M21.3). This includes an imperative of accumulation of food, increased importance of defence and territorial expansion to accommodate population growth. These imperatives lead to inter-group competition: non-growing groups exhibit less competitiveness via reduced surplus production and military capacity. Consequently, the group faces conquest by other groups with higher economic growth and military capacity.

### 3.3. Theoretical differences and conflicts

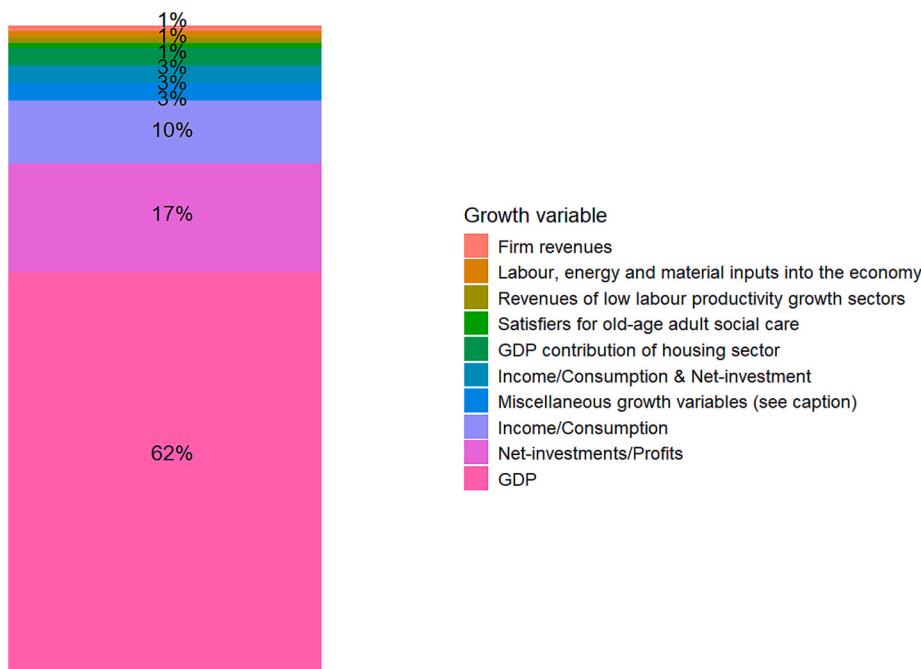
From the cluster summaries, Table 1 as well as Figs. 2 and 3 above, it becomes clear that the proposed mechanisms for GDI are heterogeneous and partly even divergent. Firstly, mechanisms differ regarding the variable of growth, the absence of which causes negative social consequences (see Fig. 4). Most mechanisms focus on real GDP growth (61.6 %), with substantial groups looking at the microeconomic level, firms' profits and net-investments (17 %), or consumers income and consumption expenditure (9.8 %). This difference can be connected to differing definitions of GDI used in the literature, with some authors focusing on GDP (Cahen-Fourot, 2022) and others on microeconomic variables such as economic efforts of firms and consumers (Richters and Siemoneit, 2019a; see also the discussion in Janischewski et al., 2024).

The differentiation between micro-meso-macro scales has potentially important implications and could be analysed in greater detail in future research. For instance, it is clear that from a GDI on the microeconomic level, a GDI on the macroeconomic level does not automatically follow. Let us take M6.1 on economies of scale on the micro-level as an example. A hypothetical economy could exist where 1) some firms' growth is compensated by others' shrinking and 2) stagnating GDP does not worsen this situation compared to growing GDP. In contrast, one could also imagine that GDP stagnation worsens the competitive situation between firms, making bankruptcies more likely (e.g. M4.2). Economies of scale could also necessitate increasing profit shares of firms, which under stagnation of GDP comes at the expense of workers (M6.9).

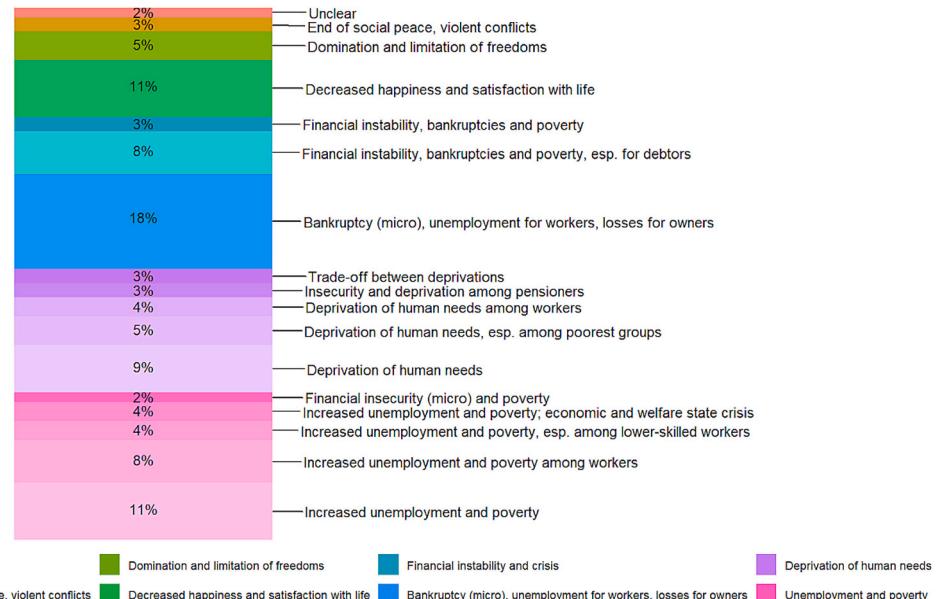
Additionally, mechanisms differ in terms of their proposed negative social consequences in the absence of growth (see Fig. 5). These negative consequences vary across mechanisms which share the same growth variable, e.g. absence of GDP growth can have different negative consequences depending on the mechanism (see Fig. 6). The four most sizable groups of mechanisms posit the following negative consequences without growth: 1) unemployment and poverty (on a macro level) (28 %), 2) deprivation of human needs (23 %), 3) bankruptcy of firms on a microeconomic level and connected unemployment and losses (18 %), as well as 4) financial instability and crisis (11 %). Some mechanisms also entail decreased happiness and satisfaction with life, domination and limitation of freedoms, or the end of social peace and violent conflicts. These differences can again be tied to different definitional understandings of GDI, with some authors arguing that imperatives only apply to existential consequences (Richters and Siemoneit, 2019a) and others that dependencies are politically determined via the social acceptability of the systems' performance under absence of growth (Petschow et al., 2018; see also the discussion within Janischewski et al., 2024).

Next, this review reveals considerable theoretical conflicts and disagreements between authors, in the sense of diverging and contradictory theoretical statements as per Dobusch and Kapeller (2012). These concern above all two questions: 1) Which mechanism or cluster of mechanisms is considered effective, active or real (i.e. exclusivity of mechanisms vis-à-vis others), and 2) which mechanisms can also co-exist and make GDI caused by other mechanisms worse (i.e. additionality of mechanisms in connection/co-occurrence with others). For instance, accumulation to the detriment of others (M1.5) could be caused by several other mechanisms. These include market competition (e.g. M4.6) (Cahen-Fourot, 2022), private property (e.g. M3.1) (Magdoff and Foster, 2010) or cheap resources (M7.1) (Richters and Siemoneit, 2019a). In turn, market competition (M4.6) could be caused by the monetary economy (M5.4) (Exner and Lauk, 2011) (see also SM 1, Section 3). The respective authors disagree on what is the causal factor, indicating that the mechanisms can be considered to be exclusive, e.g. either M5.4 is active or M4.6. Yet, in theory, all four mechanisms causing accumulation could be active, each being additional and increasing GDI. These two perspectives, exclusivity vs. additionality, are possible for most mechanisms, clusters and their connections. Another important example of exclusivity is the debate around the mechanisms in cluster “12) Private interest-bearing debt and money creation”. Many authors heavily dispute the existence of GDI caused by interest-bearing debt. They focus instead on whether interest is accumulated or consumed (cluster 1) as causal for GDI (Cahen-Fourot, 2022; Cahen-Fourot and Lavoie, 2016; Hein and Jimenez, 2022; Janischewski, 2022). Others defend it solely for the case of compounding interest (M12.9) or by outlining additional mechanisms. These include interest increasing inequality, thereby leading to net-saving (M2.3) (Arnsperger et al., 2021) and interest causing an underutilisation of economic capacity (M12.8) (Kimmich and Wenzlaff, 2021). Such diverging assessments relate to fundamental debates between economic schools of thought, here between Marxist accumulation and Keynesian monetary economy perspectives, a point we will come back to. Based on this literature, it seems clear that simplistic understandings of mechanisms in cluster 12, e.g. M12.3, 12.4, 12.6 and 12.7, can be ruled out with high confidence. An example of additionality is the work by Lange (2018). He posits a combination of mechanisms as primary causes of GDI, including from the clusters “6) Advantages of firm size”, “2) Income and wealth inequality”, “3) Economic class and private property”, “9) Sales effort” and “7) Cheap resources and energy”.

Finally, the discussion on which mechanisms exist and how they interact has important implications for how to achieve growth independence and overcome GDI. This is an essential question for degrowth and post-growth movements. For example, let us assume that GDI are primarily caused by mechanisms in the clusters of “13) Consumerist culture” and/or “14) Growthist ideology”. Then the implication would



**Fig. 4.** The distribution of growth variables whose absence causes negative social consequences across the mechanisms reviewed in this paper. The category “Miscellaneous growth variables” refers to a variety of economic variables, including agricultural surplus production, population growth and means of production like tools and machinery. Note that the height of the bars reflects the number of distinct GDI mechanisms, not the relative importance of the GDIs themselves. For the data, see SM 2, Section 1.

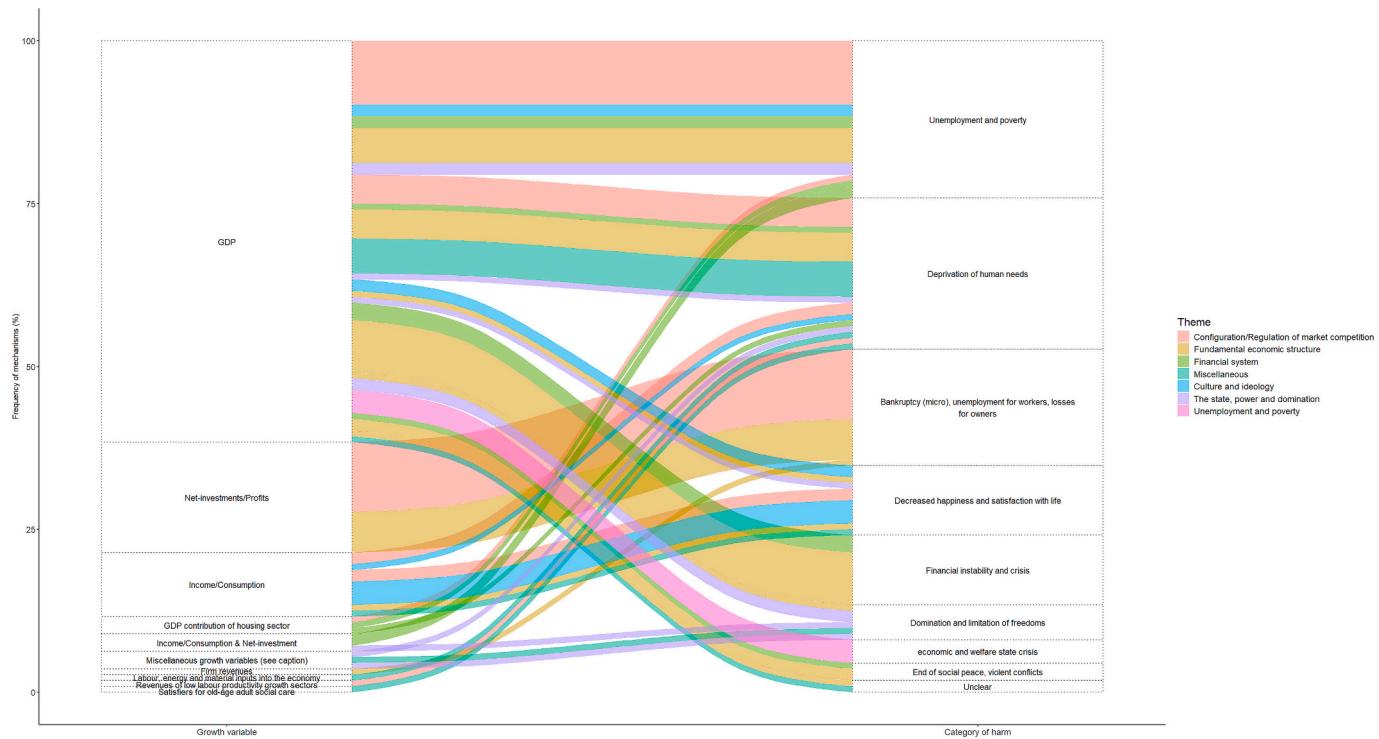


**Fig. 5.** The distribution of types of harm inflicted in the absence of growth across the mechanisms reviewed in this paper. The labels with lines refer to more specific subcategories of harm, mostly specifying social actors affected by the harm. The overarching categories of harm are shown in the legend on the bottom. Note that the height of the bars reflects the number of distinct GDI mechanisms, not the relative importance of the GDIs themselves. For the data see the SM 2, Section 1.

be that a cultural and ideological transformation towards post-growth and post-consumerist values as well as ideologies is a necessary condition for achieving growth independence. Also the cluster “7) Cheap resources and energy” centres values of meritocracy preventing redistribution and incorrect knowledge about technological change keeping resources cheap, in turn causing GDI. Following the categorisation of Alexander and Rutherford (2014), these mechanisms from clusters 7, 13 and 14 would point towards a reformist vision for a post-growth society. This is because deactivating them would be compatible

with all major institutions of the currently dominant societal system of the market economy, the state, private property and market competition.

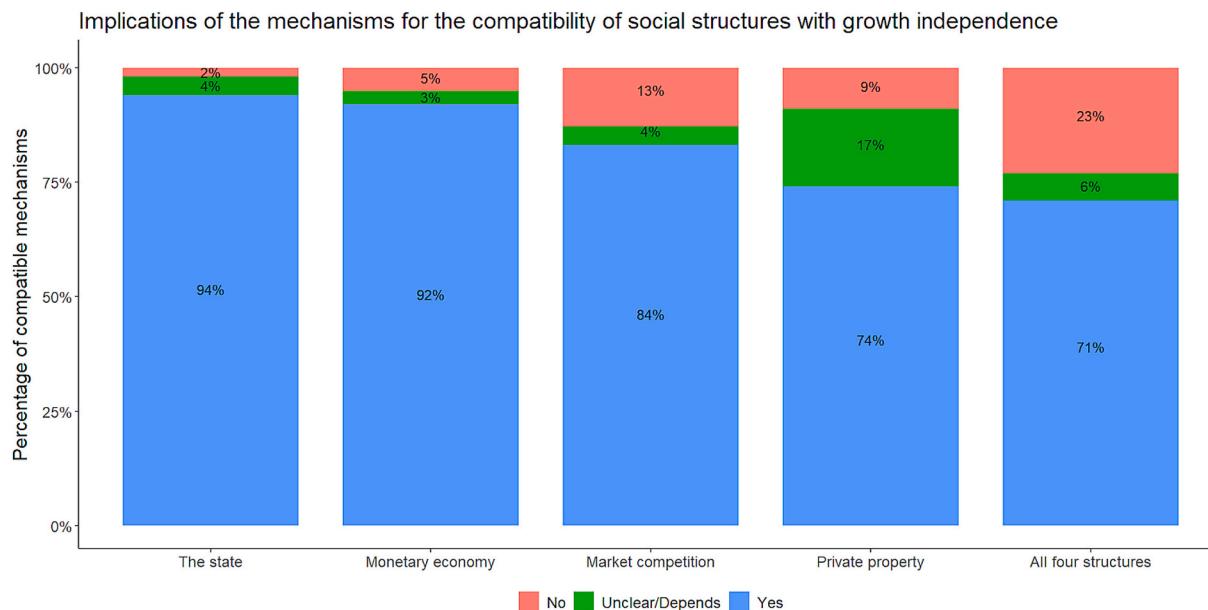
Fig. 7 shows that most mechanisms in this review, around 70 %, fall in this reformist category, as this includes the large theme “Configuration/Regulation of market competition”. About a quarter of mechanisms however locate GDI within more fundamental structures of capitalism. These include “5) Monetary economy”, “4) Market competition”, “3) Economic class and private property” or “17) The state, elites and



**Fig. 6.** A Sankey diagram connecting the distribution of growth variables on the left to the distribution of types of harm on the right, according to their frequency across the collected GDI mechanisms. The category “Miscellaneous growth variables” refers to a variety of economic variables, including agricultural surplus production, population growth and means of production like tools and machinery. Note that the width of the flows reflects the number of distinct GDI mechanisms, not the relative importance of the GDIs themselves.

geopolitics”. These mechanisms then support more the case for an eco-socialist or eco-anarchist vision of post-growth. From this perspective, a primary conflict between the theories and clusters then is which of the fundamental social structures one regards as neutral. “Neutral” here means having no impact with respect to the structures causing GDI. Relatedly, another core conflict centres differing assessments of the role of growth dependent ideology, knowledge and cultural values, as some

authors view these to be the primary causes of GDI. These conflicts in turn are rooted in the mechanisms’ different underlying schools of thought, their assumptions and ontologies, e.g. differences between varieties of neoclassical, post-Keynesian, Marxian and anarchist theories. At last, it is important to note that the mechanisms’ political implications often strongly depend on the concrete interpretation of the respective mechanism, its interactions and definitions of key terms. For



**Fig. 7.** Implications of the collected mechanisms for the compatibility of selected social structures with economic growth independence. For instance, 84 % of the mechanisms imply, following our analysis, that the social structure of market competition is compatible with achieving growth independence. In contrast, 13 % imply that they are incompatible and hence, for achieving growth independence, market competition would need to be overcome. For the data see SM 2, Section 1.

example, what precisely is “private property” or “the state”. As this is oftentimes not straightforward but open to multiple possibilities, we mark several mechanisms with “Unclear/Depends” in Fig. 7 (see also Section 4.2 on limitations).

### 3.4. Theoretical commonalities

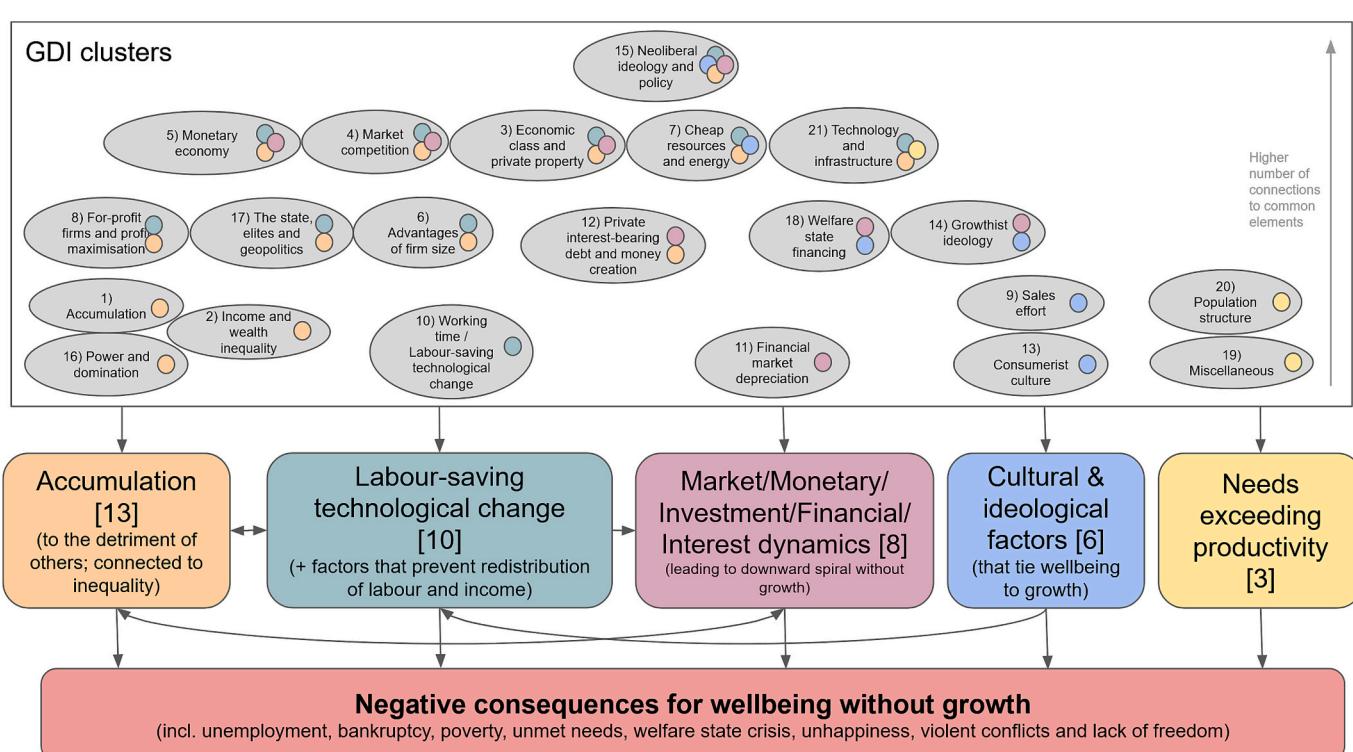
Following a perspective of additionality, as outlined above, a few commonalities across several mechanisms emerge. Certain elements are shared or reoccur across numerous clusters and mechanisms. Fig. 8 summarises these commonalities, focusing on five elements. Firstly, many mechanisms cause accumulation by one social group to the detriment of others, including mechanisms in clusters 3, 4 and 17. Many mechanisms that lead to accumulation work by also causing competition in various dimensions, such as among individuals and firms (cluster 5) and states (cluster 17). Many clusters here also cause labour-saving technological change, such as cluster 7. Secondly, labour-saving technological change then leads to technological unemployment without growth. It does so often in combination with factors that prevent redistribution of labour and income. These factors include a culture of meritocracy (cluster 7) or private property (cluster 3) and are also often connected to accumulation. Third, many mechanisms (e.g. in clusters 11, 12, 4 and 5) point to market, monetary, investment, financial market and interest-based debt dynamics that lead to an economic downward spiral without GDP growth. This is partly also connected to accumulation withdrawing assets from circulation. Fourth, there are cultural and ideological factors that tie wellbeing to growth, e.g. through a consumerist culture (cluster 13) or growthist ideology (cluster 14). Fifth, if growth in needs exceeds growth in various productivities without aggregate growth, this leads to deprivation for some groups (clusters 19 and 20). These five commonalities are similar to but go beyond the

typology created by Corlet Walker et al. (2024, p.3-6) Their typology contains the three dynamics “Growth in manifest needs”, “Labour productivity growth” and “The pursuit of economic rents”. Lastly and overarching, there is a commonality across most mechanisms regarding the connection between the level of growth of the growth variable and the connected harm (see Fig. 6). Here, this connection is gradual, meaning that harm can already start at positive growth rates but gets worse with stagnation and negative growth rates (see SM 3, Section 2).

## 4. Discussion

### 4.1. Relationship to existing literature

This review expands on the existing literature in several important ways. In terms of the number and variety of mechanisms covered, it exceeds previous reviews by Lange (2018), Richters and Siemoneit (2017a,b) and Richters and Siemoneit (2019a). This is because it builds on existing reviews, but also incorporates mechanisms that are often neglected and on which not much literature exists. This includes for instance the clusters “5) Monetary economy”, “17) The state, elites and geopolitics” and “21) Technology and infrastructure”. Following from this is the result that the proposed mechanisms for GDI are more numerous than previously assumed. This is an important finding. If more mechanisms of GDI are active, rooted not only within economic structures, but also in culture, ideology and political systems, the harder it is to achieve growth independence. Additionally, the larger would be the scope of societal changes necessary for achieving this independence. The article further provides an analysis of key commonalities as well as important differences and conflicts between theories, revealing conflicts about the role of fundamental social structures as well as ideology,



**Fig. 8.** An overview on the commonalities in terms of elements (the boxes in the middle, e.g. “Accumulation” and “Needs exceeding productivity”) that are shared across clusters of GDI mechanisms (the large box on top entitled “GDI clusters”), leading to negative consequences for wellbeing without growth (the red box on the bottom). The colourful circles in each cluster bubble indicate to which shared element the cluster is causally connected. The numbers in the square brackets behind the respective shared elements indicate the number of GDI clusters that cause that element, e.g. 13 clusters lead to accumulation. Since each cluster contains multiple mechanisms, the distribution might not work for all mechanisms in each cluster. Hence, the distribution needs to be regarded as an approximation and generalisation. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

knowledge and culture. Hereby, the paper connects to longstanding debates between differing currents of post-growth and degrowth, including reformism, eco-socialism and eco-anarchism, on concepts such as the state, capitalism, markets, private property and others (Alexander and Rutherford, 2014; Eversberg and Schmelzer, 2018; Wiedmann et al., 2020), as well as between economic schools of thought (Dobusch and Kapeller, 2012; Lange, 2018). These novel elements of this review point to new research avenues (see Section 4.3). By shedding light on the sizable existing variety of theories of GDI, this review further enables a constructive discussion and research on the various theories' merits. It thereby contributes to establishing a solid base for finding effective strategies for achieving degrowth and post-growth societies. Supplementing research by Corlet Walker et al. (2024) and Janischewski et al. (2024), the mechanism formulations in this review cover important aspects of the existing growth dependency frameworks. These aspects include the growth variable/object of growth, the agents/groups being harmed, the kind/type of harm as well as details on the growth-harm relationship and timeframe. This again allows for pursuing further research. Lastly, this review echoes the research by Wiman (2024, p. 13) which conceptualises differences between growth "dependencies" and "imperatives" as "different analytical angles for the same growth system". The paper thereby points to convergences between research on the two concepts (however, see Driouch and Kallis (2025) for an alternative perspective).

#### 4.2. Limitations

This work is subject to manifold limitations which need to be considered when interpreting the results. Firstly, despite our efforts to make this review as systematic as possible, following Sovacool et al. (2018), our methodological approach introduces several possibilities for biases in the selection of the literature. This includes steps such as when choosing the initial pool of literature, the languages covered or when scanning the results of the database searches. It is almost certain that relevant publications have been missed. Secondly, this review entails that we reformulate proposed mechanisms in the literature with our own words, hence there is an important element of interpretation. This means that we might have missed elements of mechanisms or changed the intended meaning of mechanisms in a way that is not in the sense of the original author. Due to time constraints, it was unfortunately not possible to check back with every author whether our mechanism description matches their intended meaning. Thirdly, our treatment of conflicts and commonalities among mechanisms and clusters necessarily remains limited due to space constraints. As stated in the introduction, our review does not reflect the current state of the literature on which GDI mechanisms are real / active. It is not an assessment of the mechanisms' relative significance. Hence, it also includes mechanisms that are heavily criticised in the literature. It was not possible to pay due respect to all the important debates that are happening in this dynamic field. Lastly, the clustering and grouping into themes can certainly be done in multiple ways and is thus open to reinterpretation.

#### 4.3. Further research

The results of this article open several future research avenues. Firstly, the review highlights the existence of several mechanisms of GDI which have so far not received much research attention within the degrowth and post-growth communities. Addressing this research gap could be theoretical in nature, aiming to understand the mechanisms in greater depth and detail, e.g. through modelling exercises, or also empirical, e.g. by examining historical periods under absence of growth. Modelling exercises could take inspiration from novel approaches such as agent-based modelling (e.g. Janischewski, 2021; Foramitti, 2023; Gerdes et al., 2023). Further research should also be based on recent developments on providing conceptual clarity to growth dependency frameworks (Corlet Walker et al., 2024; Janischewski et al., 2024).

Secondly, it is crucial to examine in detail the conflicts between theories found in this review. This is because depending on which combination of mechanisms is believed to be real and active, the political and strategic implications for achieving a growth independent economic system might be extremely different. These implications can e.g. vary between reformist, eco-socialist and eco-anarchist visions and strategies. As Dobusch and Kapeller (2012, p. 1053) write, in divergent or contradictory cases, theoretical statements can be put to an empirical test with empirical evidence "guiding fair judgement" (p. 1053). Suitable empirical cases might be hard or impossible to find. Yet, clarifying and as much as possible resolving the existing conflicts is crucial to finding effective ways to achieve growth independence.

### 5. Conclusion

This article addresses the current lack of a comprehensive literature review on theories of GDI as well as of research on their respective commonalities, conflicts and differences. It conducts a systematic review and includes 248 publications. From this literature, the article derives 112 mechanisms of GDI that authors believe to cause various negative social consequences in the absence of growth on different levels. The mechanisms form 21 clusters based on the similarity of the proposed theories, which are in turn again grouped into six overarching themes. The review provides a detailed categorisation of each mechanism. These categories include a mechanism description, references, and our interpretations of the respective growth variable, how and where harm occurs without growth, details on the growth-harm connection and graduality, and the time frame until harm. A core finding is that the mechanisms for GDI are likely to be more numerous and heterogeneous than can be assumed based on previous research. Further, a short analysis of the theories' commonalities and conflicts points to possibilities of exclusivity and additionality of mechanisms. It highlights contradicting perceptions on the neutrality of fundamental social structures, including the monetary economy, market competition, private property and the state. The conflicts moreover concern the specific roles of ideology, knowledge and culture. Nevertheless, manifold commonalities across clusters and mechanisms exist. These results supplement current work on conceptual clarification of GDI and expand on existing reviews of connected theories. The review thereby opens several promising research avenues, specifically on the conflicts between theories and connected empirical and theoretical research.

### CRediT authorship contribution statement

**Lorenz Keyßer:** Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Julia Steinberger:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Matthias Schmelzer:** Writing – review & editing, Supervision, Methodology, Conceptualization.

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### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ecolecon.2025.108745>.

## Data availability

All utilised data is made available in the Supplementary Materials.

## References

- Alexander, S., Gleeson, B., 2019. *Degrowth in the Suburbs - a Radical Urban Imaginary*. Springer Berlin Heidelberg, Singapore.
- Alexander, S., Gleeson, B., 2021. Urban social movements and the degrowth transition: towards a grassroots theory of change. *The Journal of Australian Political Economy* 355–378.
- Alexander, S., Rutherford, J., 2014. *The Deep Green Alternative - Debating Strategies of Transition* (Simplicity Institute Report No. 14a). Simplicity Institute.
- Antal, M., van den Berg, J.C.J.M., 2013. Macroeconomics, financial crisis and the environment: strategies for a sustainability transition. *Environmental Innovation and Societal Transitions*, Economic-financial crisis and sustainability transition, 6, pp. 47–66. <https://doi.org/10.1016/j.eist.2013.01.002>.
- Arnsperger, C., Bendell, J., Slater, M., 2021. *Monetary Adaptation to Planetary Emergency: Addressing the Monetary Growth Imperative* (Occasional Paper No. 8). Institute for Leadership and Sustainability (IFLAS), University of Cumbria, UK.
- Binswanger, M., 2019. *Der Wachstumswang: Warum Die Volkswirtschaft Immer Weiterwachsen Muss, Selbst Wenn Wir Genug Haben*. Wiley-VCH Verlag GmbH & Co, KGaA, Weinheim.
- Blauwhof, F.B., 2012. Overcoming accumulation: is a capitalist steady-state economy possible? *Ecological economics*. The Economics of Degrowth 84, 254–261. <https://doi.org/10.1016/j.ecolecon.2012.03.012>.
- Büchs, M., Koch, M., 2018. Challenges for the degrowth transition: the debate about wellbeing. *Futures* 105, 155–165. <https://doi.org/10.1016/j.futures.2018.09.002>.
- Cahen-Fourot, L., 2022. Looking for growth imperatives under capitalism: money, wage labour, and market exchange (Working Paper Series No. 01/2022). Post-growth Economics Network (PEN).
- Cahen-Fourot, L., Lavoie, M., 2016. Ecological monetary economics: a post-Keynesian critique. *Ecol. Econ.* 126, 163–168. <https://doi.org/10.1016/j.ecolecon.2016.03.007>.
- Carter, A., 2013. *A Radical Green Political Theory*. Routledge, London. <https://doi.org/10.4324/9781315008707>.
- Chancel, L., 2022. Global carbon inequality over 1990–2019. *Nat Sustain* 5, 931–938. <https://doi.org/10.1038/s41893-022-00955-z>.
- Corlet Walker, C.M., 2023. *Welfare without Growth: Tackling Growth Dependency through the lens of Adult Social Care* (Ph.D. Thesis). University of Surrey, Surrey, UK.
- Corlet Walker, C., Druckman, A., Jackson, T., 2024. Growth dependency in the welfare state – An analysis of drivers in the UK's adult social care sector and proposals for change. *Ecol. Econ.* 220, 108159. <https://doi.org/10.1016/j.ecolecon.2024.108159>.
- Dobusch, L., Kapeller, J., 2012. Heterodox united vs. Mainstream City? Sketching a framework for interested pluralism in economics. *J. Econ. Issues* 46, 1035–1058. <https://doi.org/10.2753/JEI0021-3624460410>.
- Driouch, R., Kallis, G., 2025. Sustaining power through economic growth: a *Régulation* theory of growth dependence. *Ecol. Econ.* 235, 108640. <https://doi.org/10.1016/j.ecolecon.2025.108640>.
- Eversberg, D., Schmelzer, M., 2018. The degrowth Spectrum: convergence and divergence within a diverse and conflictual Alliance. *Environmental Values* 27, 245–267(23). <https://doi.org/10.3197/096327118X15217309300822>.
- Exner, A., 2014. Degrowth and demonetization: on the limits of a non-capitalist market economy. *Capital. Nat. Social.* 25, 9–27. <https://doi.org/10.1080/10455752.2014.882963>.
- Exner, A., 2021. *Ökonomien der Gabe: Frühsocialismus, Katholische Soziallehre, Und Solidarisches Wirtschaften*. Mandelbaum Verlag, Wien Berlin.
- Exner, A., Lauk, C., 2011. Das Wachstum des Kapitals – seine Grundlagen und Grenzen. In: *Ausgewachsen! ökologische Gerechtigkeit, soziale Rechte, gutes Leben ; ein Projekt von Attac*. VSA-Verl, Hamburg.
- Foramitti, J., 2023. A framework for agent-based models of human needs and ecological limits. *Ecol. Econ.* 204, 107651. <https://doi.org/10.1016/j.ecolecon.2022.107651>.
- Gerdes, L., Aigner, E., Meretz, S., Pahl, H., Schlemm, A., Scholz-Wäckerle, M., Schröter, J., Sutterlütti, S., 2023. COMMONSIM: simulating the utopia of COMMONISM. *Rev Evol Polit Econ* 4, 559–595. <https://doi.org/10.1007/s43253-023-00110-0>.
- Gowdy, J., Krall, L., 2013. The ultrasocial origin of the Anthropocene. *Ecol. Econ.* 95, 137–147. <https://doi.org/10.1016/j.ecolecon.2013.08.006>.
- Haberl, H., Wiedenhofer, D., Virág, D., Kalt, G., Plank, B., Brockway, P., Fishman, T., Hausknost, D., Krausmann, F., Leon-Gruchalski, B., Mayer, A., Pichler, M., Schaffartzik, A., Sousa, T., Streeck, J., Creutzig, F., 2020. A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part II:
- synthesizing the insights. *Environ. Res. Lett.* 15, 065003. <https://doi.org/10.1088/1748-9326/ab842a>.
- Hartley, T., Kallis, G., 2021. Interest-bearing loans and unpayable debts in slow-growing economies: insights from ten historical cases. *Ecol. Econ.* 188, 107132. <https://doi.org/10.1016/j.ecolecon.2021.107132>.
- Hein, E., Jimenez, V., 2022. The macroeconomic implications of zero growth: a post-Keynesian approach. *European Journal of Economics and Economic Policies* 19, 41–60. <https://doi.org/10.4337/ejep.2022.01.05>.
- Heinrich, M., 2018. *Kritik der Politischen Ökonomie - Eine Einführung*, 14., durchgesehene, Auflage. ed. Schmetterling Verlag, Stuttgart, Reihe Theorie.org.
- Hinton, J.B., 2020. Fit for purpose? Clarifying the critical role of profit for sustainability. *JPE* 27, 236–262. <https://doi.org/10.2458/v2711.23502>.
- IPBES, 2019. Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.
- IPCC, 2021. *Climate Change 2021: The Physical Science Basis: Working Group I Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC/WMO/UNEP.
- Isendahl, C., Dunning, N.P., Sabloff, J.A., 2014. 4 growth and decline in classic Maya Puuc political economies. *Archaeological Papers of the American Anthropological Association* 24, 43–55. <https://doi.org/10.1111/apaa.12028>.
- Jackson, T., 2019. The Post-growth Challenge: Secular Stagnation, Inequality and the Limits to Growth. *Ecological Economics*, Special Section: Crowding-out or crowding-in? Behavioural and ethical responses to economic incentives for conservation, 156, pp. 236–246. <https://doi.org/10.1016/j.ecolecon.2018.10.010>.
- Janischewski, A., 2021. Could a post-growth transition trigger a financial market crash? Analysis via a heterogeneous agent model [WWW Document]. URL. [https://www.boeckler.de/pdf/v\\_2021\\_10\\_29\\_janischewski.pdf](https://www.boeckler.de/pdf/v_2021_10_29_janischewski.pdf).
- Janischewski, A., 2022. Inequality, non-linear consumption behaviour, and monetary growth imperatives. *European Journal of Economics and Economic Policies: Intervention* 19, 61–88. <https://doi.org/10.4337/ejep.2022.01.06>.
- Janischewski, A., Bohnenberger, K., Franke, M., Vogel, T., Driouch, R., Froese, T., Gerold, S., Kaufmann, R., Keyßer, L., Niethammer, J., Olk, C., Schmelzer, M., Yürük, A., Lange, S., 2024. It depends: varieties of defining growth dependence. arXiv. <https://doi.org/10.48550/arXiv.2409.12109>.
- Jimenez, V., 2023. Labour market stability in a zero-growth economy (Working Paper No. 211/2023) Hochschule für Wirtschaft und Recht Berlin, Institute for International Political Economy (IPE), Berlin, Germany.
- Kallis, G., Kostakis, V., Lange, S., Muraca, B., Paulson, S., Schmelzer, M., 2018. Research on degrowth. *Annu. Rev. Env. Resour.* 43, 291–316. <https://doi.org/10.1146/annurev-environ-102017-025941>.
- Kallis, G., Paulson, S., D'Alisa, G., Demaria, F., 2020. *The Case for Degrowth, The Case for Series*. Cambridge, UK ; Medford, MA, Polity Press.
- Kimmich, C., Wenzlaff, F., 2021. The structure–agency relation of growth imperative hypotheses in a credit economy. *New Political Economy* 27, 277–295. <https://doi.org/10.1080/13563467.2021.1952557>.
- Koch, M., 2018. The naturalisation of growth: Marx, the regulation approach and Bourdieu. *Environmental Values* 27, 9–27. <https://doi.org/10.3197/096327118X15144698637504>.
- Lange, S., 2018. *Macroeconomics without Growth: Sustainable Economies in Neoclassical, Keynesian and Marxian Theories*. Wirtschaftswissenschaftliche Nachhaltigkeitsforschung. Metropolis-Verlag, Marburg.
- Lawn, P., 2011. Is steady-state capitalism viable? *Annals of the New York Academy of Sciences* 1219, 1–25. <https://doi.org/10.1111/j.1749-6632.2011.05966.x>.
- Leahy, T., 2018. Radical reformism and the Marxist critique. *Capitalism Nature Socialism* 29, 61–74. <https://doi.org/10.1080/10455752.2017.1293116>.
- Lenzen, M., Li, M., Malik, A., Pomponi, F., Sun, Y.-Y., Wiedmann, T., Faturay, F., Fry, J., Gallego, B., Geschke, A., Gómez-Paredes, J., Kanemoto, K., Kenway, S., Nansai, K., Prokopenko, M., Wakiyama, T., Wang, Y., Yousefzadeh, M., 2020. Global socio-economic losses and environmental gains from the coronavirus pandemic. *PloS One* 15, e0235654. <https://doi.org/10.1371/journal.pone.0235654>.
- Magdoff, F., Foster, J.B., 2010. Monthly review | what every environmentalist needs to know about capitalism. *Mon. Rev.* 61, 1–30. URL. <https://monthlyreview.org/2010/03/01/what-every-environmentalist-needs-to-know-about-capitalism/> (accessed 1.15.19).
- Matkovic, A., 2020. “No magic bullets”: the Lawn-Smith debate, or why degrowth cannot be understood without a value-theory of imperialism. *Casopis za kritiko znanosti, domislijivo in novo antropologijo* 46, 81–98.
- Mukumbang, F.C., 2023. Retrospective theorizing: a contribution of critical realism to mixed methods research. *J. Mixed Methods Res.* 17, 93–114. <https://doi.org/10.1177/1558689211049847>.
- Nelson, A., 2016. “Your money or your life”: money and socialist transformation. *Capitalism Nature Socialism* 27, 40–60. <https://doi.org/10.1080/10455752.2016.1204619>.
- Nelson, A., 2022. *Beyond Money - a Postcapitalist Strategy*. Pluto Press, London, UK.
- Olk, C., Schneider, C., Hickel, J., 2023. How to pay for saving the world: modern monetary theory for a degrowth transition. *Ecol. Econ.* 214, 107968. <https://doi.org/10.1016/j.ecolecon.2023.107968>.
- Parrique, T., 2019. *The Political Economy of Degrowth*. Université Clermont Auvergne; Stockholms universitet.
- Petschow, U., Lange, S., Hofmann, D., Pisarskoi, E., Aus Dem Moore, N., Korfhage, T., Ott, H., 2018. *Gesellschaftliches Wohlergehen innerhalb planetarer Grenzen: Der Ansatz einer vorsorgeorientierten Postwachstumsposition* (UBA Texte No. No. 89/2018). Umweltbundesamt, Dessau-Roßlau.

- Posse, D., 2015. Zukunfts-fähige Unternehmen in Einer Postwachstumsgesellschaft: Eine Theoretische Und Empirische Untersuchung. *Schriften der Vereinigung für Ökologische Ökonomie*. Vereinigung für Ökologische Ökonomie, Heidelberg.
- Richters, O., Siemoneit, A., 2017a. Fear of stagnation? A review on growth imperatives (Working Paper No. 6/2017). VÖÖ Discussion Paper.
- Richters, O., Siemoneit, A., 2017b. Consistency and stability analysis of models of a monetary growth imperative. *Ecol. Econ.* 136, 114–125. <https://doi.org/10.1016/j.ecolecon.2017.01.017>.
- Richters, O., Siemoneit, A., 2019a. Growth imperatives: substantiating a contested concept. *Struct. Chang. Econ. Dyn.* 51, 126–137. <https://doi.org/10.1016/j.strueco.2019.07.012>.
- Richters, O., Siemoneit, A., 2019b. *Marktwirtschaft reparieren: Entwurf einer freiheitlichen, gerechten und nachhaltigen Utopie*. oekom verlag, München.
- Ripple, W.J., Wolf, C., Gregg, J.W., Rockström, J., Mann, M.E., Oreskes, N., Lenton, T.M., Rahmstorf, S., Newsome, T.M., Xu, C., Svanning, J.-C., Pereira, C.C., Law, B.E., Crowther, T.W., 2024. The 2024 state of the climate report: perilous times on planet earth. *BioScience biae087*. <https://doi.org/10.1093/biosci/biae087>.
- Röpke, I., 2010. Konsum: Der Kern des Wachstumsmotors. In: Seidl, I., Zahrt, A. (Eds.), *Postwachstumsgesellschaft: Konzepte für die Zukunft, Ökologie und Wirtschaftsforschung*. Metropolis-Verlag, Marburg.
- Schmelzer, M., 2014. Gutes Leben statt Wachstum. In: *Atlas Der Globalisierung - Weniger Wird Mehr. Le Monde Diplomatique / Taz Verlags- Und Vertriebs GmbH*, Berlin, Germany.
- Schmelzer, M., Vetter, A., Vansintjan, A., 2022. *The Future Is Degrowth: A Guide to a World beyond Capitalism*. Verso, New York, USA.
- Schweickart, D., 2010. Is Sustainable Capitalism Possible? *Procedia. Soc. Behav. Sci.* 2, 6739–6752. <https://doi.org/10.1016/j.sbspro.2010.05.020>.
- Smith, R., 2010. Beyond Growth or Beyond Capitalism. *Real-world Economics Review*, p. 15.
- Sovacool, B.K., Axsen, J., Sorrell, S., 2018. Promoting novelty, rigor, and style in energy social science: towards codes of practice for appropriate methods and research design. *Energy Research & Social Science*, Special Issue on the Problems of Methods in Climate and Energy Research 45, 12–42. <https://doi.org/10.1016/j.erss.2018.07.007>.
- Stratford, B., 2020. The threat of rent extraction in a resource-constrained future. *Ecol. Econ.* 169, 106524. <https://doi.org/10.1016/j.ecolecon.2019.106524>.
- Strunz, S., Bartkowski, B., Schindler, H., 2017. Is there a monetary growth imperative?, in: *handbook on growth and sustainability*. Edward Elgar Publishing. <https://doi.org/10.4337/9781783473564>.
- Teulings, C.N., Baldwin, R.E. (Eds.), 2014. *Secular Stagnation: Facts, Causes and Cures*, A VoxEU.org eBook. CEPR, London.
- Thiery, W., Lange, S., Rogelj, J., Schleussner, C.-F., Gudmundsson, L., Seneviratne, S.I., Andrijevic, M., Frieler, K., Emanuel, K., Geiger, T., Bresch, D.N., Zhao, F., Willner, S. N., Büchner, M., Volkholz, J., Bauer, N., Chang, J., Ciais, P., Dury, M., François, L., Grillakis, M., Gosling, S.N., Hanasaki, N., Hickler, T., Huber, V., Ito, A., Jägermeyr, J., Khabarov, N., Koutoulis, A., Liu, W., Lutz, W., Mengel, M., Müller, C., Ostberg, S., Reyer, C.P.O., Stacke, T., Wada, Y., 2021. Intergenerational inequities in exposure to climate extremes. *Science* 374, 158–160. <https://doi.org/10.1126/science.abi7339>.
- Tokic, D., 2012. The economic and financial dimensions of degrowth. *Ecological Economics*, The Economics of Degrowth 84, 49–56. <https://doi.org/10.1016/j.ecolecon.2012.09.011>.
- Tran, D.L., Martinez-Alier, J., Navas, G., Mingorría, S., 2020. Gendered geographies of violence: a multiple case study analysis of murdered women environmental defenders. *Journal of Political Ecology* 27, 1189–1212. <https://doi.org/10.2458/v27i1.23760>.
- Vogel, J., Hickel, J., 2023. Is green growth happening? An empirical analysis of achieved versus Paris-compliant CO<sub>2</sub>-GDP decoupling in high-income countries. *The Lancet Planetary Health* 7, e759–e769. [https://doi.org/10.1016/S2542-5196\(23\)00174-2](https://doi.org/10.1016/S2542-5196(23)00174-2).
- Vogel, J., Guerin, G., O'Neill, D.W., Steinberger, J.K., 2024. Safeguarding livelihoods against reductions in economic output. *Ecol. Econ.* 215, 107977. <https://doi.org/10.1016/j.ecolecon.2023.107977>.
- Wiedmann, T., Lenzen, M., Keyßer, L.T., Steinberger, J.K., 2020. Scientists' warning on affluence. *Nature Communications* 11, 3107. <https://doi.org/10.1038/s41467-020-16941-y>.
- Wiman, L., 2024. Are pensions “growth-dependent”? *Sustainability: science. Practice and Policy* 20, 2372874. <https://doi.org/10.1080/15487733.2024.2372874>.
- Wittmann, F.M., 2024. WittmannF/Sort-Google-Scholar.
- Zu Ermgassen, S.O.S.E., Drewniok, M.P., Bull, J.W., Corlett Walker, C.M., Mancini, M., Ryan-Collins, J., Cabral Serrenho, A., 2022. A home for all within planetary boundaries: pathways for meeting England's housing needs without transgressing national climate and biodiversity goals. *Ecol. Econ.* 201, 107562. <https://doi.org/10.1016/j.ecolecon.2022.107562>.