

# Value, Capital and Nature

Rethinking the foundations of ecological economics

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The candidate confirms that the work submitted is his/her own and that appropriate credit has been given where reference has been made to the work of others.

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# Abstract

Ecological economists aim to study the interrelations between ecological and economic systems, with a view to promoting changes towards sustainability. They agree that the nature of global environmental crises is systemic and rooted in economic dynamics. Yet, core economic categories, such as prices, profits, money and their interrelations with ecological destruction, are surprisingly undertheorized. The 'economic' becomes either tied to neoclassical economics or remains neglected. Marxian Political Economy has the potential to address this gap, but is mostly ignored in ecological economics, especially in what it is best at: explaining dynamics of the capitalist system as a whole.

This PhD advocates a more systemic and theoretically grounded ecological economics. I find that neoclassical economic reasoning is rooted much deeper in ecological economics than often assumed. I present a critique of the neoclassical underpinnings of ecological economics, and a Marxian alternative. I identify the Marxian understanding of 'value' and 'capital' as the missing core of ecological economics: a realistic understanding of the capitalist system, spelled out from basics in simple and abstract terms. I explain these foundations and integrate them with a system dynamics understanding of global ecological destruction, social crises and barriers to social change.

I conclude that ecological economics needs to be grounded in a realistic understanding of capitalism – if it aspires to meet its own ambitions. Economic theory and methodology are powerful political tools towards this end: they expose or conceal root causes of social ecological problems and offer better or worse guidance on how to act. Pragmatism about the role of theory and methodology is dangerous, more often than not, because it promotes the reproduction of power relations that prevent, instead of encourage, sustainability transitions. I argue for the need to break with existing prejudices against the Marxian approach and take it seriously as realistic economic theory.



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# 1 Introduction

*“We had to destroy the world in theory before we could destroy it in practice” (Laing 1988 cited by Capra, 1997, p. 19).*

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## 1.1 The argument of this thesis

This chapter introduces the argument of this PhD research, which is the following. Ecological economics provides promising foundations for understanding and acting upon social ecological crises, in terms of content, approach and ambition. It moves beyond standard economic applications to the environment in important ways (section 1.2.1). Yet, these starting points have not been fully carried through to the realm of the economic. The behaviour of ‘the economy’ and core economic categories such as prices, profits or money and their interrelations with social ecological phenomena and crises remain surprisingly undertheorized. The ‘economic’ remains either tied to neoclassical economics or gets neglected (section 1.2.2). The relationship to neoclassical economics is the core contentious issue within the field (section 1.2.3). Marxian Political Economy provides a systemic, realistic, dynamic and interdisciplinary approach to understanding the economy which is consistent with ecological economics (section 1.3.1). However, the Marxian approach remains almost absent, especially what it is best at: explaining dynamics of the capitalist system as a whole (section 1.3.2). This insight is not new (e.g. Adaman and Özkaynak, 2002; Özkaynak et al., 2012), but no one has substantially progressed on this agenda. The contributions that exist do not go far enough in remedying misunderstandings and prejudices regarding the contents and goals of Marxian Political Economy, and providing an accessible account of core Marxian insights for ecological economists (section 1.3.3). This prevents the uptake of a coherent and emancipatory ecological economics paradigm in its own right, which I see as crucial for pushing a radical agenda of social ecological transformation (section 1.4).

## 1.2 The state of ecological economics

### 1.2.1 Common ground

Ecological economics developed out of a deep concern that standard economic applications to the environment are insufficient to effectively deal with modern environmental crises (Røpke, 2005, 2004). Neoclassical economics in general and environmental economics<sup>1</sup> in particular have been attacked for denying biophysical reality and approaching what is an essentially dynamic, interrelated and complex system in a reductionist way. The alternative offered by ecological economists starts with a recognition that natural and social systems are inherently interconnected, influence each other, and need to be studied together (Foxon et al., 2013; Spash, 2011a). This establishes the subject matter of ecological economics as studying

*“the relationships between eco-systems and economic systems in the broadest sense” (Costanza, 1989, p. 1).*

*“how ecosystems and economic activity interrelate” (Proops, 1989, p. 60).*

*“the interactions between economic systems and ecological systems (Common and Stagl, 2005, p. 1).*

*“the intersection of ecology and economics” (Martinez-Alier and Muradian, 2015a, p. 15).*

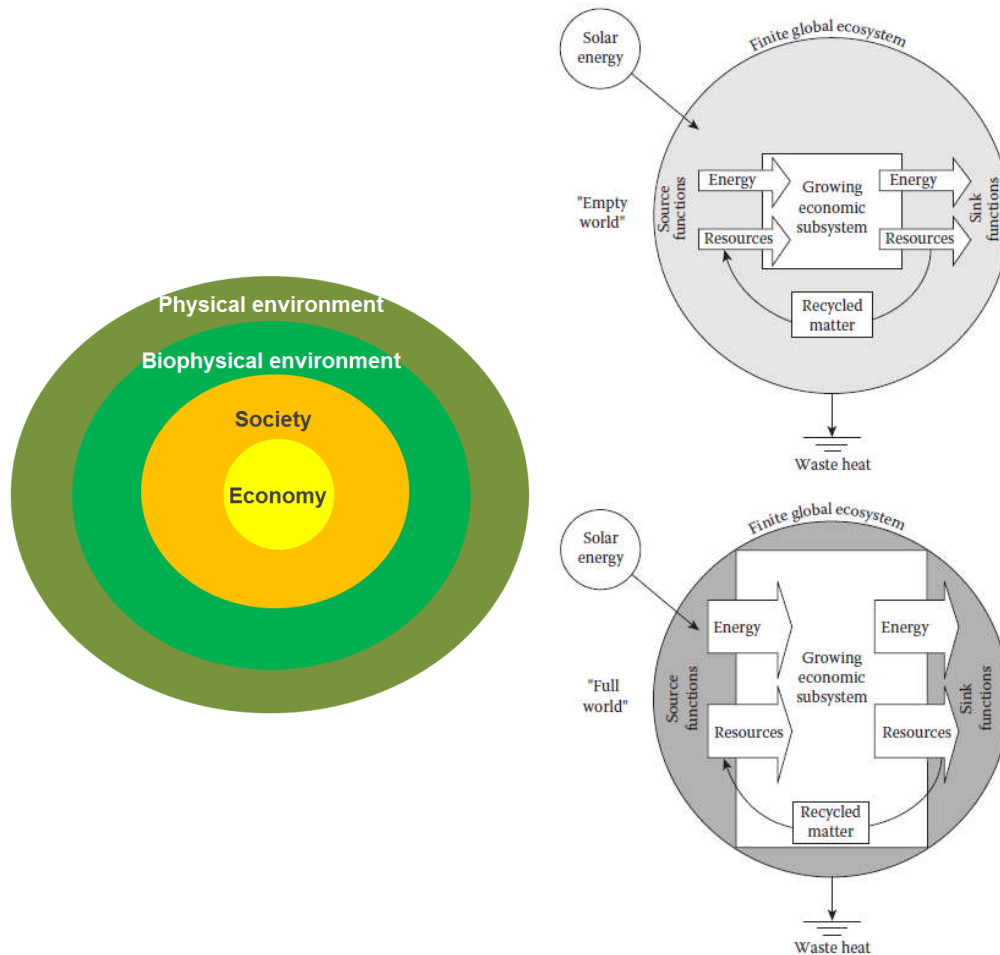
These quotes show a remarkable consistency and agreement over what ecological economists would like ecological economics to be, ever since the establishment of the field 30 years ago, i.e. the study of social ecological interrelations, with a view to change towards sustainability.

How, then, do ecological economists think about the intertwined nature of social and natural systems? The starting point is the so-called pre-analytic vision of ecological economics, a term

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<sup>1</sup> Environmental economics is a sub-discipline of neoclassical economics derived from microeconomic price theory (Krupp, 1963). It is a disciplinary field that applies concepts and methods from neoclassical (welfare) economics in approaching environmental problems (Howarth, 2011). Environmental problems are conceptualised as negative externalities that need to be internalised to remedy market failure, restore market efficiency and maximise social welfare. The basic solution to environmental problems from this perspective is to get the prices right (Vatn, 2005b). Despite innumerable critiques of environmental economics and its neoclassical foundations, it remains by far the most used analysis for environmental policy-making in practice.

borrowed from Schumpeter (Spash, 2012). Figure 1 illustrates two common ways how this vision is presented.



**Figure 1. The pre-analytic vision of ecological economics**

Source: left: Spash, 2014; right: Costanza et al., 2015, p. 5

These diagrams portray a vision of the economy as a subsystem of society, itself embedded in the biological and physical environment. From this perspective, all economic processes are social<sup>2</sup> and ultimately natural processes in terms of biological, physical and chemical

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<sup>2</sup> The distinction between economic and social spheres requires qualification. The economic system refers to the production and distribution of goods and services and associated institutions. It is portrayed as one amongst several social systems, such as politics, education, culture, science or law. All economic processes are therefore considered social processes, whereas the reverse is not the case (Luhmann, 1994, 1987).

transformations and as such subject to the laws of thermodynamics (Georgescu-Roegen, 1971). Waste and energy streams are an inevitable part of any economic process and ‘externalities’ not exceptions but pervasive and persistent (Kapp, 1971).<sup>3</sup> Complexity arises at each level of organisation – from the physical, to the biological, social and economic – which implies that social and economic dynamics cannot be exhaustively explained by biophysical laws. Ultimately, the key message from these conceptualisations is that economic and social systems are dependent for their survival on the biophysical world and subject to the limits thereof (Meadows et al., 1972; Spash, 2012).

From this starting point, ecological economics moves beyond environmental economics in important ways. Ecological economists offer a biophysical perspective of the economic process, i.e. flows of energy and resources through the system, by drawing on systems theory (Bertalanffy, 1968; Boulding, Kenneth, 1956; Meadows, 2009), thermodynamics (Georgescu-Roegen, 1971), systems ecology (Odum and Odum, 2006), and resilience theory<sup>4</sup> (Holling, 1985). In addition, they prioritise human needs and wellbeing (Cruz et al., 2009; Rauschmayer et al., 2011) as well as social and environmental justice (Martinez-Alier, 2003) as desirable societal goals, rather than economic growth or other economic targets as ‘intermediaries’. This orientation leads to the study of distribution conflicts (Temper et al., 2015), power and vested interests (Fuchs et al., 2016), institutions (Kapp, 1978; Vatn, 2015a), and environmental values and ethics (O’Neill, 1992). By taking an inter- and transdisciplinary, and deliberately pluralistic, holistic and post-normal<sup>5</sup> approach, ecological economics also offers a methodological tool-kit fit for studying social ecological complexities in realistic and

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<sup>3</sup> Whereas all forms of social organisation are associated with matter-energy and waste streams, the types and magnitudes of resource use have varied greatly throughout human history. The social metabolism of hunter-gatherer societies was estimated at about 10 GJ/capita, for agrarian societies at 50 GJ/capita and for the industrial regime at 200 GJ/capita. From 1500 AD onwards, the increase has become much steeper: it more than doubled between 1500-1800, from 1700 on it doubled per century, from 1900 on it doubled in 50 years, and from 1950 on it tripled in 50 years (Fischer-Kowalski et al., 2014).

<sup>4</sup> Resilience theory tackles the capacity of systems to deal with shocks. Holling (1986) pioneered the approach of drawing inferences from the analysis of dynamic ecological systems – including irreversibilities, thresholds, non-linearities, time-lags, fundamental uncertainty, multi-equilibrium states, complexity – onto the analysis of economic systems thus co-founding (co-)evolutionary economics.

<sup>5</sup> Post-normal science has been developed by Silvio Funtowicz and Jerome Ravetz in the 1990s as a new type of science for problems in which “*facts are uncertain, values in dispute, stakes high and decisions urgent*” (Funtowicz and Ravetz, 1993, p. 744) – such as climate change. They critique the scientisation of politics and associated use of elitist tools such as technocratic cost-benefit-analysis. Instead, they call for new problem-solving strategies based on a democratisation of the scientific process, for instance by adopting transdisciplinary methodologies (Funtowicz and Ravetz, 1994a, 1994c, 1993).

transformative ways (Funtowicz and Ravetz, 1993; Lélé and Norgaard, 2005; Max-Neef, 2005). Moreover, the field hosts spaces for advancing radical social change, such as post- and degrowth movements (D'Alisa et al., 2014).

Taken together, these foundational pillars result in the widespread view that ecological economics is the heterodox school of thought of the environment that offers a more realistic, systemic and progressive alternative to neoclassical welfare economics.

*“As the only heterodox school of economics focusing on the human economy both as a social system and as one imbedded in the biophysical universe ... ecological economics is poised to play a leading role in recasting the scope and method of economic science” (Gowdy and Erickson, 2005, p. 208).*

The same opinion is expressed by Richard Norgaard, one of the co-founders of our discipline, in an interview with Colander et al. (2004):

*Question: Is ecological economics terribly heterodox?*

*Answer: Yes, I hope so.*

## COMMON GROUND IN ECOLOGICAL ECONOMICS

### The pre-analytic vision

- Biophysical reality exists independently of humans
- Biophysical and social realities are distinct (i.e. a hierarchical ontology is accepted – physical, biological, social, economic) but interrelated
- Human development is subject to biophysical limits
- Social ecological realities are complex, dynamic, interrelated and continuously changing

### Vision & ambition

Ecological economists study social and natural interrelations, with a view to change towards sustainability. The vision of living well within limits for all includes future generations and non-human beings. Increasing ecological crises require emphasising distribution conflicts and issues of justice.

### Methodology

Complex, dynamic, interrelated social ecological realities need to be studied realistically, in their own right and with a view to transformative change; this requires

- Systemic thinking (understanding interrelations, emergence, co-evolution)
- Interdisciplinarity (different forms of knowledge, mixed-method approaches)
- Transdisciplinarity (deliberative and participatory methods, focus on processes)
- Biophysical and social assessments (input-output, material flow analyses, sustainability indicators)
- Post-normal science (strong uncertainty, complexity, reflexivity)
- Value pluralism and incommensurability (multi-criteria decisions, power and vested interest)

### Research themes (in alphabetical order)

- Co-evolutionary processes and development
- Critique of neoclassical environmental economics
- Degrowth and steady-state economics
- Ecological macroeconomics
- Ecosystem services and commons
- Energy accounting and thermodynamics
- Environmental conflicts and social justice
- Environmental governance and institutions
- Environmental values and ethics
- Human needs, wellbeing and consumption
- Social metabolism
- Sustainability indicators

**Table 1. Common ground in ecological economics**

Source: own, drawing on Martinez-Alier and Muradian, 2015 and Spash, 2017, 2012



### 1.2.2 A missing core?

The pre-analytic vision acknowledges that the dynamics of the social world cannot be exhaustively explained by biophysical laws. How, then, is the economic realm – that lies at the heart of the pre-analytic vision – conceptualised and studied in ecological economics? The answer is: surprisingly little. The economy is widely treated as a black box. Figure 1 serves as an illustrative example. In the graph on the right, the economy is indeed visualised as a box, with energy-matter entering and exiting the economy-box. This way of thinking might be a legacy from general systems theory, which provides the following rationale for conceptualising black boxes: because the inner life of systems is complex and not transparent, regularities can be observed by looking at inputs and/or outputs. Attempts to influence unknown system behaviour are then made by varying inputs or outputs. This implies a shift away from the system itself to its surroundings. In practice, this has led to much research aiming to measure biophysical inputs, throughput and output and conducting analyses that plot core conflicts between the growth<sup>6</sup> of ‘the economy’ and ‘the environment’.

Whilst the biophysical approach to understanding economic processes is insightful in many respects – for instance, to understand the reliance on certain types of resources and their impacts on ecosystems, especially dynamics and scale effects – it is insufficient for an in-depth understanding of root causes of social ecological crises. Biophysical accounts are crucial for substantiating ecological overuse, but cannot explain ecological destruction at a fundamental level. They show *what* is happening (humanity entering the Anthropocene), but fail to explain *why*. If we adopt a systems thinking perspective and accept that a system causes its own behaviour, emerging from the interrelations of its parts, then problems are not ‘out there’ but ‘in here’ (Meadows, 2009). It is crucial to understand why and how the ‘black box’, i.e. specific forms of economic organisation, destroy biophysical and social worlds. Luhmann is one social scientist who long ago argued that Bertalanffy’s system theory is a valuable first step but does not go far enough to analyse the social and economic realm. This approach may be appropriate for certain natural systems with lower levels of complexity but it is not for social systems that consist of many variables and different hierarchies (Luhmann, 1987).

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<sup>6</sup> Indeed, this also seems to explain ecological economists’ heavy emphasis on growth as the main cause of global crisis phenomena. As Meadows remarks: “*Asked by the Club of Rome to show how major global problems – poverty and hunger, environmental destruction, resource depletion, urban deterioration, unemployment – are related and how they might be solved, Forrester made a computer model and came out with a clear leverage point: Growth*” (Meadows, 1999, p. 1).

How, then, can the economy as a complex social system entangled with the biophysical world be understood? One obvious move is to turn to the discipline of economics. However, here we encounter the next problem. Although there is widespread agreement that neoclassical economics is deeply flawed (Anderson and M'Gonigle, 2012; Spash, 2013, 2011b; Spash and Ryan, 2012), in practice, it remains widely accepted as one fundamental pillar of ecological economics (Common and Stagl, 2005; Costanza et al., 2015; Daly and Farley, 2011; Shmelev, 2012). Many ecological economists believe neoclassical economics offers key insights and concepts into how the economic system works, but that it is 'freely floating', i.e. not grounded in biophysical reality and that this is what ecological economists can contribute to improving it. Or alternatively, even if scholars acknowledge severe limits of neoclassical economics, they often choose to buy into mainstream concepts for pragmatic reasons. Speaking a language policy-makers understand is often seen as increasing the chances of resolving social ecological problems (Spash, 2013).

If we leave disagreement about the role of mainstream economics within our field aside for a moment, what alternative schools of economic thought have been explored? Interestingly, at the time when ecological economics came into being, immediate links were established to the physiocrats (Cleveland, 1999, 1987) and Classical Political Economy (Becker et al., 2005; Christensen, 1989, 1987) because these schools of thought considered nature as a fundamental part of the economic process. However, explorations in this direction were mainly concerned with Smith, Malthus, Ricardo and Mill (Seidl and Tisdell, 1999; Zweig, 1979). Marxist perspectives have been widely omitted (see section 1.3.2). This matters, as Marx pursued a different approach than the other Classics and reached different conclusions, as I will elaborate in chapters 3 and 4.

Attempts to build bridges with Post Keynesian economics were initiated very early too (Gowdy, 1991). These relations have existed ever since but rather at the fringes (Holt et al., 2009; Kronenberg, 2010). This situation has changed with the development of 'ecological macroeconomics' which has led to a mushrooming of Post Keynesian contributions (Dafermos et al., 2014; Fontana and Sawyer, 2013; Jackson, 2009; Rezai and Stagl, 2016; Victor and Rosenbluth, 2007). Until now, contributions focus on modelling (especially stock-flow consistent modelling) and scenario building, not on substantive economic theory. Links to other schools of thought exist too, most prominently with institutional economics (Paavola and Adger, 2005; Vatn, 2005a), feminist economics (Nelson, 2008), and co-evolutionary economics (Foxon, 2011; Kallis and Norgaard, 2010). These research communities cover many

crucial issues; however, they do not focus on the core causal dynamics of environmental degradation of economic activities.

To conclude, the economic system and its dynamic interrelations with the environment remain surprisingly undertheorized in ecological economics. This is not a new idea. It has been recognised that ecological economics needs a framework that considers how ecological issues relate to the operation of the economic system as a whole (Adaman and Özkaynak, 2002; Burkett, 2009; Douai, 2016, 2009; Klitgaard and Krall, 2012; Özkaynak et al., 2012). However, such statements are typically made at the end of articles, without providing much substantive alternative economic theory. I conclude that the promising heterodox elements and starting points, as outlined in section 1.2.1, have not been carried fully through to the domain of the economic. After three decades our field fails to provide an alternative economic theory to the mainstream. Ecological economics remains “*an unfinished journey*” (Nadeau, 2015, p. 101).

### 1.2.3 A united but fragmented community

The uneasy relations between ecological economics and neoclassical economics disunites the field. The question of how and whether to include neoclassical economics in the pluralist ecological economics approach runs like a thread through Clive Spash’s characterisation of ecological economics as a ‘movement in three camps’ (Spash, 2013). *New-resource economists* admit that the assumptions of neoclassical theory are excessively abstract and unrealistic but argue that many tools and concepts are useful and that environmental economics should be extended. *New environmental pragmatists* aim for close links to policy and opportunistically use mainstream ideas and concepts to get environmental messages across without engaging much with theory or methodology. *Social ecological economists*, on the other hand, reject neoclassical analysis altogether; however, their research moves rather quickly from a critique of mainstream theory and elements of economic practices to stronger ties with social theory and building alternatives, without a fundamental theoretical analysis of capitalism. Alternative economic foundations remain absent.<sup>7</sup>

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<sup>7</sup> This divide can also be found in textbooks. Whereas more mainstream textbooks provide introductions to mainstream supply and demand analysis (Common and Stagl, 2005; Daly and Farley, 2011), the more progressive textbooks and handbooks tend to abstain from economic theory altogether (Martinez-Alier and Muradian, 2015a; Söderbaum, 2000; Spash, 2017).

The issue remains unresolved and disputed. It has led to a situation in which different research communities within ecological economics live rather separate lives, but even worse, the formerly more radical discourse of ecological economics has in fact drifted towards environmental (neoclassical) economics over time (Plumecocq, 2014).<sup>8</sup> Gowdy and Erickson articulated 13 years ago that ecological economics

*“has not yet coalesced into a coherent school of thought, but it is a leading contender among heterodox schools to become a comprehensive alternative to neoclassical orthodoxy” (Gowdy and Erickson, 2005, p. 208).*

This is still the case today. Ecological economics has remained a non-coherent school of thought, with a dispute about the role and importance of neoclassical economics at its heart.

## 1.3 The untapped potentials of Marxian Political Economy

### 1.3.1 Theory and methodology fit for purpose

Marx was a systems thinker and a realist. His ambitious agenda was to understand the capitalist system as a whole, with a view to changing it. What characterises capitalism? How did it emerge? How does it evolve? What are its core drivers and dynamics?

*“One of the strengths of Marx’s Capital, acknowledged by friend and foe alike, is to have pointed to the systemic character of capitalism and to its essential features” (Fine and Saad-Filho, 2016, p. 26).*

The classical Marxian approach operates at a level of analysis that is fit for purpose for understanding global environmental change, i.e. the level of generality of capitalism. Marx was not interested primarily or initially in explaining the price of a pair of shoes, nor the consumption behaviour of individuals but general tendencies, dynamics and contradictions of the system as it exists under capitalism. In addition, by adopting a realist methodology, biophysical considerations remain firmly rooted as part of the explanation of the economic process. As such, Marxian Political Economy uniquely conceptualises the interplay of

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<sup>8</sup> Plumecocq explains this fact mainly by the rise of a tacit recognition of the New Environmental Pragmatic scientific approach, i.e. ecological economists adopt mainstream concepts – prominently notions of ecosystem services and of monetary valuation – in the hope to influence political decisions.

biophysical and monetary processes and dynamics throughout the entire system, as I will elaborate in chapters 3 and 4.

The scope to tackle the system as a whole, the ambition to trigger systemic change, and the realist approach that emphasises interrelations, dynamics and change makes the Marxist approach very akin to ecological economics. Yet, the systemic perspective is a disadvantage at the same time: it is not straightforward to understand. What ‘value’ and ‘capital’ mean, or what Marx’s theory of money, profit or interest is, can only be fully grasped by understanding the Marxian approach as mainly laid out in *Capital* Volumes I-III in its entirety. This is because the Marxian approach rebuilds capitalism as a complex system in thought – this implies that categories presuppose and refer to each other.<sup>9</sup> In this way, Marx builds a theoretical architecture that forms an explanation of the system as a whole. This methodological approach gives rise to the explanatory power of the Marxian approach, but it is also one of the main reasons why confusions and misinterpretations regarding Marxian theory remain widespread.

### 1.3.2 Uneasy relations

Misinterpretations also persist in ecological economics. Influential ecological economists declare explorations into Marxism a dead-end at best and counter-productive at worst. Costanza et al. (2015), for instance, state that

*“Marx and his followers in communist countries have made a negative contribution to the allocative efficiency problem ... their ideological rejection of rent and interest as necessary prices and their insistence on a labour theory of value that neglected nature’s contribution were responsible for much of the environmental destruction in communist countries” (Costanza et al., 2015, p. 45).<sup>10</sup>*

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<sup>9</sup> Capital, for instance, is defined as value in motion. An understanding of capital therefore requires an understanding of value. Understanding value, however, requires grasping the nature of the commodity, which, in turn, already contains the seeds for understanding the expansionary nature of capital. I will detail and clarify these steps in chapters 3 and 4; the point here is to illustrate how different categories in Marxian thought are interrelated to form a systemic understanding of capitalism.

<sup>10</sup> Interestingly, this quote is part of a three-page section on ‘Karl Marx and the Ownership of Resources’ which, in fact, is not about Marxian Political Economy in any substantive sense but resource ownership issues in general. The authors briefly state that their views about concentrated ownership and control of resources roots in Marxian thinking, yet they end the section with a remarkable opposition towards the Marxian approach, for the reasons stated in this quote.

As I will explain in chapters 3 and 4, Marxian value theory does not neglect the role of nature but rather explains why nature is undervalued, underpriced and vastly appropriated – ideally for free – under capitalism. However, Costanza’s view remains widespread amongst ecological economists. In a similar spirit, Costanza’s mentor Herman Daly believes that:

*“Marx, with his theory that labor was the source of all value, was even more eager than standard economists to deny any important role to nature in the functioning of the economy and creation of value” (Daly and Farley, 2011, p. 32) or that “Marx’s models of simple and expanded reproduction are also isolated circular flow models” (Daly and Farley, 2011, p. 32).*

Contrary to Daly and Farley’s opinion, Marx’s reproduction schemes were in fact established to show – contrary to mainstream equilibrium views – why capitalism is not a simple circular system but rather an expanding spiralling system (Harvey, 2010a). Another widespread opposition stems from the fact that former Communist countries were equally advocating a growth agenda, which is what authors use to discredit the Marxian approach.

*“The former USSR and the West ... shared a fundamental commitment to economic growth as the first priority. The Marxist’s deterministic ideology of dialectical materialism refused any appeals to morality or justice” (Daly and Farley, 2011, p. xxiii).*

Daly and Farley provide a short account of the general circuit of capital in their seminal textbook, but their conclusion is that Marx advocated growth, which is why they reject the Marxist account (Daly and Farley, 2011, p. 286). This is erroneous (and unscientific). Marx did not advocate growth; he explained the inherently expansionary nature of capitalism. And whilst it is true that many Marxists have promoted growth for development, these positions do not justify discarding realistic economic theory. Also, Marx’s theory is not deterministic but explains dominant tendencies, as I will explain in chapter 4.

Joan Martinez-Alier, another co-founder of our field, former President and key source of inspiration of the degrowth movement, has prominently argued against Marx and Engels because they ignored and dismissed Podolinsky’s attempt in the 1880s to reconcile the labour theory of value with the first and second law of thermodynamics (Martinez-Alier and Naredo, 1982; Martinez-Alier, 1987). I interpret their critique as paving the way for a conventional wisdom within ecological economics that Marx neglected substantive ecological issues.

Marina Fischer-Kowalski, another former President of the Society, relies on Ted Benton’s work to conclude in one of her most cited articles:

*“Marx’s and Engels’ theory ... bears several theoretical defects ... the net effect of which is to render the theory incapable of adequately conceptualizing the ecological conditions and limits of human need-meeting interactions with nature” (Fischer-Kowalski, 1998, p. 62).*

*“The materialist Marxist traditions revived in the 1960s [did not deal] with possible physical properties of society and society-nature interaction” (Fischer-Kowalski, 1998, p. 66).*

These quotes highlight that ecological economics has developed as a discipline in which key scholars – all of those quoted above have developed whole research streams within the field – consider the Marxian approach as severely limited for the advance of knowledge in our field. These quotes indicate why relations between ecological economics and Marxists have been frosty. As a result, ecological economics textbooks are marked by an almost (e.g. Martinez-Alier and Røpke, 2008) or complete absence (e.g. Common and Stagl, 2005; Shmelev, 2012) of references to Marxist thinking. Marxian thinking remains associated with failed political projects and whilst this negative reception is partly understandable, it is a fatal mistake to abandon realistic and insightful economic theory for these reasons.

### **1.3.3 Lost in translation**

Marxists have attempted to correct influential misinterpretations, most prominently Paul Burkett and John Bellamy-Foster,<sup>11</sup> but also others, such as Ali Douai more recently (Douai, 2016, 2009). These scholars have tried to demonstrate the merits of classical Marxian Political Economy for ecological economics; however, with limited success. Burkett, Foster and Douai provide rather short accounts of Marxian value theory in their articles, and also in books (e.g. Burkett, 2009). These dense portraits of complex theory in tandem with the use of Marxist terminology that is not prevalent in ecological economics make them very difficult – if not

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<sup>11</sup> Burkett’s and Foster’s contributions have challenged arguments with respect to Marx’s reproduction schemes being, in essence, no different to the mainstream circular flow model and thereby abstracting from the biophysical world (Burkett, 2004), Marx neglecting the first and second law of thermodynamics (Foster and Burkett, 2008) or him not treating nature as a source of value (Burkett, 1996, 2003). In their literature on ‘the Podolinsky myth’ (Burkett and Foster, 2006, 2008; Foster and Burkett, 2004) they challenge Martinez-Aliers’ critique by making the case that Podolinsky had not come close to establishing a sensible thermodynamic basis for the labour theory of value (essentially by collapsing use value to energy) which was the reason why Marx and Engels did not endorse it (Burkett and Foster, 2006). Burkett’s contributions of Marxian insights for ecological economics culminated in a book on Marxism and Ecological Economics, where he introduces value theory and issues around conflict, power and systemic crises as areas where ecological economists can still learn a lot from Marxist thought (Burkett, 2009).

impossible – to understand for non-Marxists. Other Marxian authors apply Marxian theory to specific problems in ecological economics – such as to critique of ecosystem service valuation as commodity fetishism, for instance (e.g. Kosoy and Corbera, 2010) – without detailing their theoretical underpinnings. As a result, key insights from Marxian theory and methodology are not accessible enough for ecological economists. The centrepieces – an understanding of value and capital – and how they drive and shape the societies we live in, remain under-considered and under-appreciated in ecological economics.

There are many writings about ecological sustainability from a Marxian perspective. This is sometimes termed ‘eco-socialism’ or ‘eco-Marxism’. The journal *Capitalism, Nature, Socialism*, which was founded about the same time as *Ecological Economics*, in 1988, remains a key reference point. Early seminal contributions, for instance, by James O’Connor (Connor, 1988; Martinez-Alier et al., 2018) and more contemporary leading examples, such as Andreas Malm’s *Fossil Capital* (Malm, 2016) or Jason Moore’s *Capitalism in the Web of Life* (Moore, 2015) rise in importance, as global ecological crisis intensify. This PhD centres on ‘classical’ Marxian literature and the specific Marxian literature that exists in ecological economics, rather than the extensive and significant eco-Marxist literature in general. This is mainly because this literature discusses and applies, rather than explains, step by step, the foundations of Marxian theory of the capitalist system as a whole; foundations which I aim to make explicit for ecological economists. However, it would be an omission to refrain from the eco-Marxist literature altogether. I will direct the reader to selective literature in Chapters 3 and 4, especially to highlight deep and varied dialogues about the links between ‘value’ and ‘nature’ that are central to this thesis.

## **1.4 Aims, ambition and architecture of the thesis**

### **1.4.1 Aims**

The main ambition of this PhD is to contribute to radical social change towards environmental sustainability and social justice. To this end, I advocate a more systemic, realistic and theoretically-grounded ecological economics. This section elaborates this core aim from three vantage points.



## **Better economic foundations for better decisions**

Interrelated ecological, social, economic and financial crises are looming and large-scale interventions required, fast and effectively (Buch-Hansen, 2018). But how to judge what interventions contribute to desirable systemic outcomes? A realistic understanding of capitalist dynamics is a step to increasing chances for effective policies to be implemented. This PhD intends to provide better economic foundations for ecological economics. It explains why neoclassical economic foundations – that remain widespread in our field – contradict the scope, vision and ambition of ecological economics, and it presents Marxian Political Economy as an alternative. I explain core Marxian insights of the workings of the capitalist system as a whole, with a view to developing ecological economics to realise the ambition to study the interrelations between ecological and economic systems. I introduce a comprehensive Marxian understanding of ‘value’ and ‘capital’ to show how intertwined social ecological dynamics and crises can be explained in conclusive and realistic ways. These foundations can be used to prioritise future research efforts that tackle root causes of destructive social ecological changes and support systemic social change.

## **The power of ideas. Making the case why theory and methodology matter**

Ideas matter, no matter whether they are empirically right or wrong. They shape how we think about and act in the world. Economic ideas are especially important because they grant access to resources and power. Power relations, in turn, influence and dictate what ideas gain currency. They shape knowledge production in crucial ways, by channelling what gets studied and what not; what gets financially and institutionally supported and what not. As such, economic ideas – economic theory and methodology – are powerful political instruments. In ecological economics, the role of theory and methodology is often downplayed. ‘Abstract’ theory gets contrasted with ‘concrete’ action and real-world problems, and the latter is what needs to be prioritised. I partly disagree. Theories are not solutions per se, and not everything it takes to change the world. That much is clear. Marxian theory-methodology is not the Holy Grail either. Yet, good theories reveal spaces for action, warn of obstacles and, crucially, help us to see beyond empirical reality (Luhmann, 1987). In contrast, theories are highly problematic when they hide what is important and prevent sensible actions. From this perspective, an engagement with theory and methodology is no abstract exercise in academic

ivory towers but can be a radical tool for a more radical praxis. *Because* environmental crises are accelerating, we cannot afford to rely on floppy theories.

### **The power of a united community. Synthesis and integration in ecological economics**

This PhD research aims to foster integration within ecological economics, by debunking neoclassical economics as a serious barrier for the advance of knowledge and a dangerous guide for action, and by presenting Marxian economic foundations as a credible alternative. Neoclassical economics has divided the community in ecological economics; Marxian theory has the potential to serve as one powerful ingredient to strengthen the field along shared principles, as outlined in section 1.2.1, by thinking more carefully about what makes sense and what does not. More debates about substantive economic issues are needed because they bear the potential to place ecological economics on firmer ground, give it a clearer sense of direction and stronger critical voice as a united community. This is important to open up spaces for more radical research that is needed to push an agenda of social ecological transformation.

#### **1.4.2 Research questions**

This PhD research addresses the following set of questions:

- Why does ecological economics need better economic foundations? (mainly chapter 2, but also chapters 3 and 4)
- What is value? Why does value theory matter for ecological economists? What insights does Marxian value theory provide for understanding the capitalist system? (chapter 3)
- What is capital? How is the reproduction of capital interlinked with environmental impacts and barriers to social change? (chapter 4)
- What concluding insights can be derived from the previous chapters? What elements constitute a progressive ecological economics research agenda moving forward? (chapter 5)

### 1.4.3 PhD structure

This PhD research proceeds as follows. Chapter 2 ‘CONTRADICTIONS’ substantiates and exemplifies the claim made in the introduction that ecological economics lacks a coherent economic theory of the system as a whole. Steady-state economics serves as the case in point. The vision of a steady-state economy elaborated by Herman Daly is one of the most influential theories in ecological economics for considering the interrelated nature of ecological and economic systems. The chapter shows that steady-state economics internalises neoclassical economic theory and reasoning which leads to fundamental theoretical inconsistencies within steady-state theory. As Herman Daly pioneered the foundations of ecological economics with his thinking, these ambiguities are not only problematic for steady-state economics but ecological economics as a field more generally. I suggest to let go of neoclassical foundations altogether in favour of a political economy approach.

Chapters 3 and 4 aim to elaborate this alternative. Both chapters taken together aim to present the core Marxian understanding of capitalism and how ecological overshoot and societal lock-ins can be explained on this basis. Chapter 3 ‘VALUE’ makes the case that Marxian value theory – contrary to wide-held beliefs in ecological economics – is neither monistic, favouring labour, neglecting the environment nor outdated. Rather, it is part and parcel of understanding the essence of the capitalist system. The chapter shows how an understanding of simple commodity exchange reveals how capitalist markets function and shape societies. It explains, step by step, how pressures to increase labour productivity and the systemic strive for monetary gains emerge as dominant motives driving societal reproduction. These value-theoretic foundations are not consistently spelled out in ecological economics. Instead, and contrary to widespread scepticism towards neoclassical economics, ecological economists tend to unconsciously adopt the mainstream economic conception of the economic system as a whole.

Chapter 4 ‘CAPITAL’ takes a next step and shows how the value theoretical foundations developed in the previous chapter form the starting point for understanding capital. In its simplest expression, capital is a form of value; it is value in motion. This chapter introduces the circuit of capital and associated profit and competition dynamics of capitalist (re)production. A discussion of the circuit of capital may seem basic for Marxists, but it is not for ecological economists. It is virtually absent from the literature, including textbooks and handbooks. This matters, because the circuit of capital forms the foundation for identifying endogenous tendencies that drive environmental impacts and pose barriers to social change.

I identify eight dominant tendencies – overproduction, technological dynamism, appropriation, commodification, overconsumption, acceleration, alienation, concentration and financialisation – and explain how they explain growth dynamics and the formation of multiple crises.

Chapter 5 '*CONCLUSIONS*' synthesises insights from the previous chapters, including elements of a research agenda moving forward.

# 2 Contradictions

## The neoclassical Trojan horse of steady-state economics

*“The great errors and failings of attempts to apply science to matters of urgent concern have come from posing problems too narrowly, too linearly, too statically” (Lewontin and Levins, 2007, p. 149).*

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### 2.1 Introduction

Steady-state economics is one of the most influential theories in ecological economics for considering the interrelated nature of ecological and economic systems. The vision elaborated by Herman Daly describes an ecologically sustainable economy that uses materials and energy within the regenerative and assimilative limits of the planet’s ecosystems. It is defined in physical terms, by a constant stock of human population, domesticated animals (i.e. livestock) and built capital – such as buildings, infrastructure, or durable consumer goods – that are maintained by a low rate of matter-energy throughput (Daly, 1991a, p. 475, 1974a; O’Neill, 2015). Daly argues that a physically non-growing or steady-state economy is the only long-run alternative for economies to die of old age in the distant future rather than of the cancer of ‘growthmania’ (Daly, 2010a, 1996).

The analytical starting point for the steady-state goal is a new pre-analytic vision (Schumpeter, 1954) that overcomes the shortcomings of traditional economic ontology. Daly attacks the isolated circular flow model of exchange value of ‘orthodox economics’ for ignoring biophysical reality and absolute resource limits. Instead, he proposes a view of the economy as a subsystem of a finite ecosystem that is totally dependent on it, both as a source of low-entropy matter-energy and as a sink for high-entropy matter-energy (Georgescu-Roegen, 1971). This worldview infers that modern societies have moved from an ‘empty world’, where

the scale of the economy was relatively small compared to its surrounding ecosystems, into a 'full world', where it increasingly presses against planetary boundaries (Steffen et al., 2015).

The full-world perspective begs the question: how big can the economy get in relation to its surrounding ecosystems? This is the matter of sustainable scale which is Daly's most important concept and subject matter for a new 'Environmental Macroeconomics' that is meant to focus on *"the volume of exchanges that cross the boundary between system and subsystem"* (Daly, 1996, 1991b, p. 256). Scale is defined as the material-throughput that can be tolerated without eroding the carrying capacity and resilience of natural systems.<sup>12</sup> As we approach or overshoot sustainable scale, or planetary boundaries in modern parlance, the aim can no longer be quantitative growth but qualitative development, leading to *"an economics of better, not bigger"* (Daly, 1996).

The implementation of the steady-state economy is envisaged as a hierarchy of three consecutive goals: sustainable scale, just distribution, and efficient allocation (Daly, 2010a, 1992, 1991a). A 'good' scale is at least sustainable. Once the overall cake is no longer growing, distribution becomes an issue in its own right that has to be tackled as a separate economic goal. Distribution means deciding how to divide the resource flow amongst people, and a 'good' distribution is one that is just or fair, based on ethical principles and keeping levels of inequality below reasonable levels. Only after a resource limit and the level of distribution have been set does efficient allocation become the mechanism to determine the destination of scarce resources. A 'good' allocation is efficient if it:

*"allocates resources among product end-uses in conformity with individual preferences as weighted by the ability of the individual to pay. The policy instrument that brings about an efficient allocation is relative prices determined by supply and demand in competitive markets"* (Daly, 1992, p. 186).

Daly leaves little doubt that allocative efficiency is the kind of efficiency he means (Daly, 1992, 1991a, p. 82; Daly and Cobb, 1989, p. 59; Daly and Farley, 2011, p. 457).

This framework is supposed to be substantially different from the standard environmental economics solution of 'getting the prices right'. Externality theory, Daly argues, subsumes the

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<sup>12</sup> The pre-analytic vision and Daly's concept of sustainable scale were instrumental in establishing a research programme within ecological economics that deals with the operationalisation of biophysical scale, leading to concepts and methodologies such as MFA, HANPP, energy accounting, footprint and rucksack calculations, etc. (Røpke, 2005).

scale problem under allocation by assuming that once all prices are internalised, there will be no scale problem as prices reflect true scarcity. However, if scale is set first, then there is nothing wrong with using the market mechanism for what it is good at: determining prices that reflect relative resource scarcity. Faith in the market mechanism to yield Pareto-efficient outcomes is reflected not only in steady-state theory but has also become a foundation for several influential ecological economic textbooks (Common and Stagl, 2005; Costanza et al., 2015; Daly and Farley, 2011).

Any theory needs to be logically consistent, as one criterion among others, to serve as a good compass and guideline for effective action, especially so if the aim is to convince politicians, policy makers and academics to advocate and implement steady-state proposals. Daly himself says in the Preface of *Steady-State Economics* that

*“we should be concerned with whether ... arguments are valid or invalid, and whether underlying values are good or evil” (Daly, 1991a, p. xvi) and “to refute an argument one must find either a factual error in the premises or a logical error in the reasoning” (Daly, 1991a, p. xi/xii).*

Despite Daly’s appeal for theories based on logical reasoning and ethical considerations, there has been very little critique of steady-state economics. Mainstream economists tend to ignore it, do not know about it or dismiss it as naïve, and much of the ecological economics community embraces it as a useful and pragmatic vision of a sustainable society.

The purpose of this chapter is to offer a critique of steady-state theory with a view to stimulating dialogue and establishing a constructive research agenda. Thinking through the steady-state edifice step by step reveals that it relies on the neoclassical understanding of the economy. If neoclassical theory is dropped (and several reasons will be provided why this is necessary), steady-state economics remains a rather shallow normative framework stipulating that the economy ‘should’ stay within the limits of the ecosystem and that resulting redistribution issues ‘should’ be tackled in a relatively just way. Steady-state economics does not explain how growth dynamics emerge, why steady-state proposals face extreme implementation barriers, how wealth is distributed, why society changes, etc. In other words, it does not have a social or economic theory of its own that explains social ecological dynamics.

This chapter primarily draws critically on Daly’s works, for several reasons: he established steady-state economics within the field and has written most extensively about it; his contributions still influence major advances of steady-state economics, lately sometimes

under the name of ecological macroeconomics (Rezai and Stigl, 2016); and his works are most insightful in revealing the theoretical essences of the steady-state approach.<sup>13</sup>

The structure of the argument is as follows. Section 2.1 introduces the foundations of steady-state theory. Section 2.2 deconstructs these foundations by highlighting that steady-state economics relies on the neoclassical theory of demand, supply, and general equilibrium theory, which leads to theoretical inconsistencies, contradictions and unresolved issues. This section also includes some presentation of alternatives on the issues covered. Section 2.3 demonstrates that steady-state economics not only relies on neoclassical theory but also neoclassical thinking, which is problematic for similar reasons. Section 2.4 discusses why this analysis matters. Section 2.5 summarises and concludes that ecological economics requires sound theories that explain the emergence and dynamics of social ecological phenomena.

## 2.2 The ambiguous nature of steady-state theory

The steady-state approach seems reasonable at first. The idea is to limit the use of natural resources, distribute them fairly amongst people and do this in an efficient manner. Market efficiency is proposed as the third goal of steady-state economics to solve ‘the allocation problem’. However, what does this really mean? What is ‘the allocation problem’? What is efficient? For whom? And how is it to be achieved? This section reveals that allocative efficiency is not a neutral concept in neoclassical economics but integrated into its very core. Accepting allocative efficiency in the way Daly suggests implies accepting the neoclassical understanding of capitalist dynamics – the theory of demand, the theory of supply, and general equilibrium theory. This move is highly problematic, as these theories are flawed in at least two ways: they are internally incoherent, and thus fail on their own terms; and they are unrealistic, and thus do not capture essential dynamics of real-world economies that are key for explaining and addressing social ecological problems.

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<sup>13</sup> Especially Daly’s older works explicitly refer to economic theory (Daly, 1996, 1991a, 1974a). In more recent texts the focus shifts towards specific policy proposals, without addressing their theoretical underpinnings (e.g. Daly, 2010a). This is problematic, as implicit theories are more difficult to detect. However, from my reading there is little indication that Daly has changed the tendency to embrace neoclassical economic theory and methodology ever since he developed steady-state economics.



### 2.2.1 Allocation and perfect markets: the adoption of neoclassical microeconomics

Allocative efficiency is endorsed in steady-state economics based on the claim that markets solve the allocation problem and deliver Pareto optimal societal outcomes.

*“Yes, the market should certainly be the main mechanism for solving the problem of efficient allocation of resources ... We must use the market to solve the allocation question, but we cannot expect it to solve the scale and distribution questions” (Daly, 1996, p. 13). “The invisible hand [is] wonderful for allocation” (Daly, 1996, p. 59). “The best we can hope for from a perfect market is a Pareto-optimal allocation of resources” (Daly, 1996, p. 32).*

Lawn, a supporter of steady-state economics, confirms that *“Daly’s vision of steady-state-capitalism embraces the efficiency-facilitating role of markets”* (Lawn, 2010, p. 7). These statements illustrate the acceptance of the narrative and prospect of neoclassical microeconomic theory, which centres, at its heart, on yielding allocative efficient outcomes.

The ‘allocation problem’ concerns decisions about what to produce, how and how much (Pindyck and Rubinfeld, 2015). Whether, which, how and how many bicycles, shoes or teapots are produced in an economy depends on various factors, such as available means of production (machines, factories, technology, resource inputs), consumer preferences, their income and willingness to spend, and broader political economy considerations such as industrial relations, the legal architecture and cultural, historical and geographical contexts (Vatn, 2015a, 2005b). The neoclassical approach of tackling allocation assumes initial endowments, consumer tastes and technology as given (exogenous), and abstracts from political and time-space concerns (Fine, 2016). What remains endogenous is the determination of equilibrium prices and quantities. This means the ‘allocation problem’ boils down to a pure exchange problem, the solution to which is provided by ‘the invisible hand’ of the market.

Perfect markets are considered efficient by consolidating production functions and utility functions in the equilibrium, i.e. the point where welfare is maximised as the marginal benefits of consumption equal the marginal costs of production (Pindyck and Rubinfeld, 2015). The strict conditions for markets to yield efficient outcomes are well-known – they include perfect competition, perfect information and rationality of individual actors, the existence of markets for all goods and services produced across all time, the inexistence of externalities and public goods, and fully assigned private property rights for all resources and commodities (Perman et al., 2003). These conditions are notoriously unmet in real markets, and yet *“it is no*

*exaggeration to say that the entire modern microeconomic theory of government policy intervention in the economy ... is predicated on this idea*" (Lockwood 1987 cited by Gowdy and Erickson, 2005, p. 209).

Overall, efficiency is a vexed term in economics and subject to many interpretations, for instance regarding the exact relationship between allocative efficiency and Pareto efficiency. Daly uses both terms interchangeably, and so do many economists. What remains clear, however, is that this type of efficiency often relates to the claim of perfectly competitive markets yielding optimal societal outcomes. Daly maintains that *"it would be a foolish waste of effort and an intolerable imposition of microcontrol to refuse to use the market"* (Daly, 1991a, p. 89). However, it is one thing to accept a certain role of markets as coordinating production, distribution and exchange decisions, but another to accept neoclassical economic theory as a sufficiently good explanation of how market economies and markets function. It is not.

## **2.2.2 Unrealistic, flawed and inconsistent theoretical underpinnings**

The problem with endorsing allocative efficiency lies in the implicit acceptance of the neoclassical conception of the economic system and its pillars – the theory of demand, the theory of supply, and general equilibrium theory. These theories establish the building blocks for achieving a Pareto-efficient allocation of resources – a downward sloping market demand curve, an upward sloping market supply curve, and the idealised equilibrium position where both intersect. The purpose of this section is to show that all three theories are internally flawed and detrimental to ecological economic ambitions.

The neoclassical theory of demand, to begin with, conceptualises consumers narrowly as self-interested hedonists aiming to maximise their utility and concludes that this is good as it benefits society at large. The theory rests on a set of well-known preference axioms: preferences are presumed to be complete (consumers can compare and rank all possible commodity baskets and thus always choose what is good for them); transitive (if A is preferred to B, and B to C, then A to C); rational (consumers always choose what maximises their utility); and non-satiable (more consumption is always better) (Pindyck and Rubinfeld, 2015). Moreover, preferences are taken as given and considered to be stable, i.e. neoclassical economists ignore where consumer tastes come from and assume that they do not change.

Daly questions consumption theory for its lack of realism, narrow scope, and neglect of ethical concerns. For instance, he criticises the preference satisfaction approach for being purely subjective, and thus not allowing comparisons between people: as he highlights *“there is no distinction between what people of the present age of advertising think will make them whole and happy and what would in fact make them so”* (Daly, 1991a, p. 3). However, market efficiency rests on assumptions of non-satiability and a subjective theory of value<sup>14</sup> that contradict the viewpoint he presents here (satiability and objective values). As high levels of GDP and income no longer make most people in high-consumption nations any better off, neither in terms of happiness (Easterlin et al., 2010), nor quality of life (Max-Neef, 1995), whilst increasingly destroying life-support systems, sufficiency thinking matters and questioning preferences becomes an ethical responsibility (Kallis et al., 2012). This reasoning forms part and parcel of the steady-state vision to sketch a sufficiency economy that should level-off once destructive overconsumption sets in (Daly, 2008). However, theoretical inconsistencies remain unconsidered, not even when confronted with this criticism by Okun, who declared that

*“this concept of efficiency implies that more is better ... It is appropriate to ask sceptically whether people are made better off (and thus whether society really becomes more efficient) through the production of more whiskey, more cigarettes, and more big cars”* (Okun, 1975, p. 2).

Daly, however, disagrees with this argument.

*“The first of several problems with this view is that the maxim “more is better” does not follow from the definition of efficiency. We could give an equivalent definition “efficiency means getting the same output with less input”, and then argue that efficiency implied that “less is better”* (Daly, 1991a, p. 121).

He claims Okun confuses the definition of efficiency with consumer sovereignty and concludes that an alternative definition of efficiency is needed that does not *“lead to the anomalies and confusions of the ‘more is better’ school”* (Daly, 1991a, p. 122). However, Daly confuses a technical understanding of efficiency with allocative efficiency in his response to Okun. Allocative efficiency is about whether it is possible to make someone better off without making someone else worse off. Technical efficiency is about using minimum inputs for a given output. Technical efficiency plays into allocative efficiency as part of production decisions

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<sup>14</sup> The neoclassical subjective theory of value implies that the worth of things only depends on what people are willing to pay for them at the margin of consumption (Fine, 2016).

(increasing energy or labour productivity) but it does not replace it. Daly endorses both understandings of efficiency, as is standard in microeconomics.

*“It is well known in economic theory that the price system, in pure competition, will attain an efficient allocation of resources in the sense of a Pareto optimum” (Daly, 1991a, p. 202).*

This quote and others provided in the introduction clearly demonstrate that Daly endorses the allocative understanding of efficiency in the steady-state framework.

Daly’s suggestion to overcome the problems of the ‘*more is better*’ school, as he says above, is an alternative ‘comprehensive efficiency identity’ that measures the ratio between man-made capital services gained to natural capital services sacrificed. It is essentially a service-throughput, or benefit-cost ratio, expressing how much ecosystem services are used to produce goods and services for the satisfaction of people’s needs and wants<sup>15</sup> (Daly and Farley, 2011, p. 475). The introduction of an alternative efficiency identity is a move towards measuring technical efficiency differently. This is admirable, and not inconsistent with ecological economics and the rest of the steady-state framework, but it does not overcome Daly’s reliance on allocative efficiency and the problem of an unrealistic and reductionist theory of consumption and the economy more generally.

Turn now to the neoclassical theory of the firm, which is equally unrealistic. Supply theory says that firms maximise profits at optimal levels of output. The heart of the argument is an assumption of rising per-unit production costs with rising output, both in the short and the long term.<sup>16</sup> The short-run explanation centres on rising labour costs; the long-run argument on diseconomies of scale, mainly due to capacity constraints. Both assumptions lead to an upward-sloping supply curve of a firm: a higher price has to be offered to motivate firms to produce more (Pindyck and Rubinfeld, 2015). Both arguments have been refuted by Sraffa already in the 1920s (Sraffa, 1926). Sraffa showed that diseconomies of scale do not exist as firms produce up to a level of minimum efficient scale before they open the next factory. This means that, in reality, the law of diminishing marginal returns does not apply to an industrial economy in general. There is no production optimum as most firms operate under conditions

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<sup>15</sup> There are various ways how this type of efficiency can be improved, e.g. by distributing natural resources to those people first that profit most from them, increasing product lifetime, maximising sustainable yield, or giving up those ecosystems first that yield the least services for people (Daly and Farley, 2011).

<sup>16</sup> Short run means that some production inputs are variable and others fixed, whereas in the long run all factors are variable.

of constant or increasing returns to scale.<sup>17</sup> As a consequence, profit can be made from every extra unit sold. Firms will try and sell as much as they can. Limits on how much they can sell depend on their ability at persuasion – convincing consumers to spend and banks to invest (Keen, 2001). The result of constant or falling production costs for most manufactured goods is flat or downward-sloping supply curves.

*“This causes manufacturers no difficulties, but it makes life impossible for economists, since most of economic theory depends on supply curves sloping upwards” (Keen, 2001, p. 55).*

This is no mere technical detail. It matters as Daly derives misleading conclusions about the functioning of the economy. He suggests utilising the microeconomic concept of ‘optimal scale’ for thinking about the macroeconomy (Daly, 1996, 1991a, p. 83).

*“All of microeconomics is nothing other than defining the optimal scale of some activity, be it production of shoes, consumption of ice cream, hours worked per week ... But, surprisingly, when economists switch from micro-to macro-economics we hear no more about optimal scale ... each micro activity has an optimal scale, but the aggregate of all micro activities, the macro-economy, is supposed to grow forever and never exceed an optimal scale! How can this be?” (Daly and Cobb, 1989, p. 145).*

The answer is that the neoclassical theory of the firm is unsound. However, steady-state economics suggests employing the empirically unsupported ‘when to stop rule’ to think about the macro-level, for instance, by suggesting caps on natural resource use. Daly’s metaphor<sup>18</sup> of a macro ‘optimum’ of matter-energy use is portrayed as the point where marginal benefits of additional built capital for human needs satisfaction equal the marginal costs of depleting natural capital (Daly, 1996). In other words: the macroeconomic perspective of steady-state economics becomes a biophysical marginal cost-benefit-analysis for the economy as a whole, based on neoclassical microeconomic reasoning. Regardless of whether it was meant as a metaphor or not, this is severely misleading, not least because it neglects systemic growth dynamics. In reality, economies need to grow or enter into crises. It is crucial to understand

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<sup>17</sup> Modern microeconomics textbooks acknowledge the possibility or even likelihood of constant or increasing returns in certain sectors too (esp. manufacturing), but not as part of their core analysis and argument, and without drawing explicit conclusions for the demand-and-supply analysis overall (e.g. Mankiw, 2004, p. 283ff; Nicholson and Snyder, 2014, p. 204ff; Perloff, 2015, p. 166ff; Pindyck and Rubinfeld, 2015).

<sup>18</sup> I learnt from Inge Røpke and Dan O’Neill that Daly’s discussion of ‘optimal scale’ should be understood in a metaphorical way. Daly would argue that the biophysical sustainable scale of the economy can only be discussed in natural science terms (such as planetary boundaries) rather than as an outcome of valuation exercises.

these dynamics and the inherent role of (over)using matter-energy. Introducing a hypothetical ‘when to stop’ rule on the macro level – as if growth could be assumed away – distracts from facing economic realities.

Constructive alternatives to the theory of the firm can be found in classical political economy. These theories are more committed to an objective theory of value (in which costs of production are independent of demand); allow for economies of scale – both within firms (think of Adam Smith’s pin factory) and between firms (as in Marx’s analysis of the social division of labour); offer insights into how production processes are actually organised (as opposed to a pure exchange perspective on production); and explain how and why growth dynamics emerge (Fine, 2016).

General equilibrium theory is a third case in point for internal inconsistency and unrealism. It is the neoclassical theory of the system as a whole, attempting to prove that the aggregation of individual utility and production functions results in an overall equilibrium of the macroeconomy.

*“Yet those who follow the news about microeconomic theory have known for some time that general equilibrium is not exactly alive and well any more” (Ackerman, 2002, p. 120).*

General equilibrium theory was mathematically proven to be unstable 40 years ago. This means there is no unique existence of a stable, Pareto-efficient equilibrium (Kirman, 1989; Rizvi, 1994; Saari, 1995). The neoclassical micro-foundations project for macroeconomics failed as it crudely sidesteps aggregation problems (Brown and Spencer, 2014). Individualistic marginal theory is unable to grasp macroeconomic aggregates, as well as non-individual domains, such as power, class, conflict or institutions (Weeks, 2014). That emergent macro phenomena cannot be explained by aggregating individual states is obvious from a system theoretical perspective and well-rooted in ecological economics (think of rebound effects or positional goods). Daly also repeatedly emphasises that ‘the whole is more than its parts’ (Daly, 1991a, p. 3). However, again, without general equilibrium theory there is no Pareto-efficient outcome for concluding that competitive markets are efficient and lead to maximal welfare.

### 2.2.3 The narrow confines of neoclassical economics

This section makes the case that the scope of neoclassical economics is too narrow for, and conflicting with, steady-state ambitions. As historian of economic thought, Mirowski, put it recently “*Allocation as a special phenomenon ... captures the essence of economics*” (Lash and Dragos, 2016, p. 126/127). This is prominently reflected in the definition of neoclassical economics as the allocation of scarce resources between competing ends (Robbins, 1932, p. 15). The standard economics definition that Daly adopts on page three of his influential textbook (Daly and Farley, 2011) seems to suit well at first, as the subject matter is about scarce resources. This is a fallacy, however, as the focus is on allocating *given* resources in a setting of *given* production conditions and *given* ends (Pindyck and Rubinfeld, 2015). Recall: on the production function side of allocation, technology is given, factor inputs such as natural resources are given, and input prices as well due to the assumption of perfect competition; on the utility function side, preferences are given. The latter reflects a deliberate choice to abstract from any ethical content in the enterprise of ‘positive economics’.<sup>19</sup> Ultimately, this led to an extreme reductionism in the substantive content of neoclassical economics: optimising the behaviour of individuals under very restrictive conditions (Brown and Spencer, 2012).

The focus and ambition of steady-state economics is admirably different: Daly is not content with an economics that abstracts from the finiteness of ‘means’ – the question of absolute resource limits – and raises the need for tackling desirable societal ‘ends’ – such as fairer distribution and long-term sustainability. However, the way he suggests to implement this vision is problematic. He only proposes to extend the scope of neoclassical economics. The way in which this is done is to wrap ‘the allocation problem’ of neoclassical economics into a biophysical and ethical corset by adding sustainable scale and just distribution as additional goals (and to introduce a new measure of ultimate efficiency that captures the broader scope). However, adding an ethical and ecological taste to wormy theory does not transform it into ‘new’ economics – it remains ‘old’ economics with add-ons.

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<sup>19</sup> Robbins’ aim was to establish economics as a science that clearly departed from ethical judgements, reflecting the positivist philosophical understanding of the time that economists should refrain from meaningless metaphysical statements. A demarcation between objective facts and normative statements, i.e. means and ends, was introduced, leaving it to the social sciences (psychology, sociology or political sciences) to deal with the latter (Bromley, 1990; Brown and Spencer, 2012; Milonakis and Fine, 2009).

An associated issue arising from the narrow scope of neoclassical economics relates to efficiency as a goal. Why exactly does efficiency need to be a goal in its own right? It is clearly an objective in neoclassical economics. In fact, Bromley concludes that efficiency as a goal lies at the heart of the ideology of economics (Bromley, 1990). However, Daly repeatedly criticises 'growth economics' and runaway GDP for becoming ends in themselves. If steady-state economics is to move beyond a perspective of the economy as an end in itself (which Daly advocates) towards one in which the economy is a means to serve society at large, then efficiency too is a means to achieve scale and distribution, which are clearly more important. The lesson learnt from the problematic but widespread three-pillar approach of sustainable development is that economic considerations often overrule broader societal long-run targets. Establishing a goal hierarchy where scale comes first, distribution second and efficiency third, is insufficient to address this issue. I argue that scale and distribution are goals, whereas efficiency can be a better or worse means to achieve them, but should not be a goal in itself.

The alternative for effectively addressing scale issues and related ethical concerns, the two central issues in steady-state economics, is to see that the 'emperor has no clothes' (Keen, 2001). Recognising the reductionist, ahistorical, asocial, apolitical character of the neoclassical approach removed from time and space leads to the conclusion that it cannot explain its own subject matter – the economy – from its core principles and concepts (Fine, 2016). It cannot explain how and why goods are produced, nor the social relations under which allocative efficiency is generated. This means it is – in its entirety – of no help for a progressive ecological economic enterprise. Promising alternatives can, for instance, be found in Marxist theory and classical institutionalism (Marx, 1990; Veblen, 1904, 1898). Marx's analysis of capitalism is still unparalleled as an excellent account of how capital and capitalist economies function and evolve (Harvey, 2010b). The classical institutionalists, on the other hand, offer key insights into how the economic and political landscape within capitalist societies unfolds and how social change emerges (Vatn, 2015a). Both schools of thought consider the system as a whole, take a long-term perspective and do not contradict a biophysical perspective of the economy.

#### **2.2.4 The neglect of interdependencies, dynamics and change**

Another problematic consequence of the steady-state approach is the perpetuation of analytical separations. Scale, distribution and allocation are presented as analytically separate



entities that can be implemented by separate institutions.<sup>20</sup> In practice, it is impossible to uphold this distinction. Allocation and distribution are connected as one cannot know the value of production independent of the distribution of income (Bromley, 1990). Scale and distribution are connected as imposing any kind of limits-to-growth means bringing distribution back in its own right. Allocation and scale are connected as the amount of available resources, or a resource cap, would influence what is being produced. Daly acknowledges interdependencies and possible conflicts between the three goals (Daly, 1996), but not to a great extent. The neglect of strong interconnectedness and trade-offs has been discussed (Lawn, 2004; Malghan, 2010; Prakash and Gupta, 1994; Stewen, 1998a, 1998b). What I would like to add from a theoretical perspective is that the analytical separation of concepts becomes problematic when they change the focus of attention in a direction that misguides the analysis. If trade-offs between the goals are massive, which is the case in reality,<sup>21</sup> then a theoretical framework is needed that focuses on a comprehensive understanding of interdependencies (Klitgaard and Krall, 2012; Krall and Klitgaard, 2011). Above all, we need to systematically understand how the dynamics of capital accumulation relate to scale and distribution. For instance, we need to ask why, how and under what circumstances labour and resource efficiency improvements drive the expansion of the economy as a whole. Otherwise, we might be deprived of the chances to effectively think through implementation challenges.

There are alternatives beyond analytical separation. Krall and Klitgaard (2012, 2011) prominently mention the Social Structure of Accumulation (SSA) school as one alternative approach to reconnect allocation, distribution, and accumulation dynamics. I would like to provide the social provisioning approach in heterodox economics<sup>22</sup> as another example. Social

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<sup>20</sup> In earlier works, Daly suggested three separate institutions that deal with limiting population, resource use, and inequalities. This approach has been broadened by Daly (e.g. Daly, 2010a) and others (Dietz and O’Neill, 2013) over the years, leading to a longer list of policy recommendations and associated institutions (ranging from cap-auction-trade systems, to reforming national accounts, limiting the range of inequalities, stabilising population, and others). However, the central issues and problems persist: the questions how these policies and institutions are interlinked (which is absolutely crucial from a systems-perspective), and why they are not being implemented on a large scale, remain widely unaddressed.

<sup>21</sup> This fact gave rise to a recent critique of steady-state economics, which centres on the question whether a biophysically non-growing economy is compatible with capitalist accumulation dynamics (Burkett, 2009; Hahnel, 2012; Lawn, 2010; Smith, 2010).

<sup>22</sup> Heterodox economics is defined as spanning *“a variety of approaches including ‘old’ institutional economics, post-Keynesian economics, feminist economics, Austrian economics, and Marxian economics. These diverse and sometimes conflicting perspectives have for many years offered an approach to economics that situates the economy in a broader social, historical, and political context.*

provisioning means explaining the social process of how goods and services are provisioned in a capitalist system embedded in a social context (culture, technology, history etc.) (Lee, 2009). The approach recognises that allocation, distribution and scale cannot be treated separately from each other (drawing on Smith, Marx, Veblen, Keynes and others) and thus offers an integrated framework to address the problem comprehensively; above all, social provisioning focuses on process and includes elements of dynamics and change which is particularly relevant as explaining the resource flow is no longer sufficient in a resource constrained world – it is about changing it; moreover, it recognises that provisioning rests on the material basis of the natural environment; it highlights production as being more important than consumption because production decisions are made upon the expectation of profits whereas consumption is dependent on these decisions; and it is not limited to market activities as it accepts that economic processes rest on both market and non-market institutions (Bayliss et al., 2015; Boffo et al., 2017; Jo, 2011; Lee, 2009). The social provisioning approach thus seems to offer a true alternative to the core neoclassical framing of ‘the allocation problem’ that is solved by the market.

## 2.3 The logic of steady-state economics

If we agree with Audre Lorde that, *“the master’s tools will never dismantle the master’s house”* (Lorde, 2007, p. 110), novel ways of reasoning are needed to effectively address social ecological problems. Steady-state economics has potential in this respect. It starts with a promising pre-analytic vision of how ecological and social economic systems are interrelated and a strong normative position about the necessity to include distribution and sustainability issues into economic analyses. However, it does not carry this logic fully through to all domains. In fact, it remains heavily infused with ‘old’ neoclassical economic thinking, for instance, regarding static equilibrium or externality logic. I highlight several cases in which steady-state economics relies on neoclassical reasoning and show why this is problematic: it hinders the detection of how and where social ecological problems arise and thinking about how to tackle them; it also contradicts constitutive pillars of ecological economics: a systemic, holistic, evolutionary and realistic understanding of economy-environment relations.

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*They have by their nature and often by their design sought to develop links with other human and social sciences and to push economics in a more interdisciplinary direction”* (Spencer, 2013).

### 2.3.1 Unrealistic vs. realistic thinking

Steady-state theory is ambiguous about the realism of assumptions. Certain key neoclassical assumptions are adopted as first approximations, most others are rejected as being overly abstract. Above all, Daly attacks the failure of the mainstream to address reality. He accuses neoclassical economics of committing the 'fallacy of misplaced concreteness', i.e. confusing reality with abstractions of reality (Daly, 1991a; Daly and Cobb, 1989). What matters in reality – and from a steady-state perspective – is addressing absolute resource scarcities and relative social wants. However, two of the most important assumptions in neoclassical theory are relative scarcity and absolute wants. On the other hand, diminishing marginal utility, increasing marginal costs, perfect competition and individualistic maximizing behaviour are explicitly accepted as solid evidence and good starting points for theory (Daly, 1991a, pp. 82, 83, 87). Implicitly, further neoclassical assumptions are incorporated by bringing allocative efficiency on board.

The adoption of unrealistic neoclassical assumptions is problematic. A straightforward reason is inconsistency. Accepting that markets lead to allocative efficient outcomes but refuting some of the underlying assumptions for this claim to hold, e.g. insatiable consumer wants, leaves the analysis in a confused position. Yet another, more profound reason why realism matters is that the heavy use of idealisations hides topics that are relevant for steady-state ambitions. Issues of power and vested interests, for instance, do not arise in the positivist neoclassical tradition in which facts are assumed to be separable from values. In reality, the distribution of power between market participants is never equal and it is important to capture these differences to address distribution conflicts or consider the enforcement of resource limits (Fuchs et al., 2016). Who wins and who loses? Whose interests are represented and whose are not? These questions do not arise in the neoclassical framing and are issues steady-state theory barely addresses. Or take the assumption of perfect competition: in a fictitious world of perfect competition in which a myriad of enterprises produce up to levels at which marginal cost equals marginal revenue, profit-making is ruled out (Keen, 2001). This explains why neoclassical economics cannot provide a sensible theory of profit, which is clearly important to understand dynamics in real-world economies and resistance to resource caps or distribution policies (Fine and Dimakou, 2016). The need for a realistic account of the social

world is widely acknowledged and indeed a defining characteristic of ecological economics (Gowdy and Erickson, 2005; Söderbaum, 2008, 1999; Spash, 2012).<sup>23</sup>

### 2.3.2 Externality vs. systemic thinking

Whilst being sceptical about the strategy of ‘internalising externalities’ (Daly, 1991a, p. 69, 1974a, p. 18; Daly and Cobb, 1989), steady-state economics does not fully break with the externality logic of neoclassical environmental economics. Daly calls the internalisation of externalities inadequate and contradictory as a general solution to environmental problems and believes *“it is past time to change the basic framework of our thinking”* (Daly, 1996). But instead of consequently abandoning neoclassical reasoning that rests on the central belief that markets are efficient mechanisms to allocate scarce resources, once they are ‘fixed’, the suggestion is to deal with scale and distribution politically outside the market sphere and then, within constrained limits, leaving the market alone to *“safely function”*, as if it were possible to understand the political and market arena in separation from each other (Daly, 1991a, p. 89). This reasoning is not different from standard market failure theory. It implicitly accepts the conceptualisation of externalities as issues the amoral market is incapable of dealing with and maintains that, due to market failure, political intervention is needed to avoid social damage. The resulting better market will yield an efficient outcome. *“Depletion quotas”*, Daly maintains, *“can be regarded as the correction of a market failure”* (Daly, 1974b, p. 164). This is the same logic and language as in standard environmental economics. The difference is to limit quantity first (e.g. by depletion quotas), and let prices adjust, rather than fixing prices (e.g. by taxes) and let quantities adjust.

This approach contradicts systemic thinking – another pillar of ecological economics. From an ecological economics perspective, the conception of environmental problems in terms of externalities is misguided, because the natural environment is part and parcel of every economic activity. The contributions of nature are not ‘external’ to the system, but integral

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<sup>23</sup> Gowdy and Erickson, in their seminal paper on ‘The approach of ecological economics’ argue that ecological economics is different from neoclassical economics because of a more realistic understanding of the world. This includes, for instance, rejecting the rational actor model in favour of a more comprehensive analysis of humans as social actors, or rejecting marginal analysis in favour of capturing total effects and discontinuous changes (Gowdy and Erickson, 2005). In this spirit, Peter Söderbaum is a key example of introducing concepts such as ‘political economic person’ or ‘political economic organisation’ to account for multi-faceted human behaviour (Söderbaum, 2008, 1999).

endogenous features of it (Ayres and Kneese, 1969; Daly and Cobb, 1989; Kapp, 1971; Mäler, 1990). Understanding social ecological phenomena from a systemic perspective, as ontologically sketched by Daly in the pre-analytic vision and widely advocated for in ecological economics (Bertalanffy, 1968; Boulding, Kenneth, 1956; Meadows, 2009) and also by himself (Daly, 1991a, p. 46), needs to conceptually grasp interdependencies, relations and feedbacks rather than trying to separate them out. The analytical separation of economics from politics, positive from normative, and allocation from distribution, as pursued in neoclassical economics and upheld by the steady-state approach to a certain extent, runs counter to a systemic approach. It falls short of providing a sensible representation of complex systems and, in addition, frames political and moral issues as technical exercises, thus depoliticising politics (Bromley, 1990; Pirgmaier and Urhammer, 2015; Vatn, 2015b). The issue is hence not one of tackling scale and distribution outside rather than inside the market realm but to recognise that these issues are intrinsically intertwined in reality and therefore need conceptual interconnections in theory.

### 2.3.3 Equilibrium vs. evolutionary thinking

Steady-state economics operates in a static framework, where equilibrium and 'optimal' states are envisaged as ideal outcomes. Equilibrium in economics refers to states in which counteracting forces have no tendency to change (Bannock et al., 1984). As the name 'steady-state' suggests, the economy is envisaged to level off in physical terms. 'Physical equilibrium' is the optimal level of matter-energy stocks that, once reached, will be maintained by minimal throughput (Daly, 1974b). This steady-state is not considered static, but oscillating around a 'dynamic equilibrium' that can be compared to a mature forest that still develops in qualitative terms without growing in quantitative terms. Elements of dynamism are also reflected in the possibility of different steady-states levels:

*"It may happen that as a result of technical and moral evolution it becomes both possible and desirable to grow (or decline) to a different level of stocks. We may certainly do it. But growth (or decline) will then be seen as a temporary adjustment process of moving from one steady state to another, not as an economic norm" (Daly, 1974b, p. 157).*

Moving from one equilibrium state to another is thus perceived possible, but as soon as the adjustment process is complete, the economy would tend to balance again.

Equilibrium thinking stands in contrast to an evolutionary perspective of the economy, another pillar of ecological economics. Equilibrium thinking emphasises stability removed from space and time (and therefore history). In a world in flux static equilibrium has no practical meaning (Ackerman, 2002). Key to understanding the economy as an evolving process is portraying economies as ‘complex adaptive systems’ (Foxon, 2011). This explains the ecological economic research agenda concentrating on unsustainable lock-ins, crises, processes, path dependencies, time lags, resilience, co-evolution between social, technical and ecological systems, leverage points of change, transition pathways, diversity, adaptation, learning, and complexity, to mention some important aspects (Foxon, 2011; Gowdy, 1994; Holling, 1985; Kallis and Norgaard, 2010; Norgaard, 1994). Veblen insisted as early as 1898 that progressive economics needs to break with static thinking, as it prevents a deep understanding of economic systems (Veblen, 1898).<sup>24</sup> Daly repeatedly refers to co-evolving systems; however, it is difficult to see how equilibrium thinking can be aligned with a co-evolutionary perspective. Despite attaching ‘dynamic’ to equilibrium, steady-state economics remains situated in a static framework.

### 2.3.4 Biophysical vs. monetary thinking

Steady-state economics clearly presents a biophysical perspective of the economy (Farley, 2015). Most concepts applied or introduced are thought of in matter-energy terms: scale, growth, equilibrium, population, allocation, or capital. Even distribution becomes a matter of the relative division of resource flow amongst people (Daly, 1992). Conceptualising the value of physical stocks and flows in biophysical terms is considered necessary to correct the mainstream isolated circular flow model of exchange value (Daly, 1996). Daly portrays the circular flow model as a perpetual motion machine independently of any material requirements fetishizing money (Daly, 1996). He claims that Georgescu-Roegen’s introduction of ‘the entropic flow model’ provides a bridge to reality (Georgescu-Roegen, 1971). Instead of misconceptualising the economy as a mechanistic, reversible, quantitative loop, the alternative offered is a one-way throughput process from sources to sinks and wastes that

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<sup>24</sup> This view was shared by most early marginalists, such as Marshall and Jevons, who saw static analysis as a transitional methodology until economics reached maturity. However, this approach was later shown to be misguided: it was impossible to derive a dynamic understanding of the economy from static foundations (Keen, 2001). However, as much of the neoclassical architecture is bound to the idea of equilibrium, it remains in place, as it does in steady-state economics.

accounts for irreversibilities and qualitative changes. The material view of the economy in which both quantity and quality of matter-energy throughput matter is meant to complement and improve the conventional perspective of the economy, in which value is mainly expressed in monetary terms.

Daly's move is admirable, as it attempts to emphasise use value aspects that are neglected in mainstream economics. However, the way this is done is inadequate. A biophysical perspective of the economy attached to a flawed neoclassical theory does not yield a satisfactory theory. What we need to understand theoretically is how use value and exchange value considerations are related, rather than separating them out. Use value relates to the material properties by the virtue of which a commodity becomes useful for people (Brown, 2008). The use I gain from drinking coffee, for instance, stems from the coffee beans, the metal of the coffee machine and foamed milk that give rise to its specific taste and consistency. Exchange value, in contrast, is the quantity of other commodities for which coffee exchanges. As there are as many exchange values as there are different commodity combinations (coffee-tea; coffee-sugar, coffee-hats etc.) and as this is impractical, money serves as the socially accepted measure of exchangeability. This means use value relates to biophysical considerations and exchange value to monetary considerations. It is crucial to understand that a commodity is always the bearer of both, like a coin that has a 'qualitative' picture on one side and a 'quantitative' number on the other. A material perspective is, without doubt, an essential step to gain a deeper understanding; however, most economists work, think and talk about the economy in exchange value terms expressed in money, as this is the predominant value form in capitalist economies. It is essential to understand material and monetary relations, which remains underexplored in steady-state economics.

### 2.3.5 Open vs. closed systems thinking

The pre-analytic vision Daly introduces represents an open systems ontology of the social world.

*"What is needed is not an ever more refined analysis of a faulty vision, but a new vision ... The necessary change in vision is to picture the macroeconomy as an open subsystem of the finite natural ecosystem (environment), and not as an isolated circular flow of abstract exchange value, unconstrained by mass balance, entropy and finitude" (Daly, 1996, p. 48).*

In this vision, 'open systems' are defined in thermodynamic terms, i.e. exchanging matter-energy with their surroundings. This conceptualisation sounds trivial but has far-reaching implications. It means that all economic processes are ultimately natural processes in terms of biological, physical and chemical transformations and thus subject to the laws of thermodynamics (Georgescu-Roegen, 1971). However, as complexity rises from natural to social systems (Luhmann, 1987), dynamics of the economy cannot be exclusively explained in biophysical terms. There is more to inflation than atoms and molecules. Also, seeing the economy as embedded in the environment implies a hierarchical understanding: the economy needs the environment for its survival, but not vice-versa (Spash, 2012). As economies are open they can become smaller or bigger in terms of throughput and natural capital stock, giving rise to Daly's 'empty' vs. 'full' world perspective. Moreover, the outcomes of social environmental systems interdependence are unpredictable and indeterminate and subject to uncertainty and constant change.

Every sensible person (or economist)<sup>25</sup> agrees with this view. The crucial question is how economic theory relates to this ontology. To pick up Whitehead's fallacy of misplaced concreteness: given the pre-analytic vision, what is a sensible abstraction of it? What does economic theory need to look like to capture essential dynamics of this worldview? If Daly's ambition is to offer an alternative vision that is more 'realistic' to account for the nature of open reality, then it seems sensible to embrace an open system methodology that accounts for fundamental uncertainty, imperfect knowledge and mutability (Chick and Dow, 2005). Most of the foundations of ecological economics are tied to open systems methodology: the commitment to value pluralism and incommensurability (Martinez-Alier et al., 1998), the need for a different (post normal) understanding of science (Funtowicz and Ravetz, 1994a), the importance of inter- and transdisciplinarity (Lélé and Norgaard, 2005) and holism (Meadows, 2002). However, the steady-state approach unconsciously incorporates the core of an economic theory that is based on a closed systems methodology, in which certainty, atomism and isolation of linear cause-effect mechanisms prevails. As a consequence, the steady-state approach falls back into the isolated-loop architecture Daly detests so much. In the end, the ontological foundations of steady-state economics clash with the closed systems methodology of neoclassical economics.

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<sup>25</sup> This also becomes clear in the correspondence between Daly and Solow/Stiglitz in which they all agree that economic processes are subject to thermodynamic laws, embedded in a larger environmental system and dependent on it for sources and sinks (Daly, 1997a, 1997b; Solow, 1997; Stiglitz, 1997).



## 2.4 Discussion

Steady-state economics is presented as a solution-oriented and desirable alternative of a future sustainable world overcoming some fundamental pitfalls of 'standard growth economics' (CASSE, 2016). It was meant to offer an approach targeted at institutions that have the potential to set in motion, direct, and progressively foster transformational change towards sustainability and equity (Daly, 2010a, 2008). In a pragmatic spirit, Daly argues: *"theorists must not allow themselves to be debilitated and rendered irrelevant by too deep a philosophical reflection on the infinite interconnectedness of all things"* (Daly, 1994, p. 91). In other words, instrumentalists can do without theoretical rigour and waterproof philosophical and methodological foundations (and even systems thinking). What matters is a convincing narrative to gain political credibility and achieve desired outcomes, i.e. limiting resource use under a relatively fair governance regime. Given this motivation, do the theoretical, methodological and ontological inconsistencies presented in this article really matter?

It seems necessary to ask what criteria a 'good' theory should fulfil. Ecological economic theory of the human-planetary system should aspire to meet three criteria, at least. One is to offer deep explanations of why current economic development trajectories and policies prioritising GDP growth are unsustainable and increasingly unjust. Only a realistic account of how market dynamics unfold and how central capitalist dynamics relate to destructive environmental change can give rise to meaningful insights beyond naivety and utopianism. In order to do so, theory needs to arise out of concepts and assumptions that are rooted in reality (Brown and Spencer, 2012; Kapp, 1961). Besides an explanation based on realistic concepts, there is a need for logical consistency. We can only make sense of the world by logically tracing how core concepts of a theory are related. In addition, theories should aim for impact – in terms of reaching and influencing Realpolitik and societal awareness about the need for social ecological change. The criteria of deep explanation based on realism, logical consistency and real-world impact need to be balanced such that no one criterion becomes paramount. Consistent theory detached from reality is not sound, neither is aiming for impact at the expense of consistency or realism.

Steady-state economics addresses these ambitions to some extent but falls short on most of them. It provides a vision of where to go and first steps into this direction in terms of institutions and policy proposals (Dietz and O'Neill, 2013), but fails in terms of logical

consistency<sup>26</sup> and deep explanation based on realism, as it does not offer a developed theory of how capitalist dynamics relate to ecological disruptions. Without such a sound theoretical basis, the steady-state project remains a rather shallow attempt of listing normative goals and policies that bear little resonance to real-world implementation challenges. The lack of a realistic conception of growth and power dynamics constitutes a central critique of steady-state economics (Burkett, 2009; Hahnel, 2012; Mujezinovic, 2013; Smith, 2010; Spash, 2015a; Trainer, 2011), which Daly has not taken very seriously (Daly, 2010b). If we believe that systems and their structures follow dynamics emerging from the parts and relations they consist of, then the problems are not ‘out there’ but ‘in here’ (Meadows, 2009). There is a need for a realistic perspective on how markets operate and a debate about the benefits and limits of non-market vs. market economic order (Polanyi, 1944).

Advances in this direction are attempted with the development of a new ecological macroeconomics (Rezai and Stagl, 2016; Røpke, 2016) and the economics of degrowth (Kallis et al., 2012). This is not the space to review this evolving body of literature; however, what this chapter offers is an impulse to carefully think about the theoretical foundations of ‘alternatives’ proposed. Jackson, for instance, claims that “*Daly’s pioneering work provides a solid foundation from which to rectify this [ecological macroeconomics]*” (Jackson, 2009, p. 123) and proceeds to explain macroeconomics basics in terms of the neoclassical production function approach. This is highly problematic. This is just one example that illustrates the need for caution and awareness of the limits of neoclassical theory in developing constructive ecological-economic theory.

Daly’s position on neoclassical economics remains ambiguous. He is highly critical of mainstream theory, including environmental economics (Røpke, 2005). However, if Daly is so critical, what is the rationale for adopting mainstream concepts and reasoning? My speculation is threefold. First is a belief that standard market theory, when corrected for its ‘freely floating’ character that abstracts from biophysical realities, provides a satisfactory framework for analysing economic systems (Daly and Farley, 2011). This chapter shows that this is not the case. Second might be long training in mainstream thinking and lack of exposure

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<sup>26</sup> I clarify that two inconsistencies need to be distinguished: internal inconsistency of neoclassical theory (as shown by Keen, 2001, for instance) and inconsistency of neoclassical theory with steady-state ambitions and ecological economics more broadly. This chapter mainly addresses the latter: however, it also highlights the former in the discussion of the theory of the firm and general equilibrium theory in section 2.2.

to alternatives. Apart from the classical economists as a source of inspiration, John Stuart Mill's vision of a stationary state in particular (Mill, 2006), Daly speaks of 'economics' as if there was no alternative to the mainstream.<sup>27</sup> This chapter shows that there are heterodox alternatives. A third reason might be linked to pragmatism (Spash, 2013) and Daly's early ambitions to change the discipline of environmental economics from within, rather than creating a new field. As an expert of subtle and ironic formulations (Røpke, 2005), Daly developed concepts such as 'uneconomic growth', 'optimal scale' or the index of sustainable economic welfare (ISEW) to show that the pursuit of economic growth is no longer desirable, even when considered from a mainstream perspective. However, Daly's pragmatic use of mainstream theory weakens the analytical and political contribution as well as the relevance of steady-state economics. It has neither convinced mainstream economists nor led to the implementation of steady-state policies. Rather, it has contributed to a split ecological economics community (Spash, 2013), with an unfortunate tendency to become more mainstream again (Anderson and M'Gonigle, 2012), whilst social ecological crises continue to worsen.

What became clear for me, and what others highlight as well (Nadeau, 2015; Spash, 2013), is that internalising neoclassical economics and its reasoning impedes the ability to address social ecological crises as it remains caught in an ahistorical, static, universal, purely subjective and individualist methodological architecture. These foundations cannot provide sound theories of growth dynamics, profit, money or distribution, which are key to understand the contemporary political economy landscape. It is important to know neoclassical reasoning as most of contemporary economics relies upon it; however, basing central theories of ecological economics on it seems utterly misleading. Instead, it is necessary to let go of neoclassical foundations altogether, as they contradict a systemic, holistic, dynamic and realistic understanding of the interrelation between the economy and the environment with a view to

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<sup>27</sup> A few references are made to Marxist economics, which are however quickly abandoned. Daly believes that "*Marx, with his theory that labor was the source of all value, was even more eager than standard economists to deny any important role to nature in the functioning of the economy and creation of value*" (Daly and Farley, 2011, p. 32). This thought seems to have been passed onto Daly's student Bob Costanza, who argues that "*Marx and his followers in communist countries have made a negative contribution to the allocative efficiency problem*" which has contributed to much environmental destruction in former-communist countries (Costanza et al., 2015, p. 45). These accounts are based on misinterpretations of Marx's work, confuse Marxist theory with socialist dictatorships and do not acknowledge that Marxist theory cannot provide insight into 'the allocative efficiency problem' because it rejects the conception of allocation in favour of a more comprehensive understanding of production, exchange and distribution.

proposing effective policies and triggering change towards sustainability (Gowdy and Erickson, 2005; Klitgaard and Krall, 2012; Krall and Klitgaard, 2011; Spash, 2011a). The new generation of ecological economists needs to be aware of the pitfalls of neoclassical theory and pragmatic strategies to maintain mainstream language and concepts to fruitfully advance ecological economics.

## 2.5 Conclusions

This chapter reveals that steady-state economics is internally flawed as it heavily relies on neoclassical theory and reasoning. By accepting allocative efficiency of markets, the core of neoclassical economics is incorporated into the steady-state framework. The hidden implications of this move are profound. It means accepting a utility-based preference satisfaction account of wellbeing (O'Neill, 1998), stable and unquestioned preferences, the neoclassical theory of the firm, general equilibrium theory, rational economic man, instrumentalism regarding the unrealism of assumptions, and a neoclassical definition of what economics is and should be. Adopting the scope, reasoning, and core assumptions of neoclassical theory and adding a biophysical and ethical flavour to it does not lead to its improvement, but rather to fundamental internal inconsistencies between the 'old' economics paradigm and 'new' progressive ecological economic thinking.

Critique is never a satisfying end result but rather the starting point for constructive alternatives. This chapter offers a prelude for progressive advances in ecological economic theory along heterodox lines. Marxist economics, 'old' institutionalism, post-Keynesian economics, parts of classical political economy, evolutionary economics, feminist economics, Polanyian approaches and environmental sociology are amongst the most promising sources of inspiration to think about the intertwined nature of economic and ecological systems and better understand environmentally destructive feedbacks of the system as a whole. They provide a broad conception of the economy as a social and historical process, focus on social structure, crises, dynamics and change, the role of money and finance, the impact of politics, and offer methodologies that fit the pre-analytic vision of ecological economics. More bridges

between heterodox traditions and progressive ecological economics are needed to collectively establish a new economics that is supportive of socially just sustainability transitions.<sup>28</sup>

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<sup>28</sup> One attempt to establish a new economics based on a cooperation between many streams of heterodox economics is 'New paradigm economics' (see e.g. Fullbrook, 2014, 2013).

# 3 Value

## Understanding social ecological structure

*“What is essential is invisible to the eye” (Saint-Exupéry, 1943).*

*“What is value? This is perhaps the most urgent, yet neglected, question of contemporary social theory” (Murray, 2017, p. 16).*

*“If you think you can solve the environmental question and global warming ... without confronting ... the value structure ... then you got to be kidding yourself” (Harvey, 2010a).*

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### 3.1 Introduction

Value theory is abstract, difficult, and Marxian value theory very controversial – why should ecological economists care? There are at least three reasons to care. *First*, ecological economics lacks a coherent economic theory of the system as a whole. This was a key conclusion from the previous chapter. Value theory is considered to be the bedrock of an economic paradigm. Understanding and exploring what value is, how it gets reproduced, and how use value and exchange value considerations are entangled serves as a powerful starting point to understanding the system as a whole. This serves the purpose of establishing sound theoretical foundations for ecological economics as a coherent, realistic and more effective interdisciplinary paradigm. Marxian value theory provides an understanding of how biophysical flows are attached to (and detached from) monetary flows and how they travel together through the system. As such, value theory can be portrayed as the foundation for understanding and explaining social ecological dynamics.

*Second*, the practical implications and consequences of different value theoretical underpinnings are profound. Mainstream marginal utility theory leads to strategies of ‘pricing

nature', whereas the Marxian understanding of value to strategies of 'overcoming the system'. The differences could hardly be further apart. What strategies should ecological economics adopt? We need to understand how social ecological crises arise to fight them more effectively. Understanding the value theoretical underpinnings of different economic paradigms helps to trace how economists think about the emergence of social ecological crises and why they arrive at different and, at times, opposing recommendations to counter them. Through this lens, value theory is key to arriving at better informed decisions how to act upon social ecological problems.

*Third*, this chapter provides the raw material and essential building blocks for the next chapter. Capital is defined as 'value in motion' and the capitalist system is geared towards the 'expansion of value' – without an understanding of value, money and the commodity, it seems impossible to conclusively understand the drivers of capitalism as value producing and expanding system. This matters especially for the Marxian approach because many scholars and also ecological economists continue to denounce Marxist theory as ideology. In order to separate the wheat from the chaff and judge what theories are better placed to explain, understand and act upon social ecological problems, we need to understand them first (or at least try to do so). Value theory is the foundation upon which essential Marxist concepts of capital, exploitation or surplus value rest. Understanding these foundations is key for sceptics to judge whether consecutive Marxian developments make sense. If scholars choose to abandon Marxian theory or elements thereof, they should do so for sound reasons rather than inherited preconceptions. This holds especially for Marxian value theory, which is widely rejected but little understood.

This chapter aims to explain Marxian value theory and show its relevance for ecological economics. The intention is to provide an understanding of the social ecological structure of the capitalist system, which can be further developed into an understanding of social ecological dynamics in the following chapter. The research questions guiding this chapter are the following:

- What is value?
- Why does value theory matter for ecological economists?
- What insights does Marxian value theory provide for understanding the capitalist system?

This chapter is structured as follows. Section 3.2 introduces some value theoretical foundations: the meaning of use value and exchange value and how their interrelation is theorised in the classical and neoclassical tradition. These foundations provide the basis for understanding how most ecological economists approach value and valuation and why this is problematic. Section 3.3 shows that ecological economists adopt, reject or neglect a mainstream economic understanding of value, either in the classical form of Smith or Ricardo or in the neoclassical form of marginal utility theory. The remaining Marxian alternative remains absent in ecological economics. Section 3.4 explores the Marxian approach to value. Section 3.5 stresses its explanatory power. Section 3.6 concludes.

## 3.2 Foundations

The starting point of ecological economics is an awareness that social ecological problems arise out of dynamics of the economic system. But how can we grasp ‘the economy’? Value theory suggests starting from the simplest economic transaction, the exchange of commodities. Value theory in economics aims to explain what determines exchange value. This is no simple issue but forms the “*the centrepiece*” and foundation of an economic paradigm (Söllner, 1997, p. 177). What properties explain why different goods and services are exchanged in certain magnitudes? Marginal utility? Costs of production? Labour time? How can we understand how two things with very different qualities – shoes and teapots – are made commensurable in ‘free and equal’ market exchange?<sup>29</sup> And how is exchange value intertwined with use value, e.g. amounts and qualities of iron, electricity, steel, paper etc. that are transformed in the production process? Value theory sheds light on these questions. This debate is old and reaches at least back to Aristotle who distinguished between *oikonomía* (the art of household management) and *chrematistics* (the art of acquisition) (Cruz et al., 2009). 250 years ago, at the beginning of what we consider modern economics, Adam Smith adopted Aristotle’s distinction and provided a famous example how the distinction between use and exchange value poses a fundamental question in economics:<sup>30</sup>

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<sup>29</sup> Value theory aims to explain equal exchange relations, i.e. the mutual agreement of two parties to engage in the exchange of commodities. Obvious unequal exchanges based on force, manipulation and violence are excluded from this analysis for the time being. I will return to these considerations in the next chapter as part of a discussion of profits upon alienation.

<sup>30</sup> This phrase became widely known as the so-called ‘water and diamonds paradox’ or ‘value paradox’



*“The word value, it is to be observed, has two different meanings ... The one may be called ‘value in use’; the other ‘value in exchange’. The things which have the greatest value in use have frequently little or no value in exchange; and on the contrary, those which have the greatest value in exchange have frequently little or no value in use. Nothing is more useful than water: but it will purchase scarce anything; scarce anything can be had in exchange for it. A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it” (Smith, 1999, p. 131).*

In economics, there are three different ways to approach this issue and theorise exchange value: classical theories of value – prominently represented by Smith and Ricardo, marginal utility theory of value that led to the development of neoclassical economics, and Marxian value theory – which is of a different kind,<sup>31</sup> as I will explain below. Interestingly, all three approaches seem to share an understanding of what the ‘value problem’ is (Fig. 1). They accept the distinction between use value and exchange value and money as a standard unit of measure of exchangeability. What property explains the exchange value of commodities is where views diverge.

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in economics. Interestingly, it was never a paradox for Smith and his successors. *“There is no evidence that any economist expressed any difficulty in explaining the relative prices of commodities such as water and diamonds”* (White, 2002, p. 661). The classics were not much interested in explaining market-prices but rather the determination of long-run ‘natural’ prices. They acknowledged utility and demand as essential for the short-run, but also that long-run prices follow quite different characteristics. It is in this context that the phrase has to be understood. Apparently, the idea of a paradox became established and popularised by marginalists much later. The brilliant article by White (2002) traces how Smith’s paragraph was consciously misinterpreted, put out of context and finally cemented in Samuelson’s seminal textbook to promote marginal economics. The gist of the story is to show how a problem that puzzled Smith and other classical political economists can finally be solved with marginal utility analysis. As such, the ‘value paradox’ is a product of the 20<sup>th</sup> century. It has become an influential professional myth.

<sup>31</sup>Marxist value theory is typically portrayed as a version of Ricardo’s labour theory of value. In important respects, this is wrong. However, this point of view is also widespread in ecological economics (Farber et al., 2002; Gómez-Baggethun et al., 2010; Judson, 1989; Söllner, 1997), and Marxist economics itself in its neo-Ricardian versions. For understanding the entanglements between exchange value and use value, which is essential for understanding economy-environment interrelations, I will argue that the neoclassical tradition follows the footsteps of Smith and Ricardo much closer than is often recognised, whereas Marx departs from it in fundamental ways.

use value

?

money as measure of (exchange) value

exchange value

## Figure 2. The value problem in economics

Let us begin by clarifying what these terms mean (section 3.2.1) and how their interrelations are theorised in the classical approach of Smith and Ricardo and the neoclassical tradition (section 3.2.2).

### 3.2.1 Use value and exchange value

Use value denotes the appropriation of nature for the satisfaction of human needs and wants. The reasons why goods and services have ‘use’ for people is closely tied to the specific materiality embodied in them. A wooden spoon can be used for eating soup but hardly for writing a letter. As such, use values represent the material side of commodities (Harvey, 2006, p. 5). What makes objects useful also depends on individual tastes and social norms, such as cultural, historical, spiritual and symbolic contexts. As such, use value considerations predominantly stress the qualitative aspect of commodities, recognising the incommensurability of a myriad different properties that give rise to usefulness. However, there is a quantitative dimension to use values too. As use values, goods are definite quantities, such as tons of steel, litres of water or thousands of strawberries. This implies that use values have an objective basis which makes it possible to aggregate and compare them through time (Elson, 1979).

Commodities are not only useful to people but also characterised by their capacity to be exchanged. Exchange value is the quantitative worth (Shaikh, 1977) or “*ratio between any two commodities or services*” (Schumpeter, 1954, p. 561). It is the power of a commodity to exchange for other commodities. Exchange values, therefore, express a quantitative relation between useful objects, between use values. I would like to stress these two dimensions:

exchange value is a quantity and a relation. As a quantitative relation, a commodity does not measure absolute but relative amounts, i.e. it does not have 'an' exchange value but many different exchange values. In fact, there are as many exchange values as there are different commodity combinations (coffee-tea; coffee-sugar, coffee-hats etc.). However, in practice, money has developed as a socially accepted measure of exchangeability. Exchange value therefore represents the monetary side of commodities. The character of prices, incomes, or any monetary categories only makes sense in relation to others, i.e. they are all relative categories. These monetary relations change all the time and are hence often portrayed as arbitrary or accidental amounts that vary with time and place.

As mentioned above, exchange value is considered to be the most basic economic entity representing the simplest economic transaction, the exchange of commodities.

*"Nothing is more basic to the functioning of capitalist society than the elemental transaction in which we acquire a certain quantity of use value in return for a certain sum of money" (Harvey, 2006, p. 9).*

This sounds rather simple and yet, it remains one of the biggest controversies in the history of economic thought. What do a house and five beds have in common? This question is more than 2000 years old. The value problem in economics has been to explain why commodities exchange at the relative prices they do (Harvey, 2006; Schumpeter, 1954). To understand social ecological problems, we can ask what role use values play in the determination of exchange value. The interrelation between use value and exchange value is the vantage point I will use to explore how economists of different tradition theorise exchange value.

### **3.2.2 Classical and neoclassical value theory: the foundations of the 'real' economy**

How to explain value was a question that engaged almost all of Adam Smith's contemporaries. Value theory was still a core subject area for the political economists of that time.<sup>32</sup> Smith approached the problem by arguing that a pure labour theory of value only holds for pre-capitalist (barter) economies. He presented a famous beaver and deer example in which the exchange ratio of both 'commodities' is determined by the amount of time required to hunt the animals. If it takes twice as long to hunt a deer, deer will be twice as 'valuable', i.e.

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<sup>32</sup> It is no longer. If you open a standard economics textbook, you will not find a chapter called 'value theory' (if you do, please let me know).

expensive. Capitalist economies, in contrast, are characterised by the interaction of various social classes that contribute to the production of commodities in different ways. This is why Smith argued against a labour theory of value for capitalist economies due to payments required to the owners of capital and land. He formulated a cost of production theory of value for capitalist societies that explains the long-run exchange value of a commodity as the summation of wages, profits and rents required to produce it (Screpanti and Zamagi, 2005).

Ricardo detected inconsistencies in Smith's reasoning. For instance, he argued that profits are a residual income that remains after wages have been paid. Contra Smith, he made a case that a labour theory of value also holds for capitalist economies. He thought it was possible to explain exchange value by the relative amount of labour time (rather than costs<sup>33</sup>) required in production. Ricardo was well aware that labour time is not the only factor determining exchange value. His theory was empirical, rather than analytic, that is, he wanted to emphasise that relative labour times are the *dominant* determinant, not the only one (Stigler, 1958). As such, he formulated a '93% labour theory of value'. We can understand his theory as an attempt to reject the view that exchange value is governed by supply and demand.

*"It is admitted by everybody that demand and supply govern market price, but what is it that determines supply at a particular price? Cost of production" (Stigler, 1958, p. 367 citing Ricardo).*

This means Ricardo, as well as Smith, explained the determination of exchange value at a more fundamental level, one that underpins the fluctuations of supply and demand. This is sensible, important for understanding underlying drivers of social ecological problems, and also not controversial. However, his theory became widely misinterpreted and discredited over time, including in ecological economics. The few traces of Ricardo that can be found in ecological economics are limited to short statements indicating that not much can be learned from Ricardo as he suggested labour is the only sources of value (e.g. Farber et al., 2002a; Gómez-Baggethun et al., 2010).

*"The basic reason Ricardo's theory is often misinterpreted is that it was often misinterpreted in the past. If a theory once acquires an established meaning, each generation of economists bequeaths this meaning to the next, and it is almost impossible for a famous theory to get a fresh hearing. Perhaps one hearing is all that a theory is entitled to, but one may plead that Ricardo deserves at least a rehearing – his theory is relatively more*

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<sup>33</sup> Stigler (1958) highlights that one of Ricardo's main ambitions was to refute the popular idea of his time that a rise in wage rates increases the (exchange) value of commodities.

*widely misunderstood today than it was in his lifetime” (Stigler, 1958, p. 367).*

However, even though Ricardo managed to overcome some of the problems with Smith’s initial formulation of value, e.g. by suggesting that fixed capital inputs could be expressed as past labour, he was also left with several issues he could not resolve. For instance, his theory could not adequately account for the role of technological change, changes in the distribution of income (capital-labour ratios) and differences in the time it takes for commodities to come to the market. Ricardo was aware of these problems and suggested that modifications are required (Screpanti and Zamagi, 2005; Stigler, 1958).

Ultimately, both Smith and Ricardo could not explain value satisfactorily. This led to the further development of value theory in two different directions. Marx took up Ricardo’s challenge to reformulate the labour theory of value in important respects. The early marginalists, in contrast, criticised the Classics, mainly Ricardo, above all for neglecting the role of demand in price formation. They embarked on a different journey.

Bentham’s concept of utility provided a different avenue to approach the problem. Utility expresses the idea that people seek pleasure and avoid pain in the pursuit of their happiness. The innovation of the early marginalists – Menger, Jevons and Walras – was to build on this idea and develop ‘marginal utility’ as an expression for the particular quantities of ‘pleasure’ and ‘pain’ that are involved in commodity production and exchange. They assumed that every additional unit of consumption would yield less additional pleasure, whereas every additional unit of production is associated with more pain or sacrifice, such as additional hours worked, which translate into higher costs (Persons, 1913). There comes a point, so the argument goes, at which decreasing marginal utility meets increasing marginal costs (as disutility). This is the equilibrium point at which value and price are determined (Stigler, 1950).

This is how the ultimate standard for value was reconciled in the concept of marginal utility, which is an expression of the degree of well-being or satisfaction gained from consumption of one extra unit of a good (Persons, 1913). Marginal utility theory thus emphasises the role of consumption, and exchange becomes the central organising principle of capitalist society (Shaikh, 2016).

*“Jevons, Menger, and Walras ... aimed at the same goal: ... to prove that the principle of marginal utility suffices to deduce the exchange ratios between commodities” (Schumpeter, 1954, p. 878).*

*“The theory which follows is entirely based on a calculus of pleasure and*

*pain; and the object of Economics is to maximize happiness by purchasing pleasure, as it were, at the lowest cost of pain ... value depends entirely upon utility” (Jevons 1957 cited by Milonakis and Fine, 2009, p. 99).*

By emphasising exchange and consumption as determining exchange value, the role of production was downplayed, and with it, the role of labour in the production process. But how, then, did the marginalists apply the principle of utility to capture the supply side of price formation as well? Menger introduced an ‘analytic device’ that he called a ‘genuine stroke of genius’. It was the idea that means of production serve consumers satisfaction too, though only indirectly (Schumpeter, 1954, p. 880).

*“It enables us to treat such things as iron or cement or fertilizers – and also all services of natural agents and labor that are not directly consumed – as incomplete consumable goods, and thereby extend the range of the principle of marginal utility over the whole area of production and ‘distribution’” (Schumpeter, 1954, p. 880).*

In this way, the cost side became subject to *“the general kingdom of utility”* too (Böhm-Bawerk, 1894, p. 6). Formerly objective costs of production became ‘subjectivised’ as something that contributes to human wellbeing and that can be explained by individual choices. With this idea, the foundations were laid for a theory of exchange value that was capable of accounting for both costs of production (scarcity) and marginal utility.

To sum up, how can we understand how the early marginalists solved ‘the value paradox’ (i.e. the paradox they themselves created)? Essentially, they circumvented the paradox by redefining use value as utility and using marginal utility to explain and measure exchangeability. Utility serves as a homogenous entity to which heterogeneous use values can be reduced. It is important to emphasise that marginal, not total utility ‘explains’ prices in marginal utility theory.<sup>34</sup> This made comparisons possible and the main issue became how to measure utility (Alchian, 1953). Money became interpreted as a measure of pleasure and pain ‘at the margin’. Qualities are swallowed in quantities; totalities by relations and the borders between exchange value and use value blur, merge and eventually dissipate.

This move has not remained unchallenged. Fundamental criticism came from the Austrian economists, who attacked the ‘disutility’ (cost) side of the argument, for instance, as unrealistic. In industrial real-world economies workers are not free to choose the length of

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<sup>34</sup> I will come back to this issue in the next chapter by explaining that macroeconomic aggregates, such as capital and growth, cannot be coherently theorised based on marginal utility foundations.

work and adapt their 'pains' to equilibrate costs and prices (e.g. Böhm-Bawerk, 1894). The Austrian critique not only had reasoned but also ideological motives.

*"Austrian economists had fought hard to repel the labour theory of value, and they were not about to reintroduce labor as a causal factor in the explanation of subjective value" (Spencer, 2004, p. 392).*

This is why the Austrians suggested replacing the direct disutility of labour with the utility of leisure time (as opportunity costs of labour). Their view prevailed and the marginal utility of leisure time became engraved as an accepted standard of representing labour costs in mainstream economics. This is no minor technical issue. It meant that the central role of labour (work and workers) in the economic process was removed from the core of economic theory.<sup>35</sup>

Criticism targeted at marginal utility theory came not only from outside. Also the inventors of utility theory themselves were aware of fundamental problems with the approach they proposed. Bentham recognised the difficulties of inferring from measuring individual utilities to measuring total utility of all commodities; Jevons initially denied the possibility of measuring utility at all; Walras avoided interpersonal comparisons of utility; and Menger omitted to be explicit about the relation between utility and demand, to give a few examples (Stigler, 1950). Problems and inconsistencies remained and some alterations by later economists such as Marshall were considered *"only patchwork repairs"* (Stigler, 1950, p. 327).

Yet, the marginalist idea to explain and measure price and exchange value in terms of quantities of pleasure and pain became the accepted standard approach in economics.

*"This became the standard theory of value (price) that has dominated neoclassical economics to this day. It has become the orthodox approach – virtually unchallenged and widely applied to a whole range of public policy issues, including ecological problems" (Patterson, 1998, p. 107).*

*"The concept of marginal utility ... became the keystone on which the whole neoclassical edifice has been erected" (Milonakis and Fine, 2009).*

This move had profound consequences for the entire discipline of economics. As mentioned earlier, value theory provides the bedrock for an economic paradigm. A lot of fundamental

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<sup>35</sup>Moreover, the overemphasis on monetary dimensions of work (or leisure) in mainstream theory, most prominently as wages, comes at the expense of understanding and debating substantive work-related issues, such as the quality of work. This removes spaces for debate about improving working conditions as a direct way to contribute to people's wellbeing (Spencer, 2004).

issues with mainstream economics arise out of this conception, not least that neoclassical economics was developed upon individualist and subjective micro foundations (Milonakis and Fine, 2009).

What are the consequences of this value theory for thinking about and acting on environmental problems? The purely subjective valuation approach meant that objective foundations of value creation were neglected. Moreover, the assumption of a direct link between price as a measure of exchange value and exchange value as a measure of utility (Douai, 2009) and thus wellbeing, establishes money and market prices as, at least in abstract principle, adequate measures of natural wealth (as use values) and well-being. This leads to ideas that externalities need to be internalised, GDP accounts adjusted to account for environmental damage, or, in reverse, that the non-pricing and not assigning property rights gives rise to the overexploitation of land and other natural resources which needs to be corrected. Monetary valuation becomes an issue of individual preferences (typically as willingness-to-pay or willingness-to-accept) and if former unpriced parts of the environment get finally 'valued' (such as in payments for ecosystem services) it looks like an environmental success. This line of reasoning paves the way to finding salvation in green capitalism. It also forms a substantial part of what is advocated for in ecological economics (see section 3.3.1).

### **3.2.3 Similarities between the classical and neoclassical approach**

To conclude, classical and neoclassical value theories differ in important respects. However, they also share several similarities that are important for the argument of this chapter.

*First*, exchange value is essentially explained in trans-historical and naturalistic terms. This seems clear for the case of marginal utility. *"Value in use is the basis of value in exchange"* (Screpanti and Zamagi, 2005, p. 84 citing Bentham). Use value is a trans-historical concept in the sense that all human societies produce and consume things with useful properties, i.e. use values. What about the Classics? Smith emphasised the difference between use and exchange value and hence rejected the idea that exchange value can be explained in use value terms. However, by suggesting production costs as the basis for his commanded labour theory of value, he essentially suggested exchange values (wages, profits, rent) to explain exchange value, which is circular reasoning. As such, Smith's value theory is disqualified. Ricardo, on the other hand, suggested embodied labour as the basis for exchange values. The concept of embodied labour shares a crucial characteristic with the concept of use value, namely that it



too is a trans-historical concept. *All* societies, both capitalist and non-capitalist, produce things which embody specific labour activity (embodied labour), which give rise to specific useful properties (use value). This commonality across marginalists and Ricardo is significant. To explain the historically specific predominance of exchange value relations by recourse to a non-historically specific (trans-historical) concept (use value or embodied labour) is both logically invalid and serves to mystify the capitalist system by making it appear to be natural and so trans-historical.

*Second*, in the marginalist and classical tradition of Smith and Ricardo, exchange value is related to actions, needs and aspirations of individuals. In other words, exchange value is established from individualist (micro) foundations. In marginal utility theory, what something is worth depends on what *individuals* are willing to pay for it at the margin of consumption (Fine, 2016, p. 5). Although Smith was generally eclectic in his approach, drawing on both systemic and individualist arguments, his value theory is a “*micro-theory of market exchange*” (Milonakis and Fine, 2009). Also, Ricardo viewed labour time as the time of the individual embodied in the commodity (Clarke, 1991, p. 96). So even though the classics were class-theorists, i.e. they theorised society in terms of social class, their utilitarian individualism led to the conclusion of a spontaneous harmony of interests. Where there is no deep-seated structural conflict, there is no need for regulation. This highlights the direct political implications of their viewpoints: a support of the fundamental political principle of *laissez-faire*.

*“The theory of exchange imposed a commitment to laissez-faire in the regulation of economic relations, on the basis of the liberal principle of individual self-determination” (Clarke, 1991, p. 148).*

*Third*, and following from the previous point, both the classical and neoclassical tradition portray capitalism in a positive light. It is no coincidence that Smith called his seminal book *The Wealth of Nations*. The conception derived of capitalism is one of production for the satisfaction of people’s needs.

*“Orthodox theory has always insisted that the ultimate goal of all capitalist production is to provide for consumption ... it is consumption which rules the roost” (Shaikh, 1978, p. 222).*

The individual liberal framework suggested spontaneous harmony of class interests and progress in terms of material accumulation. Starting from a conception of capitalism as an efficient system of human needs provision, there was no reason to fundamentally challenge

the system, or regulate it, or question its fundamental institutions, such as private property and competition, and they did not do so.

*“For Ricardo the existence of capital, landed property and wage labour was simply an inescapable fact of life” (Clarke, 1991, p. 47).*

They took the system for granted and supported the view that liberal capitalism is the best of all possible worlds. The naturalisation of capitalist relations referred to above lay at the root of this political endorsement of capitalism.

*Fourth*, both approaches share similar philosophical roots. The theories of Smith and Ricardo were developed within the intellectual and ideological framework of the Enlightenment, which was the 18<sup>th</sup> century challenge to the absolutist order that replaced God with reason and the priest by the scientist (Clarke, 1991). Also, David Hume was a friend of Adam Smith so it does not come as a big surprise that Smith’s and Ricardo’s value theories are heavily influenced by the British empiricist tradition (Clarke, 1991; Murray, 2017). This tradition also influenced Bentham and hence what gave the philosophical imprint to marginal utility theory.

This matters for two reasons. On one hand, some Marxists argue that the methodological approach rooted in British empiricism prevented the Classical and neoclassical economists from deriving an accurate explanation of exchange value (Brown, 2008; Ilyenkov, 1977, 1960; Murray, 2017). I am inclined to adopt this position and explain why in section 3.4.1 when I discuss Marx’s alternative method. On the other hand, British empiricism provides a flat ontology of the world. A key critique of Marx was that mainstream economists are pre-occupied with appearances rather than attempting to uncover the real essences of the world. This limits the explanatory power of their theories because they are not able to grasp and explain underlying drivers and mechanisms of surface appearances.<sup>36</sup> This matters for ecological economics when it comes to understanding root causes of social ecological problems.

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<sup>36</sup> Smith and Ricardo failed to ‘dig deep’, as Marx argued, but still provided a quite rich account of the political economy of their time. The explanatory power of marginal utility theory, in contrast, is additionally curtailed by the reductionism of neoclassical economics. Supply and demand are the ‘explanatory’ mechanisms that explain changes in prices but almost everything that seems essential in this interaction is taken as given or assumed away in equilibrium analyses (see chapter 2). On this basis, neoclassical economics does not explain much at all.

I will return to these points in section 3.4 when I explain how the Marxian approach differs from the accounts offered by Smith, Ricardo and the marginalists.

### 3.3 Value theory in ecological economics: the foundations of the ‘real real’ economy

How is value theory debated in ecological economics? The answer is: surprisingly little. A keyword search<sup>37</sup> in *Ecological Economics* yields 1200 and 744 hits for value and valuation, respectively, (out of 5200 articles), but only 8 for value theory<sup>38</sup>, and 2 for a combined search of use value and exchange value. Ecological economists are preoccupied with ‘practical’ valuation, not with theory. Few articles address value theory explicitly and if so, often at the margin. In the following, I divide the ecological economics community into five different camps to understand better how ecological economists conceptualise environment-economy interactions and to what extent they draw on value theory. The conclusion I derive is that ecological economists rely on a marginalist understanding of value (section 3.3.1), reject it (section 3.3.2), draw on the classical tradition of Smith and Ricardo (section 3.3.3) or are indifferent about value theory (section 3.3.4). An alternative Marxian understanding of value remains virtually absent (section 3.3.5).

Why does this matter? I think it matters if wrong or implicit value theoretical underpinnings mislead or hinder ecological economists to grasp the nature of the capitalist system. I would argue this is the case when ecological economists conceptualise capitalism as ‘real real economy’ – that is, essentially a biophysical economy – instead of a monetary market economy. Ecological economists study the biophysical foundations of the economy and ultimate social outcomes such as wellbeing and quality of life. They dig deeper into what should matter and be valued (more) in society. This is helpful, but it is not enough. It documents the overuse and exploitation of the natural environment but it fails to identify root causes of ecological destruction. Expanding a flawed mainstream conception of the economic

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<sup>37</sup> These results are based on a Scopus document search using ‘Abstract title, Abstract, Keywords’ in the journal *Ecological Economics* on 18 January 2018.

<sup>38</sup> The same result holds for variations such as theory of value, theories of value, value theories. The combination valuation and economic theory yields 27 times, a somewhat higher result but without much more theoretical substance.

system as ‘real’ economy into a ‘real real’ economy prevents a deeper understanding of fundamental drivers of social ecological crises.

### 3.3.1 Ecosystem service advocates: adoption of mainstream value theory and valuation

The valuation of ecosystem goods and services is one of the biggest and most active terrains within ecological economics. Understanding value is the pre-requisite for valuation as the “*process of expressing a value for a particular action or object*” (Farber et al., 2002, p. 376). However, there are only a handful of articles in *Ecological Economics* that explicitly establish links to value theoretical underpinnings. When they do, it becomes clear that marginal utility theory of value is the value theory adopted.

A seminal special issue from 2002 on *The Dynamics and Value of Ecosystem Services: Integrating Economic and Ecological Perspectives* serves as an important reference point. This special issue on valuation contains 12 articles (including Introduction), some of which touch on the conceptual foundations of environmental valuation. Interestingly, eight individuals in this Special Issue are co-authors of two or more papers; two individuals co-author five articles (Wilson and Farber); and Robert Costanza<sup>39</sup> co-authors six. Some of these articles are amongst the most cited articles in *Ecological Economics*.<sup>40</sup> These contributions form a substantial part of the conceptual bedrock for ecosystem goods and services research within ecological economics. What do these authors write about value theory?

Farber et al. (2002) provide the foundational theoretical contribution of the Special Issue. The authors state

*“The classical economists, such as Smith and Ricardo, could not resolve it [the diamond-water paradox] using their labor theories of value. It was resolved only by recognizing the importance of utility and scarcity in determining exchange values, and the role of margins in value*

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<sup>39</sup> Costanza is co-founder and past-President of the *International Society of Ecological Economics*, founding Chief Editor of the journal *Ecological Economics* and on the Editorial Board ever since the first issue got published in 1989.

<sup>40</sup> Groot et al. (2002) is with 1655 citations the 2<sup>nd</sup> most cited article in *Ecological Economics*; Farber et al. (2002) has 508 citations and ranks on place 13; followed by Wilson and Howarth (2002) with 223 citations on rank 93. Limburg et al. (2002) 194 citations, Sutton and Costanza (2002) 191, Boumans et al. (2002) 152, Howarth and Farber (2002) 144.

*determination” (Farber et al., 2002, p. 378).*

Whereas the classical political economists looked for

*“a standard physical commodity unit for measuring exchange value, neoclassical theorists did not need such a commodity. As value was assumed to be determined by utility on the margin, and consumers were assumed to allocate money optimally across uses, the marginal utility of money was the same for an individual in all its uses. Money thus became the standard unit of measure” (Farber et al., 2002, p. 378).*

The authors leave little doubt that they consider the marginal approach as an improvement of the classical tradition.

*“The significance of the marginal utility theory of value to the evolving concept of ecosystem service valuation is that it can be used to measure use values, not just exchange values, in monetary units ... money can thus be used as a standard of measure of use value” (Farber et al., 2002, p. 378-*emphasis added*).*

The logic of marginal utility theory applied to ecosystem services valuation implies that

*“The exchange value of ecosystem services is the trading ratios for those services ... market prices reflect the valuation of goods and service, but only on the margin” (Farber et al., 2002, p. 388).*

This is exactly what happens in practice. Scholars in this field focus on establishing categorisations and typologies of ecosystem goods and services (i.e. a refined understanding of different use value categories) (Groot et al., 2002 is THE reference point) with a view to measure them for the purpose of ‘capturing’ environmental values that are otherwise neglected and unaccounted for. The typical procedure is to conduct environmental cost-benefit analysis in order to derive monetary measures that can be compared revealed preference methods (e.g. hedonic pricing, travel cost method) and stated preference methods (e.g. contingent valuation and choice experiments) are used (Spash, 2015b, p. 542). Monetary valuation is not the only tool advocated to raise awareness of environmental degradation<sup>41</sup> but an important and ‘useful’ one (Costanza and Farber, 2002).

Most valuation studies do not make their value theoretical foundations explicit. Environmental valuation is a practical and pragmatic approach. The implicit anchorage in marginal utility

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<sup>41</sup> Other tools include biophysical measures and models or deliberative valuation methods. In fact, in terms of non-monetary valuation methods, there is very much overlap to the position of Social Ecological Economists (section 3.3.2).

theory remains implicit or on the fringes, but nevertheless visible. These valuation methods and data “*are anchored to individual human preferences and valuation*” (Turner et al., 2003, p. 494). A lot of valuation studies proceed by speaking of ‘value’, ‘economic value’, ‘monetary value’ interchangeably (e.g. Gallai et al., 2009). What shines through is a conventional wisdom that this is what ‘economic value’ is.

### **3.3.2 Social ecological economists: rejection of mainstream value theory and alternative valuation**

Social ecological economists criticise monetary environmental valuation and the microeconomic theory upon which it is based on various grounds. At the forefront of this critique lies an attack against value monism, i.e. collapsing the multitude of environmental values into single monetary numbers. The real-world plurality and incommensurability of different values (Aldred, 2006; Martinez-Alier et al., 1998) imply that prices do not convey all information necessary to make informed choices about environmental problems (Røpke, 1999; Vatn and Bromley, 1994).

The mainstream compression of values and its theoretical justification is also attacked for neglecting important aspects that matter for environmental valuation, such as social norms, political process, rights and ethical considerations (Niemeyer and Spash, 2001; O’Neill and Spash, 2000); different social, political, cultural contexts of valuation (Vatn and Bromley, 1994); a realistic treatment of time, complexity, and strong uncertainty (Getzner et al., 2004). In addition, aggregation problems are highlighted (Niemeyer and Spash, 2001; Spash and Vatn, 2006); as well as the incapacity of marginal analysis to consider absolute resource limits (Spash, 2008a), and a disregard of realistic human behaviour and motivations (Vatn, 2005; Vatn and Bromley, 1994). Decisions made on the basis of technocratic cost-benefit-analyses are judged as misleading and distracting from intrinsically political and ethical issues.

The alternative offered is to re-politicise. As ‘prices are not much worth’ (Røpke, 1999) and as most social ecological problems are inherently complex and uncertain (Funtowicz and Ravetz, 1994a, 1993) and subject to conflicting interests and priorities, effective policies require alternative or additional valuation approaches and value articulating institutions (Vatn, 2015a,

2005a).<sup>42</sup> Multi-metric, multi-method, multi-discipline approaches are advocated that account for plural values, address conflicts, create more transparency and facilitate open, inclusive and participatory decision-making processes. This includes the necessity of biophysical assessments (both to accompany or replace monetary measures), and the application of the precautionary principle to account for fundamental uncertainty (Aldred, 2013). Deliberative valuation methods<sup>43</sup> are propagated prominently as a group of methods for dealing with plural values, such as citizens' juries, multi-criteria mapping, trade-off analysis, participatory modelling methodology, deliberative visioning, participatory multi-criteria analysis, or alternative water forums (Antunes et al., 2009; Kallis et al., 2013; Kenyon, 2007).

It becomes clear that social ecological economists discuss 'value' mainly in qualitative terms (Douai, 2009). The prime concern is to include environmental values more effectively in decision-making processes and to prevent further environmental destruction justified by technocratic monetary cost-benefit exercises. Lo (2013) highlights that ecological economics adopts an 'alternative theory of value' that draws on multiple philosophical strands, Sagoff's citizens values thesis and John Rawls's theory of justice being the most prominent. The value-theoretical links that are made thus reach out to environmental philosophy and ethics and to social theory, but do not include other *economic* schools of thought.

Alternative understandings of economic value remain largely absent, even in this more progressive camp within ecological economics. Generalisations such as the following are widespread.

*"Preference utilitarianism constitutes an implicit value theory of economics ... economists measure the value of environmental goods and services in monetary terms ... environmental values are treated as reducible to consumer preferences" (Lo, 2013, p. 84).*

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<sup>42</sup> Value articulating institutions are sets of rules that shape social processes of valuation by addressing questions such as: Who shall participate? In what role? What data are considered relevant? How are data processed? The choice of specific value articulating institutions influences what values are included, what are excluded, and what type of conclusion can be reached (Vatn, 2015a, 2005b). An example of a plural value articulating institutions are courts, as they enable different logics to be sustained, e.g. historical justice, or expressing values of recognition or responsibility (Kallis et al., 2013).

<sup>43</sup> Deliberation means "a particular sort of discussion that involves the careful and serious weighing of reasons for and against some proposition. It is the act of considering different points of view and coming to a reasoned decision that distinguishes deliberation from a generic group activity. Emphasis is given to the product that arises from discussion (e.g. a decision or set of recommendations), and the process through which that product comes about" (Antunes et al., 2009, p. 933). The goal is to achieve generalizable interests, i.e. a workable agreement. This is based on the assumption that people are capable of and want to listen to each other and be open about sharing subjective values.

For many ecological economists, this is what ‘economics’ and ‘economic value’ is and what ‘economists’ do. I interpret this as a lack of awareness that the above critique is directed towards a particular type of economic value theory rather than economics in general. Social theory and philosophy are without doubt important, but they do not replace economic theory. A sound understanding of what economic value is, is what matters to understand what matters in (and beyond) markets and why.

To conclude, this camp moves rather quickly from the rejection of marginal utility theory to pleas for value pluralism, incommensurability of values and the need for deliberative institutions. However, a critique of mainstream value theory and normative appeals to take nature into account more fully does not fill the gap of understanding economic value as a major foundation of economic theory. Without value theory, there is no basis for fully comprehending prices, money, profits and other core monetary categories of the economy. Without these foundations, it is difficult to imagine how to fully understand intertwined ecological economic dynamics and how to create an ecological economics paradigm along alternative lines. Classical institutionalism, which is sometimes propagated as ‘the economics of social ecological economics’ is insightful in many respects, but *“one of the most important lacunae in institutional thought is exactly the absence of a theory of price, or value theory”* (Milonakis and Fine, 2009).

### **3.3.3 Energy physicists: energy theories of value and energy accounting**

The argument of energy theories of value is the following: available energy of the sun (partly stored as fossil fuels) is required for the production of all goods and services and cannot be substituted as ultimate input. Labour is a form of energy as well, which means energy is the ultimate determinant of the exchange value of commodities. In addition, ‘free’ or ‘available’ energy is a homogenous substance (such as utility) that can be used to measure and compare different commodity values. This leads energy physicists to conclude that, *“the flow of energy should be the primary concern of economics”* (Costanza, 1980, p. 1219 citing Soddy). This line of thinking dates back to the French physiocrats, for whom land was the ultimate and direct source of value and wealth creation (Burkett, 2003; Christensen, 1989). In its modern reincarnation, energy theories of value replaced land by energy as a source of value, surplus and main driver of accumulation. This argument has developed in two different ways, one based on energy quantity, the other on energy costs. Both versions are variations of



*“economics as the classical school did it”* (Judson, 1989, p. 262). The difference is that energy physicists focus on embodied energy or energy costs of production instead of embodied labour or costs, as Ricardo and Smith did.

In ecological economics, this line of research dates back to H.T. Odum’s development of *emergy* as a measure for embodied energy used in production. Although some present Odum as an advocate of an energy theory of value (e.g. Judson, 1989), Foster and Holleman (2014) argue that *emergy* was meant as a measure of use values and real wealth that, as Odum repeatedly argued, should not be conflated with economic value. Odum developed *emergy* as a metric to trace wealth in energetic terms and to show that unequal exchange relations between countries and regions are much larger when accounting for energy flows instead of monetary flows. However, while not proposing *emergy* as explaining exchange value, Odum did compare *emergy* to monetary variables (e.g. an *emergy* investment ratio) to illustrate how capitalist trade relations foster inequalities heavily biased against the poor.

In the early 1990s, there was a debate on the question whether embodied energy could and should be related to market value (Foster and Holleman, 2014). Costanza argued against Odum and for an energy theory of value in the form of an energy cost of production theory. Costanza asked, *“can anyone seriously suggest that labor creates sunlight?”* (Costanza, 1980, p. 140). Based on the argument that all production costs can be carried back to the solar energy necessary to produce them, Costanza and colleagues used a Sraffian inspired input-output approach to demonstrate a strong empirical relation between embodied energy and market values (Cleveland et al., 1984; Costanza, 1980; Liu et al., 2008). A key aim was to address the neglect of the role of energy in neoclassical production theory.

When these approaches started to be developed, it did not take long for criticism to arrive. Some critiques point to problems with the methods of empirical testing.

*“Due to the lack of physical data, economic input-output statistics have to be relied upon for the determination of energy costs. Because ... the energy costs are calculated in accordance with the prices, constant energy intensities ... necessarily have to result – a methodological artefact that renders energy accounting almost useless”* (Söllner, 1997, p. 185).

Methodological issues are one severe problem. The most important critique within ecological economics, however, against energy theories of value came from Georgescu-Roegen (1971) and Daly (1991) who argued that *“matter matters too”*. They rejected energy theories of value on the grounds that it is impossible to reduce all resources to energetic terms. One direction

in which this line of thought has developed further is to study and measure various kinds of energy and resource flows in their own right, without tying these analyses to value theory. This became the hallmark of industrial ecologists (section 3.3.4).

As one response, energy theories of value were basically removed from the academic landscape in ecological economics. Even though the label is no longer used today, the traces of this research tradition are, however, still alive and active, although in somewhat different form. There are two different research communities who conduct aggregate empirical analyses on the relationship between energy and economic growth. Both have developed refined measures of either a homogenous form of energy quantity (exergy) or energy costs (EROI) that highlight the essential role of energy in production.<sup>44</sup>

Bob Ayres has pioneered the development of exergy (as useful work), which is an energetic measure adjusted for energy quality which means it considers both the quantity and quality of embodied energy used in production. Exergy was introduced in production functions to explain the Solow residual and convince mainstream economists of the importance of energy in the economic process. Empirical studies conducted by Ayres and colleagues suggest that exergy is the key explanatory variable driving technological progress as the main engine behind economic growth for various industrialised countries during the 20<sup>th</sup> century (Ayres, 1997; Ayres et al., 2007, 2005, 2003; Ayres and Voudouris, 2014; Ayres and Warr, 2009, 2005; Warr and Ayres, 2012). These findings have been somewhat confirmed by recent work from Brockway (2015, 2014) and others (Hammond and Stapleton, 2001; Heun et al., 2017; Serrenho et al., 2012; Warr et al., 2010; Williams et al., 2008).

Another research community, led by Cleveland and Hall,<sup>45</sup> make the case that energy return on investment – short: EROI – is a key variable explaining economic growth. EROI shows how much energy is left for the economy to use after taking into account the energy needed to extract and ‘produce’ it. A high EROI implies high ‘surplus energy’, whereas a declining EROI means the amount or accessibility of a certain energy resource is declining faster than the advancements in technology to harvest it more efficiently (Dale et al., 2012; Murphy et al., 2011;). By including EROI in production functions (Kümmel, 2011, 1982; Kümmel et al., 1985;

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<sup>44</sup> I am very grateful to Lina Brand-Correa who provided much substantive content and references to understanding the exergy and EROI research communities.

<sup>45</sup> Charles Hall was a student of H.T. Odum (Röpke, 2004, p. 299) as was Robert Costanza (Foster and Holleman, 2014).

Pokrovsky, 2003; Stern, 2011, 1993; Stern and Kander, 2012) studies show how the availability of cheap fossil energy has spurred economic growth of the past, and how declining EROI for oil over the last 40 years make energy ever more scarce and hence expensive. This signals ‘the end of cheap oil’ and ultimately ‘the end of growth’ for oil-dependent industrial economies (Murphy and Hall, 2011).

The practical policy implications of these approaches are no different than the ones derived from marginal utility theory (Burkett, 2009; Söllner, 1997). If we assume that prices reflect embodied energy or energy costs, then a perfectly functioning market would arrive at prices proportional to energy and thus account for the ‘true’ costs of production.

*“There is no inherent conflict between an embodied energy (or energy cost) theory of value and value theories based on utility ... Embodied energy values are accurate indicators of market values where markets exist ... this is one way of ‘internalising’ all factors external to the existing market system and solving the natural resource valuation problem ... markets can be viewed as an efficient energy allocation device that humans have developed to solve the common problem facing all species – survival” (Costanza, 1980, p. 1224).*

Costanza’s view combines energy reductionism with unrealistic economic theory. It does not allow for a “great” foundation for “a new ecological economics that links the natural and social sciences”, as he suggests (Costanza, 1980, p. 1224). Instead, views like his naturalise capitalism and thereby misguide ‘solutions’. It is perfectly legitimate to stress the essential role of energy in production, and important for raising awareness of the energy dependency of societies. However, the strong emphasis on whether or not key dimensions of biophysical throughput (EROI, energy intensity etc.) can and do affect the scale of the economic system prevents asking what underpins these relations. Why is it that capitalist societies use so much energy? Moving beyond naturalist explanations not only allows for a deeper understanding of socially-specific root causes of ecological problems but also gives rise to almost opposite policy recommendations. From Costanza’s perspective, the problem becomes one of imperfect, incomplete or missing markets in which energy externalities have to be internalised. As Murphy et al. confirm: EROI analysis is “much like economic cost-benefit analysis” (Murphy et al., 2011, p. 1889). From the perspective of understanding capitalist social relations, elaborated below, attempts to internalise externalities feed an inherently expansionary capitalist system.

### 3.3.4 Industrial ecologists: empirical approach and biophysical accounting

Industrial ecologists<sup>46</sup> provide a biophysical description of the metabolism of industrial societies.<sup>47</sup> The aim is to understand the reproduction of industrial societies in energy and material terms, along the whole supply chain from extraction, production, consumption, to waste. Empirical analyses range from very detailed micro studies (e.g. the CO<sub>2</sub> content of 1kg of strawberries produced by company XYZ) to global macro assessments (e.g. tons of iron extracted and processed along the global supply chain). They include production-based and consumption-based perspectives to account for trade patterns and burden shifting between sectors and countries. Much emphasis has been put on the establishment and refinement of accurate methodologies to develop data, indicators and biophysical accounts.<sup>48</sup> The field has become “*one of the most important paradigms for the empirical analysis of the society-nature interaction*” (Fischer-Kowalski, 1998, p. 61).

How are society-nature interlinkages studied? The short answer is: in empirical terms, in two basic ways.<sup>49</sup> Environment-economy interrelations are often studied by conducting statistical analyses, with ‘nature’ on one axis and ‘the economy’ on the other. In the same way as many economists conduct econometric analysis to understand economic relations such as changes in employment and GDP growth, industrial ecologists apply the same procedures but plot different variables. Typical correlations of interest concern the link between economic growth (typically as GDP) and environmental degradation. Modelling is the second way environment-economy interlinkages are studied.<sup>50</sup> This is where the interlinkages in the industrial system become ‘dynamic’. Integrated models combine physical with monetary data to trace past resource use and extrapolate trends or simulate different resources use scenarios as the basis

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<sup>46</sup> Industrial ecologists have their own journal and society and could be regarded as a separate community. However, there are many overlaps with ecological economics. Many industrial ecologists consider themselves ecological economists.

<sup>47</sup> The term *industrial metabolism* was coined by Bob Ayres and refers to energy and material flows through the industrial system, whereas *societal metabolism* covers non-industrial modes of subsistence as well (Fischer-Kowalski and Hüttler, 1999, p. 108).

<sup>48</sup> Prime methodologies include life-cycle assessments, environmental input-output analysis, and material flow analysis (Pauliuk et al., 2017), as well as footprint (Wackernagel et al., 1999) and rucksack calculations (Schmidt-Bleek, 2001).

<sup>49</sup> There is a third way in which economic and physical measures of the economy are related. As was already mentioned in the section on energy accounting above, in the initial stage of developing biophysical data and measures, ideally, there is no ‘interference’ with economic monetary measures. However, due to lack of data scholars revert to existing price information, whenever necessary, as proxies for calculating biophysical measures.

<sup>50</sup> For a state-of-the art of ecological macroeconomic models see Hardt and O’Neill (2017).

for policy recommendations. To conclude, the approach of industrial ecologists is empirical. Similar to the ambitions of energy physicists, the goal of industrial ecologists is to account for biophysical throughput in the economic process. Underlying these efforts is the strong desire to address economic scale arguments including biophysical dependency. However, explicit value theoretical underpinnings that inform analysis and shape policy recommendations remain absent.

### 3.3.5 Eco-Marxists: the adoption and rejection of Marxian value theory

There are few contributions and scholars that discuss Marxian value theory in ecological economics. Besides a few articles that apply Marx's value theory to specific issues in ecological economics,<sup>51</sup> there are a handful of theoretical contributions. Even though this group is small, views are divided. The demarcation line between those who defend Marxian value theory and those who reject it (or argue it needs to be adapted), centres on the question of how nature can be considered a source of value. In ecological economics, this debate is as old as the origins of the field.

Georgescu-Roegen, the founder of ecological economics, argued that Marxian value theory is 'anti-ecological' because it excludes the role of nature in production (Burkett, 1996). In this line of thought, Martinez-Alier and Naredo highlighted the pioneering role of Sergei Podolynski, a Ukrainian socialist, who attempted to ground Marxian value theory in the laws of thermodynamics, thereby acknowledging the fundamental role of nature in production. However, as this attempt was ignored and dismissed by Marx and Engels, Marxian value theory is inconsistent with energy analysis, so their argument (Martinez-Alier, 1987; Martinez-Alier and Naredo, 1982). Burkett and Foster stepped in to defend the labour theory of value on the ground that Podolinsky suggested a crude energy theory of value, which is not an improvement on, but rather the opposite of, Marx's theory (as explained in section 3.4) (Burkett and Foster, 2008, 2006; Foster and Burkett, 2008, 2004). However, this rebuttal has not settled the issue. Instead, the same debate continues today in a second generation, at the

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<sup>51</sup> Such applications include critiques of ecosystem service valuation as commodity fetishism (Kosoy and Corbera, 2010; Melathopoulos and Stoner, 2015) or state-led ecological modernisation initiatives (Hovardas, 2016) or a discussion of the role of money, prices and the market in experimenting with social transformation strategies (Nelson, 2001).

few fringes in which it exists, for instance in a recent debate between Kallis and Swyngedouw (2017) on the question whether bees produce value.

The role of nature as source of value is not only debated between ecological economists and eco-Marxists but also amongst Marxists. Some Marxist scholars suggest modifications to the labour theory of value, such as Brennan (1997), who argues to remove the subject/object distinction between ‘active labour power’ and ‘passive nature’ from the labour theory of value with the result to yield nature as overall source of value (Brennan, 1997). Other Marxists reject the labour theory of value, such as Hornborg (1998, 2014, 2015), for lack of empirical relevance and explanatory power as regards understanding asymmetrical global resource and energy flows. Hornborg advocates an ecological theory of unequal exchange purely based on physical categories.

What is remarkable is that all these contributions fail to provide a clear account and explanation of what Marxian value theory actually is. This is especially surprising in the theoretical contributions that aim to defend it. Ali Douai (2009) wrote an article on *Value theory in Ecological Economics* in which he tries to convince the progressive camp within ecological economics to adopt the Marxian understanding of value.

*“The concept of economic value is an empty space in SEE [social ecological economics]. This is detrimental to the achievement of its main goals” (Douai, 2009, p. 272). “SEE still fails to define a conceptual framework that relates ecological issues to the operation of the socio-economic system as a whole” (Douai, 2009, p. 276).*

I agree. However, when it actually comes to explaining what value means, Douai provides essentially one paragraph<sup>52</sup> (Douai, 2009, p. 264). He starts with the commodity, explains use

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<sup>52</sup> The whole paragraph reads as follows: *“The commodity is the particular form taken by a part of wealth in capitalist society. This form has a twofold aspect: (1) use-value and (2) ExV. As use-values, commodities satisfy human needs (in relation to their physical properties). For Marx, this quality depends on the social context and is not an economic category. As use-values, commodities are incommensurable: a pullover and a bowl of rice have nothing in common in terms of fulfilment of needs. As ExV, they have only quantitative characters. The equality between them means that we treat them as different quantities of something they have in common. The common substance is the labour that served to produce them. But the twofold aspect of commodities is a reflection of the twofold character of the labour that produced them. Concrete labours are not socially useful without market exchange. But exchanged labours are not concrete labours, and are instead defined by Marx as ‘abstract’ labours. Concrete labours are qualitatively different, but on markets all labours count only as ‘productive expenditures of human brains, muscles, nerves, hands’ (Marx, 1867, p. 72). Abstract labour is that which is common to all commodities, and is the substance of a purely social phenomenon: ‘economic value (exchange-value being its form of appearance)’ (Marx, 1880, p. 1550). The concrete representation of economic value is money, which can be conceived as the social institution without which the produced economic value*

value and exchange value in two sentences, moves to labour as the common substance of value in one sentence, followed by a little bit on social labour, and a statement that money is the concrete representation of economic value. He provides statements that value is ‘an immaterial social relation’ and that the analysis of the commodity is the most important part of Marx’s work; however, this is without explaining how these concepts relate to each other and what abstract socially necessary labour time means.

Interestingly, Burkett proceeds in a similar manner. His article on *The Value Problem in Ecological Economics* is a criticism of ecological economics for adopting energy theories of value or mainstream approaches to environmental valuation (Burkett, 2009). The key message is that ecological economics lacks a systematic explanation of why nature has no value. However, in his 40-page long chapter, Burkett focuses on criticising ecological economics rather than sufficiently explaining what value means in the Marxist tradition.<sup>53</sup> Like Douai, he provides a short section on the core of Marxian value theory in which he juggles with difficult Marxist terminology. Presented this way, value theory is impossible to understand – and hence judge – for non-Marxists.<sup>54</sup>

What are we left with? Some scholars endorse the Marxian theory of value, others reject it or suggest modifications but none of the contributions in ecological economics unpacks value in a way that clarifies what it means and why it matters. The result is that Marxian value theory essentially remains undebated in ecological economics. Even in the progressive camps, ecological economists consider it a dead end and outdated. The general advice is to avoid it.<sup>55</sup>

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*would not be socially validated and could not take the money-form” (Douai, 2009, p. 263/264).*

<sup>53</sup> On method, Burkett notes: *“The method Marx used to obtain these insights and the analytical mediations involved are too complex to fully recount here. For present purposes, it is sufficient to note the key role of Marx’s dialectical approach to nature, value, and use value” (Burkett, 2003, p. 159).* Burkett provides this statement in the original version of his essay published in 2003 but removes it from the later republished version in 2009. This is interesting because Marx’s method makes all the difference in understanding his theory of value.

<sup>54</sup> At least, it was impossible to understand for me. Burkett’s article was one of the very first pieces of Marxist literature I read in 2015. Back then, I found the article disappointing. In my first set of notes I remarked *“Marxian terminology widespread, not easy to understand”*. I was keen to understand Marxian theory so I approached this literature with great interest and nor I do not shy away from difficult texts; however, the language used and the compressed way in which difficult theory is presented made it impossible for me to understand. Re-reading the piece in 2018 – after having spent two years studying Marxist theory and methodology – I understand his article, but also, why other ecological economists probably do not.

<sup>55</sup> When I started to study Marxian Political Economy, several ecological economists warned me of value theory and suggested to ‘stay away from it’. For a long time, this was my intention. I changed my mind when I realised that I will not understand more complex Marxian categories and capitalist dynamics

### 3.4 Marxian value theory: the foundations of the monetary market economy

The Marxian understanding of value differs from the classical and neoclassical approaches in substantial ways. This section intends to show how and why it matters for ecological economics. I agree with Murray that

*“Marx came up with a unique, poorly understood yet (nevertheless) widely rejected theory of value” (Murray, 2017, p. 17).*

This also holds for ecological economics. This is problematic because Marxian value theory offers the starting point for a systemic, dynamic and coherent understanding of the capitalist system. It offers explanatory power far beyond marginal utility theory and helps to understand dynamics that ecological economics are interested in and concerned about. This section introduces the Marxian approach to value. My aim is to trace, step by step, why and how Marx arrived at the conclusion that exchange value can be explained by abstract socially necessary labour time and what this means.

Note that I use a smoothed and honed concept of value in this thesis. There is an extensive, thorny and controversy-strewn literature about the precise meaning of this term. ‘Value’ is equal to ‘labour value’ in most Marxian texts ever written (which is also the view I adopt), and at the same time ‘value’ means ‘price’ in most non-Marxian (and some Marxian) texts (which I reject, as explained below); and the bridge is provided in a vast literature by texts that wrestle with the idea that ‘labour is the substance of value’. Especially the linkages between labour values as set out in Marx’s *Capital* and prices as they appear in the economy are a matter of considerable controversy. That is, there is often some engagement with the issue of the transformation of labour value into prices, and the problematics of that transformation. I do not address this issue further in this thesis; the interested reader can find an extensive discussion of the ‘labour value/price’ relationship in the literature on the so-called transformation problem (e.g. Fine et al., 2004; Foley, 1982; Kliman and McGlone, 1988; Lipietz, 1982; Moseley, 2000) .

There are many logical and substantive questions that must be confronted in the attempt to understand value and its meaning for explaining capitalist dynamics. My use of ‘value’ in this

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without understanding value.



thesis draws primarily on seminal interpretations of Marx's *Capital* (e.g. Fine and Saad-Filho, 2016; Harvey, 2010b; Saad-Filho, 2002), in combination with an exciting literature on the dialectical method (Brown, 2008; e.g. Murray, 1993; Ollman, 1993; Ollman and Smith, 2008; Reuten, 2000; Smith, 1998), because method is what makes the big difference in understanding the Marxian conception of value. This is why I begin by arguing that the concept of value cannot be understood without comprehending Marx's unique methodology.

### **3.4.1 A systemic and dynamic approach to theorising value**

Marx was a realist and a systems thinker. He rejected the British empiricist epistemology and 'flat' ontology that underpins the economic thinking of his classical precursors and neoclassical successors in favour of a dialectical method and historical materialist philosophy, which is inspired by Hegel, Spinoza and ultimately Aristotle (Ilyenkov, 1977). Marx developed a method – systematic dialectics – to study his object of inquiry: capitalism.

When I started the PhD I wondered how theories are built. What does theorising mean? The main answer I got from scholars was to read much and draw inferences. I was enthusiastic when I learnt that Marx followed a specific method that allowed him to derive a realistic understanding of the capitalist system. I was even more excited when I discovered that the dialectical method closely resembles modern systems and co-evolutionary thinking. Pioneers in social ecological thought have stressed the importance of dialectical reasoning for integrating knowledge with a view to radical change. Bookchin emphasised dialectics as the philosophy of social ecology (Bookchin, 1995); Capra draws on dialectical thought in his attempt to theorise living systems (1997, 1975; 2014) and Functowicz and Ravetz stress dialectics as the basis of post-normal science (1994b, 1993; 2011). It is a philosophical foundation for understanding complexity and life. Yet, the dialectical method and systematic dialectics in particular and its philosophical underpinnings in materialist dialectics remain relatively little known.

These methodological underpinnings are no minor detail but make all the difference in understanding value in particular and capitalism as a whole. It led Marx to embark on a different journey to solve 'the value problem' and derive a realistic, rich and insightful analysis of capitalism. However, the dialectical method is not easy to understand. It is a different way of reasoning to which we are not accustomed. This difficulty has given rise to many confusions

and misunderstandings (also within the Marxist tradition). On method and its relation to the value analysis of the first few chapters of *Capital*, Marx said in the Preface to the French Edition

*“The method of analysis which I have employed, and which had not previously been applied to economic subjects, makes the reading of the first chapters rather arduous ... That is a disadvantage I am powerless to overcome, unless it be by forewarning and forearming those readers who zealously seek the truth. There is no royal road to science, and only those who do not dread the fatiguing climb of its steep paths have a chance of gaining its luminous summits” (Marx, 1990, p. 104).*

Marx’s ambition was to understand the workings of the system as a whole rather than, or as the basis for, individual exchange or prices or profits. What distinguishes capitalism from previous forms of societal organisation, such as feudalism or slave societies, is that labour, means of production and money have become commodities. This is why Marx starts his exposition with the commodity (a choice that took him 30 years). He treats the commodity not as a thing but as the simplest concrete representation of the capitalist system as it confronts us every day, and with a view to the commodity in motion, i.e. commodity exchange as a continuous process rather than a static picture in one point of time (Ollman, 1993, p. 31). He asks: what can we understand about the functioning of the system from looking at the most elementary economic transaction: the direct exchange of commodities? What does it tell us about the nature of capitalism? How are capitalist societies organised? What matters in such societies? These are questions Marxian value theory addresses.

The emphasis throughout the analysis lies on what is specific about capitalism, rather than how societies are organised in general. Marx is not at odds with other economists who argue that ‘goods and services’ are valuable because of utility, scarcity and costs. However, he argues this is not enough to understand what makes capitalist value creation and valuation different from other societies and forms of production. He aimed to uncover the historically-specific (re-)production of value and related, the historically specific forms of domination and exploitation. As I will show, this gives different insights into systemic (macro) entanglements that cannot be derived from individual (micro) accounts. It is a lens that provides particular insights into how nature is overused and appropriated. What follows is an outline of the first five steps of Marx’s analysis in understanding exchange value.

### 3.4.2 Step 1. Use value and exchange value are fundamentally different things

The starting point is a recognition that the commodity has a two-fold character: it is both a use value and an exchange value. As explained above, use value refers to the material side of commodities, whereas exchange value refers to the quantitative worth of a commodity as compared to other commodities in the market. The other value theories discussed so far – the classical approach of Smith and Ricardo, marginal utility theory, energy theories of value and those eco-Marxists who propose to include nature into the labour theory of value – essentially suggest that it is possible to express and explain exchange value in naturalistic and trans-historical terms, e.g. as utility, concrete labour time, or energy.

Marx fundamentally disagrees. He argues for a clear analytical separation and demarcation between use value, as a trans-historical category, and exchange value, the predominance of which is specific to capitalism. As exchange values, commodities have *nothing* to do with use.

*“As use-values, commodities differ above all in quality, while as exchange-values they can only differ in quantity, and therefore do not contain an atom of use-value” (Marx, 1990, p. 128).*

What does this mean? Imagine what happens in exchange. We begin, as Marx does, with simple exchange, in which two different commodities confront each other, say apples and oranges. In the act of exchange, the owner of apples views his commodity as exchange value and oranges as use value, as the thing he desires. It is the opposite for the owner of oranges. He demands apples and views them as use value but holds oranges which are exchange value for him. This means the use value of one commodity encounters the exchange value of another, and vice versa. In exchange, commodities are confronted with their counterpart (Ilyenkov, 1960). If you own a commodity, or have the power to command it, you can use it or exchange it for something else, but you cannot have both at the same time.

The *reason* for engaging in exchange is provided by different use values.

*“If the use values were not qualitatively different, hence not the products of qualitatively different forms of useful labour, they would be absolutely incapable of confronting each other as commodities. Coats cannot be exchanged for coats, one use-value cannot be exchanged for another of the same kind” (Marx, 1990, p. 132).*

Exchange value, in contrast, represents the ratio at which different use values exchange. This implies use values *cannot* bear a systematic relationship with exchange value. Why? As use values, commodities are specific, e.g. the specific shape and quantity of wood of a spoon

enables us to eat soup. As exchange value, the spoon has a general ability to be exchanged for other commodities. Exchange value is what connects and relates different commodities. An explanation of exchange value therefore needs to capture what holds for commodities in general, and cannot rely on a category, use value, as which commodities fundamentally differ from one another in exchange.

This section provides a rather intuitive explanation of the difference between use value and exchange value. A slightly different explanation can be provided by emphasising the contradictory nature of use value and exchange value. I started this section by explaining that use value and exchange value are two aspects within a commodity. This means, in reality, use value and exchange value are related – as an actual fact. They are two aspects that characterise a commodity. At the same time, however, I have just argued that they are not directly related in the sense that use values do not bear a direct and systematic relationship to exchange values. They rather confront themselves as opposites. As “*abstract opposites*” use value and exchange value are opposing poles or forces within a commodity (Banaji, 1979, p. 31). Ultimately, this means use value and exchange value are somehow related and not related – at the same time. This is what is called a contradiction.

What is the solution to a contradiction, or paradox? Ricardo could not solve the problem satisfactorily and we have seen how the marginalists approached the problem. They *circumvented* the paradox by reverting to a homogenous expression for use values as utility that they thought could express and measure exchange value. From a Marxist perspective, this is a violation of reality and dismissed as ‘bad abstraction’ because contradictions are not just ideas but realities (Ilyenkov, 1960). Cornforth invites us to think: “*Imagine, if you can, a society without contradictions*” (1987, p. 94).

The alternative offered by Marxists is to accept commodities as contradictions and derive a sound representation in thought to understand what this means and explains. Contradictions can be understood as unity and coincidence of mutually exclusive theoretical definitions (Ilyenkov, 1960), opposing conflicting tendencies (Cornforth, 1987) or “*a union of two or more processes that are simultaneously supporting and undermining each other*” (Ollman, 1993, p. 50). In this sense, use value and exchange value are one-sided expressions of a real contradictory dynamic within a commodity. Dialecticians, in contrast to philosophical approaches based on formal logic, do not shy away from such opposing contradictory processes but actively look for them because they help explain the dynamics of a system (Lewontin and Levins, 2007). The dialectical task is to trace the chain in which contradictions

move in objective reality and theorise underlying mediating links that explain how they are resolved in practice (Ilyenkov, 1960).

As they move, opposing forces are not equal or in balance but characterised by superiority-inferiority, i.e. one tendency, as the name suggests, is typically stronger. In our case this is exchange value, as the capitalist mode of production is production for exchange. This is because capitalist economies are characterised by an advanced social division of labour of commodity producers. In such societies, people and firms specialise in the production of commodities that are produced for sale (i.e. with the purpose to be exchanged), rather than for their own use. Exchange value is thus the dominant defining moment of capitalist production. The contradiction between use value and exchange value is central in Marxian thought. It forms the foundation out of which many other contradictions arise (Harvey, 2006).

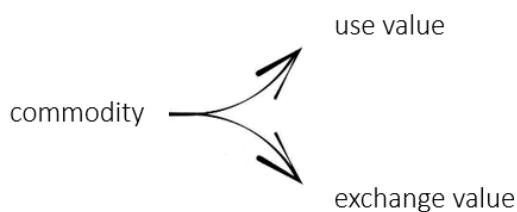


Figure 3. Step 1. The demarcation between use value and exchange value

### 3.4.3 Step 2. The mediation between use value and exchange value by a 'third thing' called value

What follows from accepting the fundamental difference between use value and exchange value? There needs to be something else than use values that explains the exchangeability of commodities. As exchange values, commodities establish definite quantitative relations, say 1 coat = 2 backpacks. What makes a coat worth twice as much as a backpack? Where does the equality (the equals sign signals equality) come from, if the commodities exchanged are different use values? There needs to be some *"common element, of which they represent a greater or a lesser quantity"* (Marx, 1990, p. 127). Commodities are, as a matter of fact, made commensurable in exchange. They meet as equivalents. *"There can be no exchange ... without*

*equality, and no equality without commensurability*". This quote is not from Marx, but from Aristotle (Marx, 1990, p. 151). Marx admired Aristotle for showing that exchange relations are based on equality and that this requires that two things can only be compared as commensurable quantities. Aristotle identified the requirement of a common substance upon which commensurability is based but then he stated that such a thing cannot, in truth, exist. Marx's response was *"But why not?"* (Marx, 1990, p. 151). If use values drop out as possible candidates to explain this equivalence and systematic relation, it needs to be something else. This 'something' Marx called value. In a first step, this is an obvious fact. Commodities have value, and this is what makes them exchangeable with other commodities. This is a colloquial use of the word 'value' with which most people would intuitively agree.

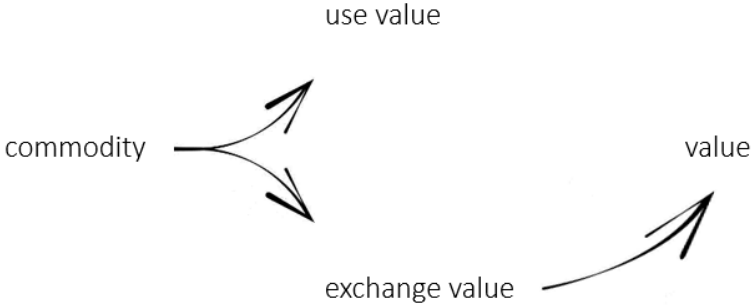


Figure 4. Step 2. The identification of a 'third thing' called value

**3.4.4 Step 3. The identification of value as abstract socially necessary labour time**

For now, we know there must be a 'third thing', but we do not know what it is. What are we looking for, if we aim to uncover the nature of value? This is a methodological question. The ontological and epistemological understanding of the world influences how scholars build theories. According to Marx's realist methodology, things have inherent causal powers that give rise to appearances in the empirical world. H<sub>2</sub>O, for instance, is the inherent causal power, real essence or inner structure that gives rise to appearances of water, ice or steam. In the same way, Marx aimed to uncover the real essence of value that gives rise to different monetary appearances. Following this reasoning there must be a real 'inner content' of commodities, i.e. something inherent and common to all commodities that explains their

power of exchangeability (Brown, 2008; Ilyenkov, 1960). The search is for properties that explain this power of exchangeability. What properties could this be?

The search is for properties that fulfil the following criteria.<sup>56</sup> Clearly, it has to be something that is characteristic of the commodity, i.e. of the specific social form to be explained. Second, it has to be something material,<sup>57</sup> i.e. an expression of objective reality. It cannot be a pure thought construct or idea because this would violate Marx's materialist and realist philosophy according to which appearances arise from material structures (Brown, 2008). A 'god-like' substance is categorically excluded. Third, it has to be a quantity that bears a systematic relationship with exchange value. As exchange value describes a quantity only another quantity has the capacity to explain exchangeability. Also, as Marx adopts an ontology in which real essences give rise to appearances, there has to be a systematic relation between the essence and its physical manifestation (Harre and Madden, 1975). As H<sub>2</sub>O as real essence necessarily manifests as water (or steam or ice), the real essence of value necessarily manifests and bears a systematic relation with money. Fourth, it needs to be something distinct from use value, as already argued above.

Marx argued the property left to explain exchange value is abstract socially necessary labour time (ASNLT). What does this mean? To begin with, 'labour' has to be understood broadly, as life activity or social practice. People work to reproduce themselves and society. As every ecological economist agrees, energy and matter can neither be created nor destroyed, only *transformed*. The agents of this transformation are human beings. People transform nature (and thereby themselves) to survive. Under capitalism, the dominant form this transformative power takes is wage-labour. Only wage-labour counts as producing value. 'Bees', and other animals, do not produce value (Kallis and Swyngedouw, 2017).

From a Marxist perspective, animals do not produce value because they are not part of human society and the social division of labour. They cannot be employed, they do not get a wage and they cannot, by the virtue of their being, exercise decision making powers as humans can.

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<sup>56</sup> I could not find explicit criteria in the literature that guide the step of theorising an underlying real essence. One way to approach this issue is to infer from Marx's philosophical foundations what can and cannot serve as a criterion.

<sup>57</sup> David Harvey famously defines value as immaterial but objective (Harvey, 2010). So is value material or is it not? Value is not natural material, i.e. it does not have a systematic determinate relationship to any natural property, such as energy or wood or broccoli. Value is however social material, i.e. it relates to an objective social reality, where social labour has to be quantitatively and qualitatively determined in any society.

Obviously, this does not mean they do not contribute to societal reproduction, not to speak of their intrinsic value. Animals co-inhabit the planet as we do, should have rights and be treated decently. In practice, often they are not. This is because human beings decide, in many ways, how animals are treated, used and otherwise instrumentalised. Why do ‘good’ people do ‘evil’ to animals in industrialised food production? This is a sociological question (Bauman and Donskis, 2016), but also an economic one because it relates to systemic pressures of capitalist value production. Understanding these systemic dynamics is needed to understand social ecological problems. Arguments against Marxian value theory on the grounds that it does not adequately account for the role of animals (and other forms of living beings and non-living nature), miss the point, in my view. We need to understand how and why human organisation results in global environmental destruction.

Having clarified why Marxists privilege labour in their explanation of value we can move on to explain what ‘socially necessary’ means. ‘Socially necessary’ denotes the average amount of labour time required, under existing conditions of skills and technology, to produce commodities.

*“If it takes one day to make a pair of shoes on average, then the abstract labour embodied in a pair of shoes is one day no matter whether it takes the individual labourer two or 50 hours to make” (Harvey, 2006, p. 14/15).*

‘Socially necessary’ points to the importance of the predominant level of technological advance in shaping value and price magnitudes.

‘Socially necessary’ is sometimes also referred to mean that without effective demand, value cannot be produced. Murray (2017) for instance argues that only socially-validated wage-labour is value producing. Brown (2008, 2002) counters that it is certainly necessary for there to be effective demand in order for there to be exchange value; however, this is a qualitative condition for exchange value only. It involves use value as a ‘determinable’ abstraction. If something is not a use value it cannot be an exchange value. This does not mean, however, that effective demand also quantitatively determines exchange value. This involves use value as a ‘determinate’ abstraction because the quantity of effective demand differs according to the different determinate properties of each kind of commodity. Brown states that the classical political economists argued that short-term demand fluctuation (market prices) gravitate around technically-determined long-run conditions of production on which effective demand has no quantitative influence and that this was Marx’s framework too.



The real innovation and difference to other value theories, however, is the concept of ‘abstract labour’. Abstract labour means that from the perspective of the system, work needs to be done. Who works and under what conditions does not matter much at all. Capitalist society as generalised commodity exchange society is *indifferent* about it (Murray, 2017). From a market perspective, one use value is just as good as any other. This means a total abstraction from determinate use value considerations in exchange and disregard for concrete labour and concrete nature.

*“In exchange the distinct qualities which give various commodities their “concreteness” are abstracted from. In exchange, what matters is not the physical properties of iron but how much wheat, or cloth, or coffee, etc., we can get for the iron; hence in exchange we treat every commodity not as a concrete bundle of distinctive qualities, but as the equivalent of specific quantities of all other commodities” (Shaikh, 1977, p. 111).*

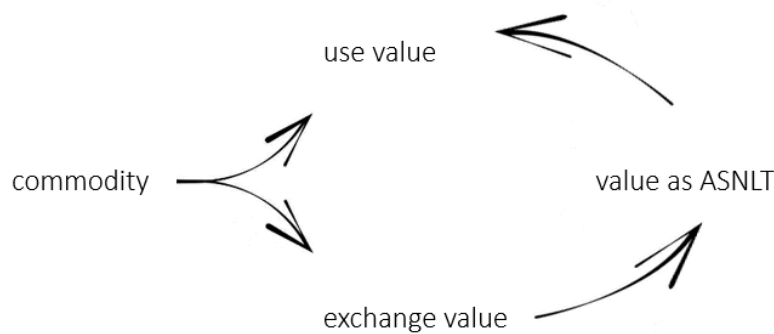
With the concept of ‘abstract labour’ Marx breaks with the Classical and neoclassical tradition. Again, the classical and neoclassical school argue that exchange value can be explained solely in trans-historical terms, involving use value or concrete labour. Marx says it cannot. Marx argues we need to understand the manifold ways in which use values enter value creation processes, but that it would be a deep misconceptualisation to conflate exchange value with use value or to conflate abstract labour with concrete labour. Money creation and ‘real wealth’ (use value) creation are very different things that need to be kept separate, even though the latter is necessary for the former.

This is a crucial point for ecological economists. Often, Marxian value theory is dismissed for emphasising labour at the expense of energy and resource considerations. This is a misunderstanding. Marxian value theory abstracts from concrete labour and concrete nature *alike* – as a way to realistically explain what exchange value is. By doing so, it accounts for and explains more about the (monetary) drivers of energy and resource overuse and exploitation than marginal utility theory which assumes a much closer relationship to use values. In other words, Marxian value theory helps explain environmental impacts better than theories which mistakenly assume a close relationship to use values.

There are deep and varied dialogues about the relationship between ‘value’ and ‘nature’ in the eco-Marxist literature. Many contributions defend Marx’s labour theory of value as a rich and powerful foundation for understanding environmental degradation, depletion of resources and ecological crisis (e.g. Horton, 1997; Liodakis, 1994; Vlachou, 2002); even though adaptations and ‘rethinks’ are often considered necessary (e.g. Taşdemir Yaşın, 2017). These

debates experience a revival at the moment. I would like to draw the reader’s attention to a recent special issue in *Capitalism Nature Socialism* that seeks to explore value-nature relationships under contemporary capitalism (Kenney-Lazar and Kay, 2017). The ‘old’ question whether labour is the only source and substance of value remains contested, with some arguing for it (e.g. Huber, 2017), whilst others insist that the ‘classical’ labour theory of value needs to be extended to incorporate the crucial contributions of nature to value creation too (e.g. Emel, 2017; Walker, 2017). Value analysis is today often applied innovatively to formerly neglected realms, such as value destruction and devaluation, for example (Knuth, 2017).

Back to my argument: Whereas abstract labour represents the qualitative substance of value, ‘labour time’ stresses its quantitative aspect. Labour time is the magnitude of value (Banaji, 1979), measured in weeks, days, hours, minutes. Recall, exchange value is, by definition, a quantitative relation. If value is a theoretical expression that aims to explain exchange value, it needs to reflect this quantitative aspect. This element of time is crucial in the definition of value. How much time it takes to produce a commodity is, without doubt, an essential aspect in understanding dynamics of real-world commodity production. This quantity is measured by duration – in weeks, days, hours, minutes. In this way, the real social process of value can be quantified, and the socially necessary labour time required to produce a banana can be compared with the one required to produce a T-Shirt.



**Figure 5. Step 3. The identification of value as abstract socially necessary labour time**

### 3.4.5 Step 4. Money as measure of value

Having established the real essence and magnitude of value, the next step is to understand how value gets measured and expressed in exchange. As value is constituted not by concrete labour but by abstract labour – which is an inherently abstract relation – it is not immediately visible in the natural properties of the commodity. It needs embodiments, i.e. forms in which it appears to individuals. Historically, when exchange was sporadic different things measured value, such as salt, tobacco or seashells. As exchange developed and became generalised, most forms disappeared in favour of one commodity that emerged as socially recognised *universal equivalent* (Shaikh, 1977). A basic money commodity as gold became the commodity that is ‘more equal’ than others as accepted standard in which relative values of commodities are expressed. Exchange relations are no longer expressed as 1 coat = 3 backpacks but 1 coat = 50 pounds.

Marx derives money as the *necessary* appearance of value (Smith, 1990).<sup>58</sup> Money arises out of simple commodity exchange as the practical solution to the contradiction between use value and exchange value (Lapavistas, 2017, p. 54). It serves as universal equivalent that measures value in terms of prices.<sup>59</sup> Price is closely connected to money as “*the monetary expression of a commodity’s quantitative worth*” (Shaikh, 2016, p. 10).

*“Marx’s labor theory of value ... is chiefly an attempt to explain why all the products of human productive activity in capitalist society have a price, not why a particular product costs such and such, but why it costs anything at all. That everything humans produce has a price is an extraordinary phenomenon peculiar to the capitalist era, whose social implications are even more profound because most people view it ahistorically, simply taking it for granted” (Ollman, 1993, p. 61).*

Price is closely connected to value, but they are not the same. Price is the monetary expression of value, a form in which value appears in the empirical world. Value, in contrast, is the ‘hidden’ underlying essence. Put differently, price is the external relation between commodities, value their internal connection (Ilyenkov, 1960). This connection is not random

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<sup>58</sup> The fact that money emerges as necessary form of commensurating commodities had already been recognised by Aristotle. The simple form of value in which 5 beds = 1 house, he says, cannot be distinguished from the more developed form of 5 beds = so much money (Marx, 1990).

<sup>59</sup> Marx’s analysis of money starts by grasping money as form and measure of value. From this starting point, different forms and functions of money can be understood, from simple to complex. Whilst money as form and measure of value is not the most significant form in developed capitalism (state fiat money and bank money have gained importance), it remains a precondition for understanding modern money (Lapavistas, 2017).

or accidental, but in fact relatively stable. Brown (2008) describes it as a ‘patterned’ or ‘rough and ready’ relationship. The continuity and difference between price and value (Elson, 1979) can be illustrated by recalling how these magnitudes are measured. Value is measured by labour time, prices by money. The colloquial expression ‘time is money’ captures their obvious connection in capitalist praxis. At the same time, everybody agrees that time and money are not the same.

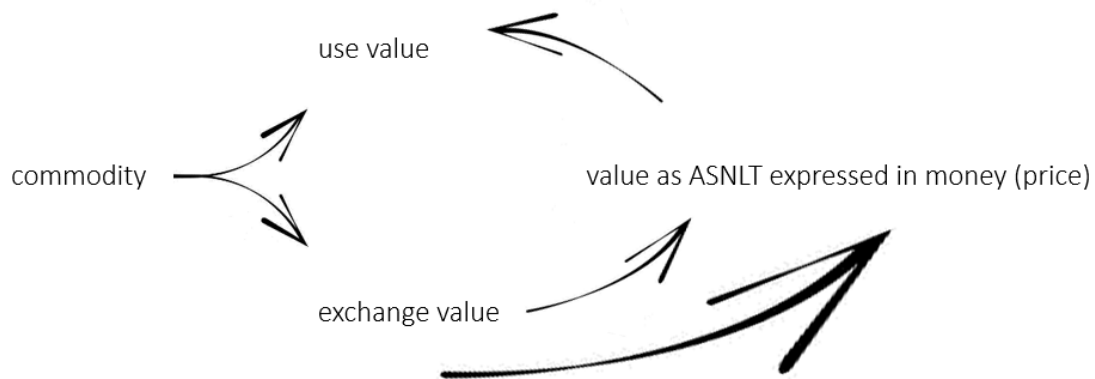


Figure 6. Step 4. Money as measure of value

### 3.4.6 Step 5. From money back to the commodity – now as capital

What we have achieved so far is to derive value, money and price and their interrelations in four steps. This four-step movement is not linear but rather a ‘cycle of abstraction’ (Banaji, 1979). The first cycle moves from the commodity through its contradictory nature between exchange value and use value to an understanding of value and the necessity of money. As the production of exchange value is the stronger moment driving the reproduction of capitalist society, and as exchange value becomes expressed as money in practice, we get, by the end of the first cycle, an explanation of why commodities are produced. In capitalism, the production of commodities is primarily driven by the purpose to make money. In this function, money transforms into capital.

*“Through our analysis of the simple commodity we arrive at the concept of value and thus at a basis for defining ... the concept of capital. Now it is capital that produces commodities which form the substance and lifeblood*

*of the process of circulation” (Banaji, 1979, p. 38). “Capital is the essence of the individual commodity ... on the other hand, capital itself is only the developed and self-developing form of value ... so value is likewise the essence of the simple commodity” (Banaji, 1979, p. 39).*

Starting from value, Marx thus derives the concept of capital. In its simplest expression, capital is a form of value. It is ‘value in motion’. The first cycle in Marx’s thinking is thus closed by a fifth step that refers back to the commodity – now as capital. The second cycle of abstraction then starts with the commodity as a form of appearance of capital, i.e. as commodity capital (Banaji, 1979). Ultimately, what this means is that *“commodity circulation presupposes production on a capitalist basis”* (Murray and Schuler, 2017, p. 125) and that *“commodity circulation is only the relatively cheery appearance of the endless accumulation of capital”* (Murray and Schuler, 2017, p. 126). The transformation of money into capital is the starting point of *Capital* Volume II (Marx, 1993: chapter 1) and also the bridge to the next chapter in which I start to explain ‘capital’ and some social ecological implications.

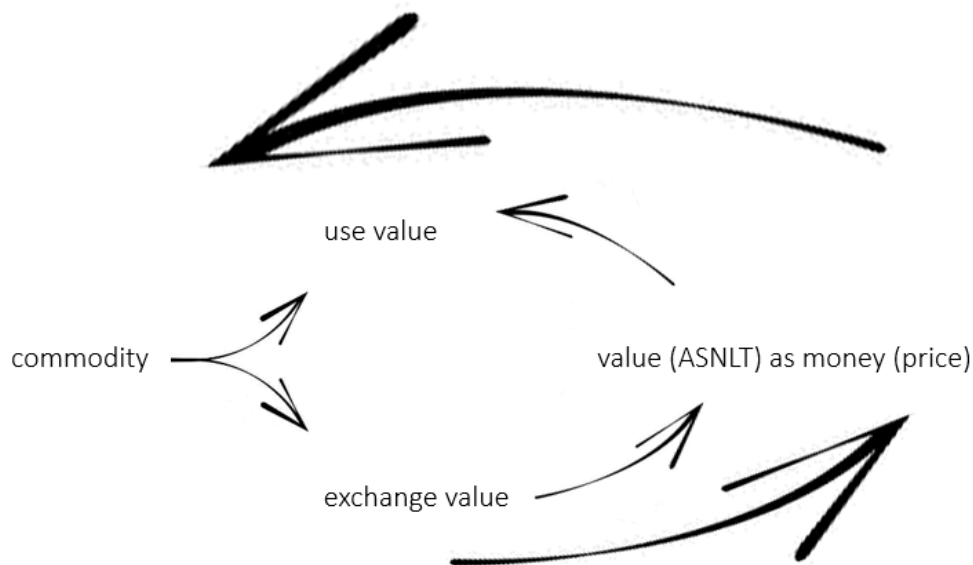


Figure 7. Step 5. From money back to the commodity – now as capital

### 3.5 From value to capital: understanding the system as a whole

What can we learn about the capitalist system from this understanding of value? In the introduction I claimed that value theory shapes how economists think about the purpose and functioning of the economic system. I also stressed that Marx's ambition was to understand capitalism with a view to change it. Having explored the Marxian understanding of value, we can ask what this understanding helps explain. What systemic insights can be derived from identifying the commodity as expression of abstract socially necessary labour time expressed as money? What does this tell us about the system as a whole? And how to possibly think about changing it? This section emphasises three key issues. Section 3.5.1 highlights how the Marxian understanding of value helps to specify the systemic challenge ecological economists aim to grasp and confront. Section 3.5.2 discusses how value theory can hide or expose fundamental driving forces of social ecological destruction. Section 3.5.3 portrays Marxian value theory as the starting point for explaining other systemic features and core economic categories of capitalism, exemplified by the possibility of crisis formation.

#### 3.5.1 Value theory specifies the systemic challenge and perceived solution space

I started this chapter with a quote from David Harvey:

*"If you think you can solve the environmental question and global warming ... without confronting ... the value structure ... then you got to be kidding yourself" (Harvey, 2010a).*

What does this mean? It means that from the perspective of certain Marxian writers, whose view I share, value is the foundational social structure of capitalism. Value is a systemic emergent property; it arises as the aggregate outcome of the impersonal un-coordinated interaction of people in the social division of labour. There is no direct discussion and planning of what to produce, how and how much. The market acts as impersonal social coordinating mechanism. At the level of long-run competitive prices and the general price level – which is the level Marxian value theory emphasises – not the free will of people matters, but the 'un-freedom' of the value structure that 'lords over' people (Smith, 1990). People do not decide on value and prices. Their wills are regulated by abstract labour.

*"Capitalism is regulated not by conscious human decisions but rather by "thing-like relations" – the relations of the market, of prices and profits" (Shaikh, 1978, p. 236).*

*“The social character of activity, as well as the social form of the product... appear as something alien and objective, confronting the individuals, not as their relations to one another, but as their subordination to relations which subsist independently of them and which arise out of collisions between mutually indifferent individuals, the general exchange of activities and products, which has become a vital condition for each individual” (Marx 1973 cited by Smith, 1990, p. 75).*

Marginal utility theory, in contrast, suggests that people are the masters who decide what they need and want to satisfy their needs. The forces of supply and demand equilibrate different preferences and capacities of market participants and result in market prices that reflect individual utilities. Free choice is the basis of market valuation. From this perspective, we ought to reflect more ‘ecological’ values in exchange, by changing preferences and internalising externalities. This is the basic premise behind the valuation of nature, which is either ‘missing’ from markets or in the calculus of individuals. Marxists acknowledge that market prices are shaped by demand and supply but as mentioned above, Marxian value theory does not aim to explain individual prices or profits but *“the meaning and underlying structure of relative prices”* (Shaikh, 2016, p. 381).

What underpins and regulates market prices? The quantity of abstract labour time necessary to produce a commodity (Shaikh, 1977). This means there is an intrinsic connection between exchange value and the labour time required to produce commodities. In other words, exchange values do not wildly differ from costs of production.

*“For commodity exchange on a society-wide basis this cannot be the case. If the exchange value is far above the production costs of a commodity, this will eventually lead others to produce it and offer it at a lower exchange value. As a result, in a society-wide system of exchange, exchange value will generally fluctuate within relatively narrow limits. These limits are not determined by “common resolve”, but by the objective material facts of production” (Smith, 1990, p. 77).*

Prices fluctuate around values and the systematic deviation between production prices and total labour times is relatively small (Shaikh, 2016). Shaikh suggests that 87% of relative industrial prices is accounted for by direct and indirect unit labour costs (Shaikh, 2016, p. 69). This is why Marx argues that the specific way that production is organised forms *“the hidden basis of the entire social structure”* of the capitalist system (Shaikh, 1977, p. 110).

Clearly, there are positive aspects of capitalist value production. The importance of ‘labour’ that is ‘socially necessary’ and undertaken in a specific amount of ‘time’ points to a key mechanism that structurally drives capitalist production: the role of technologically-induced

labour productivity increases. This does not come as a big surprise. Capitalist societies are highly productive (Smith, 1990, p. 79). Rising productivity has gone hand in hand with increasing living standards for millions of people and is hence portrayed almost unambiguously as a positive development and ‘progress’ that contributes to the thriving of capitalist societies. Also, the global division of labour and international integration has moved societies beyond provincialism (Smith, 1990, p. 83).

However, from a social perspective, capitalist value production has always gone hand in hand with systemic pressures and fierce struggles over labour time, in terms of wages, the length and intensity of work and how these social relations of production are constantly under renegotiation and subject to limits. Volume I of *Capital* is about little else. From the perspective of global environmental crises, in addition, the detrimental social effects of capitalist value production have outweighed the advantages. One core problem is the disregard and undervaluation of the environmental contributions of production.

*“Rather than a free and reciprocal consideration of all relevant costs, we have here a systematic ignoring of that significant set of costs that is part of commodity production without itself being measured in commodity prices” (Smith, 1990, p. 77/78).*

Another detrimental societal effect is that value does not peacefully co-exist with other forms of production; it *dominates* them. Different forms of and motivations for production co-exist in capitalist societies. However, value is a social power<sup>60</sup> that shapes and influences the world and people around it. In its need to expand, value colonises other forms of production. It is no coincidence that Marx’s writings repeatedly refer to the vampire-like or predatory character of capitalist production relations. This matter when considering what alternative types of production, such as non-profit organisations or cooperatives are up against.

To sum up, Marxian value theory explains the regulation of market prices and how value imposes itself onto people. As Polanyi remarked, the deepest flaw of the system is that it subordinates human purposes to the logic of an impersonal market mechanism (Polanyi, 1944). Value, money, the market and price mechanism become social forces structuring and moving society. They channel individual behaviours and form *“the hidden basis of the entire*

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<sup>60</sup> Marxists prefer the term social *relation* instead of social structure or power because the Marxian architecture emphasises how different categories *relate* to each other. I find the term social relation more precise and helpful because it transcends the structure-agency divide. Social relations involve continuous interactions and reproduction. However, I also try to use a language that is more intuitive to ecological economists and hence decided to use the term social structure.



*social structure*” of the capitalist system (Shaikh, 1977, p. 110), with associated detrimental social outcomes.

*“The inner logic that governs the laws of motion of capitalism is cold, ruthless and inexorable, responsive only to the law of value. Yet value is a social relation, a product of a particular historical process. Human beings were organizers, creators and participants in that history. We have, Marx asserts, built a vast social enterprise which dominates us, delimits our freedoms and ultimately visits upon us the worst forms of degradation” (Harvey, 2006, p. 203).*

This does not imply systemic determinism. It is not a situation of inescapable systemic lock-in that cannot be escaped. Everything that is social can also be changed. However, power is more difficult to detect when hidden. Being aware of underlying social relations that shape human interactions in detrimental ways, can be an important lever to changing them. This explains the Marxian emphasis to unravel masked relationships of domination and the necessity to move away from the value form as a central act of revolutionary transformation. The challenge then is no longer to ‘price nature’ and ‘internalise externalities’ but to reject the basis of commodity production and exchange, and confront the social structure in its totality. Clearly, this is more politically demanding.

### **3.5.2 Value theory can hide – or expose – fundamental driving forces of environmental crises**

Every system has a purpose, even if that purpose often remains difficult to see (Marx, 1990; Meadows, 2009). By purpose I mean a sense of direction or function, something upon which the reproduction of the system rests. What characterises the reproduction of the capitalist system?

From a neoclassical, and partly<sup>61</sup> also classical perspective, ‘the economy’ is steered towards the production of commodities for the satisfaction of people’s needs and wants. From a marginal utility point of view, use value aspects in the form of utility dominate and shape production decisions. The drive to satisfy people’s needs and wants lies behind wealth expansion and capitalism becomes characterised as an ‘efficient’ system that produces

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<sup>61</sup> Partly, because with Smith, wish for self-regard and how it can be reconciled with self-interest or not, plays a big role too.

wealth. It is no coincidence that Adam Smith's most famous work is called *The Wealth of Nations*. The optimism about the ability and capacity of capitalism to produce wealth for a long time, before a stationary state would be reached (that was anticipated by most classical political economists as grim future outlook, with the notable exception of J.S. Mill who was "inclined to believe that it would be, on the whole, a very considerable improvement to our present condition" (Mill, 2006, p. 453) is shared by neoclassical successors and deeply enshrined in mainstream economics – starting from marginal utility foundations.

Marxists agree with this perspective in two respects. Real wealth is indeed associated with the production of use values and capitalist production centres on the production of commodities. However, a society which produces most goods and services for sale on markets is a society that produces predominantly for exchange. How could it be otherwise? Commodities are first and foremost produced for exchange. The conclusion is that capitalism is a system primarily fuelled by the quantitative expansion of exchange value. "The overriding aim of production is not production-for-direct-social-use but production-for exchange" (Shaikh, 1977, p. 111). Exchange value is what shapes and dominates production decisions, not use value, as proposed by marginal utility theorists.

Systems are generally good at achieving their function or purpose. They need to be because this is required for their continuous reproduction and perpetuation (Luhmann, 1987; Meadows, 2009). If capitalist societies are primarily driven by the production of exchange value, this implies that the purpose of capitalist production is not the direct production of wealth. Real wealth in the form use values for people's needs and wants satisfaction result indirectly *via* the production of exchange value. The real purpose around which capitalist production centres is the creation of new value (and as a further step, surplus value as established in the next chapter).

*"The immediate purpose of capitalist production is not 'possession of other goods' but the appropriation of value, of money, of abstract wealth" (Marx 1969 cited by Kenway, 1980, p. 30).*

*"It must never be forgotten that in capitalist production what matters is not the immediate use-value but the exchange value, and in particular, the expansion of surplus value. This is the driving motive of capitalist production" (Marx 1969 cited by Kenway, 1980, p. 30).*

The dominant capitalist value regime implies a social framework in which money becomes an end in itself, outside of social control (Smith, 1990). Marx shows how money is derived from

aiming to understand exchange value and how it develops into an objective power that stands above the human community. The true ‘scandal’, as Bellofiore calls it, is that

*“the commodity is not only inseparable from money, and money from capital. There is more: capital is founded precisely on that ‘displacement’ and ‘perversion’ – inversion and madness, simultaneously – in which the living worker has really become an appendage of his or her own labor-power, and now counts only as a deliverer of living labor” (Bellofiore, 2011, p. 97).*

Hardly any economist would disagree with the fact that motives of monetary advances (as profits, interest, rent etc.) spur capitalist production. From a mainstream perspective, this is what stimulates the necessary dynamism, investment and technological advance that is associated with flourishing capitalist economies. This social organisation cannot remain unquestioned in a world of increasing and accelerating social ecological problems. By taking a highly critical stance, the Marxist perspective answers questions that remain otherwise clouded by a propaganda of technological optimism and ideas of ‘progress’ of capitalist democratic societies.

Ultimately, Marx invites us to rethink what wealth really means. He opens the door for critically reflecting upon the social ecological consequences of the pursuit of money creation. This is where Marxian theories of money fetishism and alienation enter the scene. Marx highlights that it seems *as if* capitalist societies predominantly produce real wealth, but, in fact, there is a confusion between what really matters in terms of wealth (use values in terms of healthy food, access to decent housing and mobility, social security etc.) and how we think we can achieve it, i.e. by chasing money.

### **3.5.3 Marxian value theory explains other systemic features of capitalism**

Marxian value theory is not ‘just one theory’, but a systematic starting point for understanding the capitalist system. It is not a coincidence that Marx started his exposition of the capitalist system with the commodity and value, and not a coincidence that most introductory books to Marxian Political Economy start with value (e.g. Fine and Saad-Filho, 2016; Harvey, 2010a).<sup>62</sup> Starting from the commodity, the Marxian approach unfolds, step by step, how simple and

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<sup>62</sup> It is also no coincidence that Burkett’s book *Marxism and Ecological Economics* starts with a chapter on *The Value Problem in Ecological Economics* (Burkett, 2009).

abstract categories develop into more complex and concrete ones. I explained the first cycle of abstraction in five steps in this chapter. Every cycle retains the understanding of the previous one and develops it further. The Marxian approach thus shows how parts are linked to the whole. The commodity – this trivial looking thing – contains the seeds for understanding other systemic features, such as capital, surplus, profits, growth, competition, labour, exploitation, class, crisis etc. It presupposes the totality of the capitalist mode of production and remains central to an understanding of contemporary capitalist dynamics (Fine and Saad-Filho, 2018).<sup>63</sup>

In the next chapter I will explore some more complex categories; in this chapter, I pick one example to illustrate how an understanding of value helps explain other systemic features. This example is how value theory can explain the *possibility* of crises formation. What follows aims to point towards tendencies for crises to emerge from the elements established so far. To begin with:

*“Marx put the whole matter neatly when he suggested that commodities are in love with money, but the course of true love never did run smooth”*  
(Fine and Saad-Filho, 2016, p. 81).

We established that capitalist production takes the form of commodity production for exchange. This implies whatever gets produced needs to be sold for societal reproduction to function. However, decisions about what to produce are taken by individual producers in isolation from each other and without any direct coordination with consumers (Kenway, 1980; Smith, 1990). Capitalists produce for the market, not directly for personal needs. As the coordination between what gets produced and what gets effectively sold is not personal but impersonal there is no guarantee that commodities will be sold and at what prices. Mismatches between production and exchange occur and if these disruptions happen at a large scale, crises occur. This implies that the particular way in which capitalist production is organised and motivated contains the possibility of regular breakdown and crisis (Kenway, 1980).

*“The general abstract possibility of crisis denotes no more than the most*

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<sup>63</sup> Marx’s value theory is not only about physical commodity production either. I mention this point because colleagues have frequently asked how relevant value theory is in times of financialised capitalism in which production has shifted from traditional sectors to rent-extracting activities. I argue that understanding value remains a precondition for understanding such contemporary developments. At the same time, if we consider the system as a whole, core productive activities never cease to be important. They remain the foundation for the dominant reproduction of capitalist societies.

*abstract form of crisis, without content, without a compelling motive. Sale and purchase may fall apart. They thus represent potential crisis and their coincidence always remains a critical factor for the commodity. The transition from one to the other may, however, proceed smoothly. The factors which turn this possibility of crisis into an actual crisis are not contained in this form itself; it only implies that the framework for a crisis exists” (Marx 1969 cited by Kenway, 1980, p. 28).*

*“Capitalism’s tendency toward instability derives above all from the fact that capitalism is a monetary market-economy. The social division of labour on the market is unplanned, and this ‘anarchy’ can lead to an incomplete realisation of the [new value] produced” (Bellofiore, 2011, p. 83).*

Marx argues it is not only possible but quite likely that disproportionalities between production and exchange arise. Tendencies to overproduction arise because capitalists aim to sell as much as they can. This suggests structural tendencies for crises in reproduction (Smith, 1990).

*“For Marx, capitalist crises are ultimately due to the contradiction between the capitalist tendency to develop without limits the productive forces ... and the limited social capacity to consume the product ... capitalism therefore always tends to be unstable and prone to crisis” (Fine and Saad-Filho, 2016, p. 83).*

From this starting point, different types of crises emerge. What they all seem to share is the endpoint: devalorisation. Bubbles burst and are ‘corrected’ back to a ‘real’ level. Devaluation takes various forms, e.g. money devalued by inflation, labour power devalued by unemployment or falling real wages, commodities sold at a loss, or machines lying idle. Devaluations can hence affect use values or exchange values or both (Harvey, 2006). When the necessary devaluation has taken place, overproduction is eliminated and reproduction runs anew. But as long as the value structure remains the same, the fundamental structural possibilities for consecutive crises remain (Harvey, 2006) and with it all socially disruptive consequences.

*“The fight as to who is to bear the brunt of the burden of the devaluation, depreciation and destruction of capital will likely be bitter and intense” (Harvey, 2006, p. 202).*

With the increasing interconnectedness and global flows of capital and labour across borders, problems arise that have the potential to develop into crisis of the system as a whole, i.e. crises reach global dimensions. Yet the fundamental dynamics remain largely the same. This is how it is possible to move from an understanding of the commodity to an understanding of global crises.

### 3.6 Conclusions

Value theory provides the bedrock of economic paradigms. It shapes how economists think about the purpose and functioning of the economic system. In economics, I identify three different approaches to understand value: the classical approach of Smith and Ricardo, the neoclassical approach based on marginal utility theory of value, and Marxian value theory. The classical and neoclassical tradition theorise exchange value as driven by use value (as subjective utility or objective embodied labour time or costs of production). This gives rise to a conception of capitalism as a ‘real economy’, i.e. an economic system which produces goods and services for consumption and the satisfaction of people’s needs. This is essentially a conception of a barter economy and explains the difficulties of neoclassical theory to realistically theorise money, profit, or crises phenomena.

Ecological economics implicitly adopts a mainstream conception of the economy, by drawing on classical or neoclassical value theoretical approaches, mostly implicitly. This gives rise to a conception of the ‘real real’ economy, in which the emphasis lies on studying the biophysical foundations of the economy, i.e. the flow of matter-energy through the economy, the fundamental role of ecosystem services, and ultimate social outcomes such as wellbeing and quality of life. Ecological economists dig deeper as to what *should* matter and be valued (more) in economy and society. This expands the mainstream conception of the economic system, however, its basic logic remains the same.

However, capitalism is a monetary market economy. This is the conclusion derived from Marxian value theory. Marxian value theory breaks fundamentally with classical and neoclassical value theories by insisting that use value and exchange value need to be kept analytically separate. This results in nothing less than opposing conceptions of the economic system as a whole. What is dominantly (re-)produced and emphasised in capitalism is exchange value, not use value. From this starting point, a lot of important elements are in place: the foundations are laid for theorising money, prices, profits, capital, technological change and crises. This starting point also provides the basis for a fundamental critique of the market – and of classical Political Economy and neoclassical economics for mischaracterising the nature of the system. However, this understanding remains largely absent in ecological economics.

This chapter made the case that Marxian value theory is neither monistic, favouring labour, neglecting the environment, nor outdated. Rather, it is part and parcel of understanding the

essence of the capitalist system. If we understand what use value, exchange value and value mean and how they are interrelated, we start to understand what matters in capitalism and how it shapes the world around us.

# 4 Capital

## Understanding social ecological dynamics

*“A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise”  
(Leopold, 1949, p. 242).*

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### 4.1 Introduction

At times it seems impossible to grasp a world in constant flux. Reality is complex, contradictory and constantly changing, and whenever we think we get hold of it in thought, it crumbles again, more often than not. The requirements for scientific thought are especially demanding if our ambition is to understand and act upon wicked global problems, such as accelerating environmental destruction. We know that social ecological conflicts and crises deepen, widen and accelerate around the globe. We also know that the nature of the problem is systemic and that multiple crises need to be studied together. However, it is not obvious *how* this can be done; especially, if we are committed to adopting a realist perspective to avoid misleading reductionism and distortions – as advocated in chapters 2 and 3. If we acknowledge that all social ecological phenomena are interrelated and subject to continual change and that reality can only be understood as such, how should we proceed? How is it possible to study social ecological dynamics and interrelations of the system as a whole in a realistic way?

Systems thinking offers guidance on how this can be done. At a surface level, reality is chaotic and complex; at a deeper level of reality, however, order often prevails. What strikes me as an interesting parallel between different systems theoretical approaches, from the social and natural sciences alike, is that systems are more organised than we often realise. Many complex systems and behaviours arise from simple elements, relations and organising principles (Luhmann, 1987; Meadows, 2009). All life forms, for instance, emerge from five nucleotides,



which form RNA and DNA structures that give rise to the vast diversity and complexity of life, from ants to elephants. All atoms, at a deeper level of reality, consist of protons, neutrons and electrons that constitute the foundation of all matter on Earth.<sup>64</sup> Beneath the chaotic and seemingly random flux of events lie relatively stable patterns of (self-)organisation (Capra, 1997; Capra and Luisi, 2014). Systems theorists emphasise the need to understand these patterns to understand system behaviour.<sup>65</sup>

Complex systems are also understood as forms that deal with and structure complexity themselves; they bring order to complexity (Luhmann, 1987). The way this is done is by forming hierarchies, i.e. different strata operate at distinct levels of organisation. Higher strata are embedded in lower ones and ultimately regulated by them. DNA and RNA structures are, at a more fundamental level, conditioned by chemistry (however the emergent dynamics of DNA cannot be understood by analysing electron orbitals, but belong to a new disciplinary field: molecular biology). Different strata of complexity are believed to exist *in reality*, not just in thought. A realistic representation of complex systems hence requires uncovering and explaining different layers of reality, their structures and functions, in order to understand system behaviour and causality at different levels.<sup>66</sup>

These systems theoretical insights give us two specific angles how to study complex systems: one is aiming to identify core elements and organising principles; the other trying to understand different levels of complexity and their interlinkages. This is how we can get hold of real-world complexities, and retain our commitment to realism at the same time. Marx suggested that capitalism can be studied in this way. And indeed, this is how he did it. 150 years ago, he developed and adopted a method to understand capitalism as a complex

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<sup>64</sup> These particles cannot be understood as static building blocks, but rather as parts that constitute networks of inseparable relationships. In other words, (the properties of) parts can only be understood in relation to other parts of the same system (Capra, 1975; Capra and Luisi, 2014).

<sup>65</sup> Meadows, Luhmann and other great systems theorists emphasise this point. Chasing the actualised surface level of reality is often fruitless, especially when the task is to think about systemic change. The daily chaos of the actualised is too complex and statistical links are not stable. On this basis, scientists often look for things that do not exist. *“These [event-event] explanations give you no ability to predict what will happen tomorrow. They give you no ability to change the behaviour of the system”* (Meadows, 2009, p. 89).

<sup>66</sup> Understanding the stratified nature of complex systems is insightful for several reasons. On the one hand, it helps to identify elements and levels that are more critical than others because they are closely tied to the essence and fundamental character of a system and hence important for its perpetuation and reproduction. Without cells, humans cannot live; without an arm, they can. On the other hand, it also enables us to grasp dimensions of time. This is because simpler levels of self-organisation come into being *before* more complex ones. Flatworms existed prior to elephants. Effectively, understanding how complex forms emerge out of simpler structures coalesces with evolutionary reasoning, to some extent.

evolving system that closely resembles the ‘modern’ systems theoretical insights just outlined. The method is called systematic dialectics.

Systematic dialectics starts with an emphasis on the whole system, rather than isolated parts.<sup>67</sup> The suggestion is to dare to understand the system as a totality, as an integrated whole, from different vantage points and by adopting what we would today call a mixed-methods approach. This allows identifying core elements. What follows is the attempt to order the evidence and find a logical sequence that explains how different elements interrelate. This step is fundamentally about relationships, order, and organisation. It aims to grasp the hierarchical structure of the system. Finally, the ‘method of presentation’ describes how capitalism as a complex adaptive system unfolds, starting from the most abstract and simple to ever more concrete and complex realities (Arthur, 2008; Brown, 2007, 2002; Reuten, 2000; Smith, 1990).

This is how Marx explains capitalism as a complex system that continually transforms but still retains a stable core. What is this core? What are the foundational elements and organising principles of capitalism? How are they interrelated to form a complex system? How do these interrelations give rise to environmental destruction and social crises? These are the questions of this chapter. It aims to explain the core of the capitalist system and its entanglements with social ecological crises. The emphasis lies on comprehending long-term behaviour, core drivers and interrelations. The system’s foundational elements have been established in the previous chapter: the nature of commodities, value relations therein and the special role of the money commodity as historically emerging dominant form driving exchange relations. This chapter takes a next step and asks how these elements are interlinked to form a complex system and what dynamics follow. I find these links and dynamics in the nature of what is termed ‘capital.’ In this way, it can be shown how the value theoretical foundations developed in the previous chapter enable a realistic, dynamic and coherent understanding of the capitalist system as a whole.

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<sup>67</sup> This approach stands in sharp contrast to the ‘normal’ scientific method adopted in mainstream economics, which starts from slicing up reality into ‘manageable’ parts, thereby excluding most of what is important: the factors that connect these parts, such as politics, values, natural resource inputs, specific contexts etc. – see chapter 2 – in the hope that isolated building blocks can subsequently be glued together in a meaningful way. This approach fails to provide a deeper understanding of complex systems in general (Capra, 1975) and economic dynamics in particular (Mirowski, 1989). What has been acknowledged as dead end in other disciplines for fruitfully advancing knowledge long ago, seems to dominate the economics discipline until today.

The research questions guiding this chapter are:

- What is capital? (section 4.2)
- How is the reproduction of capital interlinked with environmental impacts and barriers to change? (sections 4.3 and 4.4)

I approach these questions by adopting two lenses, or vantage points, throughout this chapter: a 'systems lens' that aims to show how Marx's systemic understanding of capitalism resembles 'modern' systems thinking, mainly by drawing on Meadows (2009, 2002, 1999), but also Capra (2014, 1997, 1975) and Luhmann (1994, 1987); and related, a 'problem lens' that aims to demonstrate the explanatory power of Marxian theory for understanding social ecological dynamics and crises. This problem lens includes considerations of ecological economics as a discipline aiming to contribute to systemic changes towards sustainability.

This chapter is a next step to demonstrate how the Marxian approach helps advance ecological economics in compliance with the foundations that ecological economists set out for themselves. In chapter 1, I argued that ecological economics is grounded in a commitment to systems thinking and dynamics to grapple with real world social ecological complexities; but that these ambitions have not been pushed far enough to encompass the economic realm as well. What happens in practice is that ecological economists fall back into neoclassical economics, as demonstrated in chapters 2 and 3 (section 3.3.1 in particular), which contradicts a systems dynamic approach because neoclassical economics has been erected on static-linear-equilibrium foundations. In chapter 3, I started to introduce systematic dialectics as a particular systems thinking methodology that helps theorise value relations in realistic and systemic terms (section 3.4.1). I then showed how Marx derives, on this basis, the concept of capital as 'value in motion' (section 3.4.2). The intention now is to show how these value-theoretical foundations can be pushed further to develop more complex economic categories and capitalist tendencies.

The chapter proceeds as follows. Section 4.2 explains the Marxian understanding of capital. I introduce the circuit of capital and associated profit and competition dynamics of capitalist (re)production. A discussion of the circuit of capital may seem basic for Marxists, but it is not for ecological economists. It is virtually absent from the literature. Section 4.3 moves towards a systemic understanding of environmental change. I identify eight endogenous tendencies of the capitalist system that drive environmental impacts and pose barriers to change:

overproduction, technological dynamism, appropriation, commodification, overconsumption, acceleration, alienation, and financialisation. Taken together, these tendencies form the social fabric of capital, the entangled web of the system as a whole. In the capitalist system, it is the interplay between these tendencies that give rise to social ecological dynamics and crises. Section 4.4 sketches the macroeconomic outcomes of the capitalist core and its tendencies: growth and crises formation. Section 4.5 concludes.

## 4.2 Setting value in motion

The previous chapter ended with an explanation of how Marx derived the concept of capital, starting from his analysis of simple commodity exchange. In its simplest expression, capital is a form of value; it is value in motion. As value starts to move, it explains the essence of the system: capital. This section takes a next step and explains the Marxian understanding of capital more comprehensively, the general circuit of capital  $M-C-M'$  in particular, and associated profit and competition dynamics. Taken together, these elements and dynamics form the core fabric around which the reproduction of capitalist economies spirals. In other words, capital is the core engine driving the expansion of the system as a whole, with associated environmental impacts, as I will highlight in section 4.3.

Discussion of the circuit of capital, profit and capitalist competition might seem basic. You would assume that ecological economics as a field aspiring to contribute to systemic changes towards sustainability would emphasise the capitalist core prominently. However, this is not the case. The core leverage point for change tackled by ecological economists is growth;<sup>68</sup> but growth and capital are not the same thing, as I will discuss below. Growth is the outcome of the movement of capital through the system – capital being the underlying dynamic. Put differently, emphasising growth (in biophysical or GDP terms, for instance) shows *what* is happening, the dynamics of capital explain *why*.

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<sup>68</sup> Donella Meadows indicates why growth has been emphasised prominently: J.W. Forrester's famous world systems model that aimed to show the interrelations between major global problems – poverty and hunger, environmental destruction, resource depletion, urban deterioration, unemployment, came out with a clear leverage point: Growth (Meadows, 1999). This finding became the cornerstone in the Club of Rome report 'The Limits to Growth' and has heralded debates about the need for slower growth, no growth, and later degrowth. This line of reasoning dominates ecological economics to the present day.

However, few contributions exist in ecological economics that address capital, profit and competition explicitly, comprehensively and as the scientific foundation for developing radical proposals for change. I consider this to be a serious omission. I do not intend to elaborate this point in much detail here, as I did in the previous chapter in section 3.3, where I showed how different camps within ecological economics implicitly adopt mainstream value theoretical foundations. Rather, I provide a brief summary here of what I consider the failings of ecological economics are, and then move onto explaining the Marxian understanding of the capitalist core.

What I find is that ecological economists consider ‘capital’ in a similar way as they consider ‘value’, as discussed in the previous chapter: either by uncritically adopting mainstream neoclassical theory and concepts such as ‘natural capital’;<sup>69</sup> refraining from theories of capital, profit, and competition altogether;<sup>70</sup> or, those ecological economists that are highly critical of neoclassical foundations and acknowledge the importance of sound theoretical foundations, most notably ‘social ecological economists’, fail to provide an alternative account of capital.<sup>71</sup> Excellent contributions exist that adopt and apply a critical social science perspective (e.g. Røpke, 2015); however, the economic underpinnings of these analyses are not made explicit enough in ecological economics. The Marxian understanding of capital remains virtually absent.<sup>72</sup>

I think this omission contributes to a situation in which the core drivers of capitalism remain widely omitted in ecological economics research. It almost seems as if profit, competition and capital are too obvious to be tackled explicitly. However, I argue in an interdisciplinary

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<sup>69</sup> I detail this finding in the discussion of capital below, see section 4.2.2.

<sup>70</sup> Many ecological economists study the biophysical and technological drivers of environmental impacts and document the biophysical dependency of the economic process, but do not substantively address the social organisation of production that underpins these drivers (Foxon, 2018).

<sup>71</sup> I found one contribution from Peter Victor in which he addresses capital theory directly. He explains and critiques neoclassical capital theory and seeks to draw on alternative understandings, notably Post Keynesian economics and the thermodynamic school, but again, without including the Marxian tradition (Victor, 1991).

<sup>72</sup> A Title-Abstract-Keyword search in *Ecological Economics* for “circuit of capital” yields 0 results; for “capital & Marx” 1 result (Burkett, 2004); for “capital & Political Economy” 10 results. A few eco-Marxist contributions exist that apply the Marxian understanding of capital (e.g. Blauwhof, 2012). One contribution from Paul Burkett (2004) stands out in addressing the issue prominently. Burkett aims to defend Marx’s reproduction schemes against widespread misconceptions by leading ecological economists (Georgescu-Roegen, Daly and Martinez-Alier in particular) who portray the Marxist explanation of capitalist reproduction as mechanistic and based on a closed systems approach in which the contribution of nature is taken for granted. However, Burkett’s classical Marxian understanding of capital and capitalist reproduction, which I share, has not entered the core of ecological economics.

research field fundamentals cannot be taken for granted but should be made explicit and highlighted prominently, for instance in textbooks (best in chapter 1). However, this is not the case. This explains my rationale for keeping a discussion of capital, profit and competition not limited to a brief introduction at this point, but rather upfront, explicit and at considerable length.

#### 4.2.1 M-C-M'

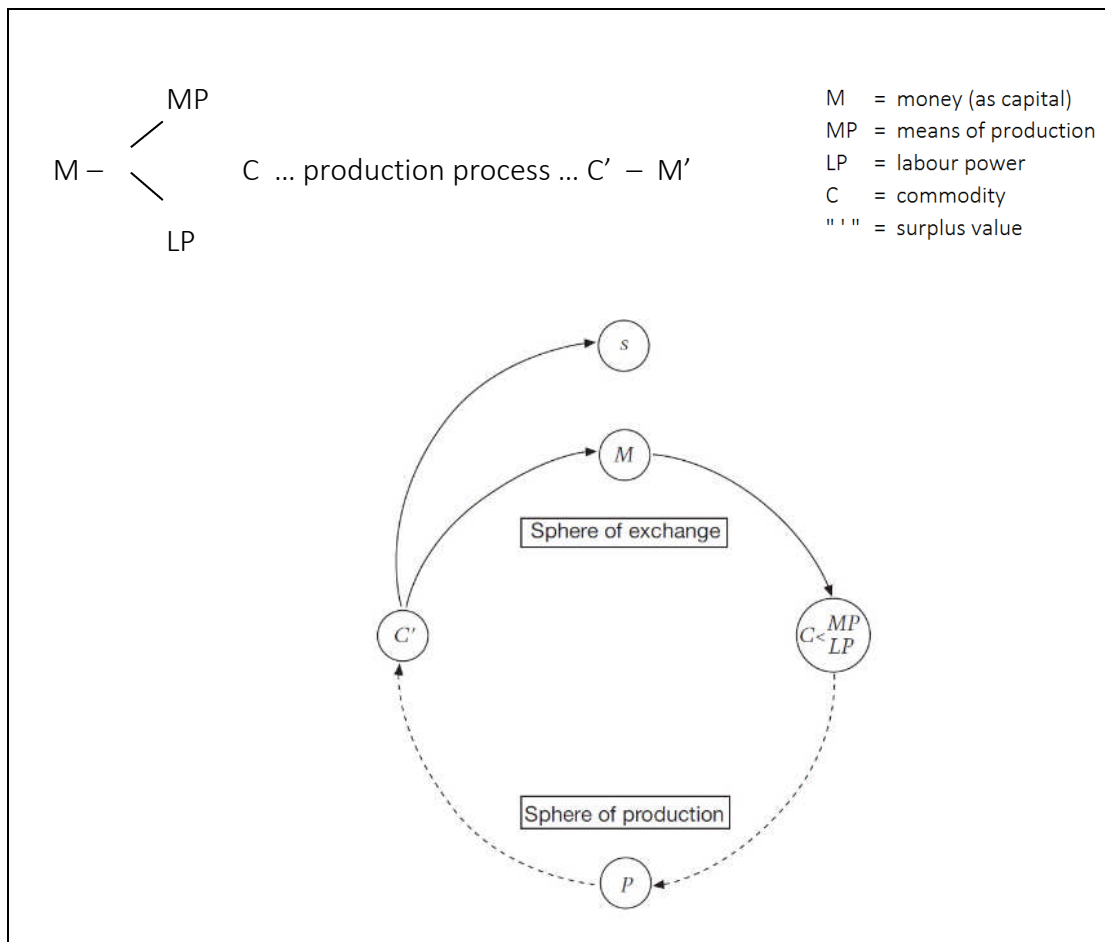
In the previous chapter, I aimed to explain the nature of commodities in general (C) and the special role of the money commodity (M). I thereby aimed to show how Marxian value theory clarifies, step by step, why it is sensible to think that simple direct exchange of goods C-C, transform into exchanges in which money becomes the universal equivalent. This sheds light on how goods have developed – over time and with expanding trade relations – into commodities, i.e. things produced for sale, and how money develops into commodity money and capital. Historically and logically, this has led to a shift from ‘stuff as property’ to ‘money as property’ (Luhmann, 1994). It also explains the rise in the importance of markets as social institutions for contractual forms of exchange for the purpose of gain and profit-making (Polanyi, 1944).

Having developed a better understanding of commodities (C) and the function of money (M) as measure of value, we can ask how these foundational elements can be combined to understand core dynamics of the capitalist system as a whole. There are not many options by which this can be done. C-C exchanges refer to the direct exchange of commodities – potatoes for tomatoes – but we know that barter is, self-evidently, not the dominant form of exchange under capitalism. C-M-C denotes a form of simple commodity exchange too, in which money functions as a means of circulation. In this form, commodities are sold in order to buy other commodities. This is the case, for instance, when labour power is sold in return for a wage, mainly used for consumption. M-M (more correctly M-M') means the exchange of money quantities, such as granting a loan in return for interest. Purely monetary transactions have become more dominant in mature (financialised) capitalist economies, especially in periods of loosely regulated financial markets. However, a society cannot live from monetary exchanges only. Something needs to be produced for people to live. Overall, even though the forms C-C, C-M-C and M-M' co-exist in capitalist societies, they are not the dominant forms explaining capitalist (re)production – and they are also not the dominant forms explaining ecological

overshoot. This is because the systemic surplus, i.e. aggregate net surplus of the system as a whole, arises from the circuit of industrial capital, as I will explain below.

150 years ago, Marx established that the capitalist mode of production is not a commodity circulating system in the form of C-M-C, but rather characterised as M-C-M', i.e. a circulation, or more precisely an advance, of money quantities *mediated by* commodity production. As such, M-C-M' represents the simplest characterisation of the capitalist system as a whole. What does this mean? Capitalist production is based on the transformation of money (M) into commodities (C) to recover the initial investment (M) plus an extra amount of money, i.e. surplus value ( $dM = M' - M$ ). In Marxist terms: value is set in motion with the purpose of extracting more value at the end of the movement (Marx, 1990, p. 132). In simple terms: capitalists strive to gain profits. For profits from production to be realised, capitalists buy in order to sell. They buy means of production (MP), such as machines, fuels, and raw materials, and labour power (LP). These two commodities are combined to produce commodities with a higher value than initially invested (C ...production process... C'). Produced commodities – hats, teapots, haircuts or toothbrushes – are subsequently offered for sale on markets to realise the additional value created (M'). This is sensible. For the risk and effort of the investment and their work, producers demand a return over investment, otherwise they would not engage in business. Part of the surplus value needs to be re-invested to maintain production over time. This is how capitalist societies predominantly reproduce.

The M-C-M' movement consists of two separate but interlinked stages: the sphere of production and the sphere of exchange (see figure 8). In the first stage – M-C – money is invested for the intermediate purpose of producing commodities for sale. In the second stage – C'-M' – these commodities are transformed back into money, typically (but not always) more money than initially invested. Taken together, the circuit of capital describes a unified process of production and exchange. The distinction between these two spheres is instructive for several reasons: it guides further analysis where in the circuit surplus value and profits can arise (section 4.2.3); it helps to locate how energy and resource use relate to the circuit (section 4.3); and where the origins of crises formation lie (section 4.4.2).



**Figure 8. The circuit of capital**

Source: Fine and Saad-Filho, 2016, p. 49

How can we be sure that M-C-M' is the dominant structure that characterises the system best? We might be content with a common sense understanding that this is how capitalist companies typically operate and hence what gives rise to corresponding macroeconomic dynamics. However, dynamics at the macro level can be quite different from those at the micro level (Shaikh, 2016), as is well known from a systems thinking perspective. A common sense explanation is therefore insufficient. How else can we explain that M-C-M' is the dominant social form of the system as a whole? The way I intend to unravel this question is by starting to contrast M-C-M' with a C-M-C conception of the economy – because neoclassical economists treat the economy *as if* it were a C-M-C system and because this conception has left wide-spread traces in ecological economics. Subsequently, at the end of the section, I explain M-C-M' as dominant social form based on the value theoretical foundations developed in the previous chapter.



To begin with, C-M-C exchanges represent simple commodity exchanges: commodities are exchanged for money, which is exchanged for other commodities. In this movement, money serves as means of exchange. A C-M-C system would come closer to the vision of an economy that produces for the satisfaction of people's needs. C-M-C forms of circulation are omnipresent under capitalism. For instance, labourers sell their labour power (C) in return for a wage (M) for the purpose of buying oranges, paying rent or going on holidays (C). This is the typical form of exchange most people encounter on a daily basis, not least because it is the form most relevant to them. C-M-C is what counts for most of us as wage workers. However, it is one of the instances where Marx highlights that truth is often not how it appears. What is dominant is often hidden. Even though C-M-C is a common and more obvious form of exchange, it is not the driving force that shapes social relations and capitalist reproduction.

Neoclassical economics treats the system as a whole *as if* it were a commodity exchanging C-M-C system, i.e. a system that produces for consumption. Two different explanations come to my mind why this understanding might have arisen. One relates to the marginal utility foundations of the discipline. As explained in the previous chapter, marginal utility incorporates the idea that exchange value and price can be explained in utility terms. This idea gives rise to the view that 'the economy' exists to serve people's needs. A second explanation for the implicit C-M-C conception of the economy relates to methodological individualism. The idea that aggregating atomistic parts enables an understanding of the whole is a relic of the successes of classical physics during the Enlightenment, but today considered inappropriate for understanding complex systems (Capra and Luisi, 2014; Mirowski, 1989). Systems thinking arose out of an understanding that 'the whole is more than the sum of its parts'. However, neoclassical economics proceeds as if it were possible to understand the dynamics of DNA on the basis of protons, electrons and neutrons. It is not. DNA *emerges* as a more complex form at a distinct level of organisation, out of the interactions of atomic particles. Similarly, M-C-M' emerges as a dominant social form as a result of generalised commodity exchange.

So let me ask again: how can we be sure that M-C-M' is the dominant form and not C-M-C that exists alongside it? Helpful guidance can be found in the systems thinking literature:

*"When a systems thinker encounters a problem, the first thing he or she does is look for data, time graphs, the history of the system. That's because long-term behaviour provides clues to the underlying system structure"*  
(Meadows, 2009, p. 89).

What do empirical data suggest about the long-term movement of the system as a whole? One of the most apparent facts of the capitalist system is its growth. Capitalist economies are

growth economies. Capitalism is not a circular but a spiralling system of exchange, i.e. it typically grows while it reproduces. Economic growth and associated environmental impacts have been the most prominent matter of concern for ecological economists (Jackson, 2009; Meadows et al., 1972; Victor, 2010). The fact that capitalist economies tend to grow (or otherwise slide into crisis, see section 4.4) is one argument for the dominance of M-C-M' over C-M-C.

There are no good reasons to believe that a system in the form of C-M-C could *systematically* give rise to growth dynamics. A system based on the exchange of commodities knows certain limits. There are only as many teapots as you may desire, or shoes – how many shoes can you have? Saturation tendencies could materialise as basic material needs are met. People might tend to opt for less work and more leisure, instead of continuing to exchange most of their time as labour time in return for wages and consumption. In an idealised C-M-C world, it would be much easier for degrowth advocates to propagate a notion of 'enough'. People would only need to be convinced that a more frugal life can increase their quality of life. However, the reality we are facing is not merely one of mistaken ideas but of structural dependency, i.e. rat-race-dynamics that are difficult to escape.

What factors *could* explain growth in a C-M-C dominated world? Population, technology and affluence are typically brought forward by ecological economists. What is well-known as IPAT identity (or STIRPAT or ImPACT variations)<sup>73</sup> (York et al., 2003) could fit well in a C-M-C framework. Population growth certainly helps to explain an increasing number of commodity exchanges and associated environmental impacts (Alcott, 2012). Technological advance is clearly part of the growth explanation too. It cheapens commodities and thus boosts consumption and rebound effects (Alcott, 2005; Sorrell et al., 2009). People's 'insatiable' needs and wants could serve as a third explanatory variable (if you really believe this is the case). All of these factors are certainly parts of the puzzle. At the same time, all of these factors, separately or taken together, do not sufficiently *explain* the *structural* tendency and

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<sup>73</sup> The IPAT identity expresses that environmental impacts (I) are the product of three driving forces: population (P), affluence (A) as per capita consumption or production; and technology (T) as impact per unit of consumption or production, hence  $I=PAT$ . ImPACT is a further development that disaggregates T into consumption per unit of GDP (C) and impact per unit of consumption (T) so that  $I=PACT$ . STIRPAT is yet another development that allows for non-monotonic or non-proportional effects from the three driving forces. Unlike IPAT and ImPACT, the STIRPAT model – for stochastic impacts by regression on population, affluence and technology – is not an accounting equation but a stochastic model that can be used to empirically test hypotheses (York et al., 2003).

*dependency* of capitalist societies on economic growth and the *necessity* of governments to stabilise capitalist economies by creating the conditions for their expanded reproduction.

On the other hand, it is not difficult to understand why a system in the form of M-C-M' knows no limit. The accumulation of capital knows no limit because its main measure of value, i.e. money, has a particular form that can be accumulated without limit. The dominance of M-C-M' can be understood by considering the nature of money. There is a fundamental difference between exchanging two commodities primarily for their use value characteristics or exchanging two quantities of money. If commodities are exchanged for consumption, say a loaf of bread for a basket of apples, what matters most is that commodities embody different qualities. Use value considerations are the reason why people engage in exchange. Such exchanges can take the form of C-C (direct barter) or C-M-C (indirect barter).

It is different with money. The only reason for exchanging a sum of money is to receive more money back at a later point in time. The incentive to lend is to yield interest. The incentive to save is to consume more at a later point. The incentive to invest is to earn profit. The only substantial difference between two sums of money is different quantities. This is why monetary exchanges do not take the form M-C-M but M-C-M' (or M-M' in the case of interest or other purely financial returns, see section 4.3.8). In those cases, the advance of an initial sum of money takes centre stage, not the exchange of qualitatively different commodities as use values.

The most convincing and conclusive argument for M-C-M' being the dominant structure driving capitalist reproduction, however, can be provided from the value analysis of the previous chapter. Marxian value theory traces, step by step, how exchange value becomes the dominant driving force in societies with a developed division of labour, generalised commodity exchange and expanded trade relations. As soon as a more complex social division of labour develops, in which people(s) collaborate to produce a social product, which is subsequently divided, more or less equally, commodities are predominantly produced for exchange. As exchange value becomes the dominant motive of production, money develops as the universal equivalent, measure of value and commodity capital. This explains the transition from money as means of circulation (C-M-C) to money as goal of economic transactions, and as such as capital, with repercussions of the system as a whole (M-C-M').

This is as far as the explanation has proceeded in the previous chapter. I would like to add three further annotations. What follows from the understanding that money develops into

capital? It implies that the originally *internal relation* between use value and exchange value in the commodity develops into an *external relation*, in which money suddenly confronts the commodity, as a thing with a separate existence. In other words: what started with the exchange of two simple goods, apples and pears, turns into a situation in which commodities emerge that can be converted into money, as independent forms of existence. This is how money M can be understood as external manifestation of exchange value, and physical commodities C, as manifestations of use value (Smith, 1990, p. 84ff).

At the same time, C as manifestation of use value and M as manifestation of exchange value do not denote independent atomistic ‘things’. They are constitutive elements of a *systemic* understanding of capitalism, as explained in the previous chapter. Understanding commodity exchange explains structural forces between different actors engaged in commodity exchanges, i.e. all of us. M-C-M’ can be understood as logical and historical *social* form of human (collaborative) development; whereas C-M-C constitutes *individual* forms only. C-M-C exchanges exist alongside the capital form; they are their individual mirror image and forms that presuppose M-C-M’ as predominant form of production. The capitalist value structure explains what holds capitalist societies together, why M-C-M’ *has become* the dominant form of societal organisation of production and continues to be.<sup>74</sup>

For readers who are still sceptical of this conclusion, let me say the following: what helps to judge whether theories are credible and useful is their explanatory power. Sections 4.2.3, 4.2.4, 4.3 and 4.4 present more arguments and evidence for the explanatory power of M-C-M’ as a realistic framework of the capitalist system as a whole. Before proceeding any further, it seems essential to clarify what ‘capital’ and ‘capitalism’ mean in the Marxist tradition and who ‘capitalists’ are.

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<sup>74</sup> An evolutionary understanding of capital matters for thinking about alternatives. Non-profit business models or local, self-sufficient forms of production, for instance, as widely proposed in ecological economics, might be portrayed as deviating from the dominant organisational structure M-C-M’. They might be viewed as forms ‘swimming against the current’ that come closer to C-M-C types of organisations. But is it sensible to think that efforts to upscale such initiatives are sufficient for ‘real’ transformative changes? This understanding can be questioned, if we understand those forms as equally embedded in commodity-structures that ultimately prioritise exchange value considerations. To me, envisioning and designing sustainable economies needs to move beyond trying to reverse the dominant trend but develop forms of organisation that transcend current dominant structures. Through this lens, thinking about radical changes towards sustainability and sensible interventions to this end becomes even more demanding.

## 4.2.2 Capital

If we open a standard economics textbook, a typical definition of capital reads as follows:

*“The tools, instruments, machines, buildings, and other constructions that businesses use to produce goods and services are called capital” (Parkin, 2014, p. 4).*

This understanding of capital as tangible wealth is often extended to include intangible wealth too, such as human capital, resulting in a general view of capital as *“wealth that lasts longer than one year”* (Alchian and Allen 1969 in: Shaikh, 2016, p. 208). Most ecological economists tap into this understanding by suggesting broadening the standard definition by ‘digging deeper’ into the biophysical realm and enriching it by systems dynamics concepts such as stocks and flows:

*“We define capital as a stock that yields a flow of goods and services into the future. Stocks of manmade capital include our bodies and minds, the artifacts we create, and our social structures. Natural capital is a stock that yields a flow of natural services and tangible natural resources. This include solar energy, land, minerals and fossil fuels, water, living organisms, and the services provided by the interactions of all of these elements in ecological systems (Daly and Farley, 2011, p. 17).*

The result is a relatively widespread and prominent advocacy for the concept of natural capital in ecological economics (Costanza et al., 1997; Ekins et al., 2003; Missemmer, 2018; Wackernagel et al., 1999). This is another example of adding extensions to the mainstream economic framework and reasoning, in the hope of including environmental constraints and concerns into it more prominently.

Marxists understand capital differently. Following a realist dialectical approach that aims to capture essences and interrelations in motion, capital is defined in a flexible and elastic yet non-ambiguous way. To begin with, the understanding of capital is not tied to certain things, such as money or machines, but emphasises the social function or purpose these things fulfil.<sup>75</sup>

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<sup>75</sup> This is one example where we see how dialectical reasoning differs from the standard Western scientific method and reasoning. Conventional reasoning relies on fixed definitions in which a thing is what it is and not another. The Marxian approach attempts to capture complex and messy reality comprehensively in thought, from different vantage points. This is why definitions are more flexible, yet still clear. In fact, in order to understand what drives behaviours and causality, it seems more useful to understand intentions, functions or purposes, i.e. the meaning attached to things and actions, rather than things and actions themselves, because this provides levers for interventions to yield different actions. However, one needs to understand dialectical reasoning; otherwise it easily becomes interpreted as unclear, confused or illogical.

Capital is not an additional factor of production,<sup>76</sup> it is production. M-C-M' conveys the essence of what capital means: *value in motion* in a way that creates more value. As such, capital is a form of value; it is *self-valorizing value* (Arthur, 2008, p. 219) or *self-expansion of value* (Brown, 2002, p. 164). This perspective captures the fluidity of value flowing through the system and how value transforms throughout the movement, taking different forms and shapes. Sometimes capital appears as money, sometimes as airports or airplanes. This does not mean that airports are always capital. They are a manifestation of capital if they serve the purpose of advancing an initial sum of invested money and cease to be capital if they no longer do so. A shut-down airport is not capital anymore. Capital needs to move, and move for a special purpose, otherwise it ceases to exist as capital.

In this spirit, capital can also be understood as *money used in a certain way*, i.e. in the M-C-M' circulation in pursuit of creating more money by the end of the movement. However, not all money is capital and not everything that is capital is money. Only when money is circulating with in pursuit of creating more value is it capital. If people decide to hoard money and take it out of circulation it ceases to be capital. If this happens on a large scale and the flow of capital is blocked, the economy slides into crisis (Harvey, 2010a). This perspective points towards the crisis-riddled character of the capitalist system (see section 4.4).

Another way to describe capital is as a social relation of domination,<sup>77</sup> i.e. a relation of power. Capital is not just one but a dominant social relation in our societies, hence the name capitalism. This perspective highlights the class-aspect and distribution of power in the system with a favourable position of the capitalist class over labourers. The capitalist mode of production constantly reproduces the capitalist relation: capitalists on one side, and wage labourers on the other. Who a capitalist is depends, again, on the function a person or entity or country fulfils. Mr Jones can be a labourer in his function as an employee, and he can be, at the same time, a landlord in his function of renting out a house for the purpose of acquiring rental income.

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<sup>76</sup> From a Marxian perspective, there are only two fundamental factors of production: means of production and labour power. This seems to be an advantage for consistent theory building as it circumvents a lot of problems that mainstream economics faces by defining capital as a separate factor of production, its measurement and rewards (see Cambridge capital controversies (Harcourt, 1969)).

<sup>77</sup> I explain how this relation of domination unfolds in the discussion of surplus value as the result of capitalistic exploitation in the following section 4.2.3.

Yet another vantage point to understand capital is as giving rise to a specific *historical period* which emerged out of the specific social conditions that will disappear once these conditions change (Ollman, 1993, p. 34). The organising principle of capital as the dominant social form of the capitalist system is the self-valorisation of value, which was not the organising principle of pre-capitalist societies (Murray and Schuler, 2017). This perspective highlights the historically specific character of capital. As such, capital incorporates aspects of change – as something that has not always been and will not always be. This perspective emphasises the distinct conditions that characterise capitalism and differentiate it from previous or possible future societal formations.

Capital has to be understood as the entirety of these perspectives: as things and relations in continual movement for the purpose of value production in a specific period of mankind. With this understanding and clarity in mind, we can move on. What we have established so far is an understanding that C-M-C and M-C-M' are interlinked processes and that the latter is the social dominant form under capitalism. The next question is how it is possible for surplus value and profits to emerge. Where does the extra value (the dash in M-C-M') come from? This is the core question of the next section.

### 4.2.3 Profit

Having the contours of capital, M-C-M' and a discussion of value theory from the previous chapter in place, we can start to unravel the central role of profits in capitalist economies. Much of Marxian analysis centres on how to understand profit, its origins (*Capital* Vol I), different forms and distribution (*Capital* Vol III). This section is not an attempt to try and reconstruct Marxian profit theory in detail but to condense key insights that are relevant for ecological economics. This section covers three critical issues: the central role of profit in driving capitalist reality; the lack of corresponding anchorage in neoclassical economic theory and ecological economics alike; and several insights that can be derived from Marxist profit theory for understanding social ecological dynamics.

## The centrality of profit-making under capitalism

Capitalism is a profit-driven system.

*“It has been recognised at least since Adam Smith that profits are the driving force in a capitalist economy. There are no state planners to issue directives concerning the productive use of the state’s resources. Habit, though not without importance, cannot be held responsible for the production and exchange of goods. And benevolence, however widespread, does not supply sufficient inducement for individuals to use their own labor and property in generating output, especially when there is no guarantee of reciprocal benevolence. It is instead the desire for personal gain, the promise of profit, that motivates the entrepreneur to initiate productive activity” (Obrinsky, 1983, p. 1).*

*“Profit is the survival condition for firms. Individual firms are punished by extinction if they make persistent losses, and can be threatened even if they merely make lower profits than their competitors” (Shaikh, 2016, p. 119).*

The business of business is business, to quote Milton Friedman, not corporate social responsibility or environmental protection. To what extent and how business interests can be brought into alliance with broader societal interests remains a contested question. The fact is that capitalist business revolves around the profit motive.

The profit of a firm is typically defined as the excess financial gain on total capital advanced. Profit is what remains after all costs have been paid for – for wages, input costs, depreciation, interest payments, etc. Competitive micro struggles of capitalist firms for profit translate into profit dynamics of the economy as a whole. Aggregate profit is the sum of positive and negative profits in the macroeconomy (Shaikh, 2016). In the aggregate, profit is an economic-shaping structure that channels aggregate outcomes (Shaikh, 2016, p. 89). This insight is not limited to Marxian analyses but is generally undisputed.

## The insufficient explanation and problematisation of profits in neoclassical economics and ecological economics

If profit is a central driving force of capitalist enterprise and economies, how are profits explained in economic thought? The answer is, surprisingly little and unexpectedly inconsistently (Howard, 1983; Obrinsky, 1983).

*“Some four decades ago, when Joan Robinson decided to take a look at the orthodox neoclassical theory of profit, she couldn’t find any. When I first*



*began to study the subject less than a decade ago, I found, much to my surprise, that the situation had changed but little” (Obrinsky, 1983, p. xi).*

Why is that? With the marginalist turn profit theory became set aside and consciously removed from the core of economic theory.

*“So far as profit is concerned, in the sense of profit of enterprise, the English classical school fails to see that it is the correlative of possible loss, that it is subject to risk, that it depends upon exceptional and not upon normal circumstances, and that theoretically it ought to be left to one side” (Walras quoted in Obrinsky, 1983, p. 43).*

In this quote, Walras suggests that profits as a core driver of capitalism can be left aside in economic theory. This is an extraordinary statement, and unacceptable from a realist perspective. What is interesting is that this reasoning can be linked to the theoretical and methodological architecture of neoclassical economics. I emphasised the unrealism of assumptions as one problem in chapter 2. As regards theory, then in neoclassical economics, a distinction is introduced between *“economic profits”*, which are zero, and *“accounting profits”*, which are profits *“in the real world”*. They are assumed to be *“mostly”* the return to capital (the mainstream understanding of capital as essentially machines) (Mankiw, 2013, pp. 51, 55). Capital is treated as a factor of production in its own right and the marginal productivity, or contribution, of this factor is considered as profit. This means profits are essentially portrayed as interest payments for the use of capital (Howard, 1983). However, this is unsatisfactory because interest is not the same as profit, and it is self-contradictory because calculating the marginal contribution of capital would require measuring capital independently of profits; but this is impossible given the treatment of capital as a collection of machines hence inherently heterogeneous with no common basis of measurement (Howard, 1983; Obrinsky, 1983).

Obrinsky (1983) concludes that mainstream economics is a *“theoretical cul-de-sac”* and that it does not have a real profit theory *“because it cannot”* (Obrinsky, 1983, pp. xi, xii). The theoretical straightjacket of equilibrium and marginalist thinking does not allow for it: the emphasis on equilibrium underexposes the importance of real-world profits; and marginalist thinking, by accentuating – as the name suggests – marginal rather than also non-marginal changes is incapable of fully capturing real-world struggles over profits. Ultimately, neoclassical economics has come to fail to question where and how profits arise in the first

place.<sup>78</sup> On this basis, mainstream theory is severely restricted to illuminate to what extent profits can be considered problematic from an ecological point of view.

How are profit considerations tackled in ecological economics? The answer remains the same: surprisingly little. A keyword search for ‘profit theory’ in the journal *Ecological Economics* yields 0 results;<sup>79</sup> for ‘profit’ 135 results, with very few contributions addressing the profit-motive in more detail.<sup>80</sup> Textbooks and handbooks either adopt a mainstream theory of profits, as part of understanding ‘economics’ (Common and Stagl, 2005) or as part of questioning ‘economics’ (Daly and Farley, 2011); address profit as (somewhat) important issue but without drawing on economic theory (Lawn, 2007; Martinez-Alier and Muradian, 2015a; Söderbaum, 2000) or neglect the issue altogether (Costanza et al., 2015; Holt et al., 2009). My conclusion is that despite the real-world significance of profits, they remain severely under-addressed in ecological economics. The paucity of a serious debate of profit considerations could, again, be interpreted as one indication how deep the roots of neoclassical theory and methodology reach in ecological economics. The situation starts to change with the relatively recent development of ecological macroeconomics grounded in Post-Keynesian theories (Richters and Siemoneit, 2017) and increasing contributions that explore the links between ‘money and sustainability’ more generally (Jayashankar et al., 2015; Lietaer et al., 2012). My contribution here is to provide some insights from a Marxian perspective.

### Marxian profit theory

What can we learn from Marxian profit theory? Marx developed his theory of surplus value as a critique to the mainstream approach of his time. From a mainstream perspective (old and new alike), profits remain, in essence, after costs of production have been paid. What contributes more to production is paid a higher price under competitive conditions. From this

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<sup>78</sup> If you open Mankiw’s seminal textbook *Macroeconomics*, for instance, profit is not part of any headline in the 14 page long list of contents of the 600 page textbook! (Mankiw, 2013).

<sup>79</sup> This is based on a Scopus search on 16 July 2018 for “theory of profit” and “profit theor\*” in *Article title, Abstract, Keywords*.

<sup>80</sup> One notable exception is provided by Lux (2003). He emphasises the profit motive as a central problem of sustainability and suggests the design of social institutions around ‘the common good’ (such as maximum incomes or non-profit organisations) without, however, addressing implementation barriers, issues of power and vested interests or links to capitalist dynamics of the system as a whole. Another contribution by Richters and Siemoneit (Richters and Siemoneit, 2017) explores the question whether the current monetary system gives rise to a ‘growth imperative’. The authors rely on a traditional understanding of profits as accounting profit and economic profit.

perspective, it seems that all production inputs and contributions are fully paid for. If all inputs are fully being paid for, this also means that output is fully being paid for (Brown, 2002, p. 161). What makes it possible to realise profit is exchange, i.e. to sell dearer than what it costs to produce. From this perspective, profits arise in circulation, not in production, as an addition to value. Marx sees this as an illusory appearance (Marx, 1863).

Marx highlighted several problems of the mainstream approach to theorising profits, which are relevant for our purposes. *First*, the mainstream treatment of profit neglects how profits are also linked to production, not just to circulation. *Second*, and related, from this perspective it seems that all production costs are passed on, the cost price seems to be the 'true' price. *Third*, all production costs are treated the same, which is how businesses calculate, i.e. profits are calculated as surplus above total costs, no matter whether labour or matter-energy is concerned. However, this perspective precludes a more nuanced understanding of social ecological dynamics, as I will explain below. The Marxian approach sheds light on these issues as follows.

To begin with, Marxian profit theory is not limited to profits from production. Profits arise wherever possible. However, profits from trade in the form of 'buying cheap and selling dear' are no ground-breaking observation. These typical merchant profits are called profits upon alienation or transfer (Marx, 1863). They are often associated with theories of unequal exchange, such as contemporary forms of rentier capitalism (Standing, 2016). One core reason why Marx emphasised profits that arise in production is because of their systemic significance. Whereas profits upon alienation, which are essentially forms of cheating, are a zero-sum game, systemic profits, i.e. net aggregate profits can only be explained by non-cheating. Marx showed how profits arise under conditions of seemingly 'equal' exchange relations in production. What he finds is that exploitation does not show itself by looking at monetary magnitudes alone.

By looking closer at production, Marx established an explanation of why production inputs that are fully being paid for can give rise to profits. From a Marxist perspective, as I mentioned earlier, the two fundamental production factors are labour and means of production (energy, resources, machines etc.). Which of these two commodities has the capacity to give rise to profits by contributing more to production than is paid for by the capitalist producer? It cannot be means of production because, as soon as there is a possibility of a 'surplus' to be made from the use of resources, energy or machines, their price will rise until the basis of any surplus vanishes (Heilbroner, 1980). Therefore means of production can only give rise to profits upon

alienation (i.e. essentially by cheating, e.g. by appropriating formerly unpriced resources) which is a zero-sum game and does not explain the net profits characteristic of the capitalist system.

It is different with labour. To begin with, what capitalists buy when they buy the ‘fictitious’ commodity of workers, is their labour power<sup>81</sup> as a *capacity* to work, i.e. a contractual agreement and obligation to do work. This capacity can be more or less ‘used’ by employers by varying work time and intensity. The former strategy – the extension of work time – does not just refer to the length of the working day but stretches out to the length of sabbaticals, holidays, retirement age, etc. The latter strategy – increasing productivity – is more prevalent today because prolonging working time has clearer limits, both physical (a day only has 24 hours) and social (e.g. as limits to social acceptance, especially if workers are well organised). The typical way by which working time is intensified is by replacing labour with machines. These two strategies are known as absolute and relative surplus value creation in Marxian thought and centre on the role of the length and intensity of working time. Both are characterised by fierce struggles over labour time throughout history.

The crucial point is that both strategies translate into spaces for the creation of a *surplus product*. Surplus product is an amount of commodities produced<sup>82</sup> that exceeds the amount required for reproduction.<sup>83</sup> The time it takes to produce this additional quantity is surplus labour time.<sup>84</sup> Under capitalism, it is the amount of labour time that remains unpaid by the capitalist.<sup>85</sup> Surplus labour time, in turn, represents the source of surplus value. Surplus value

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<sup>81</sup> There is a crucial difference between labour and labour power in Marxian theory. Labour power is the ability or capacity to work whereas labour its application (Fine and Saad-Filho, 2016, p. 21).

<sup>82</sup> In production nothing is created in a thermodynamic sense, but something is created in the sense that matter-energy is transformed into something new that has not existed before.

<sup>83</sup> Interestingly, Shaikh notes that a lot of profit theories (based on Keynes, Kalecki, Sraffa or the neoclassical school) rely on the existence of a surplus product for profit without being explicit about it (Shaikh, 2016, p. 232ff). The monetary price the surplus product takes is aggregate production profit (Shaikh, 2016, pp. 218, 224).

<sup>84</sup> Surplus labour time exists in all societies as a fund for development, as the time that a society has left to work, produce and innovate what goes beyond bare subsistence needs. In the Marxian approach, the surplus concept forms the basis of Marx’s comprehensive social theory. Social relations are essentially class relations, and at the centre of every class society are the relationships through which the dominant classes extract and gain control of the surplus, no matter whether in despotism, slavery, feudalism or capitalism. As such, surplus creation and appropriation is a matter of power relations. Marx thought the character of capitalism is shaped from this form of exploitation (Howard, 1983).

<sup>85</sup> The fact that some people take advantage of the work of others is not new. This has been the case in all societies. What Marxist theory provides is an account of what specific form labour exploitation takes under capitalism.

is the additional value created in production. It is unpaid value (Marx, 1863, p. 72).<sup>86</sup> This additional value can be realised as profits in the circulation process when commodities are sold.

Marx argued that only labour power has the capacity to produce more value, i.e. surplus value.

*“There is no other commodity whose use value can increase its exchange value” (Marx, 1863, p. 66).*

This is because only labourers can add more value to production than needed for subsistence. Recall from the previous chapter that the value of a commodity is its socially necessary labour time. The value of the commodity that workers sell (labour power) is the labour time socially necessary to produce the goods that workers need for the reproduction of themselves and their families. If workers only produced what was necessary for their own subsistence and what they earned as wages, there would be no surplus, no basis for profits and no good reason for capitalists to employ anyone.

*“For profit to be obtainable there must be a surplus of output per worker over the consumption per worker’s family necessary to keep the labor force in being” (Robinson quoted in Obrinsky, 1983, p. 141).*

This is not a quote from Marx but from Joan Robinson, who comes to the same conclusion.

If it were possible, in a fictitious idealised world, to achieve full equality, i.e. a situation in which all labour contributions were fully being paid for, as claimed in mainstream theory, there would be no surplus value.<sup>87</sup> The only source left for profit-making would be nature, in the form of buying cheap and selling dear or appropriating nature for free. If really *all* costs were fully being paid for – both labour and nature – as environmental economists advocate as part of their general strategy of ‘internalising externalities’ to achieve full cost pricing, there would be no basis for sustaining profits. This is not capitalism.

Spaces that give rise to surplus value creation get protected and protected differently than spaces of appropriating nature. ‘Protecting elements’, as Heilbroner (1980) calls them, are the *bargaining power* of workers and the pressures of *unemployment*. Both are mechanisms that prevent wages from rising to the point where they would eat up all surplus. These forces only

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<sup>86</sup> Effectively, this means that Marx follows the mainstream explanation of profits as arising from ‘buying cheap and selling dear’ but he also shows how this mechanism derives from production, not circulation.

<sup>87</sup> In this sense, idealised neoclassical theory is correct to assume implicitly no profits of the system as a whole. The problem is that this conception hides from real-world power struggles and dynamics.

apply to the commodity 'labour-power' as living human beings, not to matter-energy. Essentially, this means that labourers are always in a weaker position than employers, and the seemingly free and equal exchange relations between employees and employers turn out to be relations of domination. Even if a 'fair' price was paid to workers, the value of labour power would be less than the value that capitalists received from the commodities that are produced. This establishes Marx's theory of surplus value not as a theory of unfairness in the sense of unequal exchange, but rather as one of structural and systemic tendencies. It also shows how surplus value is created as a *normal* part of the production process, rather than exceptionally (Heilbroner, 1980).

Surplus value and profit are not the same in Marxian theory. I mention this point because it remains an issue of confusion, based on discussions I had with ecological economists. To understand this difference we can draw parallels to the discussion of value in the previous chapter. In chapter 3 I explained that abstract socially necessary labour time is the real underlying essence of value, whereas price is its form of manifestation. Prices are measures of value. Following this logic, surplus labour time is the underlying real essence of surplus value, and profits their monetary manifestation. Profits are one form of surplus value. The higher surplus value, the higher, as a general tendency, can profits be. This means profits relate to surplus value in the same way as prices to value. As the real underlying essence is the *explanation* of the empirical appearance, they cannot be the same. This is why surplus value and profits are related, yet not the same. As with value, surplus value is the real and objective basis of profits from production.

What does the concept of *surplus value* add to an understanding of profits that is not covered by other theories? Two things, at least. On the one hand, it is a concept that emphasises the sources of profit. This is where ecological economics is strong from a biophysical side. Similar to Marx, the aim of a lot of ecological economists is to ask and uncover how much resources and energy are spent in production and throughout the whole life cycle, where these resources come from and under what conditions they are sourced. Marx provides the theoretical infrastructure for understanding the entanglements between monetary and real categories (both nature and labour). Marxian theory-methodology also incorporates an understanding that monetary profits from production are rooted in something physical.

On the other hand, surplus value is an umbrella term. It alerts to the fact that different types of profits and hence different streams of revenue have the same origin in production. Without production, nothing can be sold and exchanged. What happens in production is hence a

precondition for different types of profits in circulation. Surplus value from production comes into being as general profit, which is further divided into specific profits such as rents, interest, industrial profit, merchant profit etc. How these profits are divided and distributed – who gets how much and how – is subject to class struggle (see *Capital* Volume III).

The key messages of this section are the following. Even though profit is a dominant motive and driving force of capitalist societies, its role is downplayed in mainstream economics and it is not prominent in ecological economics either. Marxian profit theory explains how profits arise both in production and in circulation. Profits from production are the result of societies able to produce a surplus. Profits from circulation arise from ‘buying cheap and selling dear’ but these are a zero-sum game with no net profit in the aggregate. Both sources of profits stem from the appropriation of labour power and nature, i.e. by not fully paying the contribution of both. If all production inputs were fully being paid for, there would be no profits. As labour and resources are entangled and because the nature of both ‘commodities’ is different, various strategies arise how profits are created and maintained in practice.<sup>88</sup>

#### 4.2.4 Competition

Competition runs like a red thread through capitalism. It is the central regulating mechanism of the system (Shaikh, 2016), giving rise to core dynamics, in particular related to temporary gains from technological innovation. At its core, competition involves continual struggles in which some gain and others lose. Reasons for these struggles can be linked back to the discussion of value in the previous chapter. There, I described how long run competitive prices are underpinned by the quantity of abstract labour time necessary to produce a commodity. This means there is a systemic imperative for capitalists to compete over labour productivity increases. The winners of such competitions gain advantages in terms of profits, market share and/or other forms of maintaining or expanding power, which typically strengthens their position in the next round of competition. Competition can thus be described as re-enforcing feedback loop or ‘systemic’ trap that is difficult to escape (Meadows, 2009).

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<sup>88</sup> For instance, capital and labour can cooperate to exploit nature, e.g. via technology-induced productivity increases, part of which labour might profit from in the form of wage increases. Capital can also use nature against labour, e.g. by using technological advance as threat to unemployment. Capital and labour in one country can also cooperate to exploit labour and nature in foreign countries.

We can ask: How does the Marxian understanding of real competition, in contrast to perfect competition of mainstream economics, improve our understanding of environmental impacts and lock-ins? To begin with, competitive advantage is temporary. It vanishes as soon as others catch up. Remaining competitive therefore drives technological rat-races, which drive energy and resource use. The temporary character of competitive advantage also explains strategies for protecting head starts (actual or potential), especially ones that require large initial investments, which is often the case in highly polluting sectors.

In addition, competitive struggles imply pressures to lower production costs. Lowest-cost producers become *regulating capitals*, i.e. their production price regulates the price of the whole industry. Regulating capitals become price-leaders, and non-regulating capitals price-followers (Shaikh, 2016, p. 271). I would argue that pressures to lower production costs are largely incompatible with more sustainable forms of production, which are typically more time-intensive and hence costly. Most organisations we would qualify as ‘more sustainable’ – because they are more local and purpose-driven – are small and medium-sized businesses.<sup>89</sup> They are typically price-followers vis-à-vis big business. If prices are regulated by price-leaders, production costs of price-followers are typically higher, profit margins smaller and survival conditions more difficult. The perversity of capitalism is that unsustainable production is structurally incentivised, often even subsidised, to remain competitive, whereas sustainable alternatives often only survive in niches, often in higher-price segments. This is not conducive to large-scale societal change towards sustainability.

A typical outcome of competitive struggles is concentration and centralisation dynamics. The reinforcing feedback loop of competition spirals up, if nothing is done to break it. That bigger companies generally have cost advantages, in terms of lower unit costs and higher profit margins, favours the formation of oligopolies or monopolies (Shaikh, 2016, p. 271). Giant companies are omnipresent as dominant operational units of mature capitalist production in major branches of environmental destruction such as energy, transport, or heavy industries.

*“Capital is, we can conclude, in love with monopoly. It prefers the certainties, the quiet life and possibility of leisurely and cautious changes that go with a monopolistic style of working and living outside of the rough and tumble of competition” (Harvey, 2015, p. 139).*

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<sup>89</sup> I do not imply that SME’s are generally more sustainable. However, I do believe that more purpose-driven businesses instead of financially-driven organisations are more likely to be sustainable.



This means that conditions favouring fiercer market competition do not foster a more efficient distribution of resources, as typically claimed by free-market advocates. Rather the opposite is the case. What tends to happen in times of laissez-faire, in which protection and regulating mechanisms of States are dismantled, is that private monopolies become stronger (the google's, Microsoft's, Nestle's of the world). I think this is commonsense and established systems thinking wisdom:

*“Market competition systematically eliminates market competition”  
(Meadows, 2009, p. 128).*

*“If a reinforcing feedback loop rewards the winner of a competition with the means to win further competitions, the result will be the elimination of all but a few competitors... the rich get richer and the poor get poorer”  
(Meadows, 2009, p. 3).*

This means capitalism is a system that requires continual regulation and redistribution to counter reinforcing feedback loops and guarantee social stability – or the transition to another system altogether. Polanyi coined this aptly as ‘laissez-faire was planned, but planning was not’ (Polanyi, 1944). Capitalism is a trickle-down system, which generates rising inequalities, if largely left on its own, as mentioned by many authors, Arnsperger, for example:

*“Capitalism and equality are like oil and water: you can mix them up vigorously, but if you don't coerce them into staying mixed they will separate again” (Arnsperger, 2008, p. 6).*

A last issue I would like to mention is the Marxian emphasis on different forms of competition. Firms compete over profits and market shares – within industries, between industries, and across nations. The latter is tied to issues of trade, globalisation and development. Workers compete over jobs, wages, and status, especially in times of rising inequalities and uncertainty. Capital and labour compete against each other in terms of shares of income (profits and wages).

*“Competition pits seller against seller, seller against buyer, buyer against buyer, capital against capital, capital against labour, and labour against labour” (Shaikh, 2016, p. 14).*

If competition is the central regulating mechanism of capitalism, and if the nature of competition is essentially understood as everyone struggling against everyone, or different interest groups or countries having to compete against each other, as Shaikh's quote seems to suggest, it is not hard to understand why serious actions to counter global ecological crises,

which have to be based on collaborative efforts of the global community, are so difficult to achieve.

To understand dynamics of vested interests and strategies to gain or protect competitive advantage, class analysis is essential. Whilst class analysis was the basis for understanding economic dynamics at the time of the classical political economists, and remains an important unit of analysis in the critical social sciences, it was removed from the core of mainstream economics, which is based on methodological individualism. Again, what gets removed from how we think about economic dynamics, is not obvious to study and hence act upon.

To conclude this section, competition per se (as technology per se) is not necessarily detrimental. Whether competition is desirable or not depends on the underlying purpose that drives it. If the purpose is to become the world champion of resource efficiency, competition may be desirable.<sup>90</sup> But we have established that the purpose of capitalism is the creation of surplus value. The striving and need for profit creation in conjunction with competitive pressures is a toxic combination.

### 4.3 Dominant tendencies

How does the circuit of capital and its ties to profit and competition help explain social ecological dynamics? This is the core question of this section. The approach is to move the analysis closer to complex realities by identifying tendencies that spring off from the basic M-C-M' structure. I identify eight endogenous tendencies<sup>91</sup> of capitalism that reveal environmental impacts and barriers to societal change: overproduction, technological dynamism, appropriation, commodification, overconsumption, acceleration, alienation, and financialisation. These dynamics can be located at particular points in the circuit of capital, as shown in Figure 9 below. Overproduction, technological dynamism, and appropriation processes belong primarily to the realm of production (M-C); overconsumption to circulation (C'-M'), whereas commodification, acceleration, alienation and financialisation span the

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<sup>90</sup> However, even when escalation is driven by good intentions it can be problematic, because it is not easy to stop (Meadows, 2009).

<sup>91</sup> I use the terms tendencies, features, and dynamics interchangeably. They represent something through which an outcome is likely to come into being.

whole circuit. This plotting of tendencies immediately shows the crucial importance of understanding production processes for understanding social ecological dynamics.

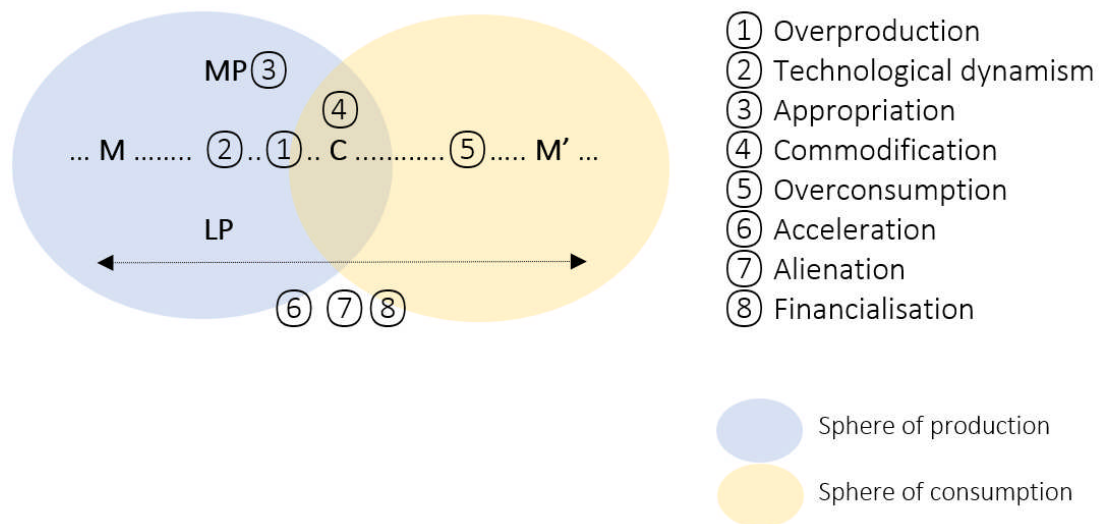


Figure 9. Systemic tendencies in the circuit of capital

Books could be and have been written about these tendencies. My contribution emphasises their interrelations because these entanglements explain both the persistence of destructive patterns and why it is so difficult to change them. To support an understanding of the interrelated nature of these tendencies, I explicitly cross-reference interlinkages as ➡ *link to...* in the following sections; and I identify factors that prevent deep changes towards sustainability as ➡ *barriers to change*. I believe an understanding of dominant tendencies is essential to make opposing forces more visible, which helps us to think about alternatives.

The first three parts of this section deal with production. What to produce, how and where are questions of overproduction (section 4.3.1), technological dynamism (section 4.3.2) and appropriation (section 4.3.3). The following parts emphasise commodification (section 4.3.4) and overconsumption (section 4.3.5). The last part tackles cross-cutting issues of acceleration (section 4.3.6), alienation (section 4.3.7), and financialisation (section 4.3.8). Before we proceed any further, a few additional remarks are required.

To begin with, these eight features of capitalist societies need to be understood as *tendencies*. A general tendency does not mean that it takes place everywhere and all the time. It is not a law-like deterministic mechanism. Instead, countertendencies are at work that offset, delay

or suspend general tendencies all the time, depending on specific cultural and historical contexts and other circumstances. There are no certainties, and other worlds are possible. However, any countertendencies can be countered again. The point is that tendencies, as the name suggests, describe what *tends* to happen, i.e. what is more likely to happen than not.

In other words, tendencies are sticky. They endure over longer periods. The specific forms these tendencies take vary between different periods of capitalism and contexts. How commodification tendencies unfold in the UK in 2018 are different from how they were in Brazil in the 1970s. However, the level of abstraction I address here describes tendencies that endure in the long run. They characterise the movements and changing faces of capitalism as a system throughout history, irrespectively of whether we speak about the Fordist, post-Fordist or financialist era. In the medium and long run it is likely that these tendencies prevail.

One reason why these tendencies are sticky is because they are embedded in a network of supporting structures. This means it is the combination of these tendencies that characterise capitalism. Taken together, they form the social fabric of capital, the entangled network of the system as a whole. As Donella Meadows informs us,

*“a system is a set of things – people, cells, molecules, or whatever – interconnected in such a way that they produce their own pattern of behaviour over time” (Meadows, 2009, p. 2).*

In the capitalist system, it is the interplay between these tendencies – underpinned by simultaneous countertendencies and social struggles – that gives rise to social ecological dynamics.

The Marxian understanding of tendencies differs from a critical realist understanding, which seems important to mention, given that critical realism has been proposed as philosophical foundation for ecological economics in recent years (Puller and Smith, 2017; Spash, 2012). Fleetwood (Fleetwood, 2011, 2001), who defends a critical realist position, rejects an understanding of tendencies as related to empirical events. He portrays a view of tendencies as ‘patterns in the flux of events’ as disguised forms of a Humean regularity view of causation based on closed systems thinking, which he rejects. Instead, he proposes a ‘deep’ understanding of ‘genuine’ tendencies as forces or causal powers that drive outcomes, irrespectively of whether these outcomes come into being or not. Tendencies may or may not cause empirically observed events.

Fine (2007; Fine and Saad-Filho, 2016) and Brown (2007), in contrast, counter from a Marxist dialectical materialist perspective that tendencies are *necessarily* linked to historically specific configurations. Put differently, tendencies *are* linked to events, although not deterministically. They are not continually actualized, but they must be actualized over a period of time for the system as a whole to persist (Brown, 2007; Reuten, 2017). This developmental view of tendencies (i.e. tendencies as something that emerges in the course of the systems' development) requires the concrete empirical study of tendencies and use of sound economic theory. On this basis, Brown and Fine critique critical realism for proposing a trans-historical methodology detached from economic theory and capitalist realities. Critical realism is not real and not critical enough, Fine concludes (2004). It strikes me that Puller and Smith (Puller and Smith, 2017), in their advocacy for critical realism for ecological economics, highlight exactly these two traits: they celebrate critical realism for being critical and realist.

Also, the interpretation of tendencies advocated here differs from cyclical variations or Kondratieff-type waves, as sometimes suggested (Fleetwood, 2011). Such a conception enables tendencies to be viewed as consonant with equilibrium thinking, which is not what I mean. I describe long-term dynamics underpinned by the capitalist core described in section 4.2. Capital is inherently expansionary and capitalism a spiralling self-expanding system, not an equilibrium system. The idea of economic equilibrium as a balance of marginal utilities stems from classical mechanics, rather than from the outcomes of real-world observations (Mirowski, 1989).

An addition remark concerns different levels of abstraction: in the previous chapter on value and the sections on capital, profit and competition in this chapter, I tried to provide a systematic explanation of core Marxian categories to show how Marx carefully unfolded an understanding of the capitalist system as a whole, starting from the most simple and abstract towards ever more concrete and complex categories. In the following sections, I drop this ambition. What follows is no longer a careful step-by-step exposition but a network-like perspective of tendencies and their interrelations that includes different levels of abstractions.<sup>92</sup> The intention is to emphasise and explain systemic interrelations associated

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<sup>92</sup> I rely on Ollman's characterisation of seven different levels of abstraction into which Marx subdivides the world, starting from the most specific to the most general (Ollman, 1993, p. 55ff): *Level one* emphasises what is unique about a person or situation. "*It's all that makes Joe Smith different from everyone else ... It's what gets summed up in a proper name and an actual address*" (Ollman, 1993, p. 55). At this level, the here and now is brought into focus. *Level two* is slightly more general. It emphasises what is general to people, their activities and products

with environmental destruction and themes that seem essential for ecological economists. I try to find a balance between keeping a ‘bigger picture view’, whilst refraining from too bold claims at the same time.

### 4.3.1 Overproduction

Capitalist commodity production tends to increase over time. Marx captured this apparent fact in the first sentence of *Capital*:

*“The wealth of societies in which the capitalist mode of production prevails appears as an immense collection of commodities” (Marx, 1990, p. 126).*

Commodities are omnipresent in the world we live in. From an ecologically minded perspective, the question is how and why they come into being. The previous chapter established that the production of commodities is primarily motivated and driven by exchange value considerations, rather than use values. However, exchange value cannot be produced and realised without use values. Profits from production require a material basis.<sup>93</sup> Surplus

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within modern capitalism, in the last 20-50 years. Here, we no longer speak of an individual, but of a financial trader, for instance.

*Level three* is capitalism as such, i.e. production as a whole. Joe Smith (level 1) as a financial trader (level 2) becomes a typical wage-worker in capitalism, who produces commodities and value. This level widens the area and lengthens the time span even further.

*Level four* addresses class society, that is, the last 5000 to 10,000 years in which human societies have been organised into classes. This level focuses on qualities of people, their activities and products that are common across capitalism, feudalism, slave societies etc.

*Level five* is human society as such, which brings into focus all human beings and their whole history.

*Level six* expands into the biological world and the qualities that are shared amongst all animals.

*Level seven* is the most general level that emphasises the physical and material parts of nature.

<sup>93</sup> The question to what extent profits require a material basis relates to one of the biggest controversies in the environmental discourse, i.e. whether energy-matter use can be decoupled from ‘value creation’ (which is typically used synonymously with economic output, GDP growth, wellbeing, welfare or consumption, e.g. in Hepburn and Bowen, 2012). The central tenet of green growthers and eco-modernists is that growth and profits do not necessarily require a material basis, i.e. the opposite of what I state here. Their argument is that a structural shift towards a service economy, driven by technological advance could lead to reductions in energy and resource intensities and indeed absolute decoupling of matter-energy use and economic growth. Green-growth positions, such as the one offered by Hepburn and Bowen (2012), typically underestimate the whole life-cycle energy and resource requirements of ‘intellectual’ goods (art, literature, music) and ‘knowledge products (computer software, the internet); they do not ask why and how technologies and growth come into being and whose interests they serve; and they revert to an idealised future state of the world, instead of confronting harsh realities in which there is no empirical evidence for absolute decoupling (except for relatively easy technological fixes such as air and water pollution).

value can only be created and profits realised from production when something is produced and sold: commodities.

The M-C-M' movement is thus *mediated* by the production of commodities. Commodities are not at the centre of interest of capitalist producers. Producers are not primarily benevolent philanthropists who produce commodities for the satisfaction of people's needs. As James Roderick, then Chairman of U.S. steel, put it: "*The duty of management is to make money, not steel*" (Murray, 2017, p. 169). This is not to deny good intentions of producers. Many businesses care about producing commodities that increase people's wellbeing but in the end, systemic pressures to survive rule the game. What matters in the end is the excess value that can be realised as profit and reinvested in new production cycles.

Several implications follow. First, the huge mass of cheap commodities is responsible for the massive environmental degradation of today. Second, capitalist commodity production does not stop once basic needs are met. Rather, luxury goods become more important with the large-scale use of money (Luhmann, 1994) (➔ [link to 4.3.5 overconsumption](#)). Third, the market is unable to distinguish between the production of commodities that satisfy basic needs or luxury consumption. The question of what to produce (and related: what to consume and waste) is crucial from a sustainability perspective (Smith, 2010). In an increasingly resource-constrained world, it makes a difference whether natural resources are used for producing SUVs, 10€ flights, penthouse flats or healthy food and decent housing. These differences escape capitalist rationality because commodity production is a means towards an end, rather than an end in itself. Fourth, what *not* to produce, i.e. questions of *sufficiency*, which are equally important from a sustainability perspective, fall out of capitalist logic (➔ [link to 4.3.5 overconsumption](#)). The rationale for engaging in capitalist business is production for profit. Limiting production typically implies limiting profits (Gould et al., 2008). Lacking advocacy for sufficiency is therefore not surprising.

What happens after commodities get sold? They can be further used and they also remain socially relevant, but they can no longer be valorised (Murray and Schuler, 2017). As valorisation needs to continue for the reproduction of the system, commodities – and with it energy and natural resources – have to be thrown constantly into the process, like "*fuel into a fire*" (Banaji, 1979, p. 37 quoting Grundrisse). A continuous flow of energy and resources is required to sustain and fuel commodity production on an extended scale. As commodities and capital accumulate over time, social structures and institutions are created that, ultimately, lock societies into highly resource- and energy-intensive lifestyles. One example is the large

share of material inputs needed to maintain the existing stock of infrastructure, such as transportation networks or residential buildings (Wiedenhofer et al., 2015).

Overproduction is not only problematic from a sustainability perspective. The term is used in Marxist crisis theory to signal a mismatch between production and effective demand, i.e. more commodities are produced that can be sold at a price that enables the realisation of surplus value embodied in those commodities (Clarke 2012) (➔ [link to 4.4.2 crises](#)). This means overproduction in the classical Marxian sense denotes problems with 'normal' economic reproduction; in times of increasing and accelerating ecological crises, overproduction adds another layer to the crisis-riddled nature of the capitalist system.

### 4.3.2 Technological dynamism

Does commodity production on an expanded scale require a growing flow of energy and materials? The previous section prompts the question to what extent commodities can be produced with less or no energy and resource throughput. Decoupling and dematerialisation debates are long, old and ongoing. This section presents the technology-productivity nexus as a central dynamic driving environmental overuse. Understanding the links between competition, profit-making and technology helps explain why the Jevons Paradox is not, in fact, a paradox, why work-time reductions are anything but easy to implement, and why technological advance is not per se a road to solving ecological crises.

Capitalism is technologically dynamic. The discussion of value in the previous chapter provides one explanation why. The importance of 'labour' that is 'socially necessary' and undertaken in a specific amount of 'time' points to a key mechanism that structurally drives capitalist production: the role of technologically-induced labour productivity increases. Raising labour productivity is crucial for remaining competitive and a central strategy of surplus value creation. Recall: surplus value can be created in two basic ways: by extending working time or working more efficiently. The former strategy has clearer limits. The length of the working day, month, year or lifetime cannot be extended indefinitely. Some time is required to sleep, eat and recover. In addition, if workers are well organised and in a strong bargaining position, employers' possibilities to prolong working time are restricted. Furthermore, labour costs are typically higher than other per unit production costs and relatively fixed, as wages are generally set by labour markets. As a consequence, labour-saving technologies account for the majority of productivity growth in advanced capitalist economies.



Increasing labour productivity lowers production costs (via reduced unit labour costs), which increases profit margins, and creates spaces for lowering prices, which increases competitive advantage (➔ [link to 4.2.4 competition](#)). Lower prices, in turn, enable higher consumption levels, especially if labour productivity increases also translate into higher wages.<sup>94</sup> Sufficient effective demand is, in turn, required for absorbing the commodities produced and for profits to be realised. Labour productivity increases thus seem to trigger a positive reinforcing feedback loop that benefits producers<sup>95</sup> and consumers alike. Much policy effort is based on this logic: fostering innovation to boost profits and competitiveness and enable higher wages and consumption levels at the same time, leading to a win-win situation for producers and consumers. In the environmental policy arena, this story becomes a green flavour. What matters is to push for the *right type* of innovations, i.e. *green* and *sustainable* ones (better insulating homes and driving in electric cars).

From an ecological economics point of view, this perspective is too narrow. What are the system-wide consequences of labour productivity increases? Who are the losers of technology-induced productivity gains? If we understand the nature of competition and profit-making as constant struggles in which some parties gain and others lose, as highlighted in section 4.2.4, we need to understand why and how the ‘win-win’ of some translates into ‘win-win-lose-lose’ elsewhere. The losers are typically the weakest and least protected human and non-human beings and the number of those who lose from competitive struggles increases in times of global environmental change.

Value theory explains continuous pressures to increase labour productivity. The problem is that technology-induced productivity gains over others are temporary. Competitive advantages disappear over time. As the name *relative* surplus value creation indicates, it describes gains relative to – in comparison to – others. As soon as competitors catch up by adopting productivity-enhancing technologies, competitive advantage and temporarily higher profit margins vanish. This is why capitalism has to be technologically dynamic. Therefore, it is not surprising to understand strategies that create and protect spaces for maintaining

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<sup>94</sup> Labour productivity increases do not automatically translate into higher wages; but higher profit margins make it both easier for producers to share part of these gains and for workers to demand a bigger share.

<sup>95</sup> Producers not only benefit from labour productivity increases in their own firm, but also in other branches. Improvements in one industry cheapen and improve the means of production in another (Marx, 1991, p. 179). Rising labour productivity hence also facilitates the social division of labour, i.e. how the specialisation of labour proceeds in a particular country and worldwide.

competitive advantage, within countries but also across countries as part of international trade relations (➔ *barrier to change*). Rent seeking via patents and intellectual property rights are prominent cases (Standing, 2016).

What are the environmental consequences of temporary productivity superiority? The ability to produce more output in shorter periods implies higher demand for machines, raw materials, and energy. Bluntly speaking, if a machine produces four times more output, four times more resource inputs are required (➔ *link to 4.3.3 appropriation*). Furthermore, as fixed capital investment in machinery needs to be amortised and as the gains of these investments are temporary, machinery is used as extensively as possible, which fuels energy and resource use even more. This is an old message.

*“As the productivity of labour develops, and thus with the development of the capitalist mode of production... the mass of means of production ... constantly grows” (Marx, 1993, p. 218).*

Marx described a rise in the capital-intensity of production over time as changing ‘composition of capital’, i.e. the tendency for constant capital (machinery) to rise in relation to variable capital (labour).

The need to work machines as intensively as possible feeds back as increased demand for labour. Marx pointed out that machines do not necessarily create unemployment (Smith, 1990, p. 139). Increases in labour productivity throughout history have not led to millions of unemployed people. Rather, rising labour productivity has the perverse effect to prolong and intensify work, instead of easing and shortening the working day. To what extent higher labour demand translates into higher wages depends on social institutions, politics and specific circumstances. An automatic strong link between productivity growth and wage increases is an illusion (Shaikh, 2016), the reality is the outcome of power struggles over the distribution of productivity gains between profits, wages and other incomes.

Technology not only contributes to higher but also cheaper outputs. Capitalist value production leads to the cheapening of commodities (Fine, 2012). The tendency is for cheaper and more, rather than high quality, durable and less, as desirable from a sustainability perspective. The tendency for cheaper commodities also has the effect that lower wages are needed for workers to enjoy a decent standard of living. Cheaper production therefore also benefits producers as it enables to keep wages relatively low.

Technology also serves as a means to discipline labour. If shorter labour time is key to surplus value creation, capital tries to control and discipline it. Technology is one means through which this power is exercised, for instance by determining the rhythm of work. Humans can be stubborn. They can demand higher wages and better working conditions. Energy, resources and machines cannot protest. From the perspective of the entrepreneur, it is easier to deal with non-living matter. Through this lens, we begin to understand why labour productivity and energy or resource productivity have to be understood differently. Living human beings behave in different ways than machines.

Technology is not neutral. This is one of the prime insights of a Marxian perspective. In the same way as capital is not 'just' money, technology is not 'just' machines detached from time and space, but things that embody specific social relations, i.e. the socially specific forms of organisation that prevail in our society. Technological innovations embody capitalist relations (Foster et al., 2010, p. 80). Under capitalism, technological advance is predominantly steered towards profit-making and competitiveness (➔ [link to 4.2.3 profit and 4.2.4 competition](#)). As mentioned above, this directionality offers potentials for higher wages, more comfortable working and living conditions and higher consumption levels for some parts of the world population (➔ [link to 4.3.5 overconsumption](#)). However, we should not get blinded by the fact that innovations in the pursuit of profit-creation look very different than innovations directed towards other social goals, such as sustainability considerations.

How many ecological economists who study decoupling, dematerialisation and rebound effects share this understanding of what seem to be crystal clear real-world economic dynamics? Clearly, it is possible to use much less energy-matter throughput in production processes and of course, it makes sense to foster the development of energy- and resource-saving production. However, this is not a question of technical or economic cost efficiency, but a social question. Green growth policies are not being implemented to a considerable degree in practice. In reality, resources are often used lavishly because what matters most is to remain competitive and secure profit margins, which can be achieved by keeping resource and energy prices low or appropriating nature for free (or subsidised), all of which do not support the uptake of resource-saving technologies or considerations of scale of impacts. Zero waste, zero carbon, cradle to cradle, and related circular economy initiatives or negative emission technologies which are prevalent in the environmental policy discourse are catch phrases that remain wishful thinking in a reality that is dominated by the need to produce surplus value.

We need to critically examine: What type of technologies and innovations benefit whom? Who supports these interests in what ways? This leads us to the role of science and the State in promoting technological advance. Technological development needs time, investment and deliberation. As Gould et al. put it: technologies do not run away by themselves, but are planned (Gould et al., 2008). States fulfil an important role in this planning by channelling and supporting technological uptakes in terms of funding and capacity provision. States launch innovation programmes and offer skills training via school and university education that is required for production (such as industry-tailored Master programmes). Often, no specification is made about what type of technologies are socially more preferable than others; from a systemic perspective, the directionality of technological change does not matter. What matters is that it happens. Most state-led innovation programmes and mainstream economic theories consider technological progress *per se* as desirable.

What are the key messages from this section? Under capitalism, human labour is substituted by energy and resources – not the other way around. Increases in resource productivity have not led to resource reduction and more leisure. The Jevons Paradox is no paradox. It is part and parcel of capitalist logic and expected outcome of prevalent economic activity. Strategies that target work-time reduction policies, energy- and resource-efficiency or eco-social tax reforms that combine both need to be understood in this context. They run counter to labour productivity gains as positive reinforcing feedback loop of capitalism and are anything but easy to implement<sup>96</sup>.

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<sup>96</sup> These arguments are not exclusive to Marxian Political Economy, but resemble the treadmill of production theory in striking ways. Treadmill of production theory considers the entanglement between technologies, labour, resource use and the role of the State (Gould et al., 2008). Initially developed to explain how US production had changed in the 1980s, based on a grounded theory approach, the Treadmill explains the increasing capital-intensification of production: the more capital was accumulating in Western economies, the more it was applied to replace labour with new technologies to increase profits. These new technologies required far more energy and/or chemicals to replace earlier, more labour-intensive processes, thus producing vast ecosystem pollution (outputs) and ecosystem depletion (inputs). These new technologies emerged from an apparatus of scientific research and company-based, -influenced or -financed research. From the treadmill perspective, productivity increases lead to an acceleration of the treadmill – more throughput, more output, higher profits, but with fewer workers and worsened environmental conditions (Gould et al., 2008).

### 4.3.3 Appropriation

The previous sections explain how a technologically dynamic capitalist system geared towards expanded commodity production fuels energy and resource demand. These resources and energy need to come from somewhere. Appropriation tackles where and under which conditions resources are sourced, extracted and accessed. The term appropriation is mainly used for sourcing means of production, whereas exploitation typically refers to sourcing labour.

A central appropriation issue is to access energy and resources as cheaply as possible to keep production costs low. I see two basic strategies how this can be done: on the basis of relatively equal<sup>97</sup> or unequal exchange relations. The more peaceful strategy is trade. Energy and resources have been traded for centuries. Under what conditions trade relations unfold depends on framework conditions set by States or trading blocks, such as the EU. Whatever specific forms trade relations take, a precondition for trade is that resources become commodified. For some resources this is more obvious (barrels of oil) than for others (CO<sub>2</sub> certificates). Appropriation tendencies are hence closely tied with commodification (➔ [link to 4.3.4 commodification](#)). The political reality of a lot of resource rich-countries is, however, not one of peaceful trade relations. The alternative strategy to access resources is by exercising brute force. Long histories of colonisation, imperialism and geographical expansion continue today as land grabbing, green grabbing, blue grabbing (Benjaminsen and Bryceson, 2012; Fairhead et al., 2012). Communities at the locations of extraction are at the sharp end of the spear of environmentally damaging capitalism; and domination over the environment relates to domination over the populations in these areas (Bookchin, 2015, 1982).

Marx described primitive accumulation as a necessary initial phase in the development of capitalism. The enclosure of common lands and eviction of peasants in the English and Scottish countryside, i.e. a systematic plunder of land and resources, was essential to get capitalism off the ground (Ince, 2014). Rosa Luxemburg, Hannah Arendt, David Harvey, Naomi Klein or Arundhati Roy, amongst many, have firmly established that primitive accumulation processes continue to remain essential for capital's autonomous expansion. Harvey coined the term *accumulation by dispossession* to describe a multitude of contemporary predatory practices and encroachment processes, the appropriation of nature being one central theme therein

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<sup>97</sup> As we have learnt in the section on surplus value creation, exchange relations are never equal if profits arise.

(Harvey, 2004). As such, appropriation has become well documented and studied by critical geographers, political ecologists, eco-Marxists and ecological economists, often, by linking it to theories of unequal exchange (Hornborg, 2014, 1998; Jorgenson, 2016; Muradian and Martinez-Alier, 2001).

Jason Moore's *Capitalism in the Web of Life* is a seminal recent contribution that features appropriation issues prominently. Moore highlights how the appropriation of unpaid work by 'women, nature, and colonies' and the capitalisation of paid work (labour) together produce value and accumulation dynamics.

*"The great secret and the great accomplishment of the capitalist mode of production has been to not pay its bills, which is what frontiers made possible" (Moore, 2014, p. 17).*

The frontiers Moore talks about are unpaid fringes that capital uses to keep costs of production relatively low. Non-commodified realms of work and life have enabled capital's 'free ride' for a long time. However, as these frontiers cease to be cheap, Moore argues, labour costs rise and accumulation opportunities shrink (Moore, 2015). The cheap nature strategy that made capitalist expansion possible in the past, is no longer likely to continue. Moore critiques classical Marxists for downplaying the role of appropriation for accumulation, focussing too much on the circuit of capital and value creation inside production. I agree with Moore on the centrality of appropriation to understand capitalist dynamics and ecological destruction, but also think if we understand the circuit of capital in its entirety – and this is what I argue for here – the appropriation of nature clearly does not lie outside of production but is an integral part of it.

The appropriation of nature and related social conflicts are a terrain that remains neglected in mainstream economics. The neoclassical approach assumes resource inputs for production as given. The question of where resources come from does not arise. The heavy reliance on equilibrium as organising principle suggests that market liberalisation leads to a harmonious state in which everyone will be better off; possibilities of unequal exchange and violent struggles over resources are widely neglected. Economics as positive science rules out normative questions of power, vested interests, or rights to access, which are key to understanding appropriation – and capitalism. The ahistorical methodological toolkit does not open its doors to critically reflecting on past and ongoing histories of imperialism and colonisation. Understanding appropriation and its links to the core productive economy

have no place in the core of mainstream economics. If you do not see a problem, there is no obvious entry point to act upon it (➔ **barrier to change**).

#### 4.3.4 Commodification

Commodification denotes processes of expanding ‘the commodity’ into new domains that were formerly not subject to the logic of market exchange. The commodity as dominant social form encroaches into areas where it has not been prevalent before. “*Something that was not functioning as a commodity, now functions as one*” (Murray and Schuler, 2017) or something that is – by the virtue of its being – not a commodity, a thing produced for profit, is treated *as if* it were a commodity. What started with the commodification of labour, land and money as ‘fictitious’ commodities and precondition for generalised commodity exchange (Polanyi, 1944), has taken new forms today, such as carbon markets, habitat banking or biodiversity offsetting (Bull et al., 2013; Sullivan, 2013; Vatn, 2015b). The question is whether we have good reasons to believe in deeper seated structural and systemic pressures for commodification tendencies and how they relate to increasing matter-energy use, environmental destruction and barriers to change.

Commodification processes are one way in which the expansion of capital can be sustained. These processes can be understood as a spectrum of something moving towards becoming a commodity – by degree. Bayliss et al. (2017) distinguish various degrees. *Commodity calculation* is the mere *idea* to use monetary criteria in decision making, without money actually changing hands. Environmental cost-benefit-analysis is a typical example. Next, *commodity form* is a different degree, which are transactions that involve payments for goods that are not produced for sale. Something is treated as a commodity, even though it is not produced for profit, such as paying pensions or unemployment benefits. Actual *commodity production* for profit is the next, however not the last step. The authors claim that commodification reaches even further by providing the basis for financialised activities (➔ **link to 4.3.8 financialisation**).

In ecological economics, the commodification of nature is a controversial field of study. The creation of and advocacy for ecosystem goods and services and associated markets is founded upon the hope that internalising some externalities can prevent further environmental damage. Often, this is based on a recognition that resources are exploited anyway (➔ **link to 4.3.3 appropriation**) and that exploiters should at least pay for some of the damages caused;

thereby sometimes also creating revenue streams that can be used for more sustainable purposes. Often, the monetary valuation of ecosystem services is merely suggested as a pragmatic means to raise awareness of environmental values that are otherwise neglected; rather than advocating for privatisation – and as such ‘full’ commodification – of the commons.

However, weaker forms of commodification shape social ecological dynamics too. Commodity calculations, in which no actual money payments are involved, cannot be understood independently from the other commodity-forms-by-degree and also not independently from the circuit of capital as a whole. What starts as well-meant intention and mere *idea* has real-world implications in terms of sustaining and feeding the status quo. As such, it perpetuates the dominant form of societal organisation, which shapes and restructures material configurations. Commodity calculation – such as the idea to put a monetary value on ecosystem services – is a necessary precondition for ‘stronger’ types of commodification. As such, it bears moral, social and political significance. What was considered unacceptable some years ago becomes normalised and legitimised over time (➔ **barrier to change**). Seriously, who would have thought that ‘habitat banking’ could be proposed as a serious policy alternative 20 years ago?

If we understand commodification as a set of tendencies amongst others that, taken together, are steered towards the reproduction of a system that is structurally inclined towards environmental degradation, as I argue in this chapter, the advocacy of ecosystem service valuation or payment schemes seems a shot in the foot, rather than a long-term viable alternative because it is an expansion of capital, when it is precisely capital that is the problem. Payment schemes and associated markets create new problems too: assigning private property rights, such as carbon credits, permit pollution protected by law, thereby legalising further appropriation (➔ **link to 4.3.3 appropriation**).

As all general tendencies, commodification processes are no one-way road. They do not imply market determinism and counter-tendencies are at work all the time. De-commodification strategies aim to reverse the dominant trend by turning something that used to be a commodity into a thing that is no longer (Gerber and Gerber, 2017). However, the point is to understand why these countertendencies are difficult to implement and sustain in a system geared towards the production of surplus value. Re(commodification) tendencies occur too as countertendencies to de-commodification strategies. Capital’s tendency is to turn nature into commodities; not the other way round (Brand, 2016).



### 4.3.5 Overconsumption

The previous sections describe tendencies that support the expansion of production. Now we turn to the question of who is willing and able to buy the increasing mass of goods and services. The willingness to consume, to begin with, is artificially stretched under capitalism. The capitalist system does not just satisfy needs and wants, but actively produces them for valorisation to continue and reproduction to function. M-C-M' explains why marketing departments exist. Advertisers actively create novelty and convince people to consume beyond need. From a systemic perspective, it does not matter whether consumption is steered towards satisfying needs or wants. The amoral market cannot make this distinction. However, the social outcome is a highly problematic *social logic of consumerism* (Jackson, 2009) that locks people into environmentally and sometimes also socially-destructive consumption patterns.

The physical requirements for people to thrive would be minimal. The question of what makes a good life is as old as humanity. It seems crystal clear that good lives do not have to cost the earth (Simms and Smith, 2008). People who feel balanced, grounded and satisfied need less material consumption. Clearly, a certain level of energy, emissions and material requirements is needed for 'decent living' under existing configurations (Rao and Baer, 2012; Rao and Min, 2018). However, if needs are met, humans are "*energy saving models*" (Hüther, 2013). If needs are not met, people search for alternative satisfiers, which are often related to more consumption and matter-energy use, especially in a throw-away consumption culture (➔ [link to 4.3.6 acceleration](#)). The problem is that capitalist structures do not incentivise the autonomous growth of people but energy- and resource intensive consumption growth (➔ [link to 4.3.7 alienation](#)). On this basis, it is hard to imagine how capitalist societies can lead to high levels of wellbeing for all.

Creating and maintaining willingness to buy is however not sufficient. Demand needs to be backed by the ability to consume, i.e. sufficient purchasing power. Where does the money come from to absorb surplus value and surplus product? Harvey explains that Marx was not much concerned with problems of effective demand. He thought capitalists would find the money to absorb whatever is produced (Harvey, 2010a). One reason why demand and consumption issues are not emphasised in *Capital* is because production matters more for understanding core systemic drivers and also because consumption lies in the realm of specificities, whereas *Capital* emphasises the level of generalities of the system as a whole. The extension of the classical Marxist approach to include consumption-related issues was

undertaken by later Marxists. The Systems of Provision approach, for instance, is one approach that helps to understand how consumption patterns and cultures are shaped and driven by general capitalist dynamics (Bayliss et al., 2017; Fine, 2002).

Back to our question: Where does the money come from to absorb surplus value and surplus production? This is a question of systemic importance because if overproduction is not met by overconsumption, capitalist economies slide into crises (➔ [link to 4.4.2 crises](#)). Who are potential consumers? The broad mass of the population? Most people are in a double-role of workers and consumers. Marx famously quotes that capitalists not only benefit from labourers in their role of workers but also in their role as consumers. However, sufficient effective demand cannot be taken for granted. If real wages stagnate, other mechanisms are required to stabilise the system. The expansion of credit is one possibility that provides money for (over)consumption purposes. Abandoning the gold standard in the 1940s meant a new regime of credit-driven fiat money that made it possible to fuel aggregate demand “*far in excess of any possible growth in their potential supply*” (Shaikh, 2016, p. 205). Credit for consumption either results in higher national debt, if the State steps in as consumption stabiliser, or private debts. Both forms of credit expansion cannot be sustained for a prolonged period of time.

Another possibility is to conquer new terrains. Rosa Luxemburg argued for the necessity of imperialism as a way out of the misery (thereby opening the doors to new miseries). Harvey (2004) mentions geographical expansion as one way to deal with crises of overaccumulation too. Malthus, on the other hand, proposed as a remedy a class in society that does nothing but consume. He made a case for the landed aristocracy to stabilise the system. Following Malthus, is further support for landlords or, more generally, the richest 10% or 1% of the world the preferable solution to stabilising an increasingly unequal and unjust and inherently crisis-prone system? Clearly not. Still, we need to ask: who are the conspicuous consumers of our times? Where do they live? In globalised capitalism, the class of consumers can be geographically detached from production. Production happens where it is cheap, consumption where people have sufficient purchasing power. Producing cheap and selling dear has become global. This global rift is supported by cheap, fast and flexible transport and communication channels, such as air transport, with considerable environmental impacts (➔ [link to 4.3.6 acceleration](#)). What it gives rise to is what Brand and Wissen call the *imperial mode of living* (2012), i.e. unacceptable resource- and energy-intensive lifestyles of high-income consumers across the world (Alvaredo et al., 2017) based on the exploitation of people and appropriation of nature (➔ [link to 4.3.3 appropriation and 4.3.7 alienation](#)).

#### 4.3.6 Acceleration

From the production of needs and wants we move onto the production of time and space. This section discusses space-time dynamics. It explains why short-termism, speeding-up the rhythm of work and life and spatial expansion are inbuilt tendencies of capitalist economies. Acceleration dynamics stretch over the entire circuit of capital. They shape both production and circulation processes. One main mechanism for shortening production time is labour productivity increases, as discussed above. This section adds three more considerations: how acceleration dynamics incentivise products and production methods that reduce turnover times; the role of transport and communication infrastructures for compressing time; and the importance of credit and finance provision for bridging time frictions.

Core Marxian concepts unravel aspects of temporality. Value is socially necessary labour *time*; capital is value *in motion*; surplus value stems from surplus labour *time*; competitive advantages are *temporal*. “*Moments are the elements of profits*”, as Marx said long ago (Marx, 1990, p. 352). This is why capitalist firms try to capture time in various ways, typically by aiming to reduce turnover times and extend labour times (➔ [link to 4.3.2 technological dynamism](#)). Time cannot be expanded, but it can be compressed. Space considerations are therefore inseparably linked to questions of time. Absolute space (a piece of land) is fixed and bears no systematic connection to time. Relative space, however, refers to the time it takes and costs it bears to move things around. It is an expression of how, for instance, urban spaces are shaped, landscapes get transformed, and distance to markets become shortened. The reduction of relative space is a systemic feature of capitalism and globalisation no accident (Harvey, 2010a).

How is space-time linked to environmental impacts? For a start, natural processes have typically longer reproduction cycles than industrial ones. This is why strategies to compress time are easy to detect in industries that deal with living substances such as plants and animals – agriculture and forestry – are subject to interruptions. As cheese ripens, grapes ferment or coffee beans dry, capital lays idle. Possibilities to compress time incentivises types of production and products with quicker turnover times. One possibility to shorten turnover time is to intensify production. Fields are harvested up to four times a year in the region I come from instead of once or twice when my grandparents were my age. Industrialised meat production nowadays systematically breeds species that give birth several times a year. The age at which pigs, chickens, cows and other animals are slaughtered has decreased substantially, compared to their normal reproduction cycles.

Another possibility to shorten turnover time is to systematically produce commodities with relatively short life-spans. This can be done physically by producing things that break relatively early (e.g. planned obsolescence) or imaginary, by fostering cultures in which certain commodities get considered outdated or unfashionable. Both strategies contribute to high resource and energy intensive throw-away consumption culture (➡ [link to 4.3.4 commodification and 4.3.5 overconsumption](#)). However, there are certain limits to compressing time. This is why strategies exist to circumvent time constraints, for instance by switching to production methods and materials that are less prone to time restrictions. Replacing natural materials (wood) with artificial ones (plastic) is one example.

Sustainable alternatives, on the other hand, often have higher turnover times. Marx discussed why sustainable agriculture and forestry are rather incompatible with capitalism (Foster and Burkett, 2016). The temporal mismatch between natural and industrial processes in a system that favours the latter gives rise to the systematic overexploitation of natural resources.

*“The common element in capitalism’s tendencies to overexploit land and labour power is the failure to provide sufficient time (and biochemical energy inputs) for the restoration of productive power” (Foster and Burkett, 2016, p. 148).*

Constant capital and machinery run significantly ahead of organic raw materials in fully developed capitalism (Marx, 1991, p. 213) (➡ [link to 4.3.2 technological dynamism](#)). From this perspective, it is not difficult to understand why capitalist production is not sustainable and why sustainable alternatives often remain niches (➡ [barrier to change](#)).

Let us turn to a next crucial issue: the role of transport, communication and associated infrastructures. Their role can hardly be underestimated for the reproduction of the capitalist system. Infrastructures are the physical lifeblood of capitalism. They are the physical web that supports the more or less fluid flow of capital through the system. Without cheap, fast and expanding transport and communication systems the increasing global division of labour and production systems would not be possible. Low fossil fuel prices are crucial to this end (rather than upward pressures in light of absolute fossil scarcities) as well as the construction of more highways, railways, waterways or virtual communication channels. The State is crucial to provide infrastructures directly, invest in R&D that support the uptake of faster and cheaper communications systems (➡ [link to 4.3.2 technological dynamism](#)), and negotiate trade agreements and other legislation that supports increasing interconnectedness. Large infrastructures are also needed to access new resource exploitation sites (➡ [link to 4.3.3 appropriation](#)) and to reach consumers in distant markets (➡ [link to 4.3.5 overconsumption](#)).

The last issue I would like to touch upon here is the crucial role of credit and finance for bridging time gaps. The essential function of credit is to provide money that has to be paid back at a later point in time. Credit is a repayment obligation (Shaikh, 2016). It guarantees continuity in the circuit and enables speeding-up, productive expansion and surplus value realisation. To kick-start production, credit can be used to bundle sufficient capital for investments, including the gap that arises between spending on labour power and means of production and the time it takes to realise surplus value after sale. This enables higher production levels than would otherwise be possible. During production, capital often lays idle. Financial instruments can be used to work capital 'productively' at all times. At the end production, credit can be provided as consumer credit to realise surpluses faster and shorten turnover time (➡ [link to 4.3.5 overconsumption](#)). The provision of credit does not only smoothen the production process but is also a potential source of disruption. Wherever credit is granted, debt arises and vast lending can outweigh the capacity for repayments (➡ [link to 4.4.2 crises](#)).

#### 4.3.7 Alienation

The tendencies discussed so far mainly explain drivers of environmental degradation. Alienation, in contrast, emphasises the negative implications that a market society has on people. It sheds light on what the systemic pressures to innovate, commodify, appropriate, accelerate, overproduce and consume do to humans. What types of people does capitalism produce? What social institutions are incentivised? What impact do they have on people's lives and behaviours? These questions matter because they help to understand why we – as societies – find it so hard to move towards more socially just and environmentally sustainable societies. Marx's theory of alienation points towards reasons why capitalist societies are not fertile breeding grounds for 'agents of change'.

How are humans conceptualised in Marxian thought? The dialectical worldview – in which 'the truth is the whole' – gives rise to a conception of human beings in realist terms: as feeling, thinking and creative social creatures embedded in specific cultural, natural and historical contexts. Living well from a Marxist perspective means to feel whole, i.e. to balance different aspects of our lives that characterise us as social beings. Being alienated, in contrast, describes how essential human characteristics become sidelined (Ollman, 1971). I found four different

aspects of alienation in the Marxist literature: alienation from our own work; our produce; other human beings, and nature (Ollman, 1971; Saito, 2017).

Let's begin with the alienation of work. What does 'normal' work look like under capitalism? The main activity of how people participate in society is wage-labour. Wage-labour means we get paid for providing our capacity to work. Work becomes alienating when it prevents free human development. Pursuing a typical 21<sup>st</sup> century job that requires to spend most of the day in front of a computer screen is an alienating activity because it separates people from other activities that help sustain their physical and mental health. It is no coincidence that most office workers strive for physical exercise or social activities after work. The problem is that the full complexity of individuals is not only not needed on markets but also disturbing (Luhmann, 1994). This is why Marx problematized wage-labour as a dehumanising activity:

*"In his work ... [the worker] does not develop freely his physical and mental energy but mortifies his body and ruins his mind" (Marx 1844 cited by Ollman, 1976, p. 136).*

Wage-labour is problematized because work becomes a means to stay alive rather than life being an opportunity to work (Ollman, 1971). Wage-labour also alienates people from their products: people do not work to directly satisfy their needs but to earn money to make a living. This matters because work for money shapes human beings differently than work for direct social purpose. If you are lucky, you have a job that combines both, but for many people this is not the case. How much time and energy do we spend on dull and meaningless tasks that do not serve the common good or our own self-fulfilment? Why is a lot of meaningful work amongst the least paid and socially rewarded? Why is the societal contribution of small-scale farmers, carpenters, or musicians – professions tied to basic needs satisfaction and making people's lives more colourful, enjoyable and meaningful – not valued higher, or at least on par with, say, the contribution of lawyers or bankers? Higher qualification and longer education is a flimsy excuse.<sup>98</sup> The point is that dedication, purpose, and quality are often only systematically incentivised if they contribute to systemic drivers towards quantitative expansion, productivity growth, and competitive advantage.<sup>99</sup>

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<sup>98</sup> This is what I was taught as part of my first economics education. Higher wages were explained as rewards for longer education times and sacrificed income periods.

<sup>99</sup> In the 'knowledge industry', to give one example, we produce 8000 word articles to make a living. Whether our research supports oil extraction technologies or climate change mitigation does not matter much from an individual career perspective. Academics are partially hired based on their capacity to acquire grants, which essentially means that scholars need to earn money, before they are allowed to

In addition, the advances of the productive forces in capitalism give rise to ways of living with strong accents on privacy and individualisation. Relationships between people are often mediated by things or, nowadays, technology. As such, the dominant way of working and living to which capitalist production gives rise becomes asocial, alienating and socially destabilising because it cuts off potential communicative bonds between people (Luhmann, 1994). On this basis, Arnsperger calls capitalist growth-oriented development “*an anthropological and spiritual disaster*” (Arnsperger, 2008, p. 5). He argues that the core functioning of capitalism is based on existential anxiety and fear, which alienates people not only from other humans or nature but crucially from ourselves.

Overall, Marx’s understanding of alienation can be understood as general alienation from life.<sup>100</sup> “The worker becomes all the poorer the more wealth he produces” (Marx 1884 cited by Clarke, 1991, p. 64). The core problem is that the market shapes people’s behaviours, rather than the other way round. The economy is not subordinated to the social order, it does not primarily serve people’s need, but rather dominates and influences people’s lives. Gains in productivity, output and profitability come at the cost of the mental, physical and emotional wellbeing of workers (Harvey, 2015). The combination of technological changes and offshoring has led to societies in which chronic overwork co-exists with many people being unemployed. This is functional to the reproduction of the system and to sustain powerful elites, but it is dysfunctional to society as a whole.

The question is whether ‘aliens’ are great agents of change. Probably not. The point is that core capitalist institutions tend not to ‘produce’ strong emancipated personalities. They rather offer the pre-conditions for inaction, indifference and general confusion. Being and feeling ‘whole’ is not encouraged in a world dominated by private property, capitalist competition and profits because it would mean to go slower (➔ [link to 4.3.6 acceleration](#)), to encourage people to develop a sense of ‘enough’ once basic human needs are met (➔ [link to 4.3.1. overproduction and 4.3.5 overconsumption](#)), to be softer with ourselves and hence also with our natural environments (➔ [link to 4.3.3 appropriation](#)), to live more real and meaningful

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think. These practices undermine the purpose of universities as critical and independent voices of society. This cannot be in the interest of society. This is not to complain (I love academia) but to explain irrational systemic tendencies that are not conducive to transformational change.

<sup>100</sup> Again, my intention is not to deny positive societal outcomes. I cannot emphasise often enough that my purpose is not to provide a one-sided perspective. Concrete developments are always variegated. However, there are general tendencies that help us understand why certain things are more likely to happen than not.

relations with people instead of machines (➔ [link to 4.3.2 technological dynamism](#)), and to learn to let go of desires to own and possess (➔ [link to 4.3.4 commodification](#)). Striving for fulfilled and meaningful lives under capitalism means to swim against the current. “*It is not easy being green*”, Kermit the frog famously said. This is why many people who care also tend to develop escape strategies, such as dropping out from mainstream society to live in sustainability bubbles, become cynical, depressed, or pragmatic. These strategies are understandable, but are they strong catalysts for radical social change? (➔ [barrier to change](#))

#### 4.3.8 Financialisation

Financialisation is often portrayed as a defining feature of contemporary capitalism, associated with the rise of neoliberalism. The remarkable growth and instability of international finance require mentioning at the end of this chapter, even if provisionally. Even though financialisation is a global phenomenon, it stands out that it is especially prevalent in mature capitalist economies, above all the US and the UK. Is this a coincidence, or does the inherently expansive and fluid character of capital become ever more accentuated over time? It is tempting to think that societies in which the social form M-C-M' has prevailed for a relatively long time give rise to financialisation as a new social dominant form. If so, what are the societal – and environmental – consequences of purely monetary forms and relations? This brief section aims to provide some initial reflections on how financialisation relates to the circuit of capital and societal reproduction.

To begin with, what is financialisation? Generally speaking, it implies a shift of the economy in the direction of finance and growth of monetary relations, simply represented as M-M' forms. More specifically and following Marxian monetary theory, financialisation can be defined as the intensive and extensive accumulation of interest-bearing capital, i.e. money capital that is traded as a commodity in anticipation of a return (interest) (Bayliss et al., 2017). In other words, finance mushrooms in the 21<sup>st</sup> century, it becomes deep-rooted and expands into new territories. Interest-bearing capital is a broad category, subsuming quite different things such as interest from a bank account or revenues from derivatives trading. However, this definition is specific enough to highlight that not all monetary advances M-M' count as financialisation, e.g. profits from retained earnings, but only such that transform future income streams into tradeable assets. On this basis, how can we get a glimpse of how financialisation is connected to M-C-M'? I see three broad interrelations.



First, financialisation arises out of social reproduction. Without commodities and the commodity-form, the proliferation of finance would not have been possible. The whole architecture of value and capital described in the previous chapter and this one is a pre-condition for the development of more complex economic relations in purely monetary terms. As such, seemingly innocent cost-benefit-analyses to make nature's value visible are increasingly shown to have disastrous consequences. Commodification has

*“greatly facilitated financialisation by creating more opportunities for the securitisation of revenue streams and capture of monetary rewards by finance” (Bayliss et al., 2017, p. 5).*

Without the creation of carbon markets, for instance, speculation upon these revenue streams would not be possible. What starts as well-meant intentions, becomes a harsh reality that fosters the accelerated destruction of the environment. This is not a solution, but part of the problem.

Moreover, without the increasing engagement of the main actors in the circuit of capital in finance, financialisation would not have been possible (Lapavitsas, 2011): non-financial businesses increasingly operating on financial markets on their own account, to finance investments or comply with shareholder's profit interests; partly as a consequence, private banks seeking financial profits, instead of earning from traditional borrowing and lending; and individuals and households willingly and unwillingly engaging in finance too, via mortgages, credit cards, or private pension schemes, etc. Although historically and institutionally variegated, these tendencies have emerged in a political context of financial liberalisation and labour-market deregulation, which highlights the active role of States in the structural shift towards financialisation (Lapavitsas, 2013).

Second, financialisation depends on social reproduction. Financial profits are profits upon alienation (➔ [link to 2.4 profit](#)) that arise from the appropriation of revenue streams. These profits require a material basis, which links them to actual physical production. Clearly, most financial transactions do not involve any physical exchanges; and many are very dissociated from real production (such as derivatives). However, finance can only have an autonomous life on its own to a certain extent. Ultimately, financial operations are based on promises to pay (or sell), i.e. claims on future wealth (Durand, 2017). These claims are rooted in something physical, either houses or harvests or originally pigs or flowers or whatever else speculation is based upon. Even seemingly 'unphysical' operations, such as speculating on stock market indices, need a physical basis. Indices are underpinned by actual activities of listed

corporations – which are the most environmentally destructive industries. What do DAX or Dow Jones listed corporations do? They engage in fossil extraction and use (aviation, car industries); mass production of IT, pharmaceuticals, chemicals, industrial food production; and – finance (banks, insurances, credit card companies). To me, this reveals a direct link between financialisation and the large-scale destruction of life-support-services of our planet.

Third, and most importantly, financialisation shapes and restructures social reproduction. The large-scale presence and power of finance shape what people do and think. Practices to make-money-out-of-money become normalised and legitimised and encroach into people's everyday lives. If this is not an alienating trend, then I do not know what is (➔ [link to 4.3.7 alienation](#)). Crucially, financialisation tendencies imply a restructuring of the provision of basic needs satisfaction, away from an ethos of public provision of housing, water, education or health, towards private provision. This goes along with an increased individual responsibility, to care for your own pension or pay for decent health care yourself, and associated hardship and penalising that may arise from an inability to do so (Bayliss et al., 2017). Consumption patterns are shown to transform too, for instance, desires for mortgage-facilitated owner-occupation of housing (Robertson, 2017)(➔ [link to 4.3.5 overconsumption](#)). The emergence of financialisation leaves remarkable traces across societal reproduction. Tendencies that foster the private and individual are diametrically opposed to creating a stronger collective spirit and social institutions to act on global environmental challenges (➔ [barrier to change](#)).

Essentially, these three entanglements – financialisation arising out of, depending on and restructuring M-C-M' – reflect the very starting point of our investigation in the previous chapter, i.e. the relationship between use value and exchange value. Exchange value emerged as the dominant social form in capitalist societies; it has arisen out of, depends on and restructures use values, as elaborated from different vantage points in this chapter. Exchange value as a social form has developed into money M – a thing with an own existence and mirror image of commodities as use values C. In the same way, we could ask the question whether financialisation is a possible next stage in the development of capitalism, in which social M-M' forms confront the entire social reproduction of societies M-C-M'. This is not a claim, but a question that could be further explored. Is financialisation a new (or recurring?) expression of how capital confronts life in the 21<sup>st</sup> century?

## 4.4 Systemic outcomes

The outcomes of a system emerge from underlying system structure (Meadows, 2009). Section 4.2 presents M-C-M' as the simplest systemic structure of the system as a whole. Section 4.3 highlights how this structure gives rise to a more complex, tangled web of dominant tendencies. On this basis, it is possible to explain key macroeconomic outcomes: growth and crises.

### 4.4.1 Growth

Growth is the normal outcome from the movements of capital through the system. Capitalist economies expand as part of their normal reproduction. How is this expansion explained? What accumulates, when capital accumulates? I explained above how the M-C-M' movement explains how surplus is created in capitalist (re)production. Surplus means disposable resources that exceed what is required for 'simple' reproduction, i.e. to maintain the same level of production and consumption or, what ecological economists would call a 'steady-state economy' or 'circular economy'.

Surplus means that more is produced than is required for the maintenance of life. In biophysical terms, surplus takes the form of surplus products, i.e. additional amounts of 'stuff'. In monetary terms, surplus takes the form of surplus value that can be realised as profits, if commodities are sold. This means the ongoing transformation of nature into commodities is accompanied by additional money creation. But the directionality runs in the opposite direction: the necessity and desire to create monetary incomes requires the transformation of nature on an expanded scale. The key determining aspect in the circuit is the production of surplus value (Fine, 2012, p. 111). The main driver of growth is profitability. Marx, Smith, Ricardo, Keynes and other great economists agree on this point (Shaikh, 2016).

*"How can the capitalist system, whose institutions, regulations, and political structures have changed so significantly over the course of its evolution, nonetheless exhibit recurrent economic patterns? The answer lies in the fact that these particular patterns are rooted in the profit motive which remains the central regulator of the system throughout its evolution. Capitalisms' heath mutates constantly but its core remains the same" (Shaikh, 2016, p. 726).*

*"The spark is ignited in production – more is produced than is required for the maintenance of life; the natural elasticity of human needs allows*

*demand to rise to the level of supply and, once in motion, to exceed it; the increase in the means of subsistence also enables the population to grow, sending up the level of both production and the amount of goods needed to maintain life. A surplus is created only to create conditions that require a greater surplus. The former makes the division of labor possible just as the latter makes it necessary, and, caught in this vise, every success of the division of labor leads to its extension" (Ollman, 1971, p. 159).*

What can surpluses be used for? There are two options: it can be consumed or reinvested, either by adding it to an existing circuit or using it for a new one (Fine, 2012). Surplus can also be hoarded, which is a mere delay of either consumption or investment. The more surplus is available, the higher the potential for accumulation. Growth is therefore primarily driven by the rate of profit.

*"The higher the profit rate, the greater is the incentive for firms to accelerate the expansion of output and capacity" (Shaikh, 2016, p. 106).*

The profit rate is crucial for accumulation because profit expectations stimulate investments. Whether investments were successful is measured by profit (Shaikh, 2016). As the rate of profit roots in surplus value, which roots in surplus labour, it is the exploitation of labour and via it the exploitation of energy and resources that gives rise to the 'added value' of the system as a whole.

In other words, growth in capitalist economies is ultimately driven by the exploitation of labour and the appropriation of nature. This sounds quite pessimistic, especially because growth and productivity advances have also gone hand in hand with improved living standards for millions of people. My point is not to deny the positive outcomes of capitalist dynamics but to emphasise the need to understand root causes of environmental crises. From a Marxist perspective, which I find convincing, a root cause of ecological overshoot is the systemic need to create surplus value. How could it be otherwise? Growth, by the virtue of its nature, describes an increase. If something grows or accumulates, an amount increases. The two ultimate factors of production are labour and nature. The accumulation of both gives rise to growth and environmental impacts. By working more, as a world society, ever more nature is transformed into commodities.

The transformation of nature can happen more efficiently, but for the reasons stated above productivity gains, as a general tendency of the system as a whole, do not translate into working less and using less resources, but into working more and using more. The perverse sociality of capitalism traps people in a rat-race of more work and more resource use to

stabilise the reproduction of the system, even in countries that have accumulated substantial amounts of wealth. This rat-race increasingly destroys living conditions on Earth.

Ultimately, I argue that Marxian Political Economy offers one of the best growth theories we have. Growth is the outcome of intertwined physical and monetary flows through the system. The trilogy of Capital consists of little else. Growth is not unidirectional but emerges out of complex and contradictory processes associated with the accumulation of capital (Fine 2012). It arises out of the division of labour (in and between companies, industries and nations), technological progress, productivity increases, sufficient effective demand, strategies to gain access to and appropriate resources, the role of States in providing legal framework conditions for the reproduction of the system, such as enabling the enforcement of private property rights and negotiating trade legislation, the role of R&D in fostering innovations, and the provision of credit and finance, all of which are fuelled by profit and competition. Taken by themselves, these elements seem rather innocent, even the more dubious ones such as the profit-motive and competition, but taken together they form the dynamics of overshoot.

Clearly, this is not good news. At least the Marxist approach offers a realistic and comprehensive understanding of the status quo – in contrast to mainstream growth theories, which explain growth at the level of technological progress, without problematizing deeper-seated social relations. ‘Old’ exogenous growth theories that arose in the 1940s (Harrod-Domar and Solow-Swan type models) aimed to measure the contributions of labour, capital and exogenous (i.e. residual, unexplained, untheorized!) technological progress to growth (Fine and Dimakou, 2016). ‘New’ endogenous growth theories of the 1980s (Romer-Lucas-type models) aim to provide better explanations of productivity growth, however, they resemble exogenous growth theory in problematic respects (Fine, 2000; Fine and Dimakou, 2016). Both are built upon micro foundations but aim to address systemic macro dynamics; both rely on methodological individualism in which representative agents optimise utility, thereby neglecting the fundamental role of social processes and institutions; both rely on static equilibrium frameworks.

In my understanding, the consequence is that a comprehensive and systemic ‘bigger picture’ explanation of growth is missing from mainstream growth theories, and crucially, one that fails to highlight the specific social configurations in which growth occurs – which is what needs to change from an ecological economics perspective. In addition, technological innovation and productivity growth are typically portrayed in a positive light by boosting competitiveness, employment creation and sufficient tax incomes to finance social welfare systems. The

uncritical stance towards growth, even in the heterodox schools of thought, has been a core issue of discontent with ecological economists (Holt et al., 2009; Kronenberg, 2010; Martinez-Alier and Muradian, 2015a).

Mainstream growth theory is subject to fundamental theoretical inconsistencies too. Growth signifies increases in absolute quantities. How can absolute quantities be sensibly theorised from marginal utility foundations? The short answer is: they cannot. Marginal utility theory explains prices on the basis of marginal utility, rather than total utility. It is a purely relative price theory (Brown and Spencer, 2012). For some economic categories this makes sense. Prices only have meaning in relation to other prices (Elson, 1979). However, some economic categories, such as growth or profits, express changes in absolute quantities. Understanding growth implies to understand changes in total income and output, i.e. non-marginal changes. Marginal utility theory fails to provide sensible explanations of such changes. It suffers from an ‘aggregation problem’ because it lacks real quantities that can make sense of macroeconomic aggregates and allow quantitative comparisons over time. Ultimately, this means the neoclassical approach based on marginal utility theory cannot consistently explain system-wide quantitative changes, i.e. economic growth.

The profound failings of marginal utility theory are well documented in the history of economic thought. The Cambridge Capital controversies, for instance, established the impossibility to sensibly measure capital and on this basis erect consistent growth theory, starting from marginal foundations (Harcourt, 1969). However, instead of seriously rethinking the foundations of mainstream economics as a consequence of devastating critiques, ‘toy models’ are deployed that model the economy as if it consisted of only one sector (Brown and Spencer, 2012; Fine, 2000). This approach circumvents and hides fundamental problems instead of seriously aiming to solve them.

I think Marxian value theory provides a sensible alternative. By acknowledging the distinct but interrelated nature of use value and exchange value categories, the Marxian approach keeps real biophysical categories at the heart of understanding economic dynamics. On this basis, it is possible to consistently theorise growth as the exploitation of labour and appropriation of nature. However, as I highlighted in the previous chapter, Marxian value theory and its ramifications for understanding real-world dynamics of the system as a whole remain surprisingly little understood.

#### 4.4.2 Crises

Capital needs to move, otherwise it ceases to exist, as explained in section 4.2.2. Crises are typically understood as periodical interruptions in the flow of capital accumulation. Depending on where disturbances happen in the M-C-M' movement, different crises occur (Harvey, 2010a). In the sphere of production (M-C), lack of sufficient credit provision, for instance, can lead to profit squeeze crises. In the sphere of exchange (C'-M'), lack of effective demand results in crises of underconsumption. Any individual crisis has specific triggers, which arise from the concrete characteristics of capital accumulation at a certain point in time and place, and need to be studied as such. At the same time, crises are not accidental, exceptional and subject to always varying causes. Rather, capitalist production is *structurally inclined* to crisis formation.

This is because of the tendency to overproduction. From a Marxist perspective, the origins of the crisis-riddled nature of the capitalist system are to be found in overproduction, i.e. a mismatch between production and effective demand, i.e. more commodities are produced that can be sold at a price that enables the realisation of surplus value embodied in those commodities (Clarke, 2012). Why is more produced than gets consumed? Because production is not mainly driven by consumption, but by the appropriation of surplus value. And from a systemic point of view, the reason why companies strive for profit is capitalist competition. Overproduction is hence rooted in competitive struggles that force companies to expand markets and cut costs. The main way this is done is by advancing technology. Producing as much as possible cheaply drives competitors out of the market, supply runs ahead of demand, and the result is systemic imbalances, which can be further exacerbated by the expansion of credit (Clarke, 2012). Eventually, bubbles burst and devaluations take place. Devaluations eliminate overproduction and pave the way for new rounds of capital accumulation.

Devaluations involve severe social hardship and struggle over who has to bear their costs. Capitalist crises, therefore, bear severe social conflict potential, especially if they persist for longer periods, such as high rates of unemployment or falling real wages. Stabilising forces become essential. The State is the central re-stabilisation institution. States manage messes. They do not create growth or crisis – financial bubbles or climate change – but try to alleviate their socially disruptive outcomes (Meadows, 2009). The way this is done is by trying to re-establish the conditions for the reproduction of capital and offering support to those who suffer most from immediate consequences of the malfunctioning of the system. However, this

strategy no longer works in the face of multiple global environmental crises, because capital reproduces by degrading the environment.

The number one message from ecological economists is that growth leads to environmental destruction. The Marxist perspective explains why. Section 4.3 explains how the systemic pressures to overproduce, innovate, appropriate, commodify, overconsume, accelerate, alienate, concentrate and financialise give rise to increasing energy and resource use. The total amount of energy and materials used counts as a proxy for environmental impact (Schandl et al., 2017). Eco-Marxists have a strong legacy of demonstrating how these dynamics unfold in practice (Clark and Foster, 2009; Foster et al., 2010; Foster and Burkett, 2016; Malm, 2016; Moore, 2015).

Eco-Marxists emphasise the need to distinguish between two types of environmental crises: traditional economic crises, in which environmental constraints impinge on further capital accumulation, for instance if cheap fossil fuels cease to exist. These crises have the potential to lead to rising costs of production and a subsequent fall in profitability. They can be temporarily 'solved' by capitalist restructuring, that is, capital manages to shift around ecological problems to pave the way for new rounds of accumulation. Such crises remain within the capitalist mode of production and often intensify the social metabolism by creating new ecological problems, e.g. by shifting from traditional fossil extraction to fracking. But shifting problems does not resolve fundamental contradictions underpinning capitalist production. Rather, more fundamental crises of human development emerge (Burkett, 2009). They indicate that the metabolic rift between capital and nature becomes progressively wider and deeper over time (Moore, 2000). The issue at stake is not just economic crises but life itself as Earth Systems are increasingly disrupted. Such epochal crisis would and could only be resolved by a *"fundamentally new historical configuration of wealth, power, and nature"* (Moore, 2015, p. 125).

Some authors believe that regulatory mechanisms exist that prevent such ultimate crisis to happen (e.g. O'Connor, 1988); which ultimately lead to a view that capitalism could be fixed; others stress the problem that capital continues thriving and reproducing on the basis of a degraded environment (e.g. Foster and Burkett, 2016). This means there is no real feedback mechanism, as often supposed, from rising ecological cost to economic crisis but the perverse logic of the system leads to new industries and markets that make money with the destruction of nature (such as waste management and carbon trading). This privatisation of formerly commons only accelerates further destruction (Foster et al., 2010). The conclusion here is that



nothing less than a revolution is necessary for effectively tackling global ecological crises. For summaries and more insights into the eco-Marxist crisis literature I refer the interested reader to, for instance, Economakis and Papalexiou (2016), Foster and Burkett (2016), Moore (2011) or <http://climateandcapitalism.com>.

Accelerating and intensifying global environmental crises put the State as a central stabilising institution in an increasingly schizophrenic position. Social stability under capitalism requires to support the reproduction of a system, whose destructive forces become ever more visible. 'Normal' crises of capitalist development and reproduction tend to intensify in the presence of financialisation. Additionally, they increasingly overlap with epochal crises, which cannot be resolved through renewed capital accumulation (Moore, 2011). This gives rise to the notion that we live in an era of multiple crises, in which ecological, economic, financial and social crises intersect. The contradictions between supporting life and supporting capital widen. Relying on traditional strategies to enable the reproduction of the system become increasingly untenable.

However, until now, States often continue to defend, support and promote capitalism as best of all possible worlds by highlighting the positive effects of the trickle-down-system and underexposing increasingly negative ones. To be fair, the State is not a monolithic organisation but consists of different institutions with opposing and contradicting internal forces. Different ministries and agencies have different mandates and missions, however, the distribution of power within States clearly tends towards supporting the status quo, even in the more progressive Western welfare states. Ask yourself: how powerful is the environment ministry in comparison to, say, the Treasury? Whose interests do these institutions represent?

*"If a government proclaims its interest in protecting the environment but allocates little money or effort toward that goal, environmental protection is not, in fact, the government's purpose" (Meadows, 2009, p. 14).*

This is not to suggest that States do not have a major role to play in fighting social ecological crises. They certainly have. However, we need to face scary, absurd and lethal realities, instead of hiding behind technological solutions which are not in place. Marxian Political Economy offers a realistic comprehensible approach that explains the emergence of planetary crises.

How are crises of the system as a whole explained in mainstream theory? Not well. Why? Starting from marginal utility foundations, neoclassical economics envisions the economy as a system that maximises pleasure and minimises pain, with supply/production/marginal costs on one side and demand/consumption/marginal utility on the other. This idea gives rise to a

conception of the economy as a cost-benefit system. The market is portrayed as the central coordinating mechanism that efficiently balances opposing forces and interests towards socially optimal outcomes. Mainstream theory thereby neglects inherent conflict potentials, crises and power imbalances. Crises are essentially exogenous shocks that disturb an otherwise self-equilibrating system. The word 'externalities' as something stemming from outside captures the idea well. Marx contested this worldview already 150 years ago by showing how capitalist crises are recurrent endogenous features of a system structurally geared towards uneven development and inequalities.

## 4.5 Conclusions

The contribution of this chapter to ecological economics is four-fold. *First*, I identified and detailed in chapters 1 and 2 that ecological economics lacks a theory of the system as a whole that explains social ecological dynamics and crises. This chapter addresses this gap, building on the value theoretical foundations of chapter 3. It introduces the general circuit of capital M-C-M' as a simple, intuitive and powerful framework that explains how global environmental problems and crises emerge and why they persist. The circuit of capital is the Marxian theoretical backbone of the system as a whole that explains long-run dynamics, irrespective of accumulation regimes and countries. It gives rise to tendencies that fuel environmental overuse: overproduction, technological dynamism, appropriation, commodification, overconsumption, acceleration, alienation, and financialisation. These tendencies, in turn, result in macroeconomic outcomes: growth and crises formation.

What does the circuit of capital explain? In a nutshell, it explains how the production of commodities spurs surplus value creation, in Western economies predominantly by the increasing use of energy and resources driven by technological advance spurred by capitalist competition; how sufficient effective demand is required and created to meet the level of production; how crises emerge if this matching does not function; how international relations – peacefully via trade and non-peacefully via violent appropriation – enable access to the increased demand for energy/resources and also labour; how credit provision balances different time frictions throughout the circuit; how financialisation fuels short-termism and systemic instabilities; how a tight network of transport and communications networks allows for the physical flows of people, information, energy and resources; how the State provides the legal architecture for the reproduction of the system and ensures more or less

redistribution of its surpluses. Taken together, these relations explain the expansion and acceleration of capitalism around the globe.

How does this understanding help ecological economists? How does attention to value analysis make a difference in the way that this problem is seen? In essence, the Marxian understanding of 'capital' explains systemic reasons for the 'growing economic subsystem' that lies at the centre of ecological economists' concerns (see Fig 1. page 3). It shows how and why capital is the core problem – rather than growth – because it is what gives rise to an expansive capitalist system, which fuels energy and resource overuse as proxies for environmental destruction, as detailed by various tendencies in this chapter. Capital, in turn, can only be understood on the basis of value theory (chapter 3), with an understanding of the crucial role of labour exploitation at its heart, which is not overemphasised in Marxian Political Economy but underemphasised in ecological economics.

*Second*, and following from the first contribution, this chapter specifies the systemic challenge ecological economists aspire to address. When ecological economists speak about the need for social ecological transformation and systemic change, what does this mean? From a Marxist perspective, the systemic challenge is to confront M-C-M' as dominant social structure of the system as a whole. M-C-M' is the simplest characterisation of the capitalist system. It highlights that capitalism is primarily a mode of production for profit, not need. The drive and structural necessity to extract surplus value – based on the exploitation of people and the natural environment – highlights the inherently expansive character of the system. Environmental problems emerge as undesirable by-products of system-inherent structural dynamics. No one deliberately creates environmental problems but they emerge anyway. A comprehensive understanding of capital remains however widely missing in ecological economics, as described in section 4.2.2. Part of this neglect can be explained, I think, by the still strong prevalence of neoclassical economics within ecological economics. I identify neoclassical economics as a barrier to change in this chapter, because it hides from essential issues and deep explanations of ecological destruction. Many ecological economists share this view. However, this chapter shows that the traces to neoclassical economics sit deeper in ecological economics than often assumed, which influences what gets studied and addressed in ecological economics, and what not.

In terms of policies, this means Marxian value analysis brings more clarity what types of interventions are urgently needed: those that have a potential to transcend the dominant M-C-M' structure. Demonstrating that the logic of capital is diametrically opposed to steady-state

or circular economy or living well within limits ambitions advocated in ecological economics has practical implications for research, outreach and action. It does not mean that these ambitions are impossible to reach; however, it implies what is required for coming closer to achieving them is a full confrontation with capitalism, with a recognition of the need for social struggles at its core. Acting in accordance with the 'good of the whole' means to transcend capital, rather than feed it. Research can be harmful, when it feeds, rather than transcends, and we should be aware of it.

*Third*, the circuit of capital can serve as a tool for integrating knowledge in ecological economics. The dominant tendencies of capitalist reproduction that I describe in section 4.3 are not new to ecological economists. However, they have been dealt with rather separately. Ecological economics has a lot of essential pillars in place to understand the political economy of nature, but it has not brought them together to form a substantive, comprehensive and consistent theory of the economy as a whole. The circuit of capital provides this framework and helps to bring 'order to chaos' in terms of identifying different drivers of environmental destruction at different levels of social ecological reality. As a realistic representation of the system that explains social ecological shifts, it has the capacity to bring a lot of empirical and theoretical work in ecological economics systematically together. This framework also points to some limitations in ecological economics. The strong emphasis on economic growth and the biophysical underpinnings of growth comes at the expense of prominently addressing underlying economic and social drivers of ecological destruction. The capitalist core – the trinity of capital, profit and competitiveness – remains surprisingly implicit in ecological economics, which I identify as a serious omission, because it prevents the upfront confrontation of capitalist institutions that prevent, instead of encourage, sustainability transitions.

*Fourth*, by drawing parallels to systems thinking, I show that Marx's understanding of capitalism is consistent with the scope, approach and ambitions of ecological economics. The Marxian realist and systemic approach enables an understanding of the interrelations between monetary and biophysical dynamics, rather than viewing them separately (this was one major point of critique in the steady-state economic approach in chapter 2). On this basis, the explanatory power of the Marxian approach can hardly be underestimated. The circuit of capital encompasses the whole life cycle – spanning production, consumption, and waste streams – and hence traces the reproduction of the system as the flow of use values and exchange values through the system. This explains growth, profit and accumulation dynamics

and their entanglement with destructive environmental feedbacks. This understanding is tightly intertwined with an understanding of power and vested interests and the role of key capitalist institutions, such as markets, credit provision, finance or the State which illuminates implementation barriers and limits of policy-making.

Ultimately, this chapter aims to establish the credibility of the Marxian approach by demonstrating its explanatory power. By starting from M-C-M' as the dominant social structure driving capitalist reproduction, various implications for society can be shown. This is not rocket science. It also does not require a set of highly abstract assumptions, as in neoclassical economics, to 'prove' the efficiency of markets. On the contrary, by adopting a realist Marxian perspective of capitalist markets, it can be shown how harmful they are. Facing reality in this way is a precondition for a more honest debate about what interventions are needed to deliver sustainability transitions. Transparency is power, as Arild Vatn, one of my teachers, remarks and the comprehensive and realistic Marxian approach is good at uncovering what is important and what often remains hidden from neoclassical analysis.

How, then, can ecological economists take this analysis on board? The framework of 8-fold tendencies underpinned by the capitalist core and the value categories established in the previous chapter can be applied to specific sustainability problems, at local, regional or global levels. The task is to follow flows of value throughout the whole system. This is how biophysical analysis, where ecological economists are strong, can be combined with Marxian value theory. The Marxian approach provides the framework for understanding how value streams that appear in biophysical, monetary and other social forms travel together through the system. Use value and exchange value flows can be traced, for example, to understand waste or emission flows throughout production and consumption systems (e.g. Horton, 1997). I do not provide any specific empirical analysis here, because it would require another PhD to trace the specific cultural, monetary, historical and other context-specific circumstances that a good political economy analysis of a specific problem requires. What I contribute are core theoretical building blocks to understand why such problems arise, evolve and persist. As such, I provide a theoretical bridge to many applied eco-Marxist political economy analyses that operate on these foundations, without usually making them explicit (e.g. Mattioli et al., forthcoming; Bayliss et al., 2015). More such analyses are needed in ecological economics because this is what it takes to put into practice what has long been claimed necessary for ecological economics: to develop the field further as radical political economy of nature.

Ecological economics can play a powerful role in the societal uptake of progressive policies and actions towards sustainability. However, it has neglected the central role of capital, profits and competitiveness and a comprehensive understanding of the interrelated movements of biophysical and monetary flows through the system. This chapter is an invitation for ecological economists to re-consider research in light of an understanding of the capitalist core; to think through bundles of proposals to confront the interconnected nature of social ecological problems; and to let go of inherited pre-conceptions against the Marxian approach.

# 5 Conclusions

*“The future can’t be predicted, but it can be envisioned and brought lovingly into being. Systems can’t be controlled, but they can be designed and redesigned” (Meadows, 2002, p. 1).*

*“Keep fighting” (Chick, 2018).*

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## 5.1 Synthesis of results

Ecological economists accentuate ‘the system’ and ‘social ecological transformation’; Marxists ‘capitalism’ and ‘revolution’; both mean essentially the same. Both traditions share a commitment to systemic thinking, realism, and ambitious changes, yet they have lived rather separate lives. I argued in chapter 1 that the core of Marxian Political Economy is what is missing in ecological economics: understanding and explaining the dynamics of the system as a whole in a realistic and coherent way. I introduced this core in chapters 3 and 4, thereby showing how an understanding of value and capital allows comprehending the capitalist system and on this basis social ecological dynamics and barriers to social change.

In this section, I synthesise three key results of this thesis. First, I find that traces of neoclassical economic theory and reasoning sit deeper in ecological economics than often assumed (section 5.1.1). Second, I present the Marxian understanding of value and capital as the missing core of ecological economics: a realistic understanding of the capitalist system, spelled out from the basics in simple and abstract terms (section 5.1.2). Third, I highlight the importance and political content of economic methodology. I argue that both the substantive failings of neoclassical economics and the explanatory power of the Marxian approach can be traced back to methodological differences (section 5.1.3). The first finding establishes a critique of ecological economics from a heterodox and particularly Marxian perspective; the latter two provide the contours of a Marxian alternative, with vast scope for future applications and concrete developments.

### 5.1.1 Neoclassical economic thought is more prevalent in ecological economics than often assumed

Contrary to widespread views that ecological economics is the heterodox school of thought of the environment, I conclude that the roots of neoclassical economics sit deeper than often assumed. This insight arises throughout chapters 2-4. I expose how ecological economics implicitly remains tied to neoclassical theory and reasoning in all three resulting chapters, and detail in each instance why this is problematic.

In chapter 2, I argue that steady-state economics implicitly relies on a neoclassical understanding of the economic process.<sup>101</sup> By accepting allocative efficiency of markets, the core of neoclassical economics is incorporated into the steady-state framework. This leaves steady-state economics in an ambiguous position: Daly vigorously criticises neoclassical economics on various grounds, but also unconsciously – or strategically – adopts several of its features. My main point of critique is that steady-state economics fails to provide a realistic

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<sup>101</sup> I have been accused of grossly misinterpreting and misrepresenting steady-state economics and its relation to neoclassical economics in a response that was published as a result of my critique. *“The characterisation of the SSE in Pirgmaier’s paper is neither deep nor correct”* (Farley and Washington, 2018, p. 447). The authors mostly agree with my critique of neoclassical economics but then distance steady-state economics from neoclassical foundations. However, I find that Farley and Washington portray and defend Daly’s approach exactly along the same lines that I criticised. They insist that Daly’s understanding of allocative efficiency is biophysical, rather than neoclassical, but then argue that carefully constrained markets can be Pareto efficient (p. 445). *“We do believe that once we have achieved ecological sustainability and just distribution, markets can help us achieve efficient allocation”* (p. 446); they highlight that scale and distribution must be *“imposed from outside the market”* (p. 445); they emphasise economic growth as the source of crisis, but without explaining how it arises; and argue that *“markets... already exist, are widely accepted, and should be used until something better emerges”* (p. 446), thereby providing an undifferentiated view of markets. Farley and Washington also adopt Daly’s pragmatism about the role of theory, which I identify as dangerous. Whilst acknowledging that theory is important, the authors think that *“all economic systems, capitalist, socialist or other, have disrupted global ecosystems”* (p. 447) and that *“there is shockingly little evidence that the theories from any economic schools truly explain our evolving system”* (p. 447). *“Our biggest challenge right now is not to exactly define how the system works, but rather to convince people that major changes are required in the immediate future”* (p. 448). As *“the problem is much deeper than capitalism”* (p. 447) we *“should perhaps focus on human behaviour and evolutionary psychology, rather than more nuanced economic theories”* (p. 447). After all, *“all scientists must accept that few assumptions underpinning any science are perfectly realistic”* (p. 445). Whilst I certainly agree with the urgency to address global ecological crises, I see our role as academics to provide sharp analysis of deep systemic problems as the basis for radical policies. This demands better economics – which exists; we do not have to reinvent the wheel but learn from heterodox traditions, rather than giving up on economics, nuance, history and complexity. All theories are abstractions from reality; however, there are very different ways to theorise and formulate assumptions. Neoclassical economics makes assumptions irrespective of its relation to reality, which ultimately can be shown to lead to policies that support the status quo, instead of challenging it. This cannot be in our interest. We cannot allow ourselves to compromise on realistic, ambitious, and systemic analysis.



economic theory that explains ecological impacts and social crises, with the practical consequence that it limits and partly misguides the proposed solution space. It lists normative goals of sustainable scale and just distribution, and policies and institutions to achieve those goals, but it does not explain how growth dynamics emerge and why steady-state proposals face extreme implementation barriers. As a consequence, steady-state proposals reflect a widely uncritical reliance on core capitalist institutions such as nation states to deliver ‘rational’ sustainability policies. They also adopt an undifferentiated view of markets as part of the solution, in problematic areas such as tradeable birth certificates to cap population growth.<sup>102</sup>

In chapter 3 I show how ecological economists mimic the neoclassical conception of the economic system as a whole. Value theory is hardly debated in ecological economics, but what ecological economists do – in practice and as a collective, as illustrated by five different camps within ecological economics – is to study the ‘real real’ economy. Ecological economists thereby implicitly adopt a neoclassical economic conception of a ‘real’ economy, rather than understanding and confronting capitalism as monetary market economy, which would imply to emphasise the social and monetary drivers underpinning matter-energy use. Marx’s core critique of Classical Political Economy was that it constituted a wrong conception of the economic system as a whole. Does the same critique hold for ecological economics today? By characterising the economic process as a transformation of matter-energy into goods and services, even some of the most progressive thinkers in ecological economics fall back into a C-M-C conception of the economic process:

*“The economy is a complex process that converts raw materials (and energy) into useful goods and final services” (Kallis, 2017, p. 2).*

This sounds intuitive, but for understanding the general working of the system as a whole it is misleading. Capitalist production is driven by the exchange of money quantities, not (physical) commodities, and the reproduction of money quantities on an extended scale. Commodities and underpinning matter-energy stocks and flows *enable* this process, rather than motivate it. Ecological economists might argue this is obvious, but I argue it is highly problematic that basic economic foundations of capitalism are not made crystal clear and explicit in ecological

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<sup>102</sup> I would not have dared to suggest transferable birth licences as an indicative example of Daly’s approach, as this proposal mainly dates back to his early steady-state writings in the 1970s and ‘80s. However, I was shocked to see it as part of the possible options proposed in Farley’s and Washington’s (2018) recent attempt to defend steady-state economics.

economics (best at the beginning of ecological economics textbooks). Realistic and transparent economic foundations are essential to support the development of transformative proposals and strategies to tackle devastating ecological destruction more effectively.

Next, in chapter 4 (especially section 4.2), I highlight how ecological economists widely neglect deeper seated social drivers of environmental destruction such as profits, capitalist competition and an understanding of capital as a historically specific social form of economic organisation – in much the same way as these drivers are neglected in neoclassical economics. Ecological economists attack economic growth – prominently and vigorously – as key problem underpinning ecological destructions of all kinds. The real fuel of economic growth is considered to be coal, oil, gas and natural resources, as well as technological advance. By framing the problem predominantly in biophysical terms, ecological economists remain fairly close to a neoclassical mechanistic understanding of capital and the economic growth process. This establishes an understanding of what is happening, but not why. As Ilyenkov remarks: a *“superficially materialist-mechanistic explanation [is] only a ‘bit’ of an explanation”*, leaving in the dark the bulk of it (Ilyenkov, 1977, p. 11). What destroys life on Earth is not natural, but social. Energy, resources and technology become meaning as social categories. I conclude that ecological economists overemphasise growth – both economic and biophysical – at the expense of underpinning social drivers of ecological destruction, most generally the systemic extraction of surplus value.

The general conclusion from chapters 2, 3 and 4 is that – despite a general scepticism and repudiation of neoclassical economics within ecological economics – it exerts a strong influence in crucial respects. This holds for the progressive camps within ecological economics too, for instance, in statements such as

*“the study of the market (the chrematistics) should come after the study of ecology and social institutions ... the market economy could not exist without social institutions, and without the unpaid services of ecosystems”*  
(Martinez-Alier and Muradian, 2015b, p. 2).

Whilst it is clear that humans cannot exist without functioning ecosystems, Martinez-Alier’s and Muradian’s framing is problematic because it guides research away from a realistic study and full confrontation of capitalism – as a major driver behind global ecological challenges. Important questions and issues are left unanswered because they often remain unasked in

ecological economics. For instance, financialisation is hardly studied at all in ecological economics.<sup>103</sup>

I find that some of the most progressive thinkers in ecological economics, who aim to radicalise and redirect ecological economics along heterodox lines, often do not go far enough in directing research to key issues at stake. Spash's seminal contribution *New foundations for ecological economics* is one example. Spash critiques orthodox economics for failing to address reality and suggests seeing

*“the future of ecological economics firmly amongst heterodox economic schools of thought and in ideological opposition to those supporting the existing institutional structures perpetuating a false reality of the world's social, environmental and economic systems and their operation” (Spash, 2012, p. 36).*

However, in what follows, Spash does not mention profits, competition, surplus, financialisation, or money – at all. ‘The economy’ is mentioned only once, in the typical ecological economics representation of the economic process as *“the economy is embedded in the Natural environmental and subject to the Laws of Thermodynamics”* (Spash, 2012, p. 43). Economics, on the other hand, is mentioned 231 times in this article, mainly to criticise the mainstream. My point is that almost all ecological economists critique neoclassical economics from a sustainability perspective, the problem is that we – as ecological economists – often unconsciously keep thinking in mainstream economics terms, which influences what gets studied and what not. Letting go of neoclassical economic foundations is more easily said than done. Whilst many ecological economists accept the need to promote a development of ecological economics that puts the social and political economy to the fore (not least by Clive Spash's seminal works, e.g. Spash, 2017), I think it is not superfluous to reiterate that our field needs to be grounded in an understanding of capitalist dynamics of the system as a whole. It needs to become a more critical and political social science.

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<sup>103</sup> A Scopus title-abstract-keyword search for financialisation in *Ecological Economics* yields 0 results (9 August 2018).

### 5.1.2 The value of value theory. Understanding the Capitalocene

In this PhD, I argue that classical Marxian Political Economy provides theory and methodology 'fit for purpose' for the further development of ecological economics. It has the capacity to ground ecological economics in a realistic understanding of capitalist dynamics. The core message that I tried to convey in chapter 3 is that – contrary to widespread views within ecological economics – Marxian value theory is neither monistic, favouring labour, neglecting the environment nor outdated. Rather, it is part and parcel of understanding the essence of the capitalist system. I argued that understanding commodity exchange and the entanglements of use value, exchange value and value help to understand what matters in capitalism and how it shapes the world around us. Concluding, I raise the question: What are the implications of Marxian value theory for ecological economists?

To begin with, value reveals the essence of the capitalist system. The behaviour and dynamics of every system follow a function or purpose that is often difficult to detect (Meadows, 2009). The function of the capitalist system is to produce value. The reproduction of capitalist societies spirals around the extraction of surplus value. Prices are not determined by supply and demand, but by abstract socially necessary labour time. By driving prices down, the market exercises pressures on people and the use of energy and resources in manifold ways, some of which I highlight in chapter 4. Marx's value theory thereby unpacks the specific and dominant forms of exploitation of labour and the appropriation of nature under capitalism. It shows how capital contradicts the fundamental limitedness of resources because of its drive toward infinite self-valorisation (Saito, 2017). The system depends on matter-energy but is also blind to its environment (Luhmann, 1987). This is a core systemic contradiction, which becomes ever more apparent in the face of global environmental crises.

This understanding helps ecological economists to concretise the systemic challenge we are facing. What do we mean when we speak of systemic change and the need to restructure the economy? What are the main problems? Money? Modernity? The market? Globalisation? Neoclassical economics? We could say that the main problem with capitalist value production is that capitalist societies are too successful. The seemingly collaborative highly productive and efficient global division of labour locks societies into increasingly destructive modes of living, as the result of systemic forces that drive abstract socially necessary labour time down. The systemic challenge, from a Marxist perspective, is therefore to transcend the dominant value regime. The systemic structure M-C-M' is a positive re-enforcing feedback loop that overshoots, if nothing is done to break it. From a sustainability perspective, it is a problem-

generating structure (Meadows, 2009, p. 112). A systemic trap can be escaped by recognizing it, or by altering its structure, for instance by reformulating goals, altering feedback loops, or adding new feedback loops.

How this can be done is difficult to conceive. However, it seems clear that it cannot be done on a simple and abstract level as the one adopted in this thesis. This thesis provides the foundations for future developments – foundations which are missing and developments which can happen much more in ecological economics.<sup>104</sup> On an abstract level, we are only able to say that capitalism tends to destroy the environment. However, “*Marx was never satisfied with such an abstract thesis*” (Saito, 2017, p. 260). Where and how the core contradiction between capital and nature (life) manifests, requires concrete analysis. Value theory serves as starting point and guiding thread for more in-depth studies of capitalism and concrete manifestations of ecological problems and spaces for transformative changes.

The capitalist system has proven highly adaptive and more capable of surviving than often thought in the past. Against this background, Marxian thought is often portrayed as not acknowledging the positive benefits and progress of capitalism and accused of painting a too grim and pessimistic picture of the world. Surely, there are happier stories to be told. About optimal markets leading to socially desirable outcomes, for instance. A flat and deterministic understanding of Marxist Political Economy often ends in biased positions of favouring ‘poor’ workers against ‘evil and greedy’ capitalists, the salvation of which can only be found in communism, as the systems next and inevitable destination. Such caricatures of Marxian thought are not helpful for a constructive agenda in ecological economics.

The strength of Marx’s analysis lies in the investigation of general dominant reproduction tendencies of the system as a whole. The explanatory power of this comprehensive and careful unfolding of the capitalist system can hardly be underestimated. The description of the system in the form of M-C-M’ is an incredibly simple and powerful notion that explains dominant forces in society. It provides a realistic assessment of capitalism as a surplus value-driven system. If our aim is to understand global environmental change, we are not well served by relying on theories that tell a more comforting story, nor stories that favour workers or capitalists or other societal groups, nor narratives that are used in the mainstream policy

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<sup>104</sup> A clearly spelled-out understanding of capital in the form of M-C-M’ underpinned by Marxian value theory is absent in ecological economics, as I show in chapters 3 and 4. This understanding can enter textbooks and teaching materials and can be used to reconsider and reshape research and actions.

discourse. We are all part of the same system. This is what needs to be understood and this is what Marx was good at explaining. There is a clear need to advance Marxian thinking within ecological economics, ‘from misunderstanding to meaningful dialogue’, as Douai aptly puts it (Douai, 2016). This PhD intends to be one contribution to this end.

### 5.1.3 The power of economic methodology

Ideas matter, no matter whether they are empirically right or wrong. Economic ideas matter especially because they are closely tied to access to resources and power. Economic methodology influences how economic ideas and theories come into being. From this perspective, methodology becomes a practical tool, with highly political content, because it either illuminates what we otherwise do not see or obscures and leaves in the dark, what is important.

*“The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influence, are usually the slaves of some defunct economist. Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back. I am sure that the power of vested interests is vastly exaggerated compared with the gradual encroachment of ideas” (Keynes, 1936, p. 234; emphasis added).*

Power is often insidious when hidden. Who would think that an innocent-looking subject such as economic methodology is a good way to hide power? I argue it is and that both the failings of neoclassical economics and the explanatory power of the Marxian approach can be traced back to methodological differences. The message for ecological economists is that the pragmatic use, neglect or failure to take economic methodology seriously can promote the reproduction of power relations that prevent, instead of encourage, sustainability transitions.

The practical implications of different methodological underpinnings can be fatal. In chapters 3 and 4 I highlight how mainstream methodological foundations rooted in British empiricism result in nothing less than a wrong conception of the economic system as a whole. Treating the economy as if it were a C-M-C system, it can be argued, is, inter alia, the result of methodological individualist foundations. Ilyenkov (1960) states that Smith and Ricardo had the ambition “to understand the capitalist system of interactions as a complex whole” (p. 169) but that they were lacking the methodological tools to do so. Their “analysis killed and

*destroyed exactly that which we intended to understand”* (p. 169). Core economic phenomena such as value, prices, profits or growth are emergent phenomena, which arise out of the interaction of complex dynamics. A methodological individualist architecture that singles out individual categories is incapable of making sense of these realities.

In chapter 4, I show how the methodological corset of neoclassical economics is associated with a mechanistic understanding of capital, a flat and incoherent understanding of profits and an idealised assuming-away of capitalist competition. The neoclassical approach thereby fails to explain much of what matters for understanding social ecological dynamics. A key critique of Marx was that mainstream economists are pre-occupied with appearances rather than attempting to uncover the real essences of the world. This limits the explanatory power of theories because they are not able to grasp and explain underlying drivers and mechanisms of surface appearances. This matters for understanding root causes of social ecological problems.

Chapter 2 shows how Daly’s steady-state approach remains infused with ‘old’ neoclassical economic thinking. Despite his claim that *“it is past time to change the basic framework of our thinking”* (Daly, 1996), I find Daly’s approach remains tied to externality and equilibrium thinking. It also perpetuates analytical separations, such as the split between the monetary and the biophysical economy, or the political sphere ‘outside the market’ and the market itself, or the idea that scale, distribution and allocation are separate entities that can be implemented by separate institutions. On this basis, I find steady-state economics does not go deep enough – in terms of explaining root causes of ecological destruction and barriers to change for Daly’s suggested ‘policy candles’ – and it does not go far enough – in terms addressing power, politics and vested interests, for example. Ultimately, I find that internalising neoclassical reasoning impedes the ability to understand and address social ecological crises realistically.

I argued against mainstream thinking for ecological economics throughout this thesis and tried to show how a neglect and failure to reason in dynamic, systemic and realistic terms easily leads to dropping important elements that explain real-world dynamics. The claim that neoclassical economics needs to give way to ‘new economic thinking’ is far from new and generally accepted in ecological economics. It is not difficult to criticise the mainstream for being reductionist; it is also not difficult to agree on the need for more realism and systems-thinking. However, it is not straightforward how this can be done. How is it possible to grasp complex dynamic realities? This is a methodological question.

The way ecological economists typically address complexity is by adopting inter- and transdisciplinary research methodologies, coupled with pleas for pluralism. This is one way towards the integration of knowledge. It can become problematic when interdisciplinarity becomes an eclectic bricolage of mixing incoherent ideas together. Chapter 2 illustrates steady-state economics as one problematic example. One message from a Marxian perspective is that there are different ways how knowledge can be integrated. The Marxian approach is holistic and systemic and insofar interdisciplinary *in itself*. It studies the object of investigation from different vantage points, works with concepts rooted in reality, and does not shy away from real-world complexities, interconnections and contradictions. In chapters 3 and 4 I introduce elements of Marx's methodology, specifically the method of systematic dialectics, grounded in dialectical materialist philosophy. I show how this method was crucial for Marx to develop a realistic theory of value and conception of the capitalist system as a whole. I also show how it resembles a systems thinking approach aspired to in ecological economics.

I conclude that the explanatory power of Marx's understanding of value and capital can be traced back to its unique methodological foundations. From this perspective, sound economic methodology is not a waste of time, but a practical tool for understanding complex realities and insurance against ideology. By thinking through, step by step, how different categories are interlinked to form a whole, it is possible to conclusively explain rather than haphazardly infer how the capitalist system functions. The combination of Marxian philosophy (materialist dialectics), method (systematic dialectics) and theory (Marx's analysis of capitalism) has the potential to improve ecological economics along the lines of its core subject matter: the study of social ecological interrelations with a view to sustainability transitions.

## **5.2 Moving forward. Elements of a critical research agenda for ecological economics**

This section turns the synthesising conclusion of the previous section into research priorities looking forward. What are the implications of these insights for ecological economics and how to deal with interconnected social ecological problems?



### 5.2.1 De-mystify and confront the power of economics

Speaking as an economist has authority and power. But as Veblen emphasised long ago, neoclassical education may contaminate instinct (Reinert et al., 2016). As neoclassical economics remains alive and well and extremely influential within ecological economics, grounds remain to contest it. It is not just another school of thought in a pluralist toolkit, but a hegemonic discipline that protects vested interests and core capitalist institutions, rather than critically exposing and dismantling them in the broader societal interest. What has always been problematic becomes dangerous in the face of accelerating global ecological catastrophes, because without active interventions, large-scale planning and serious rethinking of established ways of living, social conflicts easily escalate.

One way to address power is by making it visible. This calls for researchers to look for what is not spoken and written about, who is left out and why. From this perspective, critique becomes an essential ingredient of transition and expression of active resistance. It helps create transparency by informing people about unacceptable circumstances and can be combined with building constructive alternatives at all times. This includes debunking economic myths and challenging the dominant narrative where it is false or morally wrong. Mainstream economics remains a social disaster and core barrier to systemic changes (as identified in chapter 4), but one that can be de-mystified and confronted.

Meadows (1999) identifies the mindset or paradigm out of which the system – its goals, power structures, rules, and culture – arises as a more important lever for change than the actual goals and structures of the system (Meadows, 1999). Similarly, Oreskes and Conway (Oreskes and Conway, 2014) expose belief-systems around market-fundamentalism as a core reason for potential societal collapse. M-C-M' is a structure, not an idea, however, what keeps it alive are powerful economic ideas and narratives, which can be dismantled. By adopting a highly critical stance towards mainstream economics and institutions and by providing fierce critiques of their real-life implications, ecological economists can play an important role as loud and critical societal voice. The challenge remains to 'capture the castle', as Victoria Chick calls it, and reclaim economics not only as a social science but also as a life science.

## 5.2.2 Transcend capital

This thesis has just set the contours – in abstract and simple terms – of an understanding of the capitalist system and some of its social ecological ramifications. The general theoretical framework of the system as a whole can be filled with empirical flesh of particular cases. It can be used, for instance, to systematically explore combinations of post-growth and degrowth proposals. What could we learn if we understood work-time reduction policies or interventions to reduce labour productivity, for instance, against the background of diminishing surplus value and profit creation, in a particular institutional setting? Much research could be done to understand the role and different functions of money, financial systems and forms of de-monetisation for achieving more sustainable and just societies; or how to redesign systems of production that are not inclined towards expansion; or critically examining core institutions, such as States, in supporting or challenging basic system structures, as has been done in some of the critical social sciences for a long time.

One way to transcend capital might be to keep focussing on what really matters: satisfying human needs in a context of global justice. We know quite well what basic human needs are and how they can be fulfilled (meaningful participation in society, access to health care, healthy food, decent housing, personal dignity etc.) (Doyle and Gough, 1991; Gough, 2017, 2015). It is essential to steer research and building alternatives in directions that focus on delivering such ultimate goals directly, rather than indirectly via intermediate means. Employment is not an ultimate goal, consumption and the possession of money neither. These are means to achieving something else. Focusing on intermediaries often creates side-effects that can be detrimental to the satisfaction of needs.

What remains crucial is to understand structures and institutions in the context of a larger whole. If we understand capitalism as a complex web of entangled interactions, it becomes clear that attempted interventions on one side will face resistance from other sides. This means alternative systems and interventions cannot be about abolishing money, or labour markets, etc. but about restructuring them in a way that is no longer supportive of the dominant social relation. What we can do is to move away from piecemeal approaches and focus efforts on alternatives that combine different elements to break systemic entanglements at the same time. The challenge is to think through bundles of alternatives and the role of institutions in it. Changing many structures at the same time is obviously difficult, but if it were possible to implement alternative structures, it also means a lot could change at

the same time. Structures can be planned, redesigned, broken and transformed. Whilst it is difficult to conceive how to change systemic structures, it is not an excuse not to act.

### 5.2.3 Learn to think dialectically

Throughout this thesis, I started to introduce dialectical logic as a way of reasoning that fits the subject matter of ecological economics, i.e. the study of social ecological transformations, and I suggested that the standard Western approach to scientific reasoning is severely limited towards this end. Pioneers in social ecological thought have stressed the importance of dialectical reasoning for integrating and advancing knowledge with a view to radical change (Bookchin, 1995; Capra, 1997, 1975; Capra and Luisi, 2014; Funtowicz and Ravetz, 1994b; Ravetz, 2011). Yet, the dialectical method<sup>105</sup> and its philosophical underpinnings in dialectical materialism remain relatively little known.

Dialectics is a different way of seeing and thinking. Its subject is to capture change and interaction in thought. It can be understood as an organic way of understanding processes of becoming, emergence, co-evolution and complexity. Identifying contradictions is seen as crucial for understanding the driving forces of change.

*“In order to confront the complexities of our sciences and our world we have to internalise in our intuition a philosophy of totality, connecting within and across levels, dynamics, contradiction, and self-reflectivity – which is dialectics” (Lewontin and Levins, 2007, p. 198).*

It is not easy to let go of old-established ways of thinking, but it can be learnt. I think dialectic logic could play a helpful role in advancing research on theories of change in ecological economics. As Cornforth put it: *“Dialectical materialism is an instrument in the hands of the people for use in changing the world”* (Cornforth, 1987, p. 15). I see much potential for developing and applying the dialectical method in ways that help to ask better questions, provide different perspectives, discover potentialities, and open up new spaces for constructive changes. More radical thinking is a way towards more radical praxis and dialectical logic a tool towards this end.

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<sup>105</sup> The method of systematic dialectics is extremely little known. A Scopus search on 5 June 2018 for systematic dialectics in Abstract title, Abstract, Keywords yields 9 results. These contributions are barely cited. To me, they are treasures of understanding.

More specifically, I think developmental thinking has potentials for designing alternatives. For instance, if we learn how to understand how different forms of money or markets have developed over time, and how global tightly-interconnected production systems have evolved from formerly more local ones, we might have better chances to design institutions that do not result in unsustainability outcomes. Clearly, envisioning structural change does not only happen on laptop screens and drawing boards but is also a practical field of experimentation. However, as academics we are primarily occupied with the world of ideas and to think through what might be better alternatives than others. Therefore, learning how to think more radically, systematically and in process- and evolutionary terms seems to be an exciting avenue in my view.

### 5.3 The future of ecological economics. Towards an emancipatory paradigm?

Modern civilisation is at crossroads. Dominant forces in society are well underway to destroy the living conditions for human and non-human beings on this planet. The consequences of 4 degrees global warming are to turn planet Earth into Venus, i.e. an uninhabitable planet, with the weakest and most vulnerable beings hit first (Spratt and Dunlop, 2018). The world seems already in a transitional period of an emerging new order, but the outcome is still unclear. *“A descent to barbarism ... is just as possible as the attainment of a rational society”* (Bookchin, 1995, p. xiv). The current dominant political climate driven by rising populism, nationalism, deepening neoliberalism and ‘post-truth’ cynicism does not invite to much euphoria about the future state of the world. However, other worlds are possible and scientific contributions can be made that support moving in a direction for human betterment.

*“So how do you change paradigms? ... In a nutshell, you keep pointing at the anomalies and failures in the old paradigm, you keep speaking louder and with assurance from the new one, you insert people with the new paradigm in places of public visibility and power. You don’t waste time with reactionaries; rather you work with active change agents and with the vast middle ground of people who are open-minded” (Meadows, 1999, p. 18).*

In this spirit, I see Marx’s methodological, theoretical and political critique of capitalism as one key ingredient for improving ecological economics. In this thesis, I have firmly argued for the need to break with existing prejudices against the Marxian approach and take it seriously as realistic economic theory and guidance for more radical praxis.

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