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The Role of Economic Ideas in Sustainable Finance: From Paradigms to Policy

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Declaration

I confirm that the submitted work contains neither material from any prior theses nor any material that has already been published. The thesis is my own work submitted for the degrees of PhD in Politics and International Studies at the University of Warwick and PhD in Organisation and Management Studies with a focus on International Political Economy at the Copenhagen Business School. I have not submitted this thesis for consideration elsewhere. Unless stated otherwise, all tables and figures are original.

Summary

This thesis investigates how economic ideas have shaped the evolution of sustainable finance between 1998 and 2018. Sustainable finance has become an ever more salient topic as financial institutions, governments and central banks have looked for ways to integrate sustainability concerns. The thesis develops a transmission mechanism that outlines how ideas from economic theories influence the frames that are adopted by policy actors. The transmission of ideas is investigated through network analysis, content analysis, interviews and participant observation.

The thesis outlines four frames that actors utilise to conceptualise sustainable finance: (1) a socially responsible investment frame; (2) a risks and opportunities frame; (3) a climate finance frame; and (4) a critical frame. It finds that after an initial preoccupation with ethical questions, the most influential actors have framed sustainable finance in terms of risks and opportunities. The economic ideas that underpin most of these frames come from mainstream finance. Nonetheless, the recent emphasis on systemic risks has meant that actors like central banks have started to explore less orthodox ideas. With regards to transmission of frames to policy outcomes, the thesis finds that most of the debates have been about how to understand and implement a risks and opportunities approach. Importantly, the incorporation of economic ideas into the design of performative socio-technical instruments is a stronger transmission channel than the persuasion of policymakers.

The findings in the thesis contribute to constructivist International Political Economy. First, the proposed transmission mechanism clarifies how economic ideas affect policy in a non-linear manner. Second, the study of a case of evolution contributes to the understanding of ideational dynamics in non-crisis times. The thesis also adds to the literature on environmental politics since understanding the thinking of actors and the functioning of instruments allows for assessments of how sustainable finance will affect environmental outcomes.

List of Abbreviations

2° investing: 2 Degrees Investing Initiative

AUM: Assets under Management

BIS: Bank for International Settlements

BoE: Bank of England

CAPM: Capital Asset Pricing Model

CBI: Climate Bonds Initiative

CCS: Carbon Capture and Storage

CDA: Critical Discourse Analysis

CDP: Carbon Disclosure Project

CERES: Coalition for Environmentally Responsible Economies

CFU: Climate Funds Updates

CISL: Cambridge Institute for Sustainability Leadership

CoP: Conference of Parties

CPI: Climate Policy Initiative

CSO: Civil Society Organisation

CSR: Corporate Social Responsibility

DG: Directorate General

DNB: De Nederlandse Bank [Dutch Central Bank]

DNSH: Do No Significant Harm [Principle]

E3G: Third Generation Environmentalism

EBF: European Banking Federation

EC: European Commission

ECB: European Central Bank

EIB: European Investment Bank

EIU: Economist Intelligence Unit

EMH: Efficient Market Hypothesis

ESAs: European Supervisory Authorities

ESG: Environmental Social and Governance [issues or criteria]

ESRB: European Systemic Risk Board

ETF: Exchange Traded Fund

FNG: Forum Nachhaltige Geldanlagen [Forum for sustainable investment]

FoE: Friends of the Earth

FSB TCFD: The Financial Stability Board's Taskforce on Climate-related Financial Disclosures

FT: Financial Times

GCF: Global Climate Forum

GFC: Global Financial Crisis

GHG: Greenhouse Gas

GPIF: [Japanese] Government Pension Investment Fund

GRI: Global Reporting Initiative

HED: Heterodox Economics Directory

HLEG: [European Commission's] High-level Expert Group on Sustainable Finance

I4CE: Institute for Climate Economics

IAM: Integrated Assessment Model

ICMA: International Capital Markets Association

IEA: International Energy Agency

IFC: International Finance Corporation

IIGCC: Institutional Investors Group on Climate Change

IMF: International Monetary Fund

INCR: Investor Network on Climate Risk

IO: International Organisation

IPBES: International Platform on Biodiversity and Ecosystem Services

MCII: Munich Climate Insurance Initiative

NAWRU: Non-accelerating Wage Inflation Rate of Unemployment

NCE: New Climate Economy

nef: New Economics Foundation

NGFS: Network for Greening the Financial System

odi: Overseas Development Institute

OECD: Organisation for Economic Cooperation and Development

PACTA: Paris Agreement Capital Transition Assessment

PBoC: People's Bank of China

PO-Model: [European Commission] Potential Output Model

PRA: Prudential Regulation Authority

RAN: Rainforest Action Network

SCC: Social Cost of Carbon

SDGs: Sustainable Development Goals

S&P: Standard and Poor's

SRI: Socially Responsible Investment

STS: Science and Technology Studies

TEG: [European Commission's] Technical Expert Group on Sustainable Finance

UNFCCC: United Nations Framework Convention on Climate Change

UNEP FI: United Nations Environment Programme Finance Initiative

UNEP Inquiry: United Nations Environment Programme Inquiry into a Sustainable Financial System

[UN] PRI: [United Nations] Principles for Responsible Investment

VaR: Value at Risk

WBCSD: World Business Council for Sustainable Development

WBGU: Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen [German Advisory Council on Global Change]

WRI: World Resources Institute

WWF: World Wide Fund for Nature

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1. Introduction: A Paradigm Shift Without a Fight?

Sustainable finance is not "second-best" finance (...) hopefully in five years' time we can drop the "sustainable" because it will have become already a normal way of looking at things.

Jyrki Katainen, Vice-president of the Juncker Commission.¹

More than 10 years after the Global Financial Crisis (GFC) the financial sector could turn from villain to saviour. Instead of causing crises, finance is now presented as part of the solution to address environmental and social problems. This shift of focus is made evident by the above quote, which outlines that concerns about sustainability have become increasingly prominent in financial circles. Yet rather than taking the rhetoric of the shift at face value, the reorientation of finance towards sustainability warrants critical examination. Analysing the processes through which ‘normal finance’ is increasingly moving towards ‘sustainable finance’ can expand our understanding of how meaningful such a shift is both for sustainability outcomes and the governance of finance.

To understand how the transition towards sustainable finance occurred we might turn to earlier episodes of shifts in economic governance. Such shifts are routinely presented as responses to exogenous shocks. Keynesian macroeconomic policies, for example, are an outcome of the economic management of war economies. Similarly, the neoliberal policy toolkit was forged during the stagflation crisis of the 1970s. And while seemingly exogenous shocks like wars, financial crises or

¹ Jyrki Katainen’s speech from March 22, 2018 at the High-level conference on financing sustainable growth. Available at https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_18_2405. Accessed February 11th, 2020.

pandemics provide the background against which the priorities and the targets of economic policy are changed, such big shifts often also involve a fight. On the one hand, the incumbents try to accommodate the changed circumstances within existing ideas, institutions and governance mechanisms. The challengers of the status quo, on the other hand, contest the potential for accommodation and advocate for new agendas and priorities.

In International Political Economy (IPE), the processes that link exogenous shocks, political and ideational contestation and paradigm shifts in economic policy have been a regular focus for research. Less well researched are situations where a change in economic policymaking occurs in the absence of an exogenous shock that is presented as a major crisis by opponents of the status quo.

Sustainable finance is such a case, where a change in orientation occurred in the absence of an easily identifiable exogenous shock. In 2014, sustainable finance and related terms like green finance, climate finance and Socially Responsible Investment (SRI) were only familiar to a narrow expert community and marginal to the concerns of most policymakers. By the end of 2019, by contrast, China, the EU, France and the UK either had plans to act on the issue or were already implementing measures. Depending on the jurisdiction, these policies include the formulation of standards and labels, risk disclosures for financial institutions, subsidies to financial instruments or the creation of credit lines to refinance green lending.

In 2019, the IMF dedicated a section in its Global Financial Stability Report to sustainable finance (IMF 2019: 90ff). This indicates that sustainable finance has become a topic that is deemed to have significance for assessing the state of the global financial system. In the same year, the Network for Greening the Financial System (NGFS), an initiative that now comprises 63 central banks and regulators from five

continents, published its first report and recommendations. Several members of the network (Denmark, France, Netherlands and the UK) have already started to implement these recommendations by designing climate stress tests for banks and insurance companies. Reflecting on how incorporating climate change considerations changes the nature of prudential supervision, a recent working paper from the Bank for International Settlements (BIS) went as far as referring to Kuhn's concept of paradigm change to highlight the epistemological break that regulators' assessments need to undergo in order to address questions of sustainability (Bolton et al. 2020: 21).

Importantly, sustainable finance is not only a topic for states and regulators. The Japanese Government Pension Investment Fund (GPIF), with US\$ 1.5 trillion in assets the largest of its kind, has started to incorporate sustainability concerns into its investment strategies. It has, for example, stopped lending securities to short-sellers and started to align its passive investment with benchmarks that reflect Environmental, Social and Governance (ESG) issues.² The fact that this move is not confined to GPIF but reflects a broader sentiment in the financial sector is illustrated by a recent episode involving the world's largest asset manager, BlackRock. In the beginning of 2020, BlackRock announced that it would exit fossil fuels from its active managed funds and gear up the pressure on companies that failed to deliver on sustainability. This reflected a shift in strategy and was seen as a response to accusations that pointed out the asset manager's poor record on ESG topics.³

² Leo Lewis and , "World's biggest pension fund strikes blow against short sellers" *Financial Times*, <https://www.ft.com/content/8d61bd14-1593-11ea-9ee4-11f260415385>, Hugh Wheelan, "Japan's GPIF selects ESG indices for \$8.8bn allocation", *Responsible Investor*, July 3rd, 2017. Accessed February 11th, 2020.

<https://www.responsible-investor.com/articles/japanese-pension-giant-awards-88bn-esg-mandate>. Accessed February 11th, 2020.

³ Attracta Mooney and Owen Walker, "BlackRock seeks to regain lost ground in climate fight", *Financial Times*, January 14th, 2020. <https://www.ft.com/content/36282d86-36e4-11ea-a6d3-9a26f8c3cba4>. Accessed February 11th, 2020.

Another indication of the increased salience of sustainable finance is that public and private actors have started to devote considerable resources to establish common standards and definitions. At the time of writing, the Task-Force For Climate-Related Financial Disclosures (TCFD), hosted by the Financial Stability Board (FSB), is trying to establish a global standard for corporates and financial institutions. Meanwhile, the EU's upcoming green taxonomy and the more recent efforts by the World Economic Forum (WEF) and the four global accounting firms to establish a metric for the UN's Sustainable Development Goals (SDGs) move in the same space.⁴

Yet despite all these developments, there is no evidence of a crisis of the governance of international finance between 2014 and 2019 that resulted in a boost for sustainable finance. The fact that climate change is likely to result in catastrophic consequences for humanity has been documented by the Intergovernmental Panel on Climate Change (IPCC) for decades. However, as will be discussed in the main body of the thesis, for most of the time between the 1990s and 2018, the majority of financial institutions paid little attention to climate change and did not view it as a fundamental crisis.

How did this rapid change come about? While existing literature suggests we might expect to observe a paradigm shift occurring via a contestation of the incumbents, there is little evidence that a coalition of parties or interest groups that are promoting sustainable finance took over International Organisations, national ministries, central banks and private firms during this period. In the absence of a clear case of the well-studied dynamics of shock-induced paradigm shifts, one must look for

⁴ Billy Nauman and Patrick Temple-West, "BofA chief leads new effort to tame unruly ESG metrics", *Financial Times*, January 14th, 2020.<https://www.ft.com/content/876f143a-36de-11ea-a6d3-9a26f8c3cba4>. Accessed February 11th, 2020.

an alternative understanding that can accommodate a more gradual process that nevertheless resulted in the emergence of a new system of financial policymaking.

1.1 Main Research Question and Focus of the Thesis

This thesis addresses the following research question:

How have economic ideas shaped the production of knowledge in the evolution of sustainable finance?

The focus on ideas is justified, because ideational approaches are well-equipped to account for seemingly novel policy areas. One reason for this is that ideas provide actors with clues that reduce uncertainty in situations of crisis or novelty (cf. Blyth 2002; Widmaier et al. 2007). And while ideational accounts have often been applied to understand crises and abrupt changes, they also hold some explanatory power for evolutionary processes. Perhaps even more significantly, an analytical focus on ideas helps to reveal the politics of seemingly uncontested evolutionary processes. Yet when applied to sustainable finance the emphasis on ideas opens up two further questions. First, where have the ideas that are relevant for sustainable finance come from? And, second, how have they influenced it?

To address these questions, I draw on the literature on policy paradigms (Hall 1993), which broadly speaking studies how economic theories from academia influence policy making. Rather than merely applying the existing conceptual framework, I separate ideas as economic theories from ideas as policy influencing devices before reconnecting them in a transmission mechanism. This reformulation of the policy paradigms concept enables me to define and measure its component parts. By doing so, this thesis seeks to address the observation that policy paradigms have

often been studied in an undefined (Kuzemko 2013: 33) or even contradictory (Blyth 2013a) way.

This brief elaboration on the ideational component of the main research question leaves, however, still one question open, which is: What is sustainable finance? This question is much easier to ask than to answer and part of the thesis is dedicated to finding a response to it. For now, it suffices to state that I understand sustainable finance as the reconfiguration of financial systems to incorporate environmental, social and ethical considerations.

1.2 Theoretical Framework and Literature

In asking how the evolution of sustainable finance is related to economic ideas and policy paradigms, I engage with several strands of research. First, on the conceptual level, I draw on the literature on policy paradigms that was pioneered by Hall (1993) to study how economic ideas influence the processes that lead to incremental or all-encompassing changes in macroeconomic policy. Empirical investigations of cases such as macroeconomic policy in different geographies (e.g. Lindvall 2009; Mandelkern 2015), energy governance (e.g. Kern et al. 2014; Kuzemko 2013) and financial regulation (Baker 2013; 2015) have applied and enriched Hall's original contribution. In addition, there is a rich theoretical debate that seeks to clarify the concept as well as the process of paradigm change (Allan 2019; Blyth 2013; Carstensen 2011a; Carstensen and Matthijs 2018; Oliver and Pemberton 2004; Schmidt 2002; 2011).

Beyond policy paradigms, this thesis also addresses some broader questions of ideational explanations in IPE. First, I engage with the literature on transmission channels (cf. Berman and Hirschman 2014) to explore how ideas matter for sustainable

finance. I single out processes of institutionalisation and persuasion as well as performative dynamics throughout the stages of ideational transmission that I analyse. Second, by representing a case of evolution rather than of crisis, studying sustainable finance can deliver insights on the role of ideational factors in such circumstances. As such, the thesis contributes to longstanding theoretical debates about the seemingly different dynamics of ideas in crisis and non-crisis situations, where ideas are thought to be constraining in the former case while being disruptive in the latter (cf. Bell 2011; Bell and Feng 2019; Widmaier 2016). In exploring the characteristics of crises and evolution, the thesis also contributes to the emerging literature on slow- and fast-burning crises (Seabrooke and Tsingou 2019) and the variety of crises (Baker 2015).

The focus on evolutionary situations also connects well with the discussions on how policy issues emerge (Carpenter 2007) and how objects that are deemed worthy of political interventions are constituted in the first place (Allan 2017). This offers a point of connection between constructivist IPE and the discipline of Science and Technology Studies (STS). As I argue in the second chapter of this thesis, those two literatures are complementary as bringing them together provides us with an account that offers both an intricate discussion of the technical workings of policies and the political contestations that accompany such seemingly technical issues.

More specifically, the preoccupation in STS with the design of technical objects (cf. McCarthy 2018: 2) offers a way to account for the interplay of ideational and material factors that underpin the functioning of economic and financial systems (cf. Bernards and Campbell-Verduyn 2019: 775, 778). The emphasis on technical objects makes STS treatments relevant for studying the transmission of ideas in non-crisis times. This is because ideas that are stabilised in technical instruments can still influence economic governance in the absence of a public debate on the merits of the

ruling policy paradigm. At the same time, STS scholarship cautions against a linear and deterministic understanding of both the ideational and the material. Instead, the focus on the micro-politics of the design and use of technical objects reminds us to incorporate context and agency (McCarthy 2012; 2018: 6ff; see also Bijker et al. 1987).

In light of the complementarities between STS and constructivist IPE, scholars have called for a closer dialogue between the two strands of research in recent years (e.g. Bernards and Campbell-Verduyn 2019; Braun 2016). Meanwhile, empirical contributions on topics such as banks' risk management practices (Lockwood 2015), central bank repo markets (Braun 2017), big data and algorithmic governance (Campbell-Verduyn et al. 2017) and macroprudential supervision (Kranke and Yarrow 2018) suggest that rich insights on the workings and the politics of finance – and by extension in all likelihood also on sustainable finance – can be obtained by combining STS and constructivist IPE.

Sustainable finance is more than a useful case for theory building – understanding its evolution is significant in its own right. The IPCC's fourth assessment report as well as the special report on the differences between a 1.5° C and a 2° C warming scenario point towards the importance of redirecting both public and private financial flows for achieving mitigation and adaptation objectives (e.g. IPCC 2014: 30; IPCC 2018: 25, 29).

At the same time, students of environmental IPE and environmental politics more broadly have repeatedly pointed out that the financial sector has the potential to play a prominent role in whether and how capitalism responds to environmental crises like climate change. Paterson and Newell (2010) suggest that finance – which does not only refer to financial institutions but also to amongst others regulators, central banks,

Civil Society Organisations (CSOs) and standard setters – is at the centre of a nascent coalition that *can* actually challenge fossil fuel based capitalism and deliver decarbonisation (see also Paterson 2010: 363). More recently, Newell (2019) made a similar argument using a Neo-Gramscian framework by asking the question whether finance might be a force that defects from the fossil fuel based historic bloc and throws its power behind a new accumulation regime. Notably, he also emphasises that finance cannot be understood as a homogenous system. For instance, investors with long-term liabilities represent patient capital, which means that their interests differ from those of hedge funds and private equity investors, which are known for their short-termism.

The significance of finance for societies' (or better capitalism's) response to climate change and other environmental crises has led scholars from IPE, environmental politics and human geography to study how different actors of the financial system address environmental issues. Among other things, this emerging literature has analysed investor networks (MacLeod and Park 2011), the governance and management of environmental risks (Christophers 2017; Paterson 2001; Pattberg 2012; Thistlethwaite 2015; Thistlethwaite and Wood 2018) accounting and reporting standards (Knox-Hayes and Levy 2011; Thistlethwaite 2011; Thistlethwaite and Paterson 2016; Thistlethwaite 2017), carbon markets and their governance (Böhm et al. 2014; Helleiner and Thistlethwaite 2014; Lohmann 2009; Paterson and Stripple 2012; Paterson et al. 2017), shareholder activism (Neville et al. 2019) and the fossil fuel divestment movement (Mangat et al. 2018).

Many of the studies mentioned in the preceding paragraph offer an analysis of sustainable finance that goes beyond the issues and actors that are their immediate concern. The contributions also develop theoretical and conceptual claims that are applicable beyond their empirical cases. Notwithstanding these recent efforts, an

empirical study that starts by treating the broader system of sustainable finance as its principal unit of analysis can help to complement the in-depth investigations of individual actors or actor types that many of the existing contributions offer. And while Newell and Paterson's (2010) *Climate Capitalism* provides an early systemic account, the time of its publication means that it does not cover some of the more recent developments described at the beginning of this chapter.

In this thesis, I seek to contribute to this literature by looking at the relations among the actors that existing research has identified. I use the concept of policy subsystem (Sabatier 1998) and network analysis methods to situate these actors in a social space and to track their relations over the time period from 1998 to 2018. Based on this comprehensive mapping exercise, the thesis argues that the cleavages inside an evolving system like sustainable finance are at least partially structured according to economic ideas. This fits well with some of the existing literature in this fast-moving field, which has emphasised the significance of ideational categories like discourses and frames (e.g. MacLeod and Park 2011; Mangat et al. 2018, Newell 2019).

1.3 The Argument in Brief

Transmission of Ideas

As a first step to understand the transmission from ideas to the governance of sustainable finance, the thesis delineates the social space in which actors develop and advance their preferred policies. I conceptualise this social space as a policy subsystem. This concept enables me to group actors from diverse backgrounds according to their shared ideas. More concretely, I treat these shared ideas as common frames. As further elaborated in chapter 2, frames allow the actors to understand their environment, i.e. they provide them with a sense of what sustainable finance is about.

Importantly, frames are not *ad hoc* constructions of the actors in the policy subsystem. Instead, they are related to existing ideas, which they reproduce and reassemble. Frames can hence be differentiated by linking them with established economic theories like neoclassical-inspired modern financial theory or ecological economics. Highlighting the differences of frames according to their connections with these economic theories can help to account for the dimensions that underscore the cleavages among actors. Through specifying the relations between frames and economic theories this thesis contributes to the literature about policy paradigms and the transmission of ideas from academic economics to policy actors.

Linking the ideas embodied in frames to economic theories is only the first part of the transmission mechanism that is examined in the thesis. Ideas that have been incorporated by actors within the policy subsystem through framing still have to be translated from the purely discursive realm to policy outcomes. Building on constructivist IPE and STS scholarship, I single out two transmission channels that connect frames to policy outcomes. First, there is the route of persuasion. When following this route, actors from the policy subsystem develop debate positions that are based on their initial framing. Yet while frames provide actors with a sense of direction and help them to define their interests, debate positions are intended to convince audiences that are not part of the policy subsystem. Furthermore, actors craft debate positions to underscore the differences of their positioning *vis à vis* others.

The way in which these debate positions are transmitted to policy outcomes is not fundamentally distinct from other areas of policymaking. Actors advance their position, try to garner support among policymakers, interest groups, the (specialised) media and the interested public. If they are successful, their positioning will be incorporated into legislation and regulations. One example of such a debate concerns

the question of whether financial institutions should divest from unsustainable companies or whether they should use their stakes to help the companies transition towards better practices. A resolution of this debate into a policy outcome would consist of policymakers being persuaded by either argument and subsequently adopting regulations that reflect the respective debate position and its ideational underpinnings.

The second transmission channel is less about controversies and, instead, relates to the performative character of socio-technical instruments. These instruments enable the governance of sustainable finance by establishing accepted categories, measurements and calculation techniques. As such, socio-technical instruments integrate the ideas that are present in the frames with the material components that are necessary to transform discursive factors into a more durable form. Examples of socio-technical instruments are accounting standards, definitions, indicators and economic models. A concrete case that has received much attention in the recent past is the green taxonomy that has been tabled by the European Commission to define sustainable finance.

In addition to sketching the differences between debate positions or socio-technical instruments, the thesis also develops a hypothesis concerning variations in the relative strength of either transmission channel. I suggest that the size and maturity of a policy subsystem influences the relevance of one or the other transmission channel and with that the degree of contestation. Whereas in mature and large policy subsystems the persuasive channel is more powerful, in small and emerging ones the performative channel is more relevant. As sustainable finance represents a case of an evolving policy subsystem, it falls in the latter category.

The thesis operationalises the transmission from economic ideas to frames and subsequently to policy outcomes by looking at the knowledge production of actors inside the policy subsystem of sustainable finance. Actors that display a shared framing are detected through network analysis techniques. The content of the frames, meanwhile, is inspected through a combination of qualitative and quantitative text analysis, interview transcripts and participant observation data. Subsequently, I use text analysis methods, interviews and participant observation data to link the frames with economic theories to establish the first stage of ideational transmission. The transmission from frames to policy outcomes is, on the other hand, achieved via the persuasive and performative channels that were outlined above. While drawing on the same data sources, this second part of the transmission emphasises different aspects like contestations between actors and the development of socio-technical instruments.

Findings

The thesis analyses the structure of the policy subsystem of sustainable finance between 1998 and 2018. The starting point of this observation period corresponds with the time when the first regulatory efforts on sustainable finance were proposed in Europe, whereas the end point captures the inception of both European and global initiatives such as the EU's sustainable finance action plan, the FSB TCFD and the NGFS. Based on both historical events like the GFC and the Paris Agreement and the distribution of the data I further partition the time between 1998 and 2018 into three subperiods, namely 1998-2008, 2009-2014 and 2015-2018 (cf. chapter 4).

Throughout these three periods I identify four frames. These frames are 1) *Socially Responsible Investment* or SRI, 2) *Climate Finance*, 3) *Risks and Opportunities* and 4) a *Critical Frame*. SRI is the chronologically oldest frame and

emphasises the ethical dimension of investment. While dominant in the 1980s and 1990s, the proponents of this frame never engaged systematically in knowledge production. This means that this frame has been increasingly marginalised. Already in the first period under study (1998-2008), SRI actors were challenged by the risks and opportunities frame.

The risks and opportunities frame, meanwhile, highlights that environmental, social and governance issues (ESG) are affecting financial returns. During the period under analysis there have been variations relating to the emphasis on either risks or opportunities. Perhaps more importantly, the specification of what counts as a risk has changed from an initial preoccupation with a large set of ESG issues to a narrower and more sophisticated analysis of the risks of climate change and the transition of energy systems. In terms of its location in the policy subsystem, the risks and opportunities frame has been dominant throughout the period under examination.

The third frame, which I term climate finance frame, is less preoccupied with assessing the risks and opportunities of existing financial assets and more with the creation of new financial instruments that mobilise the capital markets to finance projects for climate mitigation and adaptation. This frame is associated with the development community and emerged in the late 2000s. While the risks and opportunities frame has maintained its dominance, the climate finance frame offers a complementary approach to sustainable finance.

Finally, the critical frame is put forward by civil society actors that remain sceptical of the ability of financial institutions and capitalism more broadly to address systemic crises like climate change. While this frame has been on the margins of sustainable finance, it has nonetheless influenced the policy subsystem insofar as its proponents have exposed the limits of approaches that rely on voluntary actions of

financial institutions. In addition, the emphasis on systemic questions that was an early preoccupation of the critical frame has been incorporated into more recent variations of the risks and opportunities frame.

After describing the frames and situating them in the policy subsystem, the thesis goes on to link them with economic theories. I find that when looking at the whole policy subsystem through the entire time period, (mainstream) modern financial theory is most frequently referenced. Environmental and climate economics, ecological economics and evolutionary/complexity perspectives are acknowledged but appear to be less relevant. Importantly, not all the references to modern financial theory are supportive as some actors try to delegitimise those ideas. Furthermore, there is some co-variation between frames and theories. The risks and opportunities frame is, for instance, citing modern financial theory to a greater extent. Meanwhile, the critical frame as well as some parts of the (systemic risk-focused) regulatory community display greater affinity towards more heterodox evolutionary systems thinking. Another finding is that only a fraction of the actors in sustainable finance engages directly with the academic literature. This might point to the instrumental role of these actors as translators between the ideas of academic economics and the policy ideas of sustainable finance. On the other hand, this finding should also caution against attributing too much causal weight to the ideas of academic economists in processes of policy change.

In addition to analysing the links between economic theories and frames, the thesis also examines how frames and the ideas that are underlying them influence policy outcomes. As outlined above, I look at debate positions and socio-technical instruments to study this transmission process. Concerning debate positions, I find that most of the prominent discussions are actually not between the proponents of different

frames but take place within the risks and opportunities frame. Furthermore, debates that occur in more scientific settings, such as the community of central bankers and regulators, have dividing lines that resemble economic theories more than frames. Variations between socio-technical instruments, on the other hand, are more closely aligned with frames. The risks and opportunities frame also dominates here as the definition of risk factors and the development of risk models are prioritised. Nevertheless, vestiges from the period in which SR investors were at the centre of the system remain present in areas like the measurement of ESG issues. The different priorities of the climate finance and the critical frame have likewise influenced the design of socio-technical instruments such as green taxonomies or metrics that benchmark the performance of the financial system as a whole against social and environmental objectives.

1.4 Plan of the Thesis

The remainder of the thesis consists of six chapters. Chapter 2 sets out the theoretical framework by discussing the questions of how ideas matter, which ideas matter and where ideas matter. Drawing on literature from constructivist IPE, the sociology of professions and expertise and STS, I elaborate on a transmission mechanism that builds on Hall's concept of policy paradigms. In light of the confusion and often unspecified use of this concept, the chapter takes a step back and starts with a discussion of the philosophy of science literature. Engaging with this literature enables me to separate Hall's paradigm concept into *academic paradigms*, which denote sets of ideas elaborated in scientific settings, and *policy paradigms*, which are about the role of these ideas in policy making. The second chapter also introduces and operationalises additional concepts that describe the transmission of economic ideas

(frames, debates, socio-technical instruments) and the social space in which it is situated (policy subsystems). Finally, I elaborate on the hypothesis that links variations in the size and maturity of policy subsystems to the relative strength of ideational transmission channels.

Chapter 3 discusses the methods and data sources that I use to conceptualise sustainable finance as an evolving policy subsystem. Before going into a detailed description of the methods, the chapter starts by discussing why the research strategy that is adopted in this thesis is well-suited to study the evolution of sustainable finance. In addition, I further explore the empirical literature of constructivist IPE to situate my thesis in the distribution of cases and to revisit existing research strategies. An in-depth discussion of the methods follows, starting with a description of techniques from the analysis of information networks that are used to delineate the boundaries of sustainable finance. Subsequently, I introduce network measures of centrality and methods for community detection. The latter are used to identify the communities that coalesce around the different frames. To establish the meaning of the frames, I draw on content analysis, interviews and participant observation.

The fourth chapter launches the empirical analysis of the thesis. The chapter begins with some background information on sustainable finance and a brief review of empirical studies on the topic. Subsequently, I introduce the data that underlies the network analysis and partition the time interval between 1998 and 2018 into three periods, i.e. 1998-2008, 2009-2014 and 2015-2018. The chapter proceeds with a description of each period, which introduces the actors that were present in the policy subsystem. Moreover, the frames that can be observed in each period are discussed. At the end of each section, the frames are summarised according to their diagnostic, prognostic and relational dimensions. Subsequently, network analysis is used to

visualise the relations between the actors in the policy subsystem and to cluster actors that display a shared framing.

The findings from chapter 4 suggest that the risks and opportunities frame was dominant during the entire time period, whereas the ethical SRI frame became increasingly marginalised. Towards the end of the 2000s, the climate finance frame started to emerge as an alternative but complementary understanding of sustainable finance. In the last period under study (2015-2018), the risks and opportunities frame became connected with the climate finance frame by hub-creating actors, which try to promote sustainable finance ‘as such’, thus creating a master frame. Lastly, proponents of the critical frame have been at the margins of sustainable finance. Nonetheless, they maintained some connections to the centre of the policy subsystem.

In the fifth chapter, the four frames are linked to four academic paradigms: 1) modern financial theory, 2) ecological economics, 3) environmental and climate economics and 4) a hybrid evolutionary systems paradigm. This linkage allows for identifying the differences of frames according to common categories that are derived from the philosophy of science. Furthermore, this sorting establishes the first part of the ideational transmission where ideas travel from academia to the actors inside the policy subsystem. By matching citation lists that reflect academic paradigms to the corpus that represents the knowledge production within sustainable finance, I find that only about one quarter of the actors engages with the academic literature. The most frequently referenced academic paradigm is modern financial theory. This goes both for citation numbers and the use of concepts. However, not all references are supportive since modern financial theory is also referenced by challengers who try to unpack and delegitimise it. Lastly, while there is a co-variation between academic paradigms and frames, the actors inside the policy subsystem often draw from multiple

economic ideas. For instance, despite significant theoretical differences, some actors use both environmental and ecological economics to link finance and the economy with the environment.

Chapter 6 concludes the empirical part of the thesis by describing the debates and socio-technical instruments that translate frames and economic ideas into policy. The chapter identifies four debates and five types of socio-technical instruments. Subsequently, both debate positions and socio-technical instruments are linked to frames and academic paradigms. While most of the debates are internal to the dominant risks and opportunities frame, the socio-technical instruments vary more in line with the frames. Also, in ‘scientised’ locations like central banks, academic paradigms seem to be of greater relevance as dividing lines than frames. The chapter closes by pointing out that socio-technical instruments are more politicised than debates. It links this observation with the hypothesis that stipulates that depending on the maturity and size of the policy subsystem, the persuasive or performative transmission channel is more influential.

The seventh chapter concludes the thesis by suggesting avenues for future research that could build on the findings of this thesis. First, future research could explore how evolutionary and crisis cases are related to ideational dynamics. A possible way to do this would be to look further into the hypothesis on how the maturity and size of a policy subsystem relates to the transmission of ideas. Furthermore, research that draws on the literature from environmental politics, IPE and STS could further explore how the changes to the financial system that are associated with sustainable finance influence capitalism’s response to environmental crises. The final chapter also discusses the limitations of the approach of this thesis. It concludes by pointing out the practical implications of the findings.

1.5 Original Contributions

This thesis makes theoretical, empirical and methodological contributions to constructivist IPE and environmental politics. On the theoretical side, it takes stock of the literature on policy paradigms and aims to clarify the discussions about the concept by outlining a process that specifies the connections between operationalisable concepts. These concepts are empirically applied through the combination of network analysis techniques, text analysis, interviews and participant observation. This builds on existing methodological toolkits but also expands them.

A second theoretical contribution is that the thesis studies a case of evolution rather than of crisis from an ideational perspective. Therefore, it helps to remedy the bias of focusing on crisis that is present in the literature. The focus on an evolutionary situation also helps to develop a more comprehensive framework for studying the role of ideas in policymaking processes.

The thesis also makes an important empirical contribution to the study of environmental politics. By conceptualising sustainable finance as a system and by sorting actors, debates and socio-technical instruments according to ideational categories, it helps to better understand the linkages between finance and environmental issues. While it is beyond the scope of this research project to make predictions about how the structure of sustainable finance will impact the environment in the future, understanding the functioning of the system nevertheless enables us to come up with informed conjectures about these relationships through showing how different options for governing sustainable finance work and which ideas underpin them.

2. Charting the Transmission of Paradigms

A lot of interesting insights on ESG [Environment, Social and Governance issues] can be gained from economics and finance theories such as Modern Portfolio Theory

We should move away from the unbelievable Cost Benefit Analysis and damaging discount rates that can be dangerous [for the environment and climate]⁵

Despite being voiced at the same conference, the two quotes opening this chapter represent very different ideas on sustainable finance. The first quote emphasises the relevance of ideas that in the IPE literature have been categorised as ‘neoclassical’ or ‘neoliberal’. The second intervention criticises these ideas. The proposition that such competing ideas ‘matter’ has influenced a great deal of political economy research. But what does it exactly mean? Who has, carries and promotes ideas? Which ideas matter and where do they come from? And how do ideas matter? These and similar questions have been the subject of many theoretical and empirical contributions in IPE and other social sciences. In IPE, there is no single theory about the role of ideas. Instead, scholars have come up with a host of theories, concepts and methods. This plurality of perspectives is valuable as it allows researchers to select the appropriate tools for investigating different research puzzles and avoids the application of a boilerplate approach. On the other hand, the variety of concepts and methods has also led to confusion and inconsistencies.

⁵ Quotes from participants at the Global Research Alliance for Sustainable Finance and Investment’s 2nd conference, Oxford, September 5th, 2019.

In this chapter, I draw from constructivist IPE, the sociology of professions and STS to outline what ideational explanations are and what insights they can deliver for the study of sustainable finance. Drawing from these literatures I develop a transmission mechanism that covers, first, the links between the ideas of academic economists and policy actors and, second, the links between the ideas of policy actors and the implementation of policy. This combination allows for a richer and more contextual understanding of the role that ideas played in the evolution of sustainable finance. Integrating insights from the three literatures also helps to avoid the pitfalls of a linear understanding of the influence of ideas.

This chapter elaborates the transmission mechanism from ideas to policies in six sections. In the first section, I introduce the three above mentioned literatures in a more general way and assess their complementarities. I give particular attention to their capabilities for understanding the evolutionary processes that are present in sustainable finance. The second section addresses the question of *how* ideas matter by revisiting the research on the transmission of ideas in each literature. In the third section, I query *which* ideas matter by introducing and operationalising the concept of *academic paradigm*, which I delineate from the concept of *policy paradigm*. The fourth section discusses *where* ideas matter. To do so I introduce the concept of *policy subsystem*. In addition, this section operationalises the concept of *framing*, which I use to sort actors inside the policy subsystem of sustainable finance. The fifth section brings the concepts together and develops the transmission mechanism. In this section, I also outline the differences between ideational transmission channels and suggest scoping conditions that influence their relative strength. The sixth section concludes the chapter.

2.1 Crises, Evolution and Ideas: Insights from Constructivist IPE, the Sociology of Professions and STS

Evolution and Crisis

In IPE, situations of uncertainty and crisis have traditionally been seen as being most receptive to ideational factors. When confronted with a crisis, actors need ideas to know what their interests are before they can calculate their preferred outcome (cf. Blyth 2002). As such uncertain situations need to be interpreted by actors (cf. Widmaier et al. 2007), they also open up the space for understanding the crisis in different ways (cf. Boin et al. 2011). One prominent function of ideas is that they can help to identify the culprits for the crisis as well as solutions to it (Neep 2018; Widmaier 2016). Solutions can then become embedded in institutions where ideas continue to live on until the next crisis occurs (cf. Babb 2013; Oliver and Pemberton 2004: 423).

This stability-crisis-stability sequencing has also been called the punctuated equilibrium model. A good illustration of punctuated equilibrium is Hall's work on policy paradigms. In Hall's original contribution one set of economic ideas reigns supreme until it is toppled by contending ideas during a crisis (cf. Hall 1993, see section 3). In constructivist and institutionalist scholarship, the notion of punctuated equilibrium has been widely criticised. Constructivist authors have singled out ideational factors as a means to overcome the difficulties of institutionalist explanations to deal with abrupt change (e.g. Blyth 2001; 2002; Schmidt 2002; 2008). Yet ideational accounts themselves have come under criticism for failing to address how and why ideas act differently in periods of crisis than in periods of stability (Bell 2011; Bell and Feng 2019; Widmaier 2016: 207ff). Moreover, the stark dichotomy

between crisis and non-crisis has become the subject of critique. This is because it appears to be unable to integrate evolutionary changes (e.g. Carstensen 2011b).

In light of these criticisms, accounts that take an ideational approach but are focused on evolutionary cases rather than on the re-examination of stability-crisis-stability dynamics can help to fill a gap in our understanding. A research design that explores how ideas matter in non-crisis situations can also address the calls for the development of a more unified theory of ideational influences (Bell 2011; Widmaier 2016). Two strands of research that can complement the often crisis-based ideational accounts of IPE are the work on expert governance that is related to the sociology of professions and the research on performativity that has been carried out by STS scholars. These research streams have focused less on crisis-induced ruptures but on gradual change and evolution.

Reviewing the broader sociological literature, Zietsma et al. (2017: 52) suggest that research on institutions and fields has moved from explanations that are based on exogenous shocks and punctuated equilibria to a focus on endogenous dynamics. More narrowly, the sociology of professions is interested in how groups that are bound together by professional status establish and maintain the jurisdiction about a particular feature of social life. A classical case is the fight among communities of health practitioners over medical licensing (Abbott 2005). More recent investigations have also highlighted that transnational professionals can reinvent themselves by occupying a particular issue like certifications for sustainable forestry (Henriksen and Seabrooke 2016) or carbon trading (Paterson et al. 2017). Here, expertise does not necessarily depend on formal gatekeepers like professional bodies but can be exerted in a looser way through networks of “issue professionals” (Henriksen and Seabrooke 2016; 2017).

An important contribution from this research strand is that the power positions of expert communities are explicitly situated in social space through concepts like ecologies or fields. Power is relational as it depends on the location of an actor inside the system of expertise. A system focus can accommodate situations where expertise does not have an “organisational home” and is, instead, distributed throughout a network of people employed by different organisations (e.g. Paterson et al. 2017: 183; see also Thistlethwaite and Paterson 2016). As such, it is distinct from treatments in IPE, where ideas are often situated within established organisations like treasuries (e.g. Hall 1993) or the IMF (Chwioroth 2010; Nelson 2014).

Furthermore, the research on institutional fields offers a typology to classify actors’ positioning. Sociological research has studied parts of sustainable finance, such as impact investing and ESG issues, by using the concepts of interstitial and issue fields (Beunza and Ferrero 2019: 516; Zietsma et al. 2017: 25). These concepts denote situations in which actors that draw on resources and connections from their home fields seek to occupy an issue of their interest (cf. Zietsma et al. 2017: 21ff). The ability to account for actors from different backgrounds (e.g. private, public, civil society) means that insights regarding fields are well-equipped to account for still evolving and thus poorly defined issues. In addition, a system focus can provide a sorting of actors that is not dependent on essentialist notions of topics like ‘finance’ or ‘environment’ but, instead, classifies the actors according to their relations within the system. Finally, by comparing the structure of the system to other cases one can come up with hypotheses concerning the relations between the shape of the system and the relative strength of different channels for the transmission of ideas.

In summary, insights from the sociology of professions can be mobilised to explicitly map evolving systems of expertise. The research on institutional fields, on the other hand, can help to arrive at a classification of what kind of case sustainable finance presents (see section 5 and chapter 3).

STS is similar to the sociological research examined above in the sense that it takes a systemic approach. It also displays an evolutionary perspective that is evidenced by its focus on (competing) networks, into which actors have to be enrolled. An important difference of STS and its concept of ‘performativity’ *vis à vis* other ideational and expertise-based explanations is its rejection of the notion that ideas or actors influence the existing governance of an issue and shape it according to their preferences or convictions (cf. Bernards and Campbell-Verduyn 2019: 6; Braun 2016). Instead, performativity describes a situation where the collaboration of ideas and actors is a precondition for governance (Allan 2017; MacKenzie 2007: 5). Depending on the ideas and actors that are involved in building the network, governance will offer certain options and interventions while closing off others (cf. Bowker and Star 1996; Latour 2003).

This emphasis on the network being the material outcome instead of acting on the material world means that STS chooses *socio-technical instruments*, which combine ideational and material components, as its main unit of analysis. McCarthy points out that one of the main preoccupations of STS scholarship is to study how such technical objects come into being (McCarthy 2017: 10). Understanding the material and ideational factors that influence the design of socio-technical instruments is important, because these design choices mediate the possibilities of future users, many of whom are likely to not have had a say in the initial design phase. This

notwithstanding, socio-technical instruments are never completely deterministic as users still might find creative ways to repurpose them (McCarthy 2012: 477).

The focus on socio-technical instruments as the main unit of analysis means that the research strategies and methods of STS scholars differ from the treatments in IPE or sociology. Instead of identifying a population of actors to delineate a system, one starts from looking at an instrument like an auctioning mechanism (Muniesa and Callon 2007) or an economic model (MacKenzie and Millo 2003) and then maps the involved actors and ideas. The relations between human and non-human actors as well as between the ideational and the material are often studied by ‘following the actors’ using historical and interpretivist methods (McCarthy 2017: 12).

In the context of sustainable finance, research that draws from STS has covered the development of new definitions, metrics and classification systems. Studies have examined the networks and interactions of data providers (Beunza and Ferrero 2019), sustainability rating agencies (Crifo et al. 2018; Dejean et al. 2004; Giamporcaro and Gond 2016) and responsible indices (Slager et al. 2012). By integrating these insights with the empirical data that is presented in the thesis, chapter 6 develops a typology of the socio-technical instruments that are being developed for the governance of sustainable finance.

Ideas and Contestation

When it comes to identifying conflicting ideas and sorting them into different blocs, the constructivist, crisis-based explanations of IPE often highlight the contestation between analytically distinguishable ideas. This is demonstrated by the research on policy paradigms (e.g. Hall 1993; Lindvall 2009) that I will further describe in the third

section. A typical paper identifies an incumbent and a challenger paradigm (e.g. Keynesianism vs. Neoliberalism) that fight over the governance of a policy field such as fiscal policy or business-labor bargaining. The outcome of this struggle is then the one preferred by the proponents of either paradigm or a hybrid case.

To map the differences between economic ideas, IPE scholars have often relied on classifications of schools of thought that are taken from the history of economic thought. In his book about the spread of Neoliberalism, Ban falls back on schools of thought to avoid a too broad (e.g. all of modern economics) or too narrow definition (e.g. only monetarism) of neoliberalism (Ban 2016: 20). Other ideational IPE scholars like Blyth (2002; 2013b) and Braun (2014) have also used history of economic thought literature to understand changes in economic policy.

This treatment of economic ideas as analytically distinguishable theories is less present in the sociological approaches and in STS. In part, these approaches have treated ideas as either enabling or constraining actors. Example of ideas being enabling can be found in some of the literature from the sociology of professions. Here, ideas are treated as a stock of relevant knowledge that can be mobilised by professionals to navigate the system (e.g. Abbott 2005; Seabrooke 2014). Ideas as constraints are featured in research that contends that professions (or fields like finance more generally) are characterised by a single and stable ideational logic (Zietsma et al. 2017: 21; see Yan et al. 2018 for an empirical study related to sustainable finance).

Notably, the above-mentioned studies do not prioritise ideational contestations within one system. In the former case of professional contests, agency is mostly accorded to individuals (cf. Eyal 2013 for a criticism). When it comes to logics, on the other hand, contestation is assumed to happen between rather than within systems. This is an important difference from the IPE literature that emphasises intra-system

conflicts. Notably, this holds also true for research from this strand of literature that explicitly includes the characteristics of ideas into its explanation. Fourcade (2006: 158ff), for instance, engages with the history of economic thought to flesh out the characteristics of neoclassical economic ideas. However, her main concern is not with the conflicts of neoclassical economics with other economic theories, but with showing how the features of neoclassical ideas contributed to the global expansion of the economics profession.

While sociological research has largely sidelined classifications of economic ideas because the contest between them has not been its main research interest, STS scholars reject the usefulness of such classification exercises more categorically. Bockman and Eyal (2002: 312-314) argue, for example, that Neoliberalism should not be treated as a logically consistent theory but as an institution that is reproduced by an actor-network. Similarly, MacKenzie (2007: 5) states that “to view economics as a body of ideas is far too narrow, for economics also consists of people, skills, datasets, techniques, procedures, tools, and so on.”

According to this perspective, the study of the analytical differences between economic theories is meaningless, because in the real world these differences simply do not exist. What exists, instead, are complex arrangements that bring ideas together with human and material factors. Therefore, performativity research does not start from the ideas but chooses the instruments that make ideas matter as its main unit of analysis. The attention to the technical detail and the seemingly mundane choices is important as it prevents the researcher from just assuming that ideational convictions of actors translate neatly into policy outcomes (cf. Kranke and Yarrow 2018: 3).

By opening up technical details, performativity research can do much to answer the questions of how ideas are integrated into policy and what these policies do actually look like. Yet while performativity is strong on the details, it has deficiencies on the politics. The focus on instruments that eventually ‘worked’ gives it a status quo bias, where alternative ideas are easily dismissed or not even scrutinised. Furthermore, its perspective that different actors from the ideational and material world come together in networks makes it prone to the assumption that each of these actors is representative of its domain. Mirowski and Nik-Khan (2007) have thus criticised the complacency of performativity researchers with dominant (and in their view false) economic theory as they take the ruling orthodoxy as a proxy for economics. Likewise, Fine (2003) has accused performativity research of failing to move from description to explanation and for leaving the study of the economy to orthodox economists.

Through its fascination with socio-technical instruments, performativity seems to suggest that existing instruments are the strongest, since they work. This understanding eclipses – and thus reproduces – existing power asymmetries (Bernards and Campbell-Verduyn 2019: 3). Where ideational (IPE) theories see a fight between opposing coalitions, performativity research tends to see a problem. The outcome of this process of problem solving is then not conceptualised as the more powerful actor prevailing but as being the only one that is sufficiently inclusive to build a socio-technical instrument. If the proposals of one ideational coalition are not reflected, this is because they ‘did not work’, i.e. they could not enroll enough socio-technical actors into their network. From there it is only a matter of interpretation to say that the outcome was the only one possible, thus eclipsing power dynamics.

Performativity research on sustainable finance has notably tried to address these criticisms by integrating a more explicit account of the power of individuals and organisations (Beunza and Ferrero 2019: 519; Slager et al. 2012: 767) as well as of macro actors like the state (Giamporcaro and Gond 2016). These studies are indicative that rather than transcending classical theories of power, STS approaches are better thought of as complements to other research strategies such as the ones employed by constructivist IPE. This is not least because if the complete collapsing of power into socio-technical instruments does not hold true, the same can arguably be said of ideational differences.

In this subsection, I have revisited the treatment of ideas in three different strands of literature. The section found that constructivist IPE is the literature that devotes most attention to studying how differences between ideas lead to political contestations. Sociological and STS research put less emphasis on these questions since they are less relevant for their research questions and units of analysis. When it comes to the study of how ideas matter in a system like sustainable finance, accounting for differences in the content of ideas remains a necessary exercise. Hence, rather than constituting an alternative, I argue that the sociology of professions and STS can complement IPE's treatment of ideas.

Complementarities of IPE, the Sociology of Professions and STS and Potential for Integration

From the above discussion it becomes clear that an ideas-centred, evolutionary account of sustainable finance can gain much from integrating insights from each of the three approaches. The sorting of ideas that constructivist research excels in can be leveraged to determine the origin of the ideas in sustainable finance. Understanding how ideas

are embedded in already existing thought systems can provide insights on why different ideas are incompatible with one another and what their implementation would likely mean. The attention to technical detail that is the strength of performativity research, on the other hand, offers an intriguing account of how ideas influence the economy. Sociological research on expertise, finally, allows for an explicit mapping of the actor population. Conceptualising the expert community as a system also provides a handy way to detect power differentials between actors advancing different ideas.

Some IPE research has already begun to exploit the complementarities between the three approaches. Seabrooke and Tsingou (2014) connect the ideational dynamics of crises with the politics of expertise by exploring how prominent experts mediated between different interpretations of the Global Financial Crisis (GFC). Similarly, Hasselbalch (2016) has examined how professional actors draw on existing knowledge to frame emerging regulatory environments. Finally, performativity research has emphasised the links between ideas and economic models (Braun 2014; Henriksen 2013; Huber et al. 2017).

A second advantage of combining the constructivist, crisis-based approach with the more evolutionary focus of performativity and expert governance research is that it can overcome the artificial dichotomy between the role of ideas in ‘extraordinary’ and ‘normal’ times (cf. Bell and Feng 2019 for a discussion). Instead of having two theories of how ideas matter in special and normal situations, the differences can potentially be reduced to a matter of scale rather than one of essence. This can point towards new research questions about the factors that mediate the extent of ideational influence. An example of such research is Baker’s conceptualisation of Varieties of Crisis in economic governance, where variations in the policy subsystem

influence where and how ideas matter (Baker 2015). Section 5 will discuss policy subsystems in connection with the literature on institutional fields that was briefly introduced above. For now, it suffices to state that variations in the degree of institutionalisation and the actor population can be used as scoping conditions for explanations of ideational influence.

Finally, an incorporation of performative elements into constructivist accounts can add to the understanding of how ideas relate to material factors. This would complement constructivist explanations, which have been criticised for being overly reliant on discursive shifts (cf. Allan 2019: 186).

In summary, a focus on socio-technical instruments combined with a politicised understanding of competing ideas, which are explicitly mapped in a system of expertise can help to identify the role that ideas play in the evolution of sustainable finance. This is illustrated in table 2.1, which lists the contributions that constructivist IPE, the sociology of professions and STS can make to the ideational, evolutionary understanding that underpins the research strategy of this thesis.

Research Field	Relevant	Less Relevant
Constructivist IPE	<p>Explicit sorting of ideas into established categories</p> <p>Politicisation and contested nature of ideational processes</p> <p>Transmission through (see next section)</p> <ul style="list-style-type: none"> - Persuasion - Individuals as carriers of ideas - Institutionalisation 	<p>Crisis focus</p> <p>Single organisations as the sites for ideational struggles</p>
Sociology of Professions/ Expert Governance	<p>Conceptualisation of ideas and expertise inside of a system</p> <p>Power is represented by the position of actors in the system</p> <p>Evolutionary perspective</p> <p>Sorting of systems (fields) according to variations in the structure of systems and the presence of actors</p>	<p>Professions as main category for differentiation and struggles and professionals as principal actors</p> <p>Treatment of ideas as relational knowledge</p> <p>Unitary logics (e.g. financial logic) covering an entire system</p>
STS/ Performativity	<p>Focus on socio-technical instruments and their impact on future debates, institutions and policies</p> <p>Evolutionary perspective</p>	<p>Lack of contestation</p> <p>Exclusive focus on models (see section 5)</p>

Table 2.1: Relevance of Insights From Constructivist IPE, the Sociology of Professions and STS for an Ideas-based, Evolutionary Account of Sustainable Finance

2.2 How Ideas Matter: Transmission Routes

The transmission between ideas and policy outcomes has only more recently become a preoccupation of constructivist accounts. That constructivist IPE has been historically more concerned with the identification and sorting of ideas and less with the transmission of ideas into policy is evidenced by some early ideational research, which adopted a counterfactual approach. Here, ideas are first sorted into different categories like paradigms or schools of thought. Subsequently, it is demonstrated that variations in any other factor apart from ideas does not lead to policy change. Henceforth, it is concluded that “ideas matter” (e.g. Blyth 2001; Chwieroth 2010).

Since then, IPE research on the transmission of ideas has proliferated. Persuasion (e.g. Widmaier et al. 2007) and socialisation (e.g. Broome and Seabrooke 2015) are only two of the transmission channels that have been suggested. To summarise existing research that does not only cover IPE but also the different research traditions that I introduced in the last section it is useful to look at a review article by Berman and Hirschman (2014) which identifies three distinct avenues for ideational transmission.

First, there is a prestige route, where the influence of ideas occurs in a way that is similar to the dynamics that are explored in the work on epistemic communities (cf. Haas 1992). Accordingly, actors in the policy process defer to the authority of (academic) economists rather than to other experts. This perspective can reveal dynamics occurring within professional jurisdictions (cf. Abbott 2005) as well as the emergence of new professional jurisdictions (e.g. Henriksen and Seabrooke 2016). Yet it is less attuned to make any pronouncements about the content of the expertise. This is because any route through which professional prestige translates ideas into policy rests on the assumption that knowledge is shared across the whole professional group.

This perspective is thus less well-equipped to detect conflicts within the expert community.

This assumption might not constitute a problem since, at first sight, economists appear to display a high degree of professional uniformity. Surveys of academic economists and graduate students have found that economists tend to be in broad agreement about matters of theory like the rationality assumption and some policy prescriptions like the dangers of protectionism (Colander 2005; Fourcade et al. 2014). As the discipline of economics becomes more aligned to the US graduate model, regional differences are also disappearing (Colander 2008; Frey et al. 2010).

Nevertheless, for emerging systems like sustainable finance, where financial expertise must engage with knowledge from other systems like environmental science and civil society, the assumption that actors holding the mainstream view are best positioned becomes problematic. This is because instead of being representative of the overall distribution, expertise systems that emerge at the periphery of finance might as well be biased. Thus one could hypothesise that the 15% of US economists that deem the rational expectations hypothesis to be unimportant (Colander 2005: 188) or the 17% of German economists who disagree with the proposition that neoclassical theory is relevant for current political problems (Frey et al. 2010: 319) could plausibly be over-represented in sustainable finance.

Indeed, IPE accounts of ideational change have tended to focus on how actors holding a minority view became influential. Both the UK's shift to monetarism and new classical economics and the post-GFC switch from micro to macroprudential supervision came from minority groups within the community of economists (Baker 2013; Hall 1993).

While keeping in mind the overall distribution of economists' ideas, the presence of such ideas in an expertise system like sustainable finance remains an empirical question. This is not to ignore that the majority view maintains important advantages over challengers. Proponents of the majority view can, for instance, marshal superior resources. Apart from greater financial firepower, these resources can include better developed concepts, larger datasets and greater legitimacy. These advantages can translate into greater influence within an adjacent system such as sustainable finance. However, such mechanisms of translation must be explicitly accounted for rather than assumed *a priori*.

In light of the above, we can expect that the prestige mechanism is less relevant in systems where the appraisal criteria for what constitutes legitimate expertise are still emerging. This notwithstanding, it is useful to keep in mind that professional prestige as such is also subject to variations, which can have knock-on effects on the influence of experts, whatever the content or maturity of their ideas. Farrell and Quiggin (2017) emphasise in this context that the political authority of economics as a profession co-varies with the degree of consensus that economists present.

A second transmission route identifies individuals as carriers of ideas. The individuals in question hold certain economic ideas (e.g. through socialisation). The transmission of their ideas to policy occurs as the individuals become policymakers, advisors or policy-implementing civil servants. This approach is adopted by Ban, who follows networks of individuals with either embedded or disembedded neoliberal views and traces their ways to positions of policy decision making (Ban 2016: 31).

While also relying on individuals as carriers of ideas, Chwierorth (2007; 2010) and Nelson (2014) have operationalised the attribution of ideas to individuals differently. Instead of adopting a network approach, both authors rely on educational

and professional experiences as a proxy variable. Chwiero uses a list of neoliberal universities to detect variations in the educational background of IMF staff, which he subsequently links to a variation in the Fund's position towards capital controls. Nelson, on the other hand, finds a variation in the stringency of the Fund's lending modalities, which is dependent on the degree of neoliberal convictions of the interlocutors from the countries requesting IMF loans. To measure these convictions, Nelson uses the educational background of policymakers and their past experiences with the IMF and the World Bank as proxies (Nelson 2014: 312).

The use of such proxy variables has led to criticism. In a review of Nelson's research, Ban (2018: 788) casts doubt on whether such broad educational and professional variables can measure Neoliberalism without distorting the concept. Such criticisms are important and the next section of this chapter that concerns the classification of ideas as well as chapter 3, which outlines how ideas can be detected, will address these issues. For the discussion on transmission channels it suffices to note that both the network-based and more contextualised approach of Ban as well as the variable-based studies of Chwiero and Nelson belong to the same category as they focus on individuals.

In summary, this strand of research assumes that individuals are vectors that carry ideas. Individuals will enact policies in period t_2 that are based on the ideas that they have been exposed to in period t_1 . If we are able to find evidence on the ideational credentials of an individual (e.g. education, membership in academic associations, think tanks, personal links, public statements), who is connected to economic policymaking, we can assume that policies, in which the individual in question played an instrumental role, reflect the previously identified ideas. An important corollary to the influence of individual actors is that they do not only matter as the designers of

policy but also in how ideas “become embedded in organisations, patterns of discourse, and collective identities” (Berman 2001: 233; cf. Lindvall 2009 for an empirical study with focus on the change of organisational routines).

A stronger version of individuals as carriers of ideas is the concept of internalisation. Here, the successful mobilisation of ideas in a first period leads to a narrowing down of the realm of the thinkable. In other words, ideas acquire taken for granted qualities (Finnemore and Sikkink 1998: 895) and act as cognitive locks (Blyth 2001: 3). When applied to economic ideas, this approach has, however, come under criticism for advancing an unrealistic conception of individuals, who are assumed to have internalised highly abstract systems of ideas (Carstensen 2011a).

The problems with internalisation notwithstanding, the transmission channel that focuses on individuals is a credible, tested and easy to operationalise way to map the trajectories of ideas. There is, however, an important nuance in conceptualising individuals as carriers of ideas that relates to the concepts of socialisation and persuasion. Whereas socialisation follows the explanation outlined above, where individuals integrate ideas as part of their worldview, persuasion is a less permanent and less intensive process. Widmaier et al (2007: 754) point out that persuasion is much more about ongoing struggles and continued contestation than about the permanent internalisation of ideas.

This separation is important, because I contend that individuals that are heavily invested in sustainable finance tend to be subjected to socialisation. This means that they introduce ideas from the outside to sustainable finance in the first place. Subsequently, they engage in knowledge production and, thereby, stabilise the presence of the ideas in question. On the other hand, persuasion occurs when these individuals (and the organisations that they belong to) try to convince actors that are

remotely connected to sustainable finance that the governance of this system should be entrusted to them (see section 5 for a more detailed discussion).

Concerning the operationalisation of individuals as transmitters of ideas, the expanded size of the population of individuals inside sustainable finance makes an approach that builds on lengthy narrations of individuals' biographies impractical. On the other hand, quantitative methods that assign ideational allegiance based on educational or professional trajectories (Chwiero 2007; see also Seabrooke and Nilsson 2014) rely on the assumption that a group that is characterised by a common educational or professional background holds shared ideas. Yet this is precisely the assumption that was rejected above, because of the possibility that non-mainstream representatives might have a disproportionate presence in emerging expert systems.

To establish the ideational credentials of individuals without either relying on extensive narratives or potentially inaccurate assumptions, I shift the level of analysis to the organisation. This reduces the number of actors to a manageable level. To understand what ideas do in organisations it is useful to consider two of the main dynamics that are highlighted in institutionalist scholarship (cf. Bell 2011: 898ff).

Ideas (and their carriers) must adapt to the institutional legacies that they are confronted with. Research on how ideas are grafted and layered on existing institutions as well as studies about regional differences and the hybridisation of ideas has explored these dynamics (e.g. Ban 2016; Ban and Blyth 2013; Babb 2013; Moschella and Tsingou 2013). On the other hand, ideas get institutionalised themselves in organisations that reproduce them. Universities, think tanks and professional organisations have been singled out as the sites of such ideational institutionalisation (Campbell 2001: 171). Within these organisations ideas can get normalised and thus depoliticised (cf. Kuzemko 2013: 51). After this normalisation has taken place, ideas

might live on and inspire procedures and policy long after their discursive hegemony has passed (cf. Babb 2013).

The third and final route of ideational influence that Berman and Hirschman identify is what they call cognitive infrastructures (Berman and Hirschman 2014: 4). As the term infrastructure suggests, this route deals with the stabilisation of ideas into more durable forms. Once established, infrastructures can be expected to mediate the possibilities for action that are open to their future users. The concept of infrastructure covers a cognitive and rules-based dynamic at the individual and organisational level as well as a performative dynamic at the level of socio-technical instruments. Concerning the question of what is stabilised, Berman and Hirschman point to the economic style of reasoning (individuals and organisations) and to policy devices (socio-technical instruments).

As to the economic style of reasoning, it is assumed that concepts from economics like incentives or the quantification drive tend to dominate the policy discourse beyond the level of a single individual or organisation. Berman and Hirschman draw from Hacking's (1992) work on the statistical style of reasoning and explain that a style of reasoning transcends the differences among competing economic paradigms. As will be elaborated further in section 4, I disagree with this assessment as it paints a too unified and unproblematic picture of 'economics'. Furthermore, the identifiers that Hirschman and Berman propose for the economic style – common concepts and methodological advice – are equivalent to the ones that philosophy of science scholars have for paradigms (cf. Hirschman and Berman 2014: 25-26). In light of these criticisms and the fact that the economic style of reasoning operates on the same units of analysis as the earlier examined processes of

socialisation, persuasion and institutionalisation, I will sort it with their second transmission channel.

Performativity, on the other hand, is about ideas becoming part of a socio-technical instrument that is subsequently used to govern a part of reality. Instead of institutionalisation or internalisation, ideas influence the construction of socio-technical instruments like evaluation standards (e.g. Cost Benefit Analysis), classification systems (e.g. NACE sector codes) or measurement conventions (e.g. GDP) (cf. Berman and Hirschman 2014: 29ff). Once such a technical device is constructed and used, the ideas that informed it become embedded as they constitute the background information against which governance is carried out. It is important to note though that the transmission from idea to socio-technical instrument is not unproblematic. As material factors like data availability, computing capacity or cost play a role, there is no linear translation from ideas to instruments. Just as ideas have to adapt to institutional legacies, socio-technical instruments have to bring together multiple actors to ‘perform’.

This section has reviewed the literature on transmission routes that map the trajectories from economic ideas to policy outcomes. The institutionalisation of ideas as well as socialisation (individuals and organisations within sustainable finance as unit of analysis), persuasion (individuals and organisations at the margins of sustainable finance as unit of analysis) and performative processes (socio-technical instruments as unit of analysis) have been singled out as the most promising avenues for the present study.

2.3 Which Ideas Matter: Sorting Ideas by Disentangling the Concept of Paradigms

Differences and Dynamics Between Academic and Policy Paradigms

The previous section gave some insights about *how* ideas influence policy. It has, however, not addressed the question of *which* ideas matter. As noted above, one of the strengths of constructivist IPE lies in the sorting of ideas. The toolkit provided by constructivist IPE enables us to go beyond the classification of ideas that are voiced in policy debates in an *ad hoc* manner. Moreover, it puts emphasis on the contested nature of ideas and avoids marking dominant ideas as just being the ‘correct’ ones. The strategy that is most commonly employed to sort ideas is relating them to existing knowledge structures.

To denote such broader knowledge structures, IPE scholars have developed and debated the concept of *policy paradigm*. The concept of paradigm comes from Kuhn’s work in the philosophy of science and was introduced to the study of ideas in political economy by Hall (1989; 1993). Since then it has been applied and modified (Babb 2013; Kuzemko 2013; Lindvall 2009; Mandelkern 2015; Neep 2018; Röper 2018), criticised (Blyth 2013a; Carstensen 2011a, Carstensen and Matthijs 2018; Oliver and Pemberton 2004; Schmidt 2002; 2011) and declared as obsolete and incomplete (Allan 2019: 186ff).

Much of the criticism of Hall’s original framework has been directed at the conflation of the ‘scientific’ processes of paradigm change that are explored by Kuhn with the ‘political’ contests that are the subject of ideational explanations in IPE (Carstensen and Matthijs 2018: 431; see also Blyth 2013a). Scholars, who study the transmission from ideas to policy (cf. previous section), have argued that the Kuhnian legacy deprives Hall’s conceptualisation of policy paradigms of analytical value. First,

Kuhn's model posits a strong internal cohesiveness for paradigms. Yet political actors, who are faced with institutional legacies and political realities, care less about ideational purity and tend to act pragmatically (Carstensen 2011a). In addition, Carstensen has argued that, unlike their Kuhnian name givers, policy paradigms cannot be understood as static ideational configurations that are only periodically disrupted during crises. Instead, they are subject to endogenous and evolutionary dynamics that also occur during periods of relative stability (Carstensen 2011a; 2011b; Carstensen and Matthijs 2018).

The Kuhnian explanation is unable to accommodate these dynamics. This means that when policy paradigms are interpreted as resembling scientific paradigms, the result is a punctuated equilibrium model (Carstensen 2011a; Carstensen and Matthijs 2018; Schmidt 2002; 2011). One reason for this is the incommensurability thesis that Hall carries over from Kuhn. Incommensurability means that paradigms are mutually exclusive thought structures. Combining different paradigms is impossible, because concepts and data that are mobilised within one paradigm are meaningless for the other one. Kuhn argues that if Einsteinian mechanics are right, then Newtonian mechanics and all its experiments and research questions must not only be wrong, but meaningless and irrelevant (Kuhn 1996[1962]: 98ff). In an economic context, Hall applies this notion by pointing out that while for Keynesians, who question the stability of the private economy, calibrations concerning public spending were meaningful (e.g. How? When? How much?), Monetarists that assume an economy in an equilibrium state deemed such questions nonsensical. This is because in their paradigmatic view public spending is always an impediment to economic performance (cf. Hall 1993: 284).

Incommensurability leads then to paradigm shifts becoming *Gestalt* switches or “all or nothing affairs” (Blyth 2013a: 208). Hence, treating policy paradigms as incommensurable results in a punctuated equilibrium model, which, as the critics point out, is unable to accommodate observations about hybridity, bricolage, layering and regional adaptation (cf. Allan 2019; Ban 2016; Carstensen 2011a; Carstensen and Matthijs 2018; Schmidt 2011). A corollary of the Kuhnian approach is that battles between paradigms can only have two contestants: one incumbent and one challenger. However, Schmidt, echoing Kuhn’s assessment of the pre-paradigmatic stage of the social sciences, has observed that this is rarely the case with economic theories (Schmidt 2011: 42). Instead, she argues that multiple and partly overlapping and thus at least partly commensurable Lakatosian research programmes are a more accurate metaphor for describing the contests between economic ideas (Schmidt 2002: 223). Moreover, if applied to the individual, the incommensurability thesis leaves us with a highly unrealistic account of agents’ cognition.

Another criticism of Hall’s framework relates to the confusion of academic schools of thought with the policy structuring devices that he calls policy paradigms (Allan 2019: 186). Keynesianism and Monetarism are names that describe both research traditions and policy paradigms. Yet does that mean that the policy paradigm of Monetarism is a direct implementation of the findings from monetarist scholars? By alluding to political and sociological processes of paradigm shifts, Hall himself seems to suggest that this is not completely the case (Hall 1993: 280). Nevertheless, the identity between schools of thought and policy paradigms has led to much confusion. This confusion is amplified by the fact that there is a lack of consensus and in many cases even a lack of thought about how to measure the presence of policy paradigms and processes of paradigm change (cf. Kuzemko 2013: 33ff for this line of criticism).

To resolve this confusion, I suggest to analytically separate schools of thought from policy paradigms. Both schools of thought – which I will refer to as *academic paradigms* since in the philosophy of thought literature paradigm is better defined than school of thought – and policy paradigms matter for ideational explanations. Yet, while connected, they have different characteristics, which lead to confusion if they are brought together within one concept. The tension between these two different concepts that are brought together under the name of policy paradigm can also be observed in Hall's contribution. First, he identifies *which ideas* matter by sorting them into the academic paradigms of Keynesianism and Monetarism. Second, he describes *how* these ideas matter by elaborating the framework of first, second and third order policy change. The criticisms outlined above argue that the Kuhnian framework is inadequate for the how question and their arguments concerning evolution, incommensurability and internalisation are convincing.

Yet the critics remain relatively silent on the academic paradigms, which are instrumental for the sorting of ideas. As argued in section 2, such sorting exercises are necessary to study the contestation between ideas within a system. To underline the necessity of conceptualising ideational systems, I also pointed out that IPE research on ideas has time and again recurred to the study of schools of thought.

This leads to a reassessment of Hall and his critics. As shown above, the criticisms of the Kuhnian framework are accurate when it comes to policy paradigms. However, to determine the categories of an academic paradigm much can be gained from Kuhn and other philosophers of science. And Hall's article is insofar right as it highlights that academic and policy paradigms are interlinked. However, the logics of these two are different. Some of their logical inconsistencies notwithstanding (cf.

Braun 2014: 60-61 on the neoclassical synthesis), when compared to policy paradigms, academic paradigms are more cohesive, stable and incommensurable.

It thus makes sense to apply concepts from Kuhn and the broader philosophy of science literature to establish the categories for comparing different academic paradigms. As illustrated above in Hall's example of Keynesianism and Monetarism, when it comes to assessing the content of academic paradigms rather than only the actors applying them, a Kuhnian notion of incommensurability is warranted. This means that the processes like hybridisation or bricolage that have been emphasised in the literature on policy paradigms cannot be applied here. After all, such incommensurabilities are one of the major factors for why we see little research collaboration between Marxism and New Institutional Economics or between Austrian and New Keynesian approaches. Furthermore, the ideas inside of academic paradigms are structured hierarchically.

Establishing categories for ideas from the philosophy of science literature also enables us to eclipse millennia-old debates about what ideas are and where they come from (cf. Carstensen 2015: 285ff for a discussion of this problematic). By narrowing down the ideas inside an academic paradigm to those that can be sorted and compared across a limited number of categories, the tangled web of ideas is ordered and thus reduced to manageable levels of complication.⁶

This subsection established that academic paradigms are analytical devices to categorise economic ideas. Policy paradigms, on the other hand, are subject to evolution, layering, hybridisation and political contestation. Also, it is policy

⁶ The emphasis on philosophy of science criteria to structure systems of economic thought is also present in Schmidt's early treatment of paradigms. Drawing from Hempel, she emphasises the triad of coherence, relevance and applicability as characteristics of paradigms (Schmidt 2002: 219).

paradigms that influence policies via the transmission routes examined in the previous section. The differences between the two concepts are summarised in table 2.2.

Category	Academic Paradigm	Policy Paradigm	Explanation / Comments
Reproduction and extension (coherence and change)	Through abstraction from core axioms	Through political entrepreneurs, institutionalisation and bricolage	Academic paradigms are more stable and cohesive and can be traced back analytically The stability of policy paradigms is a matter of historical developments
Cooperation with other paradigms	No or limited	Yes	Academic paradigms are incommensurable to the extent that they rely on different ontologies and epistemologies Policy paradigms are subject to layering, hybridisation, and regional translations
Ideas are ordered by ...	Core axioms, positive/negative heuristic Conception of actors, unit of analysis	Legacies, layering, actions from ideational entrepreneurs	
Ideas matter ...	Indirectly	Directly	Academic Paradigms or the ideas ordered in them influence frames, which then influence policy paradigms Policy paradigms consist of persuasive and performative processes (cf. section 5)

Table 2.2: Differences Between Academic and Policy Paradigms

How to Spot an Academic Paradigm When We See One?

As argued above, academic paradigms bring ideas together in larger thought systems. Examples of academic paradigms are Keynesianism, Neoliberalism, Institutionalism, Mercantilism or Developmentalism. To determine what makes up a system of thought, philosophers and historians of science have developed the concepts of thought collective (Fleck), research programme (Lakatos) and, most famously, paradigm (Kuhn).

One way to identify the characteristics of academic paradigms is to follow the logical framework that Imre Lakatos developed in his treatment of research programmes. Accordingly, the manifestation of an academic paradigm in its purely ideational dimension can be determined by logically reconstructing the derivation of a concept or argument to the core assumptions of the paradigm (cf. Lakatos 1970, see also Masterman 1970: 78-83). This approach follows the hypothetico-deductive method, where statements are derived from established premises using logical operators. If the deductive character of all parts of a paradigm was to hold, then a logical reconstruction could be undertaken. However, there are both theoretical and empirical limitations to such an approach.

The arguments against identifying paradigms through the process outlined above boil down to the observation that the hypothetico-deductive method is neither an accurate description of what scientists do nor of the evolution of a paradigm. Concerning the first criticism, it has been observed that neither natural scientists (e.g. Latour and Woolgar 1986; Masterman 1970: 60) nor economists (McCloskey 1983: 484ff) give much importance to what Karl Popper and other philosophers of science

have identified as the ‘scientific method’. As to the second criticism, Ludwig Fleck argued against a strictly logical and derivative approach stating that⁷:

“The more detailed and differentiated the description is for any field of thought, the more complex, interrelated, and mutually dependent in definition will be its concepts. They become a tangle impossible to unravel logically, an organic structure produced by mutual development and with interacting components. At the end of the process, the beginning cannot be understood any longer or even properly expressed in words. If at all, it will be understood and expressed differently than it was originally.” (Fleck 2008[1935]: 53)

Fleck’s argument points out that a purely deductive definition of an academic paradigm is at best insufficient as it would ignore that concepts are also a reflection of the time and the sociological characteristics of the scientific community. At worst, it would be a misrepresentation of the academic paradigm.

To remedy these defaults, both Fleck and Kuhn have emphasised the sociological aspects of paradigms. Examples are shared institutions like academic journals as well as common metaphors and terminology (cf. Fleck 2008[1935]: 103ff; Kuhn 1996[1962]: 44). These criticisms and observations notwithstanding, the ideational part of the paradigm – what Fleck calls the *thought style* (Fleck 2008[1935]: 110) – remains relevant and cannot be subsumed under the sociological categories.

Hence, a definition of academic paradigms must incorporate the role of social institutions. At the same time, it should be able to operationalise the ideational dimension of the paradigm in a non-strictly logical manner. The second demand can

⁷ Fleck speaks of thought collectives and thought styles rather than paradigms, but for the purpose of the argument I will equate the thought style to the intellectual and conceptual part of the paradigm.

be addressed by replacing the concept of axioms at the core of the paradigm. Alternatives to axioms, which have been proposed by Fleck, Masterman and Schumpeter respectively, are *proto-ideas* (Fleck 2008[1935]: 23ff), *crude analogies* (Masterman 1970: 84ff), and *pre-analytic visions* (Schumpeter 1986[1955]: 39ff). These concepts maintain the emphasis on a set of core ideas. They, however, propose a different mechanism for understanding how these ideas influence the expansion of the paradigm. Proto-ideas and the like are formulated in a very crude manner and do not lend themselves to a transformation into logical or mathematical statements. Instead, they come in the form of stylised facts, images or metaphors that serve as inspiration for theory development. Importantly, the translation from proto-ideas to secondary theoretical statements is carried out in an associative rather than in a derivative manner.

Proto-ideas are seldom spelt out explicitly. This means that they cannot be taken directly from texts that describe academic paradigms. Instead, they have to be constructed as analytical devices. For the operationalisation, this means that it is the task of the researcher to isolate proto-ideas from representative texts. Subsequently, these ideas serve as the basis for establishing the presence of the academic paradigm in the data under analysis. As to the isolation of proto-ideas, I follow Kuhn, who emphasises that paradigmatic ideas are conveyed to members of the scientific community through textbooks (Kuhn 1996[1962]: 165ff). Textbooks are complemented by field-surveying and intervention articles by adherents or critics of academic paradigms (see chapter 5).

To narrow down what constitutes proto-ideas, common ideational dimensions that must be addressed by all economic paradigms have to be identified. Likewise, the non-ideational parts of the paradigm, that is the sociological and terminological

dimensions, must be assessed. The literature on pluralism in economics, the history of economic thought as well as descriptions of specific schools of thought in comparison to others offer a wide menu of dimensions and indicators (Chang 2014; Costanza 1991; Dobusch and Kapeller 2012; Marieta and Perlman 2000; Resnick and Wolf 2006). Table 2.3 orders the above-mentioned literature by providing a selection of the ideational, sociological and terminological dimensions and their respective questions or indicators.

The ideational dimension queries the self-identification of the paradigm, i.e. its claim of how it contributes to knowledge. In addition, the ontological assumptions concerning questions like which units of analysis (e.g. individual, group, system) and actors are deemed most important are assessed. The same goes for the selection of paradigmatically meaningful time intervals and geographical scales.

Two further indicators for the ideational dimension are Lakatos' positive and negative heuristic. These heuristics provide an academic paradigm with a direction that guides its expansion (positive) and at the same time with a red line that cannot be crossed (negative). Lakatos points to Newton's three laws of motion as an example of a negative heuristic. Accordingly, a scientist working within the Newtonian paradigm would swiftly abandon or redirect any research that violates of these laws (Lakatos 1970: 133). Meanwhile, he defines the positive heuristic as a metaphysical principle consisting of "a set of initial conditions (possibly together with some observational theories) which one knows is *bound* to be replaced during the further development of the [research] programme, and one even knows, more or less how." (Lakatos 1970: 136, original italics). Lakatos takes the consecutive developments of Newton's planetary model as an example. While the first iteration started with a model of two fixed points (one sun and one planet), subsequent models introduced theoretically

relevant categories like spherical planets and interplanetary forces (Lakatos 1970: 135).

The final category inside the ideational dimension are analytical concepts and measurement units. This category captures prominent theoretical developments of an academic paradigm as well as the operationalisation of these concepts.

The sociological dimension of an academic paradigm can be assessed by looking at the institutional infrastructure of the academic community. One indicator for this dimension are the journals through which the members of the academic paradigm exchange their ideas. A further sociological aspect of academic paradigms is that they often are associated with a core set of foundational scholars. As the members of the paradigm tend to acknowledge these scholars in their writings, references to eminent scholars can be taken as an indicator.

Lastly, the terminological dimension is concerned with linguistic markers of academic paradigms. One indicator are idiosyncratic terms that are used frequently by the members of the academic paradigm. Metaphors, on the other hand, are thought structuring devices that are not only terminological but also express core ideas of the paradigm in a non-formalistic way (cf. Hodgson 2008).

In terms of operationalisation, the sociological indicators, i.e. paradigmatic journals and eminent scholars, will be queried through a quantitative corpus analysis in chapter 5. Qualitative content analysis will be mobilised to assess the ideational and terminological dimensions.

Ideational	Sociological	Terminological
Definition (what is the paradigm about?)	Journals	Typical language
Unit of analysis and actors	Eminent scholars	Metaphors
Time and scale		
Analytical concepts and measurement units		
Positive and negative heuristic		

Table 2.3 Selected Ideational, Sociological and Terminological Indicators of Academic Paradigms

2.4 Where Ideas Matter: Policy Subsystems and Frames

Policy Subsystems

While the preceding sections have discussed ideational transmission channels and academic paradigms, the question of how to conceptualise the environment where these processes take place remains open. I already specified that I understand sustainable finance as an evolving system, in which the positions of different actors are defined in relation to each other. A formalisation of such an understanding is provided by the concept of *policy subsystem*. Sabatier has described such subsystems in his work on advocacy coalitions. Policy subsystems are populated by actors with material or normative stakes in the issue that is governed by the system. Actors can be public or private entities as well as CSOs and International Organisations (IOs). These actors work together in so called actor coalitions or else compete to affect policy outcomes (Sabatier 1998). Shared beliefs on core elements of policy in the subsystem are, in turn, the ‘glue’ that binds them together (Sabatier 1998: 103; see also Blyth 2002 on ideas as crystallisation points).

Conceptualising sustainable finance as a policy subsystem provides a useful analytical framework since it allows for the connection of different actor types. The incorporation of different actor types is beneficial as empirical investigations on the interaction between actors from market and environmental backgrounds have shown the existence of fragmented networks that are bound together by loose frames like ‘liberal environmentalism’ (Hoffman 2011). As sustainable finance is connected to the broader systems of both environmental and financial governance, one can expect that similar dynamics might be taking place.

A second advantage of the policy subsystem concept is the emphasis that it gives to technical expertise in linking policy actors (Sabatier 1998: 99). This focus integrates well with the literature on the sociology of expertise that was introduced above. In addition, it is well-positioned to represent the dynamics of the financial system, which has been found to be relatively isolated from democratic political processes. Instead, finance is characterised by elite interactions and technical discourse (Baker and Widmaier 2014; Scholte 2013).

While the concept of policy subsystem is helpful for understanding the social space in which the dynamics of sustainable finance unfold, it has to be complemented by other concepts. To connect policy subsystems with the discussion on academic and policy paradigms, I introduce the concept of *framing* below.

A final thing to notice on policy subsystems is that Sabatier’s original framework is designed for what he calls ‘mature’ policy subsystems, i.e. systems which have existed in a stable configuration over a prolonged period. Mature systems are characterised by an established and distinguishable population of actors as well as by clearly defined conflict lines that often arose through watershed events (Sabatier 1998: 111, 114). As will be shown in the empirical chapters, sustainable finance, by

contrast, has been anything but stable over the last decades. Whereas there has been a community of actors that has linked finance with sustainability concerns for at least four decades, the actor population and the interactions among actors have undergone significant changes. I will come back on how these differences in maturity are likely to influence the transmission of ideas in the fifth section of this chapter.

Frames

In mature policy subsystems, the shared beliefs that link actors within policy subsystems are not articulated through the concepts of either academic or policy paradigms. Instead, Sabatier refers to them as ‘policy core beliefs’, which represent basic normative and empirical commitments (Sabatier 1998: 103). Sabatier suggests a list of up to 11 categories of policy core beliefs that relate inter alia to the identification of the causes of the problem, choices of which groups’ welfare counts most and the appropriate role of markets and governments. They find, however, that the operationalisation of two or three of these categories is normally sufficient to identify actor coalitions (Sabatier 1998: 112-113; Sabatier and Weible 2007: 195ff). Sabatier also notes that these belief systems are routinely defined as actors sharing a “set of basic values, causal assumptions, and problem perceptions” (Sabatier 1998: 115).

As sustainable finance presents a case of an immature policy subsystem, it can be assumed that the category of problem perception plays a particularly important role. This is because actors have yet to develop a shared understanding of the meaning of the policy subsystem. To highlight this characteristic, I adopt the concept of *framing* to signify the shared beliefs of actors within the policy subsystem.

Framing has been defined as individuals' response to the question "What is it that's going on here?" (Goffman 1974: 8), social movement actors' construction of "a shared understanding of a problematic situation that they define as being in need of change" (Benford and Snow 2000: 615), the selection and making salient of aspects of a perceived reality (Entman 1993: 52) and the "selecting, organizing, interpreting and making sense of a complex reality to provide guideposts for knowing, analysing and acting" (Rein and Schön 1993: 146). A commonality of these definitions is that they emphasise frames' function as uncertainty-reduction devices that enable actors to understand and transform their environment. This approach reflects a constructivist understanding as actors cannot perceive their interests and motivations before they interpret the reality and their position in it by means of ideas (cf. Broome 2013: 193 for an overview, see also Blyth 2002; Widmaier et al. 2007). Frames are thus close to what constructivists have classified as "ideas as blueprints" (cf. Blyth 2001). If we adopt a narrower understanding of actors' environment being the policy subsystem of sustainable finance (cf. chapter 3 on the empirical operationalisation), applying the conceptual language of framing can be utilised to understand the shared ideas that bind actors together.

Using frames instead of academic or policy paradigms to denote joint ideas, addresses the criticism concerning individuals' (and organisations') incapability to internalise highly abstract thought structures (Carstensen 2011a).⁸ At the same time, the concept of framing incorporates the notion that actors still rely on existing thought structures such as academic paradigms to interpret their surroundings. This is because framing agents are understood as being both consumers of the existing knowledge stock and producers of novel meanings (Benford and Snow 2000: 629). Second,

⁸ Exceptions are mature and highly technical issues like central banking and macro-modelling (Henriksen 2013; Kapeller and Heimberger 2017).

starting with the identification of frames allows for an inductive research strategy, which is better suited to understand the emergence of the sustainable finance policy subsystem and the role that economic ideas played in this process than a deductive testing of hypotheses (cf. chapter 3).

How to Spot a Frame When We See One?

Benford and Snow (2000: 615ff) suggest that frames can be conceptualised according to three dimensions, which capture the diagnostic, prognostic and motivational functions of framing. Diagnostic framing is about the identification of a problem, whereas prognostic framing concerns itself with the question of “what is to be done?” Since naming the problem frequently implies the solution, diagnostic framing constrains prognostic framing. Vanhala and Hestbaek provide an example of this dynamic. They observe in their study of the UNFCCC negotiations that a diagnostic frame focusing on risk leads to a prognostic frame that emphasises insurance, whereas a diagnostic frame that highlights liability is connected to a prognostic frame that prioritises compensation (Vanhala and Hestbaek 2016: 121). Motivational framing, finally, is about the deployment of vocabularies that convey the importance of taking action. Motivational framing is, however, more attuned to the study of social movements and has received less attention by researchers studying elite settings. These analyses have either focused on diagnostic and prognostic frames (Vanhala and Hestbaek 2016) or have adopted an inductive approach that does not explicitly account for the three dimensions (e.g. Baumgartner and Mahoney 2008; Crespy 2010; Ban 2015; Hjerpe and Buhr 2014).

I thus focus on the diagnostic and prognostic dimension when looking at the frames in the policy subsystem of sustainable finance. In addition, I include a third

relational dimension. Drawing from Goffman's (1974) early work on frame analysis, Hasselbalch has recently emphasised the role of relational dynamics in the framing of governance systems that are disrupted by technological innovations (Hasselbalch 2016: 68ff). Since the uncertainty that comes from technological novelties is comparable to the uncertainty that is present in an immature policy subsystem, I expect that relational framing complements actors' diagnostic and prognostic efforts. Relational processes can materialise either through an alignment with prestigious actors (e.g. the UNFCCC or the World Bank) or through the dissociation from actors that are perceived as not trustworthy (e.g. a global bank from the perspective of an environmental CSO) or non-expert (e.g. a small ethical bank from the position of a large asset manager).

2.5 Which Ideas Matter How and Where: A Transmission Mechanism

Having defined the transmission channels of ideas (institutionalisation, persuasion, performativity), the sorting of ideas (academic paradigms, frames) and the locus of ideational collaborations and contestations (policy subsystems), it is now possible to construct a transmission mechanism (figure 2.1) that links these concepts. Importantly, the transmission channels are ordered in a different way than in the discussion of Berman and Hirschman (2014) that was revisited in the second section of the chapter. The right-hand side of figure 2.1 separates between a performative and persuasion transmission channel (cf. sections 1 and 2). Meanwhile, the distinction between academic and policy paradigms, which is the subject of section 3, is visualised by putting academic paradigms as a separate concept on the left side of the figure. Whereas academic paradigms are ideational systems that can be assessed through categories from the philosophy of science, I use the concept of policy paradigms to

denote the transmission of ideas to policy outcomes via persuasive and performative processes.

Importantly, the mechanism that is outlined below separates the transmission of ideas into two parts. In the first part, ideas flow from academic paradigms to the actors inside the policy subsystem of sustainable finance via frames. The second part of the transmission is about how these actors transmit their frames to the governance of sustainable finance by means of persuasive and performative processes.

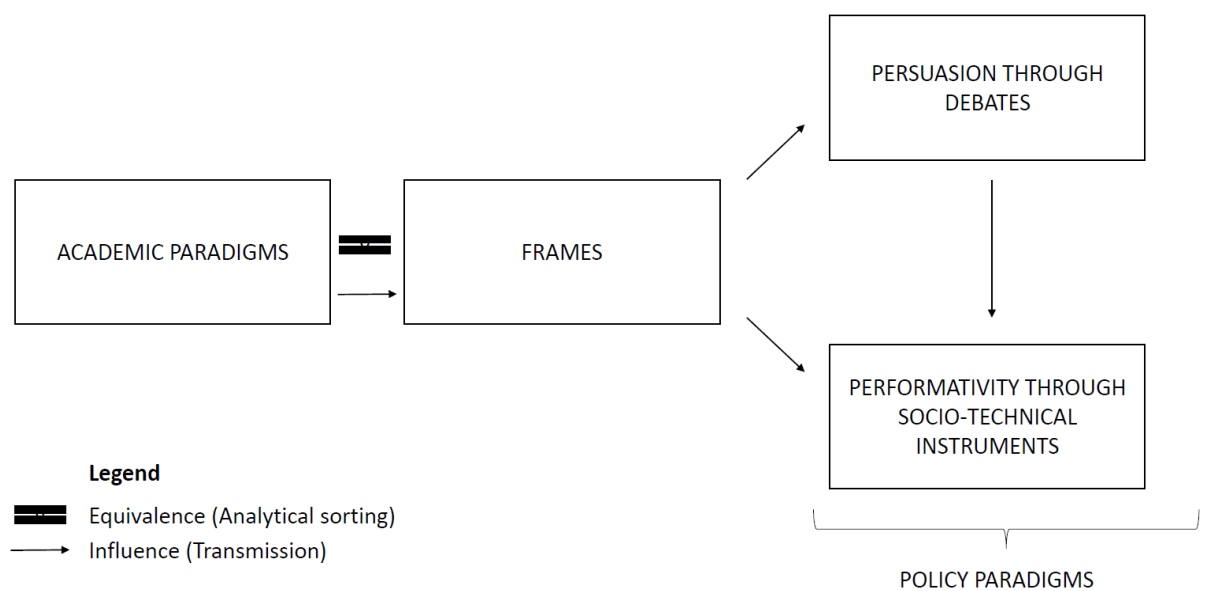


Figure 2.1 Transmission Mechanism from Academic Paradigms to Policy Paradigms

Part 1: Transmission from Academic Paradigms to Frames

On the left side of figure 2.1, there is an equivalence sign between the box labelled academic paradigms and the box labelled frames. In addition, there is an arrow from academic paradigms to frames. The equivalence sign indicates congruence between the ideas that are present in academic paradigms and the ones that are present in frames. Academic paradigms are thus used to sort the stock of available economic knowledge, from which the proponents of a specific frame draw.

Yet academic paradigms are also reproduced by the academic community. Members of the academic community can influence other actors in the policy subsystem via socialisation and institutionalisation. Hence, the arrow denotes an *actual* transmission rather than a mere congruence. Both the equivalence sign and the arrow allow for the sorting of frames into an academic paradigm. The important difference is that the sorting via equivalence remains agnostic about how the transmission of ideas occurs.

As opposed to academic paradigms, which are (re-) produced by the scientific community, frames are created by actors within the policy subsystem. These actors reassemble existing knowledge to understand their environment. Henceforth, frames take ideas out of the hierarchical and structured context of academic paradigms. As such, frames provide a more realistic description of how ideas are incorporated at the individual or organisational level. In addition, the introduction of frames as an intermediary step can provide insights as to why policy paradigms are not subject to the logic of incommensurability. This is because if policy paradigms are stitched together from the frames that have been formerly cut loose from academic paradigms, there is no reason to expect that the structure of a policy paradigm should resemble the one of the academic paradigm from which a particular frame has originated.

Nevertheless, as indicated by the arrow and the equivalence sign in figure 2.1, frames are not independent from existing knowledge. Rather than coming up with original *ad hoc* explanations, actors that employ framing can be actively influenced by academic paradigms. Alternatively, they come up with ideas that on the grounds of philosophy of science categories can be sorted into an academic paradigm.

Part 2: Transmission from Frames to Policy Paradigms

Competing Debate Positions

While Hall's original three-tiered structure of paradigm change has led to much confusion, a modification of it can be used to order the transmission channels that enable frames to influence policy outcomes. Importantly, I focus on Hall's differentiation of processes rather than on his treatment of sequence. In Hall's conceptualisation, third order changes occur when a shift of policy goals and a shift in the hierarchy of these goals takes place. Policy makers also change their causal beliefs about how the economy functions in the course of third order shifts (Hall 1993: 279-280).

Furthermore, third order shifts require the involvement of an audience that is broader than the expert community of economists and civil servants (Hall 1993: 287). Widmaier et al. (2007) emphasise that for such processes of major change, persuasion that occurs as actors interpret crises is instrumental. For them, persuasion takes place both at the elite level and at the level of the broader public. Similarly, Schmidt has highlighted that, unlike with Kuhn's scientific revolutions, major changes in policy ideas require the involvement of a community of actors that goes beyond experts (Schmidt 2002: 308). On the other hand, Oliver and Pemberton have noted that the

degree of paradigm shift cannot be easily separated along these lines. Instead, paradigm shifts are messy and complex processes, in which ideational contestations might as well take place inside the government machinery and must not necessarily entail an involvement of the broader public (Oliver and Pemberton 2004: 435).

I will return to the question concerning the difference between elite and public audiences below. For now, we can conceptualise the ideas that are mobilised in persuasive shifts as *debate positions*. These positions offer different accounts about issues that are deemed important by the actors inside the policy subsystem. Depending on which position prevails, policy changes or, alternatively, existing policy is reproduced. In other words, the process through which winning a debate matters is akin to ‘traditional’ policy making. If the proponents of a position can convince a large enough fraction of their audience that their ideas are sensible, the government machinery will be mandated to implement them.

Debate positions are, however, not the same as frames. As outlined in section 4, frames are inward-oriented uncertainty-reduction devices that provide actors with blueprints of how to understand a hitherto unknown situation.⁹ And while it is likely that empirically there is no neat separation between understanding a situation and using such an understanding to persuade others, I choose to analytically separate both processes to emphasise that inward-looking frames also structure immature policy subsystems, in which an initial absence of contestation has been observed (Sabatier 1998: 114). As the policy subsystem matures, frames inform more controversial debate positions that are aimed at the persuasion of other actors that are outside the coalition that is connected through a frame.

⁹ This conceptualisation differs from some uses of framing, where the concept has been expanded to incorporate a strategic element (cf. Benford and Snow 2000: 624).

Debate positions are also not the same as academic paradigms. Drawing from Hay, who argues that accounts of crises need not to correspond with material policy failures (Hay 1999), Neep notes that what he calls “crisis narratives” do not have to be congruent with academic paradigms, nor do they have to display the logical consistency that was discussed in the third section (Neep 2018: 498). This also resonates with the points that Hall’s critics have raised. Debate positions are distinct from academic paradigms as they need not to be coherent nor stable, nor incommensurable.

An understanding that comes close to debate positions is Widmaier’s description of how economic orders are established by value-laden exercises in ‘principled construction’. Widmaier uses Kahneman’s work on fast thinking and affective heuristics to emphasise that such debate positions are not sophisticated suggestions of a fine-tuned policy mix, but value-laden shortcuts for establishing causal links (Widmaier 2016: 16ff). In this dynamic, the boundaries between what Schmidt has called ‘principled’ (i.e. normative) and ‘causal’ (i.e. means-ends) beliefs become blurred (Schmidt 2008).

To give an example from Widmaier’s empirical investigation: In the beginning of the Keynesian era in the US, promoters of a Keynesian approach like President Roosevelt highlighted the importance of thinking in macro terms and adopting collective (i.e. government) actions to address inflation. On the other hand, critics of government measures to inflation like price controls would mark them as an attack on free enterprise and the “American way of life” (Widmaier 2016: 57-58). Likewise, the neoliberal economic order was constructed by the emphasis on individual utility and rationality, where concepts like Ricardian Equivalence and the assumption of inflation

as a “purely monetary phenomenon” served as heuristic devices (Widmaier 2016: 138).

In summary, debate positions are ideational tropes that actors use in public debates. They are principally aimed at the persuasion of other actors and as such they are akin to “ideas as weapons” (Blyth 2001) or “communicative discourses” (Schmidt 2008). Debate positions are informed by frames, which precede them in time as they materialise already when an actor ventures into the policy subsystem for the first time.

Socio-technical Instruments

Whereas third order shifts are situated in the realm of public debates, Hall’s first and second order changes occur at the technical level of policy instruments and their calibrations. According to Hall and others (Lindvall 2009; Mandelkern 2015), ideas matter through this channel, because they inform instruments that alter the economy in a means-end way. Lindvall, for instance, describes demand management as an instrument from the Keynesian paradigm that is *used* to influence the level of domestic economic activity (Lindvall 2009: 710, my emphasis).¹⁰ Similarly, Mandelkern’s instruments are provisions that hard-wire the tenets of the neoliberal paradigm into law and shift decision-making power towards institutions that are staffed with adherents to Neoliberalism (Mandelkern 2015: 933).

This view of instruments stays close to the meaning of the word. Instruments are ‘instrumental’ for achieving a desired outcome. However, such a definition cannot be applied to policy paradigm shifts in policy subsystems that are ill-defined and lack

¹⁰ Note that Lindvall defines the Keynesian paradigm as the school of thought (i.e. the academic paradigm in the language of this thesis), whose predicaments about causal mechanisms can be used by policymakers to achieve both Keynesian and not-Keynesian normative goals (Lindvall 2009: 710).

the presence of would-be policymakers and would-be technicians that adhere to a challenger paradigm. Thus, this view of instruments is also an outcome of the all-or-nothing perspective of the punctuated equilibrium model. Accordingly, causal beliefs become enshrined in instruments, which govern the economy until they are replaced with challenger instruments during a crisis. This view assumes that such beliefs are well developed and need only be applied. Yet situations of major crisis, where alternative instruments are ready to use, are the exceptions rather than the norm. So, how can ideational factors impact economic policy in areas where evolutionary dynamics and uncertainty play a much greater role?

The role of instruments based on competing ideas in a more evolutionary and uncertain situation can be illustrated by considering the shift from microprudential towards macroprudential regulation, which is studied by Baker. Before the shift, researchers at the Bank for International Settlements (BIS) took inspiration from the Post Keynesian and Austrian academic paradigms. The ideas derived from these paradigms stood in opposition to the traditional regulatory instruments, which were informed by the academic paradigm of neoclassical economics (Baker 2013: 117). As a result, macroprudential policy retained an experimental character and actors needed to develop concepts and instruments rather haphazardly. Baker illustrates this by citing a paper of Bank of England (BoE) researchers, who emphasise that “the state of macroprudential policy resembles the state of monetary policy just after the Second World War, with patchy data, incomplete theory and negligible experience, meaning that MPR [Macroprudential Regulation] will be conducted by trial and error.” (Aikman et al. 2011, quoted in Baker 2015: 355; see also Thiemann et al. 2018 on the exploratory character of the academic debate on macroprudential issues). But how can instruments that are supposed to manipulate economic variables according to the

causal relationships stipulated by an academic paradigm be applied, if these very variables are not yet stable concepts?

I suggest that to answer this question one needs to broaden the definition of policy instruments. I argue that this can be achieved by departing from the ‘instrumental’ view, which assumes that the normative and causal beliefs of an academic paradigm are neatly translated into the instruments of a policy paradigm. By contrast, the dynamics of immature policy subsystems are less about the choice between well established ‘policy instruments’ and more about developing and stabilising ‘socio-technical instruments’. While socio-technical instruments translate ideas from an academic paradigm, these ideas are not the only factor that plays a role in their construction. I thus make a similar argument to Kranke and Yarrow (2018), who problematise the link between discursive shifts and performative practices in macroprudential policy. In the performative view, ideas do not matter because they are translated into policy instruments that act upon the economy (cf. Braun 2014: 49; Braun 2016: 259). Instead, the socio-technical instruments themselves are a part of the infrastructure that makes up the economy (Callon 1998; Mitchell 2008). This ‘ideational infrastructure’ is used by market participants and regulators to reduce uncertainty, foster communication and make material investment decisions (Braun 2014: 50).

The literature on the performativity of economic models provides a good starting point for understanding the link between academic paradigms and socio-technical instruments. Performative models like the Taylor Rule at central banks (Braun 2014), Value at Risk calculations in financial institutions (Lockwood 2015), macroeconomic models inside state bureaucracies (Henriksen 2013) and the (in)famous Black-Scholes asset pricing formula (MacKenzie and Millo 2003) have

contributed much to the understanding of economic governance. To illustrate the performativity of economic models, I draw on the recent work of Huber et al., who investigate the connections between academic paradigms and the European Commission's Potential-Output Model (PO-Model) (Huber et al. 2017, see also Heimberger and Kapeller 2017).

For Huber et al., models function as connectors between the abstract assumptions of the academic paradigm that cognitively constrain agents' thinking and the active programmes that provide prescriptions for policy. They occupy this middle ground by defining problems through the formalisation of paradigmatic assumptions. This formalisation results in a quantitative output that gives a clear course for policy action (Huber et al. 2017: 3-4). This description of models as translation devices represents a solution to a hitherto missing link in the transmission chain from academic paradigms to economic policy. However, the narrow focus on models should be relaxed in favour of a more comprehensive understanding of socio-technical instruments.

Instead of ascribing performative status only to economic models, socio-technical instruments can be split up into different levels, all of which can receive input from academic paradigms and frames. Hansen and Porter provide a typology of calculative devices, which differentiates between the specific and localised counting of objects, the more abstract collection of such counts in databases, and, finally, the incorporation of database records into predictive models (Hansen and Porter 2012). Similarly, Latour discusses the hierarchy of what he calls "inscriptions of the n-th order" where e.g. a bar chart is based on the calculation of totals, which are based on individual data points, which are, in turn, based on measurement instruments (Latour

2003: 234). Latour makes the point that these devices, which he calls ‘black boxes’, are based on other black boxes (cf. Latour 2003: 80).

Frames influence these black boxes via the same mechanism that Huber et al. identified for the case of academic paradigms and economic models. A model translates the assumptions of an academic paradigm by stipulating a particular relationship between variables. In the case of the PO-Model, this relationship is between the factors of production and potential output (cf. Heimberger and Kapeller 2017). If the black box approach is applied to this model, going down to the $n - 1$ order implies that the definition of the categories in question, i.e. the factors of production and potential output as well as the indicators measuring them have to be problematised. Huber et al. actually take this step by critically examining one of the concepts that is used to estimate the quantity of labour, namely the Non-Accelerating Wage Inflation Rate of Unemployment (NAWRU) (Huber et al. 2017: 9-10).

The point I want to make here is that in the model there are two different stages of paradigmatic influence that do not necessarily have to occur together. The neoclassical paradigm is mapped onto the PO-Model on the n -th order through the use of a Cobb-Douglas growth function. Yet even without the Cobb-Douglas function, the lower order concept of NAWRU, in its shape of a descriptive statistic of the $n - 1$ order, is already a calculative device that translates input from neoclassical economics. In other words, whereas a model *performs* by selecting and formalising the relationships between certain variables (thereby omitting others), lower level calculative devices like categories and measurement methods *perform* by selecting these very variables and by establishing measurement conventions.

In the case of models, performative processes receive direct input from academic paradigms. This is, however, not necessarily the case for the relatively crude

and experimental instruments that are produced inside of emerging policy subsystems such as sustainable finance. This does not mean that academic paradigms do not matter. It only means that there is an intermediary step where the assumptions of an academic paradigm are first translated into a frame that, subsequently, influences the design of a seemingly practical instrument. One example of how relatively unsophisticated socio-technical instruments are reflecting paradigmatic assumptions are benchmarks, such as the World Bank's Ease of Doing Business Index. While the indicators of this benchmark do not postulate any relationship between variables, choosing e.g. states' treatment of Foreign Direct Investment as a relevant indicator is still based on the assumption of allocative efficiency that is part of the neoclassical paradigm (cf. Broome et al. 2018).

Part 3: Interactions Between Persuasive and Performative Processes

One final channel of influence is represented in figure 2.1 as the arrow that flows from persuasive to performative processes. This influence occurs because debates act as reference points for the development of socio-technical instruments. Accordingly, socio-technical instruments try to operationalise the arguments that are voiced in abstract debates by providing unambiguous measurements and definitions. This channel of influence is well established in the literature on policy paradigms, where 3rd order shifts are assumed to be translated into the appropriate policy instruments for implementation. Yet in contrast to Hall's framework, where the technical implementations are linear derivations from 3rd order goals of policy paradigms, the relationship between debates, frames and academic paradigms is more complex in this case. Once performativity is introduced, the hierarchy of Hall's orders of paradigm change becomes more ambiguous (cf. Henriksen 2013: 492).

Scoping Conditions and System Characteristics

The problems that Hall's framework encounters when confronted with performativity can be addressed by loosening the emphasis on the sequence of paradigm change. Notably, Blyth (2013a) has argued that Hall's original sequencing runs into a paradox. This is because the incremental process of social learning and the radical changes of paradigm shifts cannot be brought together within the same process. I suggest that focusing on the distinctness of persuasive and performative processes as well as on the characteristics of the policy subsystem is an alternative conceptualisation that can help us to understand the mechanisms of ideas-inspired shifts in policy paradigms.

In the traditional, i.e. non-performative, interpretation the ordering from 1st to 3rd order processes denotes the degree of change. Consequently, the fiercest political contestations can be expected in the high stakes 3rd order debates. Apart from its conceptual difficulties, the notion of such a universal sequence of policy paradigm change has also been challenged empirically. Oliver and Pemberton (2004) find instances of paradigm changes that lie between 2nd and 3rd order when expanding the timeframe of Hall's original case of shifts in the UK's macroeconomic policy. Another finding that does not fit well with the notion of a universal sequence is provided by Baker's comparison of the classical case of the UK's transition from Keynesianism to Monetarism in the 1970s with the shift of financial regulators from microprudential to macroprudential regulation after the GFC. Baker finds that in the latter case the political contestation occurs at the level of 1st and 2nd order instruments. At the same time, 3rd order ideational changes were relatively uncontested. To explain these differences, he points to a Variety of Crisis that is indicated by variations in the time that a crisis take to unfold (see also Seabrooke and Tsingou 2019 on slow vs. fast

burning crisis) as well as by differences in the institutional and political context of the policy subsystem (Baker 2015: 343).

In light of these findings, there is value in exploring alternatives to the sequencing model of paradigm change. The Varieties of Crisis concept provides a good starting point. However, due to the problem of arriving at exogenous categories for what makes a crisis a crisis (cf. Hay 1999) and in order to not confine the application to cases of extraordinary change, I contend that the characteristics of policy subsystems and institutional fields can be useful for finding variations that favour different transmission channels from ideas to policy outcomes.

Importantly, variations in these categories influence the second part of the transmission mechanism outlined in figure 2.1, where ideas from policy actors are influencing governance. As such they concern academic paradigms only indirectly insofar as they explain how ideas from these paradigms that have been incorporated through framing by policy actors are translated to policy. They are, however, not aimed at explaining the transmission of ideas from academic paradigms to the actors in the policy subsystem in the first place.

With these caveats in mind, a category that is highlighted both in Sabatier's work on policy subsystems and by field theorists is the level of institutional maturity (Sabatier 1998; Zietsma et al. 2017: 28). Mature systems are characterised by established hierarchies and stable actor populations. They have infrastructures that belong to the system itself such as specialised units in government organisations (Sabatier 1998: 111). As suggested in the literature on issue and interstitial fields, the opposite are immature institutional arrangements, where actors need to draw from the infrastructures of their home fields. This lack of stabilisation means then that "rules,

identities, practices, meanings and governance mechanisms may be ambiguous, unelaborated, provisional, [and] subject to reflexive debate” (Zietsma et al. 2017: 30).

Henceforth, in mature policy subsystems actors have sufficient knowledge on the issues that are subject to debates. Problems that merit attention (e.g. unemployment, inflation) are defined in an uncontroversial way and delineated from other issues. Policy paradigm shifts are about the priorities that should be given to established problems and about what should be done to address them. In addition, mature policy subsystems are often characterised by bipolar structures (Sabatier 1998: 102). This means that the adherents of the incumbent paradigm make policy while the advocates of the alternative policy paradigm have an established arsenal of socio-technical instruments at their disposal and are ‘waiting in the wings’ (cf. Schmidt 2002: 204).

All of this makes (3rd order) changes in debate positions the more powerful mechanism in mature policy subsystems. As institutional infrastructures are established and meanings are clearly delineated, the proponents of competing policy paradigms put forward their debate positions to persuade the public to entrust them with the governance of the policy machinery. In emerging subsystems, by contrast, the performative dimension of delineating how the issues that are to be governed are actually understood and measured takes precedence.

A second variation that is likely to influence the relative strength of the different transmission channels is the size and cohesiveness of the audience. In a small and cohesive policy subsystem we can expect that socio-technical instruments matter more. Yet the more diffuse the audience becomes, the more stakeholders have to be brought on board through persuasion. Debates about policy design or what Schmidt has called ‘coordinative discourse’ can be expected to be present in small, well-

connected policy subsystems. As more actors become enrolled in the governance of these systems, ‘communicative discourses’ that are aimed at persuasion rather than at the clarification of technical detail gain importance (cf. Schmidt 2008). Thus, large audiences that can, for example, be observed in established systems like macroeconomic policy display a greater propensity for persuasive processes.¹¹

In summary, the second part of the transmission mechanism seeks to understand how changes in the frames inside the policy subsystem influence the persuasive and performative processes of policy paradigms. This makes policy paradigms distinct from the previously discussed academic paradigms, which denote a stock of highly structured economic knowledge. As outlined in the first part of the transmission mechanism, actors develop and deploy frames with inputs from academic paradigms. When doing so, they can in principle stitch together knowledge from multiple academic paradigms. However, this will require greater expenses of energy and time than a simple translation of existing knowledge to a new situation.

Importantly, the process that is depicted in the transmission mechanism is not explicitly aimed at understanding how the actor population inside the policy subsystem developed. Nor does it address the question why an actor adopts one frame and not another. While the empirical chapters suggest that both developments inside the system as well as changes in related systems and the broader political context matter here, a detailed exploration of these dynamics is beyond the scope of this thesis.

The foregoing discussion on the scoping conditions has highlighted that sustainable finance as an emerging policy subsystem with a relatively small but

¹¹ A different way to look at the size of the audience is the notion of salience. Small and cohesive policy subsystems are characterised by “quiet politics” (Culpepper 2011), where levels of politization are low and technicalities matter more.

growing audience can be expected to be more influenced by the performative dynamics of socio-technical instruments than by persuasion through debates. And while the sorting of the case of sustainable finance according to the scoping conditions of institutional maturity and audience size is solely a typological undertaking, future research could adopt a comparative perspective to gain further knowledge on how variations in those conditions affect the relative importance of ideational transmission channels.

2.6 Conclusion

This chapter has laid the theoretical and conceptual groundwork for the empirical part of the thesis. First, the complementarities of constructivist IPE, the sociology of professions and STS for studying emerging systems of expertise were discussed. This literature review concluded that an explicit system-based conceptualisation of actors paired with a sorting of ideas that is inspired by constructivist IPE holds promise for a fruitful research design. In addition, a separation of the ideational transmission mechanism into two parts was suggested. First, ideas from academic paradigms are reflected in the frames that bind the actors inside of the policy subsystem together. Second, persuasive and performative channels enable the actors to transmit their frames to policy outcomes. In addition to that, I suggested scoping conditions that make either of the two channels of the second part of the transmission more meaningful.

In the next chapter, I will describe how a systems perspective can be operationalised by using social network analysis, content analysis, interviews and participant observation data. In addition, the next chapter will further elaborate on why sustainable finance represents a fruitful case for theory building as it can contribute to

the understanding of how ideas matter in non-crisis situations. The constituent parts of figure 2.1 will be further explored in the empirical part of the thesis. Chapter 4 starts from the middle of the figure. In this chapter, I identify the frames that are present in sustainable finance and trace their connections and relative power positions over time. Chapter 5 then moves towards the left of figure 2.1 by querying the ideational congruence of the frames with academic paradigms. The sixth chapter moves towards the right side of figure 2.1 and investigates how frames connect with the persuasive and performative processes.

3. Methods and Data

The main objective of this thesis is to understand how economic ideas from academic paradigms influenced the evolution of sustainable finance. The first step of this analysis consists of establishing where this transmission between ideas and policy takes place. In chapter 2, I outlined the concept of policy subsystem to specify the location, where the transmission is situated. To visualise the structure of the policy subsystem of sustainable finance as well as the positions of its actors, I use network analysis. However, mapping the evolution of the policy subsystem is only one part of the analysis. Network analysis alone cannot tell much about the content of the frames that bind actors together. Nor can it establish linkages between frames and both academic and policy paradigms. For this second analytical step, I rely on quantitative and qualitative content analysis, interviews and participant observation data.

In this chapter, I outline how each of these methods as well as the corresponding data links with the research objective of this thesis. In the first section I, however, take a step back to revisit the literature on case studies and situate my treatment of sustainable finance in it. Subsequently, I point out why a multimethod strategy comprising network analysis, interviews, content analysis and participant observation is well suited to study the evolution of sustainable finance. The second section discusses how network analysis can be used to analyse the policy subsystem of sustainable finance. Here, I introduce some foundational concepts of network analysis as well as some network measures. In the third section, I discuss the data collection strategy that follows from understanding the policy subsystem in network terms. The fourth section concerns itself with qualitative and quantitative text analysis, interviews and participant observation. These methods are used to analyse the content

of the networks that constitute the policy subsystem and thus can be mobilised to establish the linkages between academic paradigms, frames and policy paradigms. The fifth section concludes the chapter.

3.1 Selection of Case and Methods

Case Selection

When the research priority rests with theory building and with understanding so far understudied (or for that matter just emerging) phenomena like sustainable finance, case study designs are able to yield rich insights. This stands in contrast to large-n comparative research designs, which are well equipped to test alternative hypotheses that are derived from established theoretical frameworks (Gerring 2004: 346). As opposed to the adjudication between different hypotheses, the in-depth study of a case addresses how-questions that uncover the mechanisms that make a specific phenomenon happen. In this context, the case study method has also been linked to research designs that aim for establishing causal mechanisms (cf. Goertz 2017, Gerring 2004: 349ff). Importantly, for researchers in the positivist tradition, case studies' abilities to make causal inferences rest on an ontology of independent units. Henceforth, variations within one case over time (diachronic) or across cases (synchronic) must be observed to make causal claims (cf. Gerring 2004: 343).

This ontological assumption does encounter some complications when applied to the case of sustainable finance. First, as implied by the name, the policy subsystem of sustainable finance is not a variable but a system. As I will discuss in more detail in the next section, this is problematic as observations on the actors inside a system are relational. This means that they violate the assumption of independence that is required for causal claims that are based on co-variation. And while there are methods that

reconcile between the relational nature of systems and the quest for establishing correlations (see section 2), the separation between what happens inside the system and what outside factors impact the system or are impacted by the system remains a challenging task (see section 4). Second, the ‘outcomes’ that are influenced by variations in the policy subsystem are policy paradigms. Yet the constituent parts of policy paradigms as understood in this thesis are not easily reduced to variables either. As argued in chapter 2, socio-technical instruments make the governance of an issue possible in the first place. It is thus hard to imagine that one could come up with a list of variations of socio-technical instruments on a common category given that the very definition and existence of such categories is dependent on the socio-technical instruments in question.

The foregoing discussion does not mean that I refrain from making claims about how the policy subsystem of sustainable finance and the actors and frames inside of it affect policy. It means, however, that instead of looking for co-variation, I focus on transmission channels such as the persuasive and performative processes. Thus, my understanding of the relations between the structure of the policy subsystem, academic paradigms, frames and policy paradigms is closer to the “complex view of causality” that can be found among critical realists and scholars adopting a process-tracing research design (cf. Welch et al. 2011: 754ff for examples). Accordingly, causation depends on the interplay of multiple factors and can be established by explicitly considering the context rather than by abstracting from it.

Apart from making claims about causation, the methodological literature on case studies points to the issue of sorting a case into an existing, i.e. studied, population of cases. The question that arises from this part of the literature thus is: What is sustainable finance a case of? In accordance with the discussion of chapter 2, my

response to this question is that sustainable finance is a case of ideas from academic paradigms influencing policy. The distribution of cases studying this phenomenon covers the spread of Keynesianism across the world in the aftermath of the 2nd world war (Hall 1989; Oliver and Pemberton 2004; Widmaier 2016), Keynesianism's replacement by neoliberal policies in different historical and geographical contexts (Ban and Blyth 2013; Ban 2016; Babb 2013; Blyth 2001; 2002; Carstensen and Matthijs 2018; Chwierothe 2010; Hall 1993; McNamara 1998; Mirowski and Plehwe 2009; Oliver and Pemberton 2004; Röper 2018; Schmidt and Thatcher 2013; Widmaier 2016) and the more recent work on the challenges to and the reproduction of Neoliberalism in the aftermath of the GFC (Baker 2013; 2015; 2018; Blyth 2013a; 2013b; Helgadottir 2016; Schmidt and Thatcher 2013).

Much of the above-mentioned literature on how economic ideas matter is skewed to the extent that it focuses on situations of crisis rather than of evolution. As I discussed in chapter 2, this focus makes it open to the punctuated equilibrium critique. Studies that cover extended time periods (often in book-length, e.g. Ban 2016; Chwierothe 2010; Widmaier 2016) remedy this bias to a certain extent. Nevertheless, even in these cases the presence of extraordinary situations of ideational rupture structures the argument. Furthermore, most of the studied cases focus on historical developments. This means that the operationalisation often relies on archival materials and retrospective interview testimonials of involved persons. Studies on the rise of Keynesianism and its replacement with Neoliberalism have often a time lag of decades (e.g. Hall 1989; Blyth 2001).

The literature that has studied the aftermath of the GFC (Baker 2013; 2015; Blyth 2013a; 2013b; Helgadóttir 2016; Schmidt and Thatcher 2013) has addressed this issue by studying the (non-)transition of ideas in its historical context. Studying phenomena as they evolve is a valuable undertaking as it prevents researchers from engaging in *ex-post* rationalisations. This notwithstanding, as the post GFC literature is mostly focused on debates in the established system of macroeconomic policy, it has emphasised crises rather than evolutions. Studies that emphasise the emergence of new systems like the recent contributions on “macro-finance” (e.g. Gabor and Ban 2016; Braun et al. 2018), on the other hand, have so far covered the influence of ideas only in passing. To date, Baker’s studies on the emergence of macroprudential policy remain the major exception as they integrate ideational explanations with a case of a still evolving policy subsystem.

Studying sustainable finance addresses the crisis bias of the existing literature as well as the relative absence of treatments of recent and ongoing cases of ideational influence. By closing these gaps in the case distribution, it can be potentially useful for future research that compares the conditions that make one channel of ideational influence more successful than others (cf. chapter 2 on scoping conditions).

Method Selection

The selection of methods should derive from their potential for gathering insights that are relevant for the research question and not from the prestige and elegance that they command. Echoing this position, Flyvbjerg has argued that “Good social science is problem driven and not methodology driven in the sense that it employs those methods that for a given problematic, best help answer the research questions at hand” (Flyvbjerg 2006: 242). IPE in general and constructivist IPE more specifically has

produced research that integrates this advice relatively well insofar as it has been quite pragmatic in its choice of methods. It has thus largely avoided the narrowing down of what counts as an acceptable research question to accommodate a (potentially ill-conceptualised) understanding of ‘rigour’. Accordingly, the selection of methods has varied considerably depending on the case and the research question.

Research on historical cases of ideational transitions has utilised archival data and content analysis to query how ideas matter (e.g. Blyth 2002; Widmaier 2016). This is frequently complemented by elite interviews with persons who participated in the historical episodes. Moreover, secondary sources such as newspaper articles or memoirs are routinely mobilised. Instead of incorporating the data into a formalised transmission mechanism, researchers using these data sources have often relied on holistic descriptions of ideational change, which are closer to methods from the discipline of history. As explained by Widmaier (2016: 24), these more interpretative methods can account for the complex interplay of multiple factors. Rather than specifying and probing a particular transmission channel, the findings that are obtained from such methods are used to classify and partition the case under analysis according to ideational categories.

The questions and methods of historical and often interpretative treatments differ significantly from the study of transmissions, where individuals act carriers of ideas (see chapter 2). Such analyses are usually more formalised and tend to treat ideas as variables. By assigning numerical values to the ideational credentials of an individual, which, for example, are operationalised by coding the training at a specific university, regression models can be utilised to establish ideas as independent variables that affect policy outcomes (e.g. Chwieroth 2007; Nelson 2014).

More recently, the strand of research that integrates insights from the sociology of professions has brought some methodological innovations to IPE. Notably, network analysis (see next section) and methods that draw on biographical data and the coding of career trajectories have been incorporated. Much of this research is based on concepts like ecologies (cf. Abbott 2005; Seabrooke and Tsingou 2020), which treat a system as the main unit of analysis. To understand the dynamics of these systems and describe the actors that operate within them, researchers then draw on multiple methods. The blending of methods often brings together more formalistic assessments of a system like network analysis with either positivist or interpretative analyses of ideas.

One example of such a blending of methods is Ban et al.'s (2016) article on the governance of shadow banking. In this study, the authors combine a network analysis of citations with a content analysis that codes the cited texts into three categories. In addition, they use biographical data to code the career trajectories of the authors of the cited texts. The analysis of the evolution of carbon pricing experts that is provided by Paterson et al. (2017: 183) follows a similar methodological strategy as it integrates social network analysis and the coding of biographical data with interviews and archival materials. A different combination of methods is undertaken by Seabrooke and Tsingou (2014: 391), who utilise document analysis (coding), network analysis, semi-structured interviews and first-hand experience (participant observation) to map ideational differences that are present in expert group responses to the GFC. Yet another example of multimethod integration is Morin et al.'s (2016) study of the International Platform on Biodiversity and Ecosystem Services (IPBES) as a

“boundary organisation”. Morin et al. combine three different network measures with a biography-based coding of the individuals present in these networks.¹²

A final strand of ideational research that is also linked to the concept of policy subsystem concerns itself with so called discourse networks. Here, discourses from political actors that are obtained, for example, from newspaper articles or parliamentary debates, are coded. Subsequently, actors that vocalise a common discourse are linked in the network. Discourse networks have been used to study amongst others the change of German pension systems (Leifeld 2013), the evolution of ideological cleavages on climate change in the US Congress (Fisher et al. 2013) and the conflicts about regulating software patents in the EU (Leifeld and Haunss 2012).

The preceding discussion of methodological choices outlines a rich menu of approaches that are apt to query the role of ideas in evolving policy subsystems. Rather than departing from existing research and engaging in methodological innovation, I mostly rely on tried and tested approaches. I use network analysis, content analysis, semi-structured elite interviews and participant observation. This combination of methods is a commonly applied strategy for understanding ideational factors in system contexts.

Despite these commonalities, my approach differs from the ones outlined above in several aspects. First, I refrain from assigning numerical or categorical values to ideas. This is due to the complexity and the possible overlaps between different academic paradigms and frames, which prevent the unambiguous assignment to crisp and exhaustive categories. To avoid these kinds of problems, I adopt a mostly

¹² For a different but similar summary of this literature cf. Ban and Patenaude 2019: 532ff.

qualitative form of content analysis, which is integrated with network analysis, interview data and participant observation transcripts (see section 4).

Second, I do not systematically collect biographical data, nor do I use methods to code and aggregate such observations. This is because if one wants to understand the role of ideational factors it is difficult and potentially more obscuring than enlightening to develop codes that relate the training and professional stages of an individual career to certain ideas. As I argued in chapter 2, such a strategy would rely on potentially unjustified assumptions that *a priori* equate disciplines, universities, IOs, firms and other actors with an idea. The complications that such an approach entails are neatly illustrated by the dispute between Ban and Nelson (cf. Ban 2018) about the usefulness of educational and professional proxies for Neoliberalism that was briefly discussed in the last chapter.

A final departure from most of the above-cited studies is that I give more room to data that I obtained through participation observation. Ethnographic methods have been routinely employed in STS both in classical studies of the natural sciences (e.g. Latour and Woolgar 1986) and in research on financial practices (e.g. Beunza and Stark 2004). In addition, in European Studies, scholars, who advocate for giving more importance to the study of “everyday practices”, have emphasised the insights that can be gathered from participant observation (Adler-Nissen 2016). As further described in section 4, the observations that I undertook are a long way off the best practices of ethnography. Nonetheless, data that is gathered through the attendance of events, where different parts of the actor population come together, can be used to observe the interactions of an expert community in the making.

3.2 Conceptualising the Policy Subsystem: Network Analysis

Definitions and Network Types

In its most basic form, a network describes a system by looking at its individual parts and their interaction. Identifying patterns in the interactions between the individual parts can increase our understanding of the behaviour of the system as a whole (Newman 2010: 1-2). Newman (2010) makes a distinction between technological networks (e.g. railroads, the internet's physical infrastructure), biological networks (e.g. neural networks, predator-prey networks), information networks (e.g. citation networks, hyperlink networks on the internet) and social networks (e.g. friendship networks, networks of organisations). As this thesis is concerned with the role of ideas, the networks that I analyse can be grouped into the category of information networks. Yet since I also investigate how common frames bind individuals and organisations together, the analysed systems also display some dynamics of social networks.

The differences among the types notwithstanding, a common feature of all networks is that one has to specify the parts of the system and the nature of their interaction. In other words, the *nodes* (parts, actors) and the *edges* (links, ties, connections) have to be defined. To illustrate the build-up of networks one can look at a predator-prey system: Here the nodes are living organisms. The links, meanwhile, represent 'who eats whom'. While this relationship is sufficient to represent a biological network as a system, one could go further and quantify what 'flows' when, for instance, a seal devours a fish. This flow can be conceptualised as energy, which is measured in Joules or Calories. If a numerical value of a common category like Joule is assigned to the links, the network is *weighted*. It is important to note that the link that represents energy exchange through eating goes only in one direction, i.e. from the one being eaten to the one eating. In such cases, one speaks of a *directed* network.

The opposite is an *undirected* network where whatever flows through the connections can go in either way. In a friendship network, which connects individuals (nodes) through mutual friendship (links), the flows (for instance, time of friendship) are usually not thought to be directional.

A final definitional issue relates to the amount of different node types that are present within a network. In the two examples above there is only one type of node: Living organisms in the predator-prey network and individuals in the friendship network. The examples are thus *one-mode networks*. Yet one can also construct a *two-mode network* in which two different types of nodes interact. Imagine that one wishes to represent the membership of individuals in different sports clubs in a network. Here there two types of nodes, namely the individuals and the clubs. Importantly, in this network there can only be links between the two different node types. Individuals can be members of clubs, but neither can individuals be members of individuals nor can clubs be members of clubs.¹³

Two-mode networks can be transformed into one-mode networks. The example of individuals' membership in sports clubs could be either transformed into a network that provides information about how sports clubs are connected through joint members or, alternatively, a network that details connections among individuals through joint club membership. The conversion of a two-mode to a one-mode network results in an undirected, weighted network. The weights represent the sum of the nodes that have been collapsed from the two-mode network. In the above example, the link between two sports clubs with three joint members would have a weight of three. In formal notation, the conversion from two-mode to one-mode networks is carried out

¹³ Though one could hypothetically introduce a third type of node, where clubs can be members of umbrella associations.

by multiplying the affiliation matrix, which records the links between the two types of nodes, with its transpose.¹⁴

Network Measures: Descriptive and Inferential Network Analysis

The properties of nodes, links and groups of nodes as well as the structure of the network as a whole can be measured. These measurements can be used descriptively to make statements about the shape of the system and the attributes of the actors inside of it. Alternatively, network statistics can be used in an inferential way. In the latter case, actors' network attributes are influenced by non-network observations or vice versa. An example of such a relation would be the case where people with similar education establish friendship links. Alternatively, causation can flow from the network to a dependent variable outside of the system. This configuration would be present in the case where a central position in a friendship network increases individuals' happiness (cf. Borgatti et al. 2013: 15, 137ff). In addition, networks as a whole might be related to external observations. One can, for instance, imagine a case where the structure of a railway network is correlated with political and economic conditions.

Inferential network analysis is mostly operationalised through formal, regression-type models that integrate network statistics with non-network variables. Examples are Exponential Random Graph Models, Permutation Tests and Quadratic Assignment Procedure regressions (Borgatti et al 2013: 137ff; Desmarais and Cramer 2012; Leifeld et al. 2017; Lusher et al. 2013). As I argued in section 1, the processual understanding that I adopt as well as the hard to quantify nature of both ideas and

¹⁴ The mathematical representation of networks and their manipulation is further outlined in Appendix B.

socio-technical instruments means that these formal tools are less well suited for studying the role of ideas in the evolution of sustainable finance. Instead, I choose a similar approach as the IPE studies revisited in section 1, which integrate descriptive statistics from network analysis with other sources of data in a non-formalistic manner. For the representation of such descriptive statistics, the visualisation of networks can be helpful since the human eye is extremely good at detecting patterns in such spatial representations (Newman 2010: 8). Nevertheless, also the application of descriptive network statistics needs a prior discussion of the assumptions on which their calculation is based as well as of the meanings that they convey.

Node Level Measures: Degree Centrality

One of the most basic properties of a node in a network is its *degree*. The degree of a node is defined as the sum of its edges. Degree is an easy to understand and easy to operationalise measure of the importance of an actor in a network. More connections, i.e. higher degree, are often linked to greater relevance of a node for the functioning of the system. In addition, a look at the degree distribution can give insights about the structure of the system. Long-tailed degree distributions, where most nodes have zero or few links and a small number of nodes have extremely high degree values, are indications of systems that display core-periphery dynamics (Newman 2010: 8). Citation networks (Newman 2010: 64), corporate ownership networks (Vitali et al. 2011) and elite networks (Knoke 1993: 34) have been found to be characterised by such core-periphery structures. In many network configurations, degree is also highly correlated with other measures of centrality.

An example of how to calculate degree is given in the hypothetical network of figure 3.1, where the node B has a degree of three. This is because it has three edges, which connect it to the nodes A, C and D.

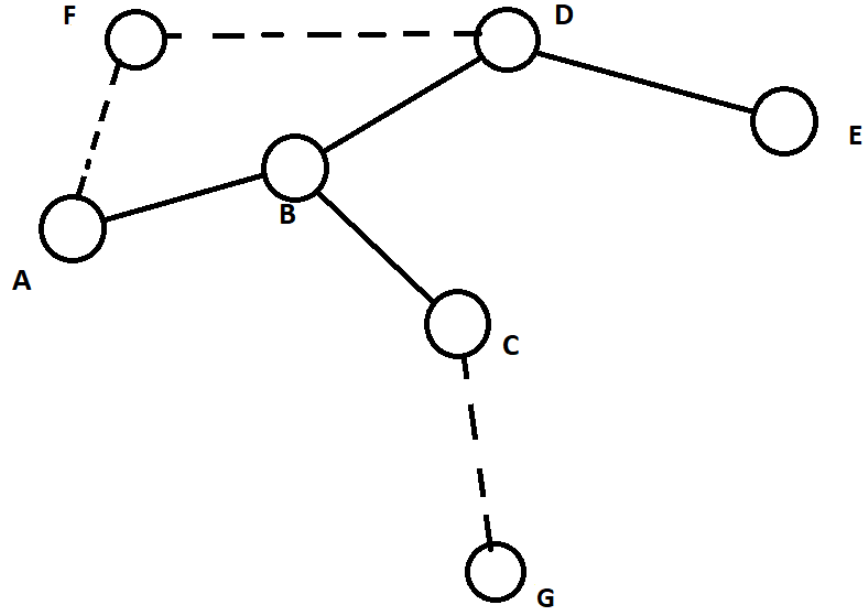


Figure 3.1 Hypothetical Network

In formal notation degree is defined by the equation

$$\text{Degree: } k_i = \sum_{j=1}^n A_{ij} \text{ (Equation 1)}$$

where the degree (k) of node i is defined as the sum of the edges it has to the n nodes of the network that are recorded in the adjacency matrix A . If the network in question is weighted, it is also possible to not just sum up the amount of edges but also their values. The network measure that captures this relation is called graph strength and is calculated in an analogous way to degree. In directed networks, the calculation of degree can be split into two measures for every node. First, there is the *out-degree* which denotes the number of outgoing edges of a node. In a citation network, the out-

degree of an article is equivalent to the number of articles that it cites. *In-degree*, by contrast, measures the sum of incoming edges. The in-degree of the article would correspondingly be the number of times the article is cited by other articles.

Node Level Measures: Betweenness Centrality

Betweenness centrality is a measure that assigns high values to nodes that link parts of the network that would have been disconnected otherwise. In social networks and information networks, high betweenness centrality scores identify nodes that aggregate information and occupy positions that bridge otherwise separate communities (cf. Borgatti et al. 2013: 185ff; Burt 1992; Seabrooke 2014). Tracking the evolution of betweenness centrality over time is a commonly used method for determining privileged positions of actors in information networks (e.g. Ingold and Leifeld 2014: 16; Paterson et al. 2014). Applied to sustainable finance, high values of betweenness centrality can thus indicate actors that possess large amounts of knowledge about the policy subsystem. Moreover, these actors can potentially use their information advantage to shape the development of sustainable finance.

Betweenness centrality measures the number of shortest paths that a node is part of. That means that in the hypothetical network in figure 3.1 node B would have a betweenness centrality of 5 as it is part of the shortest paths AD, AE, CA, CD and CE. Node D would equally have a betweenness centrality of 5, whereas A, C and E would have a betweenness centrality of 0. For cases with more than one shortest path, e.g. if there was a path from A to D via F in two steps (dashed lines), both F and B would increase their betweenness centrality by $\frac{1}{2}$ from the connection of A and D. In the case that the edges have weights, these weighted edges are taken into account by summing up the inverse of two hypothetical shortest paths. Subsequently, the path

where the sum is smaller will be used as the shortest path. Going back to the hypothetical network in figure 3.1, this means that if AB and BD both had a weight of 2 and AF and FD both had a weight of one, the relative sums of each path would be $\frac{1}{2} + \frac{1}{2} = 1$ for ABD and $1+1 = 2$ for AFD. Thus, ABD, due to its lower score, would be the shortest path.

$$\textbf{Betweenness Centrality: } C_B(p_i) = \sum_{i \neq j \neq k} \frac{g_{jk}(p_i)}{g_{jk}} \text{ (Equation 2)}$$

The formal definition of betweenness centrality (C_B) of node I (p_i) is given in equation 2, where g_{jk} denotes the number of shortest paths between nodes J and K and $g_{jk}(p_i)$ is the number of shortest paths passing node I .¹⁵

Network Level Measures: Size of Largest Component

A *component* is a set of nodes that are connected with each other through at least one edge. If one does not consider the dashed lines, the hypothetical network in figure 3.1 would consist of three components: One consisting of five nodes (ABCDE) and two consisting of only one node (F and G). In this example the five-node component would be the *largest component*, whereas the single-node components are so called *isolates*. Counting the nodes that are part of the largest component as a fraction of all nodes provides information about a network's cohesion. In a fragmented network this ratio will be relatively low, whereas in a well-connected network it will be higher (Borgatti et al. 2013: 164). And while there are no general thresholds for what counts as cohesive, a longitudinal approach that compares different states of the same network

¹⁵ For further specifications on maximal path lengths for calculating betweenness centrality in Appendix B.

can provide information about the relative cohesiveness (see chapter 4). Applied to the case of sustainable finance, a very fragmented network could be a sign of various competing frames and communities none of whom is able to acquire a dominant position. A cohesive network, on the other hand, can indicate that communities start to collaborate and that a dominant frame is emerging.

Group Level Measures: Girvan-Newman Community Detection Algorithm

Network statistics can also convey information about groups of nodes. These groups, which are also referred to as communities or clusters, are part of the overall system but have more connections among themselves than to the rest of the network. Hence, they can be conceptualised as separate entities. Examples of such groups are a clique of close friends in a friendship network or articles covering the same topic in a citation network (cf. Borgatti et al. 2013: 193ff).

Looking at groups can be valuable to identify actors that share common traits. In their treatment of social networks, Borgatti et al. note that “Actors within cohesive subgroups tend to share norms and often have common goals and ideals” (Borgatti et al. 2013: 193). This sharing of norms might result from a selection process, where actors with similar non-network attributes like common beliefs establish links in the network. Alternatively, it might come from a process of diffusion, where the connection of actors leads to a convergence of their beliefs (Borgatti et al. 2013: 144-145). The tendency of groups to be characterised by common beliefs makes them a promising place to look for actors that are bound together by a shared frame.

The literature on network analysis suggests various methods for finding such groups. A clique is a group of nodes, in which each node is connected to every other node (Newman 2010: 193). Alternatives to such formal definitions are hierarchical clustering algorithms, which compare the properties of nodes by using measures of node-similarity like ‘Euclidean Distance’ or the ‘Jaccard Coefficient’. Through a repeated calculation of these measures, first at the node level and subsequently at the level of ever larger clusters, the nodes are iteratively assigned to groups (cf. Leifeld 2013 for an application). Hierarchical clustering algorithms have, however, been criticised for assigning wrong memberships to nodes in known group structures. For example, they tend to cut off nodes that are at the periphery of a group (Girvan and Newman 2002: 7822).

To remedy this tendency, Girvan and Newman propose an alternative algorithm that is based on the concept of betweenness centrality that was introduced above. In their initial application they also applied their algorithm to an information network that sorts the publications of researchers into clusters that are based on common topics and methodologies (Girvan and Newman 2002: 7825). As their data is quite similar to the co-publication networks that I use to conceptualise the policy subsystem of sustainable finance (see section 4), the Girvan-Newman Algorithm appears to be a good choice for finding communities that are bound together by common frames.

The Girvan-Newman Algorithm calculates the betweenness centrality of all edges in a network. This works in analogy to the notion of betweenness centrality that was introduced above. The only difference is that it is the edge rather than the node, whose betweenness centrality is defined as the number of shortest paths that pass through it. Once betweenness centrality for all edges is calculated, the edge with the

highest value is removed from the graph. Then centrality scores are re-calculated and edges are removed iteratively until no more edges remain (Girvan and Newman 2002: 7283). Just as with hierarchical clustering, the result of this algorithm is a tree diagram or dendrogram. In contrast to other hierarchical clustering methods that iteratively assign nodes into every more inclusive groups, the algorithm works in the opposite direction. The removal of edges results in communities that become smaller with each iteration.

Rinscheid (2015: 47ff) applies the Girvan-Newman Algorithm to a discourse network on the issue of nuclear power in the pre- and post-Fukushima period in Japan and Germany. The algorithm allows him to check for variations in the structure of the discourse communities across both time and geography. In the Japanese case, he finds that the pre-Fukushima, pro-nuclear consensus (represented by one single community) was replaced by a more contested situation, in which the pro-nuclear community shared the discursive space with an anti-nuclear community and a third community that emphasised the need for a review of nuclear policy.

To determine which level of partition within the dendrogram is the most meaningful, the implementation of the Girvan-Newman Algorithm that is available in the *igraph* package in the programming environment *R* also calculates the ‘modularity value’ for each partition and chooses the partition with the highest modularity value as output. Intuitively, modularity can be understood as being high when there are many connections within the communities that are specified by the algorithm and few connections across communities.¹⁶

¹⁶ For a formal definition of modularity see Appendix B.

3.3 Delineating the Policy Subsystem: Data Collection

Types of Data: Co-publication and Citation Networks

To represent the policy subsystem of sustainable finance as a network, I draw on co-publication and citation measures. These measures have mostly been applied to study knowledge production in scientific contexts. An early example is Crane (1972), who constructs citation networks to assess the development, growth and social structure of sub-disciplinary communities that she calls “invisible colleges”. With the proliferation of widely accessible databases of scientific papers and their citations like the Web of Science, the feasibility of such research projects has increased markedly.¹⁷ Bearman and Shwed (2010), for instance, use citation data and the above introduced notion of modularity to assess the degree of consensus within different research themes. Other applications that are closer to IPE are Seabrooke and Young’s (2017) citation-based sorting of the IPE discipline itself into different communities as well as Morin et al.’s (2016) use of co-publication data in the study of IPBES experts.

A commonality of these analyses is that proximity in network terms is taken as an indicator of epistemic agreement. For Bearman and Shwed, high modularity scores signify the existence of competing research communities that address the same issue in different ways. The clusters that Seabrooke and Young observe are groups of scholars working on common topics or within a shared methodological (in this case meaning quantitative vs. qualitative) framework (Seabrooke and Young 2017: 20ff). The same goes for the community of co-publishing researchers in the application exercise that Girvan and Newman used to test their algorithm.

¹⁷ Another facilitating factor is the increase of computing power. This is nicely illustrated by the fact that Crane’s study was still conducted with the help of IBM punchcards (Crane 1972: 18).

If these considerations are applied to sustainable finance, the epistemic agreements can be reconceptualised as actors having common frames. Similar to the assessment of academic consensus, measuring the cohesion of the overall network can be taken as a proxy for the dominance of one particular frame. A more accentuated community structure, on the other hand, can be interpreted as a sign of greater fragmentation with multiple frames competing over the definition of what sustainable finance means and is.

Boundary Specification and Data Collection

Network analysis is a tool to describe systems and the interactions of actors situated within them. This focus has implications for the collection of data. First, unlike other methods, network analysis cannot rely on statistical sampling techniques. As the system is the unit of analysis, the entire population that makes up the system has to be considered. The relational nature of network analysis means that omitting well-connected actors might misrepresent centrality attributes as well as the grouping of actors. Second, since most social and natural systems are open, i.e. they are related to other systems, to define where a system ends is a complicated matter. This notion of demarcating what is inside the system and what is outside of it is also known as *boundary specification*. If one, for example, wanted to study the interactions amongst employees of a firm, decisions on whether part-time staff and contract agents should be included have to be made. And while in some research projects it is possible to draw on official records like membership lists to identify a system, ‘virtual’ phenomena like sustainable finance cannot rely on such sources.

Using official or consensus definitions for delineating a system is also referred to as the “realist” approach of boundary specification. The alternative, which is mobilised for systems that lack such a definition, is the “nominalist” strategy (cf. Rinscheid 2015: 44). In the nominalist approach, membership in the system is determined by the research question. In this context, it is noteworthy to recall that sustainable finance, as understood in this thesis, is a system that covers both the linkages in knowledge production and the interactions among individuals and organisations. To cover this characteristic, I first apply a system definition strategy that comes from the study of elite networks. Subsequently, I use a topic-matching approach as used in the study of information networks to delineate the knowledge production activities of these actors.

Knoke (1993: 30) summarises four commonly used methods for boundary specification in elite networks. Positional methods identify an actor population by looking at official sources like registries. Decisional methods focus on the actors that have in the past participated in binding decisions of a formal governance system. The reputational method relies on expert judgements to determine the members of the network. These judgements can either come from outside observers like academics and journalists or from actors in the network themselves. The relational method, finally, starts from a set of actors that have been found with the use of another method and subsequently includes those who cooperate with these actors as new members.

The absence of formal registries or similar sources that are a characteristic of mature rather than of evolving policy subsystems makes the use of the positional method impossible. Similarly, the evolving nature of sustainable finance also means that for the time being there are no records of major decisions and the actors that were implicated in them. I, however, rely on a slightly modified version of the decisional

method by including actors that were present at high-level events on sustainable finance. This notwithstanding, the definition of the system relies mostly on the reputational and relational methods.

In accordance with these two methods, I first assembled a list of organisations that can be attributed to sustainable finance. The organisations were sampled by looking at scholarship (e.g. Clapp and Thistlethwaite 2012; Hoffmann 2011; MacLeod and Park 2011; Newell and Paterson 2010; Thistlethwaite 2011; 2015), newspaper articles and ‘community mapping reports’ produced by actors from the field of sustainable finance (e.g. Dupré et al. 2013; UNEP Inquiry 2015; UNEP Inquiry 2016). Furthermore, in what can be called a modification of the decisional method, I included organisations that were present at events on sustainable finance like the launch of the European Commission’s High-level Expert Group on Sustainable Finance’s (HLEG) interim report in July 2017, the UNFCCC Conference of Parties (CoP) 23 in November 2017 and the Finance Day at the One Planet Summit in December 2017. The collection of actors was carried out on a rolling basis from May 2017 until the end of December 2017. Stock taking exercises were undertaken in September 2017 (185 organisations) and in January 2018 when the complete dataset included 242 organisations.

In the second stage, I assessed the knowledge production of these organisations by looking at their publications. I rely on texts that are published under the name of one or more of the sampled organisations and are freely available. Rather than including all publications from the 242 organisations, I collected only those texts that match previously specified keywords. Keyword-based boundary specification is often applied to study knowledge production. In their study of ‘cognitive domains’, Bearman and Shwed (2010: 825) argue that keyword-based approaches are better suited to map

systems of knowledge production than data collection strategies that start from a core set of authors.

The keywords that I use to determine whether a text is about sustainable finance are “sustainable finance”, “green finance”, “climate finance”, “sustainability” and “climate change”. In addition, I initially added the search term “Capital Markets Union (CMU)”, which is linked to the EU’s HLEG that started in late 2016 as well as to the EU’s subsequent actions on sustainable finance. I included this term because I used the work of the HLEG as a starting point for ‘snowball sampling’ (i.e. the relational method), since it can be expected that many actors would seek connections to such a high-level initiative.

While in light of the transnational nature of the sustainable finance policy subsystem I did not explicitly restrict data collection to a specific geography, the privileged position of the HLEG might have introduced a European bias to the networks. Since Europe has long been the geography that accounts for the greatest share of sustainable finance – 46% of sustainable assets in 2018 according to the Global Sustainable Investment Alliance (GSIA 2018: 9) – I expect, however, that most of the actors in the global policy subsystem have a presence in Europe. Consequently, they should be included in the data. Finally, I also included keywords on “alternative” or “ecologically reflexive” economic and financial systems to account for the different terminology that is used by some civil society and activist organisations that concern themselves with sustainable finance.

I collected the publications by visiting the website of each organisation and checking whether there was a section that explicitly reflects one of the keywords. If no such separate section was available, the search function of the website was used by typing in the keywords. Subsequently, I checked the relevance of the publications once

more by looking at the title and summary. The types of documents that were included in the dataset are reports, policy briefs, consultation notes, literature reviews, strategy documents, declarations and speeches. Texts like journal articles, which are aimed at an academic audience rather than at the actors in the policy subsystem, were excluded. Likewise, assessments of individual projects, companies or countries that mostly present data on one specific issue without engaging in the broader debate on sustainable finance were excluded. Lastly, I excluded documents that do not deal with finance (e.g. sustainability literature focusing on trade) or with sustainability (e.g. alternative economies literature focusing on unemployment). In this process, I collected 891 documents¹⁸ from 152 of the 242 organisations for the period between 1998 and 2018. The timeframe arose from the availability of data from the actors that were identified in the first step.¹⁹

I focused on publications in English and included translated documents whenever available. Yet while English language documents account for more than 95% of the corpus that was eventually used for the network analysis, I also included 32 German language texts and one document in Spanish. This inconsistency in language is a reflection of a bias from the researcher. However, since most existing research on sustainable finance has been conducted in Anglo-American and French-speaking contexts (e.g. Sparkes 2002; Déjean et al. 2004, see chapter 4 for an overview), I contend that this slight skew towards German language documents can deliver added value that outweighs the problems of the bias.

¹⁸ See Appendix C for the names of the 242 organisations and the number of documents that were initially obtained from them.

¹⁹ For a more detailed description on how the selection of actors and publications was carried out see Appendix C.

In summary, the shape and size of a network are always an artefact of the delineation of a system and its boundaries. In the absence of easy to find or conventionally agreed on boundaries, networks reflect the research interest as well as the availability of data. This does not mean that such networks are idiosyncratic and incomparable representations of phenomena. As I discuss in chapter 4, comparing the networks that I construct in this thesis with descriptions on the emergence of sustainable finance that are based on different data sources can give insights into omissions and biases on both sides. This can then lead to complementary insights about the different dimensions of sustainable finance.

Coding of Links

The relations between the publications on sustainable finance that act as raw data can be either conceptualised as co-publication links or as citation links. Whereas citation networks focus on the flow of information, co-publication links also indicate a social dimension. This is because people producing a joint publication can be expected to engage in social interaction. While I created both citation and co-publication networks, the communities of actors forming around shared frames are best understood through the latter type.

Co-Publication Networks

I coded co-publication links manually by identifying the individuals that are listed as contributors in the collected texts. In doing so, I relied on a more inclusive definition of who can be counted as a ‘co-publisher’. This is because many of the collected texts do not explicitly identify authors. Hence, including ‘too many’ individuals, many of

whom will end up in marginal positions in the networks, was deemed less a risk than to exclude potentially important nodes. I operationalised this broad definition of authorship by not only coding links between texts and authors but by also linking texts to the individuals that are identified as contributors in the acknowledgements section. Wherever such details were provided, I excluded individuals responsible for layout, proofreading and translation as well as lists of interviewees. These exclusions leave authors, researchers, reviewers, editors, advisors, data providers from third parties, project leaders and working group members as the types of individuals most frequently identified in the co-publication networks.

From the 891 collected publications, 666 are included in the co-publication networks. The most frequent reason for the exclusion of the remaining 225 texts was that no contributor names could be found. Additionally, some texts were excluded, because they were duplicates of other publications or upon closer inspection did not match the keywords. After finalising the assignment of individuals to texts, the data was inspected for errors and misspellings. Examples of such errors are apostrophes, special characters or middle names. Using different linguistic measures of similarity from the software *OPEN REFINE*, 119 potential instances of identical names were identified. Matching was undertaken manually and only after a background check in the cases that could not be identified as simple spelling mistakes.²⁰

The heterogeneity of the publications that are the basis for the co-publication networks is reflected in the long-tailed distribution of contributors per text. Whereas most texts have between one and three contributors, extreme values exceed the mark

²⁰ The raw data of the co-publication networks are so called “edge lists”, where the first column lists the contributor names and the second column lists the text names. I separated edge lists by year and then aggregated them into the different periods discussed in chapter 4. See also Appendix B on the different methods for network notation.

of 200.²¹ In the literature on social networks, normalisation constants have been suggested to mitigate the influence of such extreme cases (e.g. Leifeld 2013: 176). Normalisation in its most basic form assumes that all nodes in a network have equal resources that they then devote to the establishment of links, whose strength is inverse to their number. This is clearly not the case in the co-publication networks. Such a treatment would obscure that texts and actors become central because of their ample participation. This is, however, a crucial feature that can help us understand how frames become dominant and integrate with actors that advocate other frames.

A second modification that has been suggested to mitigate the influence of extreme observations is to decrease the weights of links once they reach a certain threshold (e.g. Larsen and Ellersgaard 2017: 58-59). This reasoning is based on the observation that the meaningfulness of social interactions decreases once the amount of people involved passes the threshold. The interactions arising from co-publication are likely to also be affected by such ‘decreasing marginal returns’. Yet since the node attributes that were obtained from applying decreasing node weights to texts with large numbers of contributors correlate highly with the ones where no thresholds and weight manipulations were introduced, in the following analysis I refrain from introducing any additional weights.²²

A final question in the coding of links relates to their age. Existing scholarship suggests that it is not unreasonable to assume that more recent social interactions matter more (cf. Young et al. 2017: 346). While it is feasible to address this issue, again, through a modification of the edge weights (e.g. through a decay function), I deal with the issue of time by partitioning the data into three different periods. This

²¹ For the distributions, see Appendix C.

²² Cf. Appendix C.

means that connections only appear in the time-window that they are part of. Rather than assigning a fixed time period such as a 5-year rolling window, I base the partition on patterns in the data as well as on changes in the overall political context (see chapter 4).

Citation Network

The citation network is based on a subset of the 666 texts from the co-publication networks. A link is established if one of these texts cites the name of another text. Citations were found by applying a string-matching algorithm. A list of the 666 titles was supplied to the algorithm that recorded how often any of the titles appeared in a document. I used the output of this search by establishing a link if one or multiple references to a title were found, thereby constructing a directed, unweighted network. To remedy for errors from the ‘encoding’ of texts that might arise when special fonts are transferred into a machine-readable format, spot checks were carried out manually.²³ In total, 409 of the 666 texts form part of the citation network. For this network no periodisation was applied.

Construction and Description of Networks: Raw Data

Whereas the citation network is a one-mode network (i.e. texts citing texts), the co-publication network is two-mode (i.e. individuals publishing texts). And while some information can be obtained from representing the network in its two-mode form, the centrality measures and the sorting algorithm introduced above work best on one-mode networks. The conversion from an unweighted two-mode network to a weighted one-

²³ See Appendix H on the operationalisation in the programming environment R.

mode network can thus either represent texts linked by joint contributors or individuals linked by joint publications (see section 2). As argued in chapter 2, I focus on the organisational level to keep the actor population manageable. Furthermore, the organisational level is more stable (cf. Young et al. 2017: 340).

The raw data for the three types of networks (citation, co-publication two-mode and one-mode) that were constructed with the *igraph* package in the programming environment R is summarised in table 3.1.²⁴ As chapter 4 separates the co-publication network into three different periods, I also provide the raw data for these. Whereas I relegate the detailed analysis of the evolution of the networks to the empirical chapters, the raw data shows that there is a growth in the number of nodes and edges, i.e. the size of the networks over time.

²⁴ See Appendix C for further details on the construction of the networks and the computation of network measures.

Measurement Period	Citation Network	Two-mode Co- publication Networks	One-mode (texts) Co- publication Networks
Nodes 1998-2018	409	6295 ²⁵	666
1998-2008		616	61
2009-2014		2201	247
2015-2018		4082	359
Edges 1998-2018	864	8891	8919 ^{26 27}
1998-2008		726	266
2009-2014		2604	998
2015-2018		5563	3574

Table 3.1 Raw Data for Citation and Co-publication Networks

3.4 Studying the Policy Subsystem: Content Analysis, Interviews and Participant Observation

Measuring the size of the network, its cohesion and the centralities of actors can reveal much about the evolution of the policy subsystem of sustainable finance. Moreover, community detection methods can point towards coalitions of actors that frame sustainable finance in a similar way. Yet left on their own, network measures cannot make any statements about the meaning of the information that flows through the linkages.

²⁵ Note that the number of nodes for the entire period is smaller than the sum of the three periods, since individuals that are present in more than one period are counted twice or three times.

²⁶ Links are unweighted.

²⁷ The overall period has more edges than the sum of the three periods, because the partition does not account for edges between different periods. If person A wrote a text in 2000 and another one in 2010, this edge does not appear in any of the periods but in the overall network.

As the co-publication networks link texts through individuals, two obvious strategies to understand the meaning are content analysis and interviews. Analysing the content of the publications that form communities within the network can reveal what brings them together. Content analysis thus allows for sorting communities of texts – and by extension of the individuals and organisations responsible for publishing them – into frames. The second strategy for understanding the dynamics of knowledge production is to focus on the individuals who author the texts. Interviewing members belonging to the different communities can give further insights on the characteristics of a frame as well as on its relation to academic paradigms and policy paradigms. Finally, participant observation can provide additional information on the debates that occur within the sustainable finance system. Moreover, it can remedy potential biases from the other data sources.

Content Analysis

Methods

Methodological guidance on how to treat textual data suggests that before starting the analysis, the researcher must specify the units of a document that carry meaning (Krippendorff 2004: 98ff). Textual data can, for example, be separated by syntactical units like sentences, paragraphs or chapters (Krippendorff 2004: 104). In the analysis of the publications, I focus on two units of analysis. First, in chapter 5, I use individual words and word sequences to establish congruence between texts and academic paradigms. These individual words and word sequences are the names of scholars and journals that can be sorted to academic paradigms. As such, they can be utilised as markers, whose presence indicates that the text in which they appear is at least aware (if not supportive) of the academic paradigm in question. Since it can safely be

assumed that such an awareness can be found by merely detecting marker words without considering their embeddedness in larger units of text, the task of finding and counting them can be automatised (cf. chapter 5).

Yet the automated counting of academic paradigm markers can only capture a small fraction of the meaning of the texts. Thus, the greater part of the thesis relies on qualitative content analysis. In this case, the textual units are entire publications. These documents often combine the categories that I seek to identify (i.e. academic paradigms, frames and policy paradigms) in a complex fashion. Moreover, the formal properties of the documents vary greatly. This is because the selection criterion that I applied relies solely on content (i.e. the keywords on sustainable finance) and not on form. Therefore, text sizes range from a couple to well over 300 pages. In addition, unlike with legal documents or scientific journal articles, the document type varies greatly. Documents range from short statements on specific policies to lengthy assessments of the global problems and solutions for sustainable finance. All of this means that formalised coding techniques (cf. Krippendorff 2004: 125ff) are hard to operationalise in the corpus.

An alternative that can accommodate the flexibility that the heterogeneity of the texts and the complex nature of the research question demands is qualitative content analysis. This technique allows for the inductive and recursive development of categories (Mayring 2000: 3). Rather than counting the occurrences of categories, qualitative content analysis allows for a more contextualised reading of the empirical materials. Accordingly, the analytical concepts start from an initial research puzzle but are refined through the interaction with the data (cf. Welch et al. 2011: 743). In addition, qualitative content analysis pays attention to linguistic categories without losing the context as would be the case with simple word counts. Qualitative content

analysis also integrates well with the detection of frames. Entman (1993: 52) notes that one sentence can fulfil multiple functions of a frame, while many sentences might not fulfil any. This means that a qualitative selection of meaningful sentences is better suited to capture frames than a formalised technique that gives equal weights to textual units and thereby misses their meaning and role in the document.

A specific variation of qualitative content analysis is Critical discourse Analysis (CDA). CDA mobilises qualitative interpretations to bring attention to the foregrounding and backgrounding of certain aspects in the description of an issue. In addition, CDA emphasises over/underlexicaliation, that is the over- and underuse of certain words (Machin and Mayr 2010: 2ff, 30ff). Attention to these dynamics is well suited to establish the presence of the different frames as well as the terminological dimension of academic paradigms.

Data

The population of texts that I considered for content analysis is equal to the one that is the basis for the co-publication networks (666 texts). For the quantitative analysis of marker-words I mobilise the whole corpus.²⁸ The qualitative content analysis is based on far fewer texts. The selection of relevant publications was carried out with the help of network measures. I considered texts that are important in any of the three periods of the co-publication network as well as in the citation network. As a measure for the importance of these texts, I looked at their degree and betweenness centrality scores. In addition, I analysed the texts that are representative of the different communities that were obtained through the sorting algorithm in the co-publication networks.

²⁸ Though 31 texts were excluded for technical reasons related to their encoding. See chapter 5 for details.

Finally, I analysed texts that other data sources such as interviewees, participant observation transcripts and news coverage identified as relevant. Notably, some of these additional texts are outside the time interval that underlies the text analysis. This discrepancy arises from the fact that I extended the data collection from interviews and participant observation until autumn 2019, whereas the systematic data collection for the co-publication networks was halted at the end of 2017.

Apart from the texts of the corpus and additional documents that were published by the actors from the policy subsystem, I also followed the news coverage on sustainable finance as a complementary source of information. While this data source was not analysed systematically, I gathered 360 newspaper articles that were published between January 2017 and February 2020.²⁹ Most of these articles were obtained by subscribing to tags related to sustainable finance on the Financial Times (FT). As of June 2019, this also included the weekly ‘Moral Money’ newsletter that is coordinated by the FT journalist Gillian Tett. Apart from the FT, I also included articles from specialist outlets like Responsible Investor and Bloomberg as well as from generalist newspapers such as the Guardian, the Economist, the Frankfurter Allgemeine Zeitung, die Zeit and Euractiv. In the thesis, I differentiate references to newspaper articles by marking them with a footnote instead of an in-text mention.

²⁹ For a list see Appendix F.

Interviews

Methods

The interviews that I conducted with the members of the sustainable finance expert community can be classified as elite interviews. Their contribution can be separated in two categories. First, I use interview material to obtain information about the system of sustainable finance and its history. Accounts from interviews are thus used as complementary data source to bring attention to points that network and document analysis might have missed. This first use of interviews is essentially positivist (cf. Mosely 2013: 10). The information that is obtained from the interviewee is taken as an unproblematic representation of real developments and contextual factors that are likely to influence the interviewees' responses are bracketed. While this treatment of interview data has been criticised for misrepresenting the characteristics of the complex social situation of interviews (cf. Alvesson 2003), I take a pragmatic stance insofar as I opine that this use of interview data is still superior to the alternative, which would be the lack of data. Moreover, by checking the veracity of interviewees' claims by mobilising alternative data sources, I adopt the best practices of the positivist approach (cf. Mosley 2013: 22; Roulston 2010: 205).

The second use of interview data differs substantially from the positivist approach. Here, I am interested in the interviewee as representative of a particular frame. The interview can thus give insights on the thinking that is present within a community. In other words, interviews can reveal the articulation of frames in a way that might not be openly presented in this way in written text but seem natural within the respective community. This use of interviews is similar to what has been described as the "romantic" method, where the interviewer engages in a "real conversation" with the interviewee in order to obtain authentic data (Roulston 2010: 218). My aim differs

from some uses of the romantic method insofar as I am less interested in getting access to the genuine feelings and thinking of the interviewee (cf. Alvesson 2003: 29 for a critique of this approach). Instead, I interpret the interview material as reflecting the discourse of the social group and hence the frame that the interviewee belongs to.

Data

The two intended uses of interview data have implications for the identification of potential interview partners. To satisfy the positivist search for information, interviewees should be knowledgeable about sustainable finance and its evolution. On the other hand, when it comes to the representation of frames, interviewees should be embedded in a community. To operationalise the first demand, I looked at the measure of betweenness centrality in the co-publication networks. This is because nodes with high betweenness centrality scores can be expected to receive information from multiple sources and should thus display high degrees of knowledge of the overall system.

Concerning interviewees' representativeness of frames, the selection process requires a purposive or quota sampling strategy, where interviewees are selected on the basis of a dimension that is relevant for the research question (Lynch 2013: 32). In the context of the thesis, this dimension is constituted by the frames. Based on these considerations the sampling proceeded in an iterative manner. Since the frames were repeatedly reconceptualised during the research process, at first, I targeted interviewees based on the type of organisation they were working for. After identifying the frames in the co-publication networks with the help of the community detection algorithm, I tried to interview at least one person from each community.

In practice, this theoretically informed strategy for the selection of interviewees was, however, complicated by the problem of access. In total, I sent out 60 personalised requests for interviews, which were accompanied by a tentative list of questions. Since more than half of the requests were not answered even after multiple reminders or were positively answered but scheduling did eventually run into a dead-end, I had to rely on alternative ways to avoid non-response bias (cf. Lynch 2013: 41). To obtain otherwise missing information on some communities and frames, I recruited people at conferences or made use of snowballing sampling via already established contacts.

In summary, targeting the 60 potential interviewees resulted in a total of 25 semi-structured interviews that I undertook between November 2017 and February 2019.³⁰ The interviews were carried out in person in Berlin, Brussels and Geneva as well as over the phone. The length of the interviews varied between 20 minutes and 1.5 hours. The structure of the interviews was similar as interviewees received a template with tentative questions beforehand. To take the embeddedness of the interviewees in their respective communities into account, I updated the questions for each interviewee bearing in mind their position in the network, the content of their publications and their CV. Moreover, in accordance with best practices associated with the romantic method, I aimed for creating a natural flow in the conversations rather than for covering all my questions. I also tried to minimise the time taken up by my questions and maximise the time of the interviewee talking (Roulston 2010: 202).

During the interviews I abstained from taking audio recording and instead took manual notes. This strategy was chosen so that interviewees would converse more freely and ‘speak their mind’. Afterwards, I digitised the notes into transcripts that are

³⁰ See Appendix A for a list.

organised according to the different themes that were raised during the interview. If interviewees wanted to read the transcript, I made it available to them and if they chose to make clarifications and corrections, the corrected versions were used. Interviewees were also provided with an informed consent form that was drafted by the Principal Investigator of the Horizon 2020 project that funded my PhD (GEM STONES). This form explained the research project and gave them three options regarding their level of anonymity.

The further treatment of interviews evolved over time. After the first interviews I did not compose any memos. Once I had about 10 interview transcripts, I started to organise them in a spreadsheet where I categorised them. The categories are both deductive as they cover themes related to the research question and the concepts introduced in chapter 2 as well as inductive as they include topics that were mentioned by multiple interviewees. In later interviews, I also added questions concerning the inductive categories.

Participant Observation

Method

Both content analysis and interviews are fraught with the danger of missing out on some parts of the social reality that they ought to represent. Documents might offer an official and sanitised account of what their authors ‘really’ want to communicate. Interviewees, on the other hand, may at best provide a subjective description of what they perceive to be the interest of the researcher. At worst, elite interviewees will misrepresent reality and try to manipulate the researcher for their own purposes (cf. Harrington 2017; Roulston 2010: 203).

One method that can help to obtain otherwise hidden data is ethnography and more specifically participant observation. This strategy rests on the assumption that experiencing the reality of the research subjects in the sites where they operate provides information that is essential for understanding the phenomenon in question. As such, it is well equipped to gather unexpected observations that can help with theory building. An example from the study of finance within an STS framework is provided by Beunza and Stark (2004). In their ethnographic study of arbitrage trading, they set out to understand the role of socio-technical instruments such as mathematical formulae and information processing machines. Using participant observation, they were receptive to the counterintuitive finding that the organisational and spatial arrangements of the trading firm played an equally important role as the dynamics that the research had initially prioritised (Beunza and Stark 2004: 372-373).

Apart from its theory building strengths, ethnographic research can also remedy the misrepresentations of official documents and interview accounts that I described above. This is because a researcher, who is embedded in a process where the research subjects perform their everyday work, is less likely to be subject to intentional misrepresentations than a researcher who relies on the written and oral accounts that the research subjects present to the outside world (cf. Harrington 2017: 42-43).

Yet while ethnographic methods have strong analytical credentials, their operationalisation comes with considerable challenges. To conform with best practices, participant observation should span extended periods with repeated visits to the same research site. The study on arbitrage trading introduced above is based on 60 site visits over the course of two years (Beunza and Stark 2004: 373). This indicates that ethnographic work is associated with substantial time investments on behalf of the researcher as well as with considerable financial costs. Moreover, there is always the

issue of access, i.e. the researchers being allowed to enter the site. These problems are compounded when the research site does not have a fixed geography but is dispersed internationally. Harrington observes that the study of highly mobile transnational elites, who travel between financial and political centres such as London or Zurich, leads to significant expenses for researchers (Harrington 2017: 44-45).

When it comes to sustainable finance, the evolutionary nature of the policy subsystem complicates participant observation even further. The absence of an organisational home or a clearly defined group of experts means that site visits to multiple organisations and communities would need to be undertaken to get an adequate understanding. And while, in theory, this would make for a promising research design, in practice, the constraints on time and expenses make such an approach infeasible.

In light of the complications of a fully-fledged ethnography, I adopt a compromise approach which consists of attending events where different parts of the sustainable finance community assemble. While the short nature of these events and lack of repeated observation of the same community means that a true ‘immersion’ of the researcher cannot occur, this strategy nonetheless offers insights that are attuned to the analytical framework that I pursue.

An important property of (especially large and high-level) conferences is that individuals from different communities come together. Thus, in a format that is aimed at discussion such as a panel debate one can observe differences in opinions, arguments and vocabulary. Within the analytical framework introduced in chapter 2, observing these debates can help to determine the persuasive processes of the policy paradigms. This is because cleavages that might be hidden in interview or written material as actors just do not engage with other positions become apparent in these situations (cf.

chapter 6). Attending smaller events that are more explicitly appropriated by one particular community can, on the other hand, add to the understanding of common frames that represent an implicit consensus among the participants.

Data

Between April 2017 and October 2019, I attended a total of 18 events on sustainable finance. These events were labelled as conferences, workshops, fora, public hearings and conventions. They were organised by EU institutions, IOs, universities, think tanks, industry associations and civil society actors and took place in Berlin, Brussels, Oxford, Paris and Zurich. This strategy of following experts in settings across events that are organised by different types of organisation is similar to the one that was adopted in a recent study that queried the dynamics among professionals in the governance of corporate taxation (Christensen 2020).

I transcribed these events using bullet points and indicated direct quotes as well as research notes separately. The transcription resulted in a total of 194 pages of material. To analyse the material, I worked first with colour codes, which were subsequently incorporated into a spreadsheet. The categories in the spreadsheet are analogous to those used for the analysis of the interview transcripts.

3.5 Conclusion

In chapter 2, I outlined that I understand sustainable finance as a policy subsystem. In this system shared frames bind actor coalitions together. In addition, I argued that the knowledge production that the actors undertake to advance their framing of sustainable finance receives input from academic paradigms and, on the other hand, constitutes the input for policy paradigms.

In this chapter, I first situated this theoretical understanding in the general literature on case studies and method selection. I argued that the evolution of sustainable finance as studied in this thesis can be considered as a single case of economic ideas from academic paradigms influencing policy. As it represents a still emerging policy subsystem and dynamics of evolution rather than of crisis, studying sustainable finance can add to our understanding of ideational dynamics in such circumstances. Furthermore, I argued that the conceptualisation of sustainable finance as a system as well as the incorporation of socio-technical instruments into the explanation preclude the use of case study research designs that are aimed at establishing co-variation. Instead, the evolution of sustainable finance can be better understood in processual terms. This more complex understanding of causality requires the use of multiple methods.

To operationalise the evolution of sustainable finance, I mobilise network analysis, content analysis, interviews and participant observation. Network analysis acts as a starting point as it defines the actors inside the policy subsystem as well as their relations. The co-publication and citation networks that underlie the analysis link information exchanges between individuals and organisations. Importantly, they also have a social dimension. By detecting cohesive communities within these networks, I am able to establish the locations of frames in the system over time. Another important

feature of operationalising the concept of policy subsystems through network analysis is that it leads to an explicit definition of the system. To specify the boundaries, I rely on practices from the study of elite and information networks.

Yet while network analysis can reveal much about the structure of the policy subsystem and the positions of the various frames, it remains agnostic about the meaning that flows through them. To assess this meaning and to link it to academic and policy paradigms, I use content analysis, interviews and participant observation data. Quantitative and qualitative text analyses give insights about the content of the corpus that provides the basis for the information networks. Interviews, on the other hand, can be used to gather additional data on issues that the document analysis might have missed. In addition, interviewees can act as the representatives of frames and reveal thinking that is characteristic of a frame but might remain unsaid in the documents. Finally, participant observation is a way to observe an expert community consisting of various frames as it comes together. It also helps to guard against purposeful misrepresentations in textual or interview data.

4. Who and What Made Sustainable Finance an Issue?

Wo Starkes sich und Mildes paarten

da gibt es einen guten Klang.

[Where strong itself with mild doth couple,

The ringing will be good and strong]

Friedrich Schiller, Das Lied von der Glocke.³¹

When attending a meeting, a workshop or a conference on sustainable finance in 2017 or 2018 one could hardly escape the remarks by the moderator or one of the keynote speakers on how stellar and rapid the growth of this issue was. Valdis Dombrovskis, vice-president in charge of financial policies of the Juncker Commission³², took the high turnout at one hearing on sustainable finance as proof that “sustainable finance is no longer a niche – it is going mainstream.”³³ Michael Liebreich, founder of Bloomberg New Energy Finance, commended developments such as the rise of green bonds from “nowhere” and the movement of mainstream investors like Goldman Sachs, Morgan Stanley and JP Morgan into sustainable finance.³⁴ Evidence for such claims can be found when looking at the market for certified green bonds, which grew exponentially over the past decade from a couple of billion dollars in 2008 to US\$ 389 billion of outstanding bonds in 2018 (Filkova 2018). Similarly, the amount of assets

³¹ Translation by Marianna Wetz, *Schiller Institute*, https://archive.schillerinstitute.com/transl/trans_schil_1poems.html#song_bell.

³² Mr. Dombrovskis has maintained this position under the incoming van der Leyen Commission.

³³ Notes EU Public Hearing: Final Report of the HLEG on sustainable finance, Brussels March 22nd, 2018. For a list of transcripts see Appendix E.

³⁴ Notes OECD 5th Forum on Green Finance and Investment, Paris November 13th, 2018.

managed according to broadly defined sustainability criteria grew from US\$ 13.3 trillion in 2012 to US\$ 30.7 trillion in 2018 (GSIA 2018).

Mark Lewis, global head of sustainability research at BNP Paribas Asset Management and member of the Financial Stability Board's Taskforce on Climate-related Financial Disclosures (FSB TCFD), gave an even more laudatory assessment of the evolution of sustainable finance by labelling it as "an idea whose time had come."³⁵ And while it is conceivable that these keynote speakers would exaggerate, interviewees tell a similar story. One researcher from the Grantham Institute on Climate Change and the Environment of the London School of Economics remarked that while writing a paper on the connection between finance and climate in 2014, it seemed that there was nothing else on the topic.³⁶ Less than three years later, a CSO representative expressed that "everybody [in finance] is excited about sustainable finance" and a think tank researcher working on climate risk methodologies was amused at the thought of people still talking about 'mainstreaming' (i.e. large financial institutions integrating ESG concerns, cf. Dumas and Louche 2016: 428)³⁷ as the topic had already moved from a niche to receiving attention from BlackRock and the European Central Bank (ECB).³⁸

Lieberman suggests that the phenomenon of "an idea, whose time has come" does not only depend on the idea itself but also on the history of the idea and the institutional context (Lieberman 2002: 709). Indeed, the Schiller quote at the beginning of this chapter does not just relate to the making of bells and the German

³⁵ Notes EU Public Hearing: Mid-term review of the Capital Markets Union, Brussels, April 11th, 2017.

³⁶ Interview Emanuele Campiglio, WU Vienna. For a detailed list of interviews see Appendix A.

³⁷ Dumas and Louche explain that mainstreaming is a widely discussed concept, which is defined as mainstream financial institutions integrating ESG considerations. However, while widely used, the literature has been largely silent on how such a mainstreaming occurred (Dumas and Louche 2016: 428-429).

³⁸ Interview Nina Lazic, Finance Watch, Interview Jakob Thomä, 2^o investing initiative.

poet's general views on life. It also was cited by an interviewee to illustrate that the emergence of sustainable finance can be attributed to the working together of heterogeneous actors. These actors include financial supervisors, portfolio managers, civil society, environmental scientists and credit rating agencies. Through their different perspectives these actors contributed to innovation.³⁹ Another interviewee – formerly working in academia – likened the emergence of sustainable finance to Bruno Latour's Actor Network Theory (cf. Latour 2003), in which actors form a network without necessarily knowing each other, nor necessarily agreeing with each other.⁴⁰

To understand who (i.e. which actors) and what (i.e. which ideas) contributed to the rise of sustainable finance, I will map its evolution and its constituent parts over three periods from the late 1990s until 2018. As will be shown below, sustainable finance, just as environmental governance in general (cf. Bernstein 2011), has for a long time been a relatively fragmented field of activity. In the absence of a hierarchical or until very recently even a coordinative governance structure, actors have taken different approaches to understand and promote sustainable finance. This diversity is an indication that sustainable finance is not yet a mature policy subsystem with a clear definition.

The remainder of the chapter is organised into three sections. I first briefly revisit the concept of frames and provide a working definition of the term 'sustainable finance'. The second section occupies the largest part of this chapter and divides the evolution of sustainable finance into three periods. Each period describes the actors and frames by using network analysis, interview data, qualitative content analysis and

³⁹ Interview Jakob Thomä.

⁴⁰ Interview MEP Greens/EFA.

participant observation transcripts. I summarise the chapter by listing the dominant actors, concepts and frames throughout the analysed periods.

4.1 Revisiting Concepts and Definitions: Frames and Sustainable Finance

While the transmission model that I outlined in chapter 2 starts with academic paradigms, it is important to begin the empirical assessment by looking at frames. The alternative strategy of deductively constructing hypotheses about how the different academic paradigms might frame sustainable finance and then looking for the presence of these hypothetical frames in the policy subsystem faces the problem of potentially missing most of the relevant interactions. This is because the relations between academic paradigms and frames are likely to be complex and non-linear combinations that differ from the ones specified deductively.

A more promising strategy that is frequently applied in frame analysis (e.g. Crespy 2010; Vanhala and Hestbaek 2016) is to inductively identify the frames and then trace them backwards to broader ideational structures such as academic paradigms. In the context of sustainable finance, a similar strategy has recently been applied by Mangat et al. (2018) to differentiate between storylines in the fossil fuel divestment discourse. Hence, the main part of this chapter is concerned with the different frames that actors displayed between the late 1990s and 2018. Sorting the frames into academic paradigms and relating them to policy paradigms will be the subjects of the next two chapters.

To identify frames, I follow an inductive approach that classifies textual data according to the three dimensions outlined in chapter 2 (diagnostic, prognostic and relational). Entman suggests that frames manifest themselves through the presence of keywords, stock phrases, stereotyped images and sources of information (Entman

1993: 52). Instead of looking for the frames across the whole corpus, I first apply the clustering algorithm on the co-publication networks to preselect communities that are likely to be connected by a shared frame (cf. chapter 3). Subsequently, I mobilise qualitative content analysis, interviews and participant observation to determine which frames bind the identified clusters together. While the number of identified clusters is derived from the maximisation of the modularity value and hence completely data-driven, the sorting into frames is superimposed on those results interpretatively. This means that a frame might cover several clusters. Discrepancies between clusters and frames can arise in situations, where actors working within the same frame focus on different aspects or geographies.

Before starting the description, it has to be noted that the definition of what sustainable finance is and what belongs to it is itself a topic for discussion. As outlined in chapter 3, I answer this question empirically by specifying the actor population in accordance with boundary specification methods from the study of networks. Henceforth, when talking about ‘sustainable finance’ I refer to the entire policy subsystem. A more conceptual working definition that comes close to this meaning is provided by the United Nations Environment Program’s Inquiry Into a Sustainable Financial System (UNEP Inquiry). This definition, which is also broadly in line with interviewees’ accounts, maintains that sustainable finance is about the connection of all parts of the financial system with the environmental, social, economic and governance dimensions of sustainability (Forstater and Zhang 2016).

The following section proceeds by identifying and describing three periods of sustainable finance. The description highlights the different frames that are present in the policy subsystem in the period under analysis. At the end of each period, the diagnostic, prognostic and relational dimension of each frame are summarised. In

addition, the actors that are associated with a frame are recorded in a table. The tabulation of the frames is followed by a visual representation of the co-publication network of each period. Here, the frames are attributed to clusters in the network and their position inside the policy subsystem is established.

4.2 Three Periods of Sustainable Finance

Existing periodisations of sustainable finance vary since researchers look at different timeframes and geographies. Dumas and Louche (2016), who study UK newspaper discourse on responsible investment, identify five periods between 1982 and 2010. Their chronology begins with the civil rights discourse linked to divestment from the South African apartheid regime (1982-1991). This was followed by a period of green niche investments (1992-1997). The late 1990s (1998-2000) witnessed a professionalisation of the sector. Subsequently, a discourse that replaced ethical issues with a focus on “responsibility” rose to prominence (2001-2004). The last period they study (2005-2010) was characterised by the emphasis on ESG criteria. Among these criteria, corporate governance and climate change were the most salient (Dumas and Louche 2016: 439). Crifo et al. (2019), who look at the evolution of sustainable finance in France, find a steady but slow increase of market participants and Assets Under Management (AUM) until 2012. From this time onwards, they observe a steep increase in their measurements. To sort this development, they partition French sustainable finance into four stages: an introductory phase (late 1990s-2001), an early adaptation phase (2002-2007), a diffusion phase (2008-2011) and, finally, a standardisation phase (2012-2016).⁴¹

⁴¹ See Appendix G for a representation of their data.

Robins and McDaniels (2016) from the UNEP Inquiry provide a conceptual rather than data-driven assessment of sustainable finance in the UK. They identify five waves between 2000 and 2015. Their chronology also starts with ethically motivated investment in the early 2000s. This was, however, soon overtaken by a focus on ESG issues and corporate disclosures. In the late 2000s, the reforms addressing the GFC also impacted sustainable finance. The latest, and according to their assessment currently most important, development occurred from around 2012 onwards, when the discussion about carbon and climate risks gained momentum (Robins and McDaniels 2016: 13).

Many of the concepts identified by these studies will resurface in the following description. Furthermore, the observed acceleration of activity on sustainable finance from around 2012 onwards can also be seen in the data presented below; albeit with a slight time lag. These communalities notwithstanding, the analysis in this chapter focuses on a different unit of analysis (knowledge production) and a different geography (no explicit geographic focus but with a European bias, cf. chapter 3). Henceforth, while the general trends that were observed in past studies should be reflected in the data examined in this chapter, slight variations in the observed ‘growth’ of sustainable finance as well as in the periodisations can be expected.

The bar plot in figure 4.1 displays the publications and their contributors that underlie the co-publication networks. The level of knowledge production, which is measured by those statistics, rose steadily from 1998 until 2013. In 2014, a major expansion of publications and experts occurred with both categories increasing almost twofold. In 2015, another increase by the factor two can be observed. Since then activity has plateaued.

The following description of the evolution of sustainable finance is separated into three periods, which are indicated in figure 4.1 by the black-dotted lines. The first period starts in 1998. This is one year after ‘Sustainable Investment’ made its first appearance on the European political landscape with the publication of a study by the European Commission (Delphi and Ecologic 1997)⁴² and one year before the term ‘Responsible Investment’ appeared for the first time in the continental mainstream news (i.e. in *Le Monde*, cf. Gond and Boxenbaum 2013: 711). The endpoint of this first period is the year 2008. This cut-off point was chosen to check whether the GFC that started in 2007 had an impact on sustainable finance. 2009 to 2014 are the start and endpoint of the second period, which comprises the aftermath of the GFC. In the European context, this includes the unfolding of the sovereign debt crisis. Furthermore, this period marks a new epoch in climate politics, which began with the (perceived) failure of interstate bargaining at the Copenhagen CoP in 2009 (Bernstein et al. 2010: 162ff). The last period begins in 2015 and ends in 2018 when data collection was halted with the publication of the EU’s Action Plan on Financing Sustainable Growth (EC 2018a). 2015 as a starting point reflects a major shift in the data, i.e. the two-fold increase of contributors and texts. Moreover, the Paris Agreement and the publication of the Sustainable Development Goals (SDGs) by the UN in 2015 mark the start of the third period. These global events are likely to have influenced the subsequent development and direction of sustainable finance.

⁴² See also: Interview Co-Founder, Sustainability Consultancy, Germany.

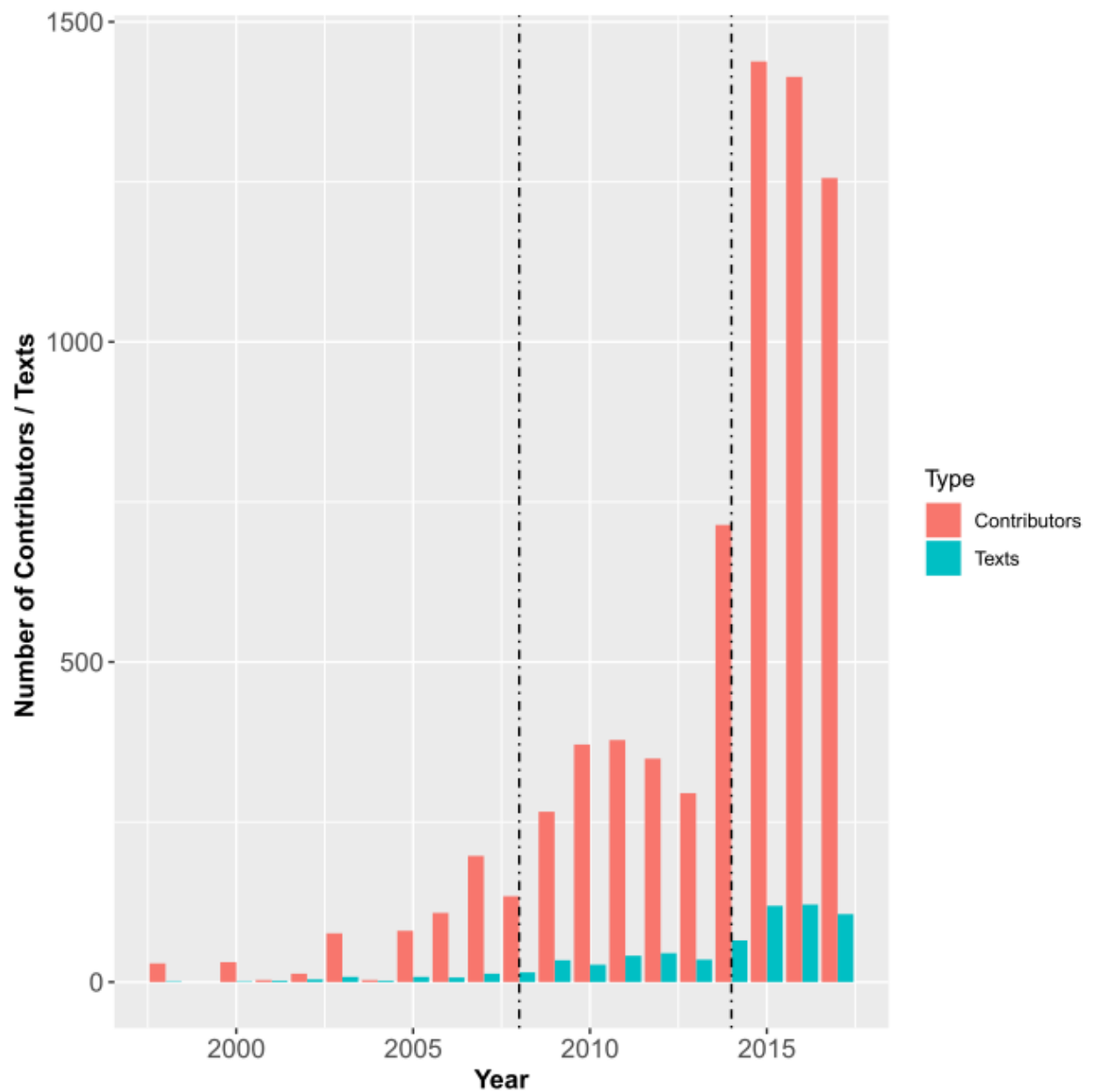


Figure 4.1 Evolution of contributors and texts that are subject to the network analysis per year. In total 666 texts and 5629 individuals were identified. While some observations from 2018 are included in the discussion below, they are not represented in figure 4.1, because I stopped comprehensive sampling in December 2017.

1998-2008: From Socially Responsible Investment to Responsible Investment

Academics as well as members from the sustainable finance community often start their chronological treatments of sustainable finance with a discussion of Socially Responsible Investment (SRI)⁴³(e.g. Robins and McDaniels 2016; Schoenmaker 2017). While the first ethical funds have been dated back to 1928 in the US and to 1948 in the UK (Gond and Boxenbaum 2013: 710; Sparkes 2002: 27, 48), SRI started to grow in the 1970s and 1980s in the Anglo-American context. SRI has its roots with ethical and often religious investors, most of whom have an evangelical Christian background (Sparkes 2002: 48ff; 2006: 43).⁴⁴ These actors seek to align their activities on the capital markets with their beliefs (Sparkes 2002: 27ff). As a consequence, SRI pioneers like the Interfaith Centre on Corporate Responsibility try to exclude the financing of sectors and products that they consider harmful or unethical. Examples are tobacco and armaments but also contraception.⁴⁵

To achieve a congruence between values and investments, religious and other ethically-minded asset owners adopted investment strategies like the opening of ‘sustainability themed’ funds that bet on the success of specific sectors or kinds of economic activity that are considered to be ethically flawless (Sparkes 2002: 28-29, see also Micilotta and Howard 2018). An alternative strategy is to perform a negative screening exercise that excludes undesired sectors and companies from the investment

⁴³ Since then SRI has been ‘rebranded’ by eurosif as “Sustainable and Responsible Investment”. see: <http://www.eurosif.org/about-us/>

⁴⁴ While this period coincides with another intersection between finance and religion, namely the rise of Islamic finance (Rethel 2011), connections between SRI and Islamic have been sparse. Indeed, Islamic finance entered the field of sustainable finance as described here only in the last period through actions like the first issuance of an Islamic (sukuk) green sovereign bond by Indonesia in 2018: See. Emma Dukley, “Indonesia Issues World’s First Green Sukuk Bond” *Financial Times*, February 23rd, 2018. <https://www.ft.com/content/e38ea51c-184c-11e8-9376-4a6390addb44>. Accessed October 7th, 2019. See also Bandar Hajjar, “It is time to position Islamic finance as sustainability leader”, *Financial Times*, November 3rd, 2019, <https://www.ft.com/content/8190401b-8ee0-42a1-89d5-945b7b3fe256>, Accessed November 29th, 2019.

⁴⁵ Interview Co-Founder, Sustainability Consultancy, Germany, Interview European Commission official.

universe. Afterwards, the portfolio manager would try to obtain the desired risk/return profile based on purely financial considerations, albeit with fewer options for diversification (see Cowton 1999 for an early in-depth case study). Another variation of SRI are so called best-in-class approaches. This method also consists of a screening exercise, but instead of excluding certain sectors altogether the screening is ‘positive’. Subsequently, the portfolio manager, whose job again is to deliver financial performance, is given an investment universe, in which only assets of the best companies (e.g. in terms of low pollution or respect for labour rights) of each sector can be chosen (Sparkes 2002: 29, see also Déjean et al. 2004: 721).⁴⁶

These three approaches are arguably the traditional strategies for SRI. The European SRI Study that measures the volumes of responsible investments and is published bi-annually by eurosif, the European umbrella trade association of SRI firms, identified these approaches as ‘core’ SRI strategies (de Marcillac et al. 2008: 11). Opposed to this are ‘broad’ strategies such as simple exclusions, which do not feature a holistic assessment and, instead, only exclude a limited number of categories such as weapons. Another broad strategy is engagement and voting. This means that investors talk with investees’ executive boards about ethical issues, file shareholder resolutions and integrate sustainability issues into their voting strategy at annual meetings (see chapter 6 for a detailed discussion). A final broad strategy is ESG integration, which means that investors adopt a screening process that assesses whether an investment will pose a financial risk that arises from ESG factors (de Marcillac et al. 2008: 13).

⁴⁶ Interviewees also repeatedly referred to this separation of different strategies.

As sustainable finance evolved, the SRI studies notably dropped the dichotomy between core and broad. In the 2016 and 2018 editions, exclusions, best-in-class and ESG integration appear next to each other without any qualifiers. In addition, the more recent SRI studies have added two new categories. With norms-based screening, financial institutions check the compliance of investee entities with global standards such as the codes of conducts developed by the Global Compact or the International Labour Organisation. The second addition is impact investing, which uses instruments like social bonds to e.g. improve the living conditions in a community.⁴⁷

In terms of magnitude, exclusion funds represented the largest share of SRI in Europe in 2017 with about EUR 10 trillion AUM. They are followed by engagement and voting (~ EUR 4.8 trillion AUM), ESG integration (~ EUR 4.2 trillion AUM) and norms-based screening (~EUR 3.1 trillion AUM). Best-in-class, sustainability themed and impact investing each account for less than EUR 1 trillion AUM (Micilotta and Howard 2018: 16).⁴⁸ In total, eurosif estimates that EUR 11 trillion AUM were managed according to one of the responsible investment strategies outlined above. This represents 43.6% of the estimated total AUM (EUR 25.2 trillion) in Europe (Micilotta and Howard 2018: 14, 32). While this number sounds quite impressive, it is also a reflection of the broad scope of the measure as well as of double counting. A much lower ratio is obtained when only counting the financial products that explicitly target sustainable ends. Performing such a stocktaking exercise, the FNG, a member of eurosif representing Germany and Austria, calculates the share of these investments at 4.8% and 12.8% of AUM in those countries respectively (Tober et al. 2019).

⁴⁷ Cf. Hannah Murphy, “Social Impact Bonds: On the Margins”, *Financial Times*, September 24th, 2018. <https://www.ft.com/content/ddf55a2e-7472-11e8-bab2-43bd4ae655dd> accessed December 21st, 2018. for a description of a project on resocialisation in the UK.

⁴⁸ Note that these categories are not mutually exclusive. Investors using norms-based screening could, for instance, include this strategy as one input for their exclusion (cf. Methodology note in Micilotta et al. 2016: 10).

Notably, even the core SRI strategies experienced some transitions. In Europe in the 1990s, SRI expanded its geographical scope from the UK to Germany, France, and Italy. While in the Anglo-Saxon context social and responsible issues had dominated SRI, in Germany environmental considerations were at the forefront.⁴⁹ While such national preferences persist, from the 2000s a process of convergence occurred. Anglo-Saxon investors started to incorporate environmental considerations and continental and in particular German actors moved their focus more to the social dimension.⁵⁰ Despite this integration, regional differences persist when it comes to the preferred approach to sustainable finance. Anglo-American jurisdictions favour exclusion, whereas in the French context best-in-class strategies dominate (Gond and Boxenbaum 2013).

As SRI funds grew in volume, the topic appeared increasingly on the radar of larger financial institutions. The entry these actors brought the issue of how to frame sustainable finance to the forefront. The pioneering, ethical actors described above emphasised that the assets of a fund have to correspond to the ethical convictions of the investors. To collect information on the ethical credentials of security issuing entities, SR investors rely on external data providers that specialise in non-financial information. A case in point is the Quaker's and Methodist church's sponsorship of the UK data provider EIRIS (cf. Sparkes 2002, cf. chapter 6 on data providers).

Larger financial institutions had little sympathy for this way of approaching sustainable finance. These actors and their interlocutors sought to depart from the often-idiosyncratic definitions of ethical investment, which they did not believe to be scalable (e.g. the Universities Superannuation Scheme's contribution in UNEP FI

⁴⁹ Interview Co-Founder, Sustainability Consultancy, Germany.

⁵⁰ Interview Co-Founder, Sustainability Consultancy, Germany.

2005: 1-3). One can thus observe a difference between a traditional *SRI frame* and a newly emerging frame that is championed by larger financial institutions.

The diagnostic dimension of the SRI frame highlights that ethically minded beneficiaries participate through their investments in economic activities that stand in stark contradiction to their values. As such, it is similar to what Mangat et al. (2018: 197ff) identify as the morality narrative in the context of divestment. The prognostic dimension emphasises that a different form of investing, i.e. the various in- and exclusion strategies and the consideration of non-financial data obtained from special rating agencies, can reconcile ethical values with financial value creation. Finally, some SR investors (about 25% according to Markowitz 2007: 139ff) adopted a relational framing that emphasises their distinctiveness from large financial institutions. They present themselves as ethical alternatives to other investors, whose integrity they question. Furthermore, they see themselves as the representatives of environmental and social movements in the sphere of finance.⁵¹

The newly arriving larger financial institutions, by contrast, wanted to participate in sustainable finance without adopting the SRI frame. One actor that mediated between the SRI frame and the needs of larger institutions was the UNEP Finance Initiative (UNEP FI). The efforts by UNEP to persuade a larger fraction of the financial industry to integrate environmental and social considerations into their activities date already back to 1993. In the aftermath of the Rio Earth summit, UNEP partnered with 13 global financial institutions including UBS, Deutsche Bank, Santander and the Royal Bank of Scotland to create the Banking Initiative. In 2003, the Banking Initiative was merged with UNEP's Insurance Industry Initiative, its

⁵¹ See notes of Ö21 meeting Berlin 2018, where participants emphasized their connections to environmental social movements and where interventions reflected an environmentalist or even "hippy" culture.

insurance homologue, which had been operational since 1997 and has been explored in greater depth by Paterson (2001), to form UNEP FI.

Apart from engaging with its membership organisations and raising awareness, UNEP FI acted as a secretariat for working groups composed of staff from the members that produced reports and analysis on various connections between finance and the environment. Working groups were active on the topics of climate change, asset management, biodiversity and insurance. A lasting contribution of this work is the abbreviation ESG, which has been attributed to the work of the asset management group (Bacani et al. 2009: 24 footnote).

UNEP FI did not see the relatively small part of the financial system that starts from ethical considerations and implements core SRI strategies as its main constituency. Instead, it focused on ‘market leaders’ among the mainstream financial institutions in banking, insurance and asset management. This insertion of large institutional investors into the SRI field can also be observed in the media data analysed by Dumas and Louche, who explain the expansion of news coverage on SRI by an “invasion” from institutional investors from 2001 onwards (Dumas and Louche 2016: 449).

To engage these actors, UNEP FI publications addressed environmental issues in a language and conceptual framework that is familiar to these institutions. Reports from the early 2000s emphasise amongst others the opportunities of the Clean Development Mechanism and other cap and trade mechanisms for the financial sector (Basson et al. 2005; Boal et al. 2005; Dlugolecki et al. 2002). However, oversupply resulting in low prices, volatility and constant political reform have since disappointed the most optimistic proponents of trading schemes for environmental (and in particular carbon) assets (cf. Ervine 2018).

A second emphasis of the UNEP FI publications of this period are the risks linked to ESG factors. One publication predicts, for example, increased losses for insurers as natural catastrophes linked to climate change such as Hurricane Katrina will occur more frequently (Dlugolecki et al. 2002: 2-3). Another assessment focuses on risks related to water management (e.g. regulatory, infrastructure, resource availability) (Jensen and Namazie 2007). And yet another study outlines the risks related to biodiversity and ecosystem services (Clements-Hunt et al. 2008).

From this discussion, the diagnostic and prognostic dimensions of the newly emerging frame can already be outlined. The diagnosis emphasises that the non-financial information that is recorded in ESG criteria is not only about the ethics of beneficiaries. Instead, it can be mobilised to identify risks and opportunities. The prognostic framing highlights that market leaders that are already able to assess and integrate ESG considerations today will later have an edge over their competitors. The above described perspective on sustainable finance that was co-developed by and for large financial institutions under the coordination of UNEP FI can thus be conceptualised as a *risks and opportunities* frame.

When it comes to the application of the risks and opportunities framing, one commonality of the approaches developed by UNEP FI is that they are often conceptual, i.e. mapping the political, social and environmental context of an issue and identifying and classifying possible risks (e.g. Dlugolecki et al. 2002; Clements-Hunt et al. 2008). Other reports focus on the benefits of ESG strategies in sectoral, company or country case studies (e.g. Barron et al. 2006). As such, they are mostly qualitative assessments that often point to broad trends but emphasise the need for additional data to be able to perform more fine-grained analysis (cf. Dlugolecki et al. 2002).

Paterson highlights that ideas on the physical risks of climate change as well as on the risks of climate-related regulations were already present in the 1990s in the insurance industry (Paterson 2001: especially 21-25). This shows that the language of risks is by no means new. Nevertheless, there is a marked difference between these early attempts and the developments in the following periods, when the quantification and standardisation of risks into categories like physical and transition risks became the centre of attention.

Another aspect of the risks and opportunities frame relates to the legal infrastructure that governs investment. In this context, UNEP FI started to contribute to the discussion on the fiduciary duties of institutional investors that had already started in the 1990s. The debate on fiduciary duties is concerned with the question whether trustees such as pension funds are supposed to adhere to Friedman's famous prescription to only to maximise financial (risk-adjusted) returns for their beneficiaries (cf. Friedman 1970) or whether they were allowed or even obliged to take broader considerations such as ESG issues into account.⁵²

While smaller SRI funds that are based on voluntary rather than mandatory contributions took a broader interpretation of their fiduciary responsibilities, many other asset owners argued that these responsibilities constitute a legal barrier to the integration of ESG issues.⁵³ Entering this conversation, UNEP FI commissioned two opinions that cover the legal systems of nine developed countries in 2005 and 2009. The first report points out that the interpretation that only financial returns have to be maximised, which was informed by the UK case *Cowan vs. Scargill*⁵⁴, is based on a

⁵² Interview Remco Fischer, UNEP FI.

⁵³ Cf. Interview asset management, Western Europe (2).

⁵⁴ *Cowan vs. Scargill* is a case about a coal miner, who argued that his union's pension fund should invest in coal, so that the jobs of the contributors would remain save.

misunderstanding, which had even been pointed out by the judge presiding over this seemingly landmark case. Emphasising the importance of ESG issues for financial performance, the report argued that “integrating ESG considerations into an investment analysis so as to more reliably predict financial performance is clearly permissible and is arguably required in all jurisdictions” (Watchman et al. 2005: 13).

The second report (Clements-Hunt et al. 2009) followed this reasoning and argues for the integration of ESG issues into the contracts between beneficiaries and intermediaries. Despite these efforts for legal clarification, fiduciary duties remained a contested issue. UNEP FI and other actors continue to publish and advocate on fiduciary duties to the present day (Sullivan et al. 2015, see also Berry 2013).⁵⁵

Another development that shows increasing prominence of the risks and opportunities frame are the efforts to standardise company disclosures. Initiatives like the Global Reporting Initiative (GRI) that was founded in 1997 or the Carbon Disclosure Project (CDP), established in 2001, tried to address the data requirements of the risks and opportunities frame. In 2000, the GRI proposed a common framework for non-financial companies to voluntarily report on sustainability issues. The initiative was created by the Coalition for Environmentally Responsible Economies (CERES) with the support of UNEP and the Tellus Institute before it became incorporated into UNEP FI. The GRI aims at the standardisation of corporate data that mainstream financial institutions require to frame ESG issues as a matter of risk. Brown et al. note that while the GRI was initially set up as a multi-stakeholder audience of corporates, SR investors, and CSOs, it soon became captured by the logics of corporates, investors and consultancy firms (Brown et al. 2009: 572).

⁵⁵ See also: Interview, CSO staff, UK.

The CDP, on the other hand, is an investor backed CSO that sends out questionnaires that ask companies about their environmental and social credentials (see also Newell and Paterson 2010: 65). As Pattberg (2012) argues in his study of CERES, the CDP and the Investor Network on Climate Risk (INCR), these organisations were instrumental in the first attempts to present climate change as a business risk. They achieved this by proposing a list of risk categories that were couched in a language that was known to financial institutions and by trying to standardise the non-financial reporting of corporations in a way that could be integrated with traditional risk assessments. Notably, the drive for standardisation that can be seen with both initiatives is different from the holistic assessment of the ethical credentials of investee companies that early SRI data providers like EIRIS provided. As I will explore in more detail in chapter 6, this differentiation in the framing of sustainable finance has had implications for the design of the socio-technical instruments that were created to address the data needs of either frame.

Yet another development related to the risks and opportunities frame is the launch of the UN Principles for Responsible Investment (PRI) in 2006. The PRI consists of six principles concerning the integration of ESG issues into the practices of financial institutions.⁵⁶ UNEP FI together with the Global Compact provide secretariat and monitoring functions. Starting from 63 signatories with US\$ 6.5 trillion AUM in 2006, the PRI had reached 2372 signatories representing US\$ 86.3 trillion AUM in 2019.⁵⁷ This makes the PRI the largest sustainable finance initiative in terms of membership and assets.

⁵⁶ The six principles are listed at <https://www.unpri.org/pri/about-the-pri>

⁵⁷ Data downloaded from: <https://www.unpri.org/Uploads/n/1/1/PRI-Global-growth-2006-2018.xlsx>. Accessed January 4th, 2019.

While ethically motivated SRI investors appeared uneasy with the broadened scope of ESG investment that initiatives like the PRI stand for, actors like UNEP FI sought to distance themselves from the old-style ethical investors. As such, the less rigid approach of the PRI can be seen as a strategy to address the dissociative relational framing that large financial intermediaries had employed towards traditional SRI actors. Mainstream financial institutions treated SRI approaches at first – and some still continue to do so – with great scepticism.⁵⁸ This criticism was and is often articulated in terms of the foregone benefits of diversification when using exclusion and best-in-class methods (UNEP FI and Mercer 2007: 7-8).⁵⁹ Furthermore, the bad performance of green technology funds during the dot.com crisis of the early 2000s convinced many mainstream financial analysts to steer clear of this investing approach for many years to come (UNEP FI and Mercer 2007).⁶⁰

One UNEP FI staffer described the framing that sought to integrate large financial institutions by cutting the link with the early ethical investors as a move from SRI to “just responsible investing”.⁶¹ Here, the legacy of the ‘socially’, which can be read as ‘ethical’, is dropped to allow for an interpretation of a financially responsible investment strategy, which incorporates an expanded list of financially material risk factors that are related to ESG issues.

Nonetheless, in terms of relational framing, UNEP FI found itself in a conflicted position. This is because it had to emphasise and celebrate the successes of the SRI frame to point out to financial institutions that there was something, which they could build upon. On the other hand, it had to rebrand ‘Responsible Investment’

⁵⁸ Interview asset management, North America. See also Thomas Hale, FT *Alphaville*, September 27th, 2018. <https://ftalphaville.ft.com/2018/09/27/1538020801000/The-new-green-evangelism/>. Accessed August, 25th, 2019.

⁵⁹ Interview Economist, environmental agency, Western Europe.

⁶⁰ See also Interview Co-Founder, Sustainability Consultancy, Germany.

⁶¹ Interview Remco Fischer.

so that it did no longer have the stigma of being an unprofitable, niche strategy that was only applied by (by now) middle-aged ‘hippies’, who had turned into boutique investors.⁶²

The complementary story to large financial institutions trying to reframe sustainable finance as being about risks and opportunities is the reaction of the former incumbents. SRI actors like trade associations, (often small) private firms and CSOs had employed relational framing to define their identity as being in opposition to the mainstream financial system. Therefore, they were naturally sceptical of large financial institutions moving into their line of work. A member of the German SRI community, for instance, was puzzled by attempts of the financial industry to start from scratch with the definition of sustainability in finance and referred to the SRI community as the “good, that is green actors” as opposed to the mainstream financial institutions.⁶³

While the dynamics between proponents of the SRI frame and the newly emerging risks and opportunities frame were the major issue in sustainable finance in this first period, there was yet another frame present in the policy subsystem. This third frame was advanced by civil society and research organisations like the British New Economics Foundation (nef). These actors approached the financial system out of an understanding that highlights its role in the creation and re-production of global inequalities. The involvement of social movements in initiatives for international debt forgiveness like the Jubilee Campaign and their criticism of the IMF’s structural adjustment programmes during the 1980s and 1990s meant that these actors

⁶² Cf. Comments by Jakob Thomä on the transition away from 40-50 years old impact investors that used to dominate the field to a new generation. See also Transcript Ö21 annual meeting, Berlin: September 21st, 2018.

⁶³ Interview Board Member, SRI Association, Europe.

maintained both a diagnostic and a relational frame that was highly sceptical of the incumbent financial and regulatory institutions (e.g. Simms 2001). In terms of environmental sustainability and climate change more narrowly, the nef also questioned of the imperatives of economic growth and capital accumulation (Simms 2001: 18; nef 2003).

This systemic criticism received new impetus through the GFC. In the immediate aftermath of the crisis, a civil society campaign group that was coordinated by the nef called for a ‘Green New Deal’. In their diagnosis the members of the campaign emphasised that the increasing deregulation of the financial system since the 1970s had not only led to the crash and exacerbated inequalities but was also linked with environmental issues. By fuelling overconsumption through the extension of credit, finance had contributed to the overburdening of natural systems (Elliot et al. 2008; 9-12).

The understanding of the relation between the financial sector and sustainability of actors like the nef can be summarised as a framing that advances a systemic critique of the financial system. The diagnostic framing emphasises that the financial sector contributes to the undervaluation of the environment and to the reproduction of poverty and exploitation. The prognostic framing that is derived from this assessment maintains that a major reorganisation of finance is necessary. This might entail the break-up of large financial institutions, tougher regulations and war economy or New Deal type efforts to redirect money allocation to societal and environmental goals (Elliot et al. 2008; Simms 2001).

From the above description, I identify three frames in the first period and summarise them in table 4.1. First, there is the SRI frame that is associated with traditional ethical investors. The second frame is the risks and opportunities frame,

which is associated with UNEP FI and aims to persuade large financial institutions to embrace sustainable finance. Finally, the *critical frame*, which is advanced by CSOs, maintains that the financial system is detrimental to environmental and social sustainability and hence needs to undergo major reform.

The positions of these three frames in the policy subsystem can be visualised by constructing the co-publication network. The network for the period between 1998 and 2008 consists of 61 texts. 41 (67.2%) of these texts are connected in the largest component. Figure 4.2 depicts a reduced version of the co-publication network, which consists of the 44 most central texts⁶⁴, 39 of which are part of the largest component. The nodes in the figure represent the publications, whereas the individuals have been collapsed to links. The application of the Girvan-Newman community detection algorithm resulted in the identification of six clusters, which are represented by the different node symbols (cf. chapter 3 for the methodology). The organisations that are present within each cluster are listed in the legend on the right side of figure 4.2. Finally, a manual sorting of the clusters to the three frames is visualised by the coloured circles and ellipses.

⁶⁴ Links with a lower weight than 2 have been deleted and in the newly obtained networks, nodes with lower degrees have been eliminated to increase readability. See also Appendix C and chapter 3.

Frame	Actors	Diagnostic	Prognostic	Relational
SRI	Eurosif and members	Investments fail to reflect (our) ethical and religious views	Financial assets should be screened according to our values	We are different from normal investors. We are environmental, religious and social movements moving into finance
Risks and opportunities	UNEP FI, MCII, Carbon Trust	Poor environmental and social credentials of companies can mean financial losses for investors. Insurers need to care about environmental catastrophes	Environmental, social and reputational risks need to be internalised in investment decision making	We are a coalition of international organisations and market leaders, who move at the vanguard that redefines finance
Critical	nef	Finance and capitalism more broadly fail to address social and environmental needs	The regulation, ownership structure and priorities of finance must change radically	We are distinct from the large private financial institutions and complicit regulators, which reproduce a dysfunctional and exploitative financial system

Table 4.1 Summary of the Frames Present Between 1998 and 2008

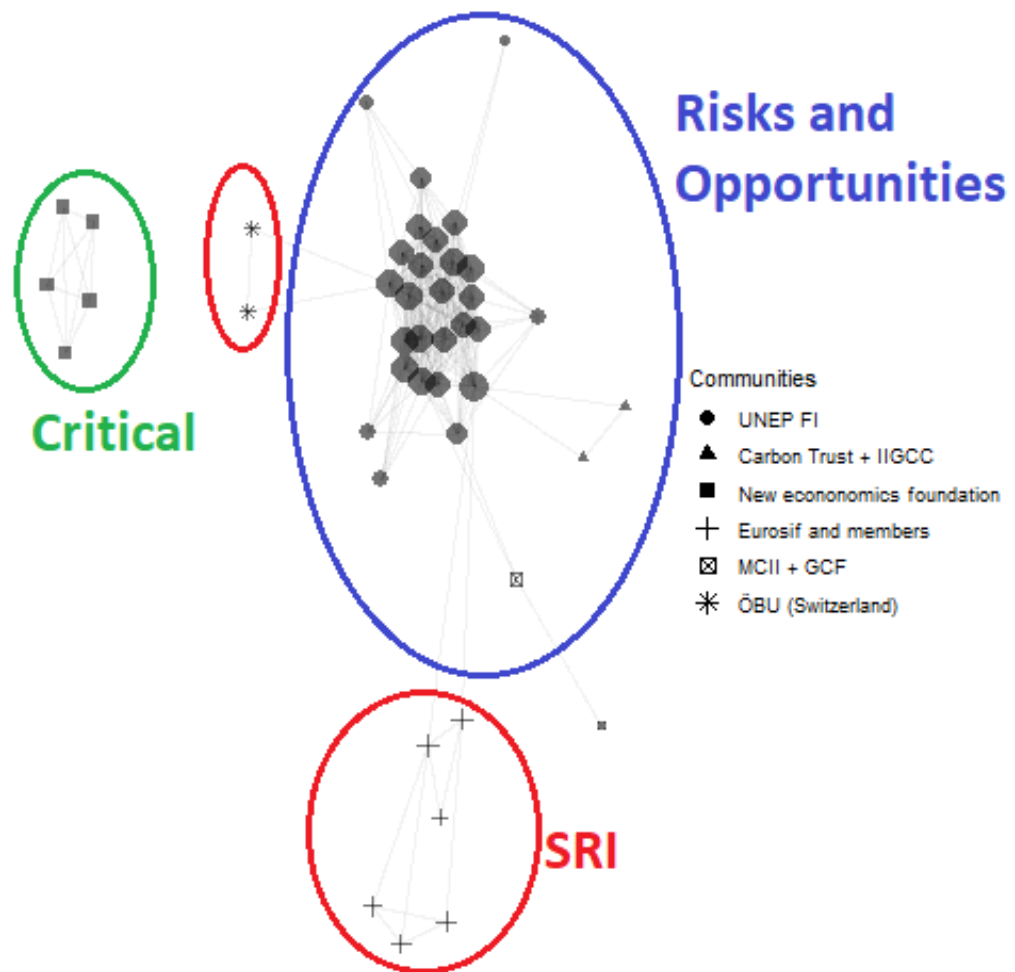


Figure 4.2 Co-publication Network 1998-2008. Nodes are scaled by degree. Symbols correspond to community membership as detected by the Girvan-Newman Algorithm. Abbreviations in the legend: Global Climate Forum (GCF), Institutional Investor Group on Climate Change (IIGCC), Munich Climate Insurance Initiative (MCII), Schweizerische Vereinigung für Ökologisch Bewusste Unternehmensführung (ÖBU), United Nations Environment Programme Finance Initiative (UNEP FI).

The figure shows a dominance of UNEP FI when it comes to the publication of expertise. The cluster in the middle of the graph, where nodes are symbolised by filled-out circles, consists of texts that were published by or in association with UNEP FI. In fact, 44% of the nodes that are depicted in figure 4.2 are related to UNEP FI. Meanwhile, the community of eurosif and its members – plus-shaped nodes – is located at the bottom of the UNEP FI cluster. In addition, the ÖBU, the Swiss trade association of SRI funds, that is represented with star-shaped nodes, forms a separate community at the left margin of the largest component that is dominated by UNEP FI. The publications from the nef (filled out rectangles) form an isolate cluster at the left side of the graph. Finally, there are two clusters that are situated at the margins of the largest component. First, the filled-out triangles represent publications from the Institutional Investor Group on Climate Change (IIGCC), a private initiative of asset owners and asset managers, and the Carbon Trust, a UK government-industry platform that seeks to promote a green transition. Second, the rectangles with an “X” at their centre are one publication by the Munich Climate Insurance Initiative (MCII), a research and advocacy group that was launched by the insurer Munich Re in the context of the UNFCCC negotiations in 2005 (cf. Vanhala and Hestbaek 2016: 116) and another publication from the Global Climate Forum (GCF), a German socio-economic research institute that is associated with the Potsdam Institute for Climate Impact Research.

In terms of framing, risks and opportunities, which are the main focus of the UNEP FI publications, dominate. The two smaller clusters of IIGCC + Carbon Trust and MCII + GCF can also be sorted to this frame. The promoters of the SRI frame like eurosif, by contrast, maintain loose associations with the risks and opportunities frame. However, their fears of being pushed to the margins of the policy subsystem appear to

be validated when looking at figure 4.2. One of the reasons for this marginalisation of the SRI frame is that its focus on members' values means that it struggles to engage in coordinated knowledge production. Indeed, most of the publications in the SRI clusters consist of general arguments about the relevance of SRI, which are then followed by explanations of the different investment approaches and stock-taking exercises of the AUM that each of them represents. The critical frame, finally, remains self-contained in this period. This should not necessarily come as a surprise, since the deep scepticism towards the financial sector and the diagnosis that the current financial system is essentially actively working against sustainable outcomes provides hardly a fertile ground for engaging with the other actors inside the system.

While the SRI frame was losing its discursive hegemony, it still dominated the efforts by several European states to regulate sustainable finance during this period. Nonetheless, the establishment of SRI as a clearly defined and regulated field of activity failed to materialise in the jurisdictions where it was attempted. In Germany, there was a general scepticism towards SRI from financial regulators. In addition, the installation of an official at the environment ministry, who showed little interest in the topic, meant that activity and conversations got into a dead end. All of this led to a quasi-abandonment of the topic by the early 2010s.⁶⁵

In Belgium, an already fairly advanced proposal for the regulation of the SRI market lost its course during the period when the state passed a period of more than 500 days without federal government.⁶⁶ Lastly, at the EU level in 1997, a report was contracted to the German environmental consultancies Delphi and Ecologic Institut to explore 'sustainable investing' and make recommendations to policy makers.

⁶⁵ Interview Co-Founder, Sustainability Consultancy, Germany.

⁶⁶ Interview Annika Cayrol, Financité.

However, a shift of priorities by the subsequent Commissions from growth, social, and environmental issues to only jobs and growth meant that the plans were shelved and ultimately abandoned.⁶⁷

This subsection has argued that sustainable finance has a legacy in the practice of SRI and its corresponding frame. SRI has historically been practised by smaller financial institutions – often with a religious background – that aim to align their financial activities with their ethical values. As these institutions are mostly small and rely on voluntary contributions, they also had more regulatory and legal room for manoeuvring. The growth of SRI strategies meant that large financial institutions, IOs and some policymakers turned their attention towards sustainable finance. On the other hand, sustainable finance was met with suspicion and antagonism from mainstream financial institutions, which emphasise the benefits of portfolio diversification and shareholder value maximisation.

An alternative frame that sought to integrate the social and environmental concerns of SRI with the arrived wisdom at mainstream financial institutions focused on ESG risks and opportunities. This frame was operationalised through a relatively broad survey of reputational, legal and financial risks and opportunities. UNEP FI provided a coordinating function for this emerging frame, while institutional investors, commercial banks and insurance companies were the frame's audience. Finally, some activist CSOs like the nef promoted a critical frame. This frame argues that there is a fundamental incompatibility between environmental and social aims and the way the financial system currently works. Based on this assessment they argue for a wholesale reform of finance. In terms of the positioning within the policy subsystem, the risks

⁶⁷ Interview Co-Founder, Sustainability Consultancy, Germany; Interview European Commission official.

and opportunities frame is clearly dominant. The SRI frame, on the other hand, is increasingly pushed to the margins and the critical frame has so far remained an isolate.

2009-2014: Two Crises and their Aftermath

Many interviewees suggested that the GFC meant that people in the financial system started again to ask questions about the purpose, the efficiency and the functioning of finance (see also Baker 2013; 2018 on post-GFC discussions about purpose).⁶⁸ However, the system question was not asked in the immediate aftermath of the crisis.⁶⁹ Some CSOs like the nef (Elliot et al 2008), the Ecologic Institute (Meyer-Ohlendorf et al. 2009) and the Heinrich Böll Foundation (French et al. 2009) as well as private banks such as HSBC (Robins et al. 2009) and research institutes like the Global Climate Forum (Jaeger et al. 2009) took the GFC as an opportunity to advocate for a Green New Deal. Moreover, some sustainable finance texts that were published in the aftermath of the crisis make the argument that this is the best time for a strategic reset of the financial system towards achieving sustainability (e.g. Clements-Hunt et al. 2009).

Such calls for reform notwithstanding, overarching revolutions of both the financial system and the resource intensive world economy have arguably not occurred to this day. Some interviewees pointed out that from an ex-post assessment the GFC was a missed opportunity to reset the financial system towards the achievement of environmental priorities. Accordingly, the potential of the crisis was wasted as

⁶⁸ Interview Jakob Thomä, Interview Co-Founder, Sustainability Consultancy, Germany, Interview Jeremy McDaniels, UNEP Inquiry.

⁶⁹ Interview Co-Founder, Sustainability Consultancy, Germany.

political protagonists decided to patch up the existing unsustainable and ineffective financial system, instead of using their power to induce such a revolution.⁷⁰

The GFC was not the only crisis that had an impact on sustainable finance. The failure of the international community to reach a binding agreement on the mitigation of climate change at the CoP 15 in Copenhagen in 2009 constituted a crisis of the multilateral bargaining approach. As a result of this stalemate, non-state, market actors and complex governance structures were increasingly explored as potential alternatives (Bernstein et al. 2010; Hoffmann 2011). These developments also influenced the strategies of climate change advocacy organisations, which stepped up their engagement with multi-stakeholder and market-oriented experiments. Furthermore, reduced spending from states for development financing presented an incentive for actors from the development community to shift their focus away from the multilateral negotiations of the CoPs and towards the financial industry.

The frame that started to emerge within this context emphasised the necessity for additional *climate finance*. One of the main diagnoses of the climate finance frame is that the transition towards low-carbon economies requires investments at a scale that cannot be financed by public budgets. Illustrating this line of argumentation, article 8 of the Copenhagen Accord states that “(...) developed countries commit to a goal of mobilizing jointly USD 100 billion dollars a year by 2020 to address the needs of developing countries. This funding will come from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources of finance.” (UNFCCC 2009). One interviewee pointed out that the US\$ 100 billion commitment played an instrumental role in the development of the climate finance community. After the announcement, private and civil society actors emerged that track these flows

⁷⁰ Interview Cillian Lohan, EESC, Green Economy Foundation, Interview MEP Greens/EFA.

and, perhaps more significantly, try to find ways to leverage them with private funding.⁷¹

The emphasis on the leveraging of public funds represents the prognostic part of the climate finance frame. If the diagnosis highlights the insufficiency of public funds, the solution is framed to lie with the mobilisation of private finance. More concretely, advocates of the climate finance frame point to new financial instruments that would be hybrids of public and private financing. Examples are green bonds, which are often issued by development banks and subsequently sold to private investors. Another kind of financial instrument that is proposed consists of mobilising a risk-sharing mechanism, in which scarce public money takes the riskiest tranche of an investment to make it attractive to investors (Holmes 2010a; Holmes 2010b; Buchner et al. 2012). Environmental and development advocacy organisations also followed the Green Climate Fund closely. The fund is operated by the UN and was established in 2010 to channel climate financing from developed to developing countries (cf. Bird et al. 2011; Watson et al. 2012).

The argument that is conveyed here is that due to the twin crises of the GFC and of multilateral climate governance, advocacy groups on climate and development started to engage with the financial system. On the recipient side of these arguments, parts of the investor community represented by bodies like the IIGCC or the INCR were quite sympathetic (IIGCC 2011). Individual financial institutions such as the French bank Caisse des dépôts and the British insurer and pension fund Aviva also supported or commissioned reports on the necessity of private finance for meeting the

⁷¹ Interview, staff, Climate finance CSO, North America.

challenge posed by climate change (Leguet 2012; Morel and Delbosc 2012; Gazibara and Chapple 2011).

A variation of the climate finance frame can be found in the discussions about green growth. The (diagnostic) arguments about insufficient public development funds and the (prognostic) solution to tap private funding is often explicitly focused on the Global South. The notion of green growth could, by contrast, also be applied to the transformation of the European economies in the aftermath of the GFC. Faced with recession and austerity as well as with the fixing of the financial system, environmental considerations were not the first priority of European policymakers. The Barroso Commission, which came into office in 2005, largely abandoned the sustainable finance initiatives that had been incorporated into the Commission's environmental and social policies in the 1990s.⁷² This shift in priorities meant that the promoters of sustainable finance had to alter their argumentation. An example of this changed context is a paper from a coalition of French research institutions that appeals to a "climate agnostic policy-maker" and highlights the co-benefits that regulatory interventions on sustainable finance could deliver for short-term policy goals like economic recovery and poverty alleviation (Hourcade et al. 2014: 5, 10).

Taking a similar framing to a global perspective, the New Climate Economy (NCE), a multi-stakeholder research collaboration that includes CSOs like the Climate Policy Initiative (CPI) as well as IOs such as the IMF, the World Bank and the OECD, published a study titled 'Better Growth, Better Climate' on the question of whether climate mitigation is compatible with continued economic growth. Using economic modelling as well as country case studies, the study argues that the answer to this

⁷² Interview European Commission official, Interview Co-Founder, Sustainability Consultancy, Germany.

question is affirmative. This is because Pareto improvements to the current economic framework can be achieved and because sizable co-benefits such as reduced health costs can accrue from climate mitigation. Hence, the twin challenges of overcoming secular stagnation and combatting climate change can be solved by moving to a new growth model, in which externalities and other market failures are addressed by policymakers (NCE 2014: especially 25ff, 33ff).

To achieve this transition, a reform of the financial industry would be necessary so that productive investments can be channelled to the right places (NCE 2014: 209ff). Notably, the diagnostic framing of the publications on green growth adds an emphasis on the positive macroeconomic effects of private green investments to the already examined argument that public funds are insufficient to meet the investment needs of greening the economy. The prognostic frame, which is about facilitating the flow of private investments towards sustainable investments, remains, however, the same. Finally, the relational dimension of climate finance emphasises the bridging position of the actors that employ this framing. Accordingly, their interlocutors are, on the one hand side, the (traditional) development community that comprises donor organisations, IOs, CSOs and project developers. On the other hand, there is the financial sector, which is represented in particular by cash-rich institutional investors that can bring private funding to the green development model.

The incorporation of co-benefits and a new growth model into the diagnostic dimension of the climate finance frame are arguably responses to a changed macroeconomic environment. The risks and opportunities frame, that had dominated the policy subsystem from the late 1990s to 2008, was also affected by these developments. Notably, the changed environment meant that new actors started to think about sustainable finance in terms of risks and opportunities. Starting around

2011, universities and CSOs began to engage with the policy subsystem of sustainable finance through this frame. Against the background of the GFC, these actors suggested that environmental risks might be the subject of the next financial crisis. By outlining how environmental factors and climate change in particular relate to financial risk, they managed to attract the attention (albeit not yet the financial decisions) of financial institutions.⁷³

The diagnostic framing of these actors holds that environmental factors represented a great source of risk for financial institutions. This is essentially equivalent to the efforts by the actors of the risks and opportunities frame in the first period. However, the new actors varied the emphasis slightly. First, their work gave much greater weight to the risk part and relegated opportunities to a secondary place. Second, the reformulation of the frame meant a reduction in scope and an increase in depth as environmental risks were narrowed down to a detailed examination of the financial risks of climate change.

This narrowing down is strongly associated with the concepts of ‘unburnable carbon’ and ‘stranded assets’. These terms were coined by the UK-based Carbon Tracker initiative. Carbon Tracker used the calculations on the ‘carbon budget’, i.e. the amount of GHG emissions still available to humanity under a below 2° scenario (Meinshausen et al. 2009), to quantitatively measure how overvalued carbon-intensive assets are. The logic behind this reasoning starts from the observation that under a below 2° scenario only one fifth of the available fossil fuel reserves can be burned. It follows that financial assets (e.g. shares, bonds), whose price is related to the valuation of fossil fuel dependent physical assets (e.g. oil tankers, coal mines) that cannot be utilised in a below 2° scenario are overvalued. In other words, this overvaluation

⁷³ Interview Jeremy McDaniels.

constitutes a ‘carbon bubble’. This is because, once policy makers take actions to guarantee that the four fifths of carbon reserves are not burned (thus unburnable carbon), the assets based on them undergo a huge downward correction, i.e. they become stranded (cf. Leaton 2011; 2013).

Apart from qualitative judgments from interviewees⁷⁴, the significance of Carbon Tracker and the stranded assets concept can be observed in the citation network. The 2013 update on ‘Unburnable Carbon’ (Leaton 2013) is the second most cited text with 23 citations, whereas the average publication receives only 2.1 citations.⁷⁵ Other prominent organisations that contributed to the reformulation of the risks and opportunities frame in this period are the University of Oxford’s Smith School that started its ‘stranded assets programme’ (now sustainable finance programme) in 2012 and the 2 Degrees Investing Initiative (2° investing), an initially France-based think tank that from 2012 worked on concepts, metrics, scenarios and indicators of climate risk (e.g. Dupré and Chenet 2012; Thomä et al. 2013; Thomä et al. 2014).

On the diagnostic side of the risks and opportunities frame, the work of these organisations contributed to a more homogenous conceptualisation of ESG risks. This was achieved through narrowing down ESG aspects to only environmental aspects and then to climate aspects (which, again, are mostly conceptualised as energy transition aspects).⁷⁶ The emphasis on a data-driven conceptualisation of risk stands in contrast to the approach of the previous period. As noted before, the actors from the cluster that

⁷⁴ Interview Jakob Thomä, Interview MEP Greens/EFA.

⁷⁵ The first most cited text is a 2016 publication by the UNEP Inquiry. The Carbon Tracker report shares the second place with a publication by the UK prudential regulatory authority on the impact of climate change on the insurance industry. The great distance between the mean and the upper end of the distribution is a typical property of networks that display often so called ‘core-periphery structures’, in which the degree distribution is long tailed (cf. Newman 2010). The distribution is depicted in the Appendix C.

⁷⁶ Interview Jeremy McDaniels, Interview Jakob Thomä, Interview Emanuele Campiglio.

was coordinated by UNEP FI had defined environmental risks much more broadly. They had also considered reputational risks to be one of the strongest motivations for enterprises to become active on ESG issues. By contrast, the stranded assets concept emphasises the financial losses that could accrue to investors as a consequence of transition risks. The term transition risk is used here to signify political interventions (e.g. a carbon price) and other societal responses to climate change. In addition to that, litigation risk, i.e. the risk of carbon financiers becoming legally responsible for the damages caused by climate change, is now emphasised as a potential link between climate change and financial losses (e.g. 2° investing 2013).

A second part of the diagnostic framing in this period highlighted the role of physical risks. This category refers to losses of financial value that result from a changing climate. Such financial losses would affect investors, whose portfolios are based on assets that would be destroyed by physical impairments (e.g. flooded real estate). In addition, financial assets linked to companies, whose business models could be affected by the physical effects of climate change (e.g. disruption of a supply chain or increase in prices of e.g. an agricultural commodity due to droughts) are exposed to physical risks (Caldecott and McDaniels 2014; see also chapter 6).

A final development in the risks and opportunities frame is the notion of universal ownership. This concept was explored by the community of sustainable finance experts in the aftermath of the crisis and is still used today, for instance, by representatives of the Japanese GPIF.⁷⁷ Universal ownership stipulates that holders of large diversified portfolios over a long timeframe actually are holders of an entire

⁷⁷ Notes One Planet Summit, Climate finance day, Paris, December 11th, 2017.

national or world economy and, therefore, should care about systemic issues like climate change (Mattiston et al. 2011).

In this second period, the diagnosis of the most relevant risk categories and the transmission channels that translate between environmental dynamics and financial institutions has become narrower and more sophisticated. Nevertheless, the proposed solution still consists of financial institutions integrating these considerations into their risk management processes and asset allocation. As to the relational dynamic of the risk frame, the audience has remained relatively stable. The actors that produce knowledge on climate risks are more interested in mainstream investors than in niche SRI funds. A second constituency are financial regulators and supervisors. 2° investing, for example, described its objective in its initial publication as “connecting the dots between the +2°C climate goal, risk performance assessment of investment portfolios, and financial regulatory frameworks” (Dupré and Chenet 2012: 1).

Lastly, the critical frame also underwent some changes. Most notably, some actors started to critically assess the claims that the market leaders had made in the first period. Bank Track, Urgewald, the Centre for Research on Multinational Corporations (SOMO), the Rainforest Action Network (RAN), Friends of the Earth (FoE) and Oil Change International are some of the CSOs that scrutinised the sustainability credentials of large financial institutions.

Apart from analysing the practices of financial institutions, these organisations also hosted public campaigns aimed at shaming commercial and development banks that did not fulfil their environmental promises and, instead, financed highly visible polluting projects like the exploitation of tar sands. Their diagnostic framing remains often limited to pointing out that financial institutions are not keeping their word. Their prognostic framing, on the other hand, emphasises divestment from environmentally

harmful activities such as fossil fuels and in particular coal (see chapter 6 on divestment).

Yet both the diagnosis and the solutions suggested by some of these actors also resonate with a criticism that goes beyond the narrow assessments of broken promises and, instead, points to the general problems of finance and capitalism. In terms of the relational dynamics, some of the mentioned CSOs posit themselves explicitly in opposition to financial institutions. This relational dimension resonates with the war metaphors (against the fossil fuel industry and its financiers) that are dominant in the divestment discourses of environmental campaigners (cf. Mangat et al. 2018: 194ff). Therefore, publications from this community (e.g. Dubey et al. 2011; Kornfield and Kresowik 2014; Van Gelder et al. 2010) can be sorted to the critical frame.

Table 4.2 gives an overview of the frames in the second period and figure 4.3 locates them in the policy subsystem. Importantly, table 4.2 separates the risks and opportunities frame into two subcategories to account for the fact that the new actors contributed to a reconceptualisation that did, however, not result in the disappearance of the actors from the first period. The largest component in the second period accounts for 75.3% of all nodes. Hence, in spite of covering a larger membership the policy subsystem has become more cohesive. On the other hand, if one takes into account the weights which represent repeated interactions and the formation of distinct communities, one can also observe a much more marked community structure. This is represented in figure 4.3 by the increase of the number of clusters to 15 (up from 6 in the previous period). For reasons of space, I will limit the description of the clusters to the largest and most representative ones.

Frame	Actors	Diagnostic	Prognostic	Relational
SRI	Eurosif and members	Investments fail to reflect (our) ethical and religious views	Financial assets should be screened according to our values	We are the pioneers of responsible investment, sustainable finance or whatever it is called these days. We act out of genuine concern and not out of a fashion (like the big financial institutions)
Risks and Opportunities	UNEP FI, MCII, WBCSD, Aviva, IFC	Poor environmental and social credentials of companies can mean financial losses for investors. Insurers need to care about environmental catastrophes	Environmental, social and reputational risks need to be internalised in investment decision making. We need better data and disclosure from firms as well as a clarification of legal obligations and regulations so that investors can integrate ESG risks	We are a coalition of international organisations and market leaders, who move at the vanguard that redefines finance
	2° investing, Carbon Tracker	Carbon intensive assets are mispriced	We need to develop risk assessments that help financial institutions and regulators to see carbon risks	We translate the science of the IPCC into the language of mainstream financial institutions and regulators
Critical	Nef, Bank Track, SOMO, Friends of the Earth	Market leaders' actions and voluntary codes provide at best cosmetic solutions to environmental and social problems. At worst they are outright frauds	We need to watch financial institutions' behaviour closely by quantifying the negative impact of their investments. The regulation, ownership structure and priorities of finance must be changed radically	We are distinct from the large private financial institutions and complicit regulators, which reproduce a dysfunctional and exploitative financial system
Climate finance (and green growth)	NCE, E3G, CBI, odi, Böll foundation, Aviva	Greening the world economy will require trillions, which austerity ridden governments do not have, but which private finance does have. Private and public investments are able to generate a new growth regime	We need to address the financial plumbing so that money can flow where it is most needed	We connect the development community with mainstream financial institutions (in particular institutional investors) and policymakers

Table 4.2 Summary of the Frames Present Between 2009 and 2014

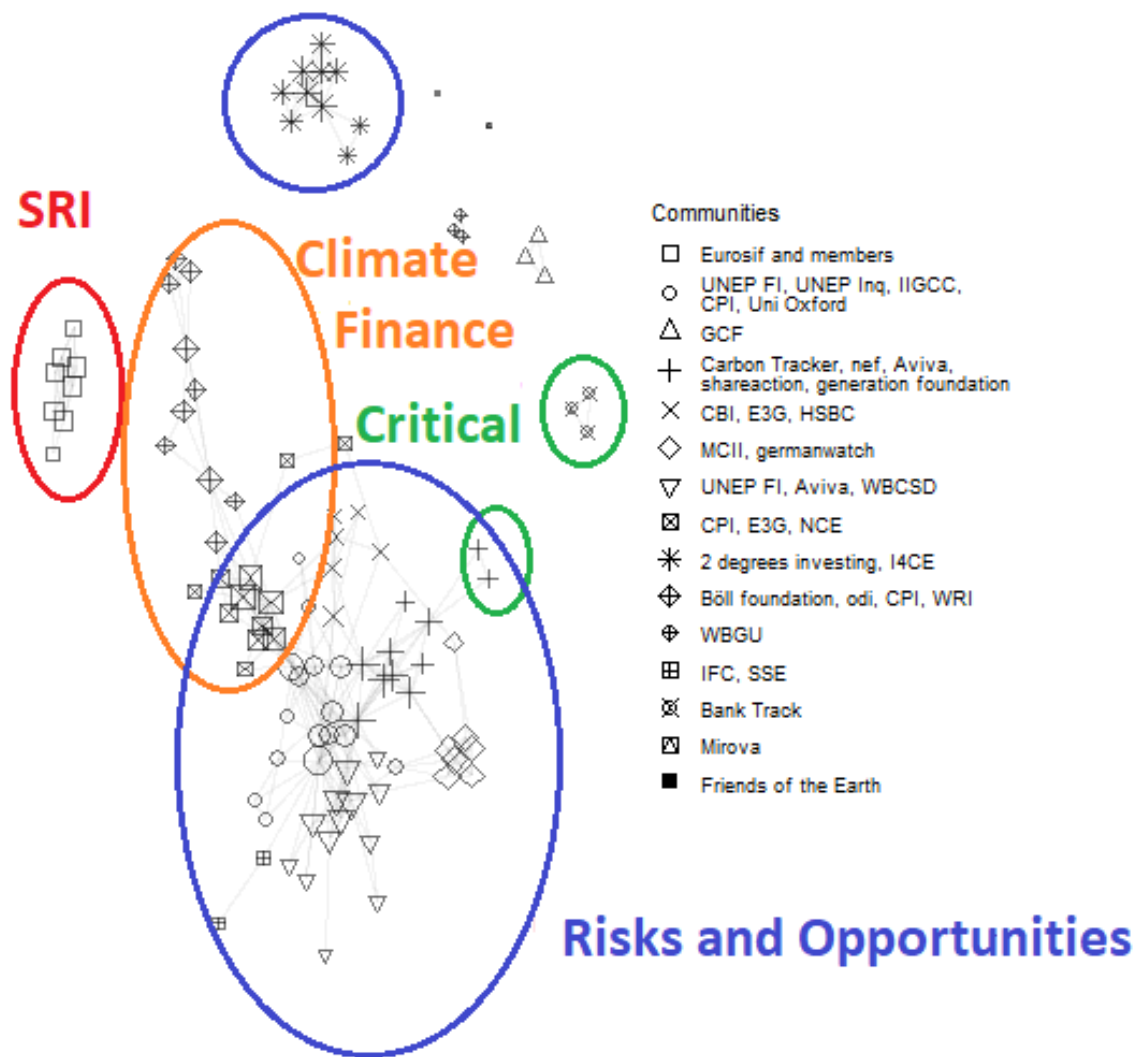


Figure 4.3 Co-publication Network 2009-2014. Nodes are scaled by degree. Symbols correspond to community membership as detected by the Girvan-Newman Algorithm. Abbreviations in the legend: Climate Bonds Initiative (CBI), Climate Policy Initiative (CPI), Third Generation Environmentalism (E3G), Global Climate Forum (GCF), Institute for Climate Economics (I4CE), International Finance Corporation (IFC), Institutional Investor Group on Climate Change (IIGCC), Munich Climate Insurance Initiative (MCII), New Climate Economy (NCE), New Economics Foundation (nef), Overseas Development Institute (odi), Sustainable Stock Exchanges Initiative (SSE), World Business Council for Sustainable Development (WBCSD), World Resources Institute (WRI).

In figure 4.3, the centre is occupied by a cluster of empty circles. Within this cluster there are texts from UNEP FI, the 2014 founded UNEP Inquiry, the IIGCC, and the CPI. As described above, some of the actors in this cluster (CPI and IIGCC) belong to the climate finance frame. UNEP FI and UNEP Inquiry, on the other hand, act as coordinators between the different actors and frames.

UNEP FI's and UNEP Inquiry's role as a hubs can also be illustrated by the measuring the betweenness centrality (see chapter 3) of their employees. In the first period, the highest betweenness centrality can be attributed to Paul Clements Hunt, the director of UNEP FI. In the second period, Hunt was relegated to the third place, whereas Nick Robins, co-director at the UNEP Inquiry and formerly head of HSBC's unit on climate change took over the pole position.⁷⁸

Moving from the empty circles to the upper right of the graph, a second central cluster of plus-shaped nodes appears. These shapes represent publications by Carbon Tracker, the nef, Aviva and ShareAction. The importance of the work of Carbon Tracker on stranded assets as well as the role of Aviva as one of the early movers on sustainability in the mainstream pension and insurance industry has been already described. Whereas Carbon Tracker was instrumental for the development of the risks and opportunities frame in the second period, Aviva was also involved in the climate finance frame. The nef, meanwhile, has been sorted to the critical frame in the first period. ShareAction, finally, is a CSO that helps environmental and social groups to translate their issues into the language of institutional investors and seeks to mobilise holders of pension plans on sustainability issues.⁷⁹

⁷⁸ See Appendix C for betweenness centrality measures and Appendix B and chapter 3 for an explanation of their calculation and relevance.

⁷⁹ Interview CSO staff, UK.

At first sight the overlap within this cluster can be less attributed to a common frame, but to spatial proximity as all the member organisations are UK-based. Nonetheless, when looking at the content of the publications, one can attribute them to the risks and opportunities frame (which in this period is much more risk than opportunities). While two of the three publications of the nef in this cluster can still be sorted to the critical frame – one being concerned with wider system change (Kemp 2010) and another one being about the Green New Deal (Simms et al. 2009) –, the third contribution links not only personally but also conceptually with Carbon Tracker as it covers unburnable carbon (Johnson 2012). This, notably, represents a connection between critical frame and the more mainstream risks and opportunities frame. A potential explanation for this connection is that the systemic implications of the stranded assets concept fit a wholesale criticism of the financial system much better than earlier and more moderate conceptualisations of environmental risks. Concerning the two remaining actors, ShareAction's contribution (Berry 2013) also addresses climate risks. And while Aviva's white paper (Waygood 2014) emphasises the need for private sector funding in accordance with the climate finance frame (Waygood 2014: 9), it also elaborates on the risks of unsustainable economic activities (ibid. p. 3) and stranded assets (ibid. p. 54).

Towards the right lower section of the largest component another cluster (empty rhombi) of the risks and opportunities frame is formed by the MCII and Germanwatch. As described in the first period, the MCII covers the insurance dimension of climate risks. Germanwatch, on the other hand, is a German CSO, whose contribution in this cluster is about the linkages between the EU ETS and Chinese emission trading schemes (Li and Griebhaber 2013). Therefore, it reflects the opportunities part of the risks and opportunities frame.

The last bigger cluster inside the risks and opportunities frame is represented by upside-down empty triangles and is formed by publications from UNEP FI, Aviva and the World Business Council for Sustainable Development (WBCSD). This cluster is more a continuation of the risks and opportunities frame from the first period as it maintains a broader, i.e. not exclusively climate, focus. Aside from the topic of how climate change will affect insurance, the publications in this cluster also address ecosystem services, the financial materiality of ESG issues and integrated reporting.

Moving via the centre (empty circles) towards the upper left part of the largest component, one starts to leave the risks and opportunities frame and enters the climate finance frame. The rectangles with an “X” inside represent a cluster that is formed of the CPI, the NCE and Third Generation Environmentalism (E3G), a CSO. The contributions from these organisations connect climate change with development questions and advocate for policies such as private sector involvement through de-risking. In addition, the argument that the move of large amounts of public and private investments can lead to a new (green) growth regime swings within this community.

The cluster, whose nodes take an “X” shape comprises the part of the climate finance frame that is invested in the new but rapidly growing asset class of green bonds. A notable member of this cluster is the Climate Bonds Initiative (CBI), a CSO that drafts standards for green bonds and promotes their issuance. In addition, E3G and the bank HSBC are part of the cluster. From the graph it can be observed that this community also provides a bridge between the climate finance frame and the risks and opportunities frame. One possible explanation for this position could be that green bonds, on the one hand, cater to the climate finance frame as they are an instrument that mobilises private funds for climate projects. On the other hand, they connect to

the risks and opportunities frame since they are considered to be (and are marketed as) a hedge for climate-related risks.

The last cluster inside the largest component is located on the top left of the graph (rhombi with a plus inside) and includes the German green party's Heinrich Böll Foundation, the British Overseas Development Institute (odi) and the World Resources Institute (WRI). This cluster mostly reflects the collaboration of the Böll foundation and the odi in establishing the Climate Funds Update (CFU), a research unit, which tracks climate development finance flows and their impact. Its connection towards the centre of the largest component via the CPI and NCE reflects that this part of the graph is linked to the climate finance frame.

When looking at the isolates in the graph, the first thing that comes to mind is that the SRI frame has been further marginalised. This can be seen when looking at the eurosif cluster (empty rectangles) in the top left corner, which no longer has a connection to the largest component. The cluster made up by circles with an "X" inside on the upper right side of figure 4.3 is made of publications from Bank Track. This actor is one of the 'watchdog CSOs' that I sorted into the critical frame. Correspondingly, the publications in this cluster are assessments on how well the balance sheets of global banks like ING or HSBC integrate with their commitments made in frameworks such as the UN PRI.

The last major isolate is located at the top of the graph and is made up of star-shaped nodes. The publications inside this cluster are from 2° investing, whose contributions on climate-related risk have been explored above. In addition, the cluster comprises texts from the Institute for Climate Economics (I4CE), which before its independence in 2015 was a research branch of the French bank Caisse des dépôts, called cdc climat. While 2° investing has a clear emphasis on climate-related risks, cdc

climat and later I4CE covers a broader range of issues including financial instruments for development finance (Morel and Delbosc 2012), green bonds (Leguet 2012), and unconventional monetary policy (Ferron and Morel 2014).

The overlap between the two organisations can be explained by their geographical proximity, which in this case is present as both actors are of French origin. Yet while their framing integrates well with the emphasis of risks and opportunities and to a lesser extent climate finance that is present within the largest component, the geographical divide between France and the Anglo-American (and within that mostly UK) discussion about sustainable finance can be seen in the figure.

In summary, the SRI frame was further marginalised throughout this period. The risks and opportunities frame, on the other hand, has expanded but was also transformed to account almost exclusively for risks related to climate change. CSOs and think tanks like Carbon Tracker and 2° investing played a role in popularising this approach. On the other hand, financial institutions like Aviva or Caisse des dépôts were a receptive audience. In addition, a new climate finance frame is focusing on the mobilisation of the financial sector for development projects related to climate change. Organisations from the development community (e.g. CPI), IOs like the OECD and multilateral development banks are central actors linked to this frame. The connection between finance and green growth is also a newcomer that most likely reflects the ramifications of the GFC and was advocated by the climate finance community to apply their framing outside of the development context. Lastly, the critical frame is more isolated but brings together a well-connected CSO community that monitors the promises made by financial institutions. However, inside the CSO community one can also identify a certain division of labour with e.g. Bank Track

taking a more antagonistic stance through campaigning, whereas ShareAction engages with actors from the financial industry.

2015-2018: Explosion and Stabilisation

The last period is noticeably shorter than the previous two. It is, however, also the period when sustainable finance ‘exploded’. Some parts of this explosion can be attributed to the extension of the frames and communities from the last period. Examples are further developments on the classification and quantification of environmental risks and the estimation of investment needs for green growth trajectories.

Next to these developments, there were also important enabling conditions outside the policy subsystem of sustainable finance. Many interviewees mentioned the Paris Agreement on climate change at CoP 21 and its explicit reference in Article 2.1 to the role that finance has to play in the achievement of the below 2° goal as an important event.⁸⁰ In addition, the SDGs, which were adopted by the UN in 2015, provided a broader framework for the sustainability agenda that extends beyond climate change. Lastly, the CoPs following Paris as well as the One Planet Summits hosted by the French president Macron in 2017 and 2018 were events that gave further impetus to sustainable finance.

⁸⁰ Interview Economist, environmental agency, Western Europe, Interview Board Member, SRI Association, Europe, Interview Jeremy McDaniels, Interview Cillian Lohan, Interview CSO staff, UK, Interview MEP Greens/EFA.

A contributing factor internal to the financial system that was mentioned by two interviewees was a speech that BoE governor Mark Carney delivered in September 2015.⁸¹ This speech, which by now has become famous within the expert community, addresses the ‘tragedy of the horizon’. Carney likened this concept to the tragedy of the commons but with the difference that while the tragedy of the commons inflicts harm from resource overuse to a local community, the tragedy of the horizon inflicts the cost on future generations. Moreover, existing authorities (including central banks) lack an incentive to address the harm. This is because the time horizon of the costs extends beyond the business and political cycles as well as beyond the mandates of public institutions (Carney 2015).

Apart from singular events like the signing of the Paris Agreement, there were also some broader developments that provided the context for the expansion of sustainable finance. Technological changes such as artificial intelligence (e.g. Robo-advisors), blockchain and new electronical payment systems were seen as a revolution that was occurring “anyway” in finance. The presence of such an “innovation field” meant that there was an opportunity to redesign the financial system with an eye towards sustainability (cf. Castilla-Rubio et al. 2016).⁸² Furthermore, a demographic change was underway with Millennials giving increasing importance to sustainability considerations both when choosing their investments and their employers.⁸³

Another important factor for the institutionalisation of knowledge production was that resourceful and prestigious actors outside of the policy subsystem became increasingly interested in sustainable finance. The support from international actors

⁸¹ Interview Board Member, SRI Association, Europe, Interview Emanuele Campiglio, Interview former central bank official, Western Europe, Interview Co-Founder, Sustainability Consultancy, Germany.

⁸² Interview Jakob Thomä.

⁸³ Interview Jakob Thomä, Interview CSO staff, UK, Interview asset management, Western Europe (2).

like the G20, the OECD, UNEP and the World Bank alongside with the interest of China, France, the EU and the UK meant that those working on sustainable finance had both the financial resources and the attention they required.⁸⁴ IOs like the G20 were of special importance in this process. Their privileged function was, however, not derived from the usefulness or novelty of their reports (e.g. the G20 Study Group on Green Finance reports), but from their ability to put pressure on member states. Notably, the G20 or the OECD can initiate institutional processes. For sustainable finance, the attention of these organisation meant that national ministries and agencies needed to start paying attention and develop strategies on the topic.⁸⁵ When it comes to the issue of funding, one interviewee mentioned that many [research and advocacy] actors were relying on the same pool of funding, which includes public grants as well as financing from private foundations like MAVA or the generation foundation.⁸⁶

Concerning the content of sustainable finance in this period, it is noteworthy that only now the term ‘sustainable finance’ is used regularly to refer to all of the activities and discussions that have been described so far. Clarifications and definitions are, of course, also instruments for erecting and blurring boundaries. A UNEP FI publication acknowledged the conceptual fuzziness between green investment, green finance, climate finance, and sustainable finance already in 2013 (Zadek and Flynn 2013: 7). The most widely used definition of sustainable finance that is roughly in line with the perception of interviewees, and which is also referred to by inter- and supranational actors like the G20 and the EU, was developed by the UNEP Inquiry in 2016 after reviewing definitions and concepts from governments and the financial industry (Forstater and Zhang 2016). As outlined in the introduction of this chapter,

⁸⁴ Interview Emanuele Campiglio.

⁸⁵ Interview Jeremy McDaniels see also Interview Economist, environmental agency, Western Europe.

⁸⁶ Interview Jeremy McDaniels.

this broad definition of sustainable finance covers ESG issues as well as an economic sustainability dimension. The concepts of green and climate finance, on the other hand, are narrower and are both part of the environmental dimension [of ESG] (Forstater and Zhang 2016: 10-11).

This overall definition of sustainable finance, notably, avoids the mentioning of risks, opportunities or financial instruments that are closer associated with one of the frames. In this context, one interviewee argued that the term sustainable finance provided an umbrella for different actors to come together.⁸⁷ Hence, it differs from terms like SRI with its ethical roots or climate finance, which brings historical baggage from the UNFCCC and development contexts.

Accordingly, *sustainable finance* could be described as a ‘master frame’, which gave a more ambiguous name to the entire policy subsystem and thus established a common basis for erstwhile disconnected communities. Yet the inclusiveness of sustainable finance should not be overestimated. The interviewee, who made the observation of sustainable finance becoming an umbrella term, noted that while being inclusive, the concept is also a misnomer. This is because in practice sustainable means mostly environment, which in turn means climate, which in turn means emissions.⁸⁸ This assessment is seconded by another interviewee, who remarked that “80% of sustainable finance is climate.”⁸⁹

Meanwhile, the risks and opportunities frame, which arguably occupied the greatest share of what now was called sustainable finance, continued its movement away from ambiguity towards more sophistication and specificity. An influential study by the consultancy Mercer, which was supported by the UK and German governments

⁸⁷ Interview Jeremy McDaniels.

⁸⁸ Ibid.

⁸⁹ Interview Jakob Thomä.

and the International Finance Corporation (IFC), estimated the potential gains and losses to different asset classes from the physical impacts of climate change (Ambachtsheer et al. 2015). A similar study was commissioned by Aviva in 2016 and carried out by the Economist Intelligence Unit (EIU). This publication translated the physical costs of different climate change scenarios (e.g. 2° or 4° warming) to the financial metric of Value at Risk (EIU 2016, see chapter 5). The salience of these publications can be assessed by their high rank in the citation network (4th and 7th place respectively) as well as by the fact that they are repeatedly referred to in panel discussions and newspaper articles.⁹⁰

For the purpose of the next chapter, which analyses the role of academic paradigms, it is noteworthy that both studies use Integrated Assessment Models (IAMs) to estimate the financial damages that result from climate change. IAMs are a common tool for policy analysis in environmental economics and have been used and developed most prominently in the Economics of Climate Change Review by Lord Nicholas Stern in 2006 and the work of the 2018 Nobel prize winner William Nordhaus (Nordhaus 1994; Stern et al. 2006). The application of these models to financial portfolios helped to further operationalise the risks and opportunities frame, which had already been narrowed down to climate-related risks in the previous period.

While these and other models operationalised climate-related risks, the precise meaning of this term was not yet well-defined. In this last period that started to change as some actors tried to standardise the categorisation of such risks. In 2015, the Bank of England's Prudential Regulation Authority (PRA) published a report on climate-

⁹⁰Notes QED forum on sustainable finance, Brussels. June 5th, 2017. See also Anjali Raval and Attracta Mooney, "Money Managers: The New Warriors of Climate Change", *Financial Times*, December 27th, 2018. <https://www.ft.com/content/c245af4a-f875-11e8-af46-2022a0b02a6c>. Accessed January 5th, 2019; Chris Bryant, "We're All Climate Catastrophe Preppers Now", *Bloomberg*, November 5th, <https://www.bloomberg.com/opinion/articles/2018-11-05/doomsday-investing-in-a-time-of-climate-change>. Accessed February 20th, 2019.

related risks for the assets and liabilities of insurance firms. In its assessment, the regulator differentiated between physical risks, transition risks and liability risks. According to both the citation network, where the publication shares the 2nd place, and the assessment of interviewees, the PRA was instrumental in defining and popularising the notion of climate-related risks.⁹¹

The fact that the PRA's take on climate-related risks became widely used is also an outcome of the regulator's power. After specifying what climate-related risks were, the PRA requested insurers to submit information on their exposure according to these categories (PRA 2015). This request had the effect to raise the awareness of financial institutions. One interviewee noted that the fact that climate change was now on the agenda of financial institutions could be attributed to a great degree to the actions of regulators.⁹² Since then the PRA has expanded the scope of financial institutions that are considered to be impacted by climate change by undertaking a similar exercise on the exposure of commercial banks (PRA 2018).

While this episode occurred in the UK, a similar development happened in France with the adoption of the 2015 Energy Transition Law. Article 173 of this law requires institutional investors to disclose information on their exposure to climate-related risks. In addition, they have to report on how ESG considerations are integrated into their investment decision making process. Despite the fact that there is still no standardised way for the assessment and stress testing of French financial institutions, the law led to awareness raising and learning. Just as the PRA, the French prudential regulation authority held bilateral talks with banks, insurers and investors on climate-related risks and their management.⁹³ This notwithstanding, the influence of regulators

⁹¹ Interview CSO staff, UK, Interview Jeremy McDaniels.

⁹² Interview CSO staff, UK, see also, Interview I17 (confidential).

⁹³ Interview former central bank official, Western Europe.

might be more a regional than a universal feature. An interviewee from the North American asset management industry questioned the relevance of regulators noting that while he would not rule out entirely the possibility, he had never experienced asset managers making strategic decisions due to the involvement of regulators.⁹⁴

The move of regulators and central banks into sustainable finance in this last period meant also a transformation of the risks and opportunities frame. The main shift in the diagnosis concerned the unit of analysis. Following the GFC, central banks had been tasked with monitoring system-wide, macrofinancial risks (cf. Baker 2013). From this vantage point they located climate-related risks at the system level. As I will further outline in chapter 5, this conceptualisation is ontologically distinct from situating the same risks at the level of a financial institution's portfolio. In short, the regulators' diagnosis emphasises that climate-related risks have the potential to not only lead to losses for and failures of financial institutions, but also threaten the stability of the financial system. The prognostic frame, meanwhile, stresses that regulators need to increase their knowledge of the interactions between climate change, societies' responses to it and financial stability. They also should ensure that the financial system increases its resilience towards such risks. Finally, regulators need to develop tools to both minimise climate-related risks before they materialise and to be able to respond to them if necessary.

The application of this variation of the risks and opportunities framing was not undertaken by all central banks in equal measure. In Europe, next to the already mentioned actors from the UK and France, the Dutch and Swedish authorities are frontrunners.⁹⁵ The Dutch central bank (DNB) has mapped sustainable investing in the

⁹⁴ Interview, asset management, North America.

⁹⁵ Interview Franziska Schütze, Global Climate Forum, Interview former central bank official, Western Europe.

Dutch pension fund market (DNB 2016) and conducted a high-level analysis of the country's financial system's exposure to climate risks (Regelink et al. 2017). In addition, it created a sustainable finance platform in 2016 and is currently developing climate stress test methodologies.⁹⁶ Another actor that started to look at the macroprudential consequences of climate and transition risks was the European Systemic Risk Board (ESRB), which published a paper on three different transmission channels of climate change to the financial system (ESRB 2016).

The internationalisation and institutionalisation of these efforts by central banks and supervisors took place at the One Planet Summit in December 2017 with the establishment of the Network for Greening the Financial System (NGFS). The NGFS is a collaboration of financial authorities that coordinates the development of methodologies, supervisory practices and regulatory interventions on climate-related risks. In addition, and closer to the climate finance frame, the network explores the role that regulatory actions can play in scaling up finance for activities that contribute to an environmentally friendly transition (cf. NGFS 2018).

Central banks and financial authorities from the four leading European states (F, GB, NL, SWE) were among the founding members of the NGSF alongside with the German Bundesbank, the People's Bank of China, the Bank of Mexico and the monetary authority of Singapore. As of March 2020, the NGFS counts 63 members from five continents – including the ECB and Western and Southern European institutions – and 12 observers amongst whom are the OECD, the BIS and the World Bank.⁹⁷ Yet while the fast increasing membership of the NGFS paints a rosy picture, some observers have suggested that the “dirty secret” of the network is that its creation

⁹⁶ Interview Franziska Schütze, Interview former central bank official, Western Europe.

⁹⁷ For a complete list see: <https://www.ngfs.net/en/about-us/membership>.

became only necessary because the US Federal Reserve refused to discuss climate-related risks inside the Basel framework and because after an initial surge the G20 quickly lost interest in sustainable finance.⁹⁸

The developments described above suggest that regulators and central banks have reframed the diagnosis of environmental and climate risks by shifting the unit of analysis from the individual financial institution to the financial system. The prognostic dimension of this frame emphasises the need to further refine the analytical tools to comprehend the systemic impact of climate-related risks. Based on these assessments regulators will then be able to either prevent these risks or at least respond to them. As to the relational dimension of their framing, regulators look to their international peers as well as to the entities which they supervise. While the NGFS highlights the willingness to cooperate, it has also been suggested that the political nature of addressing climate change might bring an end to the transnational community of technocratic central bankers.⁹⁹ In addition, the perception that the answer to climate change is a political issue has brought the relation between regulators, central banks and governments (i.e. their principals) to the forefront (see chapter 6).

In parallel to the work on systemic risk, the already existing research stream on metrics for climate-related risks on the level of the individual financial firm continued to evolve (e.g. Dupré et al. 2015; Lewis 2014). One major development in this line of work was the development of forward-looking metrics that increasingly complemented assessments such as GHG foot-printing, which are based on historical

⁹⁸ Cf. Notes on Simon Zadek's (UNDP, formerly UNEP Inquiry) remarks at OECD 6th Forum on Green Finance and Investment, Paris: October 29th, 2019. See also Gillan Tett, Billy Nauman and Patrick Temple-West, "Moral Money Special Edition: Bloomberg's big day, impact bonds, the 'other' SDGs." *Financial Times*, September 26th, 2019. <https://www.ft.com/content/cae3a64c-e001-11e9-9743-db5a370481bc>, Accessed December 4th, 2019.

⁹⁹ Claire Jones, "Splits over Green QE are a sign of the times", *Financial Times Alphaville*, January 15th, 2020. <https://ftalphaville.ft.com/2020/01/14/1579014159000/Splits-over-Green-QE-are-a-sign-of-the-times/>. Accessed January 21st, 2020.

data.¹⁰⁰ The rationale behind forward-looking metrics is that for an ‘alignment’ to policy goals such as the Paris Agreement to occur, it is insufficient to only mobilise additional investments in green industries. Instead, the entire economy must be decarbonised. This then means that a major role is accorded to investments that fund the transitions of carbon-heavy sectors (see chapter 6). The actor that was arguably most influential in developing such methodologies is 2° investing (e.g. Höhne et al. 2015; Thomä et al. 2015; Weber et al. 2017a). Importantly, the move towards transition scenarios modifies the risks and opportunities frame since the minimisation of risk and the maximisation of opportunities is equated with scenario compliance.

The significance of these developments lies less with a shift in the framing and more with changes in the socio-technical instruments. The diagnosis that financial institutions still fail to acknowledge climate-related risks and opportunities remains the same. Similarly, the prognosis that tools and processes that incorporate those issues into capital allocation need to be developed has not changed. Nonetheless, the change from past data to future projections marks a shift that matters for the design of socio-technical instruments (see chapter 6 for a detailed discussion).

The success of the 2° investing’s framework can be partly attributed to its technical sophistication. Another factor that contributed to the widespread adaptation of 2° investing’s methodologies and assessment tools by financial institutions but also by CSOs (e.g. Influence Map 2019) is that the think tank operates mostly on grant money (>70% from EU grants in 2017, cf. 2° investing 2017), which, in turn, allows for open access methodologies.¹⁰¹ 2° investing thus played an instrumental part in

¹⁰⁰ Cf. Notes on talk by Michael Kopp (WWF) at the conference: Finance as a response to environmental crises? Critical analysis of the ‘economicization’ of carbon emissions and biodiversity, University of Hamburg, Hamburg, November 29th, 2017.

¹⁰¹ See also Interview Jeremy McDaniels.

translating the arcane language of climate and transition models to the (equally arcane) language of financial risk. One interviewee remarked in this context, that 2° investing would publish a paper “about every other week” and alongside with UNEP [FI] was occupying a space between academic research and practice.¹⁰² This indicates a potential bridging position between academic paradigms and the risks and opportunities frame, which I will further explore in chapter 5.

While 2° investing’s work was influential in crafting forward-looking methodologies of climate-related risks, another actor that also emphasises the future nature of these risks is the FSB TCFD. The TCFD was convened by the FSB in late 2015 at the initiative of Michael Bloomberg and Mark Carney. The taskforce is led by actors from the private sector and its main objective is to standardise corporates’ and financial institutions’ forward-looking reporting on material climate-related risks (FSB TCFD 2017). In terms of framing, the FSB TCFD’s approach does not differ much from earlier manifestation of the risks and opportunities frame. In terms of the level of analysis, it works predominantly at the level of the individual company or financial portfolio.¹⁰³

One special aspect of the TCFD is that it has forcefully emphasised the necessity of complete, accurate and standardised data so that financial institutions can do their job of pricing assets correctly. As such, the FSB TCFD fits into the field of data provision, which I have briefly discussed in the first section with regards to the GRI and the CDP. Notably, the FSB TCFD departs from these existing reporting frameworks by emphasising the relevance of forward-looking data. This is, for instance, reflected in the FSB TCFD’s recommendation of scenario analysis.

¹⁰² Interview Economist, environmental agency, Western Europe.

¹⁰³ Cf. Interview Economist, environmental agency, Western Europe.

A general development inside the risk and opportunities frame that goes beyond the activities of single initiatives like 2° investing or the FSB TCFD is a refocusing on the opportunities. The increasing specification of how the transition will look like brought back the focus on the upside for investors. The growth opportunities in green technologies were frequently given as an example in this context.¹⁰⁴ Second, one interviewee observed that a change in the motivation of sustainable finance experts had occurred. While earlier generations had been mostly concerned with risks, the interviewee argued that more recently “do-gooders” with a genuine concern for sustainability had increasingly moved into the sustainable finance community.¹⁰⁵

A third dynamic that occurred towards the end of the third period is that the dominant focus on institutional investors was weakened a little as commercial banks received renewed attention. As described before, banks had been part of the focus of UNEP FI’s early work inside the risks and opportunities frame. In the following periods, banks that had signed up to sustainability initiatives were then scrutinised by CSOs that belong to the critical frame.

Both on climate-related risks and on ‘shifting the trillions’ towards climate finance, the main focus rested, however, on institutional investors. This changed throughout 2018 with e.g. the PRA assessment on climate risks for banks and the formulation of the Principles for Responsible Banking – in analogy to the PRI – by UNEP FI. The inclusion of banks meant also a further expansion of the international expert community on sustainable finance, which resulted in a break-up of a formerly close-knit community focused on the capital markets, where “everybody knew everybody.”¹⁰⁶ Even so, at least on a national level the sustainable finance expert

¹⁰⁴ Interview Jeremy McDaniels.

¹⁰⁵ Interview Jakob Thomä.

¹⁰⁶ Interview Jakob Thomä.

community remained sufficiently small as evidenced by the remark of an interviewee stating that exaggeratedly speaking she knew of everybody “which beer he is drinking”.¹⁰⁷

While the preceding paragraphs described developments within the risks and opportunities frame, these dynamics did not occur in isolation from the other frames inside the policy subsystem. The renewed emphasis on new investment opportunities connects, for example, well with the climate finance frame. The NCE continued its efforts with studies and policy suggestions on how to operationalise the new green growth regime (NCE 2015; 2016; 2018). Meanwhile, the OECD conducted its own economic demonstration of the positive GDP effects of climate mitigation (OECD 2017). Observing the increasing interactions between sustainable finance and green growth, one interviewee noted that from 2015/16 onwards “sustainable finance [became] the new green growth” as many researchers that had published on green growth around 2011/12 were now publishing on sustainable finance.¹⁰⁸

The discussion within the climate finance frame occurred against the background of a period, in which safe assets paid close to zero interest rates. On the other hand, the annual funding gaps for energy, climate or SDG investments were estimated in the range of trillions of US\$. These two observations were almost routinely brought together in the prognostic dimension of the climate finance frame. The advocates of this frame emphasise the necessity of connecting the trillions of AUM that are in search of for safe, long-term return to the funding needs of the new global green growth regime (e.g. Moslener et al. for DG CLIMA 2015: 4ff; NCE 2016: 16; UNEP Inquiry 2015: XIII; and Schoenberg 2015 for a focus on the EU context).

¹⁰⁷ Interview Economist, environmental agency, Western Europe.

¹⁰⁸ Interview Emanuele Campiglio.

In addition, initiatives like the Multilateral Development Banks' "Billions to Trillions" agenda and the G20's "Infrastructure as an Asset Class" provided concrete roadmaps of how to operationalise this exercise in financial plumbing.

Regarding the critical frame, there are some indications that relatively central actors incorporated parts of its diagnosis and solutions in this period. The UNEP Inquiry, for instance, takes a systems approach that assesses the state of the financial system against its performance in producing the necessary environmental outputs whilst being effective, cost efficient and resilient (UNEP Inquiry 2015: 54). Starting from this, the Inquiry has repeatedly criticised developed financial systems in terms of their disconnection from the real economy and their short-termism (UNEP Inquiry 2015; 2016). Moreover, it questioned the usefulness of concepts like the Efficient Market Hypothesis (EMH) that had been used to justify the principles on which the financial system was built in the past (Zadek and Robins 2018: 12, on the EMH cf. Baker 2010: 653-654). Furthermore, based on the argument that financial systems are the outcome of past institutional and political developments, it recommends an interventionist approach. The Inquiry also argued that rich economies could learn from emerging and developing economies, which had already transformed their financial systems according to development priorities (Zadek and Robins 2018).¹⁰⁹

The more critical argument that the financial system is not connected sufficiently with the real economy and is fraught with short-termism was also voiced by the EU's HLEG (HLEG 2017: 15, 19; HLEG 2018: 45ff) and its subsequent action plan (EC 2018a: 12). In addition, the HLEG, which was mostly composed of representatives from the financial industry¹¹⁰, also justified its recommendations for a

¹⁰⁹ See also Interview Jeremy McDaniels.

¹¹⁰ Interviewees Annika Cayrol and Co-Founder, Sustainability Consultancy, Germany mentioned this, see also HLEG 2017, HLEG 2018 for a list of members.

more systemic reset of finance by referring to the experiences of the GFC (HLEG 2017: 8).

Table 4.3 summarises the main frames of this last period. The table excludes a repeated discussion of the SRI and critical frame. This is because most of the developments in this last period occurred in the risks and opportunities frame and the climate finance frame. To account for these developments, the risks and opportunities frame is partitioned into three subcategories. While the first part outlines the traditional preoccupation with ESG issues, the second subcategory highlights the position that argues for a forward-looking perspective. The last modification of the frame is concerned with the position of central banks and regulators that emphasise the systemic aspects of climate-related risks. In addition, table 4.3 discusses ‘sustainable finance’ as a master frame. Actors that have increasingly seen their role as being hubs that link the different communities belong to this master frame. While some the actors in this category have an own perspective on sustainable finance and can hence be attributed to another frame (e.g. the FSB TCFD to risks and opportunities), they also see it as their mission to promote the entire policy subsystem of sustainable finance.

Figure 4.4 describes the network of texts linked by co-publication. As the publishing activity as well as the interlinkages between authors increased dramatically in this third period, I also visualise the core of this network in figure 4.5.

Frame	Actors	Diagnostic	Prognostic	Relational
Sustainable finance master frame	UNEP Inquiry, UNEP FI, G20 study group, HLEG, FSB TCFD	Finance plays a role in transitioning to a sustainable future. But the actors that can enable this shift are disconnected or unaware of each other	We need to connect the community of sustainable finance. Sustainable finance as a whole needs to grow	We also promote sustainable finance to actors like policymakers and not yet integrated financial institutions
Risks and opportunities	UNEP FI, FSB TCFD, Mercer, WWF	Poor environmental and social credentials of companies can mean financial losses for investors. Insurers need to care about environmental catastrophes. The green transition is not only about risk minimisation, but also about getting the upside of participating in the opportunities	Environmental, social and reputational risks need to be internalised in investment decision making. We need better data and disclosure from firms as well as a clarification of legal obligations and regulation so that investors can integrate ESG risks	We are a coalition of international organisations and market leaders, who move at the vanguard that redefines finance
	2° investing, Carbon Tracker, Co-firm CISL	The biggest issues are in the future and cannot be seen by looking at today's data	We need to develop forward-looking risk assessments.	We translate the science of the IPCC into the language of financial markets
	NGFS members	The risks from climate change are systemic.	We need to understand how these risks work and then device reactions or if the latter is not possible try to prevent these risks from materialising.	We are agents, which are bound by the mandates that policymakers gave us. Since financial stability is a global issue, we look at what our peers are doing
Climate finance	NCE, E3G, CBI, odi, Böll foundation, WRI	Greening the world economy will require trillions. At the same time institutional investors hold trillions that need a safe long- term return, but are faced with an investment environment, where negative interest rates are the norm	We need to address the financial plumbing so that money can flow where it is most needed	We connect the development community with mainstream financial institutions (in particular institutional investors) and policymakers

Table 4.3 Summary of the Frames Present Between 2015 and 2018

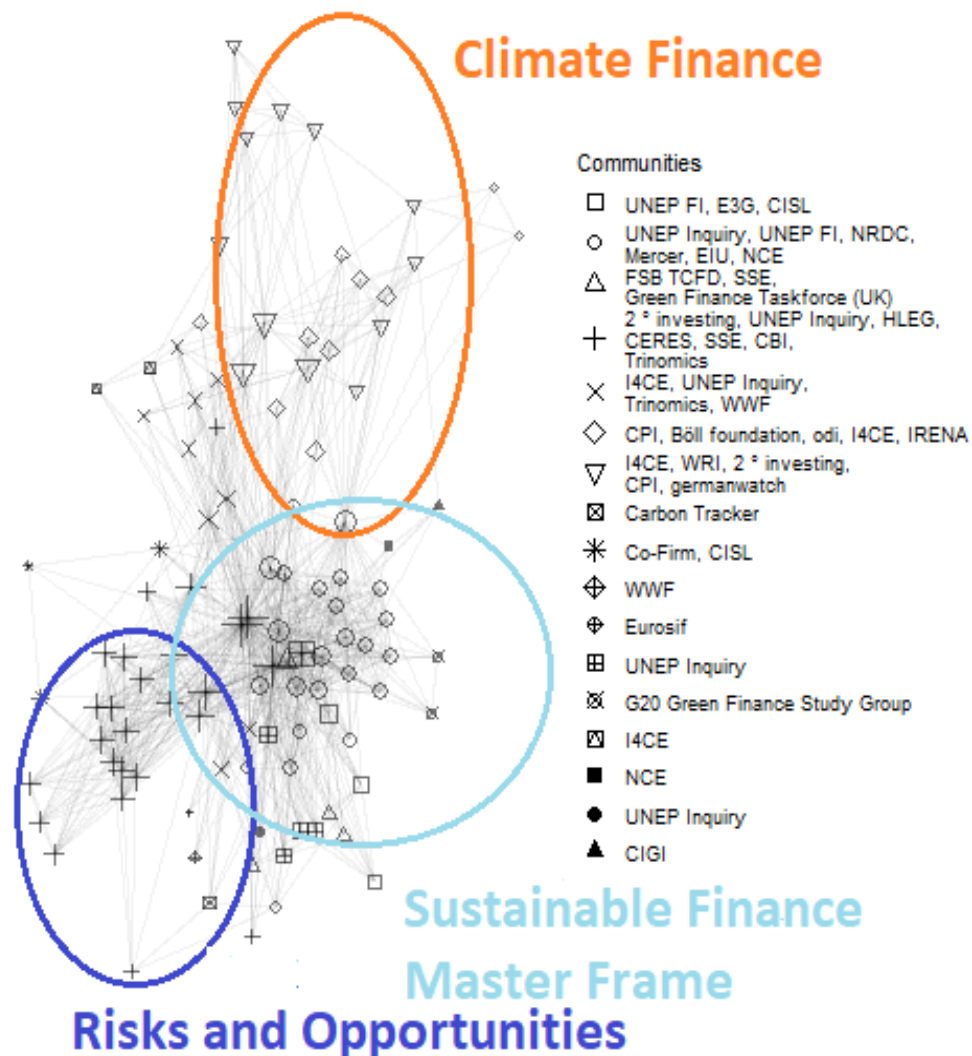


Figure 4.4 Co-publication Network 2015-2018. Nodes are scaled by degree. Symbols correspond to community membership as detected by the Girvan-Newman Algorithm. Abbreviations in the legend: Climate Bonds Initiative (CBI), Cambridge Institute for Sustainability Leadership (CISL), Centre for International Governance Innovation (CIGI), Climate Policy Initiative (CPI), Third Generation Environmentalism (E3G), Economist Intelligence Unit (EIU), EU High-level Expert Group on Sustainable Finance (HLEG), Financial Stability Board Taskforce on Climate-related Disclosures (FSB TCFD), Institute for Climate Economics (I4CE), International Renewable Energy Agency (IRENA), New Climate Economy (NCE), Natural Resources Defense Council (NRDC), Overseas Development Institute (odi), Sustainable Stock Exchanges Initiative (SSE), World Resources Institute (WRI), World Wide Fund for Nature (WWF)

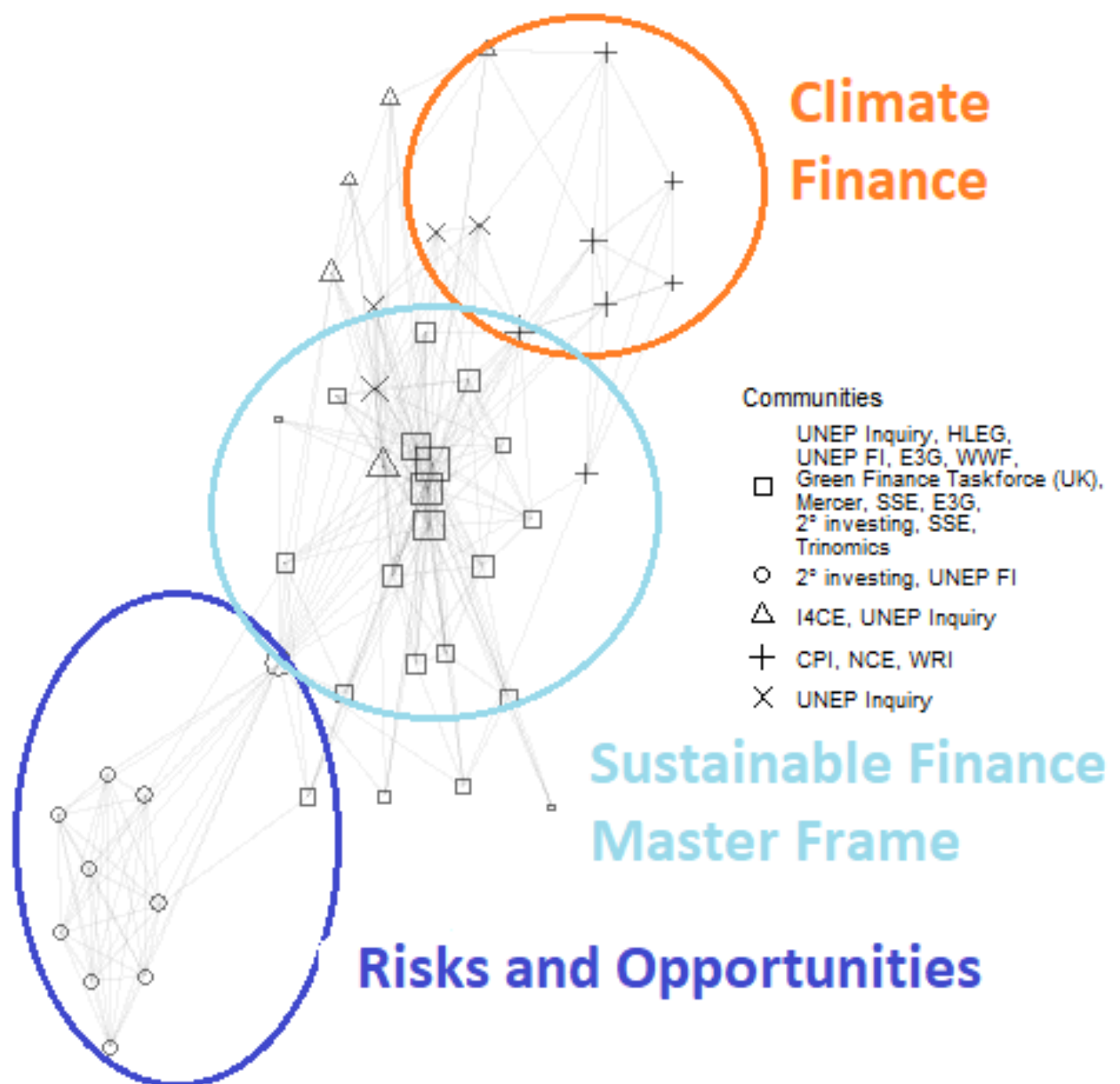


Figure 4.5 Co-publication Network 2015-2018: Core. For abbreviations see figure. 4.4

The fraction of nodes in the largest component in the network of texts between 2015 and 2018 is 78.5%. As the amounts of nodes almost doubled in this period compared to the last one (see beginning of this section), the fact that the cohesion of the network still increased gives credits to efforts of the hubs to hold the community together. In this context, it should, however, be noted that some observers have suggested that this increased cohesion represented a peak rather than a continuing plateau. This is because instead of a consolidation with actors coming together e.g. within the FSB TCFD, new initiatives still proliferated after 2018. This development could indicate re-fragmentation.¹¹¹

In terms of the frames, both figures show a crowded centre (empty triangles, empty rectangles and empty circles in figure 4.4, empty rectangles in figure 4.5) that is coordinated by the hub-creating actors like the UNEP Inquiry and the EU's HLEG. In figure 4.4, the FSB TCFD is also featured in this community, but the connection is not strong enough for being considered when extracting the core. And whereas the FSB TCFD can be sorted to the risks and opportunities frame, the task becomes more difficult for the other central actors. While UNEP Inquiry partly advocates for a risks and opportunities framing, it has also connections to the critical frame. Similarly, the HLEG covers the risks and opportunities frame, but also the climate finance frame when it emphasises the mobilisation of private funds for the transformation of the European economy.

The fact that the centre integrates those two frames can be observed in both figures as the more 'pure-play' frames branch out from there. The risks and opportunities frame that is located at the bottom left in both figures is represented by

¹¹¹ Cf. Notes talk by Daniel Klier (HSBC) at OECD 6th Forum on Green Finance and Investment, Paris: October 29th, 2019.

publications from amongst others 2° investing. As seen above, this actor is concerned with the development of forward-looking risk methodologies. Meanwhile, the climate finance frame is situated at the top of the figures. Amongst others, CPI and NCE belong to this frame.

The SRI frame, which is represented by eurosif, is still present in figure 4.4 through its connection with the HLEG. Nevertheless, as in the previous periods it has been overpowered by other actors. As described above, the critical frame is connected to some central actors even though its main CSO representatives are not represented in the figures. Instead, the less antagonistic parts of the CSO community like the WWF and the WRI occupy more central positions within the risks and opportunities frame and the climate finance frame respectively.

4.3 Conclusion

In this chapter, I have described the evolution of the policy subsystem of sustainable finance between 1998 and 2018. By analysing the interactions of the actors in the policy subsystem over three periods, I detected four frames as well as a sustainable finance master frame that has emerged in the last period. Table 4.4. summarises these frames and lists some of the actors that are employing them.

One of the most apparent findings of this chapter is the marginalisation of the SRI frame. This finding is coherent with other assessments (Dumas and Louche 2016; Robins and McDaniels 2016) and statements from SRI actors themselves, who find it difficult to make themselves heard in the current discussion on sustainable finance.¹¹² The SRI frame was progressively replaced by the risks and opportunities frame and

¹¹² Interview Board Member, SRI Association, Europe.

the climate finance frame. Concerning the risks and opportunities frame, actors like UNEP FI and Carbon Tracker contributed to its rising significance. Yet while actors from this frame often shared the same diagnosis and solution proposals, nuances in the levels of analysis and the operationalisation can be observed. As will be shown in the next two chapters, these subtle differences matter greatly for the governance of sustainable finance.

Frame	Selected Actors
SRI	Eurosif and its member organisations,
Risks and opportunities	2° investing, UNEP FI, Carbon Tracker, FSB TCFD, Mercer, NGFS
Critical	Nef, Finance Watch, UNEP Inquiry, ShareAction, urgewald, RAN, Bank Track, FoE
Climate finance	Development banks, odi, CPI, NCE, IIGCC
Sustainable finance master frame	UNEP Inquiry, UNEP FI, HLEG, G20 study group, FSB TCFD

Table 4.4 Frames Present in Sustainable Finance Between 1998 and 2018

Whereas the risks and opportunities frame has (in its different variations) remained dominant throughout the entire period, the climate finance frame has emerged as a complementary assessment. The climate finance frame has received support from the development community and has emphasised the role of financial institutions and private money in the transition towards a sustainable economy. The critical frame, on the other hand, has remained mostly on the margins of the policy subsystem. This notwithstanding, against the background of the GFC and the conceptualisation of climate change as a systemic issue, personal and conceptual overlaps between this frame and more central actors have emerged. Lastly, especially in the last period, actors started to reflect on the policy subsystem of sustainable finance itself and sought to organise and expand it and thus contributed to the emergence of a sustainable finance master frame.

While the SRI frame and the critical frame are promoted by relatively homogenous actor populations, the same is not true for the more prominent frames. The risks and opportunities frame is a case in point. Within this framing, a diverse coalition of actors that include ‘leaders’ from the asset management and insurance industry, IOs, CSOs and central banks come together. This plurality of actors means that the shortcut of understanding frames by looking at the characteristics of their proponents cannot be taken. The next chapter will, therefore, propose an alternative way to determine the background of the frames, which is to look at their relations to academic paradigms. Understanding how the frames are linked to different academic paradigms can help to spot the categories that account for their differences and commonalities.

5. Connecting Frames and Academic Paradigms

*The source of resistance is the assurance (...) that nature can be
shoved into the box the paradigm provides*

Thomas Kuhn (1996[1962]: 151-152)

Many of the ideas underlying the frames that were the subject to the analysis in the last chapter are not entirely new or idiosyncratic to sustainable finance. As highlighted in chapter 2, actors who engage in framing draw from already existing thought structures such as academic paradigms. In this chapter, I explore the connections of the frames with academic paradigms using quantitative and qualitative content analysis. The chapter first introduces four academic paradigms and subsequently links them with the actors and frames of the policy subsystem.

Understanding the relation between frames and academic paradigms matters, because it can help to draw conjectures about what the dominance of a frame means for the governance of the policy subsystem. If, for example, one frame could be traced back to a Marxist conception of the economy, whereas another one is found to be based on a neoclassical thought structure, these insights would allow for a clearer understanding of the categories along which they compete. Moreover, such a sorting enables us to determine which debate positions and socio-technical instruments the advocates of frames are likely to develop and which ones they will most likely reject.

This chapter sorts frames to academic paradigms in accordance with the operationalisation procedure that I outlined in chapter 2. Rather than just associating a frame to an academic paradigm in an *ad hoc* manner this allows to account for complex

situations, where a frame takes inputs from multiple academic paradigms. The remainder of this chapter develops and applies this sorting method in three sections. First, I revisit the concept of academic paradigms and its dimensions. I also specify the sources that I use to identify the academic paradigms. In the second section, I describe the academic paradigms of *Modern Financial Theory*, *Ecological Economics*, *Environmental Economics* and a hybrid *Evolutionary Systems* paradigm. The third section sorts the frames that were discussed in the previous chapter to these academic paradigms. First, I establish congruence on the sociological dimension by mobilising quantitative corpus analysis. Subsequently, a more in-depth qualitative assessment is carried out to map the ideational and terminological dimensions of paradigms to the frames. The fourth section concludes the chapter.

5.1 Revisiting Concepts: Academic Paradigms and How to Spot Them

In chapter 2, I introduced the concept of academic paradigms and suggested that it can be empirically operationalised by looking at its ideational, sociological and terminological dimensions (cf. table 2.3). Following Kuhn, I suggested that textbooks are a good source for detecting the ideational and terminological characteristics of an academic paradigm. The sociological dimension, on the other hand, can be operationalised by relying on quantitative measures such as citation metrics.

The next section describes four academic paradigms: 1) *Modern Financial Theory*, 2) *Ecological Economics*, 3) *Environmental and Climate Economics* and 4) a hybrid *Evolutionary Systems* paradigm. These paradigms were selected from a list of economic schools of thought that was compiled by querying articles and books on the history of economic thought and pluralism in economics (Dobusch and Kapeller 2012; Chang 2014; Costanza 1991; Resnick and Wolf 2006; Marieta and Perlman 2000).

Subsequently, the selection from the list was carried out in two steps. First, I selected those paradigms, whose main focus is either finance or sustainability. Second, I included for both the finance and the sustainability side one paradigm that can be sorted into the category of mainstream economics as well as one that has closer links with heterodox traditions. The latter criterion was incorporated to account for different treatments of the same issues.

The description of the academic paradigms follows roughly the script of table 2.3 (cf. chapter 2). The information on paradigmatic journals and scholars that will be presented at the end of each subsection will later be used for the quantitative corpus analysis, whereas the ideational and terminological categories provide a framework for qualitatively linking the frames to the paradigms.

To identify the academic paradigms of modern financial theory, I relied on an intermediary textbook aimed at MBA students (Danthine and Donaldson 2015).¹¹³ In light of the homogeneity of financial education, this book can be assumed to be reasonably representative of the paradigm. As historical background information I used Bernstein (1993), which is recommended by de Goede (2001). In addition, I consulted Dunbar's (2000) description of the role of financial theory in the rise and fall of the hedge fund Long Term Capital Management.

For ecological economics, I used Common and Stagl (2005), which is one of the few comprehensive textbooks on the paradigm. The book also discusses ecological economics' relation to environmental economics and neoclassical economics. In

¹¹³ Danthine and Donaldson (2015) and earlier versions of the same textbook have been used, for example, in Master programmes at Princeton University and the Toulouse School of Management. https://www.princeton.edu/~markus/teaching/Fin501/00Syllabus_Fin501.pdf
https://tsm-education.fr/files/FORMATIONS/Courses_Master_in_Finance_TSM_First_Year.pdf, Accessed April 9th, 2020.

addition, I incorporated the ‘classical’ volume of Costanza (1991). Moreover, I revisited Jackson (2009) for a discussion of de-growth.

To assess environmental and climate economics, I relied on Common and Stagl’s (2005) chapter on the paradigm as well as on Hussen’s (1999) treatment. For a discussion of IAMs, I looked at several review articles. Finally, the evolutionary systems paradigm was identified by reviewing Scott and Page’s (2007) volume on complex adaptive system as well as Arthur’s (2013) review article on complexity economics. For its relation to evolutionary economics, I looked at Dosi (1982) and Mazzucato (2015). To incorporate a history of economic thought grounding of all the academic paradigms, I consulted Milonakis and Fine’s (2009) book.

5.2 Seeing Like a (Financial, Ecological, Environmental, Complexity-Evolutionary) Economist: Four Academic Paradigms in Sustainable Finance

Modern Financial Theory

Praising and critical accounts alike emphasise the impact that modern or ‘scientific’ finance has had on the working of capital markets over the past half century. Throughout this period, concepts and formalised thought structures from economics and probability theory increasingly became part of financial markets. In this process, traditional stock-picking based on ‘market wisdom’ and rules of thumb as well as ‘pseudo-scientific’ methods like Chartism became marginalised. In their stead, well-diversified portfolios, arbitrage trading and most recently Exchange Tracking Funds (ETFs) have gained prominence and market shares (Bernstein 1993; Braun 2016; de Goede 2001; 2005; Dunbar 2000; Faulhaber and Baumol 1988). A comprehensive exposition of modern finance is beyond the scope of this chapter. Nonetheless, a

description of the core ideational, sociological and terminological characteristics as outlined in table 2.3 suffices to identify it as an academic paradigm.

Starting with the definition, the above-mentioned textbook states that “valuing risky cash flows or equivalently pricing risky assets is at the heart of financial theory” (Danthine and Donaldson 2015: 31). This valuation occurs at various levels that range from the individual project or company to the aggregated portfolio. What is common to all valuation exercises is the preoccupation with time and risk as basic building blocks of financial assets. These two concepts are presented as the *raison d’être* for the financial system, which is concerned with redistributing purchasing power by selling and buying the valued assets over time and probabilistic outcomes (cf. Danthine and Donaldson 2015: 5-7).

In this context, a complete contingency market, i.e. the existence of financial instruments for all possible (i.e. infinite) ‘states of nature’ over time – so called Arrow-Debreu securities – is a widely used thought experiment (cf. Danthine and Donaldson 2015: 15-18). At the same time, the impossibility and empirical falsity of such an ideal state acts as something akin to the Lakatosian positive heuristic for academics. Accordingly, they strive to formulate theoretical constructions that are logically equivalent or empirically proximate to this state. For financial practitioners, the utopia of complete contingency markets can serve as a way of legitimising new financial instruments (Dunbar 2000: 42-43).

Moving from the definition and ambition of financial theory to the operationalisation of how to value risky assets, the role of concepts from neoclassical (micro-) economics and probability theory becomes apparent. First, investors are assumed to be maximising their expected utility, which is calculated as the valuation of a given state of nature multiplied by its probability. Accordingly, the asset allocation

depends on the class of utility function displayed by investors (e.g. declining absolute risk aversion). The shape of this function determines the trade-off between risk and return that investors are comfortable with. When it comes to portfolio allocation, these different inclinations are not solved by buying different proportions of high and low-risk assets. Instead, according to the separation and optimal portfolio theorems, different risk profiles of investors are catered to by the ratio of value that is allocated to the 'risk-free' asset, for which US government bonds often serve as a proxy, and to the optimal diversified equity portfolio (Danthine and Donaldson 2015: 116).

The optimal portfolio, which represents 'the market' and is often operationalised by an index such as the S&P 500, delivers superior performance – or using jargon 'dominates' – over stock-picking strategies, because of the random nature of price movements. This randomness is, in turn, explained by the EMH, which stipulates that market participants have on average complete information and, henceforth, are able to price assets by far and large correctly. This, in turn, results in the absence of non-random trends of prices. An expansion of the optimal portfolio theory is the Capital Assets Pricing Model (CAPM). Accordingly, an asset's risk is defined as its covariance from the market (or index), which is also referred to as 'beta', whereas its difference in terms of return is called 'alpha' (cf. Faulhaber and Baumol 1988: 589).

The market portfolio exonerates the investors from the idiosyncratic risks of holding a particular company (which might go bankrupt), because of the benefits of diversification. Nonetheless, there remains universal or systematic risk. This kind of risk is generally measured via historical data. More precisely, it is equated with volatility, which is the standard deviation of the portfolio value in the period under analysis. Universal risks to a well-diversified portfolio are generally considered to be

risks that affect an entire economy. Factors that are often associated with an increase in the general volatility of the portfolio are interest rate changes, foreign exchange rate risks and changes in commodity prices.

While this exposition does certainly not do justice to modern finance and oversimplifies grossly, a couple of points are noteworthy. First among them is the equation of uncertainty with calculable risk that can be derived from past data. This means that any valuation and risk management method that builds on this conception of risk is unable to incorporate evolutionary or revolutionary developments that result in qualitative shifts or ‘unknown-unknowns’. Criticisms that elaborate on this observation have been repeatedly made by scholars, who emphasise the importance of the distinction between fundamental uncertainty as used by Knight, Shackle and Keynes and the risk estimations of modern financial theory (e.g. Blyth and Taleb 2011; Lockwood 2015).

Second, it is noteworthy that higher level concepts and calculations like the CAPM are dependent on statistical aggregations like market indices (cf. de Goede 2005 for a critical, genealogical discussion of indices). Moreover, allocation decisions are dependent on concepts like the ‘risk-free asset’, which is assumed to pay the ‘market rate of interest’. The market rate of interest is an important calculative device that has a history that predates the advent of modern finance and is universally applied in the appraisals of projects and investments, where it is used to discount future cashflows (cf. Faulhaber and Baumol 1988: 583).

Turning to the sociological parts of the paradigm, some of the most prominent journals are the *Journal of finance*, the *Journal of finance and quantitative analysis* and the *Journal of business* (Fourcade et al. 2014: 14ff; Zirney and Reichenstein 1994). *Institutional investor* has also played a role in intermediating between academia and

industry (Bernstein 1993: 215). Eminent scholars that have contributed to much of what was described above are Harry Markowitz, Kenneth Arrow, James Tobin, Fischer Black, Robert C. Merton, Eugene Fama and William F. Sharpe. Lastly, concerning the terminological dimension, expressions like *risk/return profile*, *risk-adjusted returns*, *diversification*, and *portfolio* are ubiquitous inside this paradigm. And even though they have often a precise meaning in theory and a convention for measurement, they also act in a more fuzzy or heuristic fashion when it comes to the conceptualisation of new phenomena and the exchanges amongst investment practitioners.

Ecological Economics

Ecological economics has been defined as the "transdisciplinary study of the human economy as part of nature's economy" (Common and Stagl 2005: XXVII). Unlike financial theory, it emphasises the sustainability part of sustainable finance. In its anthropocentric variant, this is defined as the "maintenance of the economic and environmental system so that it can satisfy human desires for a long time in the future" (Ibid: 8). Rather than individuals or financial assets, the main units of analysis are human and environmental systems (Carpintero 2013). In this context, the human economic system is understood as a subset of the environmental systems, into which it is 'embedded' (Common and Stagl 2005: 87). Moreover, economic activity is often conceptualised in terms of physical flows (e.g. resources, waste, energy) rather than according to human valuation conventions like prices (cf. Martinez-Alier et al. 2010: 1743).

The preoccupation with the interaction of human and environmental systems is also apparent in the topics that the paradigm prioritises. Costanza (1991:7) proposed a research agenda that can be partly read as a positive heuristic and partly as a normative

desideratum. Accordingly, ecological economics should focus on: 1) Maintaining life support systems, 2) valuation of natural resources and natural capital, 3) ecological economic system accounting, 4) ecological economic modelling on different scales, and 5) innovative instruments for environmental management.

As with financial theory, time plays a crucial role. However, for ecological economists the relevant time horizons can span hundreds of years (Costanza 1991). A second important input is the question of scale. Depending on the research question scale can range from a confined local ecosystem to the entire planet earth. In addition, the interactions between different open systems, which exchange flows of e.g. energy or materials, are an important element of the academic paradigm. Finally, uncertainty and its separation into different categories, of which risk is only one, is addressed more explicitly (Carpintero 2013; Common and Stagl 2005: 380ff).

Moving from the more general outlook to specific concepts, the desirable levels of human economic impact on the environmental systems are expressed through the concept of *carrying capacity* (Common and Stagl 2005: 45). In the case of global systems, the term *planetary boundaries* has been increasingly used to denote an equivalent idea (cf. Steffen et al. 2015). While these concepts determine the maximum value of impact that human activities can have on ecological systems without jeopardising their stable functioning, the estimation of the actual impact is often operationalised through the so called IPAT equation. This identity defines the environmental impact (I) of human activity as the product of population (P) and a certain living standard or 'affluence' (A), which is mediated by a technological factor (T) that estimates the intensity of environmental impacts per unit of living standard and human being (Common and Stagl 2005: 211).

The operationalisation of impact measurement is carried out by mapping *stocks* and *flows* of material units like natural resources, pollutants, biomass, energy or heat between systems. Additionally, ecological economists have come up with critiques and additions to conventional economic accounting to reflect the interactions between economic and environmental systems. The concept of *natural capital* highlights the contribution of natural systems to the creation of economic output. Notably, unlike some representatives of environmental economics, scholars of the paradigm are pointing out that natural capital cannot be substituted by other forms of capital. Ecological economics also points towards the non-reproducibility of natural capital by humans. This understanding underlines the case for its preservation (Common and Stagl 2005: 91ff).

The focus on natural capital and related concepts such as *ecosystem* or *amenity services* that highlight the contribution of the environment to human wellbeing has made ecological economics a long-standing critique of conventional systems for value accounting, most prominent of which is the Gross Domestic Product or GDP (cf. Common and Stagl 2005: 144ff; Jackson 2009: 38ff). Importantly, not all proponents of ecological economics have embraced natural capital accounting. Critics argue that the concept constitutes a continuation of the market-based thinking that has been traditionally been employed in the neoclassical academic paradigm and the neoliberal policy paradigm. They point out that natural capital has served as a justification for ‘green grabbing’, i.e. the appropriation and commodification of peasant and indigenous land by agents of financial capital (e.g. Corson et al. 2013).

Closely related to the measure of GDP and alternative indicators are the debates about *green* or *de-growth* that have both an academic and a political dimension. One of the main points of contention between these alternative projects is whether an

increase in human economic activity will push environmental systems beyond their carrying capacities. Proponents of the de-growth (and steady state economy) thesis point towards the strong historical correlation between increases of economic activity measured by GDP and the environmental footprint of humanity. The green growth position, on the other hand, holds that it is theoretically possible and realistically feasible to increase the creation of economic wealth while at the same time reducing environmental impact. In jargon, this process is called ‘absolute decoupling’ (cf. Jackson 2009, see Hickel and Kallis 2019 for a recent assessment on the possibility of green growth).

The main journal of the paradigm is *Ecological economics*. Ecological economists also publish in mainstream journals such as the *Journal of environmental economics and management*, and *Environment and resource economics* (Common and Stagl 2005: 17) as well as in heterodox outlets like *Capitalism, nature, socialism* (Heterodox Economics Directory, HED 2019). For the purpose of the citation analysis, the 9 journals from the ecological economics category in the HED were used to detect the paradigm. Henry Daly, J.C. Kumerappa, K.W. Kapp, Nicholas Georgescu-Roegen, Kenneth Boulding, Robert Ayres, Dennis Meadows, Ernst 'Fritz' Schumacher and Howard T. Odum are considered to be amongst the eminent scholars of the paradigm (Martinez-Alier et al. 2010: 1743).

Regarding language, there is a certain tendency to use natural science concepts such as *energy flows*, *thermodynamics*, or *ecosystems*. When it comes to metaphors, Boulding’s comparison of the earth to a spaceship that has to be responsibly managed rather than exploited with a cowboy’s frontier spirit is commonly referenced. Another prominent metaphor within the de-growth community is to associate a managed reduction of economic activity to a soft landing rather than a crash (Martinez-Alier et

al. 2010: 1742). Finally, the space where human needs are achieved while planetary boundaries are not transgressed has recently been popularised through its geometrical representation as a doughnut (Raworth 2012; 2017).

Environmental and Climate Economics

A different approach to deal with the environmental sustainability part of sustainable finance is environmental economics. While concerned with similar problems as ecological economics, this paradigm is more of an extension of neoclassical thinking to environmental issues. In this paradigm, the actors and institutions known from neoclassical approaches are maintained and environmental issues are pegged onto them. Hence, individual agents like households and firms continue to trade on markets from which they derive utility and profits. The environmental dimension is added to this familiar framework insofar as the market interactions concern issues like the extraction of resources and the emittance of pollutants (cf. Hussen 1999:6ff).

One of the main analytical concepts of environmental economics is the *externality*. Negative externalities occur when the costs of a market transaction are not completely born by the seller and buyer. The classical case is the production of a good, which causes pollution, which, in turn, causes costs for a third party. Hence, the sold product is too cheap as it fails to integrate the costs imposed on third parties. Positive externalities describe the opposite case. Here, the price paid between the two transacting parties is too high, since third parties are benefiting from the transaction as well. The focus on economic actors instead of systems becomes apparent as the preoccupation rests with in- or decreases in the welfare of these actors. Welfare is measured in economic terms and does not make reference to categories like the biophysical properties of a system (see also Stuart et al. 2019: 92 for a critical appraisal

of environmental economics with regards to climate change). Consequently, the problem of externalities is labelled as a market failure that is best fixed by a market intervention such as a tax or the allocation of property rights.

The approach of treating the environment with the concept of externalities is also carried over to climate economics, which can be seen as a sub-discipline of environmental economics. Climate change was famously described as the “greatest market failure the world has ever seen” in the Stern Review (Stern et al. 2006: VIII) and has since then been a major subject of study for environmental economists. To assess the costs of damages related to climate change and to understand the links between economic activity, emissions, climate change, and climate-related costs, economists have developed Integrated Assessment Models (IAMs). These models integrate a climatological model that describes the relationship between GHG concentrations and climate change with an economic model. The integration between the two models is achieved as, on the one hand side, economic activities contribute to increasing GHG concentrations. On the other hand, there is a feedback effect as increased GHG concentrations fuel climate change. Finally, changes in the climate lead to loss of welfare as costs from physical damages are inflicted on economic actors.

Based on these inputs and a host of other parameters such as technology development, the model comes up with a price for the GHG emissions. One important aspect is whether an IAM makes a judgement about the optimal, i.e. welfare maximising level of emissions. The optimal level is defined as the point, where the benefits from an additional unit of emissions are equal to its costs, i.e. the physical damages arising from climate change. Underlying this line of reasoning is that human-made capital can be substituted for natural capital and that the latter can be quantified using prices. An approach that builds on such a conception to determine an ideal

carbon price is the Social Cost of Carbon (SCC) that has been explored amongst others by Nordhaus (cf. Nordhaus 2014).

The SCC and optimal emission levels have been criticised for ignoring fundamental properties of the climate system such as non-linearities, tipping points and the importance of catastrophic events with a non-zero probability. Moreover, the use of market interest rates for discounting has drawn criticism on the ground of intergenerational equity. While students of ecological economics and critical economists have attacked the shortcomings of IAMs from their inception, in recent years also some of the early developers of IAMs like Nicholas Stern (Curran et al. 2019: 30) and researchers from organisations like the IMF (Krogstrup and Oman 2019: 41) have joined the sceptics.

The criticism on IAMs' role in prescribing ignorant and potentially catastrophic policy recommendations is partly addressed by a different family of models, which do not make judgements about optimality and start from an emission target that is politically agreed or climatology-warranted. These models come up with a range of socio-technical pathways that are consistent with externally specified parameters for emission reductions (cf. Guivarch and Rogelj 2017 for a discussion on the variation of carbon prices that can still occur when emission targets are exogenous).

Next to the discussions about externalities and IAMs, some environmental economists have also applied the concept of the environmental Kuznet's curve. This hypothesis states that as the per capita wealth of a country increases at first a rise of environmental impacts like pollution takes place. Once a threshold of wealth is passed, impacts decrease due to better technology and preference shifts towards an intact environment. Empirical assessments of this relationship have so far gathered some supporting evidence for local phenomena such as the pollution of rivers. On the other

hand, the environmental Kuznet's curve does not seem to hold for global issues like climate change (cf. Jackson 2009: 76, see also Dasgupta et al. 2002).

As to the sociological indicators, the *Journal of environmental economics and management*, and *Environment and resource economics*, that were designated as mainstream journals in the preceding section will be used to assess this paradigm. When it comes to eminent scholars, in the absence of a comprehensive list, I will focus on the main developers of IAMs. Apart from Nicholas Stern, notable scholars are William Nordhaus, who has developed the DICE model, as well as Chris Hope, the developer of the alternative PAGE model and Valentina Bosetti and Massimo Tavoni, who (amongst others) developed the WITCH model. Richard Tol, a prominent critic of Stern, as well as Michael Grubb, the chief economist of Carbon Trust, were also included to the list of names. Finally, on the terminological side, talk of (Pareto) *efficiency*, *optimality*, and, of course, *externalities* can be interpreted as an indication for the presence of environmental economics.

Evolutionary Systems Paradigm

Neither ecological nor environmental economics emphasises the role of finance when assessing the relationship between the economy and the environment. Yet also in the sphere of finance, there are some contending views to modern financial theory. While these alternatives draw on historically distinct academic paradigms such as Evolutionary Economics, Post Keynesian Economics, and Complexity Economics, there is a conceptual and sociological overlap between them. An additional communality is that these schools of thought oftentimes label themselves as heterodox thus positioning themselves in opposition to neoclassical or mainstream economics (cf. Dobusch and Kapeller 2012: 1037, see Colander 2000 for a more nuanced view

especially on the sorting of complexity economics). Consequently, and for the sake of brevity, I will treat them as one synthetic academic paradigm that I call *Evolutionary Systems* paradigm.

Despite their different intellectual heritages, the representatives of this paradigm share a preoccupation with the meso- and system levels. Individual agents' contribution is acknowledged but the primary focus rests on the question of how interaction amongst units (which can be individuals, organisations or even systems) leads to the *emergence* of new properties and phenomena. Keynes' macroeconomic and Minsky's financial stability paradoxes are a case in point for Keynesianism's emphasis on emergent phenomena (cf. Lavoie 2014: 18). *Agent-based models* like the famous *El Farol problem* or *Schelling's segregation model* from complexity theory share the preoccupation with emergence at the system-level (cf. Miller and Page 2007: 143-148). Analysis and simulations of such phenomena proceed in *historical time* thus highlighting path dependency and feedback effects (Arthur 2013: 16-18). The importance of positive, i.e. reinforcing, feedback effects, is also explored by evolutionary economists, who look at the lock-in of technological trajectories (Dosi 1982; Mazzucato 2015).

The evolutionary systems paradigm is less concerned with efficiency and optimal allocation as a target metric and more with the *resilience* of a system. Redundancies are not necessarily seen as negative as they can reduce the chances of system failure. Furthermore, systems are constituted by interdependent units, which are sometimes represented spatially using a network topology. Additionally, systems themselves can through their inputs and outputs become the building blocks of a *system of systems*. When it comes to the manipulation of systems, it is up to the analyst to identify one or multiple leverage points that change the systems' behaviour and

resilience (cf. Meadows 1999). Systems are not assumed to necessarily respond to marginal variations in one input parameter nor are those responses linear. Hence, proponents of a systems perspective take generally a more sceptical stance on the ability of policies, institutions and humans to manage complex issues according to a mechanistic cause-effect logic. They often prefer to take an approach that is based on the precautionary principle and cast doubt on the ‘silver bullet’ properties of single measures like a carbon price (cf. Allan 2017: 153ff).

The focus on *emergence*, *historical time* and *non-linearity* means that fundamental uncertainty is treated distinctly from knowable risks and that tendencies towards equilibrium are rather the exception than the rule. Instead, *attractor and detractor points* are references against which systems are benchmarked and a movement from one system state to another is sometimes referred to as *phase transition* (Arthur 2013). While it is arguably a little bit of a stretch, I will include the political economy, sociological and Post Keynesian literature on financialisation (e.g. Epstein 2005; Stockhammer 2004; see also Christophers 2015 for a critical appraisal) into this paradigm. This is because this literature also tends to treat finance as a system that reproduces itself and expands according to certain dynamics. Furthermore, it has inputs and outputs on the other systems like the corporate system or the system of state budgets.

Since the evolutionary systems paradigm is an artificial paradigm, the sociological dimension is more varied. For complexity economics, the Santa Fe Institute and the surrounding journals and associations could be taken as proxies. Post Keynesian and evolutionary economics, meanwhile, have their own associations and journals. In light of this heterogeneity, I use the “evolutionary” and “general

heterodox” lists from the HED¹¹⁴ to indicate the sociological dimension of this paradigm. Notably, the HED lists have already been used in a previous study that measures publication patterns to assign economists to different paradigms (Grimm et al. 2016).

Given the hybridity of the paradigm, a list of eminent scholars is difficult to assemble. I have included Keynes and Schumpeter, who both display a systems-based and historical understanding of economics, as two possible founding fathers. Concerning the terminological dimension, *emergence, evolution, complexity, adaptive systems, feedback effects, networks, lock-in, and innovation systems* are indicative of this paradigm.

5.3 Mapping Academic Paradigms to Frames

This section starts with a corpus analysis that establishes the presence of paradigmatic scholars and journals. In addition to measuring the relative presence of each paradigm, the actors that score highest in the corpus analysis are described. This is because they engage most with academic paradigms and thus are likely to be the intermediaries, which translate between academia and the policy subsystem. Following this high-level assessment, I link concepts and arguments from the frames and communities to the four paradigms described above through an in-depth qualitative content analysis.

¹¹⁴ Jakob Kapeller, “Heterodox Economics Newsletter”, <http://heterodoxnews.com/hed/journals.html>, Accessed April 12th, 2019.

Guilt by Association: Operationalising the Sociological Dimension Through Corpus Analysis

A very crude indication of the sociological dimension is depicted in figure 5.1, which applies a simple string-matching search across 635 texts¹¹⁵ from the corpus that was used for constructing the co-publication networks (see chapter 4) and counts the occurrences (that is citations and in-text mentions) of the names of paradigmatic scholars that I listed in the previous section. An important caveat to interpreting the results of the analysis is that – even though judging from spot tests the names found in the corpus do really refer to the scholars in question – some matches might be false positives. There might be a ‘Stern’ in the corpus, who has little to do with climate economics and a ‘Markowitz’, who has never heard of portfolio theory. Furthermore, the different length of the lists of scholars that were obtained from the literature might lead to biases. Also, instead of displaying the absolute number of occurrences, multiple mentions of one or more scholars from a paradigm are counted as one. This transformation was undertaken to convey the proportion of the corpus that mentions the academics and to mitigate the importance of texts with extreme values.¹¹⁶

¹¹⁵ 31 texts were excluded mainly because of encoding errors and the inclusion of texts from 2018, which have not been added to the corpus, since the end of comprehensive sampling for 2018 might mean that these texts lead to bias, see Appendix D.

¹¹⁶ However, the ranking remains the same in both cases, except for the case of the category of Environmental Economics excluding the mentions of Nicholas Stern, in which the presence of extreme values means that the paradigm is about level with Modern Finance in absolute terms, whereas after the transformation it occupies the last place. See Appendix D for the distributions.

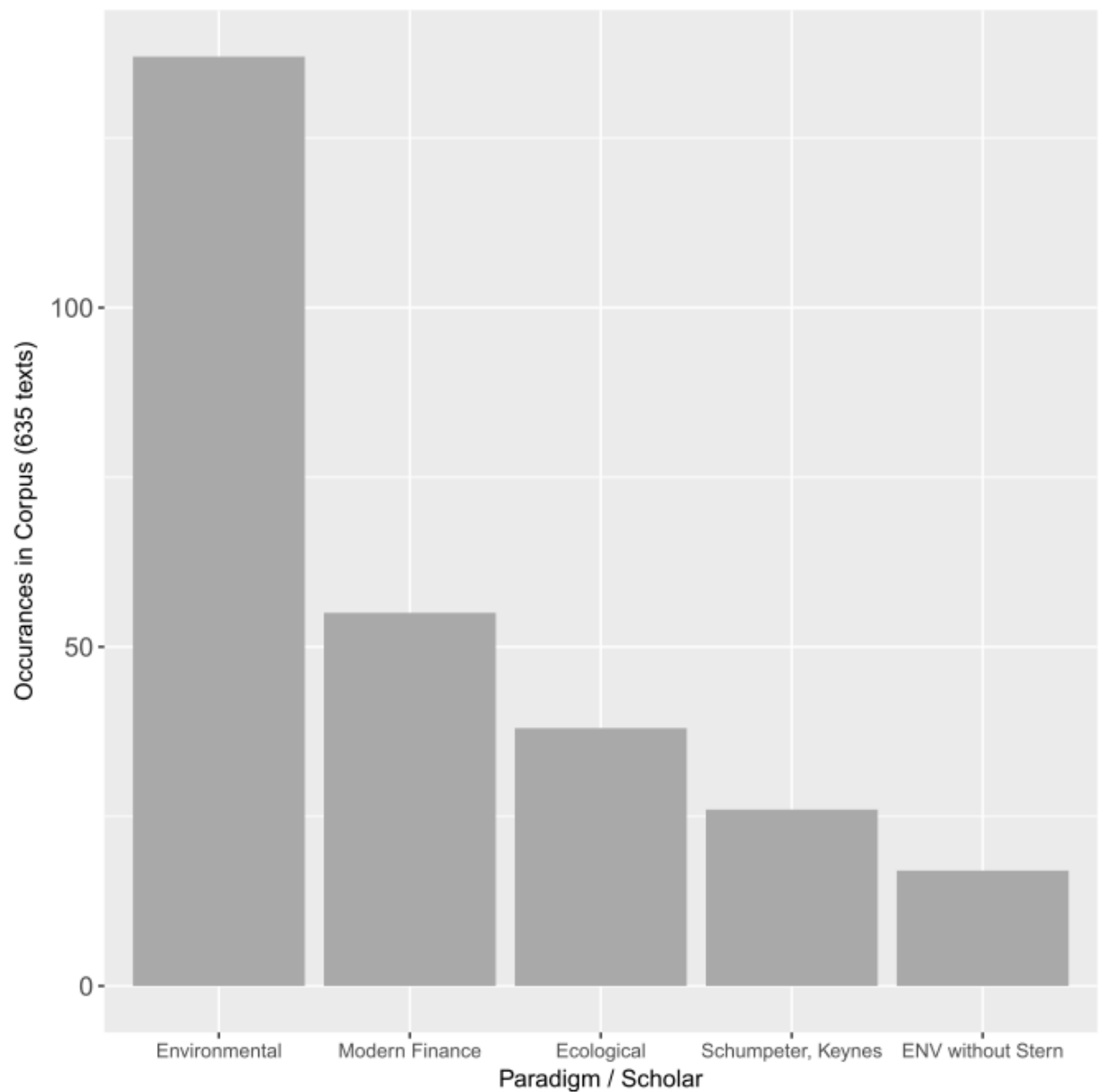


Figure 5.1 Mentions of Paradigmatic Scholars in the Corpus

Figure 5.1 shows a dominance of the climate economists that have been discussed in the section on environmental economics. Most of this is explained by references to the Stern Review, since after excluding the word ‘Stern’ from the dictionary the score for this category drops from 137 (21.6% of the corpus) to just 17 (2.7%). Environmental economics scholars are followed by academics from modern financial theory (8.7%) and ecological economics (6%). Keynes and Schumpeter are mentioned in 4.1% of the texts with Keynes accounting for 80% of this value.

The second sociological indicator looks at the citation of paradigmatic journals. In figure 5.2, the ecological, evolutionary and heterodox (a general category covering amongst others Post Keynesian journals) journal lists are based on the categorisations from the HED. Modern finance is based on a list of 13 journals from Zirney and Reichenstein (1994). The category Top 5, which is a list of the five leading ‘general interest’ journals in mainstream economics (Heckman and Moktan 2019), was included as a benchmark. Since the matching of texts uses the full-length name of the journal, except for a few instances listed below, false positives are relatively unlikely. Finally, a search of matches for other heterodox journal lists from the HED, i.e. Austrian, Radical, and Feminist, as well as the cross paradigm Interdisciplinary and History/Methodology lists was undertaken.

The scores in figure 5.2 were obtained through the same calculations that I used for the counts in figure 5.1.¹¹⁷ In total, there are 229 instances of a publication being matched to the journal lists. After manually removing false positives that occurred due to the more common language names of some journals (notably *Economy and Society* and *Local Economy*), 170 matches remain. As one publication can cite journals belonging to multiple paradigms, these 170 mentions originate from 102 texts (16.1% of the corpus).

A first result is that, unlike with the environmental economics category in the previous plot, the scores of the different bars are closer together. The leading category are modern finance journals, which are cited by 7.2% of the texts. The second most cited category are the Top 5 journals (6.3%). Ecological economics journals are cited by 27 texts or 4.3% of the corpus. 22 of these matches are accounted for by the journal

¹¹⁷ For absolute numbers and distributions see Appendix D.

Ecological economics.¹¹⁸ Interdisciplinary journals, which do not strictly cover economic paradigms but adjacent disciplines like accounting, geography and sociology, are cited in 17 instances (2.7%). The listing of these journals inside the HED can, however, be taken as an indication that these journals are also closer to paradigms that position themselves in opposition to the thinking represented in the categories of modern finance and the Top 5 journals.

With only 14 mentions (2.2%), environmental economics is relatively underrepresented. This can possibly be attributed to the fact that only two journals, none of which has an exclusive climate focus, were used to construct this category. It is also noteworthy that the journal *Nature Climate Change*, which one interviewee referred to as one of the leading outlets in the debates on sustainable finance, receives 26 mentions (4.1%). However, the interdisciplinary nature of the journal makes a paradigmatic sorting difficult.¹¹⁹ The category of heterodox journals covers 11 mentions (1.7%). Finally, evolutionary outlets as defined by the HED list are referenced in 9 instances (1.4%).

¹¹⁸ False positives that reference the discipline or the association of ecological economics rather than the journal were removed manually.

¹¹⁹ Interview Franziska Schütze.

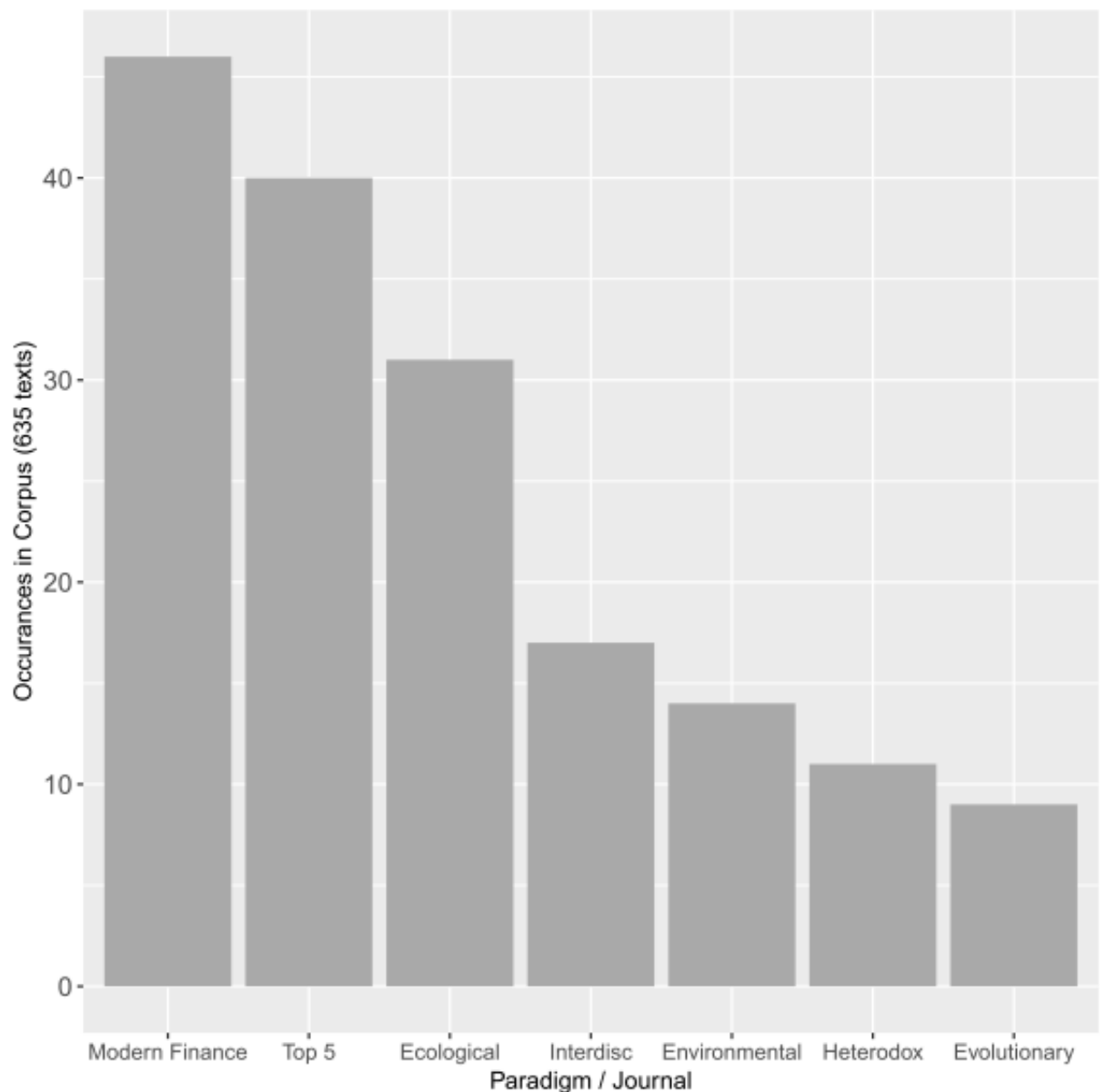


Figure 5.2. Mentions of Paradigmatic Journals in the Corpus: Of the 170 total mentions 164 are displayed. The remaining categories are 3 citations of radical journals, 2 of historical and methodological journals and 1 of feminist journals.

Another noteworthy observation that is not represented in figure 5.2 is that the citations of paradigmatic journals are highly concentrated. Indeed, only 39 of the 145 sampled actors cite an academic journal from the list. UNEP Inquiry is leading the tally and accounts for 17.6% of the 170 mentions. It is followed by UNEP FI (9.4%), the nef (7.1%), the Global Climate Forum (5.9%) and the Tyndall Centre (5.9%), the latter being a transdisciplinary research institute focused on climate issues.

Disaggregating the overall citation numbers according to the academic paradigms, it becomes apparent that with the exception of UNEP Inquiry, which holds a leading position across multiple paradigms, the different actors focus on bringing specific ideas to the policy subsystem. Table 5.2 lists the three organisations that contribute most to the citation of the paradigmatic journals displayed in figure 5.2 and the share of the total mentions attributed to these actors.

Academic Paradigm by Journals	Most Prominent Actors (% of citations of the category accounted for)
Modern financial theory	UNEP Inquiry (26%), UNEP FI (17%), 2° investing and CIGI (11% each)
Top 5 ('Mainstream economics')	UNEP Inquiry (18%), Global Climate Forum (15%), Tyndall Centre and WBGU (8% each)
Ecological economics	UNEP Inquiry (15%), NCE and WBGU (11% each), nef and UNEP FI (7% each)
Interdisciplinary	Nef (24%), UNEP Inquiry (18%), UNEP FI, WBGU and others with one mention (6%) each
Environmental economics	Tyndall Centre (14%), NCE, EIB, EIU-Aviva, UNEP FI, G20, nef and others with one mention (7%) each
Heterodox (general)	UNEP Inquiry (27%), nef (18%), CISL, UNEP FI, NCE and Positive Money with one mention (1/11) each
Evolutionary economics	Nef (22%), UNEP Inquiry, WBGU and CISL with one mention (1/9) each

Table 5.1 Actors with Most Presence in Journal Citations According to Journal Lists

The result that relatively few actors account for a significant share of the engagement with academic economics is consistent with the statement of the interviewee, who remarked that actors like UNEP FI, UNEP Inquiry and 2° investing occupy a space between financial practitioners, regulators and academia. Accordingly, they produce texts that do not fully live up to the standards of academia, but still engage with scientific debates.¹²⁰

As can be observed in table 5.2, these three actors draw heavily from modern finance and mainstream economics. If we bring this observation together with the finding that UNEP FI and 2° investing (and UNEP Inquiry to a lesser extent) are proponents of the risks and opportunities frame, it could be hypothesised that these frames translate modern finance theory to the policy subsystem of sustainable finance. On the other hand, the nef's critical framing takes input from the heterodox paradigms. Notably, UNEP Inquiry, as opposed to UNEP FI, has also engaged with heterodox journals. This association connects well with the Inquiry's systemic understanding of finance and its deployment of the critical frame (see chapter 4).

Figure 5.2 shows that the academic paradigms that concern themselves with environmental sustainability part are less frequently cited than those related to economics and finance. Meanwhile, the actors that actually cite environmental and ecological economics research tend to overlap (NCE, UNEP FI, nef). While this could be an artefact of the small size of the journal list for environmental economics, it is nonetheless noteworthy that actors belonging to the climate finance frame like the NCE as well as those advancing the risks and opportunities frame (UNEP FI) do not show a clear preference of environmental economics over ecological economics. It seems that these organisations incorporate some of the measurements and concepts of

¹²⁰ Interview Economist, environmental agency, Western Europe.

ecological economics like ecosystem services (cf. chapter 4). On the other hand, the paradigm's sceptical positions on growth and the treatment of uncertainty as risk are either ignored, or, in the case of the green growth position, rejected.

Whereas some of the organisations listed in table 5.2 have been attributed to the different frames in chapter 4, the table also lists actors that have not been revisited in detail so far. Amongst them are the Advisory Council on Global Change (WBGU), a scientific body advising the German government, the GCF, the Tyndall Centre and the University of Cambridge's Institute for Sustainable Leadership (CISL). All these actors occupy an intermediary space between academia, politics and industry that might be described with the term think tank. Yet the importance of some of these actors for sustainable finance differs strongly from e.g. the UNEP initiatives and 2° investing. When looking at the co-publication networks, it can be observed that the WBGU and the Tyndall Centre occupy more isolated positions. CISL and the GCF, on the other hand, are located inside the risks and opportunities frame. Nevertheless, they have so far not become the defining actors of this framing.

In summary, the concentration of citations suggests that certain actors provide a bridge between academic paradigms and knowledge production in the policy subsystem of sustainable finance. Looking at the relative values for the different academic paradigms, I observed that the dominance of environmental economics in the mentions of paradigmatic scholars can be largely attributed to the Stern Review. This does not necessarily mean that the documents citing Stern follow the perspective used in the report. Nonetheless, it suggests that the Stern Review acts as a reference for some of the work on sustainable finance.

Second, in both measurements modern financial theory scored relatively high. This can be interpreted as an indication of the expansion of established concepts like financial risk or diversification to new issues. The risks and opportunities frame appears to be the main recipient of ideas from this academic paradigm. However, as will be explored below, there is a second possible interpretation. References to modern financial theory might also be used by proponents of the critical frame, which seek to challenge wisdom that has so far been unquestioned. This process is akin to the ‘unpacking of black boxes’ (cf. Latour 2003), which brings the assumptions of a paradigm that are hidden in everyday conversation to the foreground by engaging with the academic literature that has established them.

The intermediary position of ecological and environmental economics in terms of journal references might be explained by the fact that the community working on sustainable finance needs input from the environmental side. One interviewee remarked in this context that in academia there is a disconnect and a lack of knowledge transfer between the macroeconomic and financial community and the work on sustainability issues from an ecological economics perspective.¹²¹ If this pattern holds also for the non-academic members of the sustainable finance community, one could interpret the referrals to the two academic paradigms not as an informed choice or an explicit allegiance, but rather as a pragmatic search for input.

Finally, the absence of heterodoxy is partly a reflection of the lack of adequate measurement when it comes to the evolutionary systems paradigm. What can, however, be said with more confidence is that other paradigms like Austrian

¹²¹ Interview Emanuele Campiglio.

Economics, Feminist Economics and Radical Political Economy, for which established measures were applied, do not play a major role in sustainable finance.

While the corpus analysis approach allows for the detection of an engagement with a certain academic paradigm, it remains ignorant about the way in which this knowledge is used in a frame. A further limitation is that the equal weighting of the texts provides information about the general distributions in the corpus but cannot account for the significance of central texts. To address these limitations, a more detailed qualitative examination of the connections between frames and academic paradigms is required.

Guilt by Explanation: Operationalising the Ideational and Terminological

Dimensions of Academic Paradigms

Modern Financial Theory

Modern financial theory left a first imprint on sustainable finance in its early SRI form through opposition rather than constructive engagement. By the early 2000s, the benefits of diversification had been integrated into investment strategies and even into the legal frameworks of fiduciary duties (Watchman et al. 2005: 7). This meant that any shift away from holding the market portfolio and towards selecting responsible assets was (and is) met with suspicion (UNEP FI and Mercer 2007: 7-8).¹²² On the other hand, as actors promoting sustainable finance moved from the SRI frame to ESG risks and opportunities and later to carbon and climate risks, they sought to graft their

¹²² See also Interview: Economist, environmental agency, Western Europe, Interview CSO staff, UK, Interview Nina Lazic, Interview European Commission official.

ideas onto financial theory. Thus, ESG issues were construed as risks at the asset, project and sector level but increasingly also as systemic risks at the portfolio level.

This expansion reflects an increasing turn of attention away from banks and specialised sectoral investors towards large diversified institutional investors. A case in point for the focus on systemic risk is CISL's work on the 'unhedgeable risk' of climate change. Accordingly, investors have an interest in mitigating climate change since the systemic losses that are associated with a changing climate cannot be resolved through diversification (Coburn et al. 2015). 2° investing also references diversification and argues that stock indices, which are seen as proxies for 'the market', are significantly tilted towards fossil fuel industries and thus result in an overexposure to the risks of this sector (Thomä et al. 2014).

Yet the application of diversification does not stop here. Expanding the concept of the market portfolio to its logical conclusion means that a large and well-diversified investor will eventually own 'the economy' and thus will be interested in its overall long-term performance. This notion has become known under the name of the universal ownership (cf. chapter 4). Proponents of universal ownership make the point that large institutions have an interest in mitigating environmental destruction. Marrying insights from financial theory with the environmental economics concept of externalities, they maintain that large diversified owners will also own the bearers of the external costs that the firms inside their portfolio create (Mattiston et al. 2011; UNEP FI 2005).

A more formalised connection between portfolio theory and environmental risks is the climate Value at Risk (VaR) model (Dietz et al. 2016; EIU 2016, cf. chapter 4). In this exercise, either physical damages or transition costs from different climate change scenarios are estimated through an IAM and then translated to a portfolio (EIU

2016: 9). Apart from the properties carried over from the IAM such as the assumption of substitutability between natural and human-made capital and the presence of discounting to commensurate future and present value (cf. 2nd section), the use of VaR also introduces ideas from the academic paradigm of modern financial theory.

The inputs to the VaR equation are an initial portfolio value, a confidence interval based on a normal distribution, a list of risk factors and their measured or simulated volatilities and a predetermined time horizon (cf. Jorion 1997; Lockwood 2015). This list of the elements of VaR make the association with the concepts of modern financial theory clear. Beyond the simple congruence of concepts, VaR calculations also feature benefits to diversification as the addition of different risky assets is mediated by their covariance (Jorion 1997: 151-152; Saita 2007). Yet the clearest indication of VaR's belonging to modern financial theory, which is also the part of the metric that has drawn most criticism, is its treatment of uncertainty as probabilistic risk (Lockwood 2015: 10ff). This property has made VaR a protagonist of financial crises such as the collapse of the hedge fund Long Term Capital Management and the GFC. This is because VaR's inability to account for emergent behaviour (which might be induced by the performative effect of VaR itself) as well as positive feedback effects left financial institutions using the model with insufficient capital to absorb losses (Lockwood 2015: 20ff). The contention of one interviewee that the application of VaR to climate change is "too far of a stretch" notwithstanding, first vendors have started to commercialise climate VaR models for financial institutions.¹²³

Whereas climate VaR is both an extreme case of incorporating modern financial theory and a highly visible one, on a more general level the expression of

¹²³ Interview former central bank official, Western Europe, for a commercial provider of climate VaR see CarbonDelta: <https://www.carbon-delta.com/>. Carbon Delta has since then been acquired by MSCI.

ESG issues in the language of risks received increased attention after Carbon Tracker and other actors started to deploy the concept of stranded assets (cf. chapter 4). This meant that climate-related risks moved away from traditional CSR categories such as reputational risks, which lack elaborate and widely accepted categories and methods. The commensuration of climate-related risks with other established categories like currency risk meant that they could be understood, measured and managed within the framework of financial theory. Interviewees from the industry as well as from civil society point out the importance of this development. Accordingly, once ESG issues had been couched in these terms, they moved away from the relatively powerless CSR departments and sparked the interest of boards and risk assessment units.¹²⁴ In this case, it is not an elaborate and formal model that integrates sustainability issues with financial theory. Instead, the expansion of techniques of measurement and categorisation accounts for the connection.

Another link between modern financial theory and the risks and opportunities frame relates to corporate disclosures. From the 1980s until today, investor groups and CSOs have requested information on ESG issues from corporates. These efforts have often been justified by pointing towards the crucial role of information and transparency in investment decisions.¹²⁵ However, the enthusiasm and the willingness to pay for such measurements has been varied as doubts on the financial relevance of such measures in the absence of regulation or the pricing of externalities persist.¹²⁶

The counterargument, which states that ESG issues matter even in the absence of such policies, is also made within the framework of financial theory as quantitative

¹²⁴ Interview CSO staff UK, Interview asset management, Western Europe (2). See also Interview Lola Gouiffes,

¹²⁵ Interview European Commission official, Interview Co-Founder, Sustainability Consultancy, Germany.

¹²⁶ Cf. interview Nina Lazic, Notes OECD 5th Forum on Green Finance and Investment, November 13th-14th, 2018.

studies of fund performance are mobilised to determine the risk-adjusted returns of ESG themed investments against a market benchmark (e.g. Friede et al. 2015, Giese and Lee 2019; UNEP FI and Mercer 2007).¹²⁷ These studies find either a positive (Giese and Lee 2019) or at least a non-negative relationship (Friede et al. 2015) between ESG and performance. Dumas and Louche note that the effect of mobilising modern financial theory to support the relevance of ESG has been that the discourse has shifted from the initial beliefs about the underperformance of ESG funds to a situation, where the mainstream view is that the ESG-performance link is “inconclusive” (Dumas and Louche 2016: 449).

Up to this point I have presented instances in which modern financial theory is mobilised to bring sustainability issues under its remit. This strategy is often used by proponents of the risks and opportunities frame, who seek to strengthen their case by pointing out that their arguments are congruent with the predicaments of a well-respected theory. However, there is also a different direction of the argument, which acknowledges the predominance of financial theory, e.g. when it comes the definition of fiduciary duties, but treats it as an obstacle that has to be overcome. This use of modern financial theory is more in line with the critical frame.

Catherine Howarth, the CEO of ShareAction, has amongst others adopted this critical view by arguing that since climate change is material at the level of the financial system and matters for the beneficiaries’ future life circumstances, modern portfolio theory constitutes a “constrained mind set”, in which people are still “stuck”.¹²⁸ Unpacking this argument, it follows that the core ideas of the academic

¹²⁷ Interview Economist, environmental agency, Western Europe, Interview European Commission official.

¹²⁸ Cf. Notes OECD 5th Forum on Green Finance and Investment, Paris: November 13th, 2018.

paradigm preclude the conceptualisation of what matters in sustainability terms, i.e. a system focus that integrates the future life circumstances of beneficiaries.

Far from being an isolated instance, the question of whether modern financial theory is a tool or an obstacle for the advancement of sustainable finance appears to be widely discussed in the expert community. Interviewees from the asset management industry recount that while some investors are introducing complementary target metrics to traditional financial risk/return measures, others remain sceptical about such initiatives since they believe in a trade-off between the two.¹²⁹ A clash that illustrates the different positions occurred at a conference of the European Responsible Investor Network in March 2019. In this setting, a representative of a (self-styled) progressive Dutch asset manager argued with a CSO representative from one of the organisations that have been sorted into the critical frame over the possibility of sacrificing beneficiaries' risk-adjusted returns for the improvement of their future non-monetary living conditions. In this exchange, the asset manager remained sceptical about the willingness of beneficiaries to forego financial gains.¹³⁰ A similar argument was advanced by a CSO interviewee, who contended that while a cultural shift from the "rational investor" to "universal ethical investor" would be desirable, so far it had not been empirically observed.¹³¹

Ecological Economics

The main significance of ecological economics for sustainable finance is related to the measurement of the categories that the proponents of the of the risks and opportunities

¹²⁹ Interview asset management, Western Europe (1), Interview asset management, North America.

¹³⁰ Cf. Notes European Responsible Investment Network (ERIN) conference, Brussels: February 25th, 2019 (Chatham House rules).

¹³¹ Interview Nina Lazic.

frame seek to translate into financial language. The above-mentioned report on universal ownership uses an Input-Output model that integrates physical flows and ecosystem services of economic activities to estimate the external costs that investors might have to bear (Mattiston et al. 2011). Yet whereas the concepts of ecosystem services and natural capital are repeatedly referenced in discussions¹³², the explicit use of an ecological economics inspired approach is rare. The same holds for the proposals to replace GDP with an accounting system that incorporates environmental categories (but see NCE 2014: 92, 171ff).

CSOs that are connected by the critical frame display a certain affinity towards the more popular concepts of ecological economics. One interviewee from this community remarked that the members of the CSO coalition she belongs to make references to concepts like the *planetary boundaries* and *doughnut economics*. However, when engaging with financial sector representatives, this terminology is absent from the debate and is replaced with the language of risk and return.¹³³ Degrowth, on the other hand, is met with personal sympathy by some experts from the civil society and research community.¹³⁴ Unsurprisingly, proponents of the climate finance frame, who make the argument that private investments will bring about a green growth regime, reject it explicitly stating that “degrowth will never be politically sustainable” (NCE 2014: 51).

¹³² Hans Bruyninckx, the director of the European Environment Agency, repeatedly advocated for a decrease of the unsustainable use of natural capital and argued that financial capital is overvalued vis-à-vis natural and human capital. He made clear that the concept of sustainability could not be applied to anything that increases resource use. Cf. EU Public Hearing: Sustainable finance, Publication of the HLEG interim report, Brussels: July 18th, 2017., Notes EU High-level conference: Financing sustainable growth, Brussels: March 22nd, 2018.

¹³³ Interview CSO staff, UK.

¹³⁴ Interview Lola Gouiffes, Interview Nina Lazic, Interview Franziska Schütze, Interview CSO staff, UK.

Yet the response from the political and financial system to de-growth seems to be non-engagement rather than antagonism.¹³⁵ In this context, one interviewee also put the blame on the academic community that researches de-growth, since scholars devote time to conceptual issues like the difference between de-growth or steady state economies, while they are oblivious to questions of political economy like the power of lobbies.¹³⁶

The refusal to engage with de-growth notwithstanding, its mirror concept green growth is frequently referenced in the discourse. EC Vice President Dombrovkis¹³⁷, OECD general secretary Angel Gurría¹³⁸, Michael Bloomberg¹³⁹, a representative from the Japanese financial services agency¹⁴⁰ and the president of the European Banking Foundation¹⁴¹ all argued in favour of green growth. This high-level advocacy is linked the climate finance frame that has been championed by the development community and the OECD from around 2014 onward (NCE 2014; NCE 2016; OECD 2017). One participant from the climate finance community remarked, however, that while green growth and the associated concepts like economic co-benefits from climate mitigation provide a valuable high-level, political narrative, they are not very significant for the day to day work on the project level.¹⁴²

¹³⁵ Cf. Interview MEP Greens/EFA, Interview Nina Lazic.

¹³⁶ Interview MEP Greens/EFA.

¹³⁷ Notes EU Public Hearing: Sustainable finance, Publication of the HLEG interim report, Brussels: July 18th, 2017.

¹³⁸ Notes OECD 5th Forum on Green Finance and Investment, Paris: November 13th, 2018.

¹³⁹ Notes EU High-level conference: Financing sustainable growth, Brussels: March 22nd, 2018.

¹⁴⁰ Satoshi Ikeda (Chief officer for sustainable investment at Japanese financial services agency) at EU public hearing: A global approach to sustainable finance, Brussels: March 21st, 2019.

¹⁴¹ Wim Mijs (EBF) at the launch event of the Principles for Responsible Banking by the EBF and UNEP FI. Cf. Notes European Banking Federation and UNEP FI: Launch of the Principles for Responsible Banking, Brussels, February 5th, 2019.

¹⁴² Interview CSO staff, climate finance, North America.

Environmental Economics

The relevance of IAMs as input to financial assessment tools like climate VaR has already been discussed. IAMs are also the basic inputs to the Mercer studies that translate benefits and costs that are derived from an IAM to different asset classes and sectors such as emerging market equity or utilities (Ambachtsheer et al. 2015; Reid et al. 2019, see also chapter 4). On the other hand, these models also face strong criticism from proponents of the climate finance frame since they fail to acknowledge evolutionary dynamics and are considered to overestimate costs and underestimate climate-related losses (NCE 2014: 14).

More recently, the NGFS has questioned the usefulness of IAMs for the purposes of analysing systemic risk. In its first comprehensive report, the central bank network points out that existing models are partial and that the incorporation of tipping points as well as of second and third round effects is needed. Furthermore, the report states that existing IAMs are less attuned to the demands of financial regulators such as systemic risk assessments. This is because they were developed for different purposes like the estimation of the SCC at the global level (NGFS 2019a: 14, 17). A stronger version of this line of criticism is reflected in a recent working paper from the BIS. Following the critiques of both mainstream and heterodox economists, the BIS researchers outline problems such as the sensitivity of IAMs to assumptions about damage functions and discount rates, their use of unrealistic general equilibrium models and their failure to explicitly model the financial system (Bolton et al. 2020: 26).

Yet while IAMs might be questioned, the environmental economics concept of externalities is omnipresent across all frames and periods. Policy proposals on sustainable finance like the EU's HLEG recommendations point out that the internalisation of external effects via prices is an imperative signal for financial reallocation (HLEG 2017: 15; HLEG 2018: 11). In a similar fashion, OECD general secretary Angel Gurría repeatedly argued for a "big, fat price on carbon"¹⁴³ at a green finance conference. Interviewees almost uniformly and independent of their supportive or sceptical position about sustainable finance also pointed out that price signals in the 'real economy' were needed (see also chapter 6 on real economy vs. finance).¹⁴⁴ They differ, however, in their assessment of how realistic the pricing of all external effects is. One representative from the climate finance community argued that this is "what we should strive for as good economists", while an interviewee from a national environment agency pointed out that the failure to arrive at an adequate carbon price over the 20 years "puts things into perspective".¹⁴⁵

A final argument that has been carried over from neoclassical economics to sustainable finance is that the emphasis on the financial sector has been described as a backdoor or a 2nd best policy, which has to be leveraged as the direct pricing of externalities is not feasible due to political economy obstacles (Berensmann and Lindberg 2016: 2ff).¹⁴⁶

¹⁴³ Notes OECD 5th Forum on Green and Investment, Paris: November 13th-14th, 2018.

¹⁴⁴ Interview Nina Lazic, Interview Remco Fischer, Interview Jeremy McDaniels, Interview CSO staff, climate finance, North America, interview former central bank official, Western Europe, Interview Economist, environmental agency, Western Europe, Interview I 17 (confidential).

¹⁴⁵ Interview CSO staff, North America, Interview Economist, environmental agency, Western Europe.

¹⁴⁶ See also Interview Remco Fischer, Interview Jeremy McDaniels.

Evolutionary Systems

In broad terms, the evolutionary systems paradigm has had two entry points into sustainable finance. First, it addresses the problems that neoclassical-inspired approaches have with incorporating long-term developments in the real economy. More concretely, evolutionary approaches seem more fitting to deal with a transition that is assumed and narrated as transforming economies and financial sectors beyond recognition. Developments like full decarbonisation are difficult to reconcile with perspectives that extrapolate or benchmark against the status quo and historical data.¹⁴⁷ This thinking is most closely associated with the climate finance frame that highlights the necessity of switching towards a new growth regime (NCE 2014; 2016; 2018).

Second, on the finance side, systems thinking has entered via the risks and opportunities frame. Prudential regulators inside the NGFS and, to a lesser extent, private coalitions like the FSB TCFD address climate and other ESG risks at least partly within the framework of the evolutionary systems paradigm. This is because the scope and timeframe of ESG risks can be better conceptualised through the evolutionary systems paradigm than through modern financial theory. Whereas in the latter case the risk is part of an independent unit like a company, an asset, a sector or a portfolio, in its systemic or macroprudential conception risks are an emergent property of interconnected financial systems (cf. Baker 2013; Kranke and Yarrow 2018).

¹⁴⁷ For instance, Klaas Knot from the Dutch Central Bank (DNB) made a point about the inadequacy of historical data and risk as volatility at the EU Public Hearing: A global approach to sustainable finance, Brussels: March 21st, 2019.

Also, the timeframe is prolonged significantly in the evolutionary systems interpretation. Whereas actors basing their risk management on financial theory seldom look beyond a five-year time horizon (and many not even beyond a one-year timeframe) (Danthine and Donaldson 2015: 182; Naqvi et al. 2017), an evolutionary systems perspective extends the horizon to 20 to 30 years at the least. The recent announcement of the Bank of England to use a 30-year horizon in its 2021 exploratory climate stress test illustrates the increasing relevance of the evolutionary systems paradigm (BoE 2019).¹⁴⁸ In addition, the NGFS and the PRA appear to reject the conceptualisation of risks that is associated with modern financial theory. This is evidenced by the fact that they both stress that climate-related risks are distinct even from other factors of structural change due to their far-reaching impacts, irreversibility, foreseeable nature and dependence on short-term actions (NGFS 2019a: 12; PRA 2018).¹⁴⁹

One tool through which such an evolutionary perspective is operationalised is scenario analysis. Working inside a complexity and network framework and positioning themselves explicitly against the alternative climate VaR¹⁵⁰, Battiston et al. developed a climate stress test that estimates the first and second round effects of asset stranding in European financial markets (Battiston et al. 2017). Their paper has since then been referenced in the HLEG's assessments and the subsequent European Commission's action plan on sustainable finance (HLEG 2018; EC 2018a).¹⁵¹ In addition, the FSB TCFD and the NGFS have advocated the use of scenario analysis (FSB TCFD 2016, NGFS 2019a).

¹⁴⁸ Cf. Interview I 17 (confidential).

¹⁴⁹ See also Interview I 17 (confidential).

¹⁵⁰ Cf. Interview Franziska Schütze.

¹⁵¹ Interview former central bank official, Western Europe, Interview Economist, environmental agency, Western Europe.

The important departure of scenario analysis from methods that extrapolate from past data is that they take a range of explicit ‘views’ on future developments. This allows for a subsequent measurement of how well financial institutions are ‘aligned’ to the scenario. Thus, the approaches that operationalise risks and opportunities through scenario analysis move towards the ideas of the evolutionary systems paradigm. This is because, first, unlike extrapolations of past and normally distributed data, scenario analysis offers a different way to deal with uncertainty that zooms in high impact events (cf. Langley 2013). Second, the assumptions and relationships that guide the scenario do not necessarily come from an ‘economic’ assessment in the narrow sense of the term. Instead, ‘non-economic’ forms of inquiry like climatology or even political goal and trajectory setting as in the case of the SDGs are mobilised in the translation of the scenarios to financial terms (cf. chapter 6).

Whereas the use of scenarios breaks with the risk analysis techniques of modern financial theory, for some observers this break is not sufficient. The above-mentioned BIS working paper goes on to suggest that while useful, forward-looking modelling will not be able to fully resolve the uncertainty of climate change and societies’ responses to it. Invoking the Knightian notion of radical uncertainty, the paper calls on regulators and central banks to go “beyond modelling” (Bolton et al. 2020: 46). The authors thus recommend an even stronger “epistemological break” with modern financial theory, where regulators should embrace rather than model away radical uncertainty and coordinate with other institutions to manage the transition (Ibid: 46-48). The links of this analysis and its recommendations with the evolutionary systems paradigm are very clear. Nonetheless, the recency of the paper and its status as a working paper mean that the extent to which the regulatory community will fully embrace such an evolutionary systems perspective remains still an open question.

Aside from the regulatory community, the evolutionary systems paradigm has also guided the work of the UNEP Inquiry (Zadek and Robins 2014) as well as of civil society organisations like the Finance Innovation Lab (cf. Berry et al. 2018, see chapter 6). Using the language of stocks and flows between systems, UNEP Inquiry stresses the ability of finance to deliver on external requirements like the SDG investment needs. Moreover, the functionality of the financial sector is determined by how effective, efficient and resilient it is in performing this task (UNEP Inquiry 2015; 2016). This re-definition of efficiency at the level of the system's outputs, which differs markedly from the more self-referential asset price focus of the EMH, integrated critical assessments of the financial sector's functionality such as Philippon (2014) and Cecchetti and Kharoubi (2015) (cf. Turbeville 2016). As such, it is not very far away from the debates on financialisation, which were also referenced by the British economist John Kay and Finance Watch secretary general Benoit Lallemand in the context of the EU's HLEG.¹⁵²

The systems perspective is also reflected by the fact that UNEP Inquiry and other actors like the EU's HLEG stress that there is no single policy that can switch finance towards sustainability. Or in the words of the HLEG: "Given the complexity of the financial system and its policy and regulatory framework, there is no single lever to achieve these ambitions and 'switch' the financial system to sustainability¹⁵³." (HLEG 2018: 5).

¹⁵² Cf. Notes EU Public Hearing: Sustainable finance, Publication of the HLEG interim report, Brussels: July 18th, 2017.

¹⁵³ See also talk of Saïd El Khadradi (EPSC). Cf. notes European RI conference: Setting the agenda for a just and sustainable Europe, Brussels: February 24th, 2019. And remarks from Frank Elderson (DNB), Nathen Fabien (UN PRI) at EU Public Hearing: A global approach to sustainable growth, Brussels: March 21st, 2019 for similar points.

5.4 Conclusion

In this chapter, I established the presence of four academic paradigms in the policy subsystem of sustainable finance. The empirical examination found that there are relatively few actors that provide a direct and observable link between academic paradigms and the frames that were identified in chapter 4. Concerning the paradigms themselves, modern financial theory is most frequently referenced. While some actors inside the risks and opportunities frame use concepts and models from this paradigm to translate between sustainability issues and finance, proponents of the critical frame attack it for being incompatible with sustainability. Furthermore, proponents of the evolutionary systems paradigm point out the inadequacy of modern financial theory to understand systems, uncertainty and endogeneity in order to promote their thinking. Whereas the paradigm of modern financial theory is associated with the earlier variants of the risks and opportunities frame that highlight risks at the portfolio level, the evolutionary systems paradigm is closer related to the conceptualisation of risks as being systemic.

Finally, while environmental and climate economics and in particular the Stern Review are widely acknowledged and used as input for higher order models such as climate VaR, some actors have cast doubt on the usefulness of IAMs. Input from ecological economics is also used by some actors but the concepts of the paradigm are not widely reflected. This relative absence of engagement with the sustainability-related paradigms notwithstanding, ecological economics and environmental economics still have the potential to influence sustainable finance. This is because categories and assessments from these paradigms are integrated into the discussions and socio-technical instruments that are cast within the framework of the other two

paradigms. The incorporation of climate trajectories into scenario analysis as well as into applications like climate VaR are notable examples. As such, the inputs from the environmental side are especially relevant for the black-boxing of socio-technical instruments, which I will examine in the next chapter.

Having sorted the paradigms to the corpus and the different frames, the next chapter will take one step forward from this and highlight how academic paradigms and frames are politically significant. This will be done by examining how frames relate to the persuasive and performative processes that I conceptualise as policy paradigms.

6. Turning Frames into Policy Through Debates and Socio-Technical Instruments

Accounting standards are not neutral; they project a vision of the world.

Olivier Guersent, Director General DG FISMA, European Commission.¹⁵⁴

How do you invest in lowering inequality?

Gerard van Olphen, APG Asset Management.¹⁵⁵

Bringing people together that supposedly fight for the same cause does not play out so well when it comes to practice, (...) As soon as you go to fundamentals, people are not so enthusiastic anymore (...) So I get tired of celebrating the fact that we are putting people together on platforms.

Bas Eickhout, Member of the European Parliament, Greens/EFA.¹⁵⁶

Does it really matter whether sustainable finance is understood as an ethical imperative, a new growth regime or a set of risk factors? Chapter 4 has tracked the development and the positioning of the frames that constituted sustainable finance over three periods between the late 1990s and 2018. In this chapter, I outlined that the initial dominance of the SRI frame was replaced by the risks and opportunities frame and to a lesser extent by the climate finance frame. In addition, the critical frame that emphasises the dysfunctionality of the financial system has accompanied the policy subsystem at its margin.

¹⁵⁴ Notes EU Public Hearing: A global approach to sustainable finance, Brussels: March 21st, 2019.

¹⁵⁵ Ibid.

¹⁵⁶ Notes ERIN conference, Brussels: February 25th, 2019.

Chapter 5 explored how these frames build on or challenge existing academic paradigms. Matching frames to academic paradigms showed that there is no simple congruence between the two concepts. While some frames display a disposition to one academic paradigm relative to the others, this is far from complete equivalence. The risks and opportunities frame is a case in point. There is a strong argument to be made that it draws from modern financial theory. However, in its systemic variant, the frame also connects well with the evolutionary systems paradigm. Finally, proponents of this frame use both neoclassical-inspired environmental economics and the more heterodox insights from ecological economics when it comes to the operationalisation.

In the following, I will examine how both frames and their connections to different academic paradigms matter for the governance of sustainable finance. I will look at two analytically different channels that translate between ideas and policy outcomes. First, there is a dynamic, where frames are used to persuade elite and broader audiences. Frames act as a starting point for debate positions, which provide a narrative that outlines the goals of sustainable finance and offers an abstract explanation of its functioning. Second, there is a performative dynamic where frames are used to design socio-technical instruments that make the economy governable (cf. chapter 2).

In the first section, I will briefly revisit the connection between frames and policy paradigms as outlined in chapter 2 and restate the hypothesis on the co-variation between policy subsystem structure and transmission channels. The second section looks into the persuasive transmission channel by examining four prominent debates. In the third section, I focus on the performative transmission channel and revisit five groups of socio-technical instruments. The fourth section summarises frame-

debate/frame-instrument links and assesses how they integrate with the transmission mechanism outlined in chapter 2. The fifth section concludes the chapter.

6.1 Revisiting Concepts: Policy Paradigms and Transmission Channels

In chapter 2, I introduced the hypothesis that the immaturity of the policy subsystem of sustainable finance makes persuasive processes less powerful than performative dynamics. In mature policy subsystems, a shift of the policy paradigm is characterised by actors fighting about whether abrupt changes in well-known categories mean that the system is in a fundamental crisis. In immature systems, by contrast, the political element can be found with the design of socio-technical instruments.

Chapter 4 lent some support to this hypothesis. Whereas there were some fundamental debates (e.g. on divestment, fiduciary duty, mainstreaming and green growth), the overall landscape of sustainable finance has so far remained relatively harmonious. This is also illustrated by the network topologies depicted in chapter 4. Throughout the three periods, the networks show that the communities cluster around the centre and display significant overlap. These topologies are different from the network structure of an antagonistic policy debate, where actors segregate themselves into opposing coalitions (e.g. Leifeld 2013; Rinscheid 2015).

To explain the variation in the importance of persuasive and performative transmission channels, I pointed to differences in the structure of the policy subsystem. One indicator is the size and stability of the actor population. For the time being, the debates about sustainable finance have by far and large not involved the general public. Instead, the expert community itself and other close elites like policymakers, specialised media (e.g. Financial Times, Responsible Investor, Bloomberg) and representatives from financial institutions are the ones who debate. Among these actors

there appears to be a lack of antagonism that comes in spite of the ideational irreconcilability of some controversies (see section 2). On the other hand, the expert community appears to be much more invested in arguing over socio-technical instruments. The description of sustainable finance's evolution in chapter 4 suggested that technical matters like the standardisation of ESG measurements were a more pressing concern than the resolution of fundamental disputes.

In the remainder of this chapter, I will further explore these preliminary observations on the two transmission channels. I will outline some of the most prominent debates and socio-technical instrument types and establish their significance for the governance of sustainable finance. In addition, I map the connections of debates and socio-technical instruments to the frames.

6.2 The Debates of Sustainable Finance

At first sight, sustainable finance appears to be a policy area that is characterised by the absence of debates. In chapter 4, I referred to an observation of an interviewee who noticed that everybody was “excited” about the topic.¹⁵⁷ Similarly, an institutional investor gave evidence to the uncontested nature of green bonds by exclaiming: “We all love them!”¹⁵⁸ And even though SRI was and is dismissed by some investors as a money burning fringe business, the dynamic between proponents and critics of SRI is more characterised by mutual disengagement than by outright conflict. Finally, as was observed in chapter 4, the mobilisation of the still relatively undefined and hence

¹⁵⁷ Interview Nina Lazic.

¹⁵⁸ Talk by Marcus Svedberg (Sweden's AP 4). Cf. Notes OECD 5th Forum on Green Finance and Investment, Paris: November 13th, 2018.

inclusive nature of the term sustainable finance as a master frame has contributed to the mitigation of conflicts in the recent past.¹⁵⁹

Yet even in this overall situation of harmony there are some debates. The subjects of these debates are often discussed in abstract and dichotomous terms. They relate to the goals of sustainable finance, its contribution to the economy and the environment and the causal mechanisms that are assumed to deliver change. Finally, since these issues reflect disagreement about debate positions and not technicalities, they can be observed at the panel discussion of conferences (as panel members are selected to encourage discussion) and in specialised media outlets. The four debates that will be revisited below have been selected on the basis of qualitative content analysis, interviews and participant observation data. The criteria that led to their inclusion are that they are repeatedly referenced in the data and are discussed in controversial terms. The debates are the *ESG – Performance Trade-off*, *Financial Materiality vs. ESG impact*, *Engagement vs. Divestment*, and *Transformative Finance vs. Real Economy Focus*.

The ESG – Performance Trade-off

Many of the developments within the risks and opportunities frame address the question of how ESG issues are related to financial performance. As described in chapter 4, the bad performance of SRI funds in the early 2000s meant that mainstream investors treated sustainable finance with suspicion. Seeing this trade-off, the opponents of SRI mobilised the concepts of fiduciary duty and financial materiality. Moreover, they argued (and continue to argue cf. Lindeijer et al. 2019) along the lines

¹⁵⁹ Cf. Interview Jeremy McDaniels.

of Milton Friedman's dictum on corporate responsibility by stating that they are only accountable to their beneficiaries and not to society as a whole.¹⁶⁰

Ever since, promoters of sustainable finance arguing within the risks and opportunities frame have mobilised large n research (see Friede et al. 2015 for a meta-study) and case studies to refute this claim. As described in chapter 5, these studies also adopted tools and concepts from modern financial theory.¹⁶¹ One way to establish the superior or at least not inferior performance of ESG investing is the back-testing on historical datasets (e.g. Grantham 2018). A different line of argumentation mobilises forward-looking scenarios that predict increased financial returns for ESG investors (e.g. Ambachtsheer et al. 2015; EIU 2016; Reid et al. 2019; see also next section). As noted in chapter 5, the predictions of forward-looking scenarios rely on an expansion of the time horizon. Hence, they move away from the short-term periods that modern financial theory and financial practice emphasise. Instead, scenarios look at time intervals in the order of decades if not centuries.

For the greater part of the analysed time period, the efforts of demonstrating that ESG issues are not an anathema to financial returns have been met with silence and disengagement rather than with outright rejection. This only changed once sustainable finance had received enough attention to be seen as an issue that unconvinced investors could no longer ignore. One interviewee from the asset management industry remarked that investors could be placed along a continuum between the believers of the "true [ESG] religion" and those that "do not even pay lip service". The greater part of the distribution between those extremes is, however, just

¹⁶⁰ Interview European Commission Official.

¹⁶¹ See also Interview European Commission Official, Interview Co-Founder, Sustainability Consultancy, Germany, Interview Economist, environmental agency, Western Europe, Interview asset management, North America.

“picking up the story without truly believing that ESG can drive return.”¹⁶² Sometimes this suspicion towards ESG is also articulated openly as in the case of a lobbyist for retail investors, who expressed concerns that ESG labels might be used by underperforming funds as a cover-up for poor management.¹⁶³

Financial Materiality vs. ESG Impact

In the dispute over financial materiality vs. ESG impact the advocates from either side start from the premise that ESG matters. Yet they disagree about what ESG is and what it should be for. The proponents of the financial materiality thesis follow the risks and opportunities frame and argue that ESG issues should be added to the list of the more established risk factors like currency risk. Thus, if physical destruction of assets occurs because of climate change or if changes in policy, technology and litigation mean that investors will lose money, investments in assets that are exposed to such ESG risks should be re-evaluated.

The adherents to the financial materiality position comprise large financial institutions, IOs, CSOs and regulators. These actors maintain that ESG issues should only be considered if a transmission between them and financial metrics can be established. In the first period, UNEP FI highlighted the materiality of ESG issues to support the argument that they needed to be part of the fiduciary duty of institutional investors (see chapter 4). More recently, the FSB TCFD explicitly asked for the disclosure of financially material information concerning climate-related risks (FSB TCFD 2017: IV). Furthermore, the stress on financially material risks and

¹⁶² Interview asset management, North America.

¹⁶³ Cf. Intervention of Jella Benner-Heinacher (Better Finance). Notes EU High-level conference: Financing Sustainable Growth, Brussels: March 22nd, 2018.

opportunities can be seen in the interview and participant observation data, where representatives from asset managers¹⁶⁴, index providers¹⁶⁵ and banks¹⁶⁶ all emphasised the need for better and more relevant data. As I will show in the next section, the focus on financial materiality influences the design of socio-technical instruments. This is illustrated by the fact that earlier measurements that had been established to accommodate the SRI frame increasingly faced criticism as the emphasis on financial materiality became dominant.

Those arguing in favour of financial materiality see themselves as only responding to changes in price signals as environmental risks are priced due to new information on natural disasters or changes in policy and regulation. Anticipating such changes, they argue that ESG issues should be monitored and integrated already today. Nonetheless, they remain adamant in their position that ESG issues only matter to the extent that they are reflected in financial risks and returns. Financial materiality is defined as the impact of all present and projected risks and opportunities that can be measured in money terms. Consequently, proponents of financial materiality are unwilling to forego financial return in favour of increasing the impact of sustainability goals that are not expressed in financial metrics.

It is noteworthy that the financial materiality interpretation posits that all relevant information is already known today and can thus be priced accurately. This reflects the understanding of the academic paradigm of modern financial theory, where – if it functions well – the financial system is assumed to be in an equilibrium state that constantly adjusts to new (exogenous) information. This understanding implicitly

¹⁶⁴ Interview, asset management, North America.

¹⁶⁵ Veronique Manzu (MSCI), see notes QED Forum on sustainable finance, Brussels: June 5th, 2018.

¹⁶⁶ Edmund Lakin (HSBC), see notes Bruegel workshop: How to speed up sustainable finance?, Brussels: November 28th, 2018.

rejects the evolutionary systems paradigm, which emphasises that today's financial decisions influence the future.

The camp of those who think that ESG impacts matter beyond their relation to financial materiality is more heterogeneous. First, CSOs that are bound together by the critical frame conceive ESG impacts as the negative consequences of existing investments. They use the focus on ESG impacts to point out the shortcomings of financial materiality. Accordingly, only integrating those parts of sustainability that have a price tag is inadequate for addressing the negative impact of finance and the economy on environmental and social systems. Such a narrow conception of sustainability is problematic, because, despite being unpriced, natural and social systems have a value to humans and the economy. Their argument thus aligns with the ecological economics paradigm as it highlights the embeddedness of finance and the economy in broader environmental and social systems. Ultimately, the emphasis to measure physical (and social) instead of financial categories aims for the removal of the dichotomy between financial risks and environmental impacts.

The promoters of the climate finance frame, on the other hand, zoom in on the positive impacts of new financial instruments. While they equally point out the necessity of measuring non-financial ESG impacts, their priority rests less with establishing the negative ESG impacts of current practices. As noted in chapter 4, the climate finance frame argues that public policy and public money should enable new private investments into climate-friendly economic activities. Determining the ESG impact of investments is a way to determine which investments deliver the greatest environmental returns. In other words, focusing on ESG impacts can help with the implementation of the climate finance frame as it enables the strategic selection of projects. A case in point is the establishment of the Global Climate Finance Innovation

Lab. The Lab is an incubator for public-private financing instruments that is run by the CPI and has to date supported 35 projects with US\$ 1.5 billion.¹⁶⁷

Importantly, only the critical frame translates ESG impacts into a debate position that opposes the financial materiality thesis. As suggested above, the critical frame focuses on ESG impacts to point out that an exclusive concern with financial materiality leads to an insufficient coverage of environmental and social issues.

I have illustrated a clash between the two debate positions of financial materiality vs. ESG impact in chapter 5 when recounting the exchange between the Dutch asset manager and the CSO representative. Confronted with the argument that financial institutions should only care about financially material issues, proponents of the ESG impact position counter that beneficiaries, i.e. consumers of financial products, are not solely motivated by maximum financial return but have a more holistic set of preferences. This means that non-financially material issues are part of the mandate of the stewards of beneficiaries' funds (e.g. Berry et al. 2018: 30-33; HLEG 2018: 20).

A second challenge from the adherents of the critical interpretation of ESG impacts is that the emphasis on financial materiality fails on grounds fairness. The fact that only risks that are expressed in money terms are considered means that e.g. climate-related damages to property in wealthy geographies are more of a risk than equivalent damages in less affluent communities. Therefore, this approach is unsuitable to incorporate equity concerns and exacerbates rather than reduces inequalities.¹⁶⁸

¹⁶⁷ Cf. Interview CSO staff, Climate Finance, North America.

¹⁶⁸ See also interview Nina Lazic.

Whereas some participants in the financial materiality vs. ESG impact debate tend to fortify their positions by arguing that only financial risks or ESG impacts matter, there are also actors that try to blur the boundaries. Some investors, for instance, try to establish a ‘second bottom line’, which aims for the maximisation of non-financial impact (see also Inderst and Stewart 2018: 4 for a typology of investors).¹⁶⁹ Interviewees from the financial sector as well as from the regulatory community also emphasised the role of “values” as opposed to financial value and the fact that there are areas [of economic activity], that simply “should not” be used for profit making.¹⁷⁰ This debate position about values echoes the ethical considerations of the SRI frame, which tries to bridge the distinction between financial and ethical considerations. However, the lack of formalisation of the frame and the idiosyncrasies of ethical views mean that the thinking about holistic values acts more as a background constraint than as an active force for developing either arguments or socio-technical instruments.

A more formalistic attempt to reconcile between financial materiality and ESG impacts are the non-financial reporting guidelines that the European Commission has recently tabled. They integrate the two positions by developing the concept of ‘double materiality’. Accordingly, the terms of materiality and risk are applied both to the impacts of climate-related risks (transition and physical, see next section) on companies and to the impacts of companies’ activities on the climate. The communication notes that these two perspectives already overlap and that this overlap will increase in the future. Furthermore, longer time horizons will mean that financial materiality will expand its scope towards holistic assessments (EC 2019).

¹⁶⁹ Interview asset management, Western Europe (1).

¹⁷⁰ Interview asset management, Western Europe (2), Economist, environmental agency, Western Europe.

In summary, the debate over financial materiality vs. ESG impact is about whether to look at financial or natural and social categories. While the ESG impact advocates can be differentiated between those coming from the climate finance frame and those from the critical frame, only the latter group has created a position that debates the financial materiality thesis. This position reflects the ecological economics paradigm and points to the embeddedness of the economy in broader systems as well as to the short-sightedness of established financial categories. The financial materiality position is, on the other hand, informed by modern financial theory and emphasises the need as well as the capability of the financial system to integrate and price previously overlooked ESG information.

Engagement vs. Divestment

The question of engagement vs. divestment is about whether financial institutions should talk to companies that are involved in unsustainable economic activities or whether they should punish them by withdrawing financing. The former strategy portrays financial institutions as facilitators in the transition of companies, whereas the latter sees them as disciplining actors. The choice between either method might well be answered at the level of the individual investment. However, rather than being decided on a case-by-case basis, engagement vs. divestment is debated publicly and reflects disagreements about articles of faith and theories of change.

The argument that engagement offers a better route to change is often made by incumbent financial institutions to fend off calls for divestment. A representative from the asset manager BlackRock remarked during a panel discussion that he did not know

what the theory of change of divestment was.¹⁷¹ Hiro Mizuno from the Japanese GPIF made a similar case by stating that divestment would mean the transfer of responsibility [for environmentally problematic companies] to irresponsible investors.¹⁷² The theory of change of engagement thus emphasises the role that activist investors can play in gently forcing unsustainable companies towards the transition. As such, it is connected to the risks and opportunities frame, which is interpreted as requiring active risk management on behalf of financial institutions.

Proponents of divestment counter this position by pointing towards incompatibility between investments in certain sectors (most notably coal) and political or scientific targets such as the Paris Agreement and the SDGs. The divestment advocates are often members of the CSO community like Bank Track, who engage in relational framing that posits them as the antagonists of untrustworthy financial institutions (cf. chapter 4). To make the case for divestment, these actors translate emission projections and energy scenarios (see next section) to the balance sheets of financial institutions. Hence, if the IPCC calculates that emissions will have to be reduced by 45% from 2010 levels by 2030, any new financing for fossil fuel projects is nonsensical (Kirsch et al. 2019: 4). Or, in the words of one of the campaigners it is “an insult to logic, to science and to humanity (...)”.¹⁷³

The theory of change of divestment is that certain sectors and companies are beyond saving and will have to be wound down. The calculations of the climate scenarios mean that there is no point in engaging with businesses that are doomed.

¹⁷¹ Tariq Fancy (BlackRock). Notes OECD 5th Forum on Green Finance and Investment, Paris: November 13th, 2018.

¹⁷² Hiro Mizuno (GPIF). Notes EU Public Hearing: A global approach to sustainable finance, Brussels: March 21st, 2019.

¹⁷³ Alison Kirsch, “Report finds global banks poured \$1.9 trillion into fossil fuel financing since the Paris Agreement was adopted, with financing on the rise each year”, *BankTrack Newsletter*, March 20th, 2019.

Here, the concept of stranded assets that is part of the risks and opportunities frame is mobilised to advocate for a position that highlights risk minimisation through exit, instead of risk management through engagement. Thought to the end this means that the logic of divestment is to convince every potential investor that assets, which are based on unsustainable economic activities, are ultimately stranded and thus worthless.

The transmission channel of divesting consists of selling the asset to another investor when it comes to equity or, alternatively, the refusal to buy bonds or issue credit in the case of debt. This means that on the level of the financial system the short-term financial impact of divestment is marginal; something that is pointed out by the engagement position. The adherents of divestment counter this argument by changing the timeframe. By means of divestment investors ‘signal’ to their peers that they no longer believe in the viability of certain industries. Over time, other financial institutions learn to shun assets that leading investors deem to be unsustainable.¹⁷⁴ The logical endpoint of ‘divestment by all’ is that companies must wind down unsustainable business lines and either pay out the remaining capital to investors or reinvest it in other sectors.¹⁷⁵

Summing up the above, engagement comes from a risk-inspired debate position, which contends that activist investors will be willing and able to manage the risks of their investees. The alternative is divestment, which also mobilises the risks and opportunities frame to emphasise the incompatibility of certain investments with scientific projections. The connection of divestment proponents to the critical frame

¹⁷⁴ Cf. remarks of Alexander Al Aloui (Salm-Salm Bank, formerly germanwatch). Notes 2nd FINEXUS conference, Zurich: January 17th, 2018. A similar point was made by an interviewee: Interview, Researcher, Sustainability Rating Agency.

¹⁷⁵ Catherine Howarth. Cf. Notes OECD 5th Forum on Green Finance and Investment, Paris: November 13th, 2018.

also means that they remain sceptical about the effectiveness of engagement and the functionality of the financial system more generally.

Transformative Finance vs. Real Economy Focus

The last debate is about whether the focus on finance as an agent of change is justified. The dispute is between those, who contend that tweaking the rules of finance is an incredibly potent lever to influence the allocation of funds and those, who see the financial sector as a transmission belt that merely reacts to developments in the real economy. For the latter group, sustainable finance is a potential instance of mission creep. This is because they fear that by trying to harness the financial sector to achieve an outcome that has little to do with its function, unintended consequences will arise.

One issue over which the proponents of the two debate positions disagree is whether capital requirements should be adjusted to favour green assets. While some banks and Juncker Commission vice-president Dombrovskis have repeatedly argued for a ‘green-supporting factor’, this has been rejected forcefully by financial regulators.¹⁷⁶ At one forum, Anne de Lorver from the Banque de France reacted to the proposition of such a factor by pointing out that sectoral monetary policies have never worked and that macroprudential policy is about the robustness of the financial sector and not about offering incentives.¹⁷⁷

Following the repeated expression of similar views, the European Commission initially backtracked on Dombrovskis’ proposals. In its action plan, the Commission follows a logic that is more attuned to the demands of regulators by arguing that

¹⁷⁶ Notes EU Public Hearing: Sustainable finance, Publication of the HLEG interim report, Brussels: July 18th, 2017. See also Interview Jeremy McDaniels.

¹⁷⁷ Notes One Planet Summit: Climate finance day, Paris: December 12th, 2017.

changes in capital requirements can only be undertaken if they are “justified from a risk perspective” (EC 2018a: 9). This means that a green- supporting factor must reflect ‘real world’ differentials in the risk of green or brown assets.¹⁷⁸ This strategic retreat notwithstanding, with the van der Leyen Commission taking up its mandate, Dombrovskis has kept on pushing for a green-supporting factor.¹⁷⁹

The demand that any supporting or penalising factor must be risk-based to not introduce bias or bubbles in the economy is rooted in the belief that finance *is* and *should* not be an agent of change. If it functions well, the financial system reflects the risks of unsustainable businesses and the opportunities of sustainable ones. In this view, market failures that lead to the inaccurate pricing of risks are located in the real economy. Hence, regulatory changes to remedy them should be undertaken in the real economy and not through the indirect route of financial regulation. This understanding of finance is in line with modern financial theory, environmental economics and the neoclassical economics paradigm more broadly. This is because it emphasises the pricing of externalities in the real economy as well as the importance of transparent, unbiased information in the financial markets. If both conditions are achieved, this will make sure that equilibrium market prices materialise.

Representatives of the financial industry and adherents to the risks and opportunities frame more broadly follow this line of reasoning when they argue that political initiatives on sustainable finance are barking up the wrong tree. In their view, the financial system would be more than ready to finance sustainable activities as soon

¹⁷⁸ The grounding of capital requirements in risks was also advanced by some of the interviewees, who favour a brown-penalising factor that increases the overall capital requirements thus contributing to macroeconomic stability over a green subsidy: Interview Jeremy McDaniels, Interview Nina Lazic, Interview Franziska Schütze,

¹⁷⁹ Sam Fleming and Jim Brunsten, “Brussels eyes easing bank rules to spur green lending”, *Financial Times*, November 27th, 2019, <https://www.ft.com/content/bddc3850-1054-11ea-a7e6-62bf4f9e548a>. Accessed January 28th, 2020.

as long-term, coherent and ‘credible’ policies such as carbon pricing make them profitable.¹⁸⁰ A similar assessment, though with different implications, was made by an interviewee from the community that is closer connected to the critical frame. Accordingly, developments in finance are of minor importance as long as the absence of externality pricing means that unsustainable production and consumption patterns remain profitable. As finance can only invest in the economic activities that exist in the real economy, the potential of reforms in finance is negligible.¹⁸¹

The opposing position holds that finance is not only a reflection of the real economy. Quite to the contrary, the financial system is characterised by self-referential dynamics that can foster or inhibit investments in sustainable activities. Therefore, reforms in the real economy like the pricing of externalities would most likely be insufficient to alter the allocation of capital flows. This is because the financial system does precisely not operate as a neutral transmission channel. Campiglio argues in this context that because of market failures inside the financial system, carbon pricing might not be enough to switch capital allocation towards green investments. These failures occur since the allocation of funds carried out by financial institutions is to a certain extent autonomous from the real economy. Instead, these flows respond to dynamics that are endogenous to finance such as the Minskyian credit cycle. Hence, behaviour that is rational from the view of financial institutions, e.g. deleveraging after a credit boom and bust, can be detrimental to societal goals like the financing of green investments (Campiglio 2016: 224).

¹⁸⁰ Chris Muldermans (KBC). Notes QED forum on sustainable finance, Brussels: June 5th, 2018; And Thomas Leysen (Unimore and KBC). EU High-level conference: Financing sustainable growth, Brussels: March 22nd, 2018.; see also: Lindeijer et al. 2019: 74.

¹⁸¹ Interview Nina Lazic.

This position is put forward by the actors that belong to or partly integrate the critical frame as well as by some actors situated within the risks and opportunities frame (e.g. Berry et al. 2016; UNEP Inquiry 2015; Zadek and Robins 2014). UNEP Inquiry highlights the failures of the financial system by pointing towards systemic biases in risk assessments, short-termism, inflated derivative markets of dubious real economic value and the inability of the financial system to create ‘missing markets’ for sustainable products (Zadek and Robins 2014: 19ff; Zadek and Robins 2018: 15). The argument that short-termism is a systemic problem of the financial system is also taken up by other actors such as 2° investing (Naqvi et al. 2017). “Undue” and systemic short-term pressures in the capital markets have also become a topic for the HLEG (2018: 5) and the European Commission. In the action plan that followed the HLEG’s recommendations, the Commission instructed the European Supervisory Authorities (ESAs) to conduct research on short-termism (EC 2018a: 11).

The climate finance frame also highlights the transformative potential of finance. Its take on the question is, however, less concerned with detecting deep structural reasons for the current misallocation of funds towards unsustainable businesses. Instead, it emphasises the transformative potential that will be unlocked once the financial plumbing connects an abundance of funds with until now cash-stripped transformative projects.

The debate on whether finance has a transformative role or not seems not be structured entirely by opposing frames. While the climate finance frame occupies the transformative finance position, the risks and opportunities frame and the critical frame are more divided. Instead, it appears that academic paradigms are a better dividing line in this debate. Modern financial theory and environmental economics see finance as an information processing machine, whose functioning has to be ensured by correcting

market failures in the real economy. The evolutionary systems paradigm, on the other hand, bestows considerable agency on the financial system.

Among the institutional locations where this relatively academic debate is most relevant are central banks and regulators. This is not surprising since these actors have undergone a process of scientisation over the past decades and as such can be expected to reflect academic disputes (cf. Marcussen 2008; Thiemann et al. 2018). As I emphasised above, central bankers and regulators adhere to the real economy focus when it comes to capital requirements. This reflects a neoclassical inspired conceptualisation of financial risks and market failures. Furthermore, as independently argued by two representatives of this community in different occasions, central bankers were at first generally sceptical about the integration of climate-related risks into their work. This is because they find it difficult to reconcile such innovations with their mandate, which is price stability. Sticking to their mandate became a central concern for central bankers after the GFC. As they had accumulated more power through unconventional monetary policies, central bankers were careful to point out the consistency of such policies with their mandates to fend off accusations that hold that they were influencing the economy in an unaccountable manner.¹⁸²

The restraint that the real economy focus imposes on central banks stands in contrast with the NGFS' activist stance. Frank Elderson, governing board member of the DNB and executive director of the NGFS, leans more towards this “whatever it takes” approach. This is evidenced by his positive view on the leverage of central banks and his tackling of the question of mandates by paraphrasing John F. Kennedy (“Do not ask what legislation can do for you [as a Central Bank], but what you can do

¹⁸² Jose Manuel Marques (Banco de España). Notes 2nd FINEXUS conference, Zurich: January 17th, 2018., Edo Schets (DNB). Notes GRAFSI, 2nd conference, Oxford: September 5th, 2019.

without additional legislation”¹⁸³). Such a position is much closer aligned with the transformative finance view. It also integrates well with the variation of the risks and opportunities frame, which is advocated by the NGFS. The systemic nature of climate risks is taken as a justification for swift, bold and decisive actions by otherwise neutral supervisors. A commonality between the transformative finance view and the systemic variant of the risks and opportunities frame is that they both borrow from the evolutionary systems paradigm.

A reconciliation between the transformative and the non-interventionist interpretations of central banks’ role is offered by proposals that argue that central banks should use their capacities in supervision and monetary policy to advance environmental aims “without prejudice” to the primary objective of price stability (e.g. Cœuré 2018; Schoenmaker 2018; Villeroy de Galhau 2019).

In summary, the transformative finance vs. real economy focus debate cuts across the risks and opportunities, climate finance and critical frame and can be better understood in terms of academic paradigms. The transformative position follows an evolutionary systems perspective, whereas the argument that financial reallocations will follow suit as soon as real economy market failures are addressed is rooted in the efficient market theories from modern finance and the pricing solutions of environmental economics. When it comes to policy recommendations, the transformative position seeks to mobilise all possible levers to move the system into a new state. The real economy focus cautions against such all-embracing measures and, instead, vouches for the careful treatment of market failures.

¹⁸³ Frank Elderson (DNB). Notes EU Public Hearing: A global approach to sustainable finance, Brussels: March 21st, 2019.

6.3 What Gets Measured, Gets Managed: Metrics, Taxonomies, Definitions and Scenarios

If it is true that what gets measured gets managed, then it matters who decides what gets measured and how the measurement is done. From a performativity point of view, measurements can be understood as attempts to establish the ideational infrastructure (Braun 2014) of sustainable finance. The tools that actors mobilise to build this infrastructure are to some extent aimed at solving the debates from the previous section. For instance, definitions and measurements of ESG issues provide the data that feeds into the large n studies that investigate the ESG-performance trade-off.¹⁸⁴ In addition, the selection of categories to measure ESG issues has implications for the financial materiality vs. ESG impact debate.

Yet the shape of socio-technical instruments cannot be simply explained as a linear extension of debate positions. Socio-technical instruments are not primarily intended as weapons for persuasion and legitimacy. As stressed in chapter 2, they bring together ideational and material components to make new objects intelligible and hence governable. To undertake ESG investing, it is necessary to create methodologies that transform the economic activities of corporations into data that is processable by people and machines that make financial decisions. The socio-technical instruments that transform a hitherto extra-financial reality into financial categories are, however, not unproblematic reflections of that reality. Instead, they incorporate certain ideational and material factors, while leaving out others. By doing so, they take inspirations from the different frames and academic paradigms.

¹⁸⁴ Cf. Interview Economist, environmental agency, Western Europe, Interview European Commission Official.

In the following section, I will examine five types of socio-technical instruments. The selection of these instruments was informed by the same criteria as the selection of the debates, i.e. repeated and controversial referrals in the data. Starting with the chronologically oldest one, I first discuss *ESG metrics and indicators*. Subsequently, I look at the *risk factors* that have been developed to link sustainability to financial decision making. In the third subsection, (green) *taxonomies* are considered. This is followed by a discussion of the role of *scenario analysis*. Finally, I examine metrics that measure the *performance of the financial system* as a whole.

Measuring Good and Bad: ESG Metrics and Indicators

ESG metrics and indicators date back to the 1980s and 1990s when SRI saw its first expansion. The demand for these indicators came mostly from religious investors, who looked for methods that could help them determine what counts as an ethical investment. The creation of the UK based ethical research service EIRIS by the Methodist Church and the Quakers is an early attempt to fill this gap (Sparkes 2002). In France, the creation of ARESE, which later merged with EIRIS to become Vigeo Eiris followed a similar script albeit its definition of social and environmental issues did not have explicit religious undertones (Déjean et al. 2004). Other sustainability rating agencies that emerged at the time are Sustainalytics, imug, ecofys, utopis and oekom.

These agencies sell ESG scores that are based on proprietary models to investors. The models combine publicly available information with ESG relevance, data from other specialised vendors (e.g. on GHG emissions)¹⁸⁵ and original research.

¹⁸⁵ GHG emissions data are in turn estimated by the non-profit CDP and special vendors like *South Pole Carbon*, *Trucost* and *Thomson Reuter's Asset4* (cf. 2°investing 2014: 17).

The unit of analysis are share and bond issuing companies and sovereigns. The outputs of these methodologies are often index values or ordinal categories (e.g. green, yellow, red). Furthermore, some agencies specialise in in-depth qualitative analysis, which, however, appears to be undervalued by investors.¹⁸⁶

When it comes to the demand for ESG ratings, faith-based investors remain important clients for sustainability rating agencies. In addition, two types of investors have joined more recently. An interviewee from an ESG ratings provider argued that the first type of investor strongly believes that ESG issues can drive returns, whereas the second type just needs “any number” for compliance.¹⁸⁷ This categorisation fits well with the earlier interview statement about debate between the true (ESG) believers and those that just jump on the bandwagon (cf. last section).

The data demands of the true believers, who are frame sustainable finance in terms of risks and opportunities, differ from those of the adherents of the SRI frame. The SRI frame had been operationalised by making in- and exclusions based on the idiosyncratic ethical views of investors. Traditional ESG ratings with their thresholds and aggregate assessments are designed to cater to these investment strategies. They do, however, not fit easily with other approaches to sustainable finance. This is evidenced by investors’ complaints about the irrelevance of ESG metrics.

A 2016 report from ShareAction and the WWF found that half of the surveyed Swiss pension funds mentioned the lack of information as an obstacle to responsible investment. Given the wide range of available ESG information, the authors attributed investors’ complaints to the lack of reliable, complete and homogenous data (Hierzig

¹⁸⁶ On the description of ESG metrics see Interview, Researcher, Sustainability Agency.

¹⁸⁷ Interview, Researcher, Sustainability Agency.

2016: 17, 36).¹⁸⁸ More recently, Morgan Stanley and Bloomberg came to a similar conclusion when surveying 300 US asset managers. Accordingly, 70% of the respondents maintained that there were no standard industry metrics for sustainable investing (Morgan Stanley and Bloomberg 2019: 12).

The criticisms on the irrelevance of ESG ratings mirror the debate about financial materiality. As noted earlier, the FSB TCFD recommendations point out that companies should disclose material information on climate-related risks in their annual financial filings. Part of the motivation of this recommendation is to move the material ESG issue of climate change away from the supplementary “window dressing”¹⁸⁹ sustainability reports to the more important annual financial filings.

Materiality assessments, which are driven by a risk and opportunity calculus, stand in conflict with earlier ESG assessments as they require different categories. A joint report by 2° investing, the World Resources Institute (WRI) and UNEP FI points out that there is a notable difference between the impact metrics of climate friendliness and measures of ‘carbon risk’. While the former emphasises the share of positive contributions of a portfolio (i.e. ESG impacts), the latter only looks at financial losses (i.e. financial materiality). A discrepancy between the two can occur when high carbon intensities do not contribute to enhanced risks. This can be the case when regulatory costs can be easily passed on to consumers. In another set of cases the high costs of fossil fuel production rather than their ‘dirtiness’ drives risk (Fulton and Weber 2015: 15ff). On a more fundamental level, there is also a discrepancy between ESG scores and ESG risks, if regulatory developments rather than physical damages are the source

¹⁸⁸ A similar point was made by Dirk Schoenmaker (Rotterdam Business School), who highlighted the weak correlations between the metrics of different ESG providers for the same companies as well as their incompleteness, since they are only based on companies that report thus leaving out the worst performers and smaller entities. Cf. Notes Bruegel workshop: How to Speed Up Sustainable Finance?, Brussels: November 28th, 2018.

¹⁸⁹ Interview, asset management, North America.

of risk. This is because as long as policy changes like the pricing of externalities or the prohibition of certain economic activities are not forthcoming, the correlation between ESG scores and material losses remains inexistent (cf. Fulton and Weber 2015: 12).¹⁹⁰

Apart from the selection of categories, the risks and opportunities frame alters the process of measurement itself. In- and exclusion strategies were served well by indices that set thresholds to determine what counts as responsible investment. By contrast, risk-based decision-making requires more granular and complete data. To measure the exposure of a bank's balance sheet or an investor's portfolio to a set of ESG risk factors, analysts need at best information on all risks for all assets. A large portfolio owner, who follows modern portfolio theory's prescriptions about the benefits of diversification, requires greater amounts of data than a niche SR investor, who is concerned with the alignment to ethics. The latter investor is perfectly happy with a smaller investment universe, which would be a non-starter for the former. On the other hand, the risk-based investor can live very well with an asset that carries high ESG risks as long as there is a hedge. This, in turn, stands in stark contrast to the principled approach of SRI. As a consequence, the ESG rating approach of relying on publicly available data plus the rating agencies' own research is no longer sufficient once the risk and opportunities frame becomes dominant.

The fact that risks and opportunities framing made the hitherto uncontentious SRI-way of measuring ESG issues problematic is illustrated by the debate about 'bottom-up' versus 'top-down' metrics. Bottom-up refers to the traditional SRI method of attributing good or bad ESG indicators of projects and economic activities to companies and then to the securities that they issue. The bottom-up approach is also used by the watchdog CSOs that report on negative environmental impacts like the

¹⁹⁰ See also Interview Nina Lazic.

coal exposure of financial institutions (e.g. Kirsch et al. 2019; see also Dupré et al. 2013). Notably, initiatives like the GRI, the FSB TCFD (cf. chapter 4), the Sustainability Accounting Standards Board and the CDP can also be sorted to the bottom-up approach. This is because they equally rely on the disclosure of companies to assess ESG issues. The important difference between these initiatives and the ESG rating agencies is that the former aim for standardisation, whereas the latter offer tailor-made, proprietary methodologies.

Despite these attempts for standardisation, the bottom-up approach still has problems with providing quick and inexpensive measurements of the exposure of all assets to all risks. The necessity to include all assets also leads to problems if corporates' disclosure is deficient. Top-down approaches can remedy this. These measurements are often based on Input-Output models that assume a fixed relation between environmental inputs (i.e. resources) and outputs (i.e. pollutants and emissions) for a given sector or value chain (Dupré et al. 2013: 17; see also Goldhammer et al. 2017: 1165 for a literature review and Busch et al. 2018; IMF 2019: 90ff on the correlations between different methodologies). Other model-based solutions are regressions that extrapolate from reported data to fill disclosure gaps (Dupré et al. 2013: 17ff).

Next to a full coverage, a risk-based understanding of sustainable finance needs a common yardstick to make potential investments commensurable. Thus, 'objective' indicators that can replace the idiosyncratic methodologies used by the sustainability rating agencies are required. Alongside with the changes in political and societal context, this requirement has contributed to the increasing centrality of climate and energy issues in sustainable finance that was observed in chapter 4. A report by the financial service provider Kepler-Cheuvreux illustrates this point by stating that GHG

emissions are the most used and standardised ESG indicator (Raynaud 2015: 15). Yet while this is the case, researchers remain sceptical about GHG foot-printing as inconsistencies between datasets and methodologies persist despite conventions like the GHG protocol (Busch et al. 2018; Dragomir 2012).¹⁹¹

In light of the complications with measuring even something seemingly conventional as CO₂ emissions, one might question whether the standardisation that is routinely demanded by risk motivated financial institutions can actually be driven by a convergence towards scientific accuracy. This might be especially questionable if investors just want ‘any number’ and are unwilling to pay for expensive measurement systems.¹⁹² And bearing in mind the question at the beginning of the chapter of how to invest in lowering inequality, the problem of standardising metrics gets even more problematic when it comes to non-climate ESG issues.

Furthermore, there might actually be an active resistance to informative and standardised metrics in some parts of the financial system. Indeed, the ‘any number’ category of investors prefer idiosyncratic ESG definitions. This preference does not reflect ethical considerations, which would imply that investors choose the metrics that align best with their values. Instead, financial institutions that are only interested in box-ticking engage in ‘ESG data shopping’. This means that they choose the provider, whose methodology emphasises the positive impact of their portfolio and downplays the negative categories.¹⁹³

¹⁹¹ On scepticism towards indicators see: Interview Franziska Schütze; See also Dirk Schoenmaker: Notes Bruegel workshop: How to speed up sustainable finance?, Brussels: November 28th, 2018.

¹⁹² On investors’ reluctance to pay for data cf. comments by Rochus Mommatz (responsAbility Investments AG). Notes OECD 5th Forum on Green Finance and Investment, Paris: November 13th, 2018.

¹⁹³ For a reflection on ESG shopping cf. “Poor scores: Climate change has made ESG a force in investing” *Economist*, December 7th, 2019. <https://www.economist.com/finance-and-economics/2019/12/07/climate-change-has-made-esg-a-force-in-investing>. Accessed January 23rd, 2020.

Even if the standardisation of financially material ESG data was to occur, one still can doubt of how ‘scientific’ such a process would be. Echoing previous episodes in the development of financial measures (cf. de Goede 2005), the process of consolidation that is currently going on in the field of ESG metrics is much more profane than one would imagine. The consolidation that is happening appears to be not about the convergence of metrics through scientific discussion but about market consolidation, i.e. mergers and acquisitions. In April 2019, the rating agency Moody’s bought the French ESG provider Vigeo Eiris. This is only the most recent episode of a buy-out frenzy of ESG firms, where International Shareholder Service acquired the German ESG firm oekom as well as the emissions data provider South Pole Group. Meanwhile, S&P bought Trucost and Morningstar holds a 40% stake in Sustainalytics since 2017, which it will increase to 100% by 2022. Lastly, more quantitatively oriented ESG start-ups have undergone the same process of consolidation. Carbon Delta, which is home to the commercial application of climate VaR, was bought by the index provider MSCI. Meanwhile, the Co-firm, a provider of scenarios for climate risks and opportunities scenarios, was acquired by the global auditor Price Waterhouse Coopers.

Notably, this process of consolidation has affected the first generation of SRI-inspired ESG data providers (Vigeo Eiris, Sustainalytics, oekom), the second generation that complemented this data with top-down modelling (Trucost, South Pole Group) and an emerging third generation that provides quantitative and computationally sophisticated (e.g. involving AI or geospatial data) modelling (Carbon Delta, Co-firm). And while investors that want to measure material risks in a

standardised way seem to be happy, ESG providers are worried about the loss of diversity.¹⁹⁴

In summary, an evolution of ESG metrics and indicators has occurred as a shift from the SRI to the risks and opportunities frame meant that the demand for in-depth company assessments was replaced by demand for granular data on all existing assets. This has favoured the role of easy to comprehend, quantitative metrics like GHG emissions over more complex and political issues like workers' rights or gender equality. At the same time, more idiosyncratic metrics seem to be able to survive as they still cater to existing SRI funds as well as to investors that engage in ESG data shopping to boost their sustainable credentials. Finally, investors' appetite for convergence might not result in a move towards the most scientifically sound metrics, but in the survival of the metric provider that fares best in the process of market consolidation.

From 'Fluffy' to 'Rock-Solid': Risk Factors

The idea that environmental issues carry some sort of risk is not particularly new. Insurers contemplated climate-related risks already in the 1990s (Paterson 2001). Furthermore, after the corporate debacle of Enron and the boycotts following scandals from oil majors Exxon and Shell in the same decade, CSR experts emphasised the relevance of reputational risks.¹⁹⁵ Yet these risks failed to get sustained attention from

¹⁹⁴ Jennifer Thompson, "ESG rating agencies fulfil the need for knowhow", *Financial Times*, May 12th, 2019, <https://www.ft.com/content/2cd37df8-a973-3f94-b498-09ee1a6ba53b>, Accessed June 13th, 2019.

¹⁹⁵ Interview European Commission Official: According to the interviewee, "social" reputational risks from mass layoffs (e.g. due to plant closure) were also prominently discussed as a reputational risk; something that has completely disappeared in the evolution of the debate. However, increased scrutiny of how firms treat their employees during and after the ongoing COVID 19 pandemic seems to suggest that attention to these factors might make a comeback. Cf. Gillian Tett et al. "Coronavirus profiteers warned; Richard Curtis's plan to build back better; the rise of 'S' in ESG", *Financial Times*,

corporates and financial institutions. While climate-related risks were explored at the time, they did not make it into the day-to-day financial decision making of insurers (Paterson 2001: 27). Reputational risks, meanwhile, were relegated to relatively powerless CSR departments.

The recent resurgence of a reputational risk narrative, which emphasises the changing demands from Millennial investors and employees (cf. chapter 4), notwithstanding, reputational risks have so far failed to generate lasting impact. As opposed to the ‘real’, financial risks, ESG issues appeared to be ‘fluffy’. But what makes risk factors either real or fluffy? The performativity answer to this question is that it is not the true nature of the risks but the (non-) existence of an ideational infrastructure that makes all the difference.

Risk factors become only real, if there are stable concepts that delineate them from other specific and residual risks and if there are conventions on how to assess them (cf. Allan 2017; de Goede 2005). One might, for example, ask how real credit risk would be, if its delineation from market risk was withdrawn, if conventional analysis techniques like looking at credit history and collateral values were put into question and if the material infrastructure of credit rating agencies ceased to exist. Far from being an exclusive concern of performativity researchers, such questions of definition and delineation matter greatly for investors. A report by the GPIF and the World Bank on sustainability in bond markets summarises these concerns and points out that “There is still little understanding and consistency about how ESG “factors” relate to the established factors in asset pricing models, such as value/growth, size, liquidity” (Inderst and Stewart 2018: 20).

March 27th, 2020. <https://www.ft.com/content/457fc6d2-4f94-4a1f-bfb7-4142a45480c4>. Accessed April 13th, 2020.

The risks and opportunities frame is quite intuitively most relevant for the stabilisation of risk factors. In chapter 4, I argued that while the overall diagnostic and prognostic framing concerning risks and opportunities remained the same, the issues that are supposed to constitute risks and opportunities as well as the corresponding definitions changed markedly. The significance of these changes is thus less observable at the level of the debates, which are characterised by positions informed by different frames, but matters all the more for the design of socio-technical instruments.

One of the most significant variations within the risk and opportunities frame is that after the failure of reputational risks to lead to much change, the stranded assets concept gave rise to a new research programme. The emphasis on social and political changes in the transition towards a sustainable, low-carbon economy meant that the stranded assets argument was soon sorted into the category of ‘transition risks’. These are also known as non-physical risks (e.g. Fulton and Weber 2015: 6) and as such different from the physical risks that estimate the impact of climate change on financial assets. The constituent factors of transition and physical risks were already present before they received these names. Possible litigation costs, technological change and shifts in consumer preferences were to become transition risks, whereas losses from floods, droughts and other natural disasters would be categorised as physical risks (e.g. Caldecott and McDaniels 2014: 10; Dupré et al. 2013: 12 for a description of these subcategories prior to the categorisation).

The stabilisation of risk factors into the two overarching categories occurred from 2015 onwards. Interviewees have pointed out the importance of the PRA’s differentiation between physical risks, transition risks and liability risks that Mark Carney mentioned in his famous 2015 speech. Subsequently, other public and private

actors were educated to think along the same lines (cf. chapter 4).¹⁹⁶ While it is unlikely that the PRA was all-powerful in popularising these concepts, it is true that transition and physical risks became widely used afterwards.

To operationalise the two overreaching concepts, a couple of subcategories have been proposed. For transition risks, these include policy and legal factors (i.e. liability risk), technological factors, market and economic factors and reputational factors. Physical risks, on the other hand, are often decomposed into an acute (e.g. extreme weather events) and a chronic (e.g. persistent change of average temperature or sea level rise) dimension (cf. Clapp et al. 2017; FSB TCFD 2017: 5ff; Fulton and Weber 2015: 8). Most recently, the NGFS has gone beyond simple categorisations and proposed transmission mechanisms that connect physical and transition risks with the real economy and the financial system (NGFS 2019a: 13-17).

The indicators for measuring the subcategories of physical and transition risks usually come from the ESG data providers discussed in the previous subsection. Data on GHG emissions is amongst the most prominent inputs for assessing transition risks. The FSB TCFD recommends the use of emissions normalised by AUM – the so called carbon intensity – as a transition risk indicator. While widely used (see also TEG 2019a), those arguing from a financial materiality perspective have criticised carbon intensity for its inconsistency and the failure to correlate with financial losses (Weber et al. 2017b).

Physical risks, on the other hand, are quantified by matching global or regional climatological models to financial assets (e.g. Ambachtseheer et al. 2015; Clapp et al. 2017 EIU 2016; Reid et al. 2019). One example of this technique would be the

¹⁹⁶ I 17 (confidential), Interview Former central bank official, Western Europe. Liability risks were dropped later and seen as a subcategory of the other two risk factors (cf. PRA 2018)

assessment of projected losses on real estate that is exposed to a changing climate. Insurance companies have traditionally carried out such assessments in-house. The arrival of the last generation of quantitatively sophisticated ESG data providers (see last subsection) might mean that this expertise is no longer the exclusive domain of insurers and their regulators.

The remaining dimensions of transition risk like litigation, technological change and preferences shifts are least developed when it comes to standardised quantitative indicators. Their understanding remains to date based on case studies, projections of trends and narrative arguments (cf. Baker et al. 2017; PRA 2018).

Finally, the NGFS and some of its member organisations have argued that climate-related risks are distinct from other systemic risks. This is because of their far-reaching impacts, irreversibility, foreseeable nature and dependence on short-term actions (NGFS 2019a: 12, see chapter 5). This understanding also has implications for the choice of measurements. The first NGFS report notes that the development of adequate data, models and “intellectual capacity” is still work in progress (NGFS 2019a: 29ff). This notwithstanding, NGFS members have developed micro-financial assessments of climate-related risks to size the exposure of financial institutions (NGFS 2019a: 24-25).

In addition, the NGFS has started to explore more ‘unorthodox’ economic models like Stock-Flow-Consistent models, Input-Output models and network contagion models to map potential transmission channels (NGFS 2019b). Notably, these techniques are more closely associated with the evolutionary systems paradigm explored in chapter 5. Yet another risk assessment tool from the NGFS is a 2x2 typology along the dimensions of orderly vs. sudden transition and success vs. failure

in meeting the below 2° target. The four categories of this typology will be used to come up with scenarios that estimate macro-financial risks (NGFS 2019a: 21).

One factor that is common to transition and physical risks is that they have to be financially material. While there is some overlay with indicators that focus on the contribution of financial instruments to environmental and social impacts (see also section 2 on double materiality), the designation of *risk* is reserved for (projected) financial losses. The relation of risk factors to the financial materiality position should come as no surprise since both are associated with the risks and opportunities frame. The capability of the different risk factors to connect with the procedures and definitions that financial institutions and regulators identify as material is also likely to have contributed to the ‘success’ of transition and physical risks compared to the relative ‘failure’ of reputational risks.

In summary, the development of risk factors has not seen a great deal of antagonism between the different frames. Instead, different approaches have remained within a broad acceptance of the risks and opportunities frame. Inside of this frame, transition and physical risk factors were stabilised through more consensual definitions and the support of regulators like the PRA. Nonetheless, a cleavage concerning the understanding of risk factors can be detected when assessing them in terms of the academic paradigms. On the one hand, the establishment of transition and physical risks as another factor alongside traditional categories like currency risk fits well with modern financial theory. The same goes for socio-technical instruments like climate VaR models, which use techniques and concepts like discounting and diversification to calculate risks and opportunities. On the other hand, the introduction of forward-looking scenarios and the systemic understanding of risks point towards a perspective that is more in line with the evolutionary systems paradigm.

Shades of Green and Brown: Taxonomies

Taxonomies are lists that answer the question of what is green or brown. By doing so, they black-box fundamental choices about the goals and the assumed causal mechanisms of sustainable finance. The indicators that are used to gauge contributions to green objectives privilege some aims at the possible expense of others. The inclusion of certain issues, even if based on reasons of political expediency or the availability of data and not on scientific merit, stabilises the assumption that they matter most for sustainability. Taxonomies' emphasis on contributions to sustainability already indicates that this kind of socio-technical instrument is geared to the measurement of non-financial ESG impacts (see previous section).

The EU's taxonomy of green economic activities (EC 2018b) is the most comprehensive of its kind so far. Furthermore, it is expected to be the base for the Commission's future actions. This has meant that it is sometimes presented as the "grammar" of sustainable finance.¹⁹⁷ To assist with the operationalisation, the Commission has established a Technical Expert Group (TEG) of 35 experts from academia, industry and civil society (TEG 2019a: 17).

As it marks the first comprehensive attempt to define greenness, the Commission emphasises the taxonomy's centrality. At the same time, financial institutions and regulators take great interest in its development (cf. NGFS 2019a: 34; Villeroy de Galhau 2019: 10).¹⁹⁸ This might sound surprising since these latter actors care more about financially material risks than about ESG impact. It, however, illustrates that the separation between the two concepts and more markedly the

¹⁹⁷Olivier Guersent (DG FISMA) OECD 2018; Mario Nava (DG FISMA). Notes OECD 6th Forum on Green Finance and Investment, Paris: October 29th, 2019.

¹⁹⁸ Interview I 17 (confidential); Edmund Lakin (HSBC). Notes Bruegel workshop: How to speed up sustainable finance? Brussels: November 28th, 2018.; Olivier Guersent. Notes OECD 6th Forum on Green Finance and Investment, Paris: October 29th.

indicators that measure them is less crisp than the discussants in the debates would like. This notwithstanding, some members of the expert community have been sceptical about the central position that the EU awards to the taxonomy, because it integrates poorly with risks and opportunities considerations (see also below this subsection).¹⁹⁹

The prioritisation that taxonomies award to ESG impact metrics can be better understood by looking at the actors that have pioneered their use. The Commission's initiative is not the first attempt to classify green economic activities. When the first actors ventured into the terrain of definitions the stakes were, however, somewhat lower. The existing taxonomies are the CBI's Climate Bonds Standard, first developed in 2010, the Green Bonds Principles from the International Capital Markets Association (ICMA) (2014), the Multilateral Development Banks' and International Development Finance Club's Common Principles for Climate Change Mitigation Finance Tracking (2015) and the Green Finance Committee of China Society for Finance and Banking's Green Bond Endorsed Project Catalogue (2015). These initiatives set out eligibility criteria and assessment procedures that confer green labels on bonds.

While the taxonomies differ, the EIB and the People's Bank of China (PBoC) have developed a self-described "Rosetta Stone" document that translates between the different frameworks. Table 6.1 describes the generic build-up of the existing taxonomies (cf. EIB and PBoC 2017). Depending on the scheme, financial instruments that provide funding for sectors that contribute to one or more of the policy objectives can be considered green.

¹⁹⁹ Monica Scatista (EIB). Notes OECD 6th Forum on Green Finance and Investment, Paris: October 29th, 2019.

			POLICY OBJECTIVES				
Macro - Sector	Sector	Sub-sector	Climate change mitigation	Climate change adaptation	Biodiversity Loss	Natural Resource Depletion	Pollution Prevention and Control
Macro-Sector A	Sector A.1	Sub-sector A1.1	Primary Criterion / Indicator	Primary Criterion / Indicator	Primary Criterion / Indicator	Primary Criterion / Indicator	Primary Criterion / Indicator
		Sub-sector A.1.2	...	...	...	...	...
	Sector A.2	...	...	...	...	...	...

Table 6.1 Universal Taxonomy Reproduced from EIB and PBoC 2017: Annex II

As can be seen in table 6.1, all taxonomies take the sector and not the individual company as their unit of analysis. In their review, the EIB and the PBoC find that some taxonomies have a broader environmental scope, while others are exclusively targeted to climate mitigation and adaptation (EIB and PBoC 2017: 5). A corollary to this is that none of the existing frameworks incorporates the social dimension of ESG. While this lacuna was addressed by the ICMA's Social Bond Principles (2017), human and workers' rights organisations have lamented the exclusion of the social dimension.²⁰⁰

The TEG's taxonomy builds on earlier attempts that are aimed at estimating the impact of sustainable financial instruments like green bonds. Before the TEG was convened, DG CLIMA had already commissioned a study for the HLEG that reviewed existing taxonomies and definitions of greenness. The commissioned study echoes the universal taxonomy of table 6.1 as it suggests a sector-based approach (Kahlenborn et al. 2017: 44ff). The significant involvement of the EIB and the CBI in the formulation

²⁰⁰ Notes ERIN conference, Brussels: February 25th, 2019 (Chatham House rules).

of the taxonomy (cf. TEG 2019a: 8-9, 20) also meant that the final shape of the 414 pages long taxonomy document reflects earlier initiatives.

After specifying relevant economic activities, taxonomies classify their greenness in a binary or continuous manner. This is achieved by establishing minimum quantitative thresholds (e.g. tons of CO₂ equivalent emitted per ton of cement produced), specifying the adoption of low-carbon practices (e.g. manure management for livestock farming) or singling out the production of certain products (e.g. insulating windows) (cf. TEG 2019a: Annex F for the examples). In the case of the TEG, the data for the respective assessments should at best come from company disclosures that are in line with the taxonomy. However, the TEG notes – in accordance with what was argued in the subsection on ESG metrics – that even GHG disclosure is deficient and that currently 80% of the data has to be obtained via estimation methods (TEG 2019a: 72).

An innovation of the TEG is that in order to comply with the taxonomy, the economic activity in question must demonstrate that it does not jeopardise five other environmental objectives as well as social safeguards (TEG 2019a: 64-65). This do-no-significant-harm (DNSH) clause is carried over from the DG CLIMA study (Kahlenborn et al. 2017: 44) and the regulatory proposal. The DNSH has notably led to the categorical exclusion of nuclear energy and waste incineration as these activities jeopardise the reduction of pollution and the promotion of the circular economy respectively (TEG 2019a: 235, 293). In addition, the TEG excludes economic activities that offer short-term reductions in emissions, but lock-in long-term high-carbon trajectories as in the case of making fossil fuel extraction infrastructure more energy efficient (TEG 2019a: 33).

One major point of contestation for the taxonomies is the tension between ‘scientific’ merit and ‘political’ influence. A case in point is the Chinese green bond framework, which allows for green bonds proceeds to be mobilised for the “clean utilisation of coal”. Clean coal refers to the capture of methane emissions from coal mining and the reduction of pollutants through the ‘washing’ of coal prior to combustion (EIB and PBoC 2017: Annex III). Since the burning of coal without Carbon Capture and Storage (CCS) is considered to be inconsistent with the below 2° target (section 2, see also next subsection), non-Chinese observers have described these ‘technical criteria’ as an obvious political choice.²⁰¹

Yet also Europe is not immune to such tensions between industry interests and scientific targets. One interviewee recounts an episode in the European Parliament, where the choice to exclude fossil fuel companies but not aviation from the proposed sustainable investing benchmarks was achieved through a kind of horse trade.²⁰² Moreover, the exclusion of nuclear energy and unabated gas electrical utilities from the TEG’s initial proposal attracted opposition from several member states (notably France for nuclear and the Germany and Poland for gas). The proposal from the TEG also received a record number of industry feedback. Both industry associations and individual firms submitted criticisms of the taxonomy.²⁰³

Notably, industry engagement with the taxonomy was not confined to Europe with a particularly scorching critique coming from the Japanese Business Association. One of the association’s members criticised the ambitious thresholds of the taxonomy by likening it to the “Darth Vader of green finance” because in his opinion just as the

²⁰¹ Philippe Zaouati (Mirova, HLEG member). Notes EU Public Hearing: Sustainable finance, Publication of the HLEG interim report, Brussels: July 18th, 2017.

²⁰² Interview MEP Greens/EFA.

²⁰³ Cf. Notes EU Public Hearing: A global approach to sustainable finance, Brussels: March 21st, 2019; Notes EU stakeholder dialogue: progress and outcomes of the technical expert group’s work on sustainable finance. Brussels: June 16th, 2019.

Star Wars villain represents the dark side of the force, the list was also “dark green”.²⁰⁴ Following these attacks from member states and industry, the final compromise reached by negotiators in the trilogue in December 2019 smoothened the taxonomy’s wording slightly.²⁰⁵ And while early commentators have interpreted those changes as minor language issues that will e.g. not lead to the inclusion of gas and nuclear as eligible projects²⁰⁶, one might interpret these moves as pre-emptive maneuverers that will potentially harden the application of the taxonomy to issues that go beyond the narrow focus of providing a standard for green bonds.

The focus on green bonds, the involvement of actors like the development banks and the CBI and the importance of ESG impact criteria already indicate that the climate finance frame is most closely related to taxonomies. This relatively unambiguous association changed, however, with the EU taxonomy. This taxonomy is envisioned as a building block that enables green bond labelling, which is in line with the legacy from the climate finance frame. However, the taxonomy might also serve as basis for the potential assignment of risk weights to existing assets and the update of capital requirements by regulators. This latter intended use is, in turn, much closer to the risks and opportunities frame. The conflicting position between these two frames has meant that the TEG’s output has become the source of criticism that goes beyond the material interests of affected industries.

One line of criticism has taken aim at the fact that the legacy of earlier taxonomies as well as the narrow mandate of the TEG meant that it is focused on defining a niche and not on changing the bulk of the financial system. 2° investing

²⁰⁴ Satoshi Ikeda (Japanese Financial Services Agency). Notes OECD 6th Forum on Green Finance and Investment, Paris: October 29th, 2019.

²⁰⁵ Jorge Valero, “EU reaches milestone by agreeing on criteria for green finance” *Euractiv*, December 5th, 2019. <https://www.euractiv.com/section/energy-environment/news/eu-reaches-milestone-by-agreeing-on-green-criteria-for-finance/>. Accessed January 23rd, 2020.

²⁰⁶ Ibid.

argued that the application of impact-based metrics ends up promoting niche financial products that are exposed to environmentally friendly economic activities. When applied to the capital markets, such policies fail on their own terms since the promotion of the corresponding financial products does not necessarily translate in environmental impact. This is because there is no direct transmission mechanism between companies' funding and their investment decisions (cf. Dupré and Felmer Roa 2019). This criticism emphasises the pitfalls of equating exposure to green activities with the increase of said activities.

A related criticism is that the project focused methods of the climate finance frame that measure the positive impact of new assets cannot be applied to equity and corporate bond markets. This is because in the former case money flows from investors to issuers, which, indeed, translates to capital expenditure for positive impacts. On the capital markets, by contrast, money flows mostly between financial institutions. Hence, equating the purchase of existing green financial assets with positive impact is misleading (Dupré and Felmer Roa 2019: 10). Proponents of this line of argument suggest separating the instruments of sustainable finance according to the context. While a green taxonomy makes sense for measuring the positive impact of new assets, it cannot be applied to reallocate funds on the capital markets. Here, risk-based measures are better suited.²⁰⁷

This understanding of a separation of instruments is not shared by all of those who criticise the inability of a green taxonomy to address misallocation of funds in the capital markets. While CSOs such as Finance Watch share the assessment that the construction of an additional green economy (climate finance of new assets) on top of

²⁰⁷ Monica Scatista (EIB). Notes OECD 6th Forum on Green Finance and Investment, Paris: October 29th, 2019.

a fossil fuel based economy is meaningless, their preferred solution is a brown taxonomy that measures the negative impact of existing assets (Finance Watch 2018²⁰⁸). This is in line with the critical frame's emphasis on negative ESG impacts that was described in the previous section.

Yet for the time being, a brown taxonomy at the EU level remains an elusive endeavour. One reason for its absence is the existence of veto players and vested interests, which would have made the formulation of a brown taxonomy a time intensive and politically challenging matter.²⁰⁹ The flipside to this is that while veto-players want to block the brown taxonomy, players from the climate finance community have a material interest in making the green taxonomy happen.²¹⁰ Apart from these interests there is also path dependency. The TEG had to start with something that already existed. Yet what existed were green taxonomies, whose initial purpose was to provide criteria for green bonds. As these taxonomies are upgraded as inputs to instruments like benchmarks, capital requirements or even monetary policy, their role becomes more ambiguous as they enter territories that display by far and large a risks and opportunities framing.

This subsection highlighted that taxonomies are socio-technical instruments that were developed inside the climate finance frame, where actors use them to define and promote the green bond niche. The indicators and definitions that underlie these taxonomies are not necessarily the outcome of scientific scrutiny and public deliberation. This is because priorities of policymakers and industry are sometimes

²⁰⁸ Charlotte Geiger, "Sustainable finance package needs strengthening and expanding to reorient capital", *Finance Watch*, May 28th, 2018, <https://www.finance-watch.org/press-release/sustainable-finance-package-needs-strengthening-and-expanding-to-reorient-capital/>, Accessed June 13th, 2019.

See also: Interview Nina Lazic

²⁰⁹ Olivier Guersent (DG FISMA). Notes OECD 6th Forum on Green Finance and Investment, Paris: October 29th, 2019.

²¹⁰ See also Interview Co-Founder, Sustainability Consultancy, Germany, Interview Emanuele Campiglio.

reflected in the ‘technicalities’. As taxonomies move into other parts of sustainable finance, path dependencies such as the focus on sectors are retained. However, the contact with other frames, notably the risks and opportunities frame, has meant that the TEG’s taxonomy displays inconsistencies, which, in turn, have led to repeated criticisms.

Locking-in the Future: Scenarios

In chapter 5, I have attributed the rise of scenario analysis to the evolutionary systems paradigm and to one of the later variations of the risks and opportunities frame. Scenarios are higher order instruments that interact with ESG metrics, risk factors and taxonomies. Scenarios like the climate VaR, CISL’s unhedgeable risk (2015), Battiston et al.’s (2017) carbon stress test, the Mercer reports and the DNB’s Waterproof? (2017) study take physical and transition risks and translate them into numerical estimates of losses, gains and exposures. ‘Alignment scenarios’, on the other hand, come up with a number that measures how close investors are to the financing of ‘science-based targets’²¹¹ like the Paris Agreement (Höhne et al. 2015; Thomä et al. 2017; Weber et al. 2017a).

The first category of scenarios integrates subcategories of risks and estimation methods to link natural kinds to financial measures. Some scenarios (e.g. climate VaR, Mercer) also reproduce standard procedures from modern financial theory. This happens inter alia through the use of discount rates and a well-diversified reference portfolio. Scenarios on physical risk also incorporate and thus stabilise the relations between climate pathways and damages e.g. via an IAM (cf. chapter 5).

²¹¹ <https://sciencebasedtargets.org/>

Alignment scenarios take a different route, which is associated with the emphasis on systemic risks (and opportunities). The concept of alignment has been championed by the UNFCCC since the Paris CoP with one participant referring to the CoP 24 in Katowice as an “Alignment CoP”.²¹² In this reading, alignment refers to translating the below 2° goal to the level of an individual financial institution. The basic idea behind alignment is to compare the investments and divestments that are needed for a transition with the actual practices of financial institutions.

The translation of the discourse of alignment to the technical level of scenarios is carried out by developing explicit assumptions about how the transition will happen. One scenario model is the Paris Agreement Capital Transition Assessment (PACTA), which has been developed by an EU funded consortium comprising amongst others 2° investing, the PRI (UNEP FI), CDP, WWF Germany and the CBI. This work has also fed into the ISO Standard 14097 (under development), which aims to assess climate alignment of financial portfolios (cf. Thomä et al. 2017: 13). The “Climate Transition” and “Paris-Aligned” benchmarks for equities and bonds that are developed by a subgroup of the TEG follow a similar logic (EC 2018c; TEG 2019b).

While coming from actors inside the risks and opportunities frame, portfolio alignment scenarios are different from forward-looking risk scenarios in two ways. First, their modelling is agnostic about future financial gains and losses of assets. The scenario also measures the exposure of a financial portfolio to emissions. Yet the emphasis is not on risk but on whether overall capital investments are consistent with a below 2° pathway. This approach thus builds on non-financial metrics of positive impact but expands them insofar as it addresses the problematic situation, where

²¹² Interview CSO staff, climate finance, North America.

investments constitute an improvement over no action but are insufficient to meet e.g. the Paris goals (Höhne et al. 2015).

There are many alternatives to operationalise alignment (cf. TEG 2019b: 48ff). One way is to compare the physical investments that are needed according to a transition roadmap with the investment plans of the companies held by the financial institution. The resulting metric measures the consistency between investments in e.g. renewable energy, cement production or transport and the pathway. An important difference to risk scenarios is that the output is expressed in degrees Celsius and not in a financial metric. Risk is thus black-boxed by the implicit assumption that e.g. the alignment with a 6° scenario is risky (cf. Thomä et al. 2017: 10). The assumption that 6° of warming translates to high risks sounds logical, given the grim projections of the IPCC. Expressing alignment in degrees rather than in money terms is also a way to circumvent the question of financial materiality and bring the risks and opportunities frame's preoccupation with existing assets together with the focus on both positive and negative ESG (read climate in this case) impacts. As such, the alignment approach prevents the possibility that the lack of externality pricing, regional inequalities in the valuation of impacted assets and financial theory assumptions about growth, discounting and diversification might lead to a result where environmental risks are not financially material.

Apart from black-boxing an affirmative answer to the question whether anything that is not Paris-aligned is risky, alignment scenarios also black-box the transition pathways. This means that scenarios require data about the allocation of future emissions to different sectors as well as about technological developments. Most frequently, this kind of data comes from transition models, which combine assumptions about the development of the aggregate carbon budgets with sectoral and

technological trends. The most widely used of these transition models is the annually updated World Energy Outlook of the International Energy Agency (IEA) (IEA 2017; cf. Thomä et al. 2017: 9).

The assumptions about technological development and energy consumption patterns of the IEA have been challenged by Greenpeace for being unrealistic and not in line with the below 2° target. This is amongst others, because the 2° consistent IEA scenario refers to the IPCC's 50% probability pathway of 2° warming (instead of the 66% one) and makes generous assumptions about the deployment of untested CCS and carbon removal technologies (Muttit 2017: 17). The BIS working paper that was introduced in the last chapter also notes that assumptions about CCS can lead to variations in the estimation of stranded assets in scenarios (Bolton et al. 2020: 25).

From a de-growth perspective it is noteworthy that the IEA energy model assumes an annual average GDP growth of 3.4% even though demand reductions in certain sectors like steel and aviation are included (IEA 2017: 13). The efforts that have gone into contesting the IEA scenarios might be interpreted as a testimony of how important alignment scenarios will become in the future. This is also illustrated by a call of “60 business leaders, scientists and investors” for a new transition scenario that is consistent with the 1.5° target, which the IPCC advocated for in its latest report.²¹³ In reaction to these demands, the IEA has come up with a 1.5° scenario for the 2019 World Energy Outlook. As Sean Kidney from the CBI mentioned at one forum, the full publication of the scenario was, however, blocked by the United

²¹³ Natalie Sauer, “Global energy agency asked to stop normalising dangerous climate change”, *Climate Change News*, April 3rd, 2019. <https://www.climatechangenews.com/2019/04/03/global-energy-agency-asked-stop-normalising-dangerous-climate-change/>, Accessed June 13th, 2019. For similar calls see also: Notes ERIN conference 2nd Day (Chatham House Rules). See also Q&A at: Notes EU Public Hearing: A global approach to sustainable finance, Brussels: March 21st, 2019.

States.²¹⁴ Meanwhile, the TEG has also recommended the use of the IPCC's 1.5° scenario for its indices, citing the precautionary principle as justification (TEG 2019b: 44).

Sophisticated scenario analysis is not yet widely used. It is, however, an instrument that has been gaining traction over the last period. The FSB TCFD recommends scenario analysis for corporates and financial institutions. NGFS members have also shown interest in scenarios for micro- and macro-financial analysis. The central banks or regulators of the UK, France, Denmark and the Netherlands have either already applied or are in the process of applying climate scenario analysis to their assessment of financial stability (cf. chapter 4, see also Danmarks Nationalbank 2019). French and British financial institutions are expected to come up with scenario-based stress tests as part of their reporting to regulators (see chapter 4). In addition, the EU's transition and Paris-aligned benchmarks will build on alignment scenarios. Finally, scenarios interact with other instruments like ESG metrics and taxonomies. If these instruments need to be made 'dynamic', i.e. being able to project forward-looking developments of sectors and technologies, they require explicit assumptions about the future.

This subsection has revisited the characteristics of scenarios. Many scenarios are sophisticated projections of the risks and opportunities framing that black-box concepts from financial theory as well as potentially problematic ESG indicators. Alignment scenarios, on the other hand, foreground ESG impacts, which are taken as a longer-term proxy for systemic risks and offer a potential way to relegate risk

²¹⁴ Karl Mathiesen, "IEA develops pathway to ambitious 1.5C climate goal", *Climate Change News*, June 11th, 2019, <https://www.climatechangenews.com/2019/06/11/iea-develops-pathway-ambitious-1-5c-climate-goal/>, Accessed June 13th, 2019.; Sean Kidney (CBI). Notes OECD 6th Forum on Green Finance and Investment, Paris: October 29th, 2019.

considerations that are based on the predicaments of modern financial theory to a secondary place. Instead of risk factors and financial calculations, these scenarios black-box assumptions about technological and societal developments.

Asking the System Question: Performance Measures for the Financial System

The last set of metrics moves in the opposite direction of the quest for ever more granular data. Instead of financial assets, the proponents of financial system performance measures take nothing less than finance itself as their unit of analysis. These metrics start from the assumption that the financial system is embedded in a wider system of systems. This embeddedness means that judgements about the state of finance cannot be made in a self-referential way (see chapter 5). Instead, the financial system's health is assessed by looking at its impact on environmental and social systems. This functional view of finance echoes the narrative of finance being 'the servant rather than the master' that has gained some traction in the aftermath of the GFC (cf. Baker 2015: 352).

The proposed metrics are amongst others finance's efficacy and efficiency to provide the money needed for environmental and social purposes (UNEP Inquiry 2016). In addition, measures such as resilience to crises, diversity of financial institutions (e.g. cooperative banks, sectoral banks, universal commercial banks, ...), the ratio of financing provided to the real economy and the minimisation of funds towards the fossil fuel industry have been suggested (Berry et al. 2018: 48-49, Finance Watch: Dashboard 2019²¹⁵; Turbeville 2016; UNEP Inquiry 2016).

²¹⁵ The Dashboard of Finance, *Finance Watch*, <https://www.finance-watch.org/dashboard/>, Accessed June 13th, 2019.

The reasoning behind these metrics reflects the critical frame and the evolutionary systems paradigm. Moreover, performance metrics implicitly take a stance on the transformative finance vs. real economy focus debate. By conceptualising finance as a proper system rather than as an appendix they convey that changes inside of finance can be transformational.

Apart from UNEP Inquiry, the main proponents of this view are CSOs like the nef, Finance Watch, Positive Money, and the Finance Innovation Lab. The system focus might make performance metrics also interesting for central bankers and regulators. This is so far, however, only partially the case. One interviewee, who interacts with this community, remarked that the question of whether finance as a system is detrimental to sustainability would be interesting. However, she was not aware of any current efforts to answer said question.²¹⁶

For the moment, it seems that NGFS members are only willing to concern themselves with the dimensions of sustainability that can be translated into systemic risks. They, however, shun measurements that benchmark finance against political goals. Regulators and central banks' intermediate positioning on their contribution to societal goals is challenged from both sides. In a recent debate that was conducted on the pages of the Guardian and the FT's Alphaville, Positive Money representatives and former BoE staffer Tony Yates expressed opposing arguments on the scope and political nature of the BoE's mandate.²¹⁷

²¹⁶ Interview Economist, environmental agency, Western Europe.

²¹⁷ Fran Boait et al. "Next Bank of England governor must serve the whole of society", *The Guardian*, June 4th, 2019.: <https://www.theguardian.com/business/2019/jun/04/next-bank-of-england-governor-must-serve-the-whole-of-society>, Accessed June 13th, 2019.

Tony Yates, "Positive Money's problematic proposal for the Bank of England", *Financial Times Alphaville*, June 6th, 2019: <https://ftalphaville.ft.com/2019/06/06/1559818727000/Positive-Money-s-problematic-proposal-for-the-Bank-of-England/>, Accessed June 13th, 2019.

Fran Boait, David Clarke and Simon Youel, "Why the Bank of England should target climate risk", *Financial Times Alphaville*, June 10th, 2019:

When it comes to policy proposals, the HLEG's and EC's demand for the ESAs to research systemic problems with short-termism might be a place into which socio-technical instruments that measure the performance of the financial system can be integrated. Yet, whereas the HLEG has publicly questioned the usefulness of self-referential measures of financial health like the liquidity and tradability of assets, neither the HLEG nor the Commission have so far suggested alternative, system-wide metrics.²¹⁸

In summary, system performance measures are instruments that enable critics of finance to gauge the functionality of the financial system. This functionality is assessed by looking at the positive and negative impacts that finance has on social and environmental systems. System output measures have been developed by CSOs and IOs to inform policy makers and regulators. So far, they have, however, not been incorporated by this target audience into regulatory processes.

6.4 Bringing it All Together: Frames, Academic Paradigms and Transmission Channels

In the previous two sections, I revisited the persuasive and performative transmission channels through which frames and academic paradigms influence the governance of sustainable finance. I explored how actors that are bound together by a common frame create debate positions and socio-technical instruments. In accordance with the transmission mechanism developed in chapter 2, I expected that frames provide the background for the positioning of actors and, hence, the cleavages in the four debates

<https://ftalphaville.ft.com/2019/06/10/1560139220000/Why-the-Bank-of-England-should-target-climate-risks/>, Accessed June 13th, 2019.

²¹⁸ Cf. Chrisitan Thimann (Athora, formerly AXA and HLEG chair): Notes EU High-level conference: Financing sustainable growth, Brussels: March 22nd, 2018.

that repeatedly flare up in sustainable finance. In addition, I outlined the hypothesis that in immature policy subsystems the performative channel would be stronger and more politicised.

In the forgoing sections, I have shown that the first conjecture concerning the attribution of debate positions to frames does not find strong support from the data. Table 6.2 summarises the four debates that I revisited by assigning a (+) and a (-) sign to the debate positions and then matching the frames to the positions in columns 2 and 3. The table shows that the only debate that is clearly structured around competing frames is the one on financial materiality vs. ESG impacts. On the (+) side, actors from the climate finance frame want to discuss the positive impacts of new financial instruments and the adherents of the critical frame emphasise the negative impacts of already existing investments. The risks and opportunities frame, by contrast, occupies the (-) side and rejects the relevance of ESG issues that cannot be expressed in financial terms.

The remaining three debates all feature the risks and opportunities frame on either side. This indicates that those debates are to a certain extent internal to this frame and that the proponents of other frames engage with these debates by joining a side. Given the central position of the risks and opportunities frame over the whole period (cf. chapter 4), the centrality of such intra-frame debates seems plausible. In other words, the framing that sustainable finance is about risks and opportunities seems relatively unchallenged and the main question is how risks and opportunities are best understood.

The presence of the risks and opportunities frame on both sides of the three internal debates does not mean that each position is supported by an equal number of actors. Importantly, some of the double positioning indicates the temporal evolution

of new positions. In table 6.2, I re-arranged the (+) and (-) signs so that the second column roughly reflects the status quo view of finance, whereas the third column is associated with a perspective that challenges the financial system. Column 2 is also closer to modern financial theory, while column 3 is proximate to the evolutionary systems paradigm.

It is no great surprise that the critical frame can be found in the column that represents the challenger position. When it comes to the double positioning of the risks and opportunities frame, it is noteworthy that the positions aligned with the challenger view are all of more recent nature. In the ESG – performance debate the traditional position was that the inclusion of ESG issues limits the room for selecting on the ‘real’ risks and opportunities categories. The more recent position that is advocated by the ‘true believer’ financial actors, by contrast, suggests that ESG is one of those real categories. In the engagement vs. divestment debate most mainstream financial institutions take the side of engagement. On the other hand, the civil society actors that advocate for divestment have also employed a risk framing that emphasises that financial institutions are failing at risk minimisation.

The transformative finance vs. real economy focus debate is characterised by the opposing views on how the financial system relates to risks and opportunities. The real economy focus position highlights the financial system’s role in pricing risks and opportunities in an equilibrium economy. The transformative finance position, on the other hand, argues that the behaviour of the financial system today contributes to materialisation of risks and opportunities tomorrow. This cleavage corresponds to the differences between the academic paradigms of modern financial theory and evolutionary systems. As such, it does not fit with the transmission mechanism that posits that academic paradigms must first be translated into frames. This aberration

can be explained by looking at the institutional site, where this debate is most prominent. As outlined above, the interlocutors of the transformative finance vs. real economy focus debate are central bankers and regulators as well as business and civil society actors that address the former two groups. Therefore, the absence of the intermediary step of framing might be explained by the scientisation of this community.

Debate	Frames (+)	Frames (-)
ESG – performance trade-off: (+): No trade-off (-): Trade-off	Risks and opportunities, SRI, Climate finance	Risk and opportunities
(+): Financial materiality (-): ESG impact	Risks and opportunities	Climate finance (positive impacts), Critical (negative impacts)
(+): Engagement (-): Divestment	Risks and opportunities (management)	Critical, Risks and opportunities (minimisation)
(+): Real economy focus (-): Transformative finance	Risks and opportunities	Risks and opportunities (systemic), Climate finance, Critical

Table 6.2 Frames' Relation to Debate Positions

A second result of this chapter is that the hypothesis, which maintains that the performative transmission channel matters more in immature policy subsystems, is validated to some extent. Looking back at sections 2 and 3, one can assert that socio-technical instruments like taxonomies received more attention than abstract debates about e.g. financial materiality vs. ESG impact. Importantly, debates and socio-technical instruments are related to each other. However, the solution of debates seems

to occur through the black-boxing of an idea in a socio-technical instrument and not by debate-winners delegating the implementation of their views.

Table 6.3 details the socio-technical instruments. Apart from the instrument (column 1) and the frames (column 2), their ‘end-uses’, i.e. their implementation in the financial system (column 3), are listed. The table reveals that the risks and opportunities frame had an impact on the development of all the instruments that were discussed in section 3 with the exception of system performance metrics, which have been developed by actors from the critical frame. The delineation and determination of risk factors has been one of the central preoccupations of this frame.

The SRI frame is still reflected in some ESG metrics that are used by SR investors as well as by larger financial institutions. Depending on their approach to sustainable finance, the latter use these metrics either for risk assessments or for ESG data shopping. Taxonomies highlight the impacts of financial instruments and are associated with the climate finance frame. Importantly, the centrality of the EU’s green taxonomy has meant that the proponents of the risks and opportunities frame have also become interested in taxonomies. This, in turn, has led to conflicts about the design and function of these socio-technical instruments. Lastly, the need for long-term projections on risk as well as systemic risk considerations have motivated the development and sophistication of different types of scenarios. Regulators and central bankers push for the uptake of these techniques since they are particularly interested in learning about future threats to financial stability. On the other hand, their interest in the more political metrics that focus on performance of the financial system has so far been muted.

The end-use of the instruments co-varies with the frames to a certain extent. While risk-inspired instruments are geared towards strategies for portfolio

management, the critical system output measures seek to inform regulation. ESG metrics as well as taxonomies can be used for the labelling of assets and funds and hence for decisions on where to invest and divest. Depending on the operationalisation, this can be of interest for SR investors and development banks as well as for financial institutions that start from a risk-based understanding. Risk factors matter for the day-to-day management of financial institutions as well as for regulatory interventions. Scenarios inform regulators about future developments. However, they can also be used by financial institutions that base strategic decisions on them or by watchdog CSOs that want to assess the compliance of banks with e.g. the below 2° target.

Socio-technical Instrument	Frames	End-use of Socio-technical Instrument
ESG metrics	SRI, Risks and opportunities	Labels, specialised assets and funds
Risk factors	Risks and opportunities	Portfolio management and investment decision making, capital requirements
Taxonomies	Climate Finance	Labels, benchmarks, capital requirements, specialised assets and funds
Scenarios	Risks and opportunities	Inform long-term strategies of investment, regulatory or voluntary compliance with alignment objectives
System performance	Critical	Inform regulatory changes, help supervisors and broader public to assess state of finance

Table 6.3. Frames' Relation to Socio-technical Instruments

6.5 Conclusion

In this chapter I examined the debate positions and socio-technical instruments in the policy subsystem of sustainable finance. Subsequently, I checked whether differences in debate positions and the design of socio-technical instruments are structured by academic paradigms and frames. I found that in the case of debate positions a separation along frames could only partially be observed since most debates are dominated by the risks and opportunities frame. This means that different interpretations or temporal variations of this frame feature on either side of the debate. Notably, one debate position (transformative finance vs. real economy focus) was more structured according to differences in academic paradigms. This might be an indication that in institutional locations that are closer to academia (e.g. central banks) the translation from academic paradigms to frames is skipped.

As to the socio-technical instruments, the increasing dominance of the risks and opportunities frame resulted in a challenge of ESG metrics that had been consolidated during the period when the SRI frame represented sustainable finance. These re-purposed metrics also served as indicators for the stabilisation of risk factors. The application of the risks and opportunities frame to taxonomies, which had been pioneered by actors from the climate finance frame, has led to some tensions. Meanwhile, the development of system performance measures integrates well with the critical frame and the evolutionary systems paradigm.

In the final section of this chapter, I explored the hypothesis that performative transmission channels are a more powerful route for ideas in immature policy subsystems. I outlined that this would be the case, because in a policy subsystem with relatively few actors, discussions would be settled at the technical level rather than in the public arena. Reviewing the dynamics of debates and socio-technical instruments,

I found some support for this hypothesis. This notwithstanding, only comparative research can determine whether variations in maturity and size of policy subsystems are, indeed, an explanatory factor for differences in the strength of transmission channels.

7. Conclusion: Ideas Matter but so Does the Context of Their Transmission

It's not easy being green

Kermit the frog.²¹⁹

The above quote from the muppets character is sometimes invoked by members of the sustainable finance community to convey that the conflicting definitions, metrics and practices make the topic a muddled and complex affair. A similar statement could be made about this thesis. If we were to ask whether the results of the thesis lend support to the often quoted Keynes phrase that asserts that the world is ruled by little else than the ideas of economists, the answer would most likely be no. On the other hand, if we were to slightly reformulate the main research question of this thesis and asked whether economic ideas influenced the evolution of sustainable finance, the answer would be affirmative.

This seemingly paradoxical situation arises because the transmission from academic paradigms to policy paradigms that has been explored in the above chapters is not as straightforward as a linear understanding of ideational influence would suggest. When ideas travel from academic contexts to the knowledge production within a policy subsystem and then to the implementation by institutions or socio-technical instruments, they are modified, disputed and reassembled in the process. This does not mean that the incorporation of one rather than another idea is arbitrary and without consequences. Ideas that are derived from an academic paradigm retain their

²¹⁹ <https://www.youtube.com/watch?v=rRZ-IxZ46ng>.

meaning and their adoption has political ramifications. Nevertheless, their modifications – e.g. into frames in this thesis – as well as their interactions with the context – e.g. legacies of material infrastructures in the case of socio-technical instruments – must be acknowledged.

This complex understanding of ideational influence has theoretical implications for constructivist IPE and the study of policy paradigms. On the other hand, the approach taken in this thesis has also some limitations. These relate both to the in-depth understanding of ideational influence as well as to establishing the significance of ideational factors for environmental politics. The limitations, in turn, give rise to potential future research questions. The same applies to some of the empirical material that could not be explored further in this thesis. Lastly, as sustainable finance is still a ‘hot topic’, there are also some practical implications that can be derived from the material in this thesis.

7.1 Theoretical Implications and Limitations

Two of the main preoccupations of this thesis were, first, to provide an explicit transmission mechanism for policy paradigms and, second, to apply this mechanism to a case of evolution. The first was addressed by mapping how ideas from academic paradigms are related to framing exercises by the actors within the policy subsystem. Subsequently, I explored how frames and, to a lesser extent, academic paradigms, provide the input for the persuasive and performative processes.

The theoretical implications of this approach and the findings of this thesis are that ideational explanations benefit from an explicit understanding of 1) the meaning of ideas in an academic context, 2) the translation of these ideas to policy subsystems and 3) the processes through which they matter for policy. In this thesis, these issues

were addressed by the concepts of academic paradigms, frames and debates/socio-technical instruments respectively. While I do not suggest that ideational scholars should adopt the same concepts and transmission mechanism, I argue that answering the questions of which ideas matter how and where will bring greater clarity. Addressing these issues upfront might also guard researchers from taking shortcuts such as taking the presence of an idea in a policy document as proof of its relevance. Another benefit of being explicit about these issues is that it helps researchers to avoid the problem of using concepts like paradigms in an unspecified way.

An example of why answering these questions matters can be found when looking at the risks and opportunities frame. On the one hand, this frame is connected to modern financial theory. This academic paradigm has historically evolved from neoclassical economics, which, in turn, has been associated with the neoliberal policy paradigm. However, a closer look cautions against such a premature attribution. As outlined in chapters 4 and 6, there are significant differences in the implementation of this framing. Risks and opportunities discourse can be mobilised to argue for better risk management of material financial risks on the level of the financial institution. It can, however, also be utilised by central banks and regulators, which worry about the systemic implications of unhedgeable risks like climate change and, consequently, will become more interventionist. In this case, it is not only ideas from modern finance theory that matter but increasingly also those from the evolutionary systems paradigm. Furthermore, depending on the twist one gives to the frame, it can support either engagement (risk management) or divestment (risk minimisation).

While there are some variations in the debate positions and socio-technical instruments that are associated with the risks and opportunities frame, the malleability of the frame still remains constrained. We have seen that the ethical considerations of

the SRI frame as well as the idiosyncratic ESG measures to whose rise it contributed are an anathema to the most sanguine promoters of the risks and opportunities frame (the true believers). Likewise, taxonomies that highlight the contributions of financial instruments to non-financial categories are not particularly well received by those inside the risks and opportunities frame.

The point I want to convey here is that ideas from academic paradigms are not translated mechanically. Their significance depends on the actors that take them up and on the relation of these actors to other ideas. In the case of socio-technical instruments, ideas also need to integrate with material factors like the availability of data and resources. This might further constrain or change them. On the other hand, the agency of actors in the policy subsystem is also not total. Neither are the material constraints of socio-technical instrument construction. There are still limits to what an idea from a particular academic paradigm can be used for. At the very least, it will be cumbersome, costly and time-intensive to connect ideas that are thought to be in contradiction in the academic context. This means that there is still value in studying the differences between academic paradigms and analysing how these play out in a policy subsystem.

Keeping in mind that this complex understanding of how ideas matter comes from observing a case of evolution rather than of crisis brings me to the second issue major issue of the thesis. One question that arises in this context is how generalisable those observations are. In other words, are they only valid for sustainable finance, for finance in general or for evolutionary cases in general? As this thesis studies only one case, any statements about generalisability are speculative. This notwithstanding, there might be some promise in exploring the hypothesis that ideational transmission channels vary according to the size and maturity of the policy subsystem. Such an

understanding might be able to resolve some of the inconsistencies that research on policy paradigms that emphasises the sequencing of paradigm change has run into (cf. Blyth 2013a; Baker 2015; Oliver and Pemberton 2004).

The dynamics of paradigm change, evolution and crisis that were explored in this thesis might also provide some clues for understanding the ongoing COVID 19 pandemic. While the multiple contingencies of the situation make such links completely hypothetical, applying some of the theoretical apparatus that was discussed in this thesis might, nonetheless, lead to some insights. For instance, the almost unprecedented rupture of economic activity across geographies has led to some early assessments, which treat the pandemic as a turning point that leads to a shift of the economic paradigm. The thesis' elaboration of how paradigm shifts occur might inspire research questions that clarify the dynamics that are currently happening. For instance, in light of the fast-moving nature of the crisis, looking at persuasive processes might be a good starting point. On the other hand, the (re-)design of socio-technical instruments that are mobilised as response to the crisis might lead to insights about longer term developments. Moreover, linking the arguments and plans for (policy) paradigm change back to academic paradigms can help to determine the fundamental differences between agendas.

Beyond addressing questions of crises and paradigm change, the thesis also has implications for students of environmental politics. Understanding the variegated nature of the policy subsystem of sustainable finance provides a starting point for analyses that query the impacts of ideas on environmental and socio-economic systems. However, the approach taken here can only make limited statements on this issue. Kern et al. (2014: 524) note that while the concepts of paradigm and paradigm change are useful to understand differences and shifts in interpretative frameworks,

policy goals and policy (in my case socio-technical) instruments, they are less well-equipped to understand how those changes manifest themselves.

In this thesis, I have addressed this limitation to a certain extent by outlining how socio-technical instruments and debate positions might influence the shape and direction of the financial system. Importantly, there is still an additional layer in finding out how such a potential transformation relates to changes in the environment. As evidenced by the transformative finance vs. real economy focus debate, this question is also a concern for the members of the expert community themselves.

A final limitation is the question of boundary specification that was addressed in chapter 3. This thesis defined the policy subsystem of sustainable finance by using delineation techniques from network analysis. However, in a fast-evolving system, actors might be overlooked, despite efforts to be inclusive. In addition, access problems as well as geographical biases might have led to misrepresentations. Finally, if one asks a research question that is distinct from the one addressed in this thesis, one might define sustainable finance in a divergent way.

7.2 Future Research

Both the theoretical contributions and the limitations suggest avenues for future research. The question of whether the ideational transmission mechanism that was observed in this thesis is idiosyncratic to sustainable finance or whether it can be applied to other cases is a first possible question. In light of the relative paucity of evolutionary cases of ideational transmission, a first step might be to check if similar dynamics can be seen in other evolutionary cases in finance. An example of such a case could be the insertion of new technologies into finance or so called FinTech. Like sustainable finance, this case also represents a change that is occurring in the absence

of a visible paradigm shift, in which incumbents and challengers display disagreements about fundamentals. Instead, financial institutions, regulators and policymakers seem to be all in broad agreement that FinTech is something worth exploring. An ideational approach might be able to uncover underlying tensions and differences and check to what extent these are related to academic paradigms or frames.

A second research design that could emerge from the findings of this thesis is of a comparative nature. Accordingly, evolutionary cases could be compared to crisis cases. A second dimension could be introduced by separating between finance and non-finance cases. This would result in a 2x2 matrix which explores how the evolutionary/crisis and the finance/non-finance dichotomies are related to different channels of ideational transmission. A variation of such a research design could use the concept of policy subsystem and relate its characteristics to the transmission of ideas. In this thesis, I suggested that immature policy subsystems with small actor populations are more prone to performative dynamics. On the other hand, as suggested by the literature on paradigm shifts in macroeconomic policy, mature policy subsystems with stable and large actor populations can be expected to be more susceptible to persuasive dynamics.

To study a case that is similar to the one explored in this thesis in all aspects but the maturity of the policy subsystem, one might actually not have to look farther than sustainable finance itself. If the increasing institutionalisation that was observed in the last period is not interrupted, the future of sustainable finance might be characterised by dynamics that are different from the ones observed. It is even possible to imagine that after an initial institutionalisation, sustainable finance could be subjected to a paradigm shift that follows the processes that are described by Hall and others. Actors from the marginalised frames could, for instance, try to mount a

challenge from outside once they have been convinced that the dominant risks and opportunities framing cannot accommodate their interests and ideas.

Next to the questions that relate to constructivist IPE, many of the issues that were explored above offer a starting point to further our understanding of how the (re)organisation of finance influences the relations between capitalism and the environment. Future research that applies different strategies and methods could check in detail how the victory of one debate position or the adoption of one type of socio-technical instrument influences both the financial system and the environment. In this context, some potential questions could be: What are the outcomes of either divestment or engagement? How – if at all – do financial products that are aligned with a taxonomy (e.g. green bonds) or a transition scenario (e.g. green ETFs) affect the environment? Does the definition and measurement of climate-related risks enable or preclude regulatory interventions?

These and other questions are not new and are, indeed, addressed by the actors that were studied in this thesis. Financial institutions, IOs, central banks, CSOs and academic economists are pondering these issues. Nonetheless, there is value in assessing such questions from a perspective that uncovers the political characteristics of such seemingly technical matters. Against the background of this thesis, I would argue that a research strategy that combines insights from environmental politics, IPE and STS has great potential here. More concretely, the emerging research on financial infrastructures offers a promising avenue for this kind of analysis (cf. Braun 2014; Bernards and Campbell-Verduyn 2019).

Another possible direction for future research could be to assess national variations in sustainable finance. In the thesis, I observed that governments and authorities of some countries were keener on the topic than those of their peers. In

Europe, France, the Netherlands, Sweden and the UK have taken the lead, whereas other countries seem to remain in a ‘wait and see’ position. Comparative research could help to understand those divergences by looking, for example, at the structure of the respective national financial sectors or at political and regulatory systems more generally. This would provide a possible touching point between the study of sustainable finance and the Varieties of Capitalism literature (Hall and Soskice 2001).

7.3 Practical Implications

I started this thesis by pointing out that the salience of sustainable finance has grown considerably in recent years. At the time of writing, it appears that it would be still too early to assert that a consolidation and institutionalisation of the issue has taken place. While actors like FSB TCFD and the EU aim to establish standards, there are also alternatives competing in the same space. Moreover, despite the efforts of the NGFS to coordinate the regulatory responses to sustainable finance, divergences are present in the regulatory community and might accentuate themselves further in the future.

This lack of consolidation notwithstanding, it increasingly appears that sustainable finance is here to stay. This comes in spite of the scepticism of hard-nosed financiers and sceptical environmentalists alike, both of whom deem it to be nothing but a temporal fad. Furthermore, initial observations in the COVID 19 pandemic seem to suggest that the promoters of sustainable finance have had so far more success in arguing that the crisis shows the true value of sustainable businesses as opposed to those that want to use the current situation to abandon the sustainable finance agenda and go back to business as usual.²²⁰ The scale and the multiple contingencies of the

²²⁰ See for example: Frédéric Simon, “EU says green finance will be ‘key focus’ of post-virus recovery phase”, *Euractiv*, April 9th, 2020. <https://www.euractiv.com/section/energy-environment/news/eu-says-green-finance-will-be-key-focus-of-post-virus-recovery-phase/>. Accessed

ongoing pandemic mean, however, that conjectures, which are based on such initial observations, remain highly speculative.

Such contingencies notwithstanding, it remains nevertheless important to understand the implications of the real possibility of a continuation and expansion of sustainable finance for the environment. The fact that sustainable finance has established itself in the financial system and may continue its institutionalisation does not necessarily mean that it will make any meaningful contributions to environmental sustainability. It, however, means that questions of why whatever version of sustainable finance fails to do so can no longer be brushed aside *a priori* by declaring that it means nothing but a change in name.

Because an argument can be made that there is some real change in finance through sustainable finance, it is worth exploring how these changes may or may not affect environmental outcomes. Some of the results of this thesis can help with that task. First, the observation that multi-actor coalitions comprising private, public and civil society representatives come together to advance their conception of the topic reiterates a point that was earlier made by authors like Newell and Paterson (Newell and Paterson 2010; Newell 2019). To assess whether finance-related responses to the climate and environmental crises are mere greenwashing or should be taken seriously, relying on categories like private-public-civil society is no longer sufficient. Some private financial institutions (think the true believers in the risks and opportunities frame) have arguably thrown their weight behind a strategy that abandons the links with the fossil fuels-based economy. So have some of the regulators. Other private financial institutions, meanwhile, have only changed their wording or at best try to

April 13th, 2020. And Gillian Tett et al. "Coronavirus poses 'acid test' for conscious capitalism; climate pressure continues", *Financial Times*, March 18th, 2020. <https://www.ft.com/content/b0620412-846b-4dc9-9451-d0887c3d8aba>. Accessed April 13th, 2020.

capture an additional niche of sustainable investment without abandoning their traditional business. Again, the same could be said for some of the regulators.

The argument that arises from this assessment is that one must probably pay more attention to the implementation than to the types of actors that are involved. This brings me to my second point. This thesis suggested that the design and adoption of socio-technical instruments matters greatly for sustainable finance. Depending on the specification of taxonomies, transition scenarios and risk factors either trillions of dollars, euros, yen etc. or next to nothing might be re-allocated. The central position of these instruments means that the designers and users of these instruments as well as policymakers should be aware of the ideas and interests that might be black-boxed in them. As the connection between socio-technical instruments and frames has illustrated, the latter might carry some path dependency in them that should be reflected. This is not to argue that socio-technical instruments should not be developed or that there should be a constant politicisation about them. For something like sustainable finance to function, a degree of standardisation and technocracy appears to be necessary. Nonetheless, questions pertaining to the transparency of the design of such instruments as well as to who has control over them once they are operational and by which processes they can be changed and updated are worth asking. Here, academic research has a role to play.

7.4 Conclusion

In this thesis I sketched a transmission mechanism between the ideas of academic paradigms and the governance of sustainable finance. I found that traditional conceptualisations of finance in terms of risks and opportunities have been the dominant framing among the actors in the policy subsystem of sustainable finance.

Nevertheless, this dominance is not unchallenged as ideas that are closer related to academic paradigms like ecological economics and evolutionary systems perspectives have influenced the thinking and framing of actors. In an evolutionary case of ideational transmission like sustainable finance, the implications of either of these ideas is ultimately mediated by the modalities of the transmission. The incorporation of ideas into socio-technical instruments has turned out to be a potent transmission channel in this context.

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Appendices

The Role of Economic Ideas in Sustainable Finance: From Paradigms to Policies

Andreas Dimmelmeier

Appendix A: Interviews

1) Interviewees allowed for attribution to their names

Jeremy McDaniels, Senior Researcher, *UNEP Inquiry*, Geneva: July 3rd, 2018

Remco Fischer, Project Officer, *UNEP FI*, Geneva: July 20th, 2018

Jakob Thomä Research Director, *2 degrees investing initiative*, Phone interview: September 29th, 2018. (Interview in German language).

Franiska Schütze, Economist, *Global Climate Forum*, Phone interview: October 10th, 2018. (Interview in German language)

Nina Lazic, Advocacy and Research Officer, *Finance Watch*, Brussels: October 24th, 2018

Lola Guiffes, Research Fellow, *I4CE*, Brussels: October 29th, 2018

Emanuele Campiglio, Researcher, *WU Vienna*, Phone interview: October 31st, 2018

Cillian Lohan, Rapporteur, *EESC*, CEO, *Green Economy Foundation*, Brussels: November 28th, 2018

Annika Cayrol Research Coordinator, *Financité*, Brussels: November 30th, 2018

2) Interviewees requested anonymity

Board Member, SRI Association, Europe, Phone interview: September 26th, 2017, physical meeting: Berlin: September 21st, 2018.

Former central bank official, Western Europe, Phone interview: December 5th, 2018

Co-founder, Sustainability Consultancy, Germany, Phone interview: October 3rd, 2018

NGO staff, UK, Phone interview: December 17th, 2018

Member of the European Parliament, Brussels: December 18th, 2018

I 17 (confidential), Phone interview: January 8th, 2019.²²¹

Economist, Environmental Agency, Western Europe, Phone Interview: January 24th, 2019.

NGO staff, climate finance, North America, Phone interview: February 17th, 2019

Asset management, Western Europe (1), Phone interview: January 31st, 2019

Asset management, Western Europe (2), Phone interview: February 2nd, 2019.

Asset management, North America, Phone interview: January 24th, 2019

European Commission official, Brussels, March 19th, 2019.

Researcher, Sustainability Agency, Phone interview, January 14th, 2018.

Staff, Social Banking, Phone interview, July 25th, 2018.

Staff, Regulatory Authority, Europe, Phone interview, March 6th, 2019.

²²¹ Highest level of anonymity requested by interviewee.

1) Network notation in matrices and edge lists

One-mode networks are recorded in adjacency matrices of size $n \times n$ (n rows and n columns). If a link is present between two nodes, the cell that intersects the row of node **I** with the column of node **J** has a value of 1 in unweighted networks and a value corresponding to the tie strength in weighted networks. If there is no link, the cell takes a value of 0. Finally, unweighted networks are symmetric as the value of the row of node **I** intersecting the column of node **J** is the same as the one in the cell, where the column of node **J** intersects with the row of node **I**. Directed networks, on the other hand record different values in the upper and lower part of the diagonal (which represents self-links of nodes).

In figure 1, I provide an example of a directed, unweighted network of 10 nodes. Table 1 presents the corresponding adjacency matrix of 10 rows and 10 columns. As can be observed both in the graph and the matrix, node one has 6 incoming links (the column of node 1) but zero outgoing links (the row of node 1). Finally, table 2 presents an alternative notation for networks: a so called edge list. An edge list consists of two columns, where the first column records the nodes from which the links are outgoing, and the second column records the nodes that receive the links. Since edge lists are much less demanding for data entry than matrices, but can easily be converted to matrices, I used this format for constructing the co-publication networks.

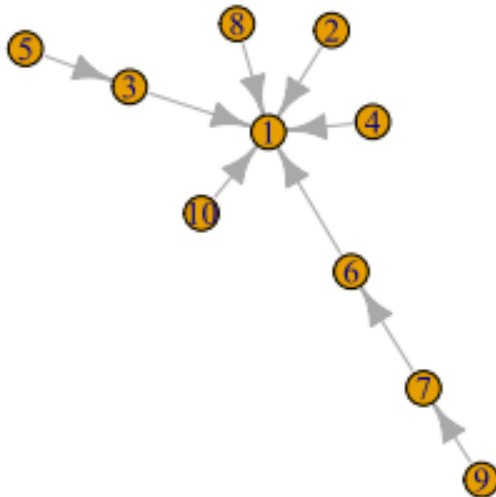


Figure 1. Hypothetical, directed, unweighted network

	[,1]	[,2]	[,3]	[,4]	[,5]	[,6]	[,7]	[,8]	[,9]	[,10]
[1,]	0	0	0	0	0	0	0	0	0	0
[2,]	1	0	0	0	0	0	0	0	0	0
[3,]	1	0	0	0	0	0	0	0	0	0
[4,]	1	0	0	0	0	0	0	0	0	0
[5,]	0	0	1	0	0	0	0	0	0	0
[6,]	1	0	0	0	0	0	0	0	0	0
[7,]	0	0	0	0	0	1	0	0	0	0
[8,]	1	0	0	0	0	0	0	0	0	0
[9,]	0	0	0	0	0	0	1	0	0	0
[10,]	1	0	0	0	0	0	0	0	0	0

Table 1. Adjacency matrix of the hypothetical network

	[,1]	[,2]
[1,]	2	1
[2,]	3	1
[3,]	4	1
[4,]	5	3
[5,]	6	1
[6,]	7	6
[7,]	8	1
[8,]	9	7
[9,]	10	1

Table 2. Edgelist of the hypothetical network

Two mode networks, on the other hand, are recorded in affiliation matrices (or alternatively edge lists). Here the rows signify one type of node, whereas the columns represent the other type of node. The network in figure 2 and its corresponding matrix (table 3) is taken from the classical “Southern Women Study” from 1941. Here the nodes in the rows are women of a community in the South of the US, while the nodes in the rows are society events attended by the women. Looking at the left side of the graph and the first row of the matrix one can observe that Evelyn attended event 1 on June 27, which is visualised by a link in figure 2 and by an entry equal to 1 in the corresponding cell in the matrix.

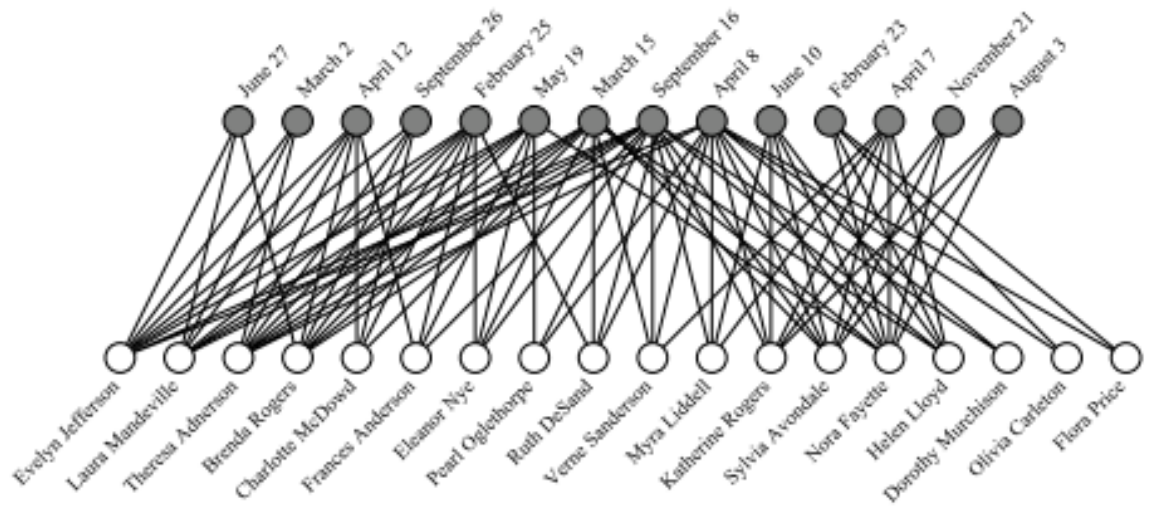


Figure 3.2: The affiliation network of the “Southern Women Study.” This network

Figure 2. Network from Southern Women Dataset. Representation from Newman 2010

	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14
EVELYN	1	1	1	1	1	1	0	1	1	0	0	0	0	0
LAURA	1	1	1	0	1	1	1	1	0	0	0	0	0	0
THERESA	0	1	1	1	1	1	1	1	1	0	0	0	0	0
BRENDA	1	0	1	1	1	1	1	1	0	0	0	0	0	0
CHARLOTTE	0	0	1	1	1	0	1	0	0	0	0	0	0	0
FRANCES	0	0	1	0	1	1	0	1	0	0	0	0	0	0
ELEANOR	0	0	0	0	1	1	1	1	0	0	0	0	0	0
PEARL	0	0	0	0	0	1	0	1	1	0	0	0	0	0
RUTH	0	0	0	0	1	0	1	1	1	0	0	0	0	0
VERNE	0	0	0	0	0	0	1	1	1	0	0	1	0	0
MYRNA	0	0	0	0	0	0	0	1	1	1	0	1	0	0
KATHERINE	0	0	0	0	0	0	0	1	1	1	0	1	1	1
SYLVIA	0	0	0	0	0	0	1	1	1	1	0	1	1	1
NORA	0	0	0	0	0	1	1	0	1	1	1	1	1	1
HELEN	0	0	0	0	0	0	1	1	0	1	1	1	0	0
DOROTHY	0	0	0	0	0	0	0	1	1	0	0	0	0	0
OLIVIA	0	0	0	0	0	0	0	0	1	0	1	0	0	0
FLORA	0	0	0	0	0	0	0	0	1	0	1	0	0	0

Table 3. Affiliation matrix from Southern Women Dataset. Table from Borgatti et al. 2013

2) Converting two-mode to one-mode networks through matrix multiplication

To transform a two-mode affiliation matrix to a one-mode adjacency matrix, the affiliation matrix has to be multiplied with its transpose. The transpose A^T is defined as the matrix where the columns and the rows of the matrix A are switched. Thus, if A is a matrix of n columns and m rows, A^T is a matrix of m rows and n columns. Table 4 is a partial representation of the transpose matrix of the “Southern Women Network” from figure 2 and table 3. As can be seen the rows and columns are switched with the events now being the rows, while the women are in the columns.

##	X__1	Evelyn	Laura	Theresa	Brenda	Charlotte	Frances	Eleanor	Pearl	Ruth
## E1		1	1	0	1	0	0	0	0	0
## E2		1	1	1	0	0	0	0	0	0
## E3		1	1	1	1	1	1	0	0	0
## E4		1	0	1	1	1	0	0	0	0
## E5		1	1	1	1	1	1	1	0	1
## E6		1	1	1	1	0	1	1	1	0
## E7		0	1	1	1	1	0	1	0	1
## E8		1	1	1	1	0	1	1	1	1
## E9		1	0	1	0	0	0	0	1	1
## E10		0	0	0	0	0	0	0	0	0
## E11		0	0	0	0	0	0	0	0	0
## E12		0	0	0	0	0	0	0	0	0
## E13		0	0	0	0	0	0	0	0	0
## E14		0	0	0	0	0	0	0	0	0

Table 4. Transposed Affiliation Matrix from Southern Women Dataset (only columns 1-9 out of 18). (own calculations)

To convert an affiliation matrix into an adjacency matrix it has to be multiplied with its transpose. In the above example this would mean that that 18×14 matrix of the Southern Women matrix is multiplied with its 14×18 transpose. This then results in an 18×18 matrix, in which the women are connected via joint attendance or, alternatively, in a 14×14 matrix, which links events via joint attendees.

The product of a matrix multiplication is obtained by taking the sum of the “term-by-term” multiplied entries of the rows of a matrix A with the columns of a matrix B . If we multiply table 3 with table 4, the first row of the new 18×18 adjacency matrix would look like this:

##		Evelyn	Laura	Theresa	Brenda	Charlotte	Frances	Eleanor	Pearl	Ruth
## Evelyn	8	6	7	6	3	4	3	3	3	

Table 5. First row of the product of the affiliation matrix of the Southern Women Dataset and its transpose (own calculations)

The first cell that connects Evelyn with Evelyn is not very informative about her connections, but only informs us that she attended 8 events.²²² The other cells, however, record the number of events that Evelyn co-attended with the person listed in the column. As can be verified by looking at the joint entries of “1” in table 2 Evelyn and Laura attended 6 events together (E1, E2, E3, E5, E6 and E8). The full matrix that results from the multiplication is thus a weighted, symmetric matrix, where the values of the cells represent the number of joint affiliations.

A graphical representation of the adjacency matrix is pictured in figure 3. Here the number of joint attendances is indicated by the shading of the links with darker shaded lines representing higher number of joint attendances.

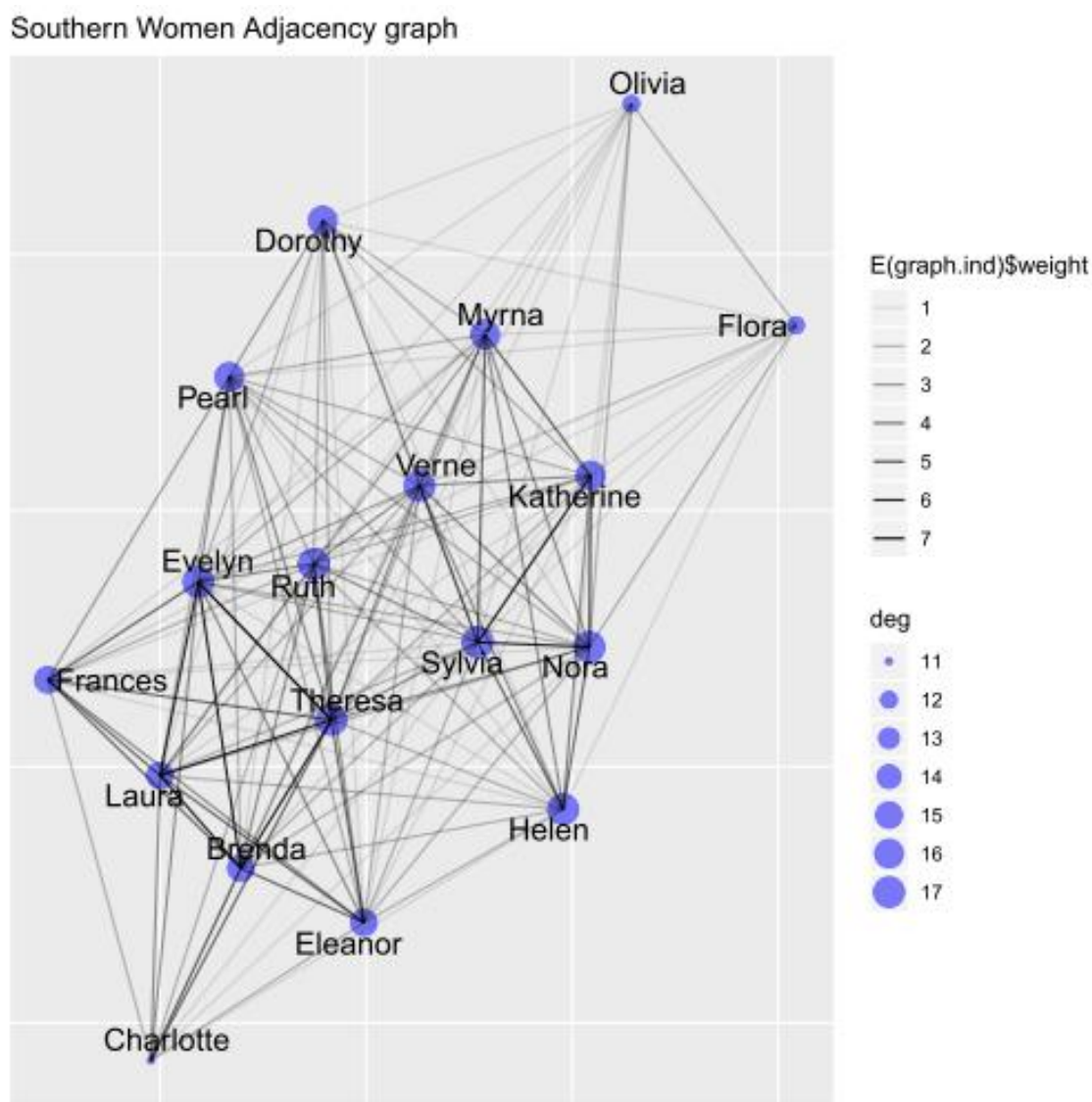


Figure 3. Network from Southern Women Dataset, where attendees are linked through events (own representation)

²²² Note that with weighted affiliation matrices the square roots of the matrix and its transpose are multiplied. As the square root of 1 is, however, also 1, this manipulation is not necessary with unweighted networks.

3) Betweenness centrality: Cut-offs

For the calculation of betweenness centrality of individual contributors that I subsequently used to identify interviewees, I set the maximum length of paths that were considered as shortest paths to 3. This is because people are in practice unaware of longer connections or the lengths of these connections make them unable or unwilling to exploit them for activities like the exchange of information (cf. Grannis 2010: 996).

4) Modularity

Modularity is defined as the number of edges falling within groups minus the expected number in an equivalent network with edges placed at random. Modularity can either be positive or negative. Positive scores indicate the presence of a strong community structure of a graph, whereas negative values point to the absence of such a structure. (Newman 2006: 8578).

In formal terms modularity is expressed by the equation:

$$Q = A_{ij} - k_i k_j / 2m$$

Where Q is modularity, A_{ij} represents the number of edges between nodes i and j recorded in the adjacency matrix A . $k_i k_j / 2m$ represents the expected number of edges between node i and j , which is defined as the product of the two nodes degrees divided by the total number of possible edges in the graph. The implementation of a community detection algorithm will then record the partitions of the nodes into different communities and select the highest modularity by checking the eigenvector that is associated with each partition (Newman 2006: 8579).

5) Girvan-Newman Algorithm

The algorithm detects communities by subsequently removing the EDGE with the greatest betweenness score, thus disconnecting the network step by step. The algorithm converges when the Modularity score of the network as a whole is highest. Modularity measures in broad terms how far the network community structure is away from a case where community membership is assigned at random.

Appendix C: Data collection and representation of network analysis, edge weights and additional analysis

1) Data for co-publication networks

Below I list in alphabetical order the 242 organisations that I collected through the mapping of “elite networks” and the distribution of the 891 documents that I eventually obtained from 152 of them (i.e. the non-zero entries below).

The identification of actors and documents was carried out according to this protocol from June 12th, 2017:

1. Identification of network actors:

1.1 mentioned in literature on sustainable finance, IPE and environment

1.2 mentioned at conferences on the topic or in talk with scholars at conferences

2.3 snowballing of the above

2. Information on sustainable finance

2.1 check website 'about us' for general description

2.2 check if sustainable finance, climate finance, sustainability, climate change, CMU, alternative economic thinking is a topic or theme on the website

If so go to 2.2.1

2.2.1 check on website description as well as flagship publications or strategy documents, which are assumed to reflect the dominant frame

2.2.2. download relevant publications available online

if not go to 2.2.3

2.2.3. search publication database for these keywords

2.2.4 download relevant publications

**publications assessing the state of affairs were downloaded when sth. novel was in there or when a focus on the EU was there for instance, whereas annual country or sector assessments were not considered*

*** 'relevance' of publication was determined based on the title, the table of content and where applicable the executive summary or abstract of the publication*

Organisation name	Number of texts included in initial data collection
2 Degrees Investing Initiative	34
350.org	0
92 Gruppen	2
ABM-AMRO	0
adelphi	9
ADI, Asset Level Data Initiative	0
AEI, American Enterprise Institute	0
AFD, Agence Francaise de development	1
AFME, Association for Financial Markets in Europe	0
AIGCC, Asia Investor Group on Climate Change	2
Allianz	3
Allianz Global Investors	0
ANT Financial Services	0
API, American Petroleum Institute	1
Asian Development Bank	0
ASN, Algemene Spaarbank voor Nederland	2
Aviva	15
AXA	0
Bank of America	0
BankTrack	21
Barclays	0
Bertelsmann Foundation	1
Beyond Ratings	0
BIC, Bank Information Center	3
BIS, Bank for International Settlements	0
BNEF's Wilderhill New Energy Global Innovation	0
BoE, Bank of England	2
Böll, Heinrich Böll Foundation	3
Both ENDS Foundation (Both ENDS)	8
Bruegel	1
BVEK, German Emissions Trading Association	10
Caisse d'Epargne	0
Capital Institute	4
Carbon Disclosure Project	12
Carbon Market Watch	1
Carbon Markets and Investment Association	0
Carbon Principles	0
Carbon Tracker	20
Carbon Trade Watch	3
Carbon Trust	3
CCX, Chicago Climate Exchange	0

CECOEDECON, The Centre for Community Economics and Development Consultants Society	1
CERES, Coalition for Environmentally Responsible Economies	4
CFU, Climate Funds Update (odi+ Böll foundation North America)	15
CICERO, Center for International Climate and Environmental Research	2
CIGI, Center for International Governance Innovation	13
CISL, Cambridge Institute for Sustainability Leadership	17
Citigroup	1
Citizens Dashboard on Finance	0
CJA, Climate Justice Action	0
Climate Alliance	1
Climate Bonds Initiative	20
Climate Change Reporting Framework	0
Climate Disclosure Standards Board	10
Climate Justic Now!	0
Climate KIC	1
Climate Smart Lending Platform	0
Climate Transparency	1
Climate Works Foundation	4
Connexions Consulting	0
CoR, Club of Rome	2
Corporación Andina de Fomento (CAF)	2
Corporate Accountability International	1
Corporate Knights	2
Council on Economic Policies	1
CPI, Climate Policy Initiative	24
Credit Agricole	1
De Nederlandse Bank	1
Degrowth Movement	6
DNV GL	0
DOLFINS, Distributed Global Financial Systems for Society (Uni Zurich)	0
Dresdner Kleinwort	0
Durban Group for Climate Justice	0
E2	0
E3G, Third Generation Environmentalism	15
EACB, European Association of Cooperative Banks	2
EBRD, European Bank for Reconstruction and Development	1
Ecofys	0
Ecologic Institute	4
EcoSecurities	0
ecovadis	1
EDF, Environmental Defense Fund	1
Edison Electric Institute	0
EIB, European Investment Bank	2
Emissions Marketing Association	1
Ende Gelände	0
Energy Transition Risk Project	0

Equator Principles	2
ESD, Energy for Sustainable Development	0
ESRB, European Systemic Risk Board	1
European Commission High Level Expert group on sustainable finance	2
European Responsible Investment Network	1
eurosif	9
EY, Ernest and Young	3
F3 Life	0
FARN, Fundación Ambiente y Recursos Naturales	0
FGW, Research Institute for Societal Development	2
Finance in Motion	3
Finance Innovation Lab	2
Finance Watch	7
FNG, Forum Nachhaltige Geldanlagen	11
FONERWA, Rwanda's Green Fund	1
Friends of the Earth	8
FSB-TCFD, Financial Stability Board Task Force on Climate Related Financial Disclosures	5
FTSE4Good	0
G20 Green Finance Study Group	6
GABV, Global Alliance for Banking on Values	0
GEI, Green Economics Institute	0
Germanwatch	3
GHG Protocol	0
GHUB, Beijing Greenovation Hub for Public Welfare Development	3
GIC, Global Investor Collaboration on Climate Change	1
Global Climate Action	2
Global Climate Coalition	0
Global Climate Forum	14
Global Commons Institute	2
Global Compact	0
Global Ethics Institute	0
Global Innovation Lab for Climate Finance	3
Global Trade Watch	0
Gold Standard	2
Green Alliance	2
Green Bonds Principles	1
Green Climate Fund	0
Green Economy Coalition	1
Green finance taskforce (UK)	1
Greenpeace	4
GRI, Global Reporting Initiative	1
HBS, Hans Böckler Foundation	3
Henderson Global Investors	0
Heritage Foundation	0
HSBC, Hongkong & Shanghai Banking Corporation Holdings PLC	2
I4CE, Institute for Climate Economics	26

IABD, Interamerican Development Bank	2
IASB, International Accounting and Standards Board	1
ICCR, Interfaith Centre on Corporate Responsibility	4
IceCap	0
IDEA Carbon	0
IEA, International Energy Agency	4
IETA, International Emissions Trading Association	19
IFC, International Finance Corporation	5
IGCC, Investor Group on Climate Change	5
IIF, Institute for International Finance	0
IIGCC, Institutional Investors Group on Climate Change	26
IMF, International Monetary Fund	2
INET, Institute for New Economic Thinking	5
Inrate	0
Institut für nachhaltige Kapitalanlagen	6
International Development Finance Club	0
International Institute for Environment and Development (IIED)	4
International Partnership for Energy Efficiency Co (IPEEC)	4
Investor Environmental Health Network	0
IPCC, Intergovernmental Panel on Climate Change	2
IRENA, International Renewable Energy Agency	1
Islamic Development Bank	1
JP Morgan Chase	1
Kepler Chevreux	2
KfW, Kreditanstalt für Wiederaufbau	1
Lisbon Council	0
London Mining Network	0
MCII, Munich Climate Insurance Initiative	12
McKinsey & Company	3
Mercer	1
Mirova	22
Morgan Stanley	0
MSCI World ESG Index	0
Munich RE	1
Natural Capital Finance Alliance	1
NatureVest	3
NCE, New Climate Economy	3
Nedbank	1
nef, New Economics Foundation	15
Network for Sustainable Financial Markets	0
Netzwerk Plurale Ökonomik	0
New Economy Coalition	0
New Rules for Global Finance	1
NRDC, National Resources Defense Council	2
ÖBU, Swiss Association for Environmentally Conscious Management	1
odi, overseas development institute	2
oekom research	0

onvalues	6
OSS, Observatoire du Sahara et du Sahel	0
Oxfam International	4
Partners for New Economy	0
PDC, Portfolio Decarbonization Coalition	0
Pew Research Center	0
Pictet	0
PIK, Potsdam Institute for Climate Impact Research	0
Point Carbon	0
Portfolio Carbon Initiative	0
Positive Money	3
PRI, Principles for Responsible Investment	3
Profundo	0
PwC, Price Waterhouse Coopers	1
Rabobank	0
RAN, Rainforest Action Network	5
RBS, Royal Bank of Scotland	0
RE, Rethinking Economics	0
REC, Responsible Endowments Coalition	5
REEEP, Renewable energy and energy efficiency partnership	4
REN21, Renewable Energy Network	0
Root Capital	6
Sandbag	3
SCF, UNFCCC Standing Committee on Finance	4
SGS	0
shareaction.org	14
Sierra Club	0
SOMO, Centre for Research on Multinational Corporations	3
South Pole Group	9
SSE, UNEP-Sustainable Stock Exchange Initiative	6
Sustainable Insurance Forum	0
Sustainable Investment Forum	1
Sustainalytics	1
The 50/50 Climate Project	0
The Climate Group	0
The CoFirm	6
The Lightsmith Group	0
Trinomics	4
Tüv Nord	0
Tüv Süd	0
Tyndall Center for Climate Change	6
UNEP Inquiry into a sustainable financial System	60
UNEP other	3
UNEP-FI United Nations Environment Programme Finance Initiative	87
UN-PAGE	0
Urgewald	1
US Climate Action Partnership	1

Utopies	0
Utrecht University Sustainable Finance Lab	0
Vashuda Foundation	2
VfU, Verein für Umweltmanagement und Nachhaltigkeit in Finanzinstituten	1
WBGU, German Advisory Council on Global Change	6
WCC, World Council of Churches	0
Western Fuels Association	0
WIR, World Resources Institute	6
World Coal Association	0
World Bank Prototype Carbon Fund	1
World Business Council for Sustainable Development	5
WSF, World Social Forum	0
WU Vienna Institute for Ecological Economics	0
Wuppertal Institute	1
WWF, World Wildlife Fund for Nature	8
Total	891

Additional organisations, whose documents were collected but are not part of the networks

(SBN) Sustainable Banking Network
Transition pathways initiative
Carbon pricing leadership coalition
Global Sustainable Investment Alliance
Global sustainable finance research network
FAIRR (investor network)
(GIIN) Global Impact Investor Network
Novethic

2) Distribution of authors per text

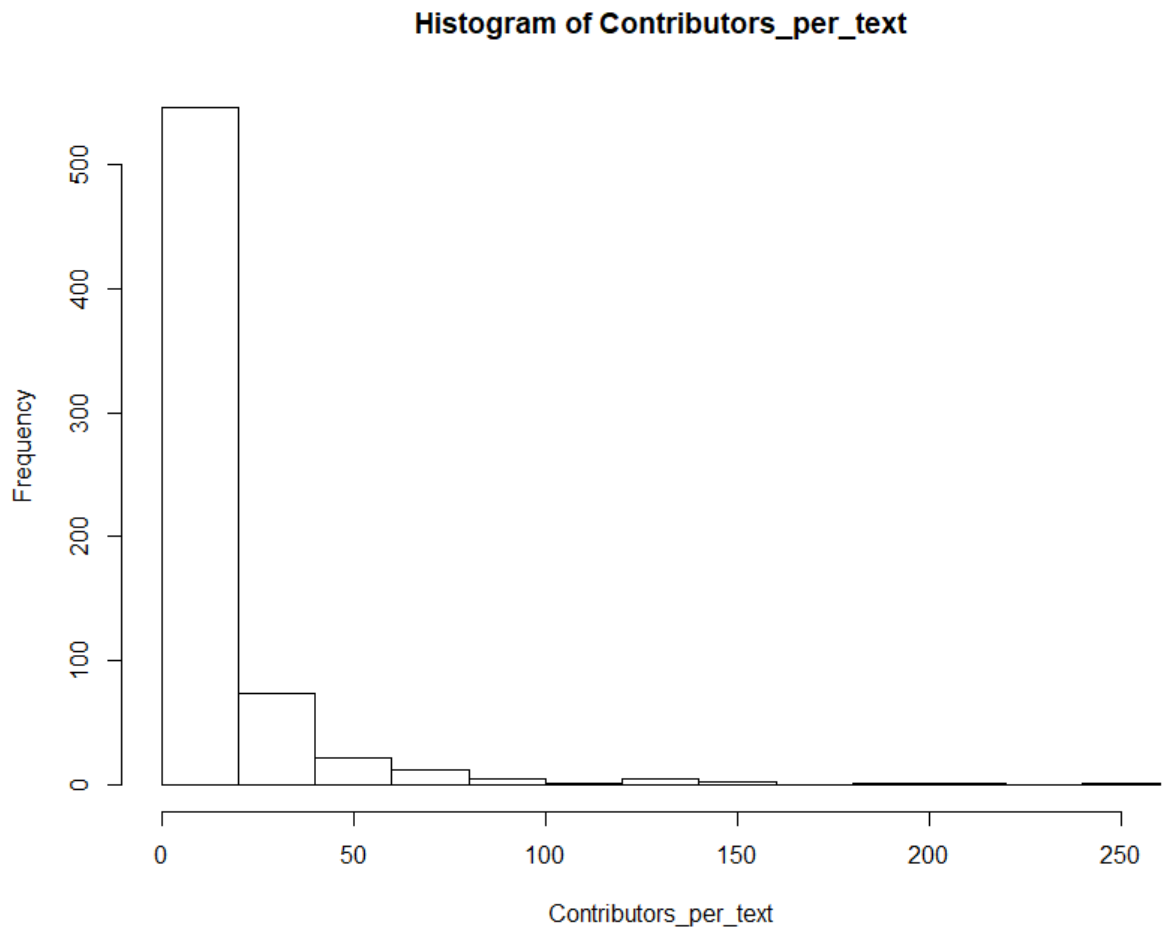


Figure 4. Distribution of authors for the texts in the co-publication network

3) Periodisation of networks: Elimination of nodes and edges for visual representations

Period 1998-2008: Nodes with edge weight < 2 deleted, i.e. texts that have less than 2 shared contributors are not linked and texts without links in the new network are not displayed

Original network: 61 texts

Reduced network 44 texts

Period 2009-2014: Nodes with edge weight < 2 deleted. Subsequently in the newly obtained network nodes with degree < 2 are deleted

Original network: 247 texts

Reduced network: 106 texts

Period 2015-2018: Nodes with edge weight < 2 deleted. Subsequently in the newly obtained network nodes with degree < 7 are deleted. The core of the network was

extracted by deleting edges with weights < 3 and equally deleting nodes with degree < 7 in the newly obtained network

Original network: 359 texts

Reduced network: 107 texts

Core network: 47 texts

4) Betweenness centrality for individuals throughout the three periods

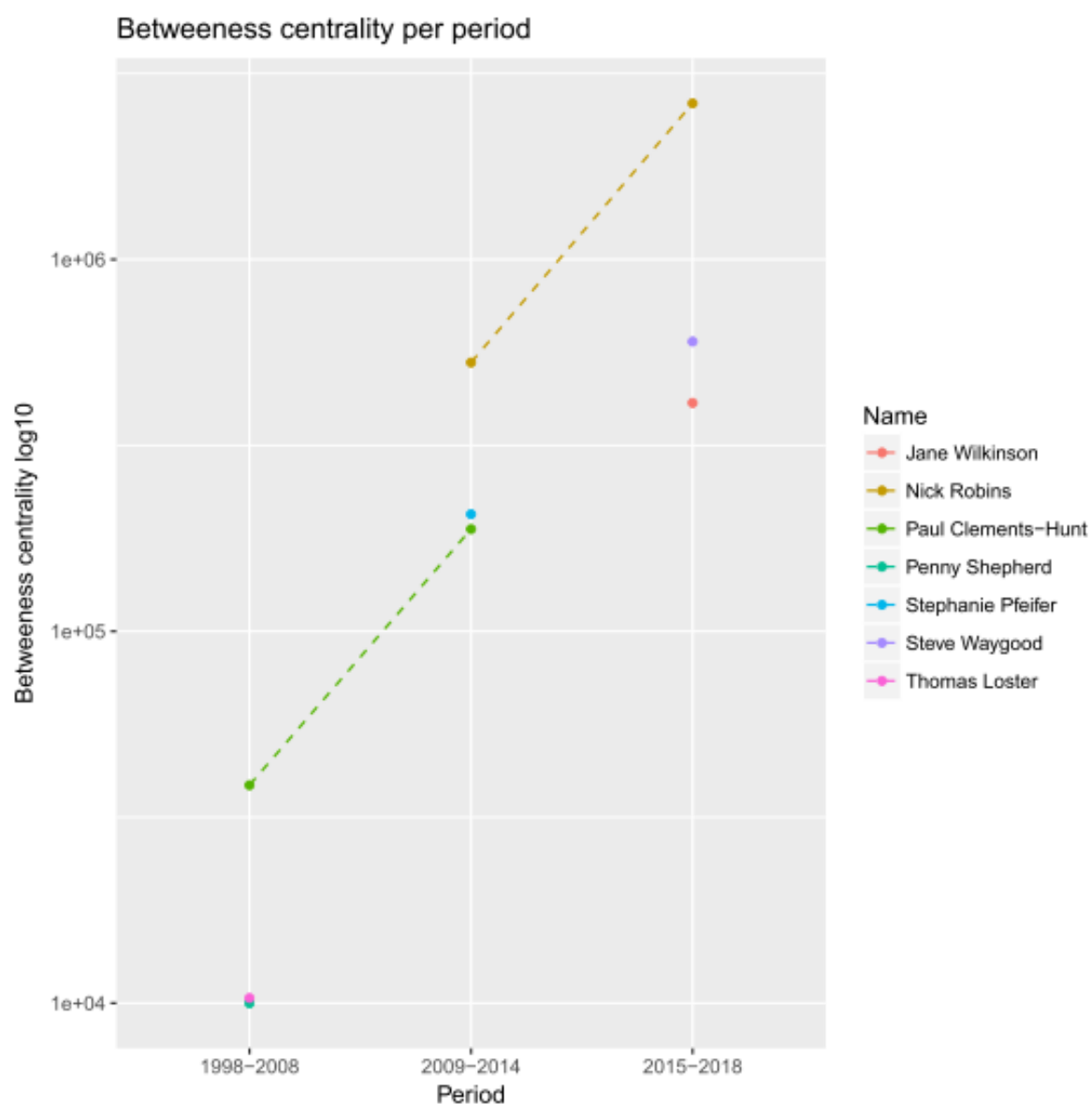


Figure 5. Top 3 individuals per period in weighted betweenness centrality with cutoff 3

Jane Wilkinson (Luxembourg Exchange), Nick Robins (UNEP Inquiry, formerly HSBC), Paul Clements Hunt (UNEP FI), Penny Shepherd (UKSIF), Stephanie Pfeifer (IIGCC), Steve Waygood (Aviva), Thomas Loster (Munich RE)

5) Weighting Correlations

Two different methods were applied to determine the weights of edges. In the first method, the conversion of two to one-mode networks results in a conversion of the sum of joint affiliation into the edge weight. To give an example, two texts that have three authors in common are linked by an edge, whose weight is equal to 3.

Alternatively, in the second method, for documents written by up to 10 contributors, individuals get a link of strength 1 to each other. If the document has more than 10 contributors, the weights of the connections between contributors get an increasing ‘punishment’. The number of 10 as well as the punishment function were obtained from Larsen and Ellersgaard (2017). The justification for taking 10 as a threshold is that the number lies within the lower bound of what sociologists consider to be maximum size of ‘sympathy groups’, within which meaningful interaction can take place (cf. Larsen and Ellersgaard 2017: 59). In table 6, I record the correlations between the betweenness centrality scores that were obtained through either method in the text-text networks in the three periods. This score was chosen as a test, since it influences the sorting through the Girvan Newman Algorithm and the interpretations of chapter 4.

Period	Correlation
1998-2008	0.67
2009-2014	0.77
2015-2018	0.91

Table 6. Betweenness centrality correlations for weighted and unweighted graphs

6) Citation network

A directed network detailing the intra-citation of the sampled documents was created using string search algorithms. This network consists of 409 documents and 864 citations amongst them. Figure 6 visualises the network, whereas figure 7 details the in-degree distribution and table 7 lists the six texts with most incoming citations.

Citation network, scaled by incoming citations

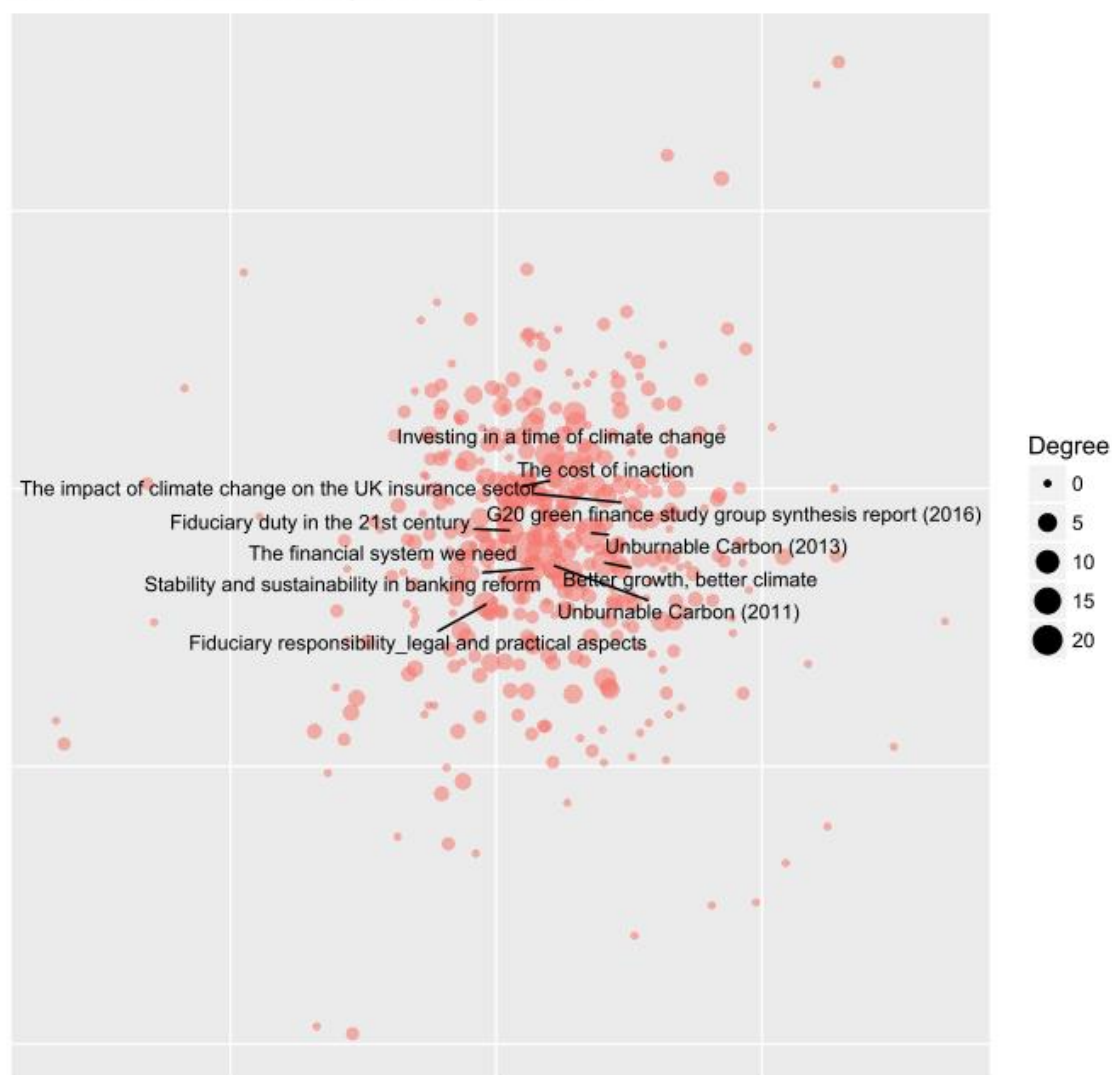


Figure 6. Citation network: Nodes scaled by in-degree

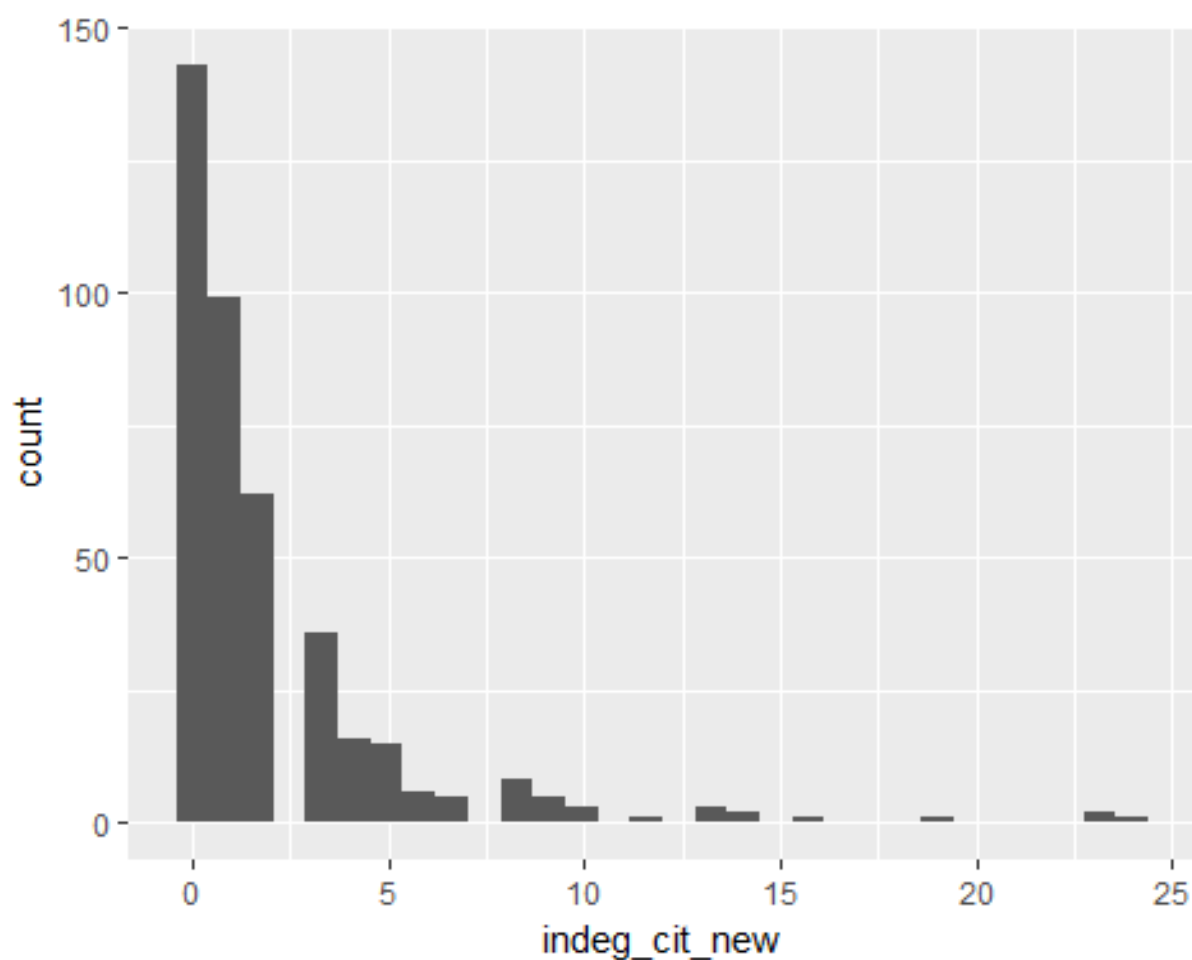


Figure 7. Distribution of in-degree

##	The cost of inaction	
##		14
##	Fiduciary duty in the 21st century	
##		16
##	Investing in a time of climate change	
##		19
##	Unburnable Carbon (2013)	
##		23
##	The impact of climate change on the UK insurance sector	
##		23
##	The financial system we need	
##		24

Table 7. Most cited texts in ascending order

Appendix D: Corpus analysis

1) Differences between texts for network analysis (667) and for corpus analysis (635)

In total the corpus analysis is based on 32 less texts than the network analysis. 28 of these missing texts could not be subjected to the corpus analysis due to ‘encoding issues’. This means that the conversion from pdf files to txt files, the latter of which are the required format for natural language processing in the *quanteda* package in the environment *R*, resulted in unreadable files. These conversion errors are most likely attributable to the use of special fonts or formatting in the pdf files. Among the documents that could not be converted are texts from CPI, 2° investing, and CISL.

Furthermore, four texts from an *Institute for New Economic Thinking* (INET) conference in Berlin in 2012 were removed manually from the corpus. Upon closer inspection these texts are scientific articles rather than policy documents or reports and as such do not meet the criteria for being included in the corpus. Hence, they should also be removed from the network analysis corpus, where they do, however, not play a critical role since they either isolates or at the fringes of the giant component.

2) Absolute occurrences of scholars' and journal's names (no checks for false positives)

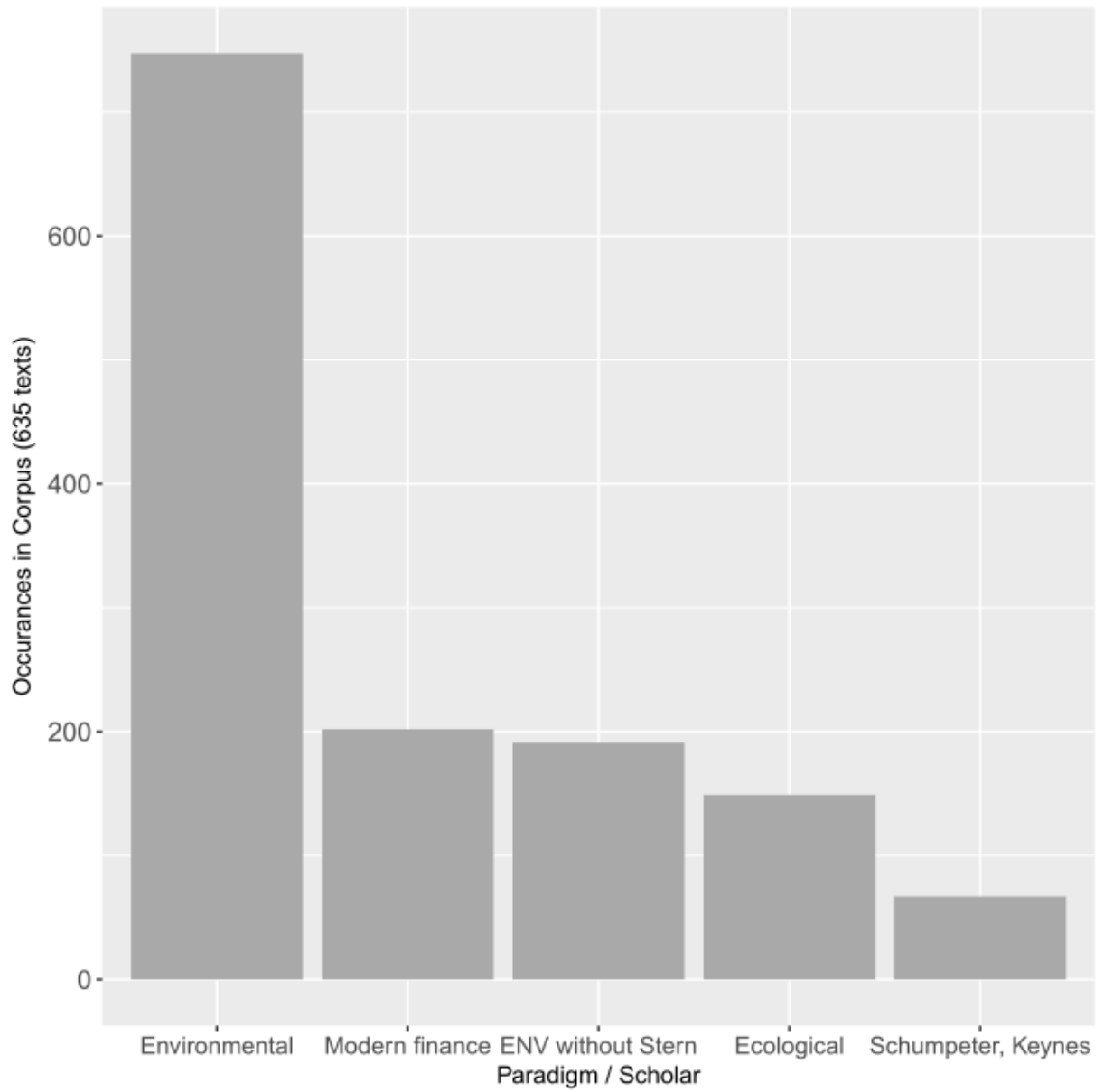


Figure 8. Absolute scholars mentions

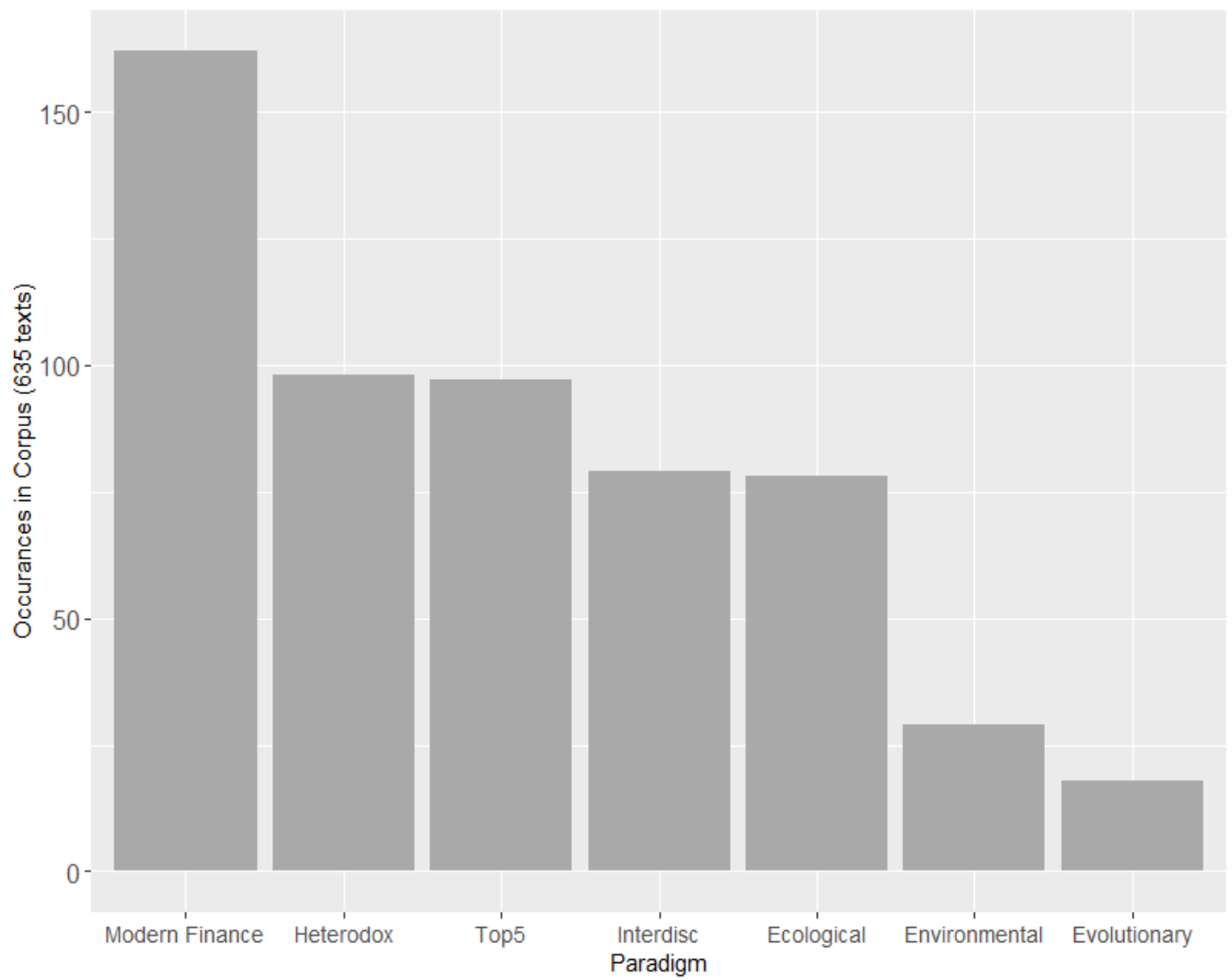


Figure 9. Absolute journal mentions

Appendix E: Transcripts of events (chronological order)

EU Public Hearing: Mid-term review of the Capital Markets Union, Brussels: April 11th, 2017.

EU Public Hearing: Sustainable finance, Publication of the HLEG interim report, Brussels: July 18th, 2017.

Finance as a response to environmental crises? Critical analysis of the 'economicization' of carbon emissions and biodiversity, University of Hamburg, Hamburg: November 29th to December 1st 2017.

One Planet Summit: Climate finance day, Paris: December 12th, 2017 (participation via live stream).

2nd FINEXUS conference, Zurich: January 17th-18th, 2018.

EU High-level conference: Financing sustainable growth, Brussels: March 22nd, 2018.

QED Forum on sustainable finance, Brussels: June 5th, 2018.

Ökofinanz 21 (German association of sustainable investment consultants) annual meeting, Berlin: September 21st, 2018.

EESC hearing: Facilitating access to climate finance for non-state actors, Brussels, October 29th, 2018.

OECD 5th Forum on Green Finance and Investment, Paris: November 13th-14th, 2018.

Bruegel workshop: How to speed up sustainable finance?, Brussels: November 28th, 2018.

Change Finance Forum, Brussels: December 6th-7th, 2018.

European Banking Federation and UNEP FI: Launch of the Principles for Responsible Banking, Brussels, February 5th, 2019.

European RI conference: Setting the agenda for a just and sustainable Europe, Brussels: February 24th, 2019.

European Responsible Investment Network (ERIN) conference, Brussels: February 25th, 2019 (Chatham House rules).

EU Public Hearing: A global approach to sustainable finance, Brussels: March 21st, 2019.

EESC hearing: The sustainable economy we need, Brussels: June 11th, 2019.

EU, Technical Expert Group Stakeholder Dialogue, Brussels: June 24th, 2019 (participation via stream).

Global Research Alliance on Sustainable Finance and Investment (GRAFSI), 2nd conference, Oxford: September 4th-5th, 2019.

OECD 6th Forum on Green Finance and Investment, Paris: October 29th-30th, 2019.

Appendix F: List of collected newspaper articles

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Arnold, M. (2019, November 27). Christine Lagarde wants key role for climate change in ECB review. Financial Times. <https://www.ft.com/content/61ef385a-1129-11ea-a225-db2f231cfeae>

Asgari, N. (2019a, July 3). World's top pension fund warns against risk of green-bond 'fad'. Financial Times. <https://www.ft.com/content/f844f1c2-998e-11e9-8cfb-30c211dcd229>

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Appendix G: Reproduction of periodisations of sustainable finance

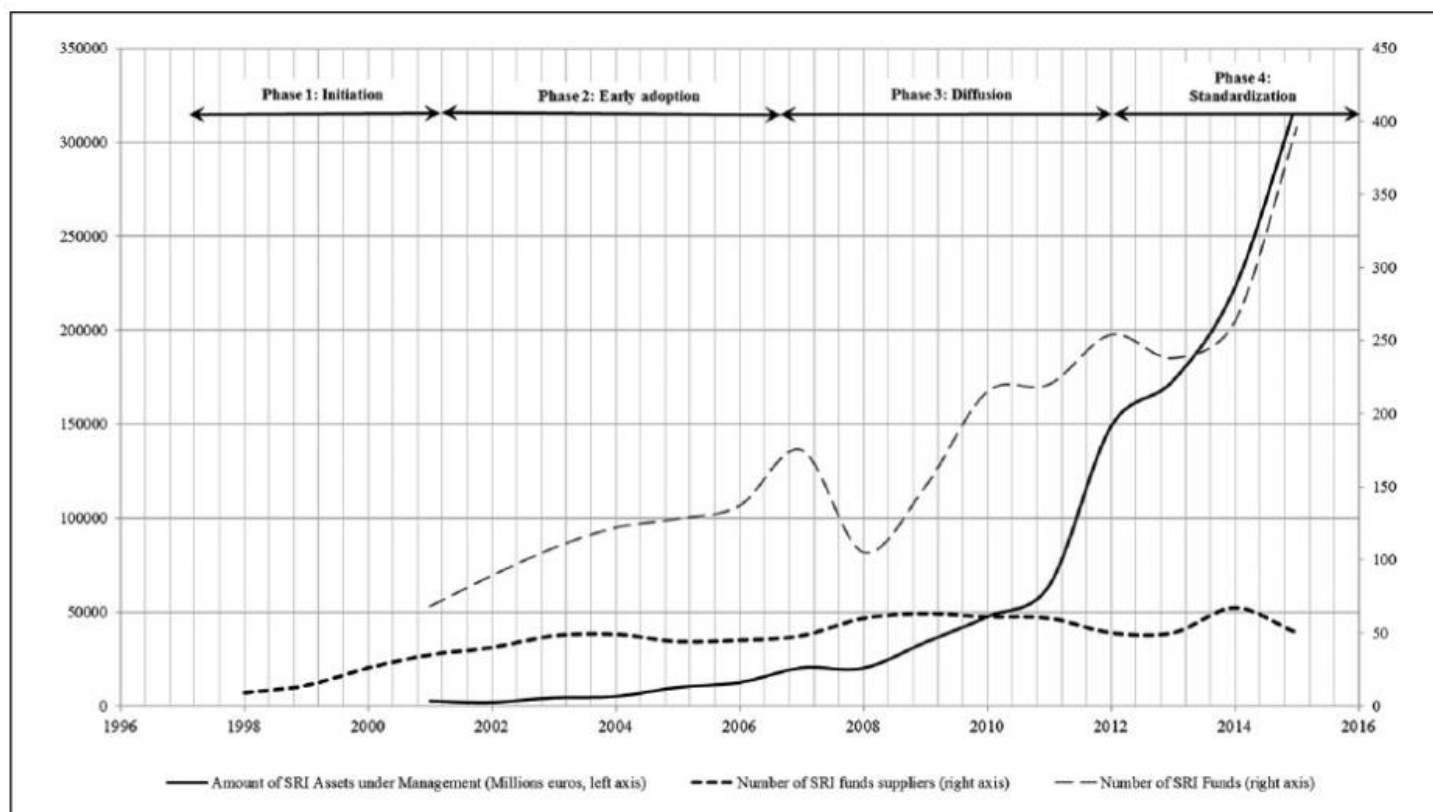


Figure 10: Periodisation of sustainable finance in France from Crifo et al. 2019

Figure 5: Key waves of sustainable finance innovation in the UK, 2000-2015

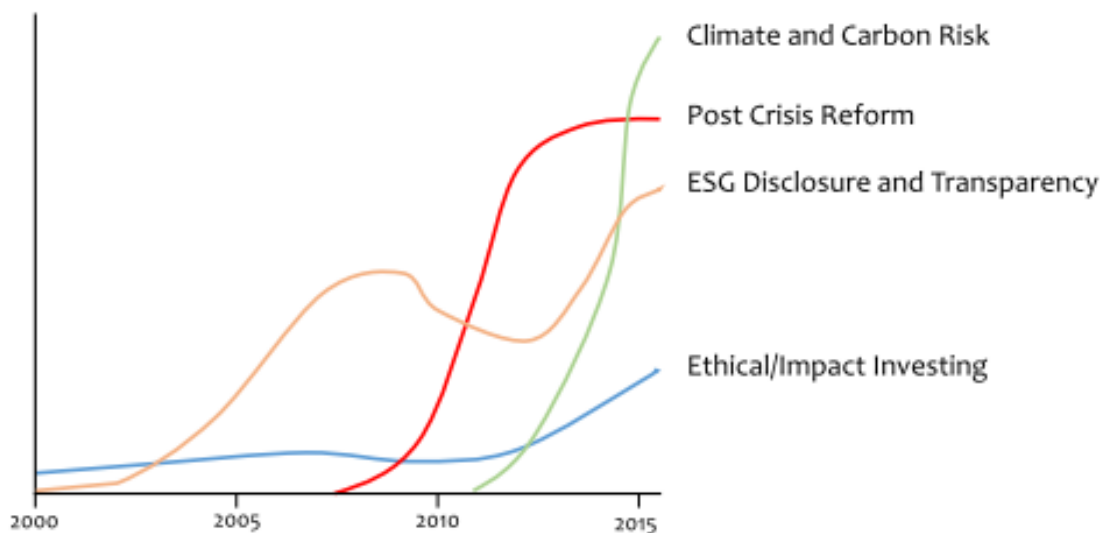


Figure 11. Periodisation of sustainable finance in the UK from Robins and McDaniels 2016

Table 2: Framework for Sustainable Finance

Sustainable finance typology	Value created	Ranking of factors	Optimisation	Horizon
Finance-as-usual	Shareholder value	F	Max F	Short term
Sustainable Finance 1.0	Refined shareholder value	$F > S$ and E	Max F subject to S and E	Short term
Sustainable Finance 2.0	Stakeholder value	$T = F + S + E$	Optimise T	Medium term
Sustainable Finance 3.0	Common good value	S and E $> F$	Optimise S and E subject to F	Long term

Source: Bruegel. Note: F = financial value; S = social impact; E = environmental impact; T = total value. At Sustainable Finance 1.0, the maximisation of F is subject to minor S and E constraints.

Figure 12. Typology of sustainable finance approaches from Schoenmaker 201

Appendix H: R Script

I implemented the analysis and visualisation of the networks in the statistical programme environment *R* using several *packages* like *igraph* that consist of a set of functions. Below I record the code for constructing, analysing and visualising the co-publication networks. The data files that are imported into R are uploaded on the GEM STONES shared [dataset](#) and can be made available on request.

1) Co-publication networks

libraries

```
library(readxl)
library(igraph)
library(ggplot2)
library(ggraph)
library(Matrix)
library(reshape2)
library(dplyr)
```

load data for the yearly graphs (1year, later no suffix), total graphs (cum) and the periods (per)

```
contnet_1_year <- lapply(excel_sheets("contnet3_281119.xlsx"),
                        read_excel, path = "contnet3_281119.xlsx")
con_cum <- lapply(excel_sheets("contnet3_cumulative_281119.xlsx"),
                  read_excel, path = "contnet3_cumulative_281119.xlsx")
cont_per <- lapply(excel_sheets("contnet_3_3periods_281119.xlsx"),
                  read_excel, path = "contnet_3_3periods_281119.xlsx")
```

transform the affiliation matrices to adjacency matrices and to graphs

```
incidence <- lapply(contnet_1_year, xtabs, formula = ~Author_Name +
                    Document_Name, sparse = T)
incidence_cum <- lapply(con_cum, xtabs, formula = ~Author_Name +
                        Document_Name, sparse = T)
incidence_p <- lapply(cont_per, xtabs, formula = ~Author_Name +
                      Document_Name, sparse = T)
graph.two <- lapply(incidence, graph.incidence)
graph.two_cum <- lapply(incidence_cum, graph.incidence)
```

```

graph.two_p <- lapply(incidence_p, graph.incidence)
adj <- function(x) {sqrt(x) %*% sqrt(t(x))}
adj.afil <- function(x) {sqrt(t(x)) %*% sqrt(x)}
adj.ind <- lapply(incidence, adj)
adj.afil <- lapply(incidence, adj.afil)
adj.ind_cum <- lapply(incidence_cum, adj)
adj.afil_cum <- lapply(incidence_cum, adj.afil)
adj.ind_p <- lapply(incidence_p, adj)
adj.afil_p <- lapply(incidence_p, adj.afil)

graph.ind <- sapply(adj.ind, graph.adjacency, mode = "undirected", diag = FALSE,
weighted = TRUE)

graph.afil <- lapply(adj.afil, graph.adjacency, mode = "undirected", diag = FALSE,
weighted = TRUE)

graph.ind_cum <- lapply(adj.ind_cum, graph.adjacency, mode = "undirected", diag =
FALSE, weighted = TRUE)

graph.afil_cum <- lapply(adj.afil_cum, graph.adjacency, mode = "undirected", diag
= FALSE, weighted = TRUE)

graph.ind_p <- lapply(adj.ind_p, graph.adjacency, mode = "undirected", diag =
FALSE, weighted = TRUE)

graph.afil_p <- lapply(adj.afil_p, graph.adjacency, mode = "undirected", diag =
FALSE, weighted = TRUE)

```

select the graphs for the three periods and the total

```

two_1 <- graph.two_cum[[10]]
two_2 <- graph.two_p[[1]]
two_3 <- graph.two_p[[2]]
graph.two_cum_total <- graph.two_cum[[20]]
p1 <- graph.afil_cum[[10]]
p2 <- graph.afil_p[[1]]
p3 <- graph.afil_p[[2]]
graph.afil_total <- graph.afil_cum[[20]]

```

calculate nodes and edges per year

```

nodes_two <- lapply(graph.two, vcount)
edges_two <- lapply(graph.two, ecount)

```

```
nodes_affil <- unlist(lapply(graph.affil, vcount))
edges_affil <- unlist(lapply(graph.affil, ecount))
```

calculate nodes and edges per period

two mode

```
E(two_1)
V(two_1)
E(two_2)
V(two_2)
E(two_3)
V(two_3)
E(graph.two_cum_total)
V(graph.two_cum_total)
```

one mode

```
E(p1)
V(p1)
E(p2)
V(p2)
E(p3)
V(p3)
E(graph.affil_total)
V(graph.affil_total)
```

Calculate betweenness centrality of individuals in cumulative graphs, weighted and with cutoff = 3

```
bet_two_cum <- lapply(graph.two_cum, betweenness.estimate, weights =
1/E(graph.two), directed = F,
cutoff = 3)
```

calculate the cohesion of the graphs in the three periods through the

ratio of nodes in the largest component

```
components(graph.affil_total)
```

```

V(graph.affil_total)
rt <- 566/666*100
components(p1)
V(p1)
r1 <- 41/61*100
components(p2)
V(p2)
r2 <- 186/247*100
components(p3)
V(p3)
r3 <- 281/359*100
# for graph two
components(graph.two_cum_total)
V(graph.two_cum_total)
to_t <- 5978/6295*100
components(two_1)
V(two_1)
to1 <- 408/616*100
components(two_2)
V(two_2)
to2 <- 1988/2201*100
components(two_3)
V(two_3)
to3 <- 3803/4082*100

```

Apply the Girvan-Newman Algorithm to the three periods of the one mode graphs

and visualize the networks

delete the vertices and edges

```

p1n <- delete.vertices(p1, which(degree(p1)< 2))
p2n <- delete.edges(p2, which(E(p2)$weight < 2))
p2n <- delete.vertices(p2n, which(degree(p2n)< 2))
p3n <- delete.edges(p3, which(E(p3)$weight < 2))

```

```

p3n <- delete.vertices(p3n, which(degree(p3n)< 7))
p3nr <- delete.edges(p3, which(E(p3)$weight < 3))
p3nr <- delete.vertices(p3nr, which(degree(p3nr)< 7))

# create and visualize the graphs
# with weights indicating proximity
e_bet_affil_2008_yes_w <- cluster_edge_betweenness(p1n, weights =
1/E(p1n)$weight)
deg_affil_c_2008 <- degree(p1n)
lab_affil_c_2008 <- V(p1n)$name
lab_affil_c_2008[degree(p1n, mode = "in") < 15] <- NA
pdf("period 1 with edge weights girvan.pdf")
ggraph(p1n, layout = "with_fr") + geom_node_point(aes(size = deg_affil_c_2008,
color = factor(membership(e_bet_affil_2008_yes_w)), alpha = 0.25)) +
  geom_edge_link(colour = "black", alpha = 0.05)+
  theme(axis.line=element_blank(),axis.text.x=element_blank(),
        axis.text.y=element_blank(),axis.ticks=element_blank(),
        axis.title.x=element_blank(),
        axis.title.y=element_blank(),
        panel.grid.minor=element_blank(),plot.background=element_blank()) +
  guides(size = F, color = guide_legend("Communities"), alpha = F) +
  scale_color_hue(labels = c("UNEP FI", "Carbon Trust + IIGCC", "New economics
foundation", "Eurosif and members",
                            "MCII + GCF", "ÖBU (Switzerland)"))+
  geom_node_text(aes(label = NA), size = 2, repel = T, check_overlap = T) +
  ggtitle("Text linked by copublication 1998-2008")
dev.off()
ebet_2008_w <- as.vector(membership(e_bet_affil_2008_yes_w))
names <- read.csv("deg affil 1998-2008e.csv")
comun_2008_w <- data.frame(names$X, ebet_2008_w)

# write spreadsheet sorting text names to community numbers for later manually
assigning
# the organisation names in the graph

```

```

write.csv(comun_2008_w, file= "communities affil weighted 1998-
2008_281119.csv")

e_bet_2014_yes_w <- cluster_edge_betweenness(p2n, weights = 1/E(p2n)$weight)

deg_p2n <- degree(p2n)

pdf("period 2 with weights girvan.pdf")

ggraph(p2n, layout = "with_fr") + geom_node_point(aes(size = deg_p2n, color =
factor(membership(e_bet_2014_yes_w)), alpha = 0.1)) +

geom_edge_link(colour = "black", alpha = 0.05)+

theme(axis.line=element_blank(),axis.text.x=element_blank(),

axis.text.y=element_blank(),axis.ticks=element_blank(),

axis.title.x=element_blank(),

axis.title.y=element_blank(),

panel.grid.minor=element_blank(),plot.background=element_blank()) +

guides(size = F, color = guide_legend("Communities"), alpha = F) +

scale_color_hue(labels = c( "Eurosif and members",

"UNEP FI, UNEP Inq, IIGCC,

CPI, Uni Oxford ",

"GCF",

"Carbon Tracker, nef, Aviva,

shareaction, generation foundation ",

"CBI, E3G, HSBC",

"MCII, germanwatch",

"UNEP FI, Aviva, WBCSD",

"CPI, E3G, NCE",

"2 degrees investing, I4CE",

"Böll foundation, odi, CPI, WRI",

"WBGU",

"IFC, SSE",

"Bank Track",

"Mirova",

"Friends of the Earth"

))+

```

```

  geom_node_text(aes(label = labtest), size = 1.8, repel = T, check_overlap = T,
alpha = F) + ggtitle("Texts linked by copublication 2009-2014")
dev.off()

ebet_2014_w <- as.vector(membership(e_bet_2014_yes_w))
names <- read.csv("deg affil 2008-2014e1.csv")
comun_2014_w <- data.frame(names$X, ebet_2014_w)

# write spreadsheet sorting text names to community numbers for later manually
assigning

# the organisation names in the graph

write.csv(comun_2014_w, file= "communities affil weighted 2009-
2014_281119.csv")

e_bet_2018_yes_w <- cluster_edge_betweenness(p3n, weights = 1/E(p3n)$weight)
deg_p3n <- degree(p3n)
pdf("period 3 with edge weights girvan.pdf")
ggraph(p3n, layout = "with_fr") + geom_node_point(aes(size = deg_p3n, color =
factor(membership(e_bet_2018_yes_w)), alpha = 0.25)) +
  geom_edge_link(colour = "black", alpha = 0.05)+
  theme(axis.line=element_blank(),axis.text.x=element_blank(),
        axis.text.y=element_blank(),axis.ticks=element_blank(),
        axis.title.x=element_blank(),
        axis.title.y=element_blank(),
        panel.grid.minor=element_blank(),plot.background=element_blank()) +
  guides(size = F, color = guide_legend("Communities"), alpha = F) +
  scale_color_hue(labels = c(
    "UNEP FI, E3G, CISL",
    "UNEP Inquiry, UNEP FI, NRDC,
    Mercer, EIU, NCE",
    "FSB TCFD, SSE,
    Green Finance Taskforce (UK)",
    "2 ° investing, UNEP Inquiry, HLEG,
    CERES, SSE, CBI,
    Trinomics",
    "I4CE, UNEP Inquiry,

```

```

Trinomics, WWF",
"CPI, Böll foundation, odi, I4CE, IRENA",
"I4CE, WRI, 2 ° investing,
CPI, germanwatch",
"Carbon Tracker",
"Co-Firm, CISL",
"WWF",
"Eurosif",
"UNEP Inquiry",
"G20 Green Finance Study Group",
"I4CE",
"NCE",
"UNEP Inquiry",
"CIGI"
)) +
  geom_node_text(aes(label = NA), size = 2, repel = T, check_overlap = T) +
  ggtitle("Texts linked by copublication 2015-2018")
dev.off()

ebet_2018_w <- as.vector(membership(e_bet_2018_yes_w))
names <- read.csv("deg affil 2014-2018e1.csv")
comun_2018_w <- data.frame(names$X, ebet_2018_w)

# write spreadsheet sorting text names to community numbers for later manually
assigning

# the organisation names in the graph
write.csv(comun_2018_w, file= "communities affil weighted 2014-
2018_281119.csv")

# extracted core
e_bet_2018_core_yes_w <- cluster_edge_betweenness(p3nr, weights =
1/E(p3nr)$weight)
deg_p3nr <- degree(p3nr)
pdf("period 3 weigthed clusters girvan core.pdf")

```



```

ggraph(p3nr, layout = "with_fr") + geom_node_point(aes(size = deg_p3nr, color =
factor(membership(e_bet_2018_core_yes_w)), alpha = 0.25)) +
geom_edge_link(colour = "black", alpha = 0.05)+
theme(axis.line=element_blank(),axis.text.x=element_blank(),
axis.text.y=element_blank(),axis.ticks=element_blank(),
axis.title.x=element_blank(),
axis.title.y=element_blank(),
panel.grid.minor=element_blank(),plot.background=element_blank()) +
guides(size = F, color = guide_legend("Communities"), alpha = F) +
scale_color_hue(labels = c(
"UNEP Inquiry, HLEG,
UNEP FI, E3G, WWF,
Green Finance Taskforce (UK),
Mercer, SSE, E3G,
2° investing, SSE,
Trinomics",
"2° investing, UNEP FI",
"I4CE, UNEP Inquiry",
"CPI, NCE, WRI",
"UNEP Inquiry"
))+
geom_node_text(aes(label = NA), size = 2, repel = T, check_overlap = T) +
ggtitle("Core: Texts linked by copublication 2015-2018")
dev.off()

ebet_2018_core_w <- as.vector(membership(e_bet_2018_core_yes_w))
names <- read.csv("deg affil 2014-2018r.csv")
comun_2018_core_w <- data.frame(names$X, ebet_2018_core_w)

# write spreadsheet sorting text names to community numbers for later manually
assigning

# the organisation names in the graph

write.csv(comun_2018_core_w, file= "communities affil weighted 2014-
2018_core_281119.csv")

```

2) Citation network

Since the matching of 666 names to a corpus of over 30000 pages exceeded the computing power of my computer, I separated the names in 6 vectors of 100 names each and one vector with 66 names. Afterwards I manually created an edge list from the matches and carried out manual spot checks e.g. to check for encoding errors.

Create spreadsheets matching strings to documents through string matching

```
# libraries
```

```
library(quantda)
```

```
library(readtext)
```

```
library(pdftools)
```

```
library(tm)
```

```
library(corpus)
```

```
library(readxl)
```

```
# create corpus from .txt files
```

```
t2 <- readtext("C:/Users/Andreas/OneDrive - University of  
Warwick/phd/NETWORK texts + citation network/co/*.txt", encoding = "latin1")
```

```
contnet_corpus2 <- corpus(t2)
```

```
# tokenize
```

```
tokcont2 <- tokens(contnet_corpus2)
```

```
# names lists
```

```
name1 <- read_excel("C:/Users/Andreas/OneDrive - University of  
Warwick/phd/NETWORK texts + citation  
network/affilnames_revised_nocommas.xlsx", sheet= 2)
```

```
name2 <- read_excel("C:/Users/Andreas/OneDrive - University of  
Warwick/phd/NETWORK texts + citation  
network/affilnames_revised_nocommas1.xlsx", sheet=3)
```

```
name3 <- read_excel("C:/Users/Andreas/OneDrive - University of  
Warwick/phd/NETWORK texts + citation  
network/affilnames_revised_nocommas1.xlsx", sheet=4)
```

```
name4 <- read_excel("C:/Users/Andreas/OneDrive - University of  
Warwick/phd/NETWORK texts + citation  
network/affilnames_revised_nocommas1.xlsx", sheet=5)
```

```

name5 <- read_excel("C:/Users/Andreas/OneDrive - University of
Warwick/phd/NETWORK texts + citation
network/affilnames_revised_nocommas1.xlsx", sheet=6)

name6 <- read_excel("C:/Users/Andreas/OneDrive - University of
Warwick/phd/NETWORK texts + citation
network/affilnames_revised_nocommas.xlsx", sheet=7)

name6_2 <- read_excel("C:/Users/Andreas/OneDrive - University of
Warwick/phd/NETWORK texts + citation
network/affilnames_revised_nocommas.xlsx", sheet=8)

name7 <- read_excel("C:/Users/Andreas/OneDrive - University of
Warwick/phd/NETWORK texts + citation
network/affilnames_revised_nocommas.xlsx", sheet=9)

name7_2 <- read_excel("C:/Users/Andreas/OneDrive - University of
Warwick/phd/NETWORK texts + citation
network/affilnames_revised_nocommas.xlsx", sheet=10)

n100 <- name1$Names
n200 <- name2$Names
n300 <- name3$Names
n400 <- name4$Names
n500 <- name5$Names
n600 <- name6$Names
n600_2 <- name6_2$Names
n643 <- name7$Names
n643_2 <- name7_2$Names

# create tokens lookups
tok100 <- tokens_select(tokcont2, phrase(n100), case_insensitive = T)
tok200 <- tokens_select(tokcont2, phrase(n200), case_insensitive = T)
tok300 <- tokens_select(tokcont2, phrase(n300), case_insensitive = T)
tok400 <- tokens_select(tokcont2, phrase(n400), case_insensitive = T)
tok500 <- tokens_select(tokcont2, phrase(n500), case_insensitive = T)
tok600 <- tokens_select(tokcont2, phrase(n600), case_insensitive = T)
tok643 <- tokens_select(tokcont2, phrase(n643), case_insensitive = T)
tok600_2 <- tokens_select(tokcont2, phrase(n600_2), case_insensitive = T)
tok643_2 <- tokens_select(tokcont2, phrase(n643_2), case_insensitive = T)

```

```

## n400 and n600 too large
# make them lists and dfs
names_contnet <- t$doc_id
toklist100 <- as.list(tok100)
toklist200 <- as.list(tok200)
toklist300 <- as.list(tok300)
toklist400 <- as.list(tok400)
toklist500 <- as.list(tok500)
toklist600 <- as.list(tok600)
toklist643 <- as.list(tok643)
toklist600_2 <- as.list(tok600_2)
toklist643_2 <- as.list(tok643_2)
df100 <- data.frame(t(sapply(toklist100,c)))
df100 <- data.frame(t(df100))
df100 <- cbind(names_contnet, df100)
df200 <- data.frame(t(sapply(toklist200,c)))
df200 <- data.frame(t(df200))
df200 <- cbind(names_contnet, df200)
df300 <- data.frame(t(sapply(toklist300,c)))
df300 <- data.frame(t(df300))
df300 <- cbind(names_contnet, df300)
df400 <- data.frame(t(sapply(toklist400,c)))
df400 <- data.frame(t(df400))
df400 <- cbind(names_contnet, df400)
df500 <- data.frame(t(sapply(toklist500,c)))
df500 <- data.frame(t(df500))
df500 <- cbind(names_contnet, df500)

df600 <- data.frame(t(sapply(toklist600,c)))
df600 <- data.frame(t(df600))
df600 <- cbind(names_contnet, df600)

```

```

df643 <- data.frame(t(sapply(toklist643,c)))
df643 <- data.frame(t(df643))
df643 <- cbind(names_contnet, df643)
df600_2 <- data.frame(t(sapply(toklist600_2,c)))
df600_2 <- data.frame(t(df600_2))
df600_2 <- cbind(names_contnet, df600_2)
df643_2 <- data.frame(t(sapply(toklist643_2,c)))
df643_2 <- data.frame(t(df643_2))
df643_2 <- cbind(names_contnet, df643_2)

# write them as csvs
# make 2nd column into a character vector
df100$t.df100. <- vapply(df100$t.df100., paste, collapse = ", ", character(1L))
write.csv(df100, file= "df100noco.csv")
df200$t.df200. <- vapply(df200$t.df200., paste, collapse = ", ", character(1L))
write.csv(df200, file= "df200new.csv")
df300$t.df300. <- vapply(df300$t.df300., paste, collapse = ", ", character(1L))
write.csv(df300, file= "df300new.csv")
df400$t.df400. <- vapply(df400$t.df400., paste, collapse = ", ", character(1L))
write.csv(df400, file= "df400new.csv")
df500$t.df500. <- vapply(df500$t.df500., paste, collapse = ", ", character(1L))
write.csv(df500, file= "df500new.csv")
df600$t.df600. <- vapply(df600$t.df600., paste, collapse = ", ", character(1L))
write.csv(df600, file= "df600noco.csv")
df643$t.df643. <- vapply(df643$t.df643., paste, collapse = ", ", character(1L))
write.csv(df643, file= "df643noco.csv")
df600_2$t.df600_2. <- vapply(df600_2$t.df600_2., paste, collapse = ", ",
character(1L))
write.csv(df600_2, file= "df600_2noco.csv")
df643_2$t.df643_2. <- vapply(df643_2$t.df643_2., paste, collapse = ", ",
character(1L))
write.csv(df643_2, file= "df643_2noco.csv")

```

Analysing degree distribution and plot

```
# libraries

library(igraph)
library(readxl)
library(ggplot2)
library(ggraph)
library(readxl)

# data

cit_new <- read_excel("edgelist_citations_new_complete.xlsx")
citnet_new <- graph.data.frame(cit_new, directed = T)
cit_new_undir <- graph.data.frame(cit_new, directed = F)

# plot

indeg_cit_new <- degree(citnet_new, mode = "in")
View(indeg_cit_new)
lab_cit_new <- V(citnet_new)$name
lab_cit_new[degree(citnet_new, mode = "in") < 11] <- NA
pdf("citnet new.pdf")
ggraph(citnet_new, layout = "with_kk") + geom_node_point(aes(size =
indeg_cit_new, color = "blue", alpha = 0.25)) +
  theme(axis.line=element_blank(),axis.text.x=element_blank(),
        axis.text.y=element_blank(),axis.ticks=element_blank(),
        axis.title.x=element_blank(),
        axis.title.y=element_blank(),
        panel.grid.minor=element_blank(),plot.background=element_blank()) +
  guides(size = guide_legend("Degree"), color = F, alpha = F) +
  geom_node_text(aes(label = lab_cit_new), size = 3, repel = T, check_overlap = T)
+ ggtitle("Citation network, scaled by incoming citations")
dev.off()
```

3) Matching to Paradigmatic Scholars and Journals

The same tokenized corpus as in the citation network (tokcont2) was used to look for the occurrences of scholar and journal names.

```
# libraries

library(quanteda)
library(readtext)
library(pdftools)
library(tm)
library(corpus)
library(ggplot2)

# create dictionary for scholars

parad_names2 <- list(MPT = c("Markowitz", "Arrow", "Tobin", "Sharpe", "Fischer-
Black", "Merton", "Fama", "Sharpe"),

                    ECO = c("Daly", "Costanza", "Ayres", "Kapp", "Meadows", "Odum",
"Schumacher", "Georgescu-Roegen",
                    "Boulding"),

                    ENV = c("Chris Hope", "Nordhaus", "Bosetti", "Tol", "Stern",
"Tavoni", "Grubb"),

                    Schumpeter, Keynes = c("Schumpeter", "Keynes"),

                    ENV_without_Stern = c("Chris Hope", "Nordhaus", "Bosetti", "Tol",
"Tavoni", "Grubb"))

dic_para2 <- dictionary(parad_names2, tolower = F, separator = " ")

# apply dictionary to the corpus and convert it to a dataframe

tok_para2 <- tokens_lookup(tokcont2, dictionary = dic_para2, levels = 1)

dfm_scholars <- dfm(tok_para2)

df_scholars <- as.data.frame(dfm_scholars)

# exclude the INET texts (see Appendix D for justification)

df_scholars <- df_scholars[-c(149,272,465,627),]

View(df_scholars)

# Store non zero entries in a vector and export as .csv
```

```

non_zero_scholars <- colSums(df_scholars != 0)
write.csv(non_zero_scholars, file = "non_zero.csv")

# Store overall values in a vector and export as .csv
scholars_cols <- df_scholars[2:6]
scholars_sums <- colSums(scholars_cols)
write.csv(scholars_sums, file = "scholar_sums.csv")

# Manually adjust header in csv to convert from vector to
# dataframe, read csv files and plot overall and non-zero values
scholars_total <- read.csv("scholar_sums1.csv")

ggplot(scholars_total, aes(x = reorder(para, -count), y = count)) + geom_bar(stat =
"identity", fill = "darkgrey") + xlab("Paradigm / Scholar") +
  ylab("Occurrences in Corpus (635 texts)") + theme(axis.text.x = element_text(size =
10.5), axis.text.y = element_text(size = 12))

non_zero_total <- read.csv("non_zero1.csv")

ggplot(non_zero_total, aes(x = reorder(schol, -no), y = no)) + geom_bar(stat =
"identity", fill = "darkgrey") + xlab("Paradigm / Scholar") +
  ylab("Occurrences in Corpus (635 texts)") + theme(axis.text.x = element_text(size =
9), axis.text.y = element_text(size = 12))

### Repeat for dictionaries with journal names from the HED, the top5 mainstram
journals
# and the journals mentioned in chapter 5
dic_manual_1 <- dictionary(list(gen = c("American Journal of Economics and
Sociology",
    "Brazilian Journal of Political Economy",
    "Bulletin of Political Economy",
    "Cambridge Journal of Economics",
    "Competition & Change",
    "Contributions to Political Economy",
    "Economic Systems Research",
    "Economía e Sociedade",
    "European Journal of Economics and Economic Policies:
Intervention",

```


Education",

"Forum for Social Economics",

"International Journal of Pluralism and Economics

"International Journal of Political Economy",

"International Journal of Social Economics",

"International Review of Applied Economics",

"Journal of Australian Political Economy",

"Journal of Economic Issues",

"Journal of Heterodox Economics",

"Journal of Institutional Economics",

"Journal of Post Keynesian Economics",

"Journal of World Economy",

"Metroeconomica",

"New School Economic Review",

"Nova Economia",

"PSL Quarterly Review",

"Panoeconomicus",

"Review of Keynesian Economics",

"Review of Political Economy",

"Review of Radical Political Economics",

"Review of Social Economy",

"Régulation Review. Capitalism, Institutions, Powers",

"Socio-Economic Review",

"World Economic Review"),

fem = c("Feminist Economics"),

hist_met = c("Economic Thought: History, Philosophy and

Methodology",

"Economics and Philosophy",

"Erasmus Journal for Philosophy and Economics",

"European Journal of the History of Economic Thought",

"History of Economic Ideas",

"History of Economics Review",

"History of Political Economy",

"Journal of Economic Methodology",
 "Journal of Philosophical Economics",
 "Journal of the History of Economic Thought",
 "Oeconomia"),
 aust = c("Advances in Austrian Economics",
 "Econ Journal Watch",
 "Quarterly Journal of Austrian Economics",
 "Review of Austrian Economics"),
 ecolog = c("Capitalism, Nature, Socialism",
 "Economics and Policy of Energy and the Environment",
 "Environmental Values",
 "International Journal of Green Economics",
 "Journal of Agrarian Change",
 "Mother Pelican: A Journal of Solidarity and
 Sustainability",
 "Organization & Environment"),
 eco_ec = c("Ecological Economics"),
 evolu = c("Innovations (Revue d'économie et de management de
 l'innovation)",
 "Development and Change",
 "Evolutionary and Institutional Economic Review",
 "Industrial and Corporate Change",
 "International Journal of Development Issues",
 "Journal of Development Studies",
 "Journal of Evolutionary Economics",
 "Journal of Innovation Economics & Management",
 "Oxford Development Studies",
 "Structural Change and Economic Dynamics",
 "Problemas del Desarrollo"),
 radical = c("Alternative Routes: A Journal of Critical Social
 Research",
 "Antipode: A Radical Journal of Geography",
 "Capital & Class",

Theory",
 "Critique: Journal of Socialist Theory",
 "Historical Materialism: Research in Critical Marxist
 Theory",
 "International Critical Thought",
 "International Socialism: A Quarterly Journal of Socialist
 Theory",
 "Monthly Review",
 "New Left Review",
 "New Political Economy",
 "New Proposals: Journal of Marxism and
 Interdisciplinary Inquiry",
 "Research in Political Economy",
 "Rethinking Marxism",
 "Review of Capital as Power",
 "Science & Society",
 "Studies in Political Economy",
 "World Review of Political Economy"),
 interdis = c("Accounting, Organizations and Society",
 "Basic Income Studies: An International Journal of Basic
 Income Research",
 "Cambridge Journal of Regions, Economy and Society",
 "Critical Perspectives on Accounting",
 "Critical Perspectives on International Business",
 "Critical Sociology",
 "Debatte: Journal of Contemporary Central and Eastern
 Europe",
 "Economic Geography",
 "Interdisciplinary Journal of Economics and Business
 Law",
 "Interface: A Journal for and about Social Movements",
 "International Journal of Public Policy",
 "Journal des Économistes et des Études Humaines",
 "Journal of Economic Geography",
 "Journal of Economic and Social Policy",
 "Journal of Human Development and Capabilities",

"Journal of Interdisciplinary Economics",
 "Journal of World-Systems Research",

 "Momentum Quarterly",

 "Public Policy Research",
 "Review of International Political Economy",
 "Social and Economic Studies",
 "Thesis Eleven",
 "tripleC: Communication, Capitalism & Critique"),
 envi_ec = c("Environmental and Resource Economics",
 "Journal of Environmental Economics and
 Management"),
 mft = c("Journal of Finance",
 "Journal of Finance and Quantitative Analysis",
 "Journal of Business",
 "Financial Analysis Journal",
 "Journal of Portfolio Management",
 "Journal of Banking and Finance",
 "Journal of Business Finance and Accounting",
 "Journal of Financial Research",
 "Review of Financial Studies",
 "Journal of Financial Services Research",
 "Journal of Financial Education",
 "Review of Future Markets",
 "Journal of Financial Economics"),
 top_5 = c("American Economic Review",
 "Econometrica",
 "Review of Economic Studies",
 "Journal of Political Economy",
 "Quarterly Journal of Economics"))))

apply dictionary to corpus

```

c_manual <- tokens_lookup(tokcont2, dictionary = dic_manual_1, levels = 1)
dfm_manual <- dfm(c_manual)
df_manual <- as.data.frame(dfm_manual)

# exclude inet texts
df_man <- df_manual[-c(149,272,465,627),]
write.csv(df_man, "citations_journals_manual_raw_no_inet_edited_het_inter.csv")

# colsums
man_cols <- df_man[2:13]
man_total <- colSums(man_cols)
View(man_total)

# calculate non-zero values
non_zero_manual <- colSums(man_cols != 0)
View(non_zero_manual)
write.csv(non_zero_manual, "non_zero_journals_manual_edited_het_interdisc.csv")

# plot non-zero values
non_zero_j_manual <- read.csv("non_zero_journals_manual_ed.csv")
ggplot(non_zero_j_manual, aes(x = reorder(jour, -no), y = no)) + geom_bar(stat =
"identity", fill = "darkgrey") + xlab("Paradigm / Journal") +
  ylab("Occurances in Corpus (635 texts)") + theme(axis.text.x = element_text(size =
10), axis.text.y = element_text(size = 12))

# plot absolute mentions from manual journals
para_abs <- read.csv("manual_total_ed.csv")
para_abs <- para_abs[,-c(1)]
para_man <- cbind( c("Heterodox","Ecological","Evolutionary","Interdisc",
"Environmental", "Modern Finance","Top5"), para_abs)
colnames(para_man) <- c("Paradigm", "No")
para_man1 <- as.data.frame(para_man, stringsAsFactors = F)

```

```
d <- as.numeric(para_man1$No)
f <- para_man1$Paradigm
para_cit <- data.frame(f,d)

ggplot(para_cit, aes(x = reorder(f, -d), y = d)) + geom_bar(stat = "identity", fill =
"darkgrey") + xlab("Paradigm") +
  ylab("Occurances in Corpus (635 texts)") + theme(axis.text.x = element_text(size =
10.5), axis.text.y = element_text(size = 12))
```