



Money and sustainability: Transitioning to an ecological monetary system

FILIPE MIGUEL MOREIRA ALVES
Master in Economics and Public Policies

DOCTORATE IN Climate Change and Policies for Sustainable Development
NOVA University Lisbon
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FILIPE MIGUEL MOREIRA ALVES

Master/BSc in Economics and Public Policies

Adviser: Rui Ferreira dos Santos
Full Professor, NOVA University Lisbon

Co-advisers: Gil Pessanha Penha-Lopes
Research Coordinator, Faculty of Sciences of the University of Lisbon

Examination Committee:

Chair: Name of the committee chairperson,
Full Professor, FCT-NOVA

Rapporteurs: Name of a rapporteur,
Associate Professor, Another University
Name of another rapporteur,
Assistant Professor, Another University

Adviser: Name of the adviser present in defense,
Associate Professor, University

Members: Yet another member of the committee,
Full Professor, Another University
Yet another member of the committee,
Assistant Professor, Another University

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This thesis is dedicated to all of those seeking the regeneration of our economies and our lives. It is for the people dedicating their time and efforts to (re)create the conditions for all life to thrive on this amazing planet we all inhabit.

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"Humanity may hit limits in material growth but there is unfathomable room for growth in work and creativity, and this for many future generations! By rethinking money, it is possible to enjoy even more than a period of prosperity but rather *a new era of genuine sustainable abundance.*" (Lieater & Dunne, 2013)

"Money is the visible sign of a universal force, and this force in its manifestation on earth works on the vital and physical planes and is indispensable to the fullness of outer life. In its origins and its true action it belongs to the Divine...Some even put a ban on money and riches and proclaim poverty and bareness of life as the only spiritual condition. But this is an error; it leaves the power in the hands of the hostile forces... If you are free from the money taint but without any ascetic withdrawal, you will have a greater power to command the money for the divine work".

Sri Aubindo, The Mother (1927), pp.11-13 cited in (Thomas & Thomas, 2013)

ABSTRACT

A profound transformation of our monetary paradigm is urgently needed. To re-think, re-imagine, and re-design our monetary system is of critical priority if we want to have a chance at sustainability. The current dominant monetary-banking-financial system is inherently, and by design, a source and a force of unsustainability lying at the core of our economies and societies. It's a system actively contributing to ecological degradation, socio-political crises, and economic instability, uncertainty, and alienation. But there are alternatives and these must be given the spotlight. Not tweaks or reforms to the system, but radical shifts in how we deal, use, relate to, and feel regarding money. The societal challenge we must embrace is rapidly transitioning our monetary reality into a purposeful ecological monetary ecosystem aligned with the regeneration of our planet and all life in it. This Doctoral thesis contributes to the emergence and development of a new monetary paradigm with planet and people at its core. The research is intrinsically transdisciplinary and based on mixed-methods. Different methodologies were used, combining qualitative with quantitative methods and more passive research with more action-oriented transformative research, including field visits, interviews with practitioners, and direct interaction with local and regional complementary currency experiments. By combining a transdisciplinary literature review with an action-research approach this thesis offers novel insights into the transition process to an ecological monetary ecosystem. A set of regenerative principles and priorities for monetary reform that would enable us to root money back into the real economy, coherent with the laws of physics and aligned with an ecology of life is offered. Moreover, a model for a multi-currency ecosystem is explored and presented at the end of this thesis. The implications of such a fundamental revolution in the core design of our increasingly monetized economies could potentially put us back

on track and re-align our socio-economic and political system with our climate agreements, our SDG and our intentions for peace and prosperity.

Keywords: money, ecological economics, ecological monetary systems, sustainability, regeneration

RESUMO

Uma profunda transformação do nosso paradigma monetário é urgentemente necessária. Re-pensar, re-imaginar, e re-desenhar o nosso sistema monetário é uma prioridade societal crítica se quisermos garantir a nossa sustentabilidade. O actual sistema monetário-bancário-financeiro dominante é inherentemente, e por design, uma fonte e uma força de insustentabilidade que se encontra no cerne das nossas economias e sociedades. É um sistema que contribui activamente para a degradação ecológica, crises sócio-políticas, e para a instabilidade, incerteza e alienação económica. Mas existem alternativas e estas têm de ser objecto de atenção especial. Não ajustamentos ou "reformas" ao sistema, mas mudanças radicais na forma como lidamos, utilizamos, nos relacionamos e sentimos em relação ao dinheiro. O desafio social que temos de abraçar é a rápida transição das nossas realidades monetárias para um ecossistema propositadamente alinhado com a regeneração do nosso planeta e de toda a vida. Esta tese de doutoramento contribui para a emergência e desenvolvimento de um novo paradigma monetário com o planeta e as pessoas no seu âmago. A investigação é intrinsecamente transdisciplinar e baseada numa abordagem de métodos mistos. Foram utilizadas diferentes metodologias, combinando métodos qualitativos com métodos quantitativos, e investigação mais passiva com investigação transformadora mais orientada para a acção, incluindo visitas de campo, entrevistas e interacção directa com experiências de moedas complementares locais e regionais. Ao combinar uma revisão transdisciplinar da literatura, com uma abordagem de investigação-acção, esta tese oferece novas ideias e concepções sobre o processo de transição para um ecossistema monetário ecológico. É oferecido um conjunto de princípios regenerativos e prioridades para a reforma monetária que nos permitiria enraizar o

dinheiro de volta à economia real, coerente com as leis da física e alinhado com uma ecologia da vida. No final da tese é ainda explorado e apresentado um modelo para um ecossistema monetário com base na co-existência de múltiplos circuitos monetários. As implicações de uma tal revolução no nosso sistema monetário e no centro das nossas economias, cada vez mais monetizadas, poderão ser potenciadoras de uma transição para um novo caminho societal, alinhado com os nossos acordos climáticos, os nossos ODS e as nossas intenções de paz e prosperidade.

Palavras-chave: dinheiro, economia ecológica, sistemas monetários ecológicos, sustentabilidade, regeneração

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ACRONYMS

AMNE's - Alternative Monetary Narratives and Experiments

BIS - Bank for International Settlements

CC - Complementary Currencies

CB - Central Bank

CBDC - Central Bank Digital Currency

ECB - European Central Bank

EE - Ecological Economics

EMS - Ecological Monetary System

EMT - Ecological Monetary Theory

EVT - Ecological Value Theory

GDP - Gross Domestic Product

GFC - Global Financial Crisis

IJCCR - International Journal of Community Currency Research

IMF - International Monetary Fund

IMMR - International Movement for Monetary Reform

IMS - International Monetary System

MGI - Monetary Growth Imperative

MLP - Multi-level perspective

MMT - Modern Monetary Theory

MMR - Mix-methods research

NEST - Network for Early Career researchers in Sustainable Transitions

OECD - Organization for Economic Co-operation and Development

PAR - Participatory Action-research

QE - Quantitative Easing

RAMICS - Research Association on Monetary Innovation and Complementary Currencies

SDR - Special Drawing Rights

SMG - Shared Monetary Governance

SDG - Sustainable Development Goals

TM - Transition Management

TT - Transition Theory

UNEP - United Nations Environmental Program

VUCA - Volatility, Uncertainty, Complexity, Ambiguity

1 INTRODUCTION

For me, the why is the beginning, the end, the main driver, and the point where one should always return for clarity and guidance within the journey (Sinek, 2011). *The why* is this central space where intuitive higher purposes, consciously stated reasons, developed skills and competencies, and a sense of mission come together to give meaning and direction to our endeavors and, ultimately, our lives. It was with the consciousness of these four quadrants mentioned above that I put the intention to enter the Doctoral Program on Climate Change and Policies for Sustainable Development, and with them that I was able to overcome personal and professional battles to remain in it. With these four dimensions, whenever I had questions or doubts about my research and this long journey I chose to undertake, I would return to restart from there. Whenever someone would ask me "Why Money?" or "Why Money and Sustainability?" or even "What has monetary economics anything to do with climate change?" I would refer to these quadrants as my own compass to navigate the inherent volatility, uncertainty, complexity, and ambiguity (VUCA hereafter) of this deep and long project during these turbulent years. These are also the reasons why I choose to begin this thesis by clearly and intentionally stating my core intention, deepest motivation, and ultimate purpose for this research.

1.1 The why

The ultimate 'why' is to address the most fundamental challenges of our societies in the 21st century – such as ecological destruction and climate change, social disruption, permanent armed conflicts, hunger, and wealth inequality – by focusing and targeting directly one of its main root cause. One that most of us touch and use on a daily basis but do not seem to notice, care or pay adequate attention when thinking about

the societal challenges of the 21st century: money. Or, more precisely, the unique design and configuration of our current international monetary system (IMS hereafter). Therefore, the higher purpose of my Doctoral program and this thesis is to contribute to the ongoing profound transformation of our monetary system and leverage an economic transition toward regenerating our social and ecological ecosystems. This purpose is anchored in a personal mission of regenerative action based on systems thinking and focusing on acting at the highest leverage point (Meadows, 1999). After spending more than a decade working within the social economy sector, I have come to realize how most of our shared challenges and obstacles, common fights and fears, and everyday struggles (inner and outer) are often externally imposed and conditioned by invisible structures that limit our possibilities and our choices. From these invisible structures – such as language or power, for example – I have come to recognize the centrality of money as a key defining matrix within a society where there is a growing commodification and financialization of everyday reality and relationships. Money permeates many of our daily decisions - from what to eat to where to invest - and determines a significant part of our behavior and well-being (short and long-term). However, rarely do we question and challenge the design of our monetary system itself. People, NGOs, and political parties might protest, debate, and challenge the political system, state policies, and CEO bonuses. However, solely they would question the nature of debt, the ethics of interest rates, the privatization of money creation by banks, or any other monetary 'detail' that fundamentally affects their everyday life and economic decisions. I have found that a common justification for this apparent paradox relates to the perceived complexity and intricate nature of monetary, banking, and financial systems. However, as John Kenneth Galbraith beautifully summarized: "The study of money, above all other fields in economics, is one which complexity is used to disguise truth or to evade truth, not to reveal it. The process by which banks create money is so simple the mind is repelled" (Galbraith, 1975, p. 15). Therefore, understanding the architecture of money, simplifying it to its core elements, and re-designing it to serve socially desirable goals became a top priority in my work, and in my life. I realized that without fundamentally transforming the nature of money, I could not truly change the impact of all the projects and activities I was committing to. In a way, it felt like constantly paddling against the stream. No matter how hard a person paddles or how efficient the canoe is, sooner or later, you will get exhausted. I needed

to find the source of the stream of unsustainability. Focusing on symptoms or even firefighting the next emergency, without seeing the big picture, was not the answer. The regenerative answer was in the systemic perspective. And here is where politics, language, and money reside. Furthermore, they are intimately connected (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012), but my calling is money. Why money? Very likely, the answer lies with my unique set of experiences and skills. As a trained heterodox economist, the mainstream neoclassical narrative around money was always troubling to me. Seeking different perspectives led me around the world to experience radically different monetary systems and expand my understanding of money, monetary governance, and monetary systems. Particularly relevant to this thesis was my empirical research in alternative communities where alternative currencies and monetary plurality is an ordinary reality that defies most classical definitions of money and monetary systems. In places like the Auroville community in India, Time Banks, LETS systems, Rupees, complementary currencies, and gift systems occupy the economic landscape providing a rich field of experimentation and realization of monetary diversity and complementarity. Finally, a critical turning point for me was the three-week intensive course' Money and Enterprise for a Sustainable Future' at the Schumacher College in 2012, where most of the seeds that ultimately led me here were planted. Being a transdisciplinary and holistic educational center, this course opened up the space and connected me with the people working on alternative monetary economics, where people and the planet mattered.

Figure 1 below attempts to graphically summarize the four dimensions that ultimately converge to give meaning and purpose to this thesis.

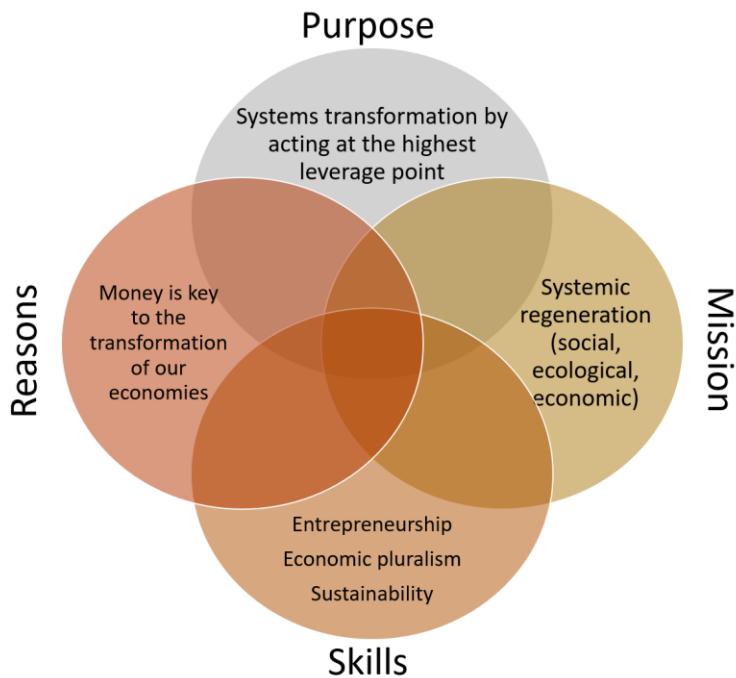


Figure 1 - The four dimensions of the why

1.2 The what

The object of this thesis is the monetary ecosystem and its relationship with our socio-ecological sustainability. In that respect, to state that the object of this thesis is money is flawed reductionism and can easily lead to misinterpretations. Not only because of the intrinsic complexity and ambiguity of defining what money is but also because it misses the point that money, in whatever shape, form, or relationship, always comes into our reality as a part of a system. A system with intrinsic, often unconscious, values, beliefs, rules, and socio-political dynamics. A system deeply entrenched within other systems - economic, social, political, and ecological - in an interconnected web of flows of information, resources, and impacts. So, this work does not focus on, or pursue, money's history and evolution - see, for example, the work by Scottish historian Niall Ferguson (Ferguson, 2008) and the American anthropologist David Graeber (Graeber, 2011) -, nor money's manifestations in terms of forms and shapes - check out Glyn Davies excellent book (Davies, 2002). The object of this thesis is not money *per se* but rather the architecture of different monetary systems. Its structure, design elements, relationships, beliefs, and, more importantly, its overall socio-ecological impact.

Furthermore, although I start by targeting and criticizing our current dominant international monetary system, the object of this thesis is not constrained by it. This is because the research is based on a broad, heterodox definition of money and monetary systems, requiring going beyond the theoretical and empirical limitations of current monetary dominant neoclassical models and ideologies. In that respect, this thesis aims to transcend the dualities imposed in monetary economics - Metallism versus Chartalism; Commodity versus credit theory of money - acknowledging these partial truths and their intrinsic limitations. Money, in this thesis, is taken not as a commodity, not even the 'god of all commodities' as Karl Marx put it, and not necessarily as credit. Money is not what money does, and it is not its diverse manifestations. As the following chapters will demonstrate, money will come to be defined as a socio-ecological contract, and the research leading to this thesis aims to understand the hidden clauses, and impacts, behind each unique monetary arrangement.

Regarding the second part of the object of this thesis - socio-ecological impact - the same holistic, transdisciplinary rationale also applies. Although sustainability is referred as the baseline, what is here taken and understood as sustainability strongly diverges from the neoclassic 'weak' sustainability approach and definition. Sustainability is embraced in its integral complexity and broader meaning. What some authors have called Integral Sustainability (Floyd & Zubevich, 2010; Egmond & de Vries, 2011) and what we see as touching the emerging concept of regeneration (Gibbons, 2020). A concept we converge to as the thesis develops and that we offer some insights in chapter 6.

In summary, this thesis aims to *Develop and deepen our understanding of the impacts of alternative monetary designs on the sustainability of our communities and offer insights and a model for the transition process to an ecological monetary system.*

In that respect, the research advances our scientific knowledge in three arenas of knowledge and experience:

- 1) Analyzing and comparing systems of design/principles/assumptions on alternative monetary systems based on their socio-ecological impact;

- 2) Understanding the processes of sustainable transitions applied to monetary systems;
- 3) Proposing a multi-currency monetary ecosystems model based on dynamic, synergic complementarity.

1.3 The starting hypothesis and four burning questions

This thesis starts with a fundamental hypothesis: the regeneration and sustainability of our societies depends on the radical transformation of our monetary paradigm, a process that fundamentally requires the conscious implementation of a monetary ecosystem of complementary currencies.

In order to fully understand this starting hypothesis, three critical assumptions behind it must be clearly stated:

- The starting assumption is that money is never neutral to economic activity, social well-being, or ecological balance. Money impacts our lives - individually and collectively - and our living world. The current international monetary system is a crucial mechanism for the unsustainability of our economies and societies. This assumption will be explored and validated in chapter 3;

- The following assumption is that the design of the monetary system is a dynamic, iterative, socio-political, and economic negotiated contract, not a physical law of our universe. Change and transformation have been a key dynamic of its evolution as it has seen many configurations and designs across space and time. Therefore, our monetary ecosystems can be re-designed, re-shaped, and re-imagined to align it with the principles and values of sustainability. This assumption will be explored in chapters 4, 5 and 6;

- The final assumption is that a transition to a regenerative monetary ecosystem is possible. It is a deep and complex social, economic, and political project that requires a multi-stakeholder, multi-scale, and multiple leverage-points strategy. This assumption will be explored in chapters 5, 6 and 7.

The starting hypothesis and the three assumptions outlined above are the guiding compass of this thesis. Ultimately they lead us to four fundamental research questions that the chapters below aim to respond:

Research question 1 - Money and Sustainability:

This thesis's first research question concerns the unsustainability at the core of our monetary systems. In that respect, it focuses on exploring the relationship between money and sustainability, starting from a critical analysis of our current IMS and identifying the design elements and the processes that make it inherently unsustainable. The initial formulation that drives the research is: *why and how does money matter to sustainability?*

Chapters 3 and 6 aim to answer this question.

Research question 2 - Monetary design and its socio-economic impact:

The second research question concerns the unique connection between monetary design and socio-economic and ecological impact. By looking into alternative monetary theories, designs, and experiments, and their impact on other systems, I hope to better understand the elements and the mechanisms that can influence behavior, choices, and overall societal directions. The formulation is: *How can the (re)design of the monetary system steer our economies towards sustainability?*

Chapter 4, 6 and 7 provide insights and preliminary answers to this question.

Research question 3 - Monetary transition processes

The third research question deals with the necessary transition process to a sustainable monetary ecosystem. It draws from transition studies and Transition Theory (TT hereafter) not only to understand ongoing dynamics but moreover to anticipate and (re)direct our efforts to the transformation needed within this complex system. The formulation is: *How can we transition to a sustainable monetary ecosystem, and what are the key leverage points to intervene?*

Chapters 5 and 6 aim to provide new insights and some partial answers to this vital question.

Research question 4 - An Ecological Monetary System

The fourth, and final, research question this thesis aims at answering, concerns the conscious implementation of a monetary ecosystem of multiple currencies. In that respect, monetary diversity and plurality is explored as a necessary condition for an ecological monetary system. A model for the purposeful, normative design and management of such a multi-currency system is offered in chapter 7. The formulation of the final research question is: *how can we implement a multi-currency ecological monetary system?*

During the thesis development, many other sub-questions naturally emerged and were formulated. These will be evident within each chapter and help answering the four fundamental research questions above. The unanswered questions will be collected in the last chapter where conclusions and future research avenues are presented.

1.4 The structure of this thesis

This thesis is structured in four fundamental phases - A to D. Each of the phases is anchored in one chapter of this thesis - Chapters 3 to 7 - and is crystallized by a corresponding academic contribution, which has resulted in three peer-reviewed publications. Phase A aims to answer the first research question stated above, phase B the second research question, and phase C the third research question. In contrast, phase D ultimately brings it all together, aims at answering the final research question and test the initial hypothesis. Figure 2 below graphically summarizes the general structure of the thesis with its four phases.

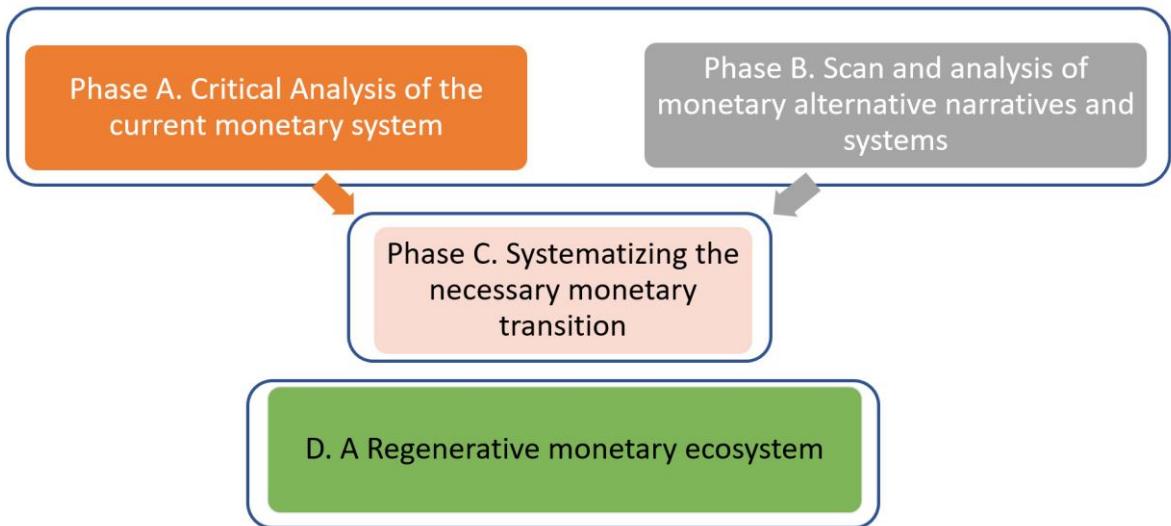


Figure 2 - General structure of the thesis

In the first two phases, representing the first two years of the research, the primary focus was on understanding and systematizing the connections between monetary design and societal impact. On the one hand, this was done by analyzing the critiques of the IMS in the literature and distilling the intrinsic degenerative design elements and socio-ecological detrimental processes (phase A/chapter 3). On the other hand, scanning, collecting, and analyzing alternative monetary experiments and theories (phase B/chapter 4). While in phase A the priority was given to the theoretical dimensions, phase B mainly was about grounding it in empirical evidence and real case studies. Phases A and B run parallel to each other and are the foundations that give the baseline for the assumptions that have already been stated.

In the third phase (C), developed until 2020, the core focus was to understand and envision a systemic transition within the monetary system. Based on the understandings from phase A and the scanning from phase B, phase C aims to systematize the ongoing innovations and transformations within the monetary regime, identify potential leverage points, and bring transition theory to monetary systems. Phase C corresponds to chapter 5.

The fourth and final phase of this research (D) is where all the previous pieces come together and are distilled in order to envision a regenerative monetary ecosystem, based on the conclusions of A and C, as well as the experiences and concrete empirical results mapped in phase B. Phase D corresponds to chapters 6 and 7.

1.4.1 Academic contributions

This is a thesis anchored in peer-reviewed published journal articles that form the backbone of the research, particularly in chapters 4, 5 and 6.

The first academic contribution in this thesis is a conference paper, submitted to, and later presented and discussed at the Ecological Challenges Conference in Oslo, Norway (Alves, 2017). This conference paper aimed at advancing the hypothesis of a growth imperative within our monetary system and by doing so placing the necessary transformation of money as a priority for the Degrowth, Steady-state and ecological movement. The paper is presented in sub-chapter 3.2.4, and a critical update to its arguments in the following section.

The second academic contribution within this thesis is a journal article published in the International Journal of Community Currency Research, in 2018 (Alves, 2018). This was a literature review article of all IJCCR publications from 2009 to 2016, presented and discussed at the Ramics Biennal 2017 conference in Barcelona. The paper was later submitted to the IJCCR and published with minor revisions in its volume 22. This paper is an important piece of chapter 4 due to the heterogeneity and vastness of monetary experiments and theories that I was confronted with during the review of these publications.

The third academic contribution is a journal article published in the Journal of Studies in Citizenship and Sustainability, in 2019 (Alves, Kovasna & Penha-Lopes, 2019). This article, with co-authors Gil Penha-Lopes from the Faculty of Sciences of the University of Lisbon and Anna Kovasna from the Global Ecovillage Network, represents a groundbreaking contribution to the understanding of the ongoing monetary revolution by applying Multi-Level Perspective and Transition Management theory to monetary systems. It aims to provide insights and answers to our third research question.

Finally, the fourth academic contribution is a journal article, published in 2022 in the journal *Sustainability*. It is chapter 6 and it represents the epitome of this thesis and its research. It brings together all previous phases and understandings under one publication (Alves, Santos, & Penha-Lopes, 2022).

A final note regarding the structure of the thesis and the integration of these contributions: I've kept the original formatting of each paper, respecting each journal requirements and templates. Updates or improvements are highlighted and summarized under each publication, in a separate section. All other content which is not a part of an academic contribution is referenced independently chapter-by-chapter.

Table 1 below shows the connections between each phase's research question, the corresponding thesis chapter, and the related academic contribution.

Table 1 - Overall connection between the vital elements of this thesis

Phase	Title	Research question addressed	Chapter	Academic contribution
Phase A	Critical analysis to the current monetary System	Why and how does money matter to sustainability?	3	<i>Monetary Transition: a priority for sustainability</i> , Conference paper presented and discussed at the Ecological Challenges Conference in Oslo, 2017. Published in the Conference Proceedings;
Phase B	Scan and analysis of monetary alternative narratives and systems	How can the (re)design of the monetary system steer our economies towards sustainability?	4	<i>IJCCR Publications – a literature review 2009-2016</i> , Journal article published in the International Journal of Community Currencies Research in 2018
Phase C	Systematizing the necessary monetary transition	How can we transition to a sustainable monetary ecosystem and what are the key leverage points to intervene?	5	<i>Alternative monetary narratives and experiments – systematizing the necessary societal transition</i> , Journal article published in the Journal of Studies in Citizenship and Sustainability, Vol. 4, 2019
Phase D	A Regenerative monetary ecosystem	How can we implement a multi-currency ecological monetary system?	6 & 7	<i>Revisiting the Missing Link: An Ecological Theory of Money for a Regenerative Economy</i> , Journal article published in <i>Sustainability</i> , 2022

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2 RESEARCH METHODOLOGY

The research methodology proposed for this thesis follows a mix-methods research approach (Timans, Wouters, & Heilbron, 2019). The strategy combines theoretical developments with empirical evidence, and bottom-up knowledge with more top-down perspectives, all within an iterative research process. For that purpose, different methodologies were used combining qualitative with quantitative methods, and passive research with a more action-oriented transformative research (Charles & Ward, 2007). In phases A and C, the core methodology used is a transdisciplinary literature review, while in phase B, this will be complemented by a more action-research approach (Bradbury & Reason, 2003; Reason & Bradbury, 2001).

The general protocol is detailed below, while each journal article's methodological section explains specific methodologies and frameworks leading to published peer-reviewed works.

2.1 Theoretical basis

"Your paradigm is so intrinsic to your mental process that you are hardly aware of its existence, until you try to communicate with someone from a different paradigm".

Donella Meadows, cited in (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012, p. 27)

Clearly stating the working paradigm that sustains and anchors one's work is of paramount importance, particularly in the case of transdisciplinary research, such as this thesis (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012). The research provided here is not anchored or bound by any single-discipline or specific school of thought. This is a conscious choice to allow free inquiry and the exploration of the richness of connections and insights that naturally emerge from a diversity of perspectives. It is not an excuse from the scientific rigor of a more disciplined approach nor to justify boundless exploration. The freedom of transdisciplinarity must be met with the clarity of concepts and theoretical paradigms that inform it. In the case of this research, and

although there are contributions from many disciplines - such as Biomimicry, Complexity Theory, Ecology, Permaculture, Systems-thinking and Sustainability -, it is centered at the crossroads between three main bodies of scientific knowledge and exploration: Heterodox monetary economics; Transition Theory; and, Ecological Economics. These were initially mapped but not 'set in stone' at the start of the research program. These three disciplines ended up naturally crystallizing as the research topic, questions, and strategies evolved and became clearer. Figure 3 below graphically systematizes the three arenas of knowledge that support this thesis and the primary authors that have contributed to my understanding of each field, as well as the areas of intersection between them.

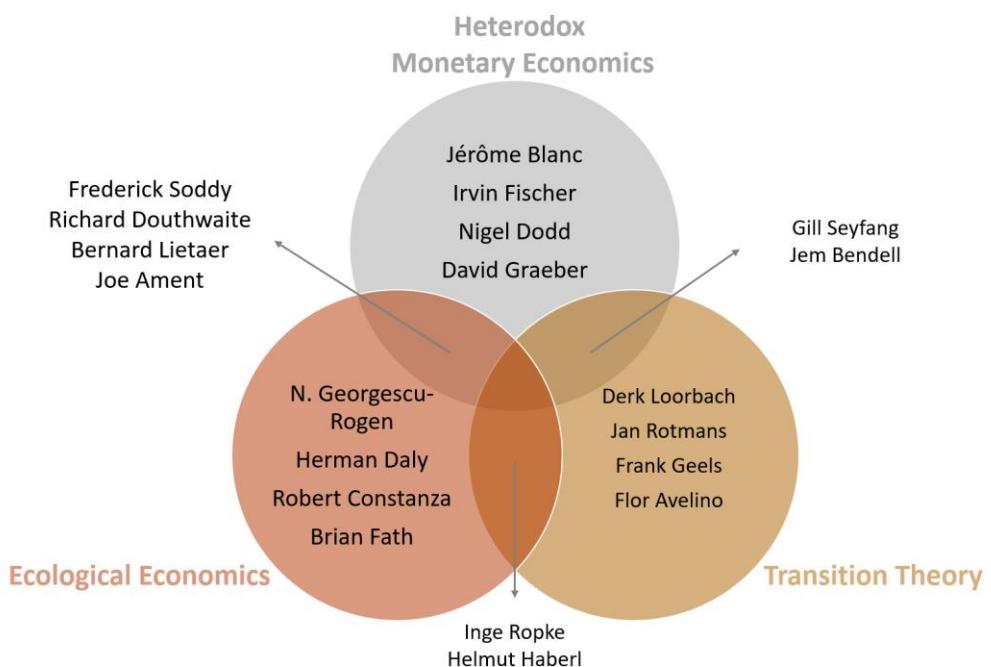


Figure 3 - Theoretical fields and main authors

It is relevant to mention that these disciplines only come together in the final phase of this thesis, particularly in chapters 6 and 7. Initially, phase A and B drew mostly from heterodox monetary economics, with a few minor contributions from Ecological Economics, while phase C was strongly anchored in applying transition theory to monetary systems. Only on phase D did this three circles of knowledge were integrated to provide a novel perspective on monetary transitions towards sustainability.

Table 2 below connects each of these fields with the corresponding chapter of this thesis and the key sources that inform the research.

Table 2 - List of theoretical paradigms by chapter

Phase	Title	Theoretical central paradigm	Key sources
Phase A	Critical analysis to the current monetary System	Heterodox monetary economics; Ecological Economics.	BIS and IMF working papers; Journal of Ecological Economics; Sustainability; New Economics Foundation
Phase B	Scan and analysis of monetary alternative narratives and systems	Heterodox monetary economics; Anthropology of Money; Sociology of Money; Ecology of Money.	International Journal of Complementary Currency Research; Ecological Economics Journal; Sustainability; People Powered Money
Phase C	Systematizing the necessary monetary transition	Transition theory; Sustainable transitions studies.	The Drift; Network for Early Career Researchers in Sustainability Transitions (NEST)
Phase D	A Regenerative monetary ecosystem	Sustainability; Ecological Economics; Regeneration	Ecological Economics journal ; Sustainability;

The research draws heavily from scientific publications as much as grey literature, particularly working reports from monetary institutions, research institutes and think tanks. Regarding academic peer-reviewed indexed journals the main sources of knowledge and inspiration are the *Ecological Economics* journal, *Sustainability* and the *International Journal of Community Currency Research*. Complementary to these, three handbooks are of critical importance and are worth mentioning here: The Handbook of Alternative Monetary Economics (Arestis & Sawyer, 2008); The Handbook of the History of Money and Currency (Battilossi, Cassis, & Yago, 2020); and, Monetary Plurality in Local, Regional and Global Economies (Gómez, 2019). Furthermore, I would like to spotlight five books that were a close and crucial company during these five years of research providing a never ending source of inspiration and insight:

- The Future of Money, by Bernard Lietaer (Lietaer, 2001)
- Rethinking Money, by Bernard Lietaer and Jacqui Dunne (Lietaer & Dune, 2013)

- Debt: The First 5,000 years, by David Graeber (Graeber, 2011)
- Currency Wars, by James Rickards (Rickards, 2011)
- The Social Life of Money, by Nigel Dodd (Dodd, 2014)

Regarding non-peer reviewed publications I would like to highlight the important contributions from the following think tanks: *New Economics Foundation* (NEF); *Positive Money UK*; *Alliance for Just Money*; and *The Dutch Research Institute for Transitions* (Drift). Their research and exploration of these themes has been critical to the development of this thesis.

2.2 Interacting with the field: action-research

The research methodology designed for this doctoral thesis, particularly in phase B, is strongly supported by a close interaction with monetary innovators, entrepreneurs, creators and other researchers. These diverse interactions are not isolated, one-way flows of information but rather part of an ongoing, dynamic, iterative dialogue with multiple stakeholders with a core premise: that the research should enable and promote transformative change in society (Charles & Ward, 2007). That fundamental premise of the research methodology underpins the strategy taken to allocate a significant portion of time, effort and focus to the pro-active participation in conferences, seminars, webinars, informal gatherings and trainings. Moreover, it has led me to interact closely with students, political parties, NGOs and scientific journals through teaching, expert advice and an editorial experience at the IJCCR. Detailed account of these interactions can be found in annex 9.1.

From a methodological perspective I will focus here on the action-research that directly concerns my field visits and practitioners interviews.

2.2.1 Field visits and semi- structured interviews

Complementary to the active participation in scientific, and non-scientific events, during the period of the doctoral program I had the unique opportunity to visit, interview and more importantly interact directly with a wide variety of monetary experiments and monetary ecosystems.

Regarding the interviews and field visits, these took place mostly in 2017/18, and in southern Europe, with the notable exception of the Aura which circulates in the Auroville community, India. I was particularly drawn to Spain and France, not only due to their geographical and cultural proximity, but mostly because of the abundant complementary currencies experiments and corresponding research (Hughes, 2015; Sanz, 2016; Blanc & Lakócai, 2020).

For the case study selection different complementary currencies databases and sources were used. Stephen DeMeulenaere online worldwide database of community currencies - Database: https://www.complementarycurrency.org/ccDatabase/les_public.html - was complemented by case studies provided in the literature, particularly those highlighted by Bernard Lietaer or benchmarked in the People Powered Money book (Bindewald, Martin, & McCann, 2015).

Ten benchmark case studies were initially selected for a semi-structured interview and at least a field visit. Selecting relevant case studies out of the thousands of currency experiments, projects and alternative systems that exist nowadays is no easy task. For that purpose a multi-criteria analysis was used, which took into consideration five fundamental criteria (with equal weighting):

1. Openness and acceptability: key to work with stakeholders is the openness and the overall acceptance and willingness of the individuals and the institutions within the socio-political and economic context in which the work is developed. All the case studies selected demonstrated high levels of interest and commitment to work with me and creating the necessary conditions for a fluid, productive and impactful project;
2. Scale: scale matters and appropriate scale is key to a successful experimentation. In order to be able to respond to the research questions stated above, the focus was on monetary ecosystems with a diversity of complementary and alternative currencies with a visible, measurable socio-ecological impact. In that respect, the decision was to select case studies from different scales - local, municipal, regional - with an emphasis on the 'meso scale', i.e., Municipality or Regional level. As we will see in the next chapters this a politically relevant geographical and socio-economic meeting ground which is experiencing a boom of complementary currency experimentations;
3. Diversity: the choice of the cases studies took into consideration the need for socio-economic, political and cultural diversity. In that respect, it was important to

ensure i) different countries, ii) different economic and cultural realities, iii) different types of currencies, and finally iv) different motivations and cultural paradigms;

4. Geographical proximity: this last criteria was initially defined as a matter of efficiency and resource management to maximize the time and effort allocated. Being based at that time at Universitat Oberta de Catalunya (Barcelona), my initial radius was Catalonia, which later was extended in order to include the Basque Country and the south of France. Other case studies in Europe were also initially selected based on anticipated conference travels but later reconfigured for online interviews or dismissed based on what became the second iteration of this criteria: the geographical proximity criteria associated with closely connected bioregional monetary ecosystems. This meant that instead of looking for benchmark case studies spread out in different parts of Europe, I started to pay closer attention to municipalities or regions that have a thriving ecosystems of multiple currencies. This shift in focus allowed me to dive more into monetary plurality and study the spaces and the mechanisms of interaction, competition and collaboration between different currency systems.

5. Sustainability: a final criteria for the selection of the case studies was the intentional, conscious, stated connection with sustainability. Either in the currency design elements or in its Mission-Vision-Aims, the primary focus was currency systems that are purposely connected with a future sustainable world. This criteria was fundamental to filter down the thousands of currencies and monies in the world, as the vast majority of them does not pay much attention to sustainability (Seyfang & Longhurst, 2013).

From the initial short-list of 10 selected case studies, two were later removed: The Municipality-driven '*E-Portemonnee*' in the Belgium city of Limburg - <http://mijn.limburg.net/e-portemonnee/> - was initially selected as a benchmark case study of a Municipal level CC generating positive incentives for recycling, use of public transportation, energy-saving, among other individual actions people could take to earn credits. The project was one of the references in the Community Currency in Action EU Interreg project - <https://keep.eu/projects/7140/Community-Currency-In-Action-EN/> (2007-2013). Most unfortunately, the project was shut down due to a political decision by the municipality and several requests to meet with the promoters were ineffective. Another benchmark case study dismissed was Makkie -

<http://www.makkie.cc/>. This neighborhood currency in Amsterdam East, which is still running and promoting the social support network in the area by directly rewarding volunteering, was ultimately dismissed after several informal conversations with the developers, as at the time it did not fit into the necessary scale criteria, nor the geographical proximity, and it was mostly a social currency with no clear link with ecological goals.

The final list of case studies for semi-structured interviews and field visits is provided below -Table 5. The interviews protocol can be found in annex 9.2.

Table 3 - Final list of benchmark case studies

12 Benchmark case studies		Comments
1	Grama – Catalunya, (https://www.gramamoneda.cat/)	Several meeting with currency designers and users. Ongoing.
2	Turuta – Catalunya, (https://communities.cyclos.org/turuta/)	Several meetings with the steering committee of the currency and the Cyclos manager.
3	Eco Tarragona – (https://www.xarxaeco.org/)	Several visits in May and June 2018. Participated in three users' meetings.
4	Faircoin (https://fair-coin.org/)	Initial meeting and interview with the founder during the IJCCR Conference in Barcelona. Followed by several online meetings. Investor.
5	Ecocoin (https://www.ecocoin.com/)	Several online meetings with the founders and the head of the research team in 2018 and 2019.
6	Eusko – País Basco, (http://www.euskalmoneta.org/)	Interview by video conference.
7	Aura - Auroville	Field visits in 2016/17
8	EKO – Findhorn, Scotland	Field visits 2017/18/19

Building on the output from the interviews highlighted above and the growing understanding of monetary complementarity and plurality, I had the opportunity to directly experience three regions/communities where monetary plurality is an ongoing reality in order to better understand the unique economic, social and political arrangements that facilitate such diverse ecosystems. These were:

- Auroville community – India (December & January 2016)
- Barcelona - Spain (October 2017 - March 2018)
- Findhorn Community – Scotland (February 2019-June 2019)

Auroville and Findhorn are two intentional communities, part of the Global Ecovillage Network where I created the opportunity to live and therefore experienced directly the monetary plurality that occupies the economic landscape. In both case studies at least four complementary currency systems were identified and studied. The main objective was to understand monetary plurality in practice, within a small community. Regarding the city of Barcelona, which is a rich nest of monetary innovation, the key objective was to understand monetary plurality within the scale of a major European city, particularly exploring the functional intersections between different currency experiments and their legal configuration.

The insights and reflections from these experiences will be explicit in chapter 4, namely section 4.4.

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3 UNSUSTAINABILITY BY DESIGN

"And I sincerely believe with you, that banking establishments are more dangerous than standing armies; & that the principle of spending money to be paid by posterity, under the name of funding, is but swindling futurity on a large scale"

(Jefferson T. & Looney J. J., 2004)

In this chapter the current international monetary system is briefly presented and its main elements explored, with a focus on how we got to the present situation and what are the social, economic and ecological impacts of its key design elements and intrinsic detrimental processes. This chapter aims to answer the first research question of the thesis and build the foundations for the conceptual re-design of the monetary system offered in chapters 5, 6 and 7.

3.1 The International Monetary System

A monetary system can be defined as the operating framework for the economic metabolism within our societies (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012). It includes the elements - people, institutions, instruments - , the flows - of information and resources - and the beliefs, ideologies, values and conventions that hold it together. Each combination of elements, flows and beliefs is unique and therefore we cannot speak of one singular monetary system, but rather contemplate the wide range of possible architectures. It is possible to have a very simple monetary systems with a single unit of account which is used by a small community to register its assets, while in the opposite side of the spectrum a multiple-currency ecosystem, supported by a wide variety of stakeholders, with very complex interactions and relationships between them. And throughout our monetary history there have been accounts of a countless number of monetary systems configurations with which we've tried to "commensurate incommensurabilities" (Maurer, 2006, p. 16; Graeber, 2011). The true scale of the monetary possibilities that we have collectively experimented with, only depends on the lenses and the filters one applies when looking into monetary systems

(past and present). Depending on our ideological and theoretical biases, what one sees as the monetary reality of a certain economic landscape can be radically different. For example, a trained neoclassical economist looking into the monetary landscape of the city of Lisbon might only recognize the Euro, and perhaps a few cryptocurrencies used for speculative investment. On another hand, a heterodox monetary researcher might recognize a tapestry of different monies, including local Time Banks - such as the recently created Banco do Tempo de Campolide -, local currencies issued by parishes - such as the case of the currency Lixo - and commercial tokens - such as TAP Miles. What both can agree on is the dominant nature of the Euro, as a unit of account, means of payment, store of value and the single currency for the vast majority of economic relations. The Euro, the U.S. Dollar, the Pound Sterling, as much as every other major national currency, are all part of the current international monetary system (IMS). This is a very specific currency, banking and financial arrangement between nations-states that has come to be the hegemonic, dominant monetary order of the past 50 years. It is a system that evolved from the landmark post-second world war 1944 Bretton Woods Agreement, particularly after the 1971 U.S. abandonment of the gold standard. The IMS has been instrumental in almost all of the key global economic, political and environmental trends ever since. The processes of commodification, marketization, globalization of trade and investment, and the financialization of our economies can all be intimately related with the IMS, making it a central and unavoidable system to take into consideration whenever one is dealing with the global challenges of the 21st century (Mader, Mertens, & van der Zwan, 2020).

The IMS can be defined as "the policies and official arrangements related to the international balance of payments [...]. Specifically, the IMS consists of arrangements for (i) exchange rates, (ii) current payments and capital flows, and (iii) international reserves. It is also (iv) a collection of institutions, rules, standards and conventions that govern its operation" (Santor & Scembri, 2011, p. 2). In this chapter the focus will be on this last point from E. Santor and L. Scembri., particularly the rules of the international monetary 'game', the underlying conventions, assumptions and beliefs that hold it together and form this unique monetary paradigm. However, it is important to note that the IMS has not been a static system. The IMS has been through profound modifications - technological, institutional, and regulatory (Benassy-Quere and Pisani-

Ferry, 2011). Nevertheless, some of its building blocks have remained untouched, unexamined and mostly unchanged in this past five decades. This chapter deals with those monetary blind spots, particularly the paradigm forming ones such as: the nation-state single currency hegemony; financial debt and fiat currencies; positive interest.

Before proceeding with our analysis of the IMS, three historical notes must be made:

1) The "I" in the IMS: prior to the 20th century we cannot refer to an internationally consciously designed and agreed monetary arrangement (D'Arista, 2009; Melvin & Norrbom, 2017). Although the 19th century saw the first age of monetary globalization with well-integrated financial markets, the rise of monetary unions - for example the Scandinavian monetary union of the 19th century (Henriksen, 1995) - and the first International Monetary Conferences (1867, Paris), these developments remained regionally clustered, limited to a few developed countries and still conserved enough monetary diversity and differentiation to avoid such generalizations (D'Arista, 2009; Blanc, 2006). The convergence towards a common, harmonized monetary design across different nations arguably starts in the 20th century, particularly after World War I. The inter-war period [1918-1939] was marked by post-war debt settlements, the stepping up of Central Banks regarding their monetary policy and its domestic economic impacts, the collapse of the interwar gold standard and partial agreements around gold-backed currencies and fixed exchange currencies. Moreover, there was an increase in banking and financial tensions among nations arising from two opposite dynamics: increased economic protectionism, and at the same time an increase in international capital flows (Wandschneider, 2008). These trends, combined with the banking and financial crisis of the 30's and World War II, paved the way for what is largely considered the first negotiated and accepted international monetary agreement between 44 sovereign nations: Bretton Woods. The Bretton Woods system lasted from the end of WW II until the early 1970s. Part of the agreement was the creation of international institutions for monetary regulation and governance - namely the International Monetary Fund (IMF) and the World Bank (WB) - and the rise of the U.S. Dollar as the dominant reference currency in the world (Capie, 2013). Although some authors claim that the Bretton Woods system was relatively successful in keeping international monetary stability for a brief period between 1950 and the mid-1960s, the system was

inherently unsustainable, as the dollar-based gold exchange standard could not be sustained in the context of rising inflation and monetary expansion (Kumar, 2014), and the rules were mostly inapplicable in practice (Capie, 2013). Ultimately the Bretton Woods system as it was envisioned in 1944, started failing in the late 1960s, and collapsed in the early 1970s, after some failed attempts at its reform, such as the Smithsonian Agreements (Kumar, 2014). The current international monetary system is the second iteration of those post-WW II arrangements that still keep some of its working mechanisms, beliefs and institutions, while changing others. Some authors refer to it as Bretton Woods II (Bibow, 2010), while others advocate that it is more a 'hybrid', or an incoherent *ad hoc* set of flexible rules and frameworks making it effectively a 'non-system' (Ocampo, 2017; Santor & Schembri, 2011). In this thesis I argue that the current IMS is a legacy of the Bretton Woods agreements, and although it has undoubtedly diverged from a coherent internationally held set of rules, to a multi-polarized set of partly consistent practices and policies, at the paradigm level there are still a number of harmonized conventions, values and beliefs at its center. These will be presented and discussed in this chapter;

2) The development of territorial currencies and the tight connection between a nation-state and its own unique single currency is a historically recent event that remains an under researched theme in monetary economics (Helleiner, 1997; Gilbert & Helleiner, 1999). One that is fundamental to understand current monetary governance and the root causes of the money-power nexus within the IMS (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012; Robbins & Di Muzio, 2017). As E. Helleiner points out: "territorial currencies and nation-states have shared a closely interrelated history. Not only were territorial currencies created out of many of the same historical processes that have been associated with the emergence of the nation-state in the nineteenth century [...] Equally significant, once in place, territorial currencies bolstered three important features of this historical form of state: its economic coherence, the sense of collectivity that binds national citizens; and the state's more direct link to the society it governs" (Helleiner, 1997). What Helleiner fails to highlight but N. Ferguson rightly adds with his 'square of power' are the connections between monetary innovation in developed nations, the financing of wars and the ability for powerful nations to remain powerful and hegemonic (Ferguson N. , 2001; Rickards, 2011). The argument I would like to offer here is that one cannot dissociate the evolution in monetary design from

developments in the structures and dynamics of political and economic power (Seddon, 2021; Broz & Frieden, 2001). And this is of particular importance to fully understand the Bretton Woods arrangement, as much as the international monetary system that emerged after its partial collapse in 1971-3. It will also be key to understand the necessary power transitions to transform the monetary system as it evolves beyond the Westphalian nation-state conceptualization. As Jonathan Kirshner rightly points out: "In their disparate inquiries, students of money in general and political scientists most particularly must return to that basic starting point - money is politics" (Kirshner, 2003);

3) A final historical note regarding the post-Bretton Woods monetary system. Five mega trends in the international monetary architecture that developed after 1973 are of crucial importance for this chapter and for the understanding of the key characteristics of the IMS:

a) The world goes 'fiat', i.e., starting slowly in 1971 and ultimately embracing all major world currencies, the pegging or backing of a currency to a precious metal - typically gold or silver - or to any other commodity is lost. We (re)enter a period of convertible (fiduciary) currencies with the caveat that these are now monopolistic single currency systems;

b) Private banking reserve ratios converge to 0 and the exponential increase in private and public debt. Over the course of two decades the mandatory, legal reserve ratio for most private banks decreased close to 0% (Congdon, 2009) leading to a massive, indiscriminate expansion of financial debt - private and public - in most world economies. The fact that private banks were creating 97% of all the money in the system, 'out of nothing', was empirically proven by Professor R. Werner and helped to discredit and overthrow two prevailing theories on banking: the financial intermediation theory of banking, and the fractional reserve theory of banking (Werner, 2014);

c) The period from 1970 to 2000 saw the biggest increase and the highest mean average of interest rates in our 5,000 years financial history (Homer & Sylla, 2005). This interest rate sudden spike strongly exacerbated the financial debt crisis and greatly contribute to the rise of inequality and international imbalances;

d) The post-Bretton Woods period was also marked by the free market logic of neoliberalism applied to the financial liberalization of capital flows, systemic de-regulation of financial markets, the rise of shadow banking, the development of multinational banks and the creation of offshore companies. All of these well documented trends contributed to the unaccountability, un-traceability and lack of proper governance within the monetary-banking and financial international system (Bullough, 2018; Mazucatto, 2018);

e) And finally, during the last 50 years we have witnessed a growing commodification and financialization of our economies and everyday lives, which strongly exacerbates the role of money and the monetary system (Mader, Mertens, & van der Zwan, 2020). As more and more socio-ecological and cultural flows and relationships are intermediated by a monetary instrument, more vital the intrinsic characteristics and impacts of that instrument are to the balance and sustainability of those interactions.

The combination of this trends leads to what the anthropologist C.A. Gregory called 'Savage Money' (Gregory G. , 1997).

The abovementioned trends and the historical notes added help to briefly introduce the IMS and some of its working paradigms. In the next point the focus is on the modern critiques to the IMS.

3.2 Making the case of a degenerative monetary system

Critiques to the IMS, and its institutions, are as old as the IMS itself. The Cambridge economist Nicholas Kaldor and the Austrian School economist Friedrich Hayek are among the many scholars opposing and arguing for deep reforms in the IMS already in the 1970s and the early 1980s (Sakbani, 1981; Nowzad, 1981; Kaldor, 1978; Glasner, 1989; Hayek, 1976). The critical analysis to the foundations and the developments of the architecture of the IMS post-Bretton Woods remained somewhat marginal and got little real attention from mainstream economists and the monetary regime institutions until 2007/8 when then got a dramatic, awakening boost with the global financial crisis (Satragno, 2022). The Global Financial Crisis of 2008/9 (GFC hereafter) was arguably a major landscape shock within the monetary regime (Alves *et al.*, 2019), which revived the critics to the IMS and brought new actors, institutions

and ideologies to the playing field. Even the Vatican, through the Holy See Press Office published a Bulletin in 2018 entitled '*Considerations for an ethical discernment regarding some aspects of the present economic-financial system*' recognizing: "the growing influence of financial markets on the material well-being of most of humankind" and the need for "to develop a new economy, more attentive to ethical principles, and a new regulation of financial activities that would neutralize predatory and speculative tendencies and acknowledge the value of the actual economy." (Ladaria, Turkson, Morandi, & Duffé, 2018)

In order to systematize and help navigate the tsunami of critical analysis and contributions to the international monetary system, three levels of economic and monetary feedback loops are identified and classified for the purpose of this thesis. These follow the triple-loop learning conceptual process (Gupta, et al., 2010) which figure 4 graphically demonstrates.

The first loop of criticisms concern the more superficial, technical tweaks and 'fixes' to the system. It focuses on symptoms and aims at actions. It works from and within the system itself and for the purpose of our argument here, a link is established to levels 9, 8 and 7 of the scale proposed by Donella Meadows regarding the leverage points to intervene in a system (Meadows, 1999). The second feedback loop concerns the frameworks and the rules of the system and advocates for reforms and reframes. It corresponds to levels 6, 5 and 4 of Donella's scale. Finally, the third and the most transformative loop of the system concerns the deeper context, the distribution of power, the goals and the paradigms of the system - leverage points 3, 2, 1. In the following sections each loop is explored individually.

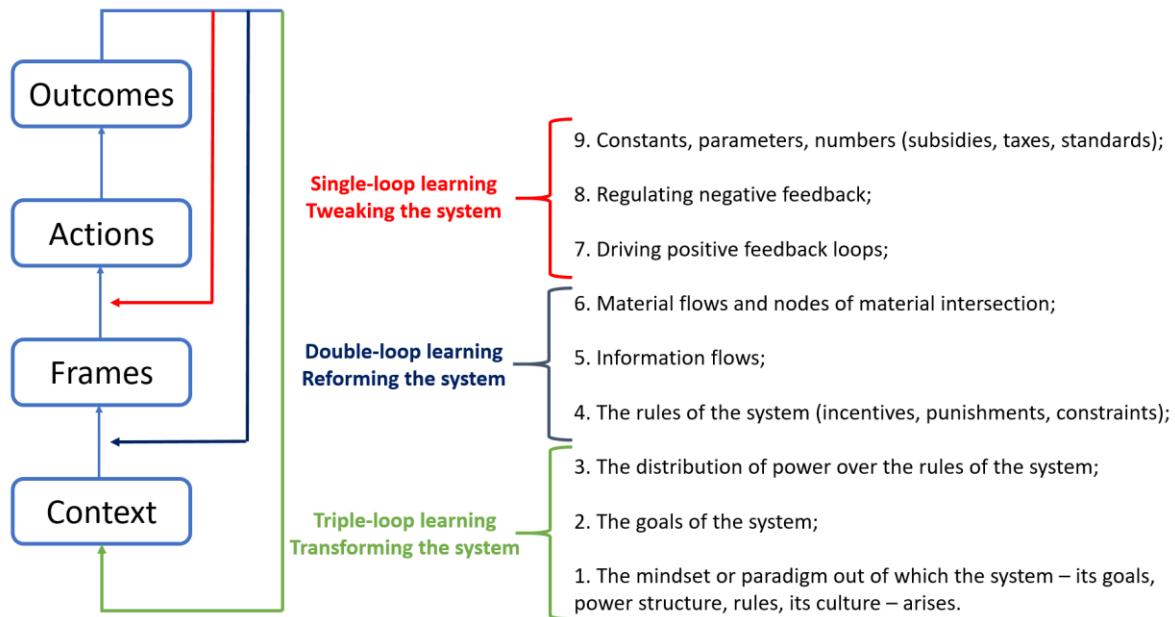


Figure 4 - Triple-loop learning process in the IMS (Adapted from Gupta, *et al*, 2010) and the 9 leverage points to intervene in a system according to Donella Meadows (Meadows, 1999)

3.2.1 Instability, inefficiency & fragility

Currency, banking and financial crisis are a well-studied phenomena, one that is very far from being randomly sporadic or occasionally occurring (Reinhart & Rogoff, 2011; Ferguson N. , 2008). From the work "Paper currency and Commercial Distress" published In 1836 by John Stuart Mill, to Hyman Minsky's 'Financial Instability Hypothesis', that these periodic monetary crisis, the economic output cycles and the relationships between them are studied and explored by economists with increasingly empirical evidence of their positive correlation (Kenny, Lennard, & Turner, 2021; Wan & Jin, 2014; Hoggarth, Reis, & Saporta, 2001; Kaufman, 2000; Minsky, 1992). This clear link between monetary cycles and economic wellbeing has gotten particularly accentuated since the beginning of the 20th century. Between the hyperinflation and crashes of the 1920s and the GFC of 2009, we had a century marked by severe economic volatility, hundreds of currency, banking and financial crisis (Laeven & Valencia, 2018) and repetitive cycles of 'boom and bust' with profound impacts in economic output, in the

distribution of wealth, in the trust that the various economic agents have in the "efficient market hypothesis", and unshakeable belief in the neoliberal economic theories of de-regulation and *laissez absolute faire*. The 20th century provided the empirical proof of the limitations and the serious consequences associated either to the poor understanding of money or the (un)conscious and (un)democratic implementation of orthodox theoretical ideologies - as with the case of the Chicago School monetarism (Cagan, 1989). The first feedback loop and level of critical analysis to the IMS refers specifically to the system's inherent instability and fragility, and comes naturally from the institutions of the monetary regime itself - such as the IMF, the World Bank and the Bank for International Settlements (BIS hereafter), and national Central Banks. These institutions have produced a vast body of literature - mostly technical reports and working papers - pointing to different elements in the current configuration of the IMS that can be improved, enhanced or tweaked for better efficiency, increase stability and robustness (Tiwari, 2016; Truman, 2011; Farhi, Gourinchas, & Rey, 2011; Borio, 2014). In most cases, these are the type of symptoms-fixing and incremental improvements to the current system that aim at guaranteeing its perpetuation and keeping the regime configuration intact. The call for a more stable, predictable and robust monetary system is at the very base of the IMS and remains the core argument put forth by its advocates for keeping it in place. These level of criticisms and their proposed solutions do not radically impact the overall monetary-banking-financial system design, do not fundamentally question the underlying assumptions and ideologies of the IMS and therefore cannot be considered transformative in any meaningful way (Alves, Santos, & Penha-Lopes, 2022). They provide a valuable, yet shocking, example of the lack of systemic thinking and the unwillingness to look deep into the foundations of the IMS within the monetary regime. An empirically relevant example is the monetary regime response to the GFC. Central Banks worldwide responded with Quantitative Easing strategies (QE), the revival of IMF Special Drawing Rights (SDR), Bank stress tests and other limited, inadequate, or misadjusted measures that ultimately failed to produce any significant impact in re-booting the economy or on the overall stability of the IMS (Coppola, 2019; Shkodina, Melnychenko, & Babenko, 2020; van Lerven, 2016; Giansante, Fatouh, & Ongena, 2019). Within this spectrum of actions, the most 'radical' proposal is with those making the case for a new Bretton Woods style of reform (Gallagher & Kozul-Wright, 2022). The language used can be deceiving: "A Bretton

Woods moment is urgently needed to avoid further health, climate and financial crises and to build a new trajectory toward sustainable, inclusive prosperity." (BU Global Development Policy Center, 2022). However, the identified problems and the proposed solutions remain mostly technical and single-focused. Therefore, we would still include these criticisms and their proposed solutions in this first level.

Although the single-loop critical analysis of our current dominant monetary system remain valid and important to build the argument of this chapter, the limited view of those symptoms as well as the proposed and implemented responses by the IMS regime are tangent to this thesis. There is no doubt that the IMS is unstable, fragile and volatile. And most will also agree that part of the problem resides in the lack of proper regulation, accountability and the inner function of the IMS. However, and for the purpose of validating the initial hypothesis, there is a need to dig deeper and go to the true root of instability, uncertainty and volatility, residing at the core of the system, as I will try to demonstrate in the next sections.

3.2.2 Inequality, unfairness and opaque governance

The second level of criticism to the IMS often comes from heterodox economists, think tanks and other institutions at the margins of the monetary regime - such as Positive Money, the International Movement for Monetary Reform (IMMR) or the Finance Innovation Lab. Aiming at a partial reform or reframe of the IMS, at this second level the criticism and its proposed solutions already focus on structural, persistent and systemic elements and processes at the center of the IMS. Beyond instability and fragility, the key topics addressed concern structural inequality, global imbalances, unfairness, disembeddedness, unproductiveness and a non-democratic, non-ethical governance of the monetary system. The core purpose is not to technically fix the symptoms, but to look for the source of the illness and change the rules and flows at a more macro level. Here, is where social and political criticisms come into place, demanding a reform of the system and its institutions. It already reflects a different consciousness and economic paradigm because the focus is no longer just the workings of the IMS itself, but also its external impact in other systems, namely social and economic. A fundamental critique within this second loop concerns the nexus between the current monetary system and economic inequality (Hodgson, 2013). This correlation is supported

by a wide variety of studies that have empirically established the link between the IMS and different measures of economic inequality and global imbalances (Dyson, 2010; Coibion, Gorodnichenko, Kueng, & Silvia, 2017; Othman, Alhabshi, Kassim, & Haron, 2020; Lang, 2021; Bagchi, Curran, & Fagerstrom, 2019). As Coibion and colleagues argue: "Contractionary shocks appear to have significant persistent effects on inequality, leading to higher levels of income, labor earnings, consumption and total expenditures inequality across households. Furthermore, while monetary policy shocks cannot account for the trend increase in income inequality since the early 1980s, they appear to have nonetheless played a non-trivial role in cyclical fluctuations in some forms of inequality" (Coibion, Gorodnichenko, Kueng, & Silvia, 2017, p. 88). Although different authors will argue for different inequality transmission mechanisms within the IMS - see figure 5 for a systematization - they all agree that the IMS and its institutions exacerbate economic inequalities, both within a country and internationally. What figure 5 does not fully show is also the indirect mechanisms by which each money contributes to inequality. An example of such indirect mechanisms is the relationship between monetary policies and the education sector. Monetary instability and contractionary policies affect the quality and quantity of the public, and private, education, which is a strong predecessor of income inequality (Baker, 2021).

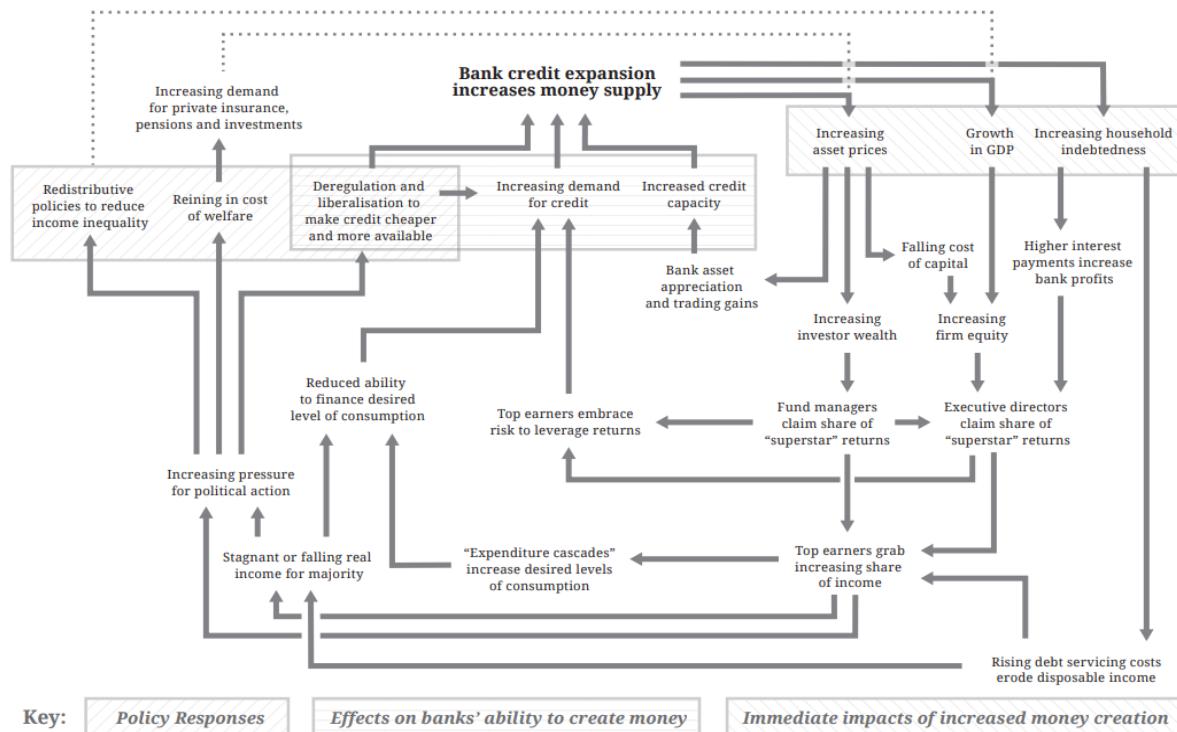


Figure 5 - Inequality transmission mechanisms (Hodgson, 2013)

Another dimension of criticism within this second loop deals with the scarcity inducing nature of current financial capital allocation. Due to the growing process of financialization, de-regulation of capital markets, offshores and other financial loopholes we've arrived at a time where the vast majority of financial capital barely engages with the real economy (Mazucatto, 2018). This disembedding of money, where the vast majority of the trillions of dollars, euros and pounds that circulate are mostly in the unproductive, speculative, 'casino economy' (Strange, 1986), create a twin negative effect in the real economy: the illusion of monetary scarcity, which drives unnecessary competition, losses in well-being and poorer societal choices; and, an artificialization of the measures of value (Mazucatto, 2018). Furthermore, by trapping most of our financial capital in financial black holes, offshores and 'fenced-off pools of money' (Arnsperger, Bendell, & Slater, 2021; Bullough, 2018), the IMS further promotes economic and fiscal injustices and imbalances, and effectively creates a growth imperative on the real economy, as (Arnsperger, Bendell, & Slater, 2021) have demonstrated. Moreover, the mechanisms of interest only benefit a small minority at the upper end of the income distribution, leading to a systematic "fairness misconception", where wealth is constantly, and by design, being relocated from poor to wealthy segments of

the population (Kennedy, 2001). It is also fundamental to make another important remark here which concerns monetary governance. This is what we would consider the third fundamental criticism within this second loop. The privatization of money creation, together with the marketization of money allocation, the concentration of banking and financial power and the loss of transparency in financial flows has created an opaque, non-democratic, non-accountable, non-scrutinized 'monster' (Doorman, 2015; Barmes, Eames, Livingstone, Musto, & Youel, 2022; Jackson & Dyson, 2012). This progressive erosion of public influence, scrutiny and control in banking and finance since the 1970s is a key piece of the governance puzzle that the IMS critiques are paying increasing attention since the 2009 GFC (D'Arista, 2009). D. Weitzner and J. Darroch remind us, while analyzing the governance failures at the root of the GFC, that it was the consciously designed opaque financial systems, the supervision failures, the over trust in the self-regulation of banks and financial markets and an overall weak governance environment that created the ground for greed, arrogant, unethical behaviors to flourish. "Rather, greed and hubris led to the enrichment of the few to the cost of the many. It would be naive to believe that a moral renaissance is at hand and will solve all ills, so until that time we must enforce rules to promote the virtue of transparency to prevent shadow worlds in the financial system" (Weitzner & Darroch, 2009).

The three main criticisms identified here within the second loop - inequality, unfairness and opaque governance - provide valuable insights and are a fertile field of new ideas and concepts. By working at a higher leverage point within the monetary system, they should be given more attention than those highlighted in section 3.2.1. However, these are often single-focus reforms, which end up perpetuating key monetary myths and beliefs - such as the myth of barter or the monopoly of money creation and single currency systems - and therefore cannot yet be considered radically transformative.

3.2.3 Unsustainability

The third feedback loop of criticism regarding the IMS is where radical ideas and a call for deep transformation of the current system lie. These come mostly from outside the monetary regime, its institutions and mainstream ideologies. The two core arguments that we will explore here are:

- 1) the current international monetary architecture is physically and ecologically unsustainable;
- 2) the IMS is driving unsustainability in our ecological and climate systems.

The first author to clearly present these ideas was the physicist Frederick Soddy to whom money was in direct opposition to the first two laws of thermodynamics (Soddy, 1933; Soddy, 1931). Although Soddy understood money as a social relation, and not a commodity subject to the same physical laws that govern all material things, he still opposed the idea of compound interest and fractional reserve banking (Dittmer, 2014). For Soddy, the fact that money could escape both the conservation law and the entropy law of the universe, by some level of mystical alchemy performed by banks and stock markets was unacceptable: "You cannot permanently pit an absurd human convention, such as the spontaneous increment of debt [compound interest], against the natural law of the spontaneous decrement of wealth [entropy]" (Soddy 1922: 30). Soddy's criticisms were later picked up by several Ecological Economists (Daly, 2011; Kallis, Martinez-Alier, & Norgaard, 2009), particularly around the topic of compound interest, which stood for decades as a key target for heterodox criticisms. Although historically most of the arguments against positive interest (usury) have an ethical, moral or equality nature, among EE and Degrowth scholars this quickly became a sustainability issue closely connected with the Monetary Growth Imperative (MGI hereafter). In its simplest formulation the idea is that the current monetary system cannot not grow, forcing the economic system into a perpetual growth dependency in order to pay the rising debt, plus its interest. Of course, perpetual growth based on an extractive economy, in a finite planet, is a physical impossibility, demonstrating the impossibility of continuous growth to finance constantly rising debt.

Due to the centrality of the MGI within the EE critiques to the IMS I dedicated my first work to uncover a bit more of this complex topic. The following section is a transcript from a conference paper originally submitted and later discussed in the Ecological Challenges Conference which took place in Oslo on January 2017. An update and critical analysis of the ideas and arguments defended on this work is offered in the next section.

3.2.3.1 A contribution to the growth imperative debate

Monetary Transition: a priority for sustainability

Filipe Moreira Alves*

*Center for Environmental and Sustainability Research, NOVA School of Sciences and Technology – NOVA University Lisbon (CENSE – FCT-UNL). Email: fmalves@fc.ul.pt

Abstract

This paper addresses the existence of a growth imperative within the design of our current monetary and financial systems, and thus as a key building block of our growth addicted economies. It is concluded that the current fractional reserve system of privately created debt with positive and fluctuant interest rates, with a single dominant currency, creates a strong growth impetus on firms, households and governments, reinforces a strong growth impetus on population dynamics and more importantly, has embedded a financial growth imperative in the pressing need to repay increasing private and public debt plus compounded interest. Therefore, we argue that a monetary and banking transformation is an unavoidable priority not only for the Degrowth movement but also for any coherent and significant systems-change towards sustainability. By placing the design of our current monetary and banking systems at the core of the *growthmania* of political neoclassical economics, we aim to reinforce and complement existing arguments for monetary and banking reform, while giving them an increased sense of priority. A priority ever more urgent because of the increasing monetization, commodification and financialization of society's daily life in the past half century, including human-nature interactions.

Introduction

The economic and political debate about growth, its drivers, and enablers, sociopolitical and environmental impacts has been intense and present since the early days of

Political Economy, from Smith and Malthus to Marx and Keynes. Yet, simple and direct answers to the question of the existence of growth imperatives, the links between growth and money and between money, interest, debt and (de)growth are hard to find in the literature and at times naïve, incomplete or biased due to the wide range of competing monetary theories and the complexities of our current monetary economies (i). The absence of clarity, consensus and empirical validation has fueled rather than stopped the economic debate, as seen in the aftermath of the Great Recession and the now growing number of voices across the political and academic spectrum arguing for a revision of the role of money in neoclassical economics, a critical update on the arguments of Monetarism based on empirical evidence and the urgent need for a monetary and banking reform towards a more transparent, stable, accountable, democratically controlled and sustainable system (ii).

In this paper, we aim to first discuss the concept of growth imperatives through a critical analysis of the Degrowth and Ecological Economics literature. Second, we expose the concrete design elements of the current monetary and banking systems that together create a multiplying effect with devastating ecological, social, cultural and economic consequences. Third, we present future possibilities for the re-design of our monetary and banking system that incorporates sustainability principles and elements that serve the healthy and wealthy progress of societies.

Growth imperatives

Karl Marx and Rosa Luxemburg are among those who have stated that capitalist societies have an intrinsic growth imperative forcing political economy to be focused on one single golden variable: economic growth - measured by the Gross Domestic Product (GDP). More recently, Joel Kovel and Michael Lowry, authors of the 'Ecosocialist Manifesto', reinforce that claim by stating that capitalist society has an "imperative to constantly expand production" and so is "being predicated upon the rule: grow or die"(iii). They are not the first nor the last to claim that a growth imperative exists in capitalist societies, and in this paper, we follow this path of exploring growth not as an objective of our economies but as a necessity to avoid economic collapse. This shifts our analysis from growth drivers to the under-researched topic of growth imperatives,

forcing the question: which are the underlying unavoidable mechanisms in our economy that force it to “either grow (at a sufficiently high rate) or shrink, if the growth rate falls below the positive threshold level”, and make a no-growth capitalist economy an oxymoron (iv)? By reframing the fundamental “growth question” of our times, we are not avoiding the vast literature criticizing growth as both a mean and an end, its limits and (dis)advantages, but rather pondering the possibility of a steady-state or degrowth strategy set within the current economic system. The list of growth imperatives under scientific scrutiny, much smaller than those of growth drivers, can be split into three categories: competition and profit seeking under capitalist market rules; population growth; and monetary factors, specifically in indebted economies (v).

The role of competition and the profit motive of firms operating in the market has been discussed by many authors and is, to this day, considered a major growth driver strongly linked with the innovation agenda of firms, with technological progress, and with risk taking. The question we pose here is whether it also sets an imperative to grow? Is it conceivable that the main driver for growth in firms is not some DNA factor embedded in entrepreneurs, the will to excel and succeed, or the curiosity to innovate, but rather a consequence of externally imposed rules and conditions? Are our firms growing because they must or because they want to? After all, private debt-to-GDP ratios in most OECD countries is well above 100% (vi) and as firms must repay their loans and return their investments within short to medium terms, with interest, they need yearly running surpluses that adjusted to inflation must grow constantly. Growth, then, becomes an inevitability to firms because of the way money supply is designed. Therefore, it is plausible to argue that the competitive market logic creates a strong growth impetus from a microeconomic perspective. However, we cannot argue the same from a macroeconomic level. After all, bankruptcies, insolvencies and failures of firms is the day-to-day life of a thriving capitalist system and there are examples of market economies remaining innovative and stable while having a very low or no-growth GDP, such as Japan in the last 35 years. It follows necessarily that we should move our focus from the market logic, upstream, to the money market logic which conditions it (vii, viii).

Regarding the population factor and its relationship with economic growth, it's important to stress that it is not only a matter of absolute population growth *per se* - which increases the demand for food, shelter, or energy, forcing total output to grow over time - but also demographics, migration flows and consumption *per capita*, i.e., population dynamics. There is little doubt that population growth forces overall throughput to grow over time. Even in a scenario of zero population growth this century (ix), rising *per capita* consumption in developing economies means the world GDP must grow if we want to sustain the expectations of billions of households in developing countries. In this analysis, we do not exclude the potential role of innovation, distributional strategies, population stabilization scenarios and lifestyle changes in developed countries (x). Nevertheless, we stand with those who argue that the decoupling positivism narrative normally associated with some level of 'technofixism' must be carefully framed within relative versus absolute decoupling, theory versus practical implementation, and Jevon's Paradox rebound effects (xi). It should not be forgotten that it was the rapid economic growth of the industrial revolution that enabled fast population expansion and created a consumer society with high expectations. And it should also not be forgotten that it was the development of new financial mechanisms and monetary innovations that triggered that productive explosion in the first place (xii). Therefore, we claim a tight causal connection between monetary supply, financial innovation and the growth-imperative residing within population dynamics in a post-industrial world, not only in terms of consumption patterns but also in terms of absolute growth. Once again, we must thus move our focus from population dynamics upstream to the money market logic that conditions it.

Finally, the third dimension associated with economic growth imperatives: money. According to Loehr: "If we don't consider productivity growth and population growth, the remaining driver of economic growth is the sphere of accumulation". It is however not a matter of money itself, but rather of its functions and design elements that are important for our queries. Where does money come from? Who controls the money supply? What is the role of interest? Is a debt-based economy a growth-addicted economy?

Since S. Gesell, F. Soddy and I. Fischer, a wide variety of authors have supported the claim that the current monetary system is inherently unfair, unstable and unsustainable – economically, socially and environmentally (xiii). A particularly potent critique of the growth-addiction of the current monetary system comes from the field of Ecological Economics and the claim that interest-bearing debt economies have an intrinsic need to constantly grow to repay debt plus interest in an infinite rat race that faces long run physical impossibilities considering that we live on a finite planet with finite resources, slow rates of natural reposition, and governed by the Law of Entropy (xiv). Although Tim Jackson and Peter Victor argue that the link between interest-bearing debt and the growth imperative is “intuitively appealing, but has been subject remarkably little in depth scrutiny”, and that the causality is yet to be proven as it’s highly dependent on many different variables (xv), here we still argue that there is overwhelming empirical evidence supporting the hypothesis of an inherent growth imperative within the monetary system, its cascading effect of indebtedness, and the inescapable unsustainability of such a growth-dependent system within our finite planet earth. Our overall conclusion regarding the three types of growth imperatives is that: i) The capitalist competitive profit-seeking market logic *per se* does not carry, necessarily, a growth imperative; ii) Population dynamics entail a growth imperative, part of which can be directly attributed to the monetary system and financial innovation; and, iii) The current monetary system imposes a powerful growth imperative with cascading effects throughout the economy, mainly due to fact that more than 90% of the current money in circulation is privately issued and controlled debt with compounding positive interest rates (xvi). In the following section, we will look deeper into the design of the current monetary and banking system and its implications for growth and sustainability.

Monetary and Banking systems

Martin Wolf, Chief Economist of the Financial Times, brilliantly summarized the core design elements of the dominant monetary system, explaining that “The essence of the contemporary monetary system is creation of money, out of nothing, by private banks, often foolish lending”. Underlining the consequences of such a system, J. Farley’s

states that “The current interest-bearing, debt-based system of money creation stimulates the unsustainable growth economy; it exacerbates boom and bust cycles, while systematically transferring wealth and resources to the financial sector. [...] With interest rates exceeding economic growth rates, this monetary system is inherently unsustainable, even if it existed on an infinite planet”(xvii). Wolf and Farley, quoted above, succinctly point out five major characteristics of the current monetary system that make it historically unique as well as important for understanding economic dynamics and growth addictions. However, while most scholars, apart from orthodox neoclassical economists, do recognize that money supply affects real economic variables at least in the short-medium term (xviii) -, the question of how and how much monetary policies and banking systems affect macro and microeconomic behavior of our societies remains controversial. A more in-depth analysis of these five characteristics is therefore necessary to dissect the interconnections and the leverage points for change:

- i) All our money is *de facto* fiat money, i.e., it is not backed by gold, silver or any other commodity or real guarantee, making it basically “inconvertible, intrinsically useless money”(xix). The value of the fiat currency is therefore set by the market, usually supported and enforced by the taxing power of governments and some level of faith by economic agents. Irvin Fischer called it a curse, Frank Fetter labelled it has a „poor type of money“ while Voltaire is attributed the famous quote: „paper money eventually returns to its intrinsic value: zero“(xx);
- ii) All our money is issued through debt creation under a fractional reserve system. For the Austrian economists, debt or credit money was strongly criticized as a fragile, unstable, fraudulent, driver of inequality, unsustainable system (xxi). Empirical evidence from the XX century collected by the International Monetary Fund shows that since the boom in credit creation, specifically since the progressive reduction of the reserve ratio from the 1970’s onward, the world has experienced 124 systemic banking crises, 208 currency crises and 65 sovereign debt crises (xxii). The same period has seen a sharp rise in wealth inequality, fraudulent banking, Ponzi schemes and bank rushes;
- iii) Private banks, given responsibility for money creation, or more precisely debt/credit creation, have a monopoly to create ‘monetized debt’ through the money

multiplier. Since the 1970's, and closely related with the previous point, the amount of money created by Central Banks (M1/M2) have remained stable while bank created debt (M3/M4) has risen dramatically all over the world, especially in well established financial capitalist economies such as the U.S. and the U.K where it accounts for 93% of all monetary mass in circulation. This unparalleled situation has made even governments dependent on private banks to finance their public budgets in a financial silent *coup-d'etat* making the entire economy hostage of a few financial institutions and volatile speculative financial markets. As Norm Franz states in 'Money and Wealth in the New Millennium': "Gold is the money of kings, silver is the money of gentlemen, barter is the money of peasants - but debt is the money of slaves";

iv) Apart from very local and/or short-lived experiences with negative interest-rates or free-interest money, most money today has positive interest that compounds to an ever-growing debt. This controversial characteristic of money - for many the fundamental basis for the growth imperative - is a socioeconomic-political choice, mostly unquestioned in neoclassical economics, that fundamentally shapes our societies, specifically wealth distribution and inequality, institutional power relations and investment decisions;

v) Monetized debt creation and allocation by private banks is mostly unaccountable, under scrutinized, non-transparent and out of public democratic control (xxiii). There is no doubt that the banking industry today is highly regulated - specifically transactional banking - this however does not mean that it is under democratic control or even under societal scrutiny for predatory, illegal, unethical and unsustainable behaviors.

Financial innovation and complexity, together with banking centralization and the merging between transactional banking and investment banking has allowed banks and other financial institutions to be ahead of legislation and supervision (xxiv). Moreover, many international laws and accords, like the BASEL agreements, are non-binding or non-vinculative (xxv), and the widespread use of fiscal paradises and island black-holes where fiscal and legal authorities have no jurisdiction or control whatsoever, still create limits to public scrutiny of banking activities.⁶

If taken individually and separate from each other, the five major characteristics of money discussed above do not necessarily create a growth imperative. Instead, it's their unique combination in the current monetary systems that creates such an extraordinary effect (xxvi). Even more, in today's fully monetized and financialized societies this combination enables private interests to infiltrate, manipulate and control a growing number of assets previously in the hands of public, collective or individual actors while subjecting all other forms of capital (human, natural, social, cultural) to the overwhelming power of financial artificial speculative capital. As once eloquently said by Mayer Rothschild "Permit me to issue and control the money of a nation, and I care not who makes its laws! ".

Discussion - Possibilities and pathways for Degrowth and steady-state economies

The first section of this paper demonstrated the centrality of the current monetary system in imposing a growth imperative in our economies. The second section highlighted the design elements responsible for the growth imperative. This third section offers alternative solutions and transition strategies, based on existing literature that would allow alternative economic proposals to be viable and attainable under the current economic system.

In our perspective, the starting point for a transition to a more transparent, resilient and sustainable monetary system is a three-fold strategy based on the democratization, decentralization and diversification of our monetary economies. This means adjusting and adapting the design of the monetary system to serve society rather than the opposite by opening the door not only for new actors and institutions with new systems of governance, but also for the co-existence and complementarity of multiple currencies that serve distinct functions. In concrete terms two parallel movements are necessary: one towards People Powered Money, specifically at the local and regional level, through the promotion and active support of community currencies, time-banks, barter networks; the other towards sovereign money creation by states either through the government, the central bank or a third independent institution (xxvii). However, for this transition to sustain itself and not repeat patterns and mistakes from the past two key design recommendations are set forth: interest-free money – or even negative

interest - should be the norm in exchange currencies; and, currencies that perform the function of unit-of-measure and exchange must be either backed by real commodities or, in the case of fiat currency, controlled by full reserve banking systems (xxviii).

The three-fold strategy together with the two key design elements, if coherently put together, can have the power to dramatically transform the rules of the game, particularly of the money game, significantly impacting the choices and behavior of households, firms and governments. Most of all, they remove the imperative need for economic growth, since there would be neither rising debt nor interest to chain our economies to impossible futures. In addition, re-designing money and money markets also means re-thinking value, worth and wealth, since money is also a crucial unit-of measure. When people democratically give their own value to their own money, they are also empowering themselves to account for what is important to them, and direct their investments and their communities towards the futures they envision. Finally, our main conclusion is that a monetary transformation through decentralization, democratization and diversification should be taken as a key priority for the steady state and Degrowth movements as well as for anyone working in systems-change, because of all the arguments presented so far. It is likely one of the biggest and most difficult challenges of our times, but also one we cannot avoid if we are serious about ensuring sustainable, healthy and wealthy livelihoods for our common future.

Endnotes

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(ii) Binswanger, Mathias. 2009. "Is there a growth imperative in capitalist economies? a circular flow perspective." *Journal of Post Keynesian Economics* 31 (4): 707-727; Strunz, Sebastian, Bartosz Bartkowski, e Harry Schindler. 2015. Is there a monetary growth imperative? Leipzig: Helholtz-Zentrum fur Umweltforschung GmbH - UFZ.

(iii) <http://ecosocialistnetwork.org/Wordpress/wp-content/uploads/2012/03/Manifesto-1-en.pdf>

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(vi) http://stats.oecd.org/Index.aspx?DataSetCode=FIN_IND_FBS consulted on 27-12-2015

(vii) Binswanger, Mathias. 2015. "The growth imperative revisited: a rejoinder to Gilányi and Johnson." *Journal of Post Keynesian Economics* 37 (4): 648-660.

(viii) There also other authors that claim that market competition and the profit motive have an intrinsic growth imperative namely due to its impacts on (un)employment - the productivity trap - or the risk of bankruptcy linked with the inherent uncertainty of profits under a zero or negative growth economy. However, most of these arguments have been partially or even fully criticized and discarded on the basis of cultural changes^{viii} or new (re)distributional policies of wealth and opportunities.

(ix) Which for many authors is an unlikely scenario. See for example the work from Gerland, Patrick, Adrian E. Raftery, Hana Ševčíková, Nan Li, Danan Gu, Thomas Spoorenberg, Leon-tine Alkema, et al. 2014. "World population stabilization unlikely this century." *Science* 346: 234-237.

(x) Huesemann, Michael, e Joyce Huesemann. 2011. *Techno-Fix: Why Technology Won't Save Us Or the Environment*. Gabriola Island, Canada: New Society Publishers;

Krausmann, Fridolin, Simone Gingrich, Nina Eisenmenger, Karl-Heinz Erb, Helmut Haberl, e Marina Fischer-Kowalski. 2009. "Growth in global materials use, GDP and population during the 20th century." *Ecological Economics* 68: 2696-2705

(xi) Behrens, Arno, Stephan Giljum, Jan Kovanda, e Samuel Niza. 2007. "The material basis of the global economy Worldwide patterns of natural resource extraction and their implications for sustainable resource use policies." *Ecological Economics* 64: 444-453.

(xii) Niall Ferguson makes a strong case for this in his book "The Ascent of Money"

(xiii) Douthwaite, Richard. 2011. "Degrowth and the supply of money in an energy-scarce world." *Ecological Economics*; Greco, Thomas H. Jr. 2001. *Money: understanding and creating alternatives to legal tender*. USA: Chelsea Green Publisher Company.

(xiv) For more we recommend Nicholas Georgescu-Roegen masterpiece "The Economic Process and the Entropy Law".

(xv) Such as the demands of capital adequacy, the destination of interest payments in the economy, the savings/investments ratios of households, the level of private and public debt and its trend against GDP trends. The authors concluded against a growth imperative embedded

within positive interest, highlighting nevertheless their limited assumptions, variables and modelling capacity of the FALSTAFF Model. Jackson, Tim, e Peter A. Victor. 2015. "Does credit create a 'growth imperative'? A quasi-stationary economy with interest-bearing debt." *Ecological Economics* 120: 32-48.

(xvi) Jackson, Tim, e B. Dyson. 2012. *Modernizing Money: Why our Monetary System is Broken and How it Can be Fixed*. London: Positive Money.

xvii Farley, J., M. Burke, G. Flomenhoft, B. Kelly, D. Forest Murray, S. Posner, M. Putnam, A. Scanlan, e A. Witham. 2013. "Monetary and fiscal policies for a finite planet." *Sustainability* 5: 2802-2826.

(xviii) Hiscock, Robert, e Jagdish Handa. 2013. "Long-run neutrality and superneutrality of money." *Applied Financial Economics* 23: 739-747; Mankiw, N.G. 2009. *Principles of economics*. 5th ed. Mason, OH: South-Western Cengage Learning.

(xix) Goldberg, Dror. 2012. "The tax-foundation theory of fiat money." *Econ. Theory* 50: 489-497.

(xx) <https://mises.org/library/higher-inflation-inevitable>

(xxi) https://wiki.mises.org/wiki/Criticism_of_fractional_reserve_banking

(xxii) Laeven, Luc, e Fabian Valencia. 2008. Systemic banking Crises: A New Database. WORKING PAPER IMF 08/224.

(xxiii) There is a wide literature on the subject. See the references quoted on Endnotes vi, xvi and (xvii).

(xxiv) Barth, James R., Gerard Caprio, e Ross Levine. 2012. *The Evolution and Impact of Bank Regulations*. New York: The World Bank Development Research Group, Working Paper 6288; Kroszner, Randall S., e Philip E. Strahan. 2014. "Regulation and Deregulation of the U.S. Banking industry: Causes, Consequences and Implications for the Future." Em *Economic Regulation and its reforms: What have we learned?*, editado por Nancy L. Rose. Chicago: University of Chicago Press.

(xxv) For more see: <http://www.bis.org/bcbs/basel3.htm>

(xxvi) For example, the existence of non-backed currencies in itself is not problematic. Only when we combine fiat currency with fractional reserve banking systems in a money monoculture, do we trigger the possibility of decoupling money creation from the real economy and therefore allow debt to be recklessly created. If to this scenario, we add-up compounded interest we certainly create a problematic, unsustainable system.

(xxvii) See the People Powered Money report from the Economics Foundations and the Sovereign Money Report from Positive Money UK..

3.2.3.2 A critical update

The most significant academic contribution to MGI debate in the past years, which I believe to be complementary to the analysis of the previous section, was done recently by three leading authors in the field of heterodox monetary economics (Arnsperger, Bendell, & Slater, 2021). As with the analysis presented above, the authors argue that although multiple sources of growth dependency exist in our economies and societies, there is a strong case for the existence of a monetary growth imperative. Moreover, they stress that no single independent variable - not even interest - can be solely responsible for a MGI. Rather, it's the unique combination of certain elements within the design of the current monetary system that "creates a competition for money between debtors and savers which is resolved though the creation of more debt-money, which in turn drives growth and the resulting ecological and climate emergency" (Arnsperger, Bendell, & Slater, 2021, p. 1). Of critical relevance in their innovative analysis is the central role of capital accumulation and hoarding - namely within 'fenced-off pools of money' -, which within a debt-money system creates the MGI 'trilemma': "In any economy where money hoarding and accumulation is not curtailed, the preponderance of money issued by private banks as debt, with or without interest, leads to a system-wide scarcity of money available to people and organizations to service their debts, unless there is continual economic growth" (Arnsperger, Bendell, & Slater, 2021, p. 20). These detrimental processes of capital accumulation and hoarding away from the real productive economy, are most definitely a fundamental variable in our MGI equation and a key piece of the puzzle that I will internalize in chapters 5 and 6 of this thesis.

The overall conclusion of (Arnsperger, Bendell, & Slater, 2021) is consistent with most of the literature on the topic and once again reinforces the argument that our current monetary architecture plays a determinant role in the unsustainability of our growth addicted economies. A steady-state or a Degrowth agenda cannot co-exist with the current IMS.

3.2.3.3 Money, ecology and climate change

The second part of our initial third-loop critical analysis to the IMS concerns not the sustainability of the IMS itself but rather, how the IMS is driving unsustainability within our ecological and climate systems.

One way the IMS is contributing to the destruction and degeneration of our planet is by 'Banking on climate chaos', i.e., directly supporting and channeling very substantial financial resources to invest in companies and industries that are destructive to life on earth (Banking on Climate Chaos: Fossil Fuel Finance Report, 2022). These too-big to fail banks and investment funds choose to invest in oil, gas, fracking, mining and other major destructive industries because of the underlying incentives, licenses and deeply rooted practices at the core of financial markets. Ultimately, they keep on doing it because they can, they profit from it and are unaccountable (present or future) to the risks associated with their investments. Furthermore, beyond the private sector, recent reports, namely the 'Green Banking Scorecard', demonstrate how Central Banks worldwide are failing at aligning their policies, investments strategies and concrete actions with our climate goals. As the 2021 report concludes: "[..] the scorecard reveals a universal absence of high impact policies that target reductions in financial support for fossil fuel activities from all G20 central banks and supervisors. [...]. Faced with the prospect of climate and ecological breakdown, 'market neutrality' serves as little more than a facade to paper over the inherently political nature of policy decisions made by central banks, and current approaches focused on climate-related disclosures and stress tests are insufficient. Global financial markets have repeatedly failed to deliver climate-safe outcomes, and will continue to do so until central banks and supervisors enact policies that reshape the financial system to better serve people and planet." (Barmes & Livingstone, The Green Central Banking Scorecard, 2021). The argument here is that both public and private financial institutions have been consistently and systemically misallocating monetary and financial resources to destructive and degenerative industries.

Another way the IMS is driving unsustainability is by systematically devaluating and eroding social and ecological capital (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012). Three main mechanisms contribute to that ongoing process: 1) Short-termism and the common practice of discounting the future (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012); 2) Legal frameworks and embedded practices about what is valued and valuable financially that systematically underplay and underrepresent natural and social capital; 3) By processes of commodification of social

and natural capital, which is then subject to the 'rules of the market' and vulnerable to speculation, dumping practices and other non-ethical and non-economical actions (Knuth, Potts, & Goldstein, 2019). All the mechanisms mentioned created a strong bias within the economic system that systematically distorts, misrepresent or simply ignores the intrinsic value of life and the systems that nurture life.

The third way in which the IMS drives ecological and climate unsustainability is through inequality. As figure 5 above demonstrated our monetary system is a driver of economic inequality. Inequality is itself a driver of ecological destruction (Dorling, 2017). Moreover, ecological destruction hits stronger those in low income parts of society and the world, further accentuating this reinforcing feedback loop between inequality and ecological degradation (Laurent, 2015).

Finally, the fourth way concerns the ecological footprint of the system itself. There is an increasing body of knowledge using life-cycle assessment and carbon footprint calculations to analyze and differentiate different payment technologies and banking systems (Shonfield, 2017; Hanegraaf, Jonker, Mandley, & Miedema, 2018). Although relatively residual, when compared with other major industries and economic sectors - such as transportation or agriculture - the message that these studies have helped to spread is that the monetary-banking-financial system also has an ecological cost and different configurations yield very different carbon footprints. The debate is quite lively these days, particularly given recent calculations of the very significant energy-intensity of crypto-currencies (Stoll, Klaassen, & Gallersdörfer, 2019). This is something we will explore further in chapter 6.

3.3 Concluding remarks: The money-sustainability nexus

Our current monetary system is a very complex, dynamic, multi-layered combination of a high diversity of flows, elements and beliefs. Trying to isolate a single independent variable or quantify a direct causal relationship is an extremely difficult endeavor which will most probably fail at its objective. As (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012, p. 67) remind us "we need to see economic systems as

open systems, which act like complex flow systems with multiple and interrelated causalities". This creates a structural problem for linear-thinking economists looking to find the root cause, or the element that needs changing within the monetary system to finally bring stability, equality and sustainability. As the work from (Arnsperger, Bendell, & Slater, 2021) and (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012) clearly demonstrates, a radical transformation of the monetary system is not achievable by just erasing interest rates, or implementing full reserve banking systems, or adding more regulation to capital markets. It requires a different approach. An integral, systemic, regenerative approach. This is what Bernard Lietaer started in his groundbreaking report to the club of Rome and that we will continue in the next chapters of this dissertation. For now and for the sake of answering our first research question, I would like to summarize the core findings of this chapter:

- 1) The design of the current international monetary system is of critical importance to social, economic and ecological sustainability. The 'rules' of the monetary game have a tremendous influence in our individual and collective behaviors and beliefs, which are shaping our lives and our world in very real and concrete ways. When considering strategies and pathways to ensure our common future, we need to acknowledge the non-neutrality of money;
- 2) The current international monetary system is a driver of financial and economic instability, economic inequality and ecological destruction. Our dominant monies are not only non-neutral, but more importantly they are an active source and a force of unsustainability. When envisioning a sustainable economy, we need to acknowledge the central and pivotal role of money;
- 3) The root cause of the unsustainability of the IMS lies deep in its intrinsic paradigm and only by intervening at the highest leverage points within the system can we fundamentally transform it and re-align it with sustainability. When acting to transform our IMS, we need to focus and prioritize not tweaks or superficial reforms, but rather the fundamental core pillars: single-currency hegemony; debt; interest;
- 4) An integral, complex, systemic, living-systems approach is needed to identify the core design elements and five detrimental processes that are critical to the IMS unsustainability. Figure 6 below shows these elements and processes.

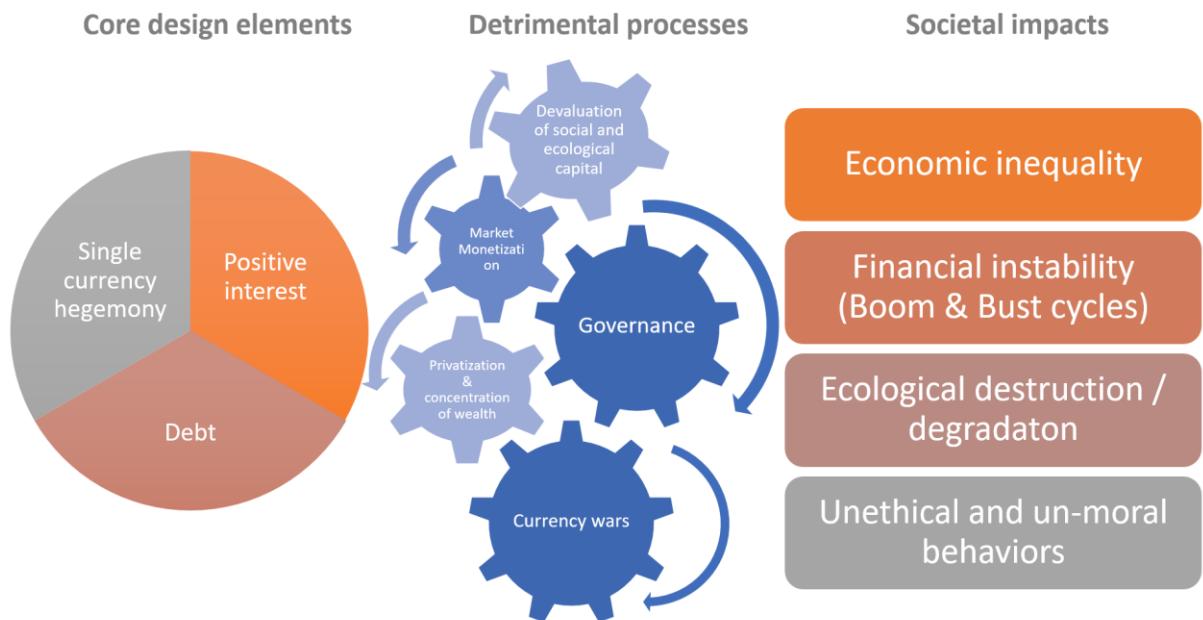


Figure 6 - The drivers of unsustainability in the IMS

Figure 6 above links the core design elements of the IMS, together with its key detrimental intrinsic processes and its overall impacts. This understanding is a graphical representation, adaptation and evolution from the "Money and Sustainability: the Missing Link" report findings. It will be further explained in chapter 6. What I would like to convey here for the time being is the distinction between core design elements, detrimental processes, and the complexity of interactions and elements that create and perpetuate the unsustainability of the IMS. The monopoly of single currency, debt and interest are deeply rooted, foundational elements of the current monetary paradigm. They have been unquestioned and undisturbed for more than 50 years and that's the reason I have called them 'monetary blind spots'. On the other hand, the devaluation of social ecological capital, market commodification, the privatization and concentration of wealth, currency wars, and the un-democratic, opaque governance of money, are all ongoing socio-political and economic mechanisms fundamentally "incompatible with sustainability" (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012, p. 94). They are the forces that affect the monetary regime, its shape and core dynamics.

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4 SEEKING ALTERNATIVES: HETEROODOX THEORIES AND COMPLE- MENTARY PRACTICES

"Of all the many ways of organizing banking, the worst is the one we have today. Change is, I believe, inevitable. The question is only whether we can think our way out though to a better outcome before the next generation is damaged by a future and bigger crisis."

Sir Mervyn King, Governor of the Bank of England

"Banking: from Bagehot to Basel, and back again"

Speech made in New York City, USA, 25 October 2010

Stories are a powerful. The narratives we are told and the ones we tell ourselves are critical elements in shaping our opinions, behaviors, worldviews and beliefs (Gottschall, 2012; Gregory M. , 2009). They can be profoundly liberating as well as deeply conditioning. The language used, the terms and concepts from where our ideas emerge, the emotions we attach to them and the dreams we are able to dream depend on these narratives. And I risk saying that most of them are unconsciously and uncritically repeated through society, academia included (Hutchins & Storm, 2021 [2019]). Therefore, consciously avoiding 'single-story' traps (Adichie, 2009), unveiling unconscious narratives about the world and transcending pre-conditioned possibilities is of fundamental importance when one is venturing into such complex topics as money. Money, is one of such themes where myths and biased narratives are told and re-told in classrooms, conferences, TV's and social media (Kraemer, Jakelja, Brugger, & Nessel, 2020). To break free from these narratives, one has to unshackle the economic, philosophical and sociological chains that binds us into the common, well-known, mainstream story. This is one of the key reasons why this research is transdisciplinary and why I've started the doctoral program with the theoretical freedom of not being affiliated to any specific school of economic thought or discipline. Even what is considered as 'alternative', depends on the paradigm that one takes as the reference point. For example, Market Monetarism or New Monetary Economics can be considered alternative monetary perspectives, if the reference is classic monetarism. However, from

a heterodox monetary perspective these could hardly be considered an alternative, but rather small variations or adaptations of Monetarism. Perspective is everything and in this chapter I have tried to broaden the reference point for 'alternative' by going beyond the path well marked and look in different disciplines and schools of thought, namely those at the margins, for new insights and avenues of exploration. The exploration of alternative monetary theories started first by reading and reviewing the better known heterodox writings in the last century - see annex 9.3 for a flowchart of relevant literature consulted -, particularly the (neo) Keynesian and Austrian economics schools of thought, and later opening up the spectrum of heterodoxy beyond the economic discipline, where most of the truly alternative views on money reside.

4.1 Alternative monetary theories

Trying to systematize alternative historical views and economic theories on money has proven to be a massive challenge. Money is a recurring historical economic and philosophical topic, even before Aristotle and Plato (Fuller, 2020), and the history of monetary thought is a maze, filled with secret passages, dead ends and many cross-roads. As one goes deeper into the 'rabbit hole', the simplistic dualisms of Metallism versus Chartalism, as defined by Georg Knapp (Knapp G. F., 1924), vanish into complexity. John Smithin argues that "a full understanding of monetary and financial issues [...] will require far more of an interdisciplinary approach than is currently the norm in academia. [...] a realist approach to monetary and financial issues able to effectively cross interdisciplinary boundaries would require study in each of the following fields (in order): (1) A Realist Social Ontology; (2) Economic Sociology, (3) Monetary Macroeconomics; and, (4) Political Economy" (Smithin, 2013, p. 20). Although I fundamentally agree with Smithin argument on the unavoidable necessity of inter and transdisciplinarity to accomplish a monetary apocalypse, for the purpose of this thesis, and as a framework to temporarily classify different views and theories on money, I have focused on three different streams of knowledge and inquiry that I believe to be complementary and provide a broad and alternative perspective on the different natures and manifestations of money. These are:

- The anthropology of money;
- The sociology of money;

- The ecology of money;

These are not fully sealed knowledge silos, as they interact occasionally, and they do not encapsulate all possible alternative theories on money. My goal here is to seek alternatives beyond the mainstream (neo)classical orthodox theory of money and the competing credit theory of money, that are well supported in the literature and provide valuable insights for this thesis.

Anthropological research into monetary systems is a rich and fascinating field of research that extends far beyond the economic dimensions of money and that has contributed to challenge the classic views of monetary systems in many of its working assumptions (Truit, 2020; Nelms & Maurer, 2014; Maurer, 2006). Ethnographic studies of monetary practices across space and time have supplied scholars with an incredible diversity of monetary systems, extending centuries before the invention of coins, paper-currency and banks. "Confronted with a range of objects that have money-like features, anthropologists have highlighted the multiple practices and beliefs animating the idea of money [...] The challenge is therefore not just to define what money is, but also to understand how the institutional and collective efforts to make, unmake, and remake money are on-going projects of human sociality" (Truit, 2020). In that respect the anthropology of money has immensely contributed to our understanding of spheres of exchange, the multiple different functions of money, monetary pluralism and the connections between money, language, cultural symbols, meaning, and power. Moreover, by analyzing such diverse examples as the global use of cowrie shells, the fascinating giant Yap rai stones or the long lived tally sticks, anthropological research has shown how "the complexity of such interfaces makes it difficult to sustain, notions of boundedness, simple functionalism, and ahistorical or ethnocentric approaches to understanding the currency of money-objects." (Nelms & Maurer, 2014, p. 39). Although some long held distinctions in the field - such as the difference between so called 'primitive' and 'modern' money - are now mostly outdated and unused, Karl Polanyi's contribution with general purpose versus special purpose money, and embedded versus disembedded economy, are still relevant contributions that we will pick further on in the research (Polanyi, 1944).

Of particular interest to this thesis is the anthropological research into "how people juggle not one but many currencies", specifically in the global south where it "has long prevailed" (Truit, 2020). Examples from Papua New Guinea, Haiti, Mongolia or Cuba are used to show how "Monetary pluralism challenges normative assumptions of the social foundations of money, namely trust and confidence." (Truit, 2020). One cannot value enough the paradigm shifting contributions from authors such as David Graeber, Caroline Humphrey or Bill Maurer, and a synthesis of their contributions would be a thesis on itself. However, I would like to highlight three very clear insights I have distilled from their works: firstly it is evident, looking into historical ethnographic studies, that monetary diversity and plurality is the norm and not the exception. Multiple currency systems co-exist within the same socio-economic landscapes and that fact is valid across time, different geographical locations and socio-political configurations; secondly, most authors when presenting diverse monetary ecosystems, document two, three or up to five simultaneously occurring money systems, hinting at potential socio-economic limits of monetary plurality; thirdly, from these studies one cannot infer a pattern for determining the specificity of each diverse monetary arrangement, i.e., the existence of different currencies is not necessarily set or bound by territorial or functional complementarity or competition only. Monetary plurality seems to emerge from a combination of different contextual factors in very dynamic equilibriums. We will explore these insights from anthropology in chapter 7 of this thesis.

Anthropology has not develop an independent theory of money, neither has the field taken sides regarding the long held economic debate between Metallists and Chartalists. Although Graeber tries to accommodate both monetary theories when he states that "money is almost always something hovering between a commodity and a debt-token" (Graeber, 2011, p. 75), it is clear, within anthropological research, that a closer connection with the social and credit theory of money exists (Nakayama & Kuwata, 2020). This is also the case with another fundamentally important stream of monetary understanding: the sociology of money.

George Simmel's major work on the Philosophy of Money (Simmel, 2004 [1900]) did not significantly influence the study of monetary phenomena within Sociology and Economics for almost a century (Deflem, 2013). However, its revival, particularly

with Geoffrey Ingham and Nigel Dodd, has been of vital importance to the understanding of the true nature of money as fundamentally a social relation (Ingham G. , 2004; Dodd, 2014; Davis, 2019). As Ingham initially points out: "although money should be seen as having "social" conditions of existence, sociology, with the notable exceptions of Weber and Simmel, has contributed very little directly to the study of the actual social production of money as a *system of social relations, sui generis*" (Ingham G. , 1996, p. 509). There's little doubt that this has dramatically changed in the past two decades and the Sociology of Money occupies an increasingly important role in alternative monetary thinking. One of its major contributions has been in the debunking, deconstruction and dismantling of the 'Metallist', commodity theory of money. What is commonly referred as the Aristotelian tradition of monetary thought, and the idea of money as a 'creature of the market' which emerges to facilitate exchange and solve the problems associated with barter (Fuller, 2020). Despite the fact that ethnographic research has failed to provide any concrete evidence of such 'fantasy' states (Humphrey, 1985; Graber, 2011), and numerous prominent economists - such as J.M. Keynes - have pointed out the ontological and epistemological flaws in the narrative of money as 'a thing' (Tily, 2012), the alternative social and credit theory of money remained, surprisingly, marginal. The 20th century monetary transformations and arrangements were mostly informed by neoclassical monetarist ideologies that perpetuated the neutrality, exogeneity, and exchange function of money. Ingham's work on the 'Nature of Money', and Dodd's 'Social Life of Money' are two landmark contributions to a radical conceptualization of money that has extended far from Sociology. As I will argue in the next section, they have been instrumental in the widespread conceptualization of money across heterodox economics as intrinsically a social phenomenon, which is obviously endogenous to the socio-economic process, non-neutral, and at its core a unit of account (Ingham G. , 2004). Developments in the Sociology of Money have also greatly contributed to the building of two monetary theories that are gaining momentum nowadays: Modern Monetary Theory (MMT hereafter) and Ecological Monetary Theory (EMT hereafter). Once again, it is not my intention here to offer a synthesis of the vast contributions of the Sociology of Money, however two important insights have emerged from the literature that are of particular relevance to this thesis: firstly, if we take the central idea of money as social product that mediates and symbolizes

complex social relationships (Thiel, 2012), which is intrinsic to our societies - as language or the metric system -, then the radical proposals to 'demonitize' our economy and establish moneyless systems as the ultimate sustainable utopia (Jameson, 2007; Exner, 2014) are hugely paradoxical. A modern society without any form of money is as hard to conceptualize as a modern society without language. Unless, one assumes that these monetary abolitionists have a commodity money theory as their starting ground and what they are truly referring to is not the demonitization of our societies but rather the profound restructuring, re-symbolizing and reimagining of our monetary relationships, starting from the decommodification of certain spheres of exchange. "These are images of Utopia defined not by money's absense but rather its radical transformation" (Dodd, 2014, p. 314); secondly, the sociology of money explores the psychological dimensions - individual and collective - associated with some of the key elements of the monetary system, particularly debt. The differentiation between the general concepts of debt as a key aspect within human relations, and financial debt as an inescapable part of our "*economy of interest*" is of critical importance to understand the moral and ethical dimensions of the IMS. As Dodd concludes "the debt problem today seems especially serious, not simply in scale but in fact that, perhaps for the first time in history, debtors and states, as well as individuals, are facing a financial climate in which the notion of debt forgiveness is absent. [...] A monetary system that is defined by an overarching orientation towards the interests of creditors is inimical to democracy. [...] Debt is no longer facilitating capitalism. It is driving it" (Dodd, 2014, p. 134).

The Sociology of money has greatly contributed to the (re)emergence of an alternative monetary theory that has gained some traction in recent years and deserves a critical look: Modern Monetary Theory (MMT). Following the writings of Alfred Mitchell Innes with his 'Credit Theory of Money' (Mitchell-Innes, 1914) and G.F. Knapp 'State Theory of Money' (Knapp G. F., 1924 [1905]), the credit theories of money were later embraced by J. M. Keynes, H. Minsky, Abba Lerner, and Joseph Schumpeter among other prominent economists. Within heterodox monetary economics, different strands of credit theory and chartalism developed (Arestis & Sawyer, 2008) - circuitists, horizontalists, structuralists and verticalists - ultimately being harmoniously put together by Randall Wray (Wray, 2012). The idea of money as a creature of the state and the theory of tax-driven money suited well the long advocates of a return to debt-free sovereign money creation as a key strategy for governments to regain control of money

issuance. This has been presented as a fundamental step in the reform of the IMS towards better governance, increased accountability, transparency and scrutiny. Also, advocates of sovereign money argue that regaining public control of money will be a significant step in the reduction of economic inequalities and sustainability (Doorman, 2015). This latter argument has even attracted several ecological economists to indirectly support and contribute the development of MMT prescribing "public credit money issued interest-free by the government" as a key monetary policy for a steady state (Farley, et al., 2013). For the purpose of the arguments develop in the next chapters three critical considerations about MMT need to be made:

1) By putting the emphasis on a monetary system anchored by a government-issued currency, MMT perpetuates the concept of a monopolistic single currency system. In doing so, it does not address one of the fundamental design critiques of the IMS identified in chapter 3: single currency *hegemony*. On the contrary, it reinforces it by advocating for the public monopoly of money issuance and dismissing complementary currencies (Nakayama & Kuwata, 2020). As Lietaer and colleagues stress: "Replacing a private monopoly with a public one wouldn't resolve the problem of structural fragility" (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012, p. 130);

2) MMT perpetuates the concept of national territorial currencies, i.e., the notion of one nation, one currency, and aims to reinforce this political and monetary sovereignty by guaranteeing the public reinstatement of monopoly of currency issuance (Nakayama & Kuwata, 2020). This "westphalian model of geography of money" as Benjamin Cohen stated (Cohen, 1998), is somewhat an historical anomaly that emerged in the 19th century and consolidated in the 20th century, particularly after the Bretton Woods agreements and the sharp increase in the number of countries with sovereign Central Banks (Blanc, 2006). As I have argued before and will reinforce in the next chapters, any monopoly of money - public or private - is a critical design flaw if we want a monetary system aligned with sustainability. Moreover, an intrinsic part of the transition process for an Ecological Monetary system, which will be presented in chapter 7, is the de-nationalization of money;

3) Finally, MMT promotes the centralization of monetary power which has been identified and signaled as a key detrimental process within the IMS. In this thesis, par-

ticularly in chapters 6 and 7, the argument for the decentralization of monetary governance as a pre-condition for a more resilient, just and sustainable system will be made and defended.

To the three points highlighted above, Bernard Lietaer and colleagues add that the nationalization of money issuing lacks "political realism" and carries an intrinsic risk with uncertain unintended consequences, due to the necessary scale of implementation that most policymakers and decision-makers will try to avoid (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012, p. 130). All of these factors combine to make MMT, and "MMT-like" proposals such as the "Chicago Plan", not recommended from an ecological standpoint

4.1.1 The emergence of ecological monetary economics

Within Ecological Economics and its research programs since the 1980s, the topic of value, valuation and money has been critical and recurring (Ropke, 2005). Money, and particularly debt, is a commonly referred 'evil' within EE publications and clearly identified as a foundational problem at the heart of an economic system in crisis (Kallis, Kerschner, & Martinez-Alier, 2012). However, the often dispersed ideas and criticisms to the monetary system didn't truly crystalize (Ament, 2019), and it is not until very recently that we can unmistakably refer to a set of coherent proposals for a monetary theory within the field. Unfortunately the lineage of ideas, concepts and monetary hypothesis, that one can trace back to Frederick Soddy in the 1920s occupied only a marginal space in the larger field of EE and bared no theoretical connection with developments in Ecological Macroeconomics or Ecological Value Theory. Arguably the first author to pick up from F. Soddy works, N. Georgescu-Roegen insights and H. Daly criticisms, and focus particularly in money and the monetary system is Richard Douthwaite (Douthwaite, 1996; Douthwaite, 2000; Douthwaite, 2012). Douthwaite made very important contributions, particularly regarding the need of a monetary ecology of diverse complementary systems. As he powerfully summarized it: "Without equitable, locally and regionally controllable monetary alternatives to provide flexibility, the inevitable transition to a lower-energy economy will be extraordinarily painful for

thousands of ordinary communities, and millions of ordinary people. [...] A total reconstruction of our money-issuing and financing systems is therefore a *sine qua non* if we are to escape a human, social and economic disaster" (Douthwaite, 2012, p. 190). After Douthwaite's important contributions, and to my understanding, Bernard Lietaer is the first author to explicitly mention Ecological Economics as the foundational field to attempt an integrated new monetary paradigm (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012). "Money and Sustainability: The Missing Link" together with "The Future of Money" and "Rethinking Money" are unavoidable masterpieces of an emerging new field of ecological monetary economics (Lietaer & Dune, 2013; Lietaer, 2001; Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012). However, it was Joe Ament who academically coined the term Ecological Monetary Theory (EMT), and who presented a proposal for an EMT with which EE finally could claim to have its own monetary autonomy (Ament, 2020). In this section I would like to present some of the key ideas I believe to be essential for an EMT as well as briefly discuss Ament's proposal. A complementary analysis is presented in chapter 6 and an ecological model for monetary plurality proposed in chapter 7.

Ecological Economics prides itself of being a pluralistic, heterodox, transdisciplinary field of knowledge (Constanza, 1989; Gowdy & Erickson, 2005; Ropke, 2005), which makes the process of tracing back its key ideas regarding money a rather complex theoretical "archeology". I followed the bread crumbs of references among key ecological publications one century back and starting from the turn of the 19th century constructed the diagram below - see figure 7 - which I believe honors some of the authors and the relationships that are key for what Richard Douthwaite, Bernard Lietaer and Joe Ament have recently brought regarding the monetary dimension of Ecological Economics. As one can observe in the diagram of figure 7, there is an attempt to establish a progression of ideas since S. Gesell and A. Kitson, till J. Ament and R. Svartzman. This has not been a linear, simple, brick-by-brick process of building a monetary theory. In different moments in time this 'ecological line of monetary ideas' was disturbed, sometimes challenged and often enriched by a mix of different perspectives from different disciplines, which ultimately converge in the 21st century. Although our ecological monetary lineage could well start with Frederick Soddy, whose writings in the 1920s are indisputably landmark contributions, I've chosen to place Silvio Gesell and

Arthur Kitson in the beginning of our 'green line' in figure 7. These two monetary thinkers played an important role in the economic thought of F. Soddy and are frequently referred in the EE literature. While Kitson's vast legacy (Kitson, 1903; Kitson, 1895) was overshadowed by his friend and contemporary author F. Soddy, Gesell's Natural Economic Order (Gesell, 1958) has inspired and influenced many, particularly after its translation to English, including J.M. Keynes. Also many key ideas that form this ecological lineage were already explored - not always explicitly and directly - by these two authors, such as the endogeneity of money, the non-neutrality of monetary systems, the link between monetary design and socio-ecological goals, and the importance of embedding money within the biophysical laws and the sociological context. While some other critical building blocks of an EE approach to money - like monetary plurality and complementarity - only deposit later with R. Douthwaite and B. Lietaer, four out of five defining characteristics of ecological monetary thought are at least one century old. It is also important to note here that Kitson's and Gesell's contemporary authors, such as G. Simmel, Gregory F. Knapp and A. Mitchell-Innes, all share three core ideas, which oppose the Aristotelian-Metallist tradition:

- 1) Money is not a thing but rather a socio-economic phenomenon that transcends whatever medium we use;
- 2) Money is intrinsically endogenous, economically and socially;
- 3) The way money is designed and put in circulation affects us, our economies and our world.

What later came to distinguish an ecological approach to money versus for example a sociological approach to money- the blue line in figure 7 - or Chartalism - yellow and pink line - are: 1) the focus on a monetary ecology of currencies fit for purpose and working synergistically; 2) a value theory grounded in a biophysical, energy paradigm; 3) embedding money within an economic system which is itself embedded within an ecological system.

Another potential critical difference for the development of ecological monetary economics is the connection with deeper developments within ecological macroeconomics. As Romain Svartzman and colleagues conclude: "our argument in this article has not aimed so much at defining *how* the monetary system should be transformed, but rather at providing evidence that such considerations are essential and should be

acknowledged by ecological macroeconomists. Ultimately, it is the nature of endogenous money that needs to be revisited for a new ecological era (Svartzman, Dron, & Espagne, 2019, p. 118).

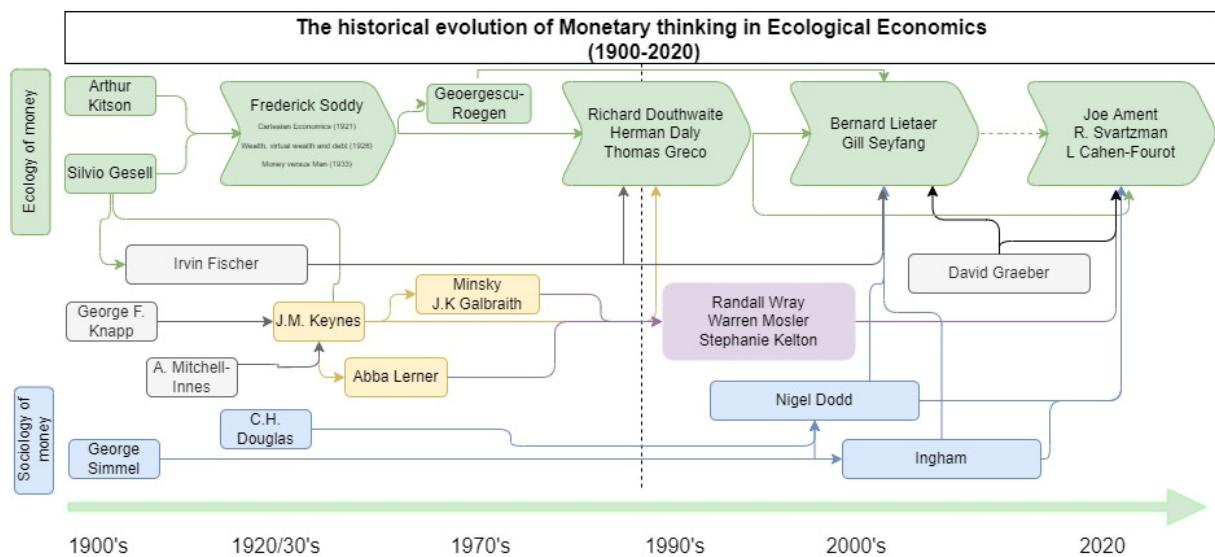


Figure 7 - The Historical Evolution of monetary thinking in Ecological Economics

The green line depicting the evolution of monetary thinking in Ecological Economics has had a recent major milestone following the contributions from Joe Ament (Ament, 2020; Ament, 2019). In 2020, writing in the Journal of Ecological Economics Joe Ament put forth an "Ecological Monetary Theory" (EMT). Ament's EMT draws heavily from the sociology of money and ends up by placing the intrinsic nature of money as a "claim on resources" (Ament, 2020, p. 171). Moreover, by setting the ontological and epistemological grounds of "What is money?", "How does money get its value?", and "How does money get into circulation?", Ament aims to place the foundations of an EMT. Most unfortunately he does not refer to, or build on the works from Richard Douthwaite or Bernard Lietaer. Neither does Ament's EMT bear any connection with EE macroeconomics or with EE value theory. More importantly to the arguments explored in this thesis, Ament's EMT does not explore in any significant way the core pillar of a monetary ecosystem of currencies. These important limitations to Ament's EMT weaken its viability as a competing monetary theory and do not answer the calls for a new monetary paradigm with planet and people at its core. Ament's EMT is further discussed in Chapter 6 while a potential contribution to the development of an ecological model for monetary plurality is presented in chapter 7.

4.2 Complementary monetary practices

Although there are well documented evidences of the use of different complementary monetary systems throughout the world, for millenia (Graeber, 2011; Maurer, 2006), in this chapter I will focus on the use of complementary currencies in the last 40 years, following their re-emergence in the 1980's with the LETS in Canada (Blanc, 2011). In this four decades, and particularly after the 2009 GFC there has been a sharp rise in the number of local currencies, Time banks, LETS, regional currencies, crypto currencies, commercial reward systems, tokens, among many other examples of a field bursting with innovation and experimentation (Battilossi, Cassis, & Yago, 2020; Howarth, 2022; Seyfang & Longhurst, *Growing green money? Mapping community currencies for sustainable development*, 2013). Although there are some partial databases of CC's - such as the Complementary Currency Resource Center - and a few country-specific inventories - such as the cases of Spain and France as I will showcase in section 4.4. - the current number of CC experiments is extremely hard to accurately calculate (Fare & Ahmed, 2018). G. Seyfang and N. Longhurst claimed to have found 3,418 local projects in their mapping of CC's (Seyfang & Longhurst, 2013), while some more recent estimations point to well over 20,000 cases of complementary currencies in circulation today, particularly given the developments in digital and crypto currencies (Howarth, 2022). The growing number, diversity and complexity of CC's makes it a very difficult task to classify, systematize and learn from all of these experiments. In an attempt to gather insights and new perspectives from a multitude of CC case studies with a broad theoretical openness, I turned to the International Journal of Community Currency Research as the richest and more transdisciplinary source of CC research.

4.2.1 IJCCR Literature review

The following section is a direct transcript from a research paper published in the International Journal of Community Currency Research in 2018. The core purpose of this extensive literature review was to immerse myself in the field of complementary and alternative currencies. The IJCCR was an obvious choice due to its transdisciplinarity, academic freedom and volume of research.

IJCCR Publications – a literature review 2009-2016

Filipe Moreira Alves and Rui Ferreira Santos*

* Center for Environmental and Sustainability Research, NOVA School of Sciences and Technology – NOVA University Lisbon (CENSE – FCT-UNL). Email: fmalves@fc.ul.pt

Abstract

This paper aims at a literature review of all scientific articles published in the International Journal of Community Currencies since 2009 in order to identify research patterns and research gaps in the literature. It complements the work done by Schroeder (2011) and Seyfang (2013), among many others, who have focused on characterizing the literature and practice in this field of research. A universe of 78 articles retrieved from IJCCR website in November 2016 are statistically analyzed, taking into consideration their structure, methodology and key conclusions as well as research gaps and future research needed in the field of complementary currencies.

Although a strong heterogeneity can be found in the number of publications per year as well in the sample characterization, both in format and content, our analysis enables clear patterns of the IJCCR in the past eight years to emerge and research gaps to be identified, specifically the need for longer, more in-depth, comparable and methodologically coherent socio-economic impact assessment of CC experiments; more and better knowledge regarding optimal scale and design optimization; deeper recognition and understanding of socio-psychological factors influencing CC implementation and success; sustainable governance options and impacts; and finally, more research done into multiple currency interfaces and exchange mechanisms between complementary currencies. These gaps and research needs are presented and may serve as potential guidelines for future publications within the Journal as well as the establishment of more refined research agenda for IJCCR that serve the evolution of scientific knowledge in this growing field.

Keywords: IJCCR Literature review; research gaps in complementary currency literature; trends and biases in the IJCCR publications

1. Introduction

This paper aims to honor and better understand the field of complementary currencies through investigating a period of eight years of papers published in the International Journal of Community Currency Research (IJCCR). Not only past research was analyzed, but also the published authors, their backgrounds, and what they see as future needs, steps, opportunities and challenges. It presents a holistic perspective into IJCCR knowledge creation and dissemination in the post-recession period, by diving deep into the microcosm of each individual publication and author. While not covering the entire range of publications of the Journal – the IJCCR has been publishing since 1998 – we have considered 2009 a cut-off point for our analysis, not only for its symbolic meaning but taking into consideration the structure and distribution of publications prior to and after the great financial recession of that year, namely the fact that it is after 2010 that the IJCCR published its first and second Special Issues and co-supported the first three international conferences dedicated to complementary currency research.

This literature review aims at complementing and enriching the existing and on-going systematization, mapping and understanding of complementary currency (CC) research worldwide while opening up the possibility of a future integral management of this field of research that would allow other researchers to more easily tap into existing publications and complement, compare or further analyze international CC research. By no means this literature review presents an overall state-of-the-art of CC research worldwide or aims at a global picture of CC research in the past decade, as we do not consider our sample within the IJCCR publications fully representative of CC research. Nevertheless, being the IJCCR one of the reference journals within this field and the period considered the most prolific in terms of scientific publications we believe this work to be an important contribution to our common understanding of CC developments and CC research.

Section 2 below discusses the methodology used, while in section 3 the results from the analysis are briefly presented before section 4 presents a proposal for a IJCCR research agenda beyond 2018 based on our findings.

2. Methodology

This paper is based on a literature review of a universe of 78 articles published in the International Journal of Community Currency Research (IJCCR) in the period 2009-2016 corresponding to Volumes 13 to 20 of the Journal. For matters of coherence in the analysis, book reviews as well as editorial and introductory notes were not included in our sample.

Our analysis considered four separate components: structure; methods; conclusions; and research gaps. Each component contained a set of variables that were registered and coded. Regarding structure, we considered the following variables: name, gender, nationality, affiliation and academic background of main author; name and number of co-authors; number of pages, references and IJCCR references per article; key author referenced. Regarding methods our variables were: nature of the research – theoretical, empirical, both or none; research methods used; macro or microeconomic modelling used (Y/N, which model); time of the analysis – prospective, retrospective, none or both; number, scale, name, country and type of complementary currency in the case study; impact assessment; and finally, the use of new methods of research. Considering the conclusions, we retrieved the main considerations made in the end of each article highlighting common visions as well as dissonant opinions. Finally, and concerning research gaps, we've clustered them into four separated areas that emerged from our analysis and that inform the final section of this paper where a research agenda for IJCCR for the period beyond 2018 is proposed.

All data was retrieved from the consultation of each paper downloaded directly from the IJCCR website and analyzed using Excel spreadsheet and Excel statistical functions. The database will be made available after publication of this article for researchers willing to follow-up and complement our work.

3. Results

In this section, we present key results for the above-mentioned components of our analysis, starting with more quantitative analysis regarding 'Structure' and 'Methods' and moving after to a more qualitative analysis concerning the main conclusions retrieved and summarized and research gaps identified. The discussion of these results feeds directly in to our later section where an IJCCR research agenda beyond 2018 is attempted. All data refers to the period 2009-2016 unless clearly stated otherwise.

3.1 Structure

Between 2009 and 2016, a total of 78 scientific papers were published in the IJCCR. In this eight-year period the average number of publications per year is ten articles. However, and as can be seen in figure 1 below, yearly rates vary significantly from the average, showing the impact of IJCCR supported and co-organized conferences (2011, 2015 and 2015) and Special Issues (2011, 2012). With 23 publications 2011 is the most 'productive' year of the IJCCR representing 30% of all publications, while 2014 is the least productive with only two scientific peer-reviewed articles.

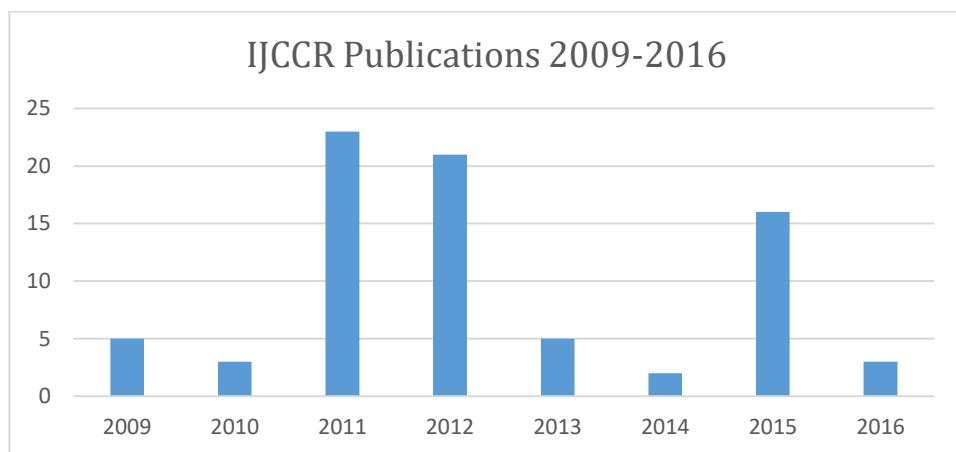


Figure 7 - Total number of articles published by IJCCR per year from 2009 to 2016

Regarding the composition of authorship, and although the author with most published paper is Dr. Irene Sotiropoulou (three published papers), the IJCCR is not a gender balanced Journal, even when the gender of the main author is considered – 62,8% men and 37,2% women. Findings also show that most authors prefer to publish alone (70,5%) while only a minority (15,4%) co-authored with more than one other researcher, making Fesenfeld *et al* (2015) with six authors a clear outlier. No explanatory variable was found statistically relevant for this trend towards single authorship.

Regarding the nationality of main authors, half are Europeans (52.6%) and the top 4 countries – USA, Germany, UK and Japan – together represent 52.6% of all publications. Africa is the least represented continent (one author only, from South Africa), and some countries recognized by their vibrant complementary currency tradition are underrepresented, such as in the case of Brazil (only one author, Freire 2009). This unbalanced distribution of authorship regarding nationality can also be found in the case studies presented and discussed in the articles of our universe, where a large majority of projects under regular research are in Germany, UK and the USA.

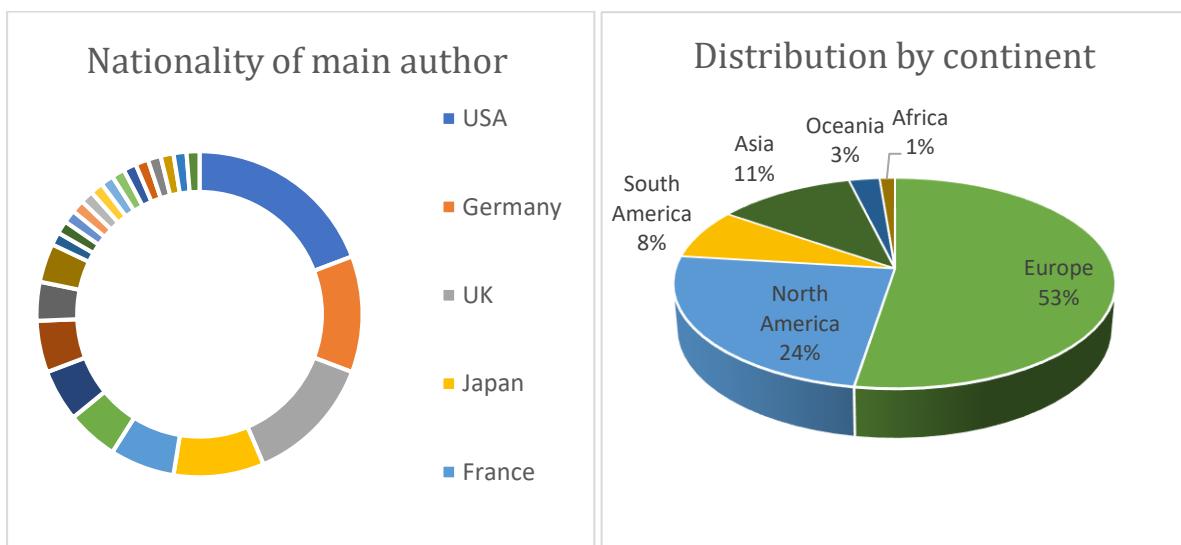


Figure 8 - Nationality of main author (per country and continent)

Regarding the academic background of the first author, 35,8% are from the discipline of Economics while only 11,5% are from Business Administration and Management, 7,7% from Sociology, 2,6% from Law and 1,3% from Finance. The remaining 41% that we have considered as “Others” either represent other disciplines such as Engineering, Philosophy or Forestry, or mixed backgrounds that were difficult to trace back and/or cluster into a single discipline. Of note is also that a clear majority of first authors reported their affiliation to a University (67,9%) followed by NG0s and Cooperatives (16,7%) and Research Centres (5,1%). Other organisations and institutional bodies such as central banks and private companies have only a minimal presence, while authors primarily affiliated with commercial banks, municipalities and other government institutions have not yet published in this Journal during the period investigated here. Two authors are present as ‘Independent researcher’.

Regarding the format of the examined articles, they have on average 10,6 pages – including bibliography (Average deviation (AVGDEV) 3,32), 28,8 references, including references to grey literature and webpages in accordance with the practice of the journal (AVGDEV 16,63), and two references per article to IJCCR publications (AVGDEV 2,14). As can be seen in the average deviation, the numbers of references per article vary significantly. Important to note that the percentage of IJCCR references per publication also increased during the period, especially after 2013, with an average of 14% in 2013-2016 compared to 4,7% between 2009 and 2012. The most referenced author is by far and for the entire period Gill Seyfang from the University of East Anglia, followed by re-knowned authors Bernard Lietaer and Peter North. Other common referenced authors include names such as Thomas Greco, Silvio Gesell and Karl Polanyi.

3.2 Methods

Concerning the methods used to research complementary currencies in the given period, most analyses are based on empirical data and case studies rather than theoretical explorations, which represent only 23% of the sample (see figure 3 below). Therefore, it is not surprising that 84% of all publications have a retrospective temporal dimension while only 19% have both past and future and 5% are extemporal in their analysis ('None'). These findings are consistent with the research methodologies used: 51,3% of all authors support their research primarily with secondary data, specifically literature reviews and analyses of meeting minutes; 16,7% use 'Mixed methods' approaches; 9% supported their findings in questionnaires; and finally, 7,7% are participant or non-participant observations. The explicit use of Participatory Action-Research (PAR) methodologies is rarely mentioned.

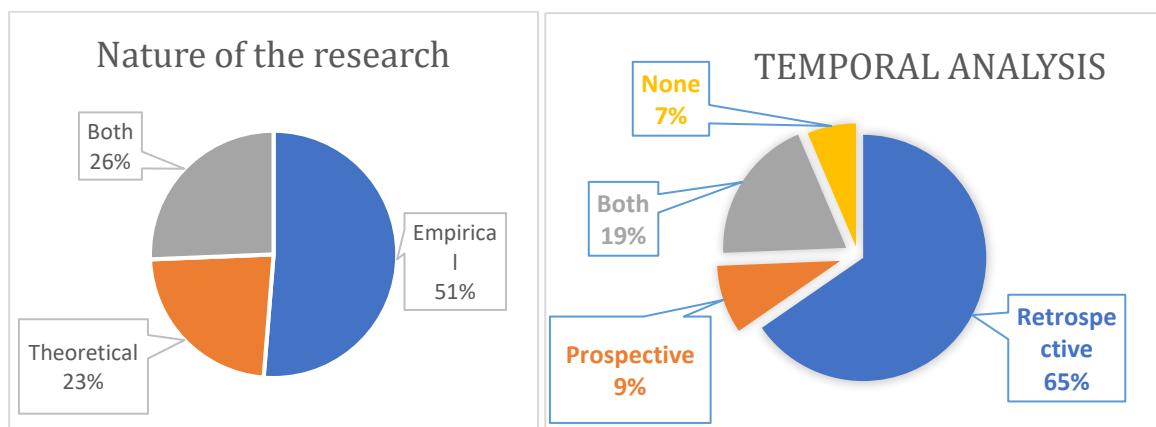


Figure 9 - Nature of the research (theoretical, empirical or both) and temporal analysis

Still regarding research methods, 95% of the publications do not use econometric models or any kind of macro, micro or monetary economic modelling for the analysis. In those that use economic modelling, 75% are prospective with a single regional case study.

Regarding case studies, 81.4% of the total sample discusses one or more case studies, with almost half (49.2%) having a single case study as the basis for research – see figure 4 below. From the case studies and projects researched, 37% are either local or regional in scale, 25% and 12% respectively, while 28% of all publications contain a nation-wide analysis and 16% include cases from several countries or even with a global scale, such as Bitcoin. Nevertheless, most cases presented and discussed are based in just 6 countries - USA, Germany, Japan, UK, Greece and France – with the Chiemgauer, the SOL and the UK transition currencies (Bristol Pound, Brixton Pound and Stroud Pound) as the most researched experiments.

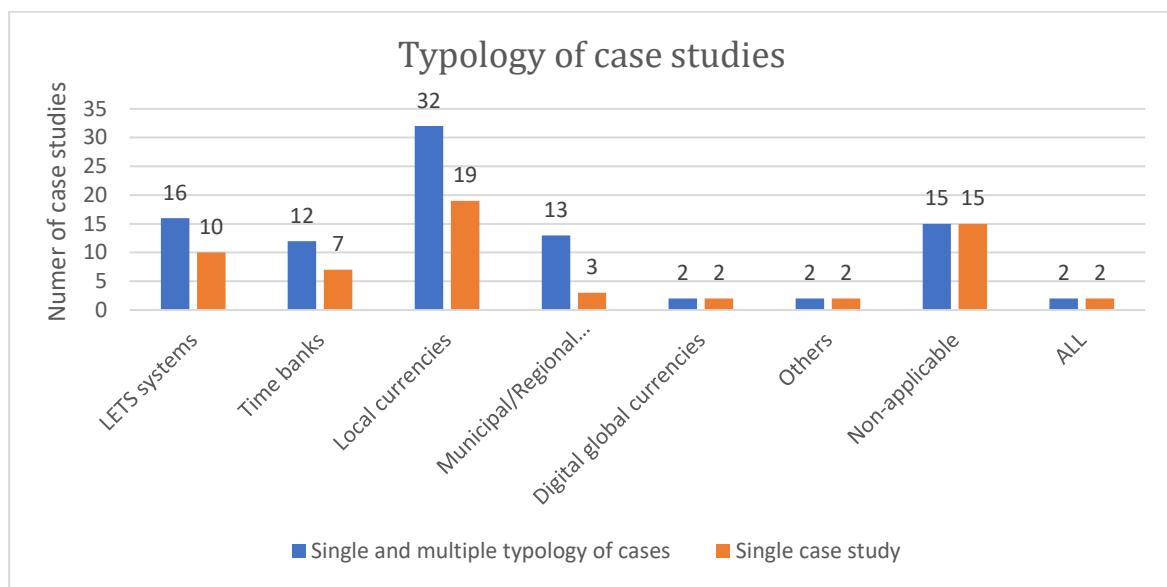


Figure 10 - Typology of case studies researched

Using the typology of complementary currencies proposed by Jérôme Blanc (2011), with a minor change, we clustered all publications in 6 different typologies: G1 – LETS and other Mutual Credit Systems; G2 – Time-banks and time-credit systems; G3 – Local and community currencies; G4 – Regional currencies; G5 – Digital global currencies; G6 – Others. Figure 4 above illustrates this and shows a clear trend towards local and community currencies as well as LETS and Time Banks. We've found only two articles that focus on Bitcoin as the world's most famous digital global currency and also two articles which have taken into consideration all typologies (G1-G5) in their research.

Finally, 35% of the articles analyzed included some level of impact assessment of the complementary currency in economic, environmental and/or social variables. In most cases a partial analysis using basic data is available while only a minority – less than 5% - includes a thorough, exhaustive and mid to long impact assessment (more than one year of systematic data collection and analysis). Due to the variety of methodologies, indicators, proxies and the mixed temporal window used in the impact assessments, a comparative analysis between assessments or even a compound macro simulation would prove hard to accomplish.

3.3. Main conclusions across published papers

“The development of community currencies has reached a crucial stage: it has become evident that the attempts of small groups of social activists to overcome the scarcity of money are not sufficient to create alternatives. It will also be necessary to enter a political struggle and campaign for appropriate framework in which economically viable community currencies can prosper” (Schroeder, 2011).

If there is a main conclusion we've taken out of all these papers own conclusions is that complementary currencies are not the magic solution that will solve all our economic challenges, let alone the wider societal and ecological problems. The potential for societal transformation through re-designing and reconfiguring economic exchange and interaction is there and it's widely recognized by the IJCCR authors as well as the potential for CC's to be *“strategic targets for evolutionist institutional design in order to solve current social and economic problems caused by global capitalism”* (Nishibe, 2012). However, experiences in co-designing, implementing, managing, financing and sustaining an impactful CC initiative face multiple challenges and require much more than just good intentions and some know-how. And this is particularly evident in the case of 'social currencies' in which key objectives involve the reduction of income inequalities, fighting long-term unemployment, integrate vulnerable populations, value non-monetized economic activities, fight gender discrimination, among others. As Ricardo Orzi points out: *“History gives us evidence of the low sustainability of social complementary currencies within the capitalist market system. (..) Designing a social currency to promote a 'new economy' requires thinking of it as one element in a transition and within a transitional configuration which may evolve in different ways into a future 'new economy'.”*, (Orzi, 2015). While most authors with concrete cases studies recognize the limited economic impact of CC's, only a small fraction points out processes of gentrification, exclusion and the mimicking of old monetary patterns of control, hierarchy and non-transparent management set within CC's. Scott Cato words still stand mostly unquestioned and un-responded: *“Perhaps the most telling criticism is that it is not a serious economic endeavour at all, but rather a game for middle-class activists who have other sources of livelihood.”* (Scott, 2012).

Nevertheless, the movement is growing and although many authors find it impossible to measure with accuracy the number, diversity and scale of CC's around the world,

research shows that every year more and more experiments and CC initiatives are reported worldwide - see for example Neil Hughes for the case of Spain (Hughes, 2015). As the number and scale of CC's around the world grows more and more, concerns are being raised that demand clear and timely answers. As Lizzote mentions in 2011 "*This [CC use] raises the legal question of where does the civil right of exchanging informally become tax evasion*". And she is not alone as several authors question the appropriate scale and function of complementary currencies within the current economic system, question its relationship with legal tender and the role of Central Banks and finally question existing power relationships through debt and investment that CC's could shake with unknown consequences. Christopher Place, for example, questions the impact of an intervention, even if well intentioned by the Central Bank: "*Nevertheless, as community currency innovation and circulation stability totally depends on a democratic management system, would the possible control from the Central Bank of Brazil finally destroy this creativity through homogenisation and standardization?*" (Place, 2011). Marc Brakken suggest that "*complementary currencies be treated as complementary and either established as non-competitive with dominant currency structures or seek to be competitive in different modes by redefining sets of relationships. (..) The national currency is better optimized for the economic context within which it operates. It helped define that context. Changing only the scale of exchange is insufficient.*" (Brakken, 2012). Others claim for CC's to drop the complementarity and assume the alternative in a process of amending the economic and sociological concept of money, itself an agenda to 're-programme money' and re-define its symbolism (Thiel, 2012). The middle stand is the one that defends monetary diversity connected with stability, resilience and sustainability where multiple currencies co-exist and intertwine with each other across different functions, stakeholders and scales. However, the sample here researched did not offer any clear insights into what monetary plurality means regarding the optimal number of currencies, the exchange mechanisms between multiple currencies across scales, the competing consequences of monetary pluralism, limits and costs for complex monetary systems, among many other inquiries. We may argue that the CC field is not mature enough, scientifically speaking, or articulated enough to endure such intellectual and practical challenges but reality is catching up very fast in many CC projects and this particular set of questions will be pressing on the agenda of practitioners and researchers in the near future. For the time being and considering research patterns in this sample we've found a

growing interest in appropriate design of CC's and in understanding the concrete impacts of different design choices in the success of complementary currency projects. Some design elements of CC's are presented and discussed, such as the impact of demurrage in the velocity of circulation for example, but in most cases the results are inconclusive, confusing or even counter intuitive as in the case of Hugo Goldschalk: *“Demurrage probably does not matter if the usage, turnover and velocity are the benchmarks; The main driver behind higher level of circulation of CC is probably Gresham's law: Bad money drives out good money.”* (Goldschalk, 2012). Damjan Pfajfar paper, also in 2012, defies some beliefs and perhaps naïve views when stating: *“We have, first, found that measures of monetary stability (such as inflation, money growth and inflation volatility) are negatively related to the likelihood of ACC adoption. Second, we have found that measures of financial sector development (such as domestic credit, number of bank branches and non-performing loans) are positively related to ACC's. Our final key finding is that overall developments of economic development (GDP per head and GDP volatility) are positively related to ACC's. This suggests, contrary to what one may have expected, that alternative currencies do not act as a substitute for fiat money.”* (Pfajfar, 2012). These counter intuitive conclusions, found in the IJCCR post-recession literature regarding the design of complementary currencies, represent, for us, a call for a new phase in CC research focused more on understanding complex economic exchange systems, their design and its socio-economic impacts and finally complementary currency acceptance and use in different cultural contexts. As highlighted by several authors CC success in the end is a matter of identity positioning, community acceptance, regular reciprocal use and socio-economic concrete, visible and recognizable impact. If a complementary currency is not useful for the community it won't last; if it's not trusted, it won't last; and if its badly designed in its key assumptions it won't last as well. Hélène Joachin and co-authors summarize: *“Firstly, designers of the project have to decide about the manner to motivate people to get on-board (motivation to participate), then design the functioning of the system accordingly (operations) and then choose the parameters for the currency itself (currency)”* (Joachin et al, 2012). All those choices are interrelated and create mutual dependencies. For some authors, the response for these multiple, complex and uncertain challenges is 'Democratic Money' or participatory currency governance, i.e., re-embedding currency decision-making processes in community life. Once again, the path might be inviting and logic but the road not so easy to drive in, as Shira Jones points out: *“Currency stakeholder,*

including external regulators, internal decision-makers and currency users, are affected by currency governance, but there exists no clear model for what shared decision-making among all stakeholders might look like.” (Jones, 2011). Still and as Shira Jones also concludes in another paper, some governance principles for sustainable currency governance can be extracted from the existing literature: “*consistent regulatory framework treatment, transparency, accountability and participation as applied to all stakeholders who are affected by monetary functionality*” (Jones, 2011). To these, Skylar Brooks adds social and environmental principles stating that “*monetary systems do affect the natural environment. They do so by promoting economic activities that have real, often deleterious, environmental consequences. (..) Regardless of how monetary systems are governed, they can be governed according to social and environmental, rather than strictly economic, principles. As such, monetary governance arrangements can be designed to promote environmental behaviour.*” (Brooks, 2015).

Returning to the beginning of these section and based on the conclusory remarks from our universe of articles, we might add that the stakes are high for CC’s practice and research into the future. The necessary dive into the complexity of monetary systems in diverse and changing socio-economic and cultural contexts with multiple risks, scales and iterative interactions will require new methods for economic analysis, more in-depth research, more transdisciplinary approaches, more diverse case studies, better comparability between cases and more articulation between researchers, between researchers and practitioners and also with policy makers and decision makers at all levels.

3.4 Research gaps

Contrary to what could be expected in scientific articles specifically in new or under researched fields, 60% of the publications in our universe did not explicitly call for more empirical tests, experiments or trials, and almost half (48%) did not call for more or deeper research. While the reasons for this are beyond the scope of this paper, no explanatory variable was found within our set of data collected. Nevertheless, from the 52% that did mention the need for more research and clearly stated the research gap and/or a future research agenda, four clusters can be identified: Impact assessment; appropriate design; sustainable governance; and better and wider data across scale, stakeholders and economic sectors.

Concerning the impact assessment gap, several authors make the call not only for better and more consistent methods, indicators and proxies, but also for longer periods of analysis across multiple scales, and for cross-checking with other socio-demographic and economic data from the region or country of implementation. The effectiveness and real economic impact of CCs is regularly questioned in the sample both from a micro and macroeconomic perspective. A recent paper from Place and Bindewald (2015) aims at filling this gap by proposing a coherent methodology – The Theory of Change supported by the Impact Assessment Matrix - for the impact assessment of CCs. Less present in the literature analysed are calls for more impact assessment of CCs in official money markets and the wider monetary system. However, there is a clear trend for this topic to become more central as CC experiments grow in number, users and scale. A tipping point is the growing number of municipalities issuing their own CC, which will potentially attract the attention of Central Banks and other institutional bodies in the near future.

This brings us to another research gap present in the sample, which is the need for more cross-sectorial, multi-disciplinary, multi-scale data analysis and stakeholder engagement. Many authors identify the need for wider data collection and analysis – temporal, geographical, socio-demographic and economic – that can be compiled, compared and made useful in improving the design of CCs and the complementarity between existing currencies. Following that, a need to research deeper and wider into exchange hubs for multiple currencies as these have become important nodes of confluence and meeting points with new and complex challenges is also identified in the sample. We may conclude that more than single case-study short-lived empirical research – which as we have seen represents half our sample - there is a concrete aspiration for longer timescales, better indicators, more comparable data and integrating monetary complexity.

Regarding the cluster ‘appropriate design’, there is a wide variety of research needs that concern the fit between purpose, functionality, financing, scale and design elements of each CC and its sustainability, resilience and effectiveness. Several authors ask for more research into the appropriate design of each typology of CC according to its objective and context, among other important elements. More recent papers have

started to systematically analyse certain CC features, for example CC financing options discussed by Schroeder (2015) or the factors influencing the velocity of circulation by De la Rosa and Stodder (2015), but the need for more research into the fundamental issues of appropriate design of CC it is still widely recognised.

Finally, a cluster that is not widespread but rather characteristic of a small number of authors who recurrently bring the subject up is the issue of CC governance. Not only the question of how different models of governance impact the effectiveness and viability of a CC, but also how to measure its sustainability, coherence with the objectives and the most appropriate model of governance for each specific socio-political context. Once again, the research gap here is across scales, from the micro scale of CC governance at the community level, to the meso scale of regional currencies and international exchange hubs of multiple currencies, to the wider macro scale of the capitalist economic system and the governance of monetary systems.

Although many other research gaps are identified, for example regarding the cultural and symbolic impact of CC experiments, the psychological and sociological factors that affect and condition CC acceptance and success or the effectiveness of CC literacy investments, we believe that the above-mentioned clusters represent the critical mass of important topics to feed into future research agendas in the IJCCR.

IJCCR beyond 2018: filling in the gaps and correcting the biases?

In this paper we have mostly looked into the past and therefore we would like to conclude with a note into possible futures. The International Journal of Community Currency Research aims to "*provide a common forum for informed articulation and debate of empirical, critical and theoretical research on community currencies.*" bridging the gap between currency 'activists' and 'academics' and making CC research freely accessible to all. Although a clearer research agenda can only be found in the specific call for papers in IJCCR co-organized international conferences, we argue that in face of the results presented and the long track of IJCCR in the past decades, a new research agenda beyond 2018 might prove to be useful and successful in directing academics and practitioners not only to fill the research gaps and correct some of the biases identified but mainly to invite new research that effectively complements existing knowledge and pushes our understanding of complementary currencies into new

realms. This explicit and intentional research agenda would actively promote co-authorship and more collaboration within the field, invite new authors from under-represented geographies or realities, embrace and strengthen new research methodologies, encourage multi-case study and longer-term research as well as promote the use of more economic and monetary modelling. On the other hand, this new research strategy should highlight hot topics within CC research, the key research questions alive in the field as well as theoretical hypothesis unattended and research gaps to be filled. Some of these have been mentioned in this paper as a result of our analysis, specifically the four clusters identified regarding research gaps that we believe that should be prioritized: i) Appropriate design of CC; ii) interexchange mechanisms and platforms in multiple currency systems; iii) Monetary governance; iv) impact assessment metrics and frameworks. We acknowledge the fact that scientific articulation, coordination and cooperation is not a simple task and the balance between scientific articulation and scientific freedom is a fine thread to walk in. Nevertheless, we hope that some of the questions, clusters and patterns identified in this paper serve as an invitation for the scientific community working in this field to consciously (re)consider and (re)prioritize co-developing a common research agenda beyond 2018.

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4.2.2 An update

Since the publication of this review article in 2018, which covers the period from 2009 to 2016, the IJCCR has published 70 new articles, divided in five volumes (winter and summer editions) that cover most of the academic work presented and discussed at the RAMICS Biennal conferences - the last one took place in 2019 in Japan: <https://ramics.org/5th-cccs-conference-hida-takayama-2019/>. Connecting these new articles with the research gaps identified in 2017, it is possible to affirm that there has been a consistent flow of new inputs regarding 1) the impact of a currency in its ecosystems (at least 10% of new articles refer to some sort of impact measurement) and 2) in terms of currency design. However, regarding sustainable monetary governance and the need to deeper, longer, richer solid studies I've found little direct contributions to this research gap identified in 2017.

More recently another landmark contribution to the study of CC alternatives was the publication of the "Handbook of the History of Money and Currency" (Battilossi, Cassis, & Yago, 2020).

4.3 Insights from Permaculture and Biomimicry

Being a trained Permaculture designer, it was only natural that in my attempts to bridge monetary economics and ecology, I would try to bring nature's principles and metaphors to think about the architecture and the flows of our monetary system. Money, viewed as the water streams that run (or not) within our economic system, or the blood in our economic metabolism are well-known metaphors superficially used by many authors that I'd tried to unfold or at least dig a bit deeper. Unfortunately Bill Mollison's masterpiece on Permaculture does not provide much insights, clues or content on the topic, beyond some scattered metaphors and loose criticisms to the financial system in the last chapters (Mollison, 1990). Moreover, most developments within Permaculture in the last three decades have been mostly focused on the ethics of earth care and people care, leaving the ethic of fair share and the economics of 'spaceship earth' often for last and lacking proper scientific investigation. Even key authors within the Permaculture international community who have dedicated a fair

amount of effort to economics and money - like Mark Boyle's 'Moneyless Manifesto' and Charles Eisenstein 'Sacred Economics' - have set most of their focus envisioning a radically different economic system based on revitalizing a culture of gift exchange and other non-monetary reciprocal systems, rather than the re-design of money according to inspiration from nature (Boyle, 2012; Eisenstein, 2011). C. Eisenstein critiques the current financial system intrinsic unfairness and inequality - particularly regarding interest - but does not explore the money-sustainability nexus in depthness and provides superficial answers on the question: "Is it possible to treat money as a commons in the same way as the land or the atmosphere? Is it possible to reverse the mechanism of interest, which, like the expropriation of the commons, allows those who own it to profit by its mere ownership?" (Eisenstein, 2011, p. 201). Although it is common to find lively debates, even some articles - see for example (Válek & Jašíková, 2013) - and plenty of experimentation of community currencies within Permaculture projects and circles, the field is yet to develop a mature understanding of money and monetary systems based on Permaculture's 12 principles.

It was ultimately within Biomimicry that I found more inspiring and concrete proposals for monetary and financial re-design. Janine's Benyus work (Benyus, 2002) has been critical in promoting a new wave of nature-based and nature inspired designs across different fields, namely in finance and money. In 2012 Benyus organization Biomimicry 3.8 united with Hazel Henderson - founder and President of Ethical Markets - to collect signatures on their joint 2012 "Statement on Transforming Finance based on Ethics and Life's Principles". As they point out: "[..] we acknowledge that our commitment to transforming finance, its models and selection processes can lead to re-design of money, banking, finance, investments, patents, legal and governance systems. This will require reintegration of human knowledge, mentoring by Nature's genius, and whole systems-thinking, operationalized through whole human beings integrating mind, heart, body and wisdom based on evolving higher levels of consciousness". Following in their footsteps and nature-inspired life's principles, Jamie Brown-Hansen proposes a monetary system based on a credit commons with LETS, Time banks and B2B exchange currencies at its heart, mediated through a sustainable cryptocurrency based on Ripple. As J. Brown-Hansen powerfully summarizes: "We have the same misconception about monetary circulation in the body of the economy. We tend to think of banks as the power, the engines of money, but they're not. Money's

circulation is powered by our acceptance of it in the payment of goods and services, and this is a distributed phenomenon throughout the network of veins and arteries of the economy. A monetary system collapses not when banks collapse, but when people stop accepting the money. We are the pump. The buck starts here." (Brown-Hansen, 2015). Her proposal will be integrated and further developed in chapters 6 and 7.

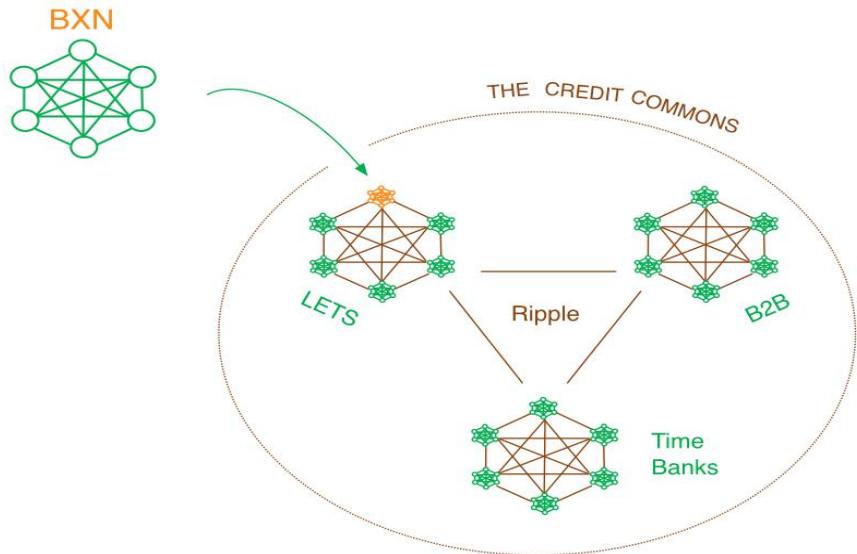


Figure 8 - Jamie Brown-Hansen Credit Commons proposal (Brown-Hansen, 2015)

Within this investigation of nature-inspired design I attended the NBDF course. The following sub-section is a short course report of my main findings.

4.3.1 Nature-Based Design Frameworks - course report

The Nature-Based Design Frameworks (NBDF) was a 5-day intensive course that took place in the Jardim Botânico de Lisboa from the 14th to the 18th of May and was organized and held by Dr. Gil Penha-Lopes and Hugo Oliveira from the Faculty of Sciences of the University of Lisbon. This was the 3rd Edition of the course which runs on an annual basis since 2016.

I attended the course following the suggestion given by the Thesis Mentoring Committee - Comissão de Acompanhamento de Tese in Portuguese (CAT) - to further explore nature-based and biomimicry inspirations to the re-design of the monetary system as well as deepen my understandings of an Ecological design of the Monetary, Banking and Financial system. Another reason to attend the course was the strong

practical and applied structure of it which allowed me to propose and work on a specific 'challenge'. Although the initial challenge was a 'nature-based monetary system' for many different reasons the final challenge we've worked on was: 'Nature-based local currency for Vale dos Barris'.

The key insights for my PhD thesis and work from the course took place mostly in the 'challenge phase' of the course and can be clustered into two separate – but interconnected – dimensions: Process and Content.

- Process: diverse, participatory and with a touch of randomness/emergence. These were the key qualities of the different NBDF that have impacted and inspired me the most during this week following their application in the challenge and the outcomes it generates during the design process. The diversity of methods, approaches, principles and perspectives allows and enables spaces for creativity, surprise, critical thinking and no single-story / single-solution / lock-in pathways which can be tremendously transformational. NBDF inspire iterative processes of constant renewal and re-organization aiming at greater system resilience rather than efficiency. Regarding the design process it reminded me that no true "sustainable currency" can ever be designed from the outside-in of a certain socio-economic ecosystem, neither can it be imposed or enforced from the top-down if it is to serve the community and function as a healthy enabler of economic exchange. It allowed me also to better understand how important common ownership is and the role it plays in the trust and acceptance of a new currency within a monetary system as well as the crucial factor that any voluntary new currency has to be well rooted in the needs and aspirations of the community where it circulates. If it serves no real function (recognized and made visible) for the socio-economic ecosystem, it's not needed, and it will disappear/perish. Also important to mention that the course focused on Nature-Based design Frameworks – such as Biophilia, Biomimicry, Permaculture, Regenerative Design – so the focus was mostly on design processes and principles-based making any design unique and non-replicable;
- Content: during the challenge phase several insights regarding a "Nature-Based Local Currency" came to the team, typically revolving around the use of natural

elements in the currency itself and its design; the importance of grounding the currency function and values in local symbolism/traditions/stories; the importance of having the currency as a living adaptable organism with embedded feedback mechanisms; the idea of a biodegradable currency which would act as a natural entropic demurrage system; the concept of establishing a parity between the currency value and the ecosystem health and/or the social community health; the idea that any nature based currency must be local, not speculative, rooted into biochemical systems. Several metaphors and parallels were also tried out, namely with what is widely called 'life's currency': ATP. However, this later path proved to be a highly technical and complex parallel to easily engaged with in such an exercise. Moreover, I personally felt that there is a big difference from applying Biomimicry to Architecture and Engineering or to apply it to social systems such as Economics and Politics. In this respect I came to the conclusion that not only we should take inspiration directly from nature's design patterns and principles and do our best to translate and adapt it but also dig deep into anthropological economic research which can offer humankind interpretation and implementation of nature's patterns throughout time and space.

Future developments

The academic and scientific gap between these two fields – biomimicry and other Nature-based design frameworks and Monetary Economics – is still wide and deep and the literature is remarkably scarce and superficial. As bridging this gap is not (presently) the objective of my work and research, I will invest limited time in dwelling further on besides already scheduled meeting with Jamie Brown-Hansen which is one of the leading (and only) active researchers in the Monetary Biomimicry field, based in Switzerland. Nevertheless, the principles of NBDF will certainly influence any future monetary design process I will be engaged with and perhaps further conclusions might only arise through the participatory work at the local scale.

4.4 Insights from selected case studies and field visits

The action-research field work that took place essentially in 2017 and 2018 had two objectives: firstly to better understand different currency designs and their socio-

ecological impact; and secondly, to study the processes and arrangements leading to different configurations of monetary complementarity and plurality in practice. In order to do so two main methodologies were used: semi-structured interviews and field visits. From these in-depth analysis of real cases I have extracted important insights that were critical in developing the concepts, ideas and possibilities presented in chapters 5, 6 and 7. In this section I will highlight the specific insights taken from each of the eight case studies.

Gramà

The Gramà is the Municipal currency of Santa Coloma de Gramenet, in the northeast end of Barcelona, Spain. In legal terms it is a local payment system, officially managed by the Municipality to improve the autonomy, sustainability and resilience of the local economy. This initiative was launched in July 2016, after the Council's approval of the "Reglament del Circuit de Comerç Social de Santa Coloma de Gramenet" (Ayuntamiento de Santa Coloma de Gramenet, 2016). The Gramà is still in circulation and continues to grow annually in terms of numbers of users, volume of transactions and social impact. Recently the team responsible for the currency published its 2021 numbers:



Figure 9 - The evolution of the numbers of users and volume of transactions of the Gramà between 2016 and 2021
(Ayuntamiento Santa Coloma de Gramenet, 2022)

I met with Lluis Muns from the Municipality and Andreu Honzawa - currency developer - in 2017 during the Ramics Biennal Conference in Barcelona where the currency was publicly presented. After that I had the opportunity to visit them in Santa Coloma de Gramenet in 2018 and speak with some of the local businesses that are part

the system. I also kept regular conversations with Andreu Honzawa until late 2019. My interest in this particular currency has two main angles: firstly to understand the socio-political process that led to the council's approval of an official complementary currency in the Municipality; secondly to verify if this local currency effectively contributes to reducing the "leaky bucket" problem draining local economies of their wealth by promoting local consumption and a more circular economy.

Regarding the first inquiry - the adoption process -, the research led me to the following insights: 1) the three year EU project "Digipay 4 growth" (D4G) that took place between 2014 and 2016 was of fundamental importance. D4G created the platform - using the Cyclos software -, the International network and provided the initial start-up investment for the development of Grama; 2) the project was grounded and attached to two socio-political constructs that were determinant for its promotion and cultural acceptance: "Social and Solidarity Economy", and "Social Innovation and Transformation". These are well established concepts that have gathered a large support among the public and across the political spectrum in Catalonia. Moreover, the Grama was not presented as an official currency but rather as a complementary payment system. I believe that these differentiations were key to its approval in the council and the acceptance in the local community; finally, 3) The Grama is born within the very fertile and welcoming economic and political ecosystem of the city of Barcelona. With more than 20 Time banks, recognized and supported by the Municipality - see here: <https://ajuntament.barcelona.cat/tempsicures/en/canal/els-bancs-del-tempsla-ciutat> -, several LETS and its own distinctive Municipal currency - The REC <https://rec.barcelona/es/inicio/> - the Municipality of Barcelona has been an active promoter and supporter of complementary currencies within and around Barcelona. The Grama, the Villawatts - in the adjacent Municipality of Viladecans - or the Moneda Social de Manresa - another adjacent Municipality -, are all great examples of this thriving network of knowledge, experience and mutual support. Although there isn't yet an official coordination body for this currencies, strong personal relationships and a culture of cooperation and sharing of resources has helped to grow this ecosystem of multi-currencies;

4) the Grama's simple design and clear incentives for different target groups strongly contributes to its wide acceptance and fast circulation - according to the 2021

report available on the Grama website, the currency circulation is 2 to 6 times that of the Euro and other well established CC's such as the WIR in Switzerland or the Berkshares in the USA (De La Rosa & Stodder, 2015). The direct parity with the Euro (1 Grama = 1 Euro), the free entry and exit costs, no transactions fee, no demurrage, and the convertibility guarantee given by the Municipality make the Grama a very attractive currency. The only existing potential constraint to its acceptability and use is a 45-day waiting period in which the currency cannot be converted back to Euros.

The insights highlighted here regarding the political and economic process with the Grama are not unique to this case study. Throughout the literature I have found many examples of such currencies where external initial investment and support, plus an easy and simple design aiming at fast local circulation, packed within a mainstream narrative that appeals to a wide public, are fundamental factors to its acceptance and success.

Regarding the second inquiry - local economic impact - the Grama case study is a singular one due to the regularity and quality of the research that the municipality office, together with Clickcoin, runs on an annual base. The traceability reports, issued since 2017 and available online - <https://www.gramamoneda.cat/normativa-i-documentos->, allow to uncover where, how and how much currency is circulating. From this data set three considerations are worth mentioning: 1) the currency circulates mostly between individual users and very small enterprises, or within SME's themselves. SME's up to 3 workers represent 70 % of all operations and small business in local markets represent more than 10 % of the total volume of transactions. So, the currency is effectively circulating in the local economy, where it was designed to. This fact is reinforced by the local multiplier indicator that for the year 2021 was of 5.82. This means that on average each Grama was used in almost 6 local transactions, from its creation by the Municipality till its elimination when returned back to the source either through the payment of services, taxes or exchanging back to Euros; 2) 70% of all transactions are related to the food and drinks industry, or health. While the Fashion industry, culture and leisure services remain under 10%. I believe that it is socially relevant that the currency has been mostly used for everyday consumption of essential goods; 3) there is a low exit rate from the Grama system from its users. Historically this has been under 10% per year meaning that the vast majority of the Grama users choose not to convert their Grama's back into Euros. This is perhaps one of the more

solid confirmations of the success of this complementary payment system in reducing the monetary leaky bucket.

From these considerations we can conclude that the Grama is being effective at promoting local consumption and increasing economic circularity within Santa Coloma de Gramenet. Moreover, participants in the system portrait high level of trust and regular use of the currency which can be a proxy indicator of growing social capital and reflect trust in the public management organizations. Although we cannot take social impact conclusions from the traceability reports - they are not build for that and do not possess a Theory of Change or social impact measures -, the overall feeling within the Municipality and the users is of a successful project that is reaching its aims and goals.

Turuta

The Turuta is a local, social currency in the Municipality of Vila Nova i La Geltrú, 50km south of Barcelona. It started in 2011, after the buildup of the local Transitions Town movement which later led to the creation of the local association Ecol3VNG. Contrary to the previous case study, the Turuta is a bottom-up, citizens-led initiative with a strong ideological basis at its core, which the currency fully crystallizes in its design features. I first met with Ton Dalmau and Jordi Grieria in 2017 and later interviewed them in Vila Nova i La Geltru in 2018. The currency has been dormant for the past few years with a stagnant or declining number of users, very limited circulation, low number of transactions and residual economic impact (Souza, 2019). I was initially drawn to this case study in order to better understand the limitations and potentialities of a local CC initiative, whose currency design embedded a very radical economic view. The currency was designed with a demurrage tax (10% per year), with an accumulation limit (300 T), with a minimum entry request of 10 T and two possibilities to gain Turutas: buying them at par with the Euro or exchanging volunteer work for credits. Theoretically, all these design elements were put in place to foster circulation, avoid hoarding and promote a social and solidarity local economy. In real terms, the currency did not perform as expected and after a short-lived spike in users and transactions in 2016/7, started its declining process. Its economic

impact in the local businesses and community is residual and from a monetary plurality point-of-view the case study ended up not providing significant inputs to my research. Nevertheless, I was able to take two major insights from this case study. Firstly concerning the topic of scale, i.e., the necessary critical scale to unlock the potentialities of a CC within a Municipal context. And scale here signifies not only the number of users or transactions, but more important the frequency and intensity of connections within the ecosystem. This is what I will come to call the monetary connectivity of the ecosystem. In the case of the Turuta, even in its highest peak with several hundreds of users, the number of transactions remained low and velocity of circulation slow. Moreover, the diversity of flows and actors was limited, conduced to an excessively homogeneous network. This led to bottleneck nodes in the system and an overall 'stuckness' in the circuit metabolism. Together with the restrictive design features identified above, it compounded to the slow death of the Tutura. As with natural ecosystems, the resilience and productivity of the system depends highly on the capacity of a wide range and variety of elements to establish efficient channels of communication and interaction which can be are mutually reciprocal and reinforcing (Keesstra, et al., 2018). Further reflecting on the decaying process of the Turuta, the second major insight I took regards the process of designing, implementing and evaluation a local currency system. The more bottom-up led a process is, the more it needs an active participatory, engaging process with the local community that the currency aims to serve. It's more than just building trust, it's about building co-ownership and making sure that the currency design reflects the values and the serves the needs of the local community. There are plenty of examples of complementarity currencies that by failing to adequately mobilize, listen and engage with the local community, ending up being socially and economically irrelevant. The Turuta started with a strong impetus from a few very motivated members, however it never got the community traction it needed to be socially and economically relevant. More than the design, or the ideology behind, I believe that the process was the key element in determining the final outcome for the Turuta.

ECO - Xarxa Eco de Tarragona

The complementary currency 'Eco' is a local initiative from the Eco Xarxa of Tarragona since 2009. Initially a physical currency in paper, since 2010 that it is fully digital, with the exception of temporary editions which are made valid for the duration of special events, such as exchange markets - EcoFiras. As with the previous case, the Eco has at its core a deep economic ideological basis. However, contrary to Turuta, the Eco emerged from a thriving network of producers and consumers which already existed and who collectively felt the need for another economic instrument to further stimulate and ground their alternative economic network. The Eco is at par with the Euro and also has a demurrage fee to incentivize circulation. I interviewed Sebastian Corradini (one of the founders) and later was invited to participate - as a silent observer - in three members meetings of the network in 2018. Two paradigm-shifting insights came from those interactions: the first concept that was of profound significance to me at that time, was the idea of using a complementary currency to demonetize and decommodify certain spheres of human interactions. According to Corradini and others, a potential success of the Eco could be measured by its declining use at the neighborhood level. In initial stages the Eco was adopted and frequently used at different scales, but with time a trend that emerged was that while the Eco remained a useful exchange tool for business and exchanges with other parts of the wider Tarragona, at the neighborhood level its use was in decline. The reason was simple: once the human connection was there, people who lived closed to each other, established new kinds of relationships and the currency was no longer needed or was being rejected. These findings are consistent with Dan Ariely conclusions on how money can be a tool for undermining social relationships, particularly among friends (Ariely, 2010). These same people were still using their Eco's in the local market and in local business but had naturally excluded such monetary transactions for other services. Picking up kids from school, taking shopping to elder people, aiding a disability person on a daily commute. It is important to mention that although similar dynamics have been seen among Time Banks, this was not fully intentional or anticipated but rather an emergent reality that the network members were capable of interpreting in a radically different way, shifting the measures of success of the currency depending on its scale of use and function. And this leads us to the second major insight from this peculiar case study: here was a currency with two apparently opposite objectives and

functions operating within the same network. The currency was simultaneously building social capital at the neighborhood level, and facilitating local exchange at the Municipal and regional scale. This is an important aspect of many CC projects which are designed from the start to perform more than one monetary function and fulfill several socio-economic, cultural or ecological goals. Furthermore, this apparent duality of uses and socio-economic functions was mostly unseen by its users who found it completely normal to use the Eco for the groceries and not for some guitar lessons because now the teacher was a friend who would come for dinner and music. Curiously this trend is coherent with anthropological accounts of tribes and communities using gift and other direct reciprocity systems inside the community and more elaborate systems of account and exchange when dealing with other tribes or enemies.

FairCoin

FairCoin is the monetary instrument of the FairCoop Cooperative and community and a fundamental part of the Fair ecosystem, which includes the Fairmarket, Faircredit, Fairpay and Fairfunds - see figure 8 below. In concrete terms, the FairCoin is a Blockchain, global crypto currency, which was bought by Enric Duran in 2013 to be the pivotal element of a post-capitalist, commons-based new economic system. "FairCoin is more than a neutral means of exchange. It is a relational tool and a boundary object, by which diverse and geographically distant communities can coordinate action and communicate with each other" (Kasliwal, 2019, p. 876). Considered by some as the largest and most successful commons-based crypto-currency experiment (Dallyn & Frenzel, 2021), FairCoin was consciously re-designed in 2017 to be an inclusive, scalable, global, green, cooperative crypto-currency with its innovative "Proof-of-Cooperation" protocol (PoC). "In terms of its underlying cryptography, FairCoin was designed to help facilitate this transition to post-capitalist futures through an alternative, collectivist and sustainable Blockchain design" (Dallyn & Frenzel, 2021). The FairCoin white-paper (König, Duran, Fessler, & Alton, 2018), attracted much attention within the crypto community - mostly due to the PoC and the "cooperatively validated nodes" (CVNs) - and even more within the Digital Commons movement.



Figure 10 - The FairCoop ecosystem design

I met with Enric Duran in early 2017 and in 2018 became a FairCoin investor to understand, from the inside, this collaborative, open-source, decentralized, crypto-for-good. I was particularly drawn to this case study due to its trans-local scalability, the strong political dimension, the intricate governance and the dual pegging of its value - FairCoin has a fixed exchange value equal to 1,20 € and a financial market value, which currently is at 0,0078 € - figure 9 below.



Figure 11 - Faircoin Market value for the whole period (Source: Coinbase, visited August 12/08/2022)

Faircoin provides a great case study of a currency that has a lot of good arguments to occupy an important space in our transitioning monetary system but which hasn't been able to do so. As with its market valuation, FairCoin use within FairCoop spiked in 2017 and 2018 and as ever since being laying dorment, despite the continuation of Fairmeetings, hackatons and winter/summer camps to work on the currency - <https://fair-coin.org/en/faircoin-winter-camp>.

Having had the possibility of accompanying the "rise and fall" of FairCoin's use and value I was able to distil a few insights of this unique project and network, which I believe can be extremly useful for te purpose of this thesis. Firstly, the ideology and the ecosystem behind FairCoin act as a powerful attracter and a mobilizer of people, organizations and capital at multiple scales. FairCoin doesn't only offer a different currency, it proposes a whole alternative integrated system that is more than just a monetary experiment, but rather a poltical, economic and social endeavour. The post-capitalist, collaborative, peer-to-peer, decentralized narrative appeals to a wide range of alternative movements - Permaculture, Transition Network, Commons, Social and Solidariety Economy, anarchists, new age digital innovators, 'radical infrastructural mutualists' (Swartz, 2017) - as much as Degrowth and Ecological Economists looking for solutions and new systems. Furthermore, FairCoin was intended to be a bridging system between the global network and the local nodes, and between a decaying capitalist system and the necessary post-capitalist economy. I stress this point because these aren't just layers of the currency, these are the unavoidable foundations of a truly alternative monetary ecosystem and the possible pathways for a transition process. Not many projects attempt at such a scale.

Ironically, FairCoins strongest arguments are also its weakest points. The dual value system, initially designed to bridge financial capital out of the crypto world and into the real economy, backlashed and become a source of inner conflicts and strong divisions within the network. Not only was the parity and the convertibility with the Euro questioned, but also the differences between its market value and its pegged value became unsustainable to hold. Furthermore, incoherences in FairCoin design (Dallyn & Frenzel, 2021) as well as a lack of clear set boundaries led the project to ultimately fail at its key objective of becoming the commons instrument for an alternative economic system. As Dallyn and Frenzel stress: "What the case also

highlights is the partiality of postcapitalist alternative currencies, in restaging the fiction of the dominant monetary system without transcending it. This is arguably a feature of postcapitalist projects in general, in operating within, while trying to work towards an after, capitalism." (Dallyn & Frenzel, 2021, p. 880).

ECO coin

The ECO coin is a digital token reward system backed by sustainable assets that promotes sustainability (Nextnature network, 2018). Unlike previous case studies, this is a corporate complementarity currency, based in the Netherlands that has been put in circulation in different companies - such as L'Oreal - and events as a means to achieve some pre-defined climate or ecological goals. The design is rather straightforward: by doing some "eco" action you get ECO coins, which you can then use for a variety of products or experiences. So the ECO coin is a measuring and tracking instrument that allows us to quantify, incentivize and reward an individual's "eco" actions. It follows in the footsteps of an emerging trend within CC's to act "as instruments for behavioral changes towards sustainability" (Joachain & Klopfer, 2012).

I held several online meetings with Lewis Just - one of the founders - in order to understand the business case and the potential impacts of such a system. I was drawn to this case study for one main reason: to investigate the potential possibilities and limits of reward systems for sustainability, namely within the corporate sector. This is what Karl Polanyi would definitely call a case of special-purpose money. The ECO coin creates the incentives to alter our preferences, choices and ultimately our economic behavior. And, according to the first results published it seems to be working, i.e., participants in the reward scheme are effectively following the pre-conditioned behavior patterns - see figure 12 under portraying a total of 4050 "ECO actions" in one month with 204 active users, corresponding to 74% rate of staff engagement and 8.423 Kg of CO₂ reduction - leading to further questions, namely: are these nudges ethical? Can they lead to more permanent behavior changes? Can they lead to consciousness awakenings? According the Evaluation survey, 75% of staff felt more positive about sustainability after the one month pilot, while 83% of staff reported to think about sustainability more in their day-to-day lives. This data is consistent with other eco reward systems using tokens and other complementary currency schemes, how-

ever it does not fully answer the question regarding the morality and ethics of consciously using CC's for behavior control. As Louie Larue and colleagues rightly point out "[..] although incentives may be less coercive than other interventions (such as restrictions), they should still be analyzed as tools for political control, that is, as a way for the state or other's to control people's behavior in a certain direction [...]. An important ethical question is therefore whether, and on what grounds, such control is legitimate." (Larue, Meyer, Hudon, & Sandberg, 2022, p. 310)

Sustainable actions per day

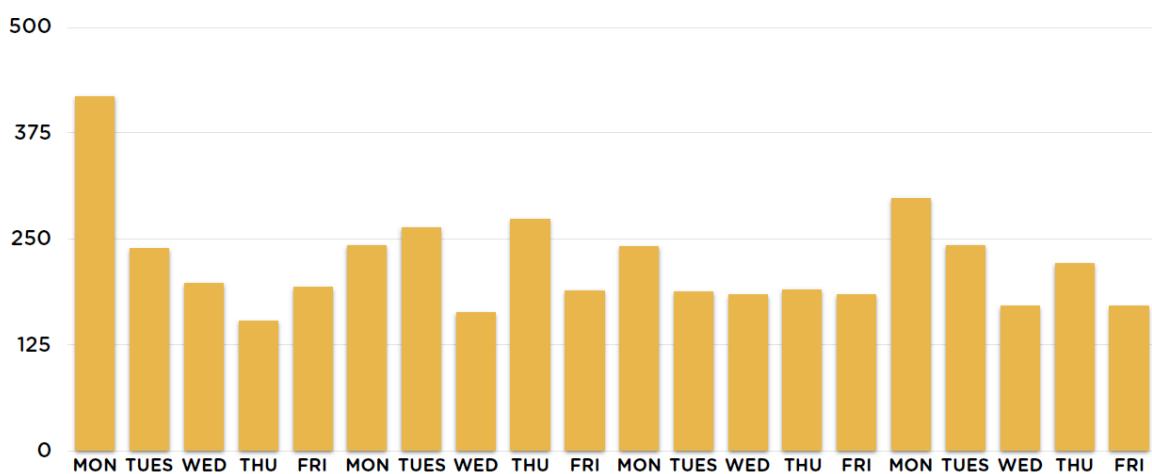


Figure 12 - Number of L'OREAL staff ECO actions per day during the first month trial experiment

The morality and ethics of purpose-driven CC's is an over-arching question that should concern most, if not all, monetary systems once we recognize that 1) they are never neutral, and 2) their design impacts our lives in many fundamental ways. This has been a topic mostly overlooked by researchers and practitioners and I fully agree with Larue and colleagues further research directions: "A third interesting area of research concerns the mechanisms that ACs employ to address these issues, which include restrictions, incentives, and appeals to moral values. We have argued that the effectiveness of these mechanisms is inherently connected to the fairness of their consequences. Further philosophical analysis is needed of the ethical justifications for restricting the purchasing power of money to local circumstances and for nudging people's behavior through monetary schemes." (Larue, Meyer, Hudon, & Sandberg, 2022). As it will be explored on chapter 7, an intrinsic key component for the sustainability

of a planned monetary ecosystem, is a shared-monetary governance, anchored in participation, transparency, accountability and a set of moral and ethical principles that guarantee the coherence and social validity of the whole system.

The Eusko

"Euskoa denen esku"

(The eusko in the hands of everyone, Eusko motto)

The Basque regional currency Eusko, founded in 2013 by the local association Euskal Moneta, is widely recognized as the largest and most successful example of a complementary currency in France, and in Europe (Edme-Sanjurjo, Fois-Duclerc, Lung, Milanesi, & F., 2020). With more than 3 million Euskos in circulation, 4.000 individual accounts and 34 municipalities participating in the scheme, this peculiar currency had 20% user and circulation growth rates from 2013 to 2016 and following the introduction of the Euskokart, doubled-it for 40% in the period 2017-2020 (Edme-Sanjurjo, Fois-Duclerc, Lung, Milanesi, & F., 2020).

I was drawn to this case study as it crystallizes all of the elements that are theoretically critical for the success of a complementary system: strong socio-economic embeddedness; legal and official recognition and validity by local governments; a professional employed team managing the currency; and, the use of technologies that facilitate and accelerate its circulation (Blanc & Fare, 2018). Most unfortunately, the Eusko is a very specific and special case study and the multifactorial conditions for its success are not easily replicable elsewhere. For example concerning the social embeddedness: "The Eusko was born in a fertile social soil with an organizational ecosystem rich in human, material and monetary ties driven by a political and social history that brought ethical trust, symbolic strength, and diverse know-hows to this monetary initiative. [...] The objectives of relocating the economy, revitalizing the territory, reappropriating exchanges by citizens or solidarity of a local currency could only find a favourable response in a context historically marked by the defense of an economic and cultural identity" (Edme-Sanjurjo, Fois-Duclerc, Lung, Milanesi, & F., 2020, p. 18). These are highly specific cultural and historical conditions impossible to replicate and not often found. The Basque country - both in Spain and France - has been for many decades a cocoon and a benchmark case regarding workers cooperatives, local associations, and

strong local activism. Therefore, the mobilization of volunteers and activists, the economic activation of the network and the promotion of a culture of participatory governance were all relatively easy avenues for the Eusko development. Moreover, in 2014 France became the first country in the world to officially recognize CC's as official means of payments and to "recognize the existence of a monetary ecosystem through the promulgation of Law n° 2014-856 of 31 July 2014" (Arciniega Gil, 2019). Although this law has been recognized within OECD as a good practice to be replicated in other countries (OECD/EU, 2017), progress has been slow and often only partial.

Beyond its undeniable success and socio-ecological impact, this is a case study I found to be relevant to this thesis for two key insights that concern its intrinsic design options: 1) the first design option I found intriguing was the unanimous decision taken by Euskal Moneta council "not to retain the Gesellian principle of regular face-value depreciation for the future currency due to the reluctance of many participants to agree to such a mechanism" (Edme-Sanjurjo, Fois-Duclerc, Lung, Milanesi, & F., 2020, p. 21). Intriguing because for many CC experiments the topic of demurrage, oxidation or programmed depreciation - often referenced back to Silvio Gesell - is often used with the argument of promoting faster circulation, avoiding hoarding and incentivizing long-term investments. In this case - and also in the case of the Gramma mentioned before -, although these objectives are all explicitly there, the currency developers recur to alternative mechanisms dismissing the use of a depreciation rate. Nevertheless and as with the Gramma, empirical evidence shows a high rate of circulation of the Eusko, low rates of hoarding or bottlenecks and consistent average conversion rates back to Euros, leading me to question the effectiveness and the willingness of users for consciously accepting and embracing depreciation rates. Although empirical evidence of the use of demurrage in Stamp Scripts and local currencies seems to point towards a positive impact in the velocity of circulation of a CC (Godschalk, 2012), a growing number of examples is demonstrating the overall higher acceptance and even effectiveness of other incentives. Sociological studies on the use of CC have demonstrated that CC users tend to prefer positive incentives over imposed restrictions or limitations (Godschalk, 2012; Smith & Lewis, 2016); 2) the second design option that has led me to have several debates with the currency developers concerns the parity - 1 Eusko = 1 Euro - and the convertibility with the Euro. For me personally these two core design options are incompatible with the Eusko charter. As Maurizio Ruzzene generalizes:

"there is a tendency to pursue incoherent, contradictory objectives, such as declaring ecological aims while the real major aim is to increase production and consumption of goods, albeit locally, or pretending to be immune from the inflationary growth of money while remaining linked to the official currency, often for a lack of a solid value base" (Ruzzene, 2015, p. 87). Having a fixed parity with the legal tender is a common practice within CC's, either to fit into the legal framework of complementary currencies, or to facilitate its use and reference value by using something that everyone has strong familiarity with. The key question is whether this can be a design option coherent with sustainability for local or regional complementary systems? The answer is not straightforward as there are obvious pros and cons. From a relocalization of consumption and production perspective, and the withdrawal of monetary mass from the speculative economy back to the real economy, one could be inclined to support such currencies as strategies to promote sustainable development (Michel & Hudon, 2015). On the other hand, by linking the value of a CC to the artificial, inflationary, speculative, abstract value of official currencies, one is at best deeply limiting the transformative and regenerative potential of a CC scheme, and at worst being compliant and helping to perpetuate unsustainable values and degenerative economic valuations. This last argument is strongly exacerbated with the possibility of convertibility between currencies, which is a more problematic design feature. The Eusko has only partial convertibility and imposes a malus, or conversion tax, when professional accounts within the system convert Euskos back into Euros. Nevertheless, even with partial convertibility, there are serious risks to CC projects from exposing their currency, their circuit and their values to other currencies, namely official currencies and speculative cryptocurrencies, as we've seen with the case of the FairCoin. By having direct parity and convertibility I would argue that these type of CC's can be considered as effective tools for economic and fiscal localism, but not necessarily instruments for transformative regeneration. As we will see in chapter 6 and 7, a regenerative monetary system requires a fundamental reconceptualization of notions of value and monetary valuation that must transcend the need for parity with Euros, Dollars or Pounds.

Intentional community currencies - Aura and Eko

The Aura and the Eko are a distinctive set of case studies that I've ultimately grouped together for a common analysis as they share commonalities and lead to the

same major insights for this thesis. These are local currencies which circulate within an intentional community, or ecovillage (Dawson, 2006). The Aura is one of the many alternative currency systems in Auroville, India. The Eko is an alternative currency printed by Ekopia and that circulates in Findhorn, Scotland. Although they have different design features they share four key patterns which I want to highlight here:

- 1) These are meaning-making instruments whose primary function is building cultural and social identity and social capital. Although they are an integral part of the monetary and economic landscape, their impact cannot be measured by classical monetary methodologies or indicators (Fare & Ahmed, 2018). This is an insight we can easily extrapolate to other currencies and to our understanding of monetary ecosystems, i.e., the measures of vitality, resilience, efficiency and sustainability of diverse monies need to obviously reflect each unique form and function. So, although the macroeconomic impact of such community currencies is often residual, that doesn't mean that the currency is not performing important socio-economic functions. We just have to change the lenses and look into CC's impact in a different way. As M. Fare and P. Ahmed conclude "Logically, the hypothesis, methodology and normative conceptions of money by conventional economics lead to consider CCSs either as non-monetary phenomena (as they do not constitute legal tender), or as merely insignificant and marginal (their purchasing power being too limited); or – yet another possibility – as a punctual alternative linked to a lack of official currency in quantity or quality. A socio-economic and institutional approach to money seems more helpful in revealing the nature, logics and impact of the complementary monetary practices. (Fare & Ahmed, 2018, p. 12)"
- 2) Both the Aura and the EKO are an integral part of a monetary ecosystem which is mostly unconscious to its community members. This realization came after spending time within the two communities and realizing that in both of them, people were actually using different currency systems to complement and sometimes adjust or adapt legal or economic limitations. Although the members of the each community were mostly aware and proud of their EKO or Aura, in monetary terms they were regularly using up to four different currency systems, with complex commensurability and convertibility relationships. The example of Findhorn helps to illustrate this: within the

community the British Pound circulates alongside the EKO - 1 to 1 parity - with ease-ness and fluidity. The EKO is a physical currency (notes only), which reflect Findhorn's history and main symbols, and is put in circulation by the community development trust Ekopia, who pays its employees partially in EKOs.

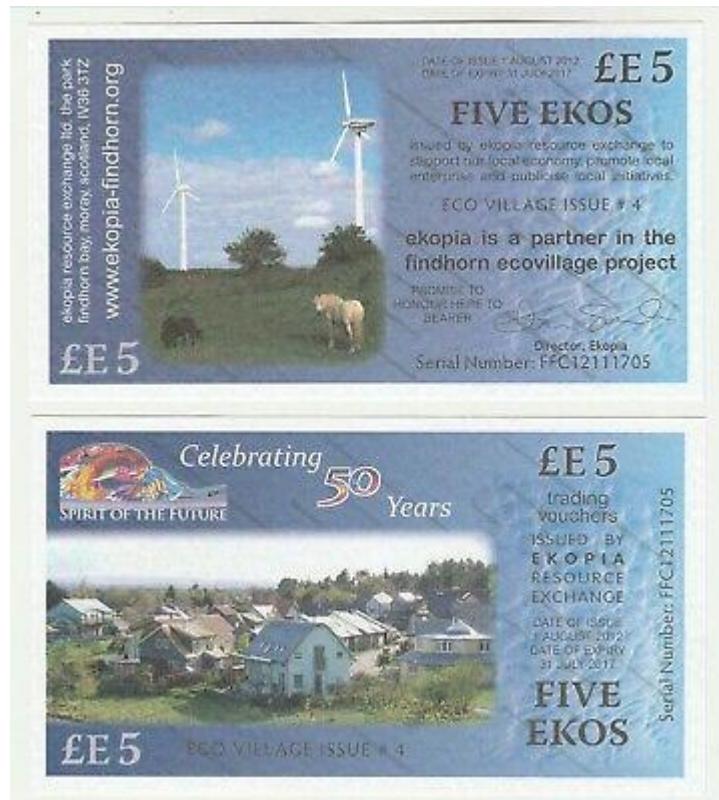


Figure 13 - An example of a note of five EKO's

Within the region, and used by several community members, there is also a LETS, several free-gifts "shops" and other examples of a share economy based on reciprocity and communal values. Interesting, was also to find that the food-vouchers, given to volunteers and community members who perform different jobs within the community, are also part of a complementary payment system, as people frequently use them to settle small debts or exchange working shifts. There are also some members of the community who trade and invest in crypto currencies and many who use point-loyalty schemes with local businesses. If we zoom out, we then have an economic landscape with at least 4 to 5 simultaneous currencies that co-exist. They share the same territorial boundaries, however due to different functions, purposes and designs, their circulation circuits rarely overlap, leading mostly to non-competing relationships. Some are convertible, while others not and in the case of the food vouchers

there is no convertibility but there is flexible commensurability depending on a number of contextual factors. Even more relevant to our understanding of this small but fascinating monetary ecosystem is the fact that the EKO's do not circulate often between community members, but rather from the individual users to the local businesses and associations, and then between them. This apparent paradox is coherent with the insight of demonetization occurring at the neighborhood level in the case of the Eco Xarxa of Tarragona. A similar dynamic can be seen at play in Findhorn;

3) Another curious pattern of these community currency projects is that hoarding of the currency is a common issue, particularly by visitors, guests and tourists that drain the system from its currency. It's a special case of the leaky bucket and I'm partially guilty as well because I've been carrying 20 EKOs since 2017 for educational purposes. According to Alex Walker of Ekopia, whom I interviewed in two occasions in Findhorn, the external users hoarding can be up to 10% of the monetary mass in circulation. This together with intra-community hoarding and the existence of bottlenecks in the circuit, effectively slows down the EKOs velocity of circulation and limits its exchange function. This example provides an opposite case to the one highlighted above regarding the dual function of the Eco Xarxa in Tarragona. In the case of Findhorn, the EKO exchange function and its cultural identity-building function seem to be contradictory, or at least non-mutually reinforcing. This leads to the question of how much economic inefficiency is one willing to concede in order to maintain a certain level of socio-cultural function? The inconsistency between monetary functions within a CC system can lead to monetary and socio-political tensions which can be a factor for the collapse of such experiments. As F. J. García-Corral and colleagues remind: "Given their adaptability and flexibility, the objectives of the CCs can mutate and be transferred to others which may prove to be more consistent over time, although it could also be considered the reason for their disappearance as it generates differences among promoters" (García-Corral, Pablo-Valenciano, & Cordero-García, 2020);

4) Finally, an important insight and pattern concerns the role of community currencies and alternative monies in containing or fighting back what I've called the monetary 'contamination' of community life. This trend struck me particularly in Auroville,

where I found a growing number of community members conscious and rightly concerned with the process of commodification and monetization of community life, partially due to badly designed monetary system that become too permeable to other currencies, namely the Indian Rupee and by default any other currency in the market.. During my stay I had the chance to share my thoughts in the local journal 'Auroville Today' - see Annex 10.1 - and later connect this trend with the case study of FairCoin, where a similar pattern emerged. In both cases, by allowing some level of convertibility and/or by pegging the CC with another currency - often the "official" "tender - monetary innovators are inadvertently undermining their own project, values and value. In the case of the Aura and the Auroville economic system, which was informed by the vision and the writings of the Indian philosopher and Yogi Sri Aubindo and Mirra Alfasa - known as The Mother - this process is even more striking due to the extremely different conceptualizations of money, economy and life. Auroville was envisioned and planned to be an autonomous money-less communitarian society where gift, barter, direct reciprocity and mutual credit systems would guarantee the economic flows and vitality of the community (Thomas & Thomas, 2013). As with many tribal societies, external money was only accepted for trade with the outside and for very limited circumstances, such as the financing of the Matrimandir - Auroville soul and spiritual center. The 'corruption' of the Auroville monetary reality started with the interpretation of The Mother vision of a 'money-less' society that became a 'cash-less' society, i.e., no cash (coins or notes) inside the community. This led members of Auroville to create a community organization - *Pour Tous* - that, among many other functions, acted as an account system where people could deposit which ever currency - even official currencies - and be credited an amount of tokens to be used inside Auroville according to the exchange rate. Time, Dollars or Rupees were welcomed in Auroville, but only in the front desk, inside they were in a way 'hidden behind the books'. Without any limits to convertibility, with a direct parity to the Indian Rupee and with a growing number of visitors, guests and tourists flooding into Auroville every year, the apparently innocuous account system, rapidly revealed its true nature as a monetary and economic Trojan horse. Auroville monetary ecosystem, which was mostly based on reciprocal exchanges, time banks and a local currency, has been gradually replaced by a monetary system where a single currency - the Indian Rupee - dominates and permeates most relationships. It is a 21st century case of Gresham's famous law that "bad money

drives good money out of circulation" (Selgin, 2003). Nowadays it is possible to use most debit and credit cards in whatever world currency in many of the Auroville shops and stores and although cash is still not accepted in some economic circuits inside the community's core, this fact is not relevant to the arguments made and to the processes taking place. The Auroville monetary and economic system has been fundamentally re-shaped in the last 20 years, away from the initial vision, intention and plan from its founders and into the market capitalism economy. A key instrument for that process was money and the critical design element was free convertibility with the legal tender.

4.5 Concluding remarks: mainstreaming the alternative

Chapter 4 tells a radically different monetary story. One that is filled with creative experimentation, diversity of examples and innovations, and innumerable possibilities for monetary design. By recurring to alternative theories, perspectives and practices within monetary systems three fundamental conclusions can be taken:

1) Strong monetary plurality is the historical norm, with the notable exception of the 20th century. In the 21st century we are once again witnessing the spontaneous emergence of alternative and complementary currencies, triggered either by the monetary-banking-financial crises, or by technological developments enabling digital and crypto currencies. Given the ongoing dynamics, which are explored in section 5.1, it is very likely that the future will bring us back to a monetary ecosystem based on a diversity of currency systems;

2) Monetary design is a rich and thriving field that allows monetary innovators to purposefully create, adapt and own the unique characteristics of each currency. Technological developments and a new consciousness of the impact of complementary currencies has brought an unmatched diversity of currency systems that often occupy the same economic landscape. This has opened up new possibilities for monetary competition and cooperation, as well as raised the responsibility bar for the designers of CCs, given the ethical and moral considerations that every architecture entails;

3) Within this fast growing field of monetary innovation, only a small fraction is directly engaging with or targeting sustainability in a holistic and integral way. Therefore, the potential for CC's to steer our monetary ecosystem towards sustainability is

yet mostly untapped. Given the socio-ecological challenges we face nowadays, more attention should be placed in the conscious and purposefully re-directing of CC's to the regeneration of our social-ecological and economic landscapes.

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5 SYSTEMATIZING THE NECESSARY MONETARY REVOLUTION

5.1 Alternative monetary economics

The following section is a direct transcript from a research paper published in the Journal of Studies on Citizenship and Sustainability in 2019.

Alternative monetary narratives and experiments – systematizing the necessary societal transition

Filipe Moreira Alves (1), Anna Kovasna (2), Gil Penha-Lopes (3)

1 Researcher at the Centre for Environmental and Sustainability Research (CENSE), FCT-UNL; 2 Independent researcher; 3 Researcher at Centre for Ecology, Evolution and Environmental Changes, Faculty of Sciences, University of Lisbon

Abstract

This essay aims at a contextualization and systematization of current alternative monetary narratives, experiments and movements (AMNEs), in search of the actions, collaborations and synergies that could provide the most effective pathways to transitioning the current dominant monetary system towards a more resilient and sustainable paradigm. Using Multi-Level Perspective (MLP) and Transition Management (TM) as analytical frameworks, we argue that the financial crash of 2007-08 should be taken into consideration as a major landscape shock, or avalanche, with multi-dimensional impacts in the monetary socio-technical regime. This event opened the space for very significant transitions in the configuration of money systems, which we analyse using seven thematic AMNE clusters. From this, we move on to consider areas of confluence and synergetic arrangement of collaboration with transformative potential. Our main conclusion is that we are currently going through a unique tipping point for monetary innovation and transformation, where municipal complementary currencies and

crypto currencies will play a major role in reshaping the monetary socio-technical regime, facilitating the necessary societal transition to a more diverse, complementary and resilient monetary system.

Keywords: alternative monetary systems, complementary currencies, socio-technological transitions

1. Introduction

It is undeniable that in the past decades, and mainly after the global financial crash of 2007-08, the number, diversity, scale and impact of alternative monetary narratives, movements and experiments have witnessed a significant increase, closely matched by a growing interest of media, policy-makers and researchers in the phenomenon (Tibbett, 2007; Michel and Hudson, 2015; Seyfang and Longhurst, 2013; Ziegler et al, 2017). With initiatives ranging from grassroots innovations such as community currencies and LETS systems, through studies on legislative banking and financial reforms commissioned by governments in several European countries, to the potential revolution of worldwide digital and crypto currencies based on blockchain technology, the monetary ecosystem is alive with initiative. This vitality is mirrored by new trends within academia, with a revival of theories on monetary plurality and complementarity, a reconceptualization of gift and barter economies in the XXI century, and requests from heterodox economists and other disciplines, such as anthropological economics, to rewrite economic textbooks, removing the myth of barter, revising the neoclassical standard stories of the evolution of money and banking, as well as accepting the endogeneity of money¹(Arestis and Sawyer, 2006). These are a few examples of the growing, decentralized and not yet fully interconnected movement that we explore in this paper, and that we refer to as Alternative Monetary Narratives and Experiments (AMNEs hereafter). Although AMNEs are considerably diverse in content,

¹ For more on this check this websites: <https://www.core-econ.org/>; <http://www.isipe.net/open-letter/>; <http://www.rethinkeconomics.org/>; <https://www.exploring-economics.org/en/>

vision and practice, we argue that they are unified in their shared critique of the current monetary and financial system and its key design elements of centralization, monopoly, privatization and lack of transparency and democratic control. Present in the diverse motivations, visions and solution pathways that fuel AMNEs, are a few unifying key aims, including monetary plurality and complementarity; economic sovereignty and greater resilience; democratic control over money; decentralization and re-localization of economic exchange; and the strengthening of local economies and regional networks. In addition, many of the different AMNEs share common theoretical backgrounds, owing much to the writings and thought of scholars such as Silvio Gesell, Irvin Fisher, Karl Polanyi, John M. Keynes and more recently Thomas Greco, Gill Seyfang, Peter North, James Robertson, Ellen Brown and Bernard Lietaer (Alves, 2018).

Although AMNEs share some foundations and co-exist in our highly interdependent and interconnected economies, we argue that cross pollination, cooperation and partnerships for mutual benefit are still far from reaching their potential. Someone who would participate in different events, such as a FEBEA² meeting, the International Conference on Complementary and Social Currencies, a Finance Innovation Lab meet-up and a crypto-currency symposium, would notice that while the core intentions and motivations are often very similar and some of the proposed solutions even the same, the people do not overlap, the vocabulary is different, cross-collaborations are scarce or nonexistent, joint publications rare, joint practices even more so, and overall mutual support lacking. Why this tendency for separate practice and theoretical silos, even in a field where practice is so shaped by ideals of sharing and mutuality? The hypothesis explored in this essay is that the current lack of coherent and easy to understand systematizations of AMNEs precludes the macro-perspective necessary to unlock mutually beneficial flows and links. In terms of AMNEs, what we have is a monetary ecosystem with great diversity, but low relationship. In this paper, therefore, we develop a suggested systematization using Multi-level Perspective (MLP hereafter) and Transition Management (TM hereafter) to conceptualize, visualize and better understand the different levels and flows of the AMNE field, using Europe as a case study to trial the robustness and effectiveness of the proposed framework. Our aim is to build on

² **FEBEA is the European Federation of Ethical and Alternative Banks** (FEBEA – Fédération Européenne des banques Ethiques et Alternatives): www.febea.org

existing work that already introduces several pieces of the AMNE-MLP monetary puzzle – such as Seyfang 2007; Finance Innovation Lab 2012 - and link them together to accomplish a meta-level perspective.

From a theoretical perspective this paper is thus anchored in Multi-Level Perspective and Transition Management studies, following the work of authors such as Frank Geels, Derk Loorbach, Jan Rotmans and J. Haan. According to Geels “The multi-level perspective (MLP) is a middle-range theory that conceptualizes overall dynamic patterns in socio-technical transitions. The analytical framework combines concepts from evolutionary economics (..), science and technology studies (..), structuration theory and neo-institutional theory.” (Geels, 2011: 3). With its capacity to address structural change of different types with multiple actors and at different levels while providing a clear graphic perspective of transition pathways, MLP shows great potential as a tool for understanding money systems. This is especially so, since the current monetary system shares some of the key characteristics of the systems where MLP has been traditionally used and developed, such as energy, food and transportation.

MLP thus offers not only the possibility of framing and systematization, but also a potential for better understanding the dynamics of a socio-technological transition in our present monetary economy. This is where Transition Management (TM) becomes a good complement, allowing us to go deeper into the socio-technological processes, tipping points and thresholds that unlock and steer societal transitions (Loorbach and Huffenreuter, 2013). As Loorbach and Rotmans explain “Transition management is now defined as a deliberative process to influence governance activities in such a way that they lead to accelerated change directed towards sustainability ambitions. Transition management is meta-governance: how do we influence, coordinate and bring together actors and their activities so that they reinforce each other to such an extent that they can compete with dominant actors and practices?” (Loorbach and Rotmans, 2010: 2). The terms and concepts gathered from MLP and TM used throughout this paper refer to this literature and will not be discussed or defined more closely here, as it is not the purpose of the work.

In section two below follows a brief explanation of our methodology, while section three presents a listing of key European AMNEs and a discussion of their central stakeholders, characteristics and dynamics, which in turn form the basis of placing them within the MLP framework as well as analysing the specific dynamics and flows of each actor using TM as the theoretical baseline. In section four, we discuss the potential cross-benefits of different stakeholders and movements, as well as potential tipping points and thresholds that could be jointly explored to facilitate a societal transition in the monetary field.

2. Methodology

The methodology used in the crafting of this paper consists mostly of a literature review complemented by website consultation focusing on worldwide databases of complementary currencies, international think-tanks and research centres focused on our field of study. Key members of the latter category include the New Economics Foundation (NEF), The Royal Society of Arts, the Dutch research centre Drift, the International Movement for Monetary Reform (IMMR) and RAMICS - Research Association of Monetary Innovations and Complementary Systems.

From a methodological standpoint, it is also important to define more clearly our scope and what we mean by 'alternative'. Here, three key building blocks serve to illustrate and define:

By alternative we mean any narrative and/or experiment that fundamentally challenges the classical and neoclassical theory of money and its functions, role in the economy and the societal need it responds to. Therefore, any theory, proposal, movement or experiment that builds upon, works within or aims to improve (make more efficient for example) the current dominant monetary system is excluded. One such example is the *Slow Money Movement*³, which aims at establishing more ethical lending practices among farmers and small entrepreneurs, offering better interest rates, better payment conditions and overall sustaining a stronger and more resilient economic network.

³ <https://slowmoney.org/>

While both useful and impactful, it can be argued that this nevertheless is a movement that works within the current system rather than fundamentally challenging it or any of its key design elements. The same can be said for the 'Move your Money' campaigns⁴ that got a lot of traction in the aftermath of the global financial crisis of 2007-2008, and the bankruptcies and financial scandals that followed. Whilst they present a critique of and solution for current banking and financial practices, they do not challenge the key design elements of the banking industry.

By alternative we mean any narrative and/or experiment that embraces radical change and redesign as a key element of its discourse, aims and practice, rather than promoting incremental strategies. An illustrative example is the difference between an ethical and co-operative bank such as the Co-operative Bank UK⁵, and the European Bank of the Commons or the cooperative JAK Bank⁶. While ethical banks such as Banca Ética, La Nef and the Co-operative Bank UK promote a laudable incremental approach to more sustainable, stable and ethical banking practices, they still operate within the same fundamental logic as the current monetary system. The European Bank of the Commons, on the other hand, presents a radical new configuration of banking, as boldly stated in their mission: "[..] to facilitate a transition to an ethical post-capitalist space to gradually free us from the control of the current banking system, replacing it by a growing, fair, self-managed system. We want to rethink money and finances as commons."⁷ The same can be said for the cooperatively-owned and run, interest-free, full-reserve system of the JAK Bank, which fundamentally challenges some of the key characteristics of the current banking system;

By alternative we mean any narrative and/or experiment that is born out of and promoted by economic agents outside the key institutions of the current monetary system, i.e., outside of central banks, private banks, hedge funds and rating agencies or stock markets. Local currencies offer a great example of such initiatives being developed, used and promoted worldwide in a decentralized way by communities, NGO's, co-

⁴ <https://www.moveyourmoney.com/>

⁵ <https://www.co-operativebank.co.uk/>

⁶ <https://jak.se/>

⁷ <https://bankofthecommons.coop/vision-and-mission/> visited in November 2018

operatives and informal associations of people outside the dominant banking and monetary system.

In addition and from a theoretical point-of-view, we agree with the definition of 'alternative' put forward in the Handbook of Alternative Monetary Economics (Arestis and Sawyer, 2006), particularly in the first chapter '*Money: An Alternative Story*' by Éric Tymoigne and L. Randall Wray. We also agree with the four leverage points for systems change and the Transition Theory put forth by the Finance Innovation Lab. Although some of the innovations considered in their 'Alternative Finance Wheel' might not fully fit our criteria – such as the case of crowdfunding to Equity –, the overall perspective on systems change is sound and coherent with the proposed conceptual framework of this essay⁸.

Another important field to consider in Alternative Monetary Narratives and Experiments is that of complementary currencies, and how to approach and understand the diversity of initiatives in that field. Here, we use Jérôme Blanc's classification of complementary currencies (Blanc, 2011), detailed in Figure 2 below. Blanc identifies four different generations of complementary currencies, considering not only their historical roots and evolution, but also their design and socio-economic function. Included in Blanc's categorisation, we find solutions from LETS to Time Banks, local currencies and regional digital currencies, showing a wide variety of alternative monetary designs used at different scales, for different purposes and to fulfil different functions. What to us is missing in Blanc's four generations, is the more recent development with regional and global digital currencies based on blockchain technology. Considering the increasingly widespread use and high profile of cryptocurrencies such as Bitcoin, Dash and Ethereum, we thus propose to add a fifth generation (G5) to the classification scheme.

⁸ https://financeinnovationlab.org/wp-content/uploads/2015/04/FIL_SystemsChange-Web-Final.pdf visited November 2018

Generation	Name	Significant cases	Complementarity	Scale
G1	Exchange systems	LETS; Trueque; CES	Autonomy; Community	Local
G2	Time banks	Time Banks and Time credits; Accorderie	Autonomy; Community	Local
G3	Local currencies	Ithaca hour, Regio, Palmas, Berkshares	Simultaneity and Supplementarity	Local and Municipal
G4	Municipal and Regional currencies	NU, SOL	Simultaneity and Supplementarity	Local, Municipal and Regional
G5	Digital	Bitcoin, Dash, Ethereum	Substitution and Supplementarity	All scales

Figure 2 – Classification of complementary currencies, adapted from Blanc (2011)

3. Systematizing niche innovations, regime changes and typologies of socio-technical pathways

The basic premise and hypothesis of this paper is that an overarching systematisation of AMNEs would benefit practitioners, policy-makers and researchers by highlighting possible synergies, collaborations and complementarities, and thus allow a conscious steering of the monetary socio-technical transition underway towards sustainability, resilience and regeneration. In short, a redesign of money systems to serve a ‘better world’ (Telalbasic, 2017). However, it is not easy to maintain a clear overview of the present multitude of alternative solutions and proposals, which is likely one reason why current categorisations mostly consider separate sectors of innovation, such as the ones for currencies presented above. Today’s great diversity of initiatives spring from different economic sectors and agents, use different technologies, have distinct dynamics and even differing theories of change. To identify, list and classify everything that is out there would be overwhelming. What we instead aim to do in this

section, is to use our framework of Multi Level Perspective and Transition Management to classify some iconic AMNEs with a view to shedding more light on our hypothesis. Building on the classifications presented above, we will place and discuss the following AMNEs:

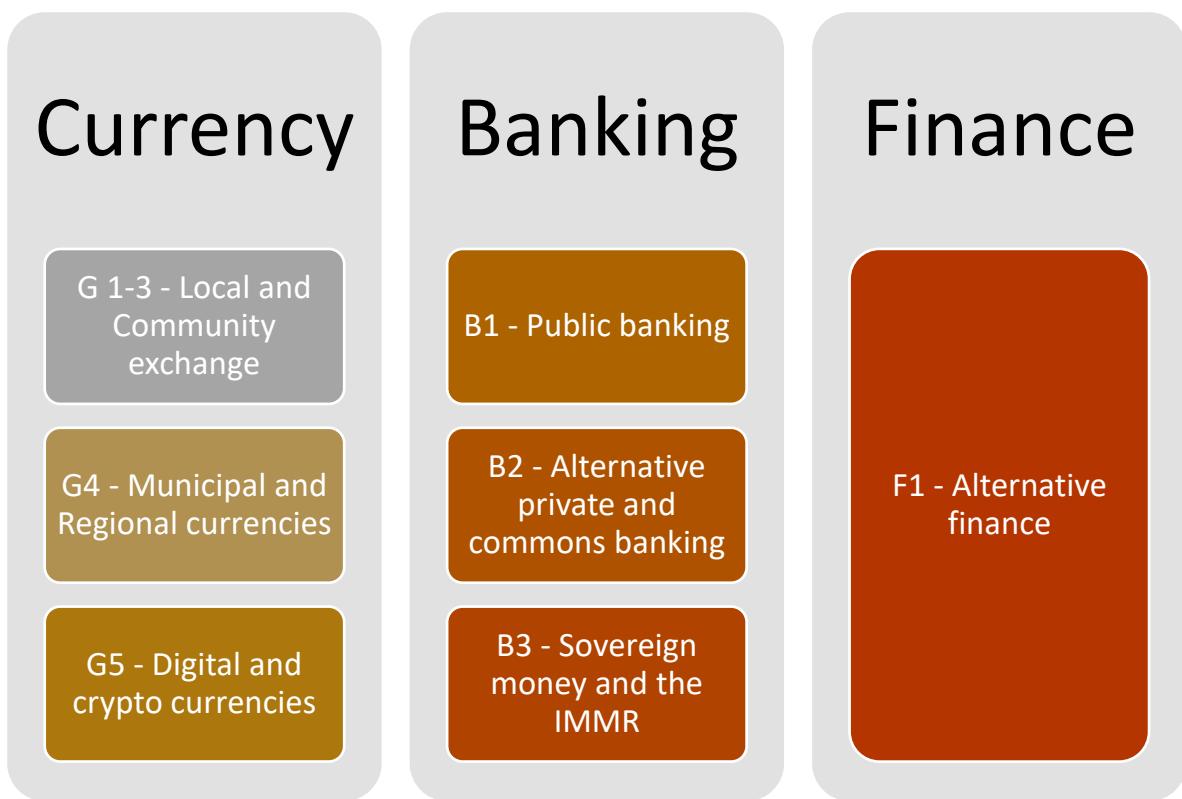


Figure 2 - AMNEs clusters

These seven AMNE clusters (G1-3; G4; G4; B1; B2; B3 and F1) were chosen to represent the different layers of a monetary system - currency/money, banking, and finance – as well as different scales – from nano and micro complementary currencies systems to macro monetary reforms – and different socio-technical transition dynamics.

For the purpose of this systematization, we separated the generations of complementary currencies. This is mostly because to us, LETS (G1), Time Banks (G2) and local currencies (G3) do not fundamentally affect the socio-economic monetary regime and within the MLP-TM framework remain mostly as niche innovations, marginal to the dominant monetary regime and without a clear transition pathway. We also left aside non-monetary niches such as gift circles and direct barter experiments for the same reason. This is not to minimize their socio-political, cultural and economic impact as well as the important societal space they occupy, but rather to reduce the analysis to

those AMNEs which are directly and significantly re-shaping the current structures, institutions, flows and dynamics of the monetary system on a larger scale.

We also decided to distinguish the public banking movement from other banking alternatives, as they have different rationales, with distinct key institutions and mechanisms, and the potential to re-align the current system in substantially different ways. Public banking aims to shift the power of money creation and allocation away from private institutions and to public institutions under democratic control. Banking alternatives such as the JAK Bank envision and practice an interest-free, full reserve system banking, but within the current design.

Figure 3 below allows for a better understanding of some of these distinctions and how to categorise the seven AMNE clusters under investigation here, taking into account the four key design elements of the current monetary system where AMNEs mostly intervene – interest, speculation and inflation; fractional reserve banking and fiat money; money monoculture; and the private issuing and control of money. The three clusters focusing on the currency/money level mostly offer solutions and alternatives that defy the current hegemony of single currency monetary systems. The banking clusters, on the other hand, mostly intervene in the area of how money is created, and under whose control and conditions the creation takes place. That is why, in our analysis, the IMMR and the Sovereign Money proposals (B3) not only directly criticize and act against the private issuing and control of money, but also question the current dominant practice of fractional reserves of debt money. Finally, because finance works in tandem with the underlying banking and currency matrix, we have placed alternative finance solutions (F1) at the centre of the graph, connected with all four areas of critique, and intervening in all of them through varied means. For example, Peer-to-peer (2P2) lending platforms that work with multi-currency systems, can directly defy not only the money monoculture, but also its unquestioned principles, such as interest, and, by bypassing the need for intermediaries, the private control of money allocation.

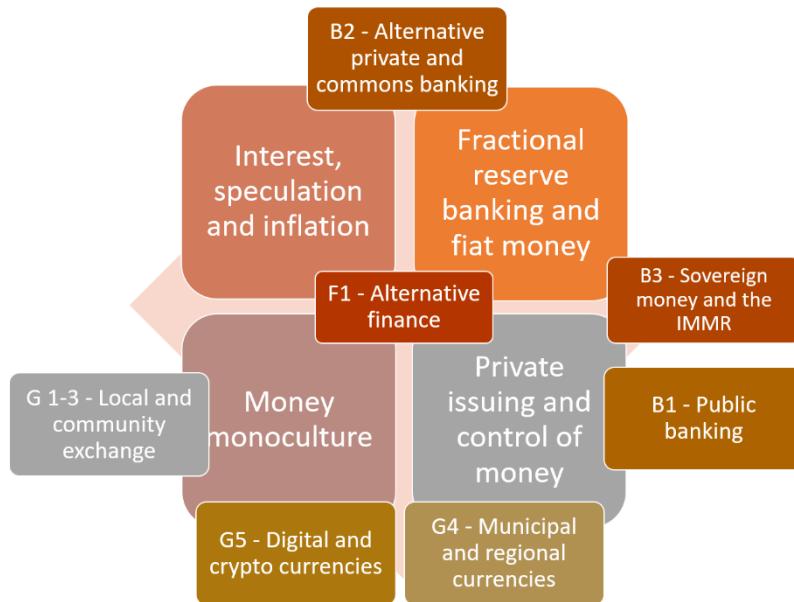


Figure 3 - AMNE's and the four dimensions of the monetary design critique

3.1 Landscape, regime and niche innovations

Moving on to place these seven clusters of Alternative Monetary Narratives and Experiments within the Multi-Level Perspective framework, it is important to first understand the different dimensions of MLP, namely landscape, regime and niche innovations, especially in the context of monetary systems. Starting with the higher level of structuration of activities, we have the socio-technical landscape. This represents the wider context, and can affect both the regime and niche innovations. The stability and continuity of the landscape conforms with the “concept of *longue durée* proposed by the historian Braudel, [which] highlights not only the technical and material backdrop that sustains society, but also includes demographical trends, political ideologies, societal values, and macro-economic patterns” (Geels, 2011: 7). The current socio-technical monetary landscape has largely taken shape since the industrial revolution, with the creation of the first Central Banks in Europe, the first stock and bond markets, and the widespread introduction of nation-based currencies that systematically gained economic and monetary prominence (Ferguson, 2008). It is, however, also fair to say that it was during the last decades of the 20th century, especially after the abandon-

ment of the gold standard, that the culture, practice and beliefs that make up the current monetary landscape really came together. This period, like much of the 20th century, was marked by severe and constant crises and shocks (Al-Suwailen, 2012; Reinhart and Rogoff, 2009; Laeven and Valencia, 2008), giving our monetary socio-technical landscape a 'hyperturbulent' character. However, while that hyperturbulence, had deep economic and social impacts, it never critically put in jeopardy the structures, culture and practices of the monetary landscape. A recent example is the monetary and financial crisis in Argentina in 2000-02, which had significant economic and social impacts, spurred the rapid growth of a parallel monetary system – Trueque – but ultimately produced no significant change in the monetary socio-technical regime or landscape. The Trueque fell even faster than it rose and the Argentinian economy took several years to recover from the monetary blow, but the overall system was intact and kept up with business as usual (Gomez, 2012).

The second layer here introduced is the 'regime'. "The socio-technical regime forms the 'deep structure' that accounts for the stability of an existing socio-technical system [...]. It refers to the semi-coherent set of rules that orient and coordinate the activities of the social groups that reproduce the various elements of socio-technical systems." (Geels, 2011: 4). The socio-technical regime is the overall architecture of a specific system that holds the policy, market, technology and culture of that system. While being a 'dynamically static' structure, the regime can be path dependent and locked-in to a dominant design, and therefore resistant not only to changes but most importantly to paradigm shifts (Figure 4).

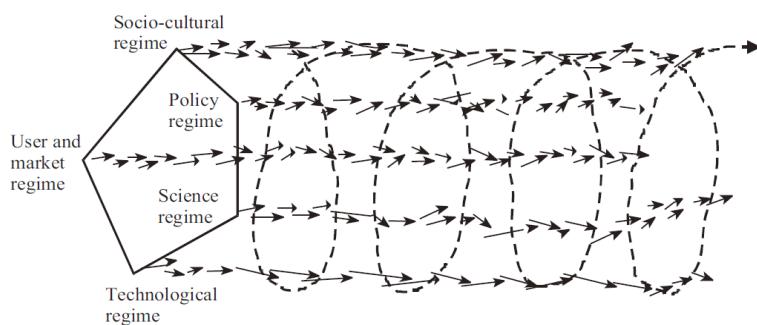


Figure 4 - Socio-technical regime (Source: Geels, 2011)

This is where landscape-exogenous shocks and niche-innovations come into play. Without major landscape shocks, such as the financial crash of 1929 or 2007-08, regimes can stay locked-in for long periods, even in face of ‘persistent problems’ such as systemic crises, inherent inefficiencies, unsustainable practices and negative societal impacts (Loorbach, 2013). Regimes and Landscapes are not independent but rather inter-dependent and even co-dependent in dynamic equilibriums with the capacity for mutual influence, i.e., regimes can have an impact on landscapes and landscapes not only frame the matrix of the regime but can also change them dramatically, specifically in the case of landscape shocks such as the financial crash of 2007-08 and the great recession that followed. Without landscape shocks, the regime will also likely integrate niche-innovations within the regime itself without any major changes to its core structure, institutions and dynamics, so called endogenous renewal (Geels and Shot, 2007: 3), or simply guarantee that they remain marginal, illegal or socially insignificant. This was indeed the dynamics of the socio-technical monetary regime in the four decades before the 2007-08 events. Although niche spaces of monetary innovation spread, grew and gained momentum, from a policy, scientific, socio-cultural and technologically dominant perspective they remained mostly invisible or considered of minimal economic and monetary relevance (Rösl, 2006).

Those patterns changed in 2007, with the financial crash and the great recession that followed. Because of its intensity, speed and simultaneous impact in multiple dimensions of the regime, we consider the 2007 crash to be a key landscape shock or, borrowing a concept from Suarez and Oliva (2005), an “Avalanche change”. Although some authors argue that the subsequent economic crises since 2008 display a mix of regular, hyperturbulence, specific shocks, disruptive trends and avalanche (Loorbach, 2013), we argue that the economic sub-system of money and finance in fact went through disruptive changes in many dimensions simultaneously, and therefore categorized as “avalanche”. This financial avalanche created the conditions not only for niche innovations to breach into the market and gain their space and momentum, but also for the regime to be forced to adapt and look for new configurations. As Barbier rightly claims and Loorbach, cited here, concurs, “perhaps only radical systemic change (or at least the threat of such an event) can induce powerful interest groups to take the necessary steps for dealing with persistent unsustainability, given their vested

interest and the high transaction costs of overcoming institutional lock-in." (Loorbach, 2013: 5; Barbier, 2011: 65).

The signs of this more radical change are many. In 2015, the new Icelandic government requested a study on sovereign money and discussed "A Better Monetary System for Iceland". And in 2016, for the first time in 170 years, the British parliament discussed money creation and set a task force to investigate solutions and alternatives (KPMG, 2016). In Switzerland, a referendum was held in June 2018, to ask citizens if banks should continue to be allowed to create money. Malta recently became the first country in the world to have a specific regulatory framework for blockchain, cryptocurrency and distributed ledger technology. In a similar vein, the EU Parliament very recently approved its first resolution⁹ on distributed ledger technologies and blockchains: "Building trust with disintermediation".

At the same time, traditional banks saw their market share fall while ethical banks – even in conservative markets - witnessed sustained growth (Callejas-Abinana, 2017). Likewise, the European Social and Responsible Investment market doubled from 2010 to 2016¹⁰. But the biggest changes did not come from existing market players or shifts in the market share of banks and investment firms - they came from new industry entrants with different rationales, behaviours and technologies. Most of the monetary, banking and financial innovation post-2008 did arguably not come from existing industry leaders, but from a multitude of new actors such as Transferwise, ripple, SEEDRS, Cyclos and Community Forge (see figure 4 below). These new actors are entering the market, boldly pushing multicurrency borderless accounts, low fee online banking practices, freeware for the development of digital community currencies, decentralized proof-of-account verification systems, direct investment in what the investor believes in, accountability and transparency in money transfers and allocations, and more.

⁹ <http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P8-TA-2018-0373&language=EN&ring=B8-2018-0397>

¹⁰ Source: <https://www.statista.com/topics/3973/ethical-investments-europe/>



Figure 4 – Leaders versus innovators (Source: Future of Financial Services, World Investment Forum (2015)

The 2007 landscape avalanche also opened the ‘Pandora’s Box’ of digital and crypto currencies, which gained momentum, investment and increased acceptance in the aftermath of the crisis. A typical example is that of Bitcoin and blockchain technology. Having existed in the shadows since 1991, the decade since 2008 has seen an exponential growth in their use, profile and acceptance, having Satoshi Nakamoto’s seminal paper introducing Bitcoin in 2008 as key tipping point. Blockchain is today widely recognized as a technology that will have a major role in the re-configuration of the money, banking and financial systems in the world (Tapscott and Tapscott, 2016; Iansiti & Lakhani, 2017). A potentially even greater disruptor is the meeting of digital crypto currencies, the GAPA giants (Google, Amazon, Paypal, and Apple), and worldwide crypto currencies that transcend nations, central banks, or private banks, become a reality. Such an initiative is already at our doorstep¹¹.

3.2 Transition pathways in monetary systems

As mentioned before, reforms, revolutions, re-alignments and even the collapse of complex systems can come from very different sources, with distinct natures and dynamics and affect the socio-technical regime in different ways. Understanding such dynamics of change then, is central for effective change-makers, policy-makers, anarchists and monetary reformists. This is so not only to understand the dynamics at play,

¹¹ <https://initiativeq.com/>

but most importantly to help identify underlying barriers and hidden opportunities, threshold points, optimal leverage areas to steer the socio-technical transition towards sustainability, resilience and regeneration.

Figure 6 below offers a first categorization of the seven AMNEs according to their level of coordination (from unplanned/emergent to planned/vision-driven) and the nature of resources allocated and invested by the specific movement or experiment (internal or external to the regime). In this way we can differentiate from more top-down (Q2) to bottom-up dynamics (Q4) as well as between processes of endogenous renewal and reconfiguration and more emergent and transformative processes.

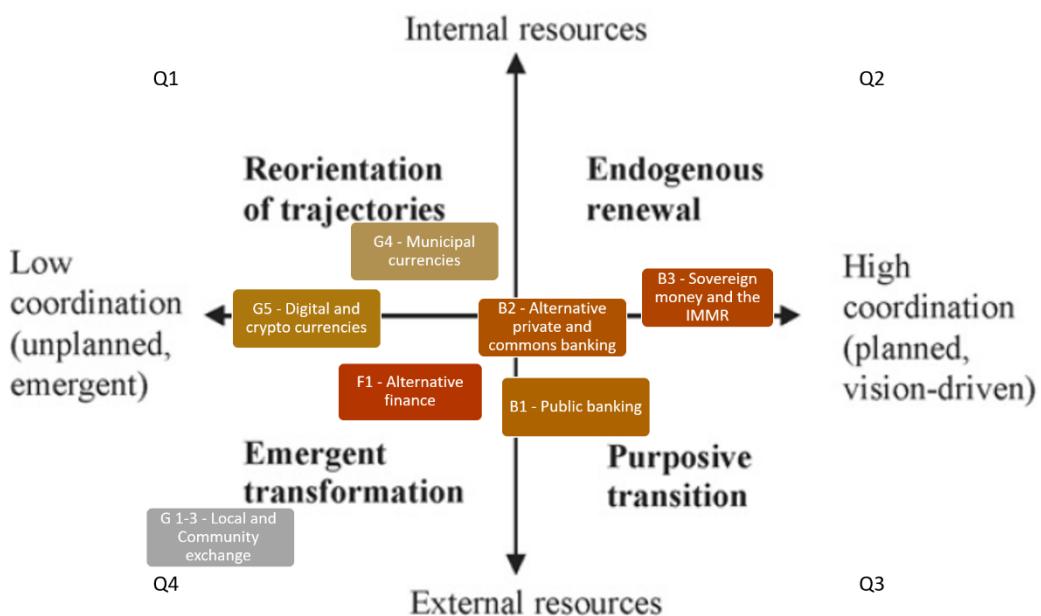


Figure 6 - Transition pathways and AMNEs, adapted from Geels and Schot, 2007

Following the definition of 'alternative' put forth earlier in this chapter, we would expect to find most AMNEs in the emergent quadrant due to their decentralized, low coordination, niche-innovation nature. However, this systematization allows a richer visualization of the different AMNEs, acknowledging that some have a clear top-down transformative (or purposive) vision demanding a high level of planning and coordination and using resources both external and internal to the socio-technical regime. Also important to acknowledge is the growing role of municipality-driven complementary currencies, which is happening within the administrative capacity of the regime in a semi-decentralized way and using mostly the internal resources of the system. In these cases we can refer to a 'Reorientation of trajectories' or a reconfiguration

of the regime that uses the landscape shock to scan, test and absorb some niche innovations in order to continue pursuing its goals. We also argue that the place of Digital and Crypto currencies is between internal and external resources, since some of the biggest investors in such new technologies are current industry leaders, such as Goldman Sachs investments in Bitcoin or Paypal's new qinitiaitve¹². Similarly, worldwide financial and governmental institutions are putting a lot of effort into regulating and creating markets for such technologies. Figure 6 also allows us to see that the different AMNE clusters are located in different of socio-technical transition pathways, source their resources in different ways, and require different levels of coordination. This plurality of solutions and approaches might reveal itself a winning formula, avoiding direct competition while acting at multiple levels. However, it might also turn out to be ineffective in producing change if not correctly understood and to a certain degree managed.

3.3 The monetary transition from an MLP-TM framework

Figure 7 enables a first visualization of our working conceptual model, with the different AMNEs placed in an MLP chart according to their suggested nature and embedded dynamics. Here, we see the levels of landscape, regime and niche innovation on the y-axis, with time making up the x-axis, the landscape shock of 2007-2008, and the different clusters placed accordingly.

¹² <https://www.bloomberg.com/news/articles/2018-10-01/institutional-investors-are-using-back-door-for-crypto-purchases?srnd=cryptocurrencies>

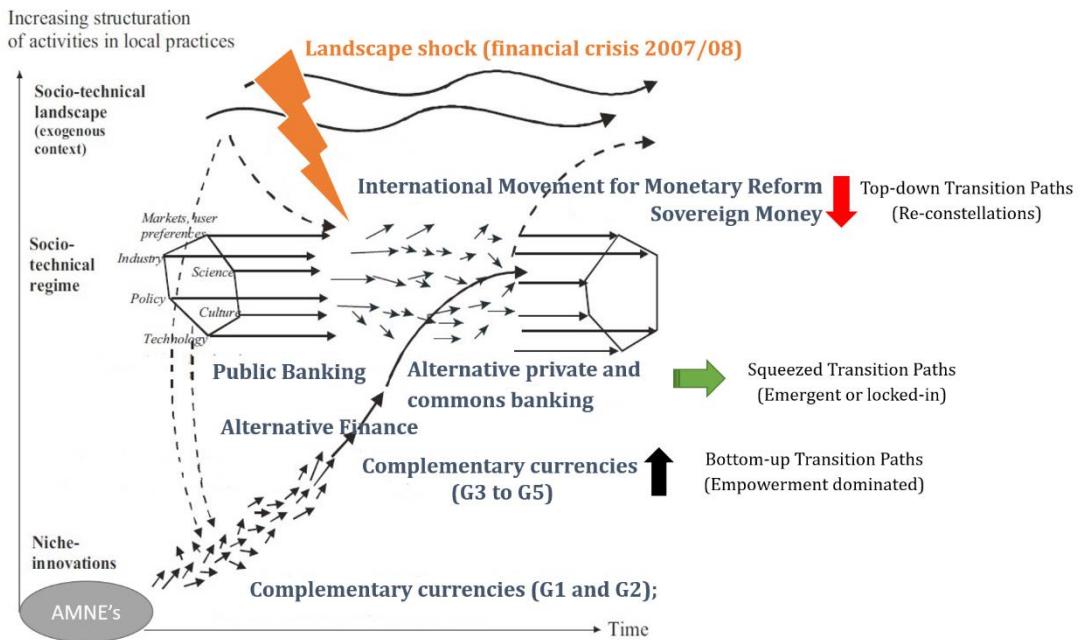


Figure 7 - MLP and the AMNE's: a first conceptualization

Starting from the bottom of the y-axis, we find complementary currencies G1 and G2 (LETS, other Mutual credits and Time Banks), reflecting their marginal socio-economic level of institutionalization and structuration within our current system. Other complementary currencies are placed further up in the y-axis because although they are unquestionably niche-innovations, we argue that the newer generations (Municipal and regional complementary currencies (G3 and G4); digital and cryptocurrencies G5) satisfy, to varying degrees, the four proxies for regime re-alignment potential: there are established dominant designs; there are powerful actors joining in; price/performance is increasing; and, the market niche and volume they represent is already statistically relevant. To add to this, most have the clear mission, or at least a willingness, to affect and transform the monetary system. One can argue that some of them already re-shaped that regime, such as in the case of the WIR in Switzerland, the C3 in South America, the Fureau Kippu in Japan or Bitcoin worldwide (Stodder, 2009; Lieater, 2013).

Further up on the y-axis we placed Alternative Finance. It is clear that many recent financial developments are niche-innovations that support or are supported by grass-roots initiatives with a clear bottom-up dynamic. Many of these initiatives have also

gone through a process of integration and regulation by existing monetary and political authorities. One example is crowdfunding, which is now fully regulated in most OECD economies. There are, however, also cases of alternative finance developments that follow a different pathway, one more in line with what in TM is called an emergent squeezed transition. A good example is Social Impact Investment – a mechanism to finance organizations that demonstrate their social impact, in partnership with public sector, private investors and very often third sector organizations. This is more than just an incremental improvement or adjustment. Rather, it is supported by a new paradigm of what finance is, what finance should be doing and which values to consider when making investment decisions.

Regarding alternative banking initiatives, such as the above-mentioned Bank of the Commons, Transferwise and JAK Bank, we argue here that they are clear cases of intrapreneurship and inside innovation, and therefore of movements within the regime itself, attempting to re-arrange part of its design to accommodate new market demands and spread risk. These are often initiatives that work within existing banking laws and regulations, but which explore the edges, gaps and the unexplored realms of those regulations in order to push the boundaries of the system and introduce new logics. They are distinct from the ethical and ecological incremental advancements in the industry – such as in the case of La Nef and TRIODOS Bank – and bring disruptive practices within the cultural norms of the regime. They surf on the landscape shocks that open the space for regime changes, while at the same time they also have their own momentum and agenda running parallel to both niche innovations and landscape changes. These are also initiatives that explore ground-breaking new technologies, and as early adopters of these gain competitive advantage over industry leaders. The evolution of Transferwise from a more efficient and cheaper platform for online money transfers to a new player in the banking industry with multicurrency bank accounts and a 100% online bank across borders is a great testimony to the power of innovation and early technology adoption.

Between alternative private banking initiatives and sovereign money proposals, we have the public banking. This is a growing movement within the U.S. as well as in Europe. We have placed it higher up in the y-axis as we primarily see it as a dormant

piece of the old monetary regime that awakened after the 2007-08 avalanche and gained traction with the succeeding austerity measures that strongly limited the public sector's ability to respond to the economic crisis. It is not the core purpose of the movement to abolish private banking or to end the fractional reserve system and the money multiplier or even to promote currency plurality. Rather, it is to place the power of money creation back in public hands, for the financing of the economy and especially of public goods and within the public sphere. Public banking is not *per se* an innovation, neither a niche. It is being supported by grassroots initiatives and established political parties alike, both outside and inside in the socio-technical regime, and therefore categorized it as playing a role in an emergent squeezed transition.

Finally we have the International Movement for Monetary Reform (IMMR) and its founding member Positive Money UK. These, we have placed closer to the landscape level since their three key proposals aim for a major redesign of the banking and financial regime, with substantial socio-technical as well also socio-economic landscape impacts. This, we argue, is clearly within the scope of a top-down radical reform of the socio-technological regime. Within the spectrum of top-down Transition Paths, there are also several other examples that we have not addressed here, but which serve to demonstrate the wide variety of experimentation at the level of the nation state. One such case is the Petro, a new currency in Venezuela indexed to oil prices. Two other, the proposals from Thomas Mayer and Yannis Varoufakis for a dual currency system in Greece using the "Geuro" or a revival of the Greek drachma, and the ongoing Zimbabwean multicurrency experiment operational since 2009.

Continuing our analysis of figure 7 above, but switching now to a Transition Management perspective, one can claim that the AMNEs better positioned to realize their transition pathways are complementary currencies (G3 to G5), particularly if working in tandem with the alternative banking and financial initiatives. This is because top-down reforms or revolutions within the political and socio-cultural context of Europe, the European Union and the Euro area can hardly be achieved in the short or medium term. Perhaps such reforms could happen in non-EMU or non-EU countries, but recent

events, such as the results in the Swiss Vollgeld referendum¹³, the delay by the Icelandic Government in taking bold monetary action, the discouraging EU response to any ideas for a dual currency system in Greece in 2012, and the ECB's negative response to a digital Euro aimed at directly financing the economy in a "helicopter money" proposal¹⁴, all indicate that the probabilities are quite low. Tight connections between the monetary socio-technical regime and the political socio-technical regime make it virtually impossible to enact any major changes or break-through at the moment unless a much wider and stronger socio-economic-political avalanche change takes place. The implementation of a dual currency system in an EMU member state, for example, would require amendments to European Treaties, approvals by the EU Parliament, the EU Council, the European Central Bank or the National Central Bank, National Parliament approvals, in a never-ending political and bureaucratic loop which seems rather unlikely to come about. On another hand, a nation-wide, non-governmental crypto currency, implemented by an alliance of NGO's, co-operatives, companies and even local public governments, could be implemented in an efficient and effective way in just days or weeks. For example, if you wanted to revive the Greek drachma in the midst of an economic crisis, the simplest, quickest and cheapest way to do so would likely not be through the Government, but by a coalition of private and public entities.

Similarly, we find that the pressures and movements for public banking also could be more effective if done at a regional or local scale and using complementary currency as an instrument. The city of Curitiba in Brazil is a great example of local public policies being implemented by the municipality using a local currency managed by a "public bank" (Lieater, 2013). These reinforcing complementarities between AMNE's for sustainable transitions in the monetary socio-technical regime will be further explored and discussed in the next section.

4. Unpacking plurality and complementarity between AMNE's

¹³ The Swiss rejected by a significant majority (73%) the Sovereign Money proposal.

¹⁴ https://www.fidefundacion.es/dinero/Sobre-la-emision-de-un-euro-digital_a16.html

To foster the type of collaboration, cross-pollination and synergy between AMNEs that we just discussed, we believe that it is fundamental to unpack two key concepts: monetary complementarity and monetary plurality. Regarding the former, we see complementarity between AMNEs unfolding in a similar way to Blanc's proposal for complementarity between monies: substitution; simultaneity; supplementary; and autonomy (Blanc, 2016). Focussing on a socio-technical transition, we will here look mostly into complementary relationships of simultaneity and supplementary, which share the characteristics of coincidence of spheres of use, and the potential for mutually beneficial linkages. Considering plurality, we aim to go beyond the limited and constrained concept of just "more-than-one" currency systems, and integrate different types of monies, different banks and different financial mechanisms as well as multiple combinations possible among them. As the thinker and philosopher Edward de Bono said, "The notion of multiple target currencies opens up a new way of thinking in economics... Multiple parallel systems, with permeable membranes between them, give very stable systems – as in the human body. This is a whole field which needs, and will get, attention." (De Bono, 1994). Monetary plurality, then, is not only about breaking free from a single dominant currency system, but mainly about breaking out of a single dominant monetary architecture. With that, monetary plurality in fact becomes the unifying element of all AMNEs.

In many ways, the claim that monetary plurality can be a key unifying element with the AMNE sector, is a continuation and evolution of the famous works of Mundell (1961) and his currency zones, Polanyi's (1957) ideas of "special purpose money", Hayek's (1976) denationalization of money, and Douthwaite's (1995) proposals for Ecological Money systems. All of these authors propose multicurrency systems, beyond multiple debt-based national currencies, to provide not only economic efficiency but also resilience and economic justice. We argue that it is in this exploration of potential new monetary architectures that synergies and opportunities truly emerge. Figure 8 below thus provides a snapshot of the unfolding of monetary plurality and some of the possible combinations. For example, the possibility of different types of currencies with separate function, supported by different types of banks and ownership structures, and enhanced by different technologies that in turn allow for very different financial mechanisms. Instead of responding to the crisis and the unsustainability of

our monetary system with a new currency, or a stronger bank or even a new type of green bonds or “sustainable” stock market, the invitation thus becomes to consider the monetary system as a whole, and explore the cross-benefits arising from this integral view. Wicked and persistent problems deeply embedded in a regime cannot be solved by single solutions. They require wicked and persistent solutions working in tandem and complementarity. What happens when we combine public banking ideas with municipal or regional complementary currencies? What happens when crypto-currencies meet with alternative banks or alternative finance? Or when the sovereign money proposals bypass the need to reform the current monetary system and instead focus on developing their own parallel national currency systems?

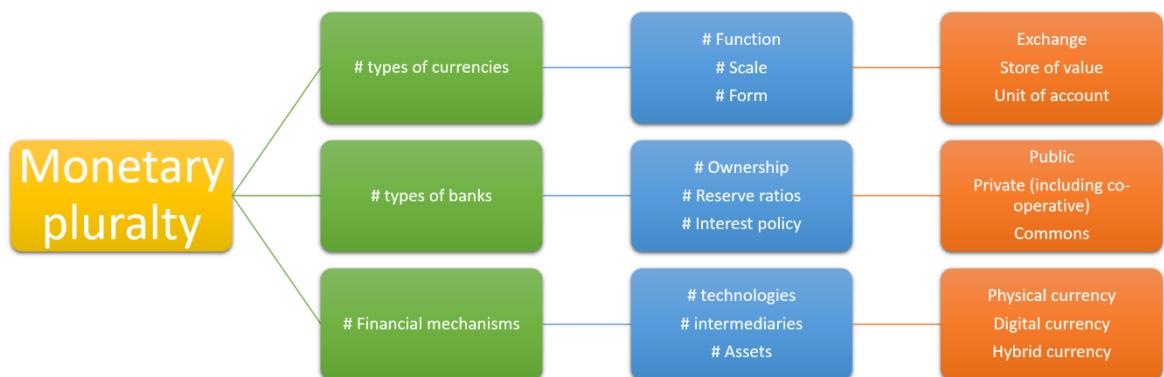


Figure 8 - Unpacking monetary plurality

These are the spaces of incredible potential for deeper transformations and reconfigurations of the monetary system. These meeting places between AMNEs are, if you will, where the magic happens and revolutions can take place. Furthermore, although the confluence areas between AMNEs are many, we argue that two areas are of particular interest and socio-technical relevance: municipal complementary currencies (MCC) and crypto currencies (CryC). As illustrated in figure 9 below, which further develops the graph in figure 7 above, municipal complementary currencies are a space where complementary currencies can meet public banking solutions, embrace a commons-focused governance system and alternative finance practices, and even apply some sovereign money principles at the local or regional scale. Crypto currencies, on the other hand, are a space where complementary currencies easily can meet with alternative banking practices and finance mechanisms. An example of the latter is the Fair-coin, which was used in the financing and start-up of the Bank of the Commons, and

has been adopted by several co-operative movements in Europe to finance a new economic system.

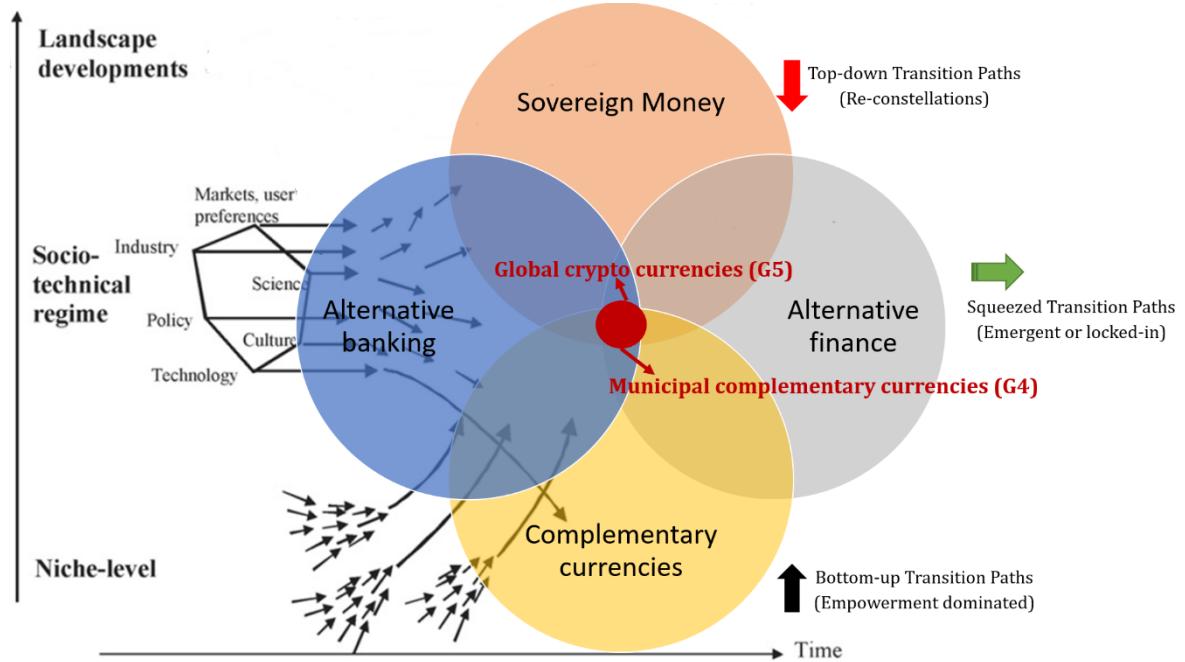


Figure 9 - Unpacking complementarity within the MLP-TM framework

The convergence place for MCC and CryC depicted figure 9 is of particular relevance to our argument not only because of the potential synergies between AMNEs, but more importantly because of the potential societal impact of their adoption in the short and medium-term. A local complementary currency might find it hard to gain social and economic traction and acceptance, as thousands of experiments all over the world have indeed showed (Schroeder et al, 2011). A Municipal currency validated and supported by the local government, on the other hand, can easily grow to a regional scale and have significant macro-economic impacts. An example is the E-portemonnee, which started in Limburg, Belgium, and now expanded to more than 10 municipalities in the region, reaching out to more than 850.000 people¹⁵. Similarly, a monetary or financial reform at a global level to anchor money in the real economy, such as the Kilowatt Dollar proposal presented at the Rio 92 conference, might remain a utopia for decades, while a decentralized, global, blockchain-based solar energy incentive

¹⁵ <http://www.communitycurrenciesinaction.eu/e-portemonnee/>

such as SolarCoin quickly achieved a very significant 48 million coins in circulation within a few years¹⁶.

The core issue here at stake is why? Why are municipal complementary currencies and crypto currencies the leverage points for a systems shift in the monetary regime, and what makes them so different from other AMNEs like Time Banks, Peer-to-peer lending or even Ethical Banks? Two key reasons: appropriate scale; and appropriate relationship with the existing regime. MCC are a great example of appropriate scale. Not too small, nor too big, they provide the benefits of a locally rooted currency without many of the acceptance and circulation issues – mostly solved by the backing of the municipality itself – and at the same time avoid having to face bigger and stronger systems, such as Central Banks, and heavy bureaucratic legal processes nation-wide. They can thrive in the legal, fiscal and political autonomy of the municipality, and keep local rootedness and accountability. CryCs are a great example of the relationship between regime institutions, cultures and laws. Transboundary in every way, decentralized, evolving quickly and multiplying even faster, they are hard to regulate and even harder to stop and/or control in an effective way. However, they do not pose any real threat to the regime, at least not in the short-term, and most of the times appear in complementarity. The invitation they extend to the existing regime is for more effective and efficient transactions, a more transparent and accountable system. And a more creative and innovative system beyond the next derivative and more towards the next Ecocoin or Recyclebank. So, in a way they do not pose a direct threat to the regime, like for example sovereign money does, and their creative technologies and solutions are far from being old or irrelevant, which can be the case with some Time Banks or local currencies. At the same time, they cannot easily be stopped or eliminated from the ecosystem. This does not leave much choice to the existing institutions but to adapt, reconfigure and reorganize. Through appropriate scale and relationships, MCC and CryC can thus bypass or transcend many of the limitations imposed on other AMNEs, and thrive within a post-avalanche ecosystem that is more open to change and welcoming of different solutions.

¹⁶ <https://chainz.cryptoid.info/sl/> - Visited Nov 27th 2018

5. Conclusion

Throughout this chapter, we have argued that the financial 'avalanche' of 2007-08 is a landmark changing point in the overall direction of our monetary economies. It triggered, unlocked and gave rise to a multitude of alternative narratives, experiments, movements and innovations in the monetary field that are unprecedented and to a high degree also unstoppable and uncontrollable. We clustered these AMNEs in seven categories, and used Multi-level Perspective and Transition Management to better understand the nature, dynamics and potential of these different technologies, innovations and paradigms. We also aimed at exploring the synergies between them by unpacking the possibilities for complementarity and plurality within the monetary field. Our conclusion is that the strongest drivers for a reconfiguration and substitution of the current monetary system in Europe are the newer generations of complementary currencies, specifically crypto currencies and municipal/regional currencies. These bottom-up initiatives are squeezing their way into the existing monetary regime, exploring the fringes left open by the financial landscape shock, and forcing the existing institutions and cultures to adapt, reconfigure and even re-constellate. While not pushing for top-down reforms or revolutions, their potential impact within this transition period is very significant and is leading to a technology substitution - particularly with Blockchain - and a culture of monetary plurality that might be the biggest step towards a more diverse and resilient, perhaps even sustainable, monetary system.

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5.2 Municipal eco-currencies: the appropriate scale for sustainability?

Within the spectrum of profound transformative monetary actions highlighted in the article on section 5.1 above, I dedicated a period of my research on the particular case of municipal currencies. Municipality-supported or directly managed complementary currencies represent a new generation of complementary currencies (Blanc & Fare, 2013) which have been consistently growing in Europe since the Global Financial Crisis of 2008/9, many of which already with embedded green or sustainability principles in its design. The case of municipal cases in Spain (Serra, 2015), the UK Transition Towns currencies (Singer, 2018), the Austrian towns accepting payments in local currencies (Blanc & Fare, 2013), the municipal reward systems implemented in Belgium and the Netherlands (Bindewald, Martin, & McCann, 2015), or more recently the development of such systems in Portugal (Nabo, et al., 2021), are important case studies that I have explored in order to assess the true impact of these monetary innovations in pushing for societal changes in behaviors and beliefs towards increased resilience and sustainability at the local and regional scale.

Following the key concept of 'monetary subsidiarity' put forth by Marie Fare and defined as "a complementary scheme in which, on each relevant scale of action, a specific currency is deployed within a single socio-economic and geographical sphere of use" (Fare, 2018, p. 221), I argue that the territorial socio-political construct of the municipality is, in many cases, the most appropriate scale for monetary sustainable innovations and to navigate the complexity of monetary strong plurality. Three critical reasons converge to support the previous statement:

1) Firstly, a matter of political and fiscal autonomy. At least in Europe, and as the different case studies showcase and the social and solidarity economy law in France (OECD/EU, 2017) officially recognizes, local governments retain a level of economic, fiscal and political autonomy that allows for the recognition, validation and co-use of such monetary innovations. The Municipality therefore represents a scale within the monetary regime where monetary niche innovations can find spaces to break through and enter the monetary regime. As the case of the Gramo highlights - see section 4.4 -

having the Municipality as an official guarantee of the validity, acceptability and convertibility of the CC scheme is a crucial factor in its success;

2) Secondly, at the Municipal scale, one can often strike an ideal balance between direct accountability and socio-ecological embeddedness, an economic scale that allows an appropriate level of diversity of actors and flows within the system, and a significant macroeconomic potential impact. In that respect one can claim that the potential monetary circuit of a Municipal currency can achieve the appropriate critical mass of economic actors and transactions to justify an exchange system, while not being too big or dispersed for one to lose track of its accountability, or to have to give up on the necessary participatory shared governance. Moreover, it is a scale where it is possible to easily transcend some of the limitations of small community or neighborhood currencies which often show no significant economic activity or overall macroeconomic impacts (Michel & Hudon, 2015);

3) Thirdly, historically there are several accounts of the use of Municipal currencies, either as emergency currencies to prevent the collapse of the internal economic system, for example in moments of war, or as a tool for monetary localism with the "idea of revitalizing activity and financing local projects or local public authorities" (Blanc, 2006, p. 5). J. Blanc documents the case of several "free currency" periods in different European and South American countries, where either local banks, local municipalities or local business were free to issue their own currencies. Perhaps less known but of particular interest to me was the case of such Municipal currencies in Portugal, namely in 1920's and 1930's. This phenomenon in the Portuguese monetary history helps to illustrate how local currencies have already been a valid economic instrument to bring increased resilience for local economies, given an inflationary or other kind of external shock. While some of these Municipal or private currencies only circulated for a brief period of time - such as the case of the Municipality of Sintra which were issued and redeemed between 1921 and 1923 due to Governmental decree (CMS, 2018) - others lasted for almost an entire decade - such as the case of the Municipality of Gondomar where these complementary notes remained in use from 1917 to 1926 (CMG, 2018). Although the use of local Municipal currencies in Europe, in times of war or of economic shocks is a well documented phenomena, most unfortunately the economic literature on these currency uses is scarce and does not allow a proper scientific investigation to estimate the socio-economic impact of such local emergency

currencies. More recent examples of Municipal currencies in the 21st century have started to show how these could be important counter-cyclical instruments to add resilience and sustainability to local economies (Jayaraman & Oak, 2005).



Figure 14 - Example of a Municipal currency issued in Portugal in the 1920s (Vieira, 1999)

The arguments for giving special attention for Municipal initiatives towards monetary plurality are not meant to dismiss or criticize the role of more "highly localized level" CC's - such as Time Banks - nor the importance of regional currencies, such as the Eusko described in section 4.4 or the German Regional currencies (Regiogeld) that Magrid Kennedy, Bernard Lietaer and John Rogers strongly advocate for (Kennedy, Lietaer, & Rogers, *People Money: The Promise of Regional Currencies*, 2012). On the contrary, and as argued above in section 5.1, a resilient multi-currency system constellation is dependent on such a diversity of currencies working at different scales. However, the defining characteristic of the Municipal scale is its optimal political and economic sphere, where both local and regional currencies overlap and where an ecological monetary integral governance can potentially occur at best efficiency and resilience. A caveat must be made here before proceeding: municipalities differ substantially, particularly in terms of scale. In Portugal for example, the biggest municipality has more than half a million people - Lisbon - while the smallest has less than 500 - Corvo (<https://www.pordata.pt/Municipios>). So it might be that the optimal political and economic sphere is not always the Municipality but rather the parish, or on the other hand the inter-municipal region. I just use the Municipality as the key reference point.

As argued above in section 5.1, municipal currencies have the potential to be major trigger points and catalysts for societal transition and transformations within the monetary system. Not only in supporting and giving the necessary recognition and

legal framework for local CC initiatives but also as places of mediation between different monies operating at different scales and performing a multitude of socio-economic and ecological functions (Blanc & Fare, 2013). However, and as it is increasingly recognized within a more normative approach to complementary currencies, it is of fundamental importance that we build radically different monetary governance structures. As Skylar Brooks argues the appropriate monetary "scale can be seen as a product of governance [...] First, governance directly influences scale [...] Second, governance arrangements determine the conditions under which money is created and credit is provided [...] Third, the rules of the monetary game can be designed to intentionally promote pro-environmental behavior" (Brooks, 2015, p. 16). These will necessarily bring to the political scenario new institutions, new governance mechanisms and dynamics - for example based on direct participatory democracy, transparency and reciprocity - , new technologies and a shift of powers. This is something that can be seen happening with municipality-driven responses to climate change. Initiatives such as 'The Covenant of Mayors' - <https://www.eumayors.eu/> - DK2020 in Denmark - <https://nordregio.org/nordregio-magazine/issues/remote-work-and-just-green-transition/unique-municipal-collaboration-accelerates-climate-action/> - or the Costa Rica municipality-led program 'País Carbono Neutralidade' - <https://cambioclimatico.go.cr/programa-pais-carbono-neutralidad/> - are important examples that show how interconnect networks of municipalities, often across national borders, are moving faster and setting more ambitious goals than nation-states. As Branko Milanovic points out the world needs to move beyond the limitations and the constrictions imposed by the obsolete political and economic invention of the nation-state if we are to face the challenges posed by climate change and economic inequality (Milanovic, 2019). I would argue the same regarding the governance and the future of our monetary ecosystem and suggest looking into the Municipality as the appropriate sphere for such a new monetary governance model which is both socio-economically rooted and politically interconnected at a relevant scale of action and accountability.

I will further develop these insights in chapter 7.

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6 THE MISSING LINK

6.1 Revisiting the Missing Link

Revisiting the Missing Link: An Ecological Theory of Money for a Regenerative Economy

Filipe Moreira Alves ^{1,*}, Rui Santos ¹ and Gil Penha-Lopes ²

¹ CENSE—Center for Environmental and Sustainability Research, School of Science and Technology, NOVA University Lisbon, 2829-516 Caparica, Portugal; rfs@fct.unl.pt

² Centre for Ecology, Evolution and Environmental Change (cE3c), Faculty of Sciences, University of Lisbon; 1749-016 Lisboa, Portugal; gppenha-lopes@fc.ul.pt

* Correspondence: fmalves@fc.ul.pt

Abstract:

Money is critical for a regenerative future. Transforming it is an unavoidable social, political, and economic endeavor that must be a global priority if we are to prevent future financial crises, reduce economic inequality and adhere to our climate agreements and sustainability goals. For this transition to occur, we urgently need new economic and monetary paradigms that address the root causes of our current unsustainability, offer a new monetary ontology and design, and, more importantly, steer our monetary regime towards the regeneration of our social, economic and ecological landscapes. We need an ecological understanding of money grounded in Ecological Economics and an Ecological Value Theory that lays down the foundations for the conscious democratization, decentralization, and diversification of money. In this work, we revisit and update the missing link between money and sustainability by proposing new ontological avenues and reviewing the design elements and degenerative processes built into the existing system. We also contribute to the development and emergence of Ecological Monetary Economics by systematizing the ongoing monetary transition toward sustainability and by offering a set of principles drawn from the regenerative economics literature for the conscious design of monetary ecosystems that contribute positively to solving our societal challenges of the 21st century.

Keywords: money and sustainability; monetary transition; regeneration; monetary ecosystem

1. Introduction

Much has been written in the aftermath of the 2008 global financial crisis (GFC) on the causes, the consequences, and the actors of this tremendous financial shock to our economies. Its sheer magnitude, cascading societal impact, and long-lasting ripples forced scholars and politicians to dig deeper than ever before for answers, while it opened up spaces for increasingly unorthodox ideas and debates to surface, namely in terms of money, banking, and finance [1]. It was a 'landscape shock' strong enough to crack open the monetary-banking-financial regime, leading to widespread niche innovations, such as complementary currencies, and the strengthening of alternative monetary theories, such as Modern Monetary Theory. It gave rise to social movements such as 'Move Your Money' campaigns, 'Public Banking' or 'Slow Money' [1].

Within the tsunami of articles and publications analyzing the events, the triggers, and the fragilities within the current monetary, banking, and international financial system (IMS hereafter), a rogue report authored by a group of transdisciplinary thinkers, stood out with a fresh and out-of-the-mainstream perspective on the financial crisis, monetary design and the central role of money in our current economies. "Money and Sustainability: The Missing Link", published in 2013 [2], argued a simple yet radical idea: our monetary system lies at the center of the (un)sustainability of our current societies, and therefore, it cannot be, naively or intentionally, considered neutral, exogenous or innocuous to our economies. More adequately, it should be seen as part of an invisible matrix, solely questioned, that locks us into instability, inequality, and unsustainability [2-4]. This crucial link between money and sustainability, mostly absent in mainstream monetary thinking, is argued to be the critical missing part in neoclassical monetary theory and a key piece in the necessary transformation of our monetary system if we are to avert the "triple crunch": another significant financial crisis, socio-economic inequality and instability, and ecological disaster [5-7]. Undoubtedly, the responsibility for the current ecological and socioeconomic situation in the world cannot be solely attributed to our monetary system. However, Lietaer et al. [2] argue that

in our increasingly monetized societies, where so much economic and political power has become dependent on how money is supplied, allocated, and (re)distributed, one cannot exclude it as an important explanatory variable.

Nevertheless, and until the GFC, there was apparent myopia, disregard, or discomfort, in approaching this linkage and challenging mainstream monetary thought in some of its working assumptions, such as the neutrality and the exogeneity of money, the single-currency hegemony, the privatization of money issuing or the necessary full liberalization of banking and finance. Although those assumptions and strongly held beliefs at the core of monetarism and monetary policy in OECD countries since the 1970s have been in the spotlight and under scrutiny, this is yet to translate into any significant or radical change [8-10]. In the past decade, we have missed a unique window of opportunity for collective and timely monetary transformation and the looming public-and-private debt crisis ahead [11], record-breaking inequality levels [12], together with the acceleration of ecological and social degradation [13,14] and the unique challenges posed by the COVID-19 pandemic to sustainability worldwide [15], make the missing link ever more relevant.

Adding to the reasons highlighted above, we would add three more for the importance of resurfacing the missing link and grounding a new ecological, monetary paradigm: (1) mainstream monetary theory is unable and incapable of understanding and integrating the complexity of monetary innovations booming after 2009; (2) alternative monetary economics, such as Modern Monetary Theory, is not addressing the fundamental degenerative processes within the monetary system; (3) a diverse, complex, and complementary monetary ecosystem requires an ecological perspective than can inspire and guide monetary designers and policy-makers.

As Romain Svartzman and colleagues summarize, we need to develop “a new monetary order embedded in a worldview that acknowledges the finiteness and incommensurable values of Earth’s life support systems” [16] (p. 109). As we step, willingly or not, into unorthodox monetary terrain, a new conceptual framework is needed. This is something that an ecology of money can offer and that we aim to enrich and con-

tinue with the present work. As Donella Meadows pointed out, the most effective leverage point to intervene in a system is at the core of its working paradigms and mind-set [17]. This paper aims not only to revisit the missing link but mainly to continue the development of ecological monetary economics that contributes to the transformation urgently needed in our current monetary and banking system. In this respect, Section 1 summarizes the key ideas and arguments in the existing literature for a structural transformation within monetary theory and the links between money and society. Section 2 debates the next steps within the field of Ecological Economics regarding a theory of money, while in Section 3, we offer some insights and principles for a monetary transition pathway to a more resilient and regenerative ecosystem.

2. Methods

The core methodology for this work is a transdisciplinary literature review. Our starting point is Lietaer et al.'s groundbreaking report "Money and Sustainability: The Missing Link" [2]. We followed the trail of academic and grey literature that references it, focusing on those works that criticize, advance, or update the arguments and ideas gathered in the report. Moreover, we used Google Scholar, Academia, and ResearchGate as search engines for the following keywords: ecological monetary theory; monetary transition; money and sustainability; money and regeneration. Although wide-reaching and transdisciplinary, our research led us consistently to three leading scientific journals—*Sustainability*, *Ecological Economics*, and the *International Journal of Complementary Currencies Research*—and three economic think tanks—New Economics Foundation, International Movement for Monetary Reform, and the Financial Innovation Lab—that form the backbone of our theoretical approach.

The arguments presented have also benefited tremendously from the close interactions and conference discussions with the scientific community of the Network for Early Career Researchers in Sustainability Transitions (NEST) and the Research Association on Monetary Innovation and Community and Complementary Currency Systems (RAMICS).

3. Revisiting the Missing Link

“A fish will never create fire while immersed in water. We will never create sustainability while immersed in the present financial system. There is no tax, or interest rate, or disclosure requirement that can overcome the many ways the current money system blocks sustainability”, Prof. Dennis Meadows, in [2] (p. 6).

Monetary systems are as old as human societies, with debit and credit registries as old as writing, and the role of money in social and economic life is a long-debated theme within religions, philosophical debates, and political economy [18–20]. However, research has shown that the specific link between our monetary system and our societal sustainability is an underdeveloped and under-researched arena of knowledge [3,21]. Beyond loose ideas, scattered hypotheses, and unscientific claims, this fundamental link was only truly grounded in 2013 by Bernard Lietaer and colleagues in a report to the Club of Rome. This timely and politically powerful contribution ended up sharing with some of the works it references and builds upon—ironically, one must note—the historic complacency given to ideas and concepts perhaps too revolutionary for the economic paradigm and political status quo of their times. The report is scarcely cited in scientific articles—256 citations according to Google Scholar (consulted December 2021)—and mostly absent in publications from institutional monetary actors, particularly Central Banks. More surprisingly and striking, the ideas, arguments, and concepts presented and discussed in the report are still mostly ignored or absent in heterodox economics. This might not be surprising to economic historians as one can trace a line of alternative monetary ideas, questions, and hypotheses that significantly differ from the Aristotelian tradition that remain somewhat in the shadow or at the margins of mainstream monetary theory.

In G. Simmel, C.H. Douglas, N. Dodd, and G. Ingham, we trace the lineage of the philosophy and sociology of money [22]. In S. Gesell, A. Kitson, F. Soddy, N. Georgescu-Roegen, H. Daly, and R. Douthwaite, we can find the seeds of an ecology of money and the nexus between money, energy, and sustainability [2,3]. Those sociological and ecological streams found no fertile ground in the development of monetary economics in the 20th century [21]. Likewise, there is a similar absence within key ecological and sustainability literature about the role of money and the impact of the design of the

monetary system, as the authors of the famous Club of Rome 1971 report “Limits to Growth” later recognized: “I did not think about the money system at all. I took it for granted as a neutral aspect of human society [...]. I now understand that the prevailing financial system is incompatible with sustainability” [2] (p. 6). A striking example emerges from analyzing the United Nations’ 17 Sustainable Development Goals and its 169 targets from a monetary reform perspective. None directly targets or even mentions the necessary monetary system transformation. Even those that focus directly on banking and finance—such as targets 8.10, 10.5, 16.4, and 17.4—propose more regulation, expanded access to the same flawed system, or even suggest ‘debt sustainability’ management, not questioning where that debt came in the first place or the underlying mechanisms—like compound interest—that make it structurally unsustainable, unfair and highly damaging for developing countries [23,24]. Furthermore, part of the reason for this collective blindness to the money-sustainability nexus is because transforming monetary systems to meet sustainability, resilience, and stability is not about tweaking the capital requirements of banks, adjusting interest rates, or strengthening the role of Central Banks and other financial supervisors [10,25,26].

Monetary transition is an agenda that defies neoclassical economics beliefs, dismisses most macroeconomic and monetary modeling, and questions conventional policy goals—such as Gross Domestic Product growth. It is a convergence of sociopolitical movements challenging the full monetization of economic and social life, the systematic concentration and privatization of wealth, and the dependency on non-democratic, non-transparent banking and financial systems. Therefore, it is a fundamental and radical shift of power, beliefs, and, ultimately of economic paradigms [2,27]. Such a new monetary paradigm can only emerge from a systemic, complex, and transdisciplinary approach to money and economics, sprouting from seeds such as Kate Raworth’s “Doughnut Economics” [28], as much as the Ecological Economics literature and alternative monetary economics [29]. Only then can we fully uncover money’s deeply rooted symbols and embedded structures of power and build something truly new and integrated without falling into the traps set at every corner by conventional thinking.

Suppose we fail to address these structural flaws. In that case, the repetition of boom and bust cycles and the numbers of currency, banking, and financial crises will only continue to add up to what is already an impressive track record of 425 systemic crises in the four decades between 1970 and 2010 [30]. Moreover, we will do it at the expense of our societal well-being as much as our natural ecosystems' resilience and sustainability, despite what might be our best interest, intentions, and international agreements. It is only logical then that "rethinking our money system is a necessary part of any solution [to face the challenges of today]" [2] (p. 193). Not only because of the embedded unsustainability of money but also due to the relationships between money, politics, and socioeconomic power in our modern societies. This necessary monetary apocalypse must include the deconstruction of persistent monetary blind spots (e.g., the monopoly of single-currency debt money), the unveiling of myths about the nature of money and its evolution (e.g., the myth of barter), the exploration of key structural flaws in monetary and banking theory, evidencing its nexus with political, economic and social power, and most importantly the connection with people and planet. A challenge not only to monetarism and (neo) Keynesianism but, more importantly, to Ecological Economics, a transdisciplinary field that, until very recently, did not have a monetary theory of its own [4,31,32]. This is of particular importance for two reasons: firstly because we urgently need new paradigms to understand complex economic systems that do not treat the biosphere and ecological impacts as externalities or market failures but that "explicitly recognize the interconnections and interdependence of the economic, biophysical and social worlds" [33]. Secondly, and as Joe Ament rightly argues, without a sound monetary theory, "ecological economics risk importing flawed monetary theories and dualistic social/ecological ontologies, and accordingly, proposing ineffectual and contradictory policies" [31,32] (p. 2). Therefore, we need an ecological approach to money, and ecological economics needs a foundational theory of money.

3.1. An ecological Ontology of Money

Revisiting the missing link between money and sustainability starts with revisiting money itself. Without delving too much into the history of money, perhaps because "[i]n truth, we can probably never discover the origins of money. Nor is this crucial

for understanding the nature of the operation of modern monetary systems [...]” [34] (p. 12); a definition of what money intrinsically is, opposed to what money does, is taken as the common starting point for a new alternative narrative among ecological and sociological thinkers [2, 32]. However, given the plurality and diversity of manifestations, representations, and interpretations, crystallizing what money is has proven to be an immense and controversial challenge. Attempts to offer a unified “Reference Ontology of Money” – see [19,35,36] – remain as philosophical debates at the edge and somewhat distanced from current monetary thinking. Although there is a growing consensus within heterodox economists and other social scientists to see money not as a thing – a commodity or a neutral lubricant of economic activity – but rather as a social phenomenon – perhaps one of the most complex social institutions in our modern societies [22,37] – a new ontology of money with non-hierarchical dualisms between humans and nature is only now emerging and solidifying [31,32]. Lietaer et al. attempted to fill that gap with their ecological definition that follows the credit theory of money and tries to go further by honoring place and people at its core: “money is an agreement within a community to use something standardized as a medium of exchange” [2] (p. 120). This definition already allows us to broaden the scope of what we consider money and look into economic history with different lenses. However, in this paper, we will take a different stance. Firstly, because the notion of an agreement presupposes some degree of consent, consciousness, or intentionality by its users, we argue it might not always be the case, particularly with the dominant “national” currencies, as we will explore further on. Secondly, because it overstates the exchange function of money, specifically over the unit of account function, that is more overreaching and sounder from a sociological, anthropological, and ecological standpoint [18,38]. More than a social technology that shapes social relationships and institutionalizes value [39], money should be taken as a language that creates commensurability and comparability among the different goods and services [14,40]. Therefore, our transdisciplinary ecological ontology of money must go beyond the classical metalist notion of money as a thing or the chartalist concept of money as credit. Above all, money is the underlying economic language in our societies. The symbols, structure, unique design, and the specific uses of that “language” shape us individually in our behavior and beliefs, as much as collectively in our relationship with each other, with nature, and ultimately our choices and futures [3,41,42]. “Languages do matter for sustainability.

In addition to being communication instruments, they can shape value systems about local nature.” [43]. In that sense, we support the claim that “[m]oney is not only endogenous from an economic standpoint but also from a social one [...] and the existing monetary order seems incompatible with the emergence of a much-needed new ethics of human-nature relationships” [14] (p. 117). Therefore, building an ecological ontology of money must be more than just recognizing its intrinsic endogenous and social nature, or adding “ecological” words and concepts to the existing hegemonic dictionary. It must be a starting point to re-examine the invisible structures of money, its hidden value assumptions, and the starting point to offer new narratives and theories congruent with a systemic, holistic, and ecological view of money.

3.2. The Critique of the Current System: Structural Design and Detrimental Processes

In the convergence point between structural design and societal impact, the missing link between money and sustainability is fully revealed. Once again, Lietaer et al. play an essential role in synthesizing and crystalizing a wide range of century-old ideas: “Today’s monetary system combines a pro-cyclical money supply with de-regulated capital flows and uncontrolled speculative flows incentives. Furthermore, this money is created with built-in compound interest that makes growth obligatory and automatically renders the concentration of wealth. None of these features is an immutable law of nature. They are all conventions that can be systematically counter-balanced [...]” [2] (p. 117). From this analysis, three fundamental building blocks of the IMS are stated: compound interest, single-currency hegemony, and privately created debt. These design elements lock us into unstable and unsustainable patterns by what the authors call the ‘five detrimental processes’: pro-cyclical nature of money creation; short-termism; compulsory growth; concentration of wealth; and devaluation of social capital [2] (p. 94). This systematization of the social and ecological critiques of the IMS is crucial to understanding the missing link and developing an EMT. Based on current developments and our critical assessment, a few modifications are proposed, particularly to the detrimental processes, i.e., the intrinsic working mechanisms built into the system that perpetuate the key design elements and accentuate the overall degenerative impact of the whole system. Firstly, we would add two more detrimental processes: on the one hand, monetary governance, or more specifically, the undemocratic, opaque, highly centralized, non-transparent, non-inclusive governance within our

monetary institutions. Something that Lietaer et al. bring only at the end of their work and that we wish was given more centrality and visibility as it contributes to all other detrimental processes while disabling public debate, discouraging civic action, promoting myths and unnecessary complexity, and hindering collaborative solutions across the political and socioeconomic space [44,45]. The addition of monetary governance to the detrimental processes of the unsustainability of the IMS is made for three key reasons: (1) because money, as Nietzsche defined, is the 'crowbar of power', and any change to the architecture of the IMS is not only a political endeavor but more fundamentally a power negotiation. After all, the current dominant money exists "not by nature, but by law"; (2) to reinforce the relevance of the unique institutional arrangements, often negotiated in the context of wars between nations that created the present system [46]; and finally, because governance and agency directly influence the scale, the pace and the heading of any transition and is crucial for the impact of a currency as we will later on [44,47]. On the other hand, we would also add a detrimental process that is not referred to by Lietaer et al.: currency wars, i.e., the processes by which the IMS is able to push out, destroy, depreciate, integrate or limit other complementary or competitive monies. This is done by employing institutional conceptual discrimination—for example, what Central Banks define as money—legal instruments—what is officially recognized as legal tender by the state for the payments of taxes—and economic instruments such as transactional fees, exchange rates, and other depreciation tactics [48].

Secondly, in our analysis, we propose to re-classify the privatization of money issuance and allocation from a design feature to a detrimental process for two key reasons: (1) by itself, as an isolated design element, one cannot argue that private money is necessarily degenerative. Many forms of non-governmental money issuance and control can be regenerative, as we will see later on; (2) the privatization of money, specifically after the 1970s, has been a growing, incremental process with many stages, protagonists, and practices behind it. It has been a critical dynamic process in the loss of public monetary accountability and the mass misallocation of capital to destructive industries, particularly in the face of growing de-regulation and lack of financial control, that the famous offshore accounts are the most "visible" side [45].

Thirdly, we propose eliminating two detrimental processes: compulsory growth and short-termism. The latter is considered a result or a consequence of specific design elements – such as positive interest and future depreciation – not a distinctive process. Moreover, many aspects of what alternative authors criticize as short-termism are mainly determined by political cycles, cultural biases, and people's time preferences beyond the monetary system's design. Regarding the long-standing debate in terms of 'compulsory growth' and the 'growth imperative' following some recent contributions made by Arnsperger et al. [7], we fundamentally agree with the authors' critique of the over-simplified, interest-focused initial formulations of the growth imperative. We stress that the overriding dynamics pushing for that impetus and need to grow the monetary base – namely the leakages to unproductive spheres and the high concentration of financial wealth – are already encapsulated within the "privatization & concentration of wealth" as well as within the "governance" processes.

These modifications to the initial analysis from Lietaer et al. allow us a more up-to-date and complete image of the already not-so-missing link. If taken together and considering the non-linear interaction between the five processes identified and the three core components of the IMS, the true 'root of all evil' is ultimately unveiled. Not the language or the social technology itself, but rather its structural design. Therefore, it is here that any initiative towards transforming our money system, and with it, our economic system and society, must start.

3.3. Establishing Priorities for Monetary Reform

Monetary reformists, as much as monetary innovators and radical thinkers, have been putting out different strategies and priorities for the transformation of our monetary system. Lietaer et al. sided and reinforced the ideas and voices arguing for deep structural reforms rather than cosmetic changes [25,26]. From the elements above in Figure 1, the priority for transformative action is clear-cut: to challenge the monetary 'blind spot' and core design fault of a single-currency hegemony by designing and implementing a diverse monetary ecosystem with multiple currency systems other than a monoculture of bank-debt money, are allowed to play a role. As mentioned by the authors: "The structural solution needed to give sustainability a chance, albeit totally unorthodox, is to diversify the available exchange media and the agents that create

them. In short, in place of a monetary monoculture, we need a monetary ecosystem [...]. This would provide greater structural diversity in both the media of exchange and the institutions creating them.” [2] (p. 88). Jérôme Blanc, Georgina Gomez and many other heterodox economists reinforce this claim by focusing on monetary diversity and plurality as the defining characteristic and the starting point for an alternative, more resilient, and sustainable monetary system [49–51]. These concepts are explored and developed mainly from a strong plurality perspective and not from the more common weak plurality—which only concerns different means of payments or market competition between the same types of currencies, following the Austrian school of thought [52]. Strong plurality extends that diversity to units of accounts and focuses on ‘unpacking complementarity’ and the different means of linking different types of endogenous money—substitutability, simultaneity, supplementarity, and autonomy [49]. Although we fundamentally agree and support strong monetary plurality, we argue that the rejection and critique of movements and initiatives towards more institutional reforms—such as the American Monetary Act and the Sovereign Money proposal in the UK [53]—and the oblivion of other squeezed alternatives—e.g., Move Your Money, Public, Ethical and Values-Based Banking—is detrimental for the overall transition of the monetary regime and perhaps reflects a lack of systemic approach to large-scale transition processes and a biased belief in niche diffusion and translation. As mentioned elsewhere [1], there is no single recipe for monetary reform and re-alignment, and there can hardly be a shared vision given the number, diversity, dispersion, and scale of alternatives. It is a technological, institutional, and socioecological multi-level and multi-actor dynamic that requires integrated strategies, working in symbioses to fully explore the cracks left open by the GFC landscape shock. This is something an ecological theory of money can offer, but only if it integrates this multi-arena, multi-stakeholder, multi-term holistic ecological gaze.

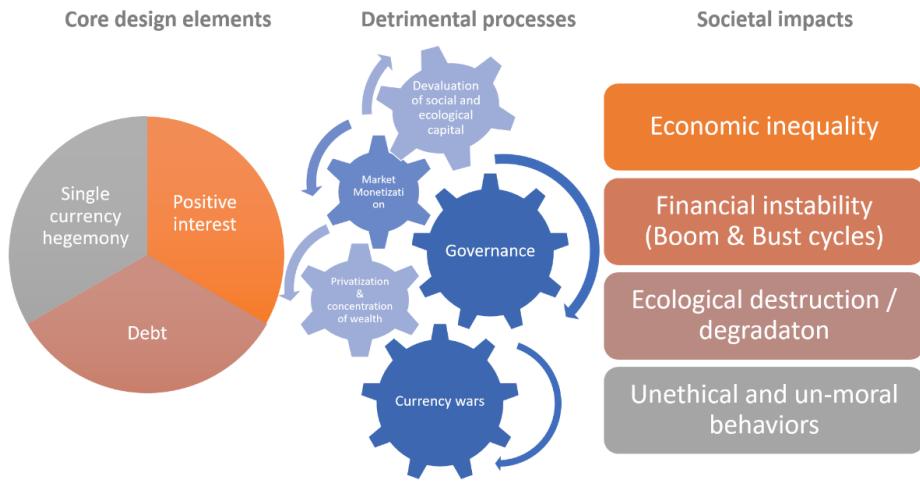


Figure 1. Three design blocks, the five detrimental processes and their combined impact.

4. New Developments for Ecological Monetary Theory

“Money and Sustainability: The Missing Link” is a report that makes its economic paradigm explicit and refers to ‘Ecological Economics’ as the working baseline for the concepts, ideas, and references presented. This is particularly relevant because it is, to our knowledge, the first attempt at building an ecological monetary theory, which made evident the gaps, limits, and biases within ecological economics, namely regarding its monetary thought. Building a monetary theory out of a field of dispersed, not always coherent, and not yet mature ideas is a challenge in itself [54]. By the time Lietaer et al. were writing, Ecological Macroeconomics was still in its early stages of development and mainly was an ‘ecological add-on’ to post-Keynesian models [16,55,56]. EE value theory is an under-discussed and undervalued theme within the field [54,57,58]. Furthermore, as Louie Larue recently argued in his critical assessment of the ecology of money, the analogies and comparisons between the natural world and monetary ecosystems are “unlikely to hold”, and the transposition of critical concepts, such as efficiency and resilience, “still needs quite a lot of work to withstand scientific critique” [54] (p. 7). The ontological and epistemological foundations of an Ecological Monetary Theory (EMT hereafter) were only laid down recently by Joe Amment [32]. Based on his work as well as Lietaer’s contributions we envision a theoretical nested relationship for Ecological Monetary economics, as illustrated in Figure 2.

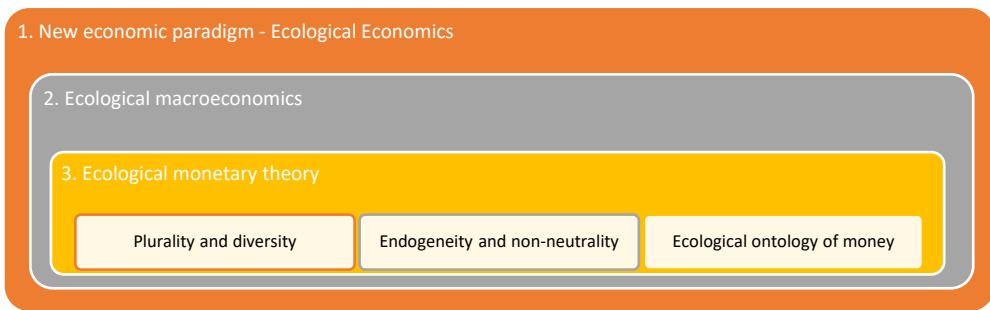


Figure 2. The foundations and nested logic of an EMT.

Beyond Ament's [31, 32] and Svartzman's work [16], developments in ecological monetary economics, have shyly progressed since 2013, with ecological economists developing the macroeconomics dimension of EE – see for example [55,56] – and the three key concepts of the EMT highlighted in Figure 2. These developments allow us to envision a monetary theory that focuses not on the quantity of money but instead on the qualities of different monies: a monetary theory that embraces the necessary complexity of an ecosystem of currencies and unpacks its potential relationships – one that re-symbolizes the language of money coherently with an ecological paradigm. A monetary theory that sets concrete monetary goals and policies in tune with a sustainable and ecological economy. However, as we have pointed out earlier, ecological monetary economics is still far from standing on firm ground and proving itself a scientifically sound alternative. Adding to an ecological monetary ontology – discussed in point 1.1 – and a solid critique of the current system – point 1.2 – in our perspective, two elements are strongly needed: a transdisciplinary systems science value theory; and the transition theory that offers pathways and storylines of a new monetary future and how to get there.

4.1. An Ecological Theory of Value

"Value theory forms the bedrock of several economic paradigms" [57] (p. 1) and is probably the most critical theoretical piece needed to 'finish the puzzle' of Ecological Economics and place it "as a more effective interdisciplinary paradigm". After all, value theory sits at the core of economic paradigms with profound implications in all ramifications of any school of economic thought, Ecological Economics being no exception [57–59]. An Ecological Theory of Value (EVT hereafter), sprouting from seeds such as the Energy Theory of Value [60], could be the fundamental 'missing piece'

between Ecological Economics and an Ecological Monetary Theory, that the ‘Money and Sustainability: The Missing Link’ report, and most of the literature afterward, fails to address. Important debates that have fueled Ecological Economics, namely in the 1990s, around embodied energy, exergy, energy, and Energy Return on Energy Invested – see for example [61–63] – are scarcely mentioned. We are left without this key theoretical construct of the EMT. One that can challenge the classic – labor – and the neoclassic – utility – view of value, valuation, and money, with an embodied energy concept of value at its genesis. A benchmark concept of value and wealth that anchors monetary theory within the laws of thermodynamics and sets design principles for what Silvio Gesell called, more than a century ago, ‘a natural money system’. Such a grounding theory would also provide a clear framework for monetary and economic analysis: the Energy Return on Energy Invested.

An Ecological Value Theory is also a fundamental piece in the analysis, criticism, and offering of solutions regarding the degenerative design elements, particularly the ‘Debt’ and ‘Interest’ processes. Both have been extensively criticized by the ecological, de-growth, steady-state movements, not always with the scientific backing that an EVT could provide [7]. Two fundamental design principles emerge from the EVT literature: (1) no money system should carry positive interest. Interest should be 0 or negative; (2) no money system should be debt-based. Instead, we should design and implement currency systems backed by real assets, banking systems based on full reserve, or revert to mutual credit systems [64,65]. Finally, an EVT with energy and the Laws of Thermodynamics at its core could be the ideal starting point for new currency designs. Examples of this include what H. Odum’s proposed with the Emdollars, R. Douthwaite with his ‘ebcu’ [41], Kang with the Energy Coin [66], and many others have continued with energy-backed or energy-linked currencies [67].

4.2. A Monetary Socioecological Transition

Building an ecological theory of money is both an end goal and a more profound, longer, harder iterative process of questioning and transforming monetary paradigms and practices. And for such processes, a transition theory is of fundamental importance to better understand and frame ongoing dynamics and, more importantly, to anticipate, explore, and manage the opportunities, limitations, and conditions for

steering this sociotechnical transition [68]. The literature on transition theory applied to the monetary-banking-financial sector is scarce. However, contributions have been made, for instance, regarding transitions within the UK banking systems [10], the principles for global transitions in money [69], systemic intrapreneurial transformations in finance and banking [70], the use of complementary currencies as a tool for a low carbon economy transition [71], as well as regarding the meta-transformation within the broader monetary-banking-financial system using Multi-level Perspective and Transition Management theory [1].

In this work, we want to build on these contributions while using the specific lenses of “Sustainability Transitions”, i.e., those processes, pathways, and actors that are involved in disruptive changes and transformations which are happening within the IMF towards a greener, more sustainable, regenerative system [10,71,72]. In particular, we are interested in understanding it mainly from an institutional and sociotechnical approach focusing on who is doing what within the IMF transition process and which level of influence can each actor-practice combination have in our monetary shift towards sustainability. Considering this and based on current trends in monetary innovation, practices, and theory, we identified and categorized three interdependent spheres that are emerging and co-developing, powered by three different socioeconomic-political dynamics. The first sphere, which we named “Green money”, includes the new awareness regarding the ecological and social footprint of money systems, making headlines in both alternative and mainstream academia and media [73,74]. It includes calculations of different payment systems’ energy and emissions footprints—Cash vs. Visa vs. Cryptocurrencies [75,76]—as much as different currencies themselves. It integrates new trends in sustainable and fair banking, both in the private sector [77] and within the realm of central banks—see the latest Glasgow Declaration from the Network for Greening the Financial Systems [78]. It pushes for social and ecological accountability and new standards in financial markets, stocks, and bonds [79]. It has led to the developments for the decarbonization of cryptocurrencies [80], the creation of ‘greener’ versions, such as Bitgreen—to face the critics regarding Bitcoin’s significant ecological footprint [81]—or the promotion of sustainable cryptocurrencies such as Moeda, IOTA or Solarcoin [67].

It is the logical first step to improve or upgrade the existing system in many cases. It is not revolutionary nor transformative but part of the squeezed-in transitioning processes [1,10]. Most of the dynamics, practices, and actions that we have categorized within this first sphere have a limited impact in steering the IMS towards sustainability, and they do not fundamentally address any of the three design blocks or the five detrimental processes identified above. It might even lead to socially detrimental banking strategies, such as the war on cash [82,83], which might have positive environmental impacts but have profound negative impacts on those more vulnerable to a cashless society. Moreover, it might contribute to “develop path-dependency through processes of optimization and incremental innovation” [47] (p. 605).

In a second sphere, we have a more profound process that looks beyond the mere “greening” of our money and payment systems and focuses on the goals and societal impacts of each monetary strategy and policy. We call it the “sustainable money” sphere. It includes recent movements lobbying for the European Central Bank and European Banks to align their monetary policy with the SDGs, the Paris Agreement, and our common climate goals [84,85]. It also includes the movements toward Public Banking in the USA [86] or UNEP’s vision of “Aligning the Financial System with Sustainable Development” [87]. It recognizes that monetary policy affects our world in very tangible ways and seeks coherence between social, environmental and climate goals with monetary goals. Four illustrative examples are: (1) the ‘Green Quantitative Easing’ campaign [88] and the ‘Green Scorecard’ for Central Banks, which ranks central banks’ climate performance, taking into account not only the footprint of their operation but, more importantly, the ecological impact of their investments choices and monetary policies [89,90]; (2) impact currencies and impact tokens designed to foster and accelerate the implementation and reach of the SDG’s [91]; (3) corporate and complementary currencies designed to promote and reward sustainable lifestyles and behaviors—such as Ecocoin, NU-Spaarpas or Torekes [92]; and finally, (4) developments in energy currencies, carbon currencies and emission reduction currency systems whose design and goal is targeting CO₂ reductions and new standards of wealth and value anchored in nature [70,93]. The actors and actions within this second sphere still work mostly within the current monetary paradigm and its institutions, forcing its ‘re-

configuration', 're-constellation' and re-direction. It can be argued that these are transformative actions as they can potentially alter the configuration of the IMS regime in its design blocks – particularly regarding the single-currency hegemony and opaque governance. However, they have been limited by their scale, applicability, and other sociopolitical-economic constraints such as lack of proper funding, re-prioritization of goals, and monetary regime resistance to change [94,95]. The potential socioecological impact of sphere two actions is significantly higher than those of sphere one, particularly in the face of constant landscape pressures. Finally, our third sphere represents the radical shift an ecology of money embodies. It goes far beyond the footprint of money or its strategically designed goals. It is a sphere that includes the overall design of the system as a whole, its players, flows, relationships, and key assumptions. Therefore, it is not about incremental improvements (sphere one), nor reconfigurations within the existing regime (sphere two) but a different consciousness that informs a radical redesign and re-conceptualization of the whole IMS. It envisions a fundamentally different monetary architecture based on the building blocks in Figure 2. The sphere of deeply transformative and revolutionary actions leads to profound socioecological impacts on our economies and societies. Due to its disruptive nature, and following the work of Daniel Wahl [96], we call it "regenerative money". It includes new currency ecosystems in development, such as Seeds, which already embodies a whole-systems approach focused on regenerative actions – see Figure 3.

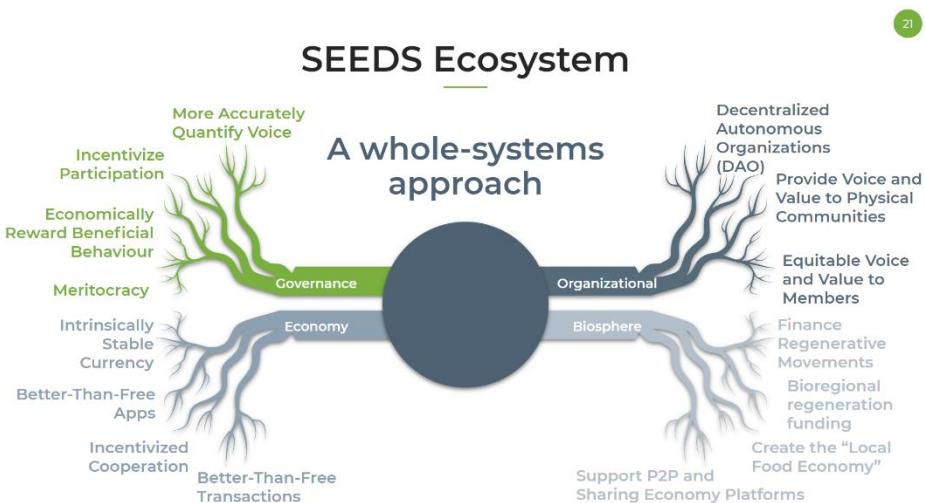


Figure 3. Seeds ecosystem design.

It also includes the principles behind the movements towards regenerative finance as stated by the Capital Institute [97] or Triodos Bank Regenerative Money Centre. It is a sphere characterized by new monetary actors, institutions, movements, and socioeconomic and political dynamics radically re-conceptualizing the monetary paradigm of the last 50 years. It works at the highest leverage point, and because of it, the implications and potential impacts are deeply transformative. Its holistic perspective addresses all building blocks and detrimental processes in Figure 1 and beyond.

To complement the ‘what’ is of crucial importance to know the ‘who’. Once again, we categorized three parallel dynamics according to the actors or institutions driving and governing each monetary development: people-powered money; sovereign money; and corporate money. The first one represents the niche innovations and bottom-up dynamics of groups and communities, specifically at the local and regional level, through the promotion and active support of community currencies, time banks, barter networks, and mutual credit systems. It is mostly a decentralized, heterogeneous, not-for-profit, exchange-focused, and resilience-building social dynamic [98]. This has been an abundant experimental, pioneering movement and field of monetary innovation in all three spheres, particularly in “green money” and “sustainable money” spheres [94,95]. However, its impact on the IMS regime or influence in the transition processes is residual [95,99]. The second dynamic is towards complementary Sovereign Money creation, or official acceptance, by the state either through the government (national or local level), the central bank, or a third independent institution. It has gained momentum since the GFC in two main streams: the adoption of municipal currencies at the local level, frequently in multi-stakeholder initiatives – see, for example, the case of REC in Barcelona; and the fast development by major central banks worldwide of CBDCs or ‘govcoins’, such as the E-krona in Sweden or the digital e-Yuan in China [100]. It represents the integration of new technological developments – such as Blockchain – into the existing centralized, not-for-profit, exchange, and unit-of-account public service system that aims to regain its monetary power. While in the municipal currencies stream, it is common to have social and ecological principles and goals fully embedded in the monetary design – see, for example [101] – regarding CBDCs, only a small fraction of ‘under research’, ‘pilot’ or ‘proof of concept’ CBDCs seem to be already integrating socioecological principles into their designs, placing the

vast majority of CBDCs outside of our spheres and Municipal currencies within sphere 1 or 2. Lastly, we have the case of corporate currencies. A movement started decades ago with air miles, consumer loyalty points, and other benchmark cases such as the WIR in Switzerland, and that has been evolving since 2009 towards widespread use by businesses of global digital and cryptocurrencies [102]. Sardex, a B2B regional complementary currency [103], and Ven, a global digital ‘stablecoin’, provide two case studies of such developments since 2009. This decentralized, for-profit, all-purpose money dynamic has gained particular relevance for institutional monetary institutions given the potential impact of such global giant corporations – such as Facebook with ‘Diem’ and Amazon with ‘Amazon coins’ – developing their internal currency.

This double-entry logic for the systematization of ongoing trends and innovation dynamics within the monetary system can help us to better frame and understand the underlying mechanisms and the impact of each actor-practice combination. It also allows us to identify arenas for future development – e.g., sustainable and regenerative CBDCs – and potential tipping points for systems change. Figures 4 and 5 provide two graphical representations of the ongoing dynamics we have discussed. Figure 4 integrates “Climate Change” as an overarching concept for the climate and ecological landscape pressures forcing the IMS to change while identifying some trends with the highest potential impact to shake the system.

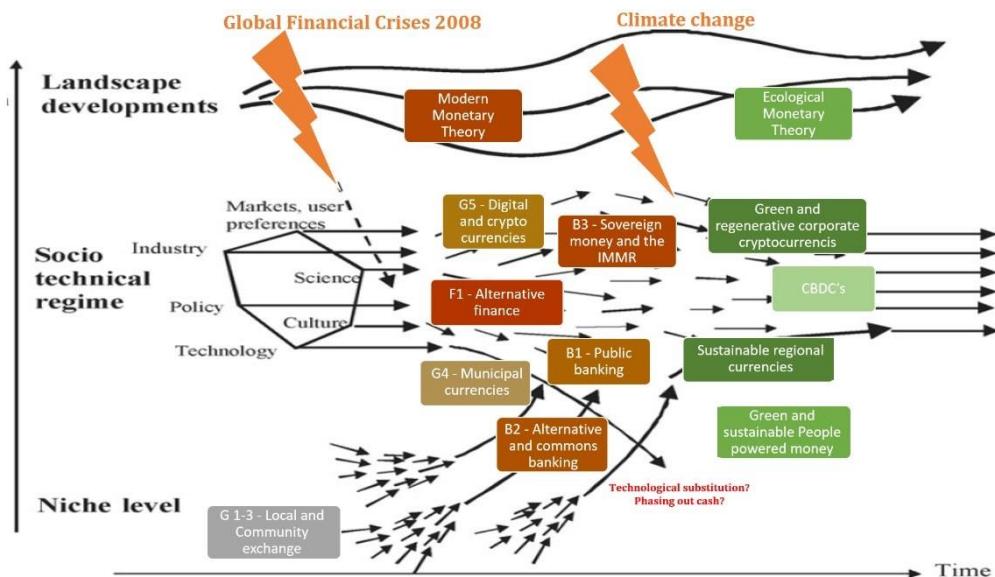


Figure 4. Trends in monetary transition processes (Adapted from [1]).

In Figure 5, we place the three spheres together with the three sociopolitical dynamics and provide some examples of currencies and projects that crystallize the essence of each cluster. While 'Regenerative Money' is still an emerging, challenging trend in its early stages, there are plenty of 'Sustainable Money' examples that can inspire and trigger a movement from Green and conventional money toward more impactful and transformative practices. It is also important to highlight that these are multi-actor ongoing live experiments that can and will transcend these subjective frontiers. Nevertheless, identifying the root, core intention, and consciousness of each transition movement is fundamental for understanding the larger-scale process and its steering towards a shared, desired future.

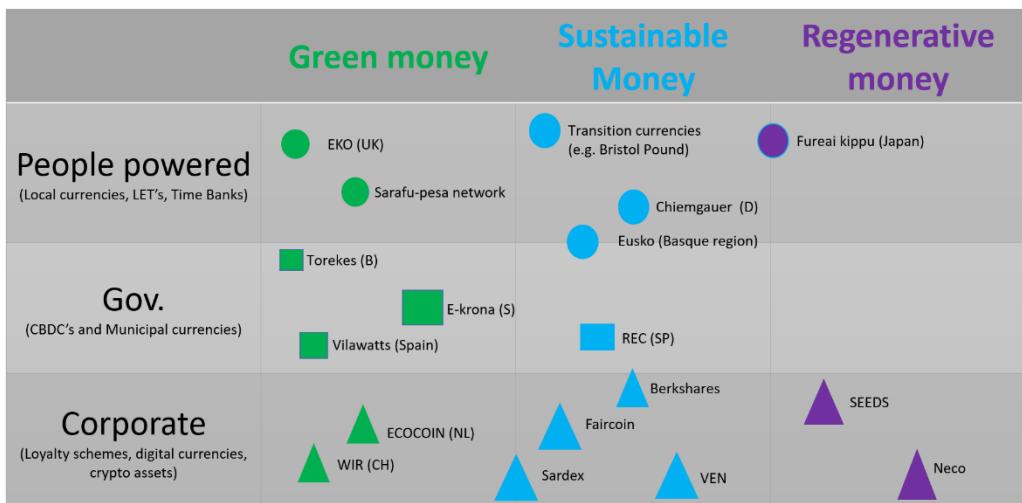


Figure 5. Spheres, dynamics and respective scales of circulation and use.

5. A Monetary Ecosystem beyond Sustainability

This systemic view of an ecosystem of currencies from different actors and serving different socioeconomic functions, together with a narrative of transformation and a transition theory, is a revolutionary step in monetary thinking, one where we must embrace complexity, non-equilibrium thermodynamics, and ecological network analysis if we aim to develop a new and coherent transdisciplinary monetary discipline. This is a non-linear leap, very often into uncharted territory, which we take not with a precise map, compass, and straight route but rather with a set of principles, some boundaries, and envisioned regenerative processes. Furthermore, for it to be transformative and not repeat patterns and mistakes from the past, it cannot be logically incremental nor focus on sustainability. Conventional sustainability and 'sustainable-

thoughtware' are no longer enough [104]. We must embrace the highest leverage point in the system and aim for regeneration. Only then can we protect ourselves from single-focus solutions and the single-perfect-currency illusion. An economic-political mirage that has attracted so many into thinking that there is such thing as a perfect currency that will solve all our economic and societal problems. The Terra TRC by Bernard Lietaer, the mutual credit systems for Bendell and T. Greco [71], the EnergyCoin from Kang [66], or a Carbon Currency that will be the next 'gold standard' and root our entire economic system into the 'real economy' [93].

An ecological monetary system that goes beyond sustainability must thus be anchored in regenerative principles and processes. Based on the works of John Fullerton, Daniel Walsh, Carol Sanford, among others, Patrick Huntjens proposes a new 'Natural Social Contract', based on eight fundamental principles for a regenerative economy [105]. Parallel to this, Brian Fath and colleagues propose ten principles and indicators for a regenerative economy coming from Energy Network Science [69]. Combining these different sources and applying them to monetary systems, while making a differentiation between design principles and regenerative processes, we propose that an ecological theory of money beyond sustainability should be based on the following design principles and regenerative processes (Figure 6):

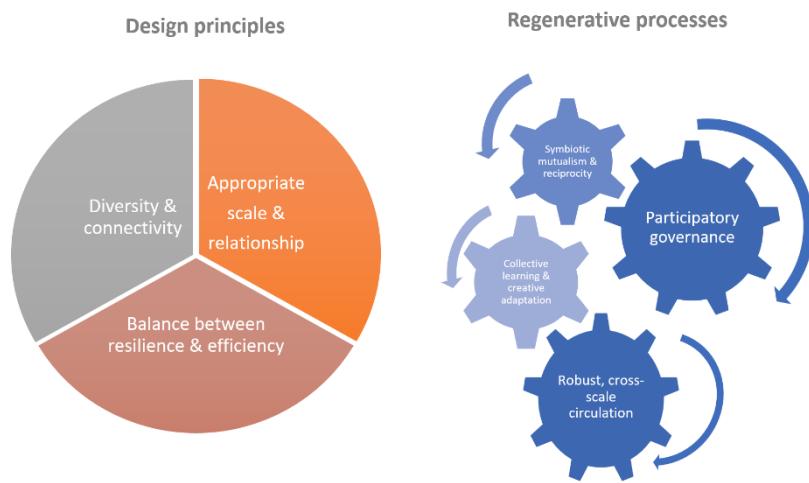


Figure 6. Design principles and regenerative processes

The design elements and the regenerative processes shown above in Figure 6 serve as a map and compass to navigate the necessary transition and potential measures to assess the vitality and health of the ecosystem. It is essential to observe that they are equally important—no hierarchies or “steps” here—mutually beneficial and deeply interconnected. The principle of ‘diversity and connectivity’ has been already discussed above regarding strong monetary plurality, i.e., diversity of actors, mediums of payments, currencies, and units of accounts. Moreover, inhomogeneity by itself is not a necessary condition for a thriving, healthy system. Studies in Energy Network Analysis show that only diverse connectivity can guarantee resilience [69]. To complement and enrich this crucial design element, we need two more: to seek a balance between resilience and efficiency that guarantees that the system avoids excessive stagnation or brittleness and maintains itself within what Lietaer et al. called “The Window of Vitality” [2]. To strike that vital dynamic balance, we need a holistic view into the appropriate scale and relationship of the elements within the systems. This means fitting scale to form and function, primarily as a critical design protocol for each currency within the ecosystem and secondarily for managing the relationships between currencies. As one can easily infer from the lines above, these three principles are tightly connected and cannot be taken isolated as each one calibrates, complements, and enriches the others.

Regarding the processes that we believe fundamental for a metabolic systems, such as our monetary system, to be regenerative, four dynamics are unavoidable: robust, cross-scale circulation; participatory, empowered governance; symbiotic mutualism and reciprocity; collective learning and creative adaptation. “The circulation of money and information is particularly critical in socioeconomic networks, and these flows are always closely linked to networks and processes of energy” [69] (p. 16). Monetary circulation concerns much more than just the speed at which money changes hands—the money multiplier. It is about where that money is going—productive versus non-productive economy [106]—where are the bottlenecks and spaces of accumulation and concentration, where are the leaks in the system—such as offshores and “fiscal paradises” [45]—and the degree of mutualism and balance across scales and actors. A robust and regenerative metabolism must thus “continuously channel resources into self-feeding, self-renewing, self-sustaining internal processes” [69] (p. 18). Part of this

process is intimately connected with seeking symbiotic or synergic relationships that are mutually beneficial. The degree to which an economy can foster collaborative dynamics and mutualism depends on factors beyond money. However, money can be designed to facilitate, promote and reinforce those flows and contribute effectively to a new regenerative economy. The extent to which each currency and the overall monetary ecosystem can integrate feedback learning loops and creatively respond and adapt to a continuously changing environment is perhaps the most crucial regenerative process and, at the same time, the one hardest to measure. Once again, Fath et al. proposed a composite list of indicators for collective learning, which can easily be transposed to monetary systems [69] (p. 19). Finally, we have empowered, participatory, accountable, transparent governance. Given the opaqueness of current existing national and global systems and the importance of these information, organization, and power processes – highlighted in Section 1 – it is only natural that governance occupies a central role in any revolutionary movement towards regeneration. As Lietaer et al. conclude, “[monetary governance] may be the most crucial unresolved organizational question we need to deal with if we are serious about sustainability.” [2] (p. 191).

6. Conclusions

Transforming our concept of money and our understanding of monetary ecosystems is an unavoidable part of any process and pathway of economic and societal re-alignment with sustainability and regeneration. Moreover, the emergence of a new economic and monetary paradigm is a highly complex transition process for which we need new thoughtware to navigate appropriately. An ecological theory of money, such as Ament’s EMT, anchored and supported by an Ecological Value Theory and a Sustainable Transition theory, has the best chance to replace neoclassic monetary theory and provide the right lenses to acknowledge the language of money in all its symbols, forms, and mediums, and redesign our thriving monetary ecosystems to regenerate our social, economic and ecologic landscapes. A monetary ecology must avoid single-focused solutions and embrace complexity, interdependences, and complementarity. At its core, it must have a set of principles and working mechanisms distilled and adapted from the regenerative economics literature. The three design elements – appropriate scale and relationship; diversity and connectivity; balance between resilience

and efficiency – together with the four regenerative processes – robust cross-scale circulation; participatory governance; symbiotic mutualism and collaboration; collective learning and creative adaptation – form the fundamental pillars for a new monetary paradigm that can steer our monies to face the ecological and social challenges of the XXI century.

Future research should increase our knowledge and understanding of complex monetary ecosystems and the interplay of relationships among those currency arenas. Furthermore, it could also shine some new light on the role of money in sustainability transitions and how to explore landscape shocks best to trigger transformations within the IMS. We missed the opportunity for deep reform after the landscape shock of the GFC in 2008. Let us not do the same with the COVID-19 shock and use this opportunity to bring about the monetary revolution the world urgently needs.

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7 MONETARY PLURALITY FOR A REGENERATIVE ECONOMY

"We need to collectively usher in a new age of monetary and societal experimentation, and this requires us to accept new knowledge and experience in areas where it was previously unheard-of. 'Thinking outside the box' of conventional monetary arrangements may have to become the new common sense - not out of a taste for 'newness' *per se*, for anarchy, or for new age ideology, but simply because our future welfare depends on it."

(Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012, p. 191)

The topic of monetary plurality and complementarity is gaining increasing interest nowadays. The advent of digital and cryptocurrencies, including CBDCs, and the exponential growth of alternative payment systems has opened Pandora's jar of new monetary possibilities and constellations, as chapters 4 and 5 demonstrated. Contrary to the diversity of currencies that led nation-states to converge to the IMS in the 20th century, the reality is profoundly different nowadays. These are not just different nation-state currencies with similar designs competing through exchange rates or fiscal policies. Nowadays, we are witnessing many radically different monetary designs, focusing on different scales and functions, and with a wide range of ideologies and beliefs. Moreover, different monies are not merely competing or collaborating within the monetary ecosystem, neither keeping it within fixed political borders. The playing field is much more complex than those binary simplifications or invisible lines. And the growing digitalization of money potentially de-roots and de-materializes even more, these relationships.

The new dynamics of monetary plurality and complementarity are explored in this chapter, as vital processes in the transition towards a more resilient and regenerative monetary ecosystem (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012; Lietaer & Dune, 2013; Mouatt, 2010). As Richard Douthwaite claims, "[..] if we wish to live more ecologically, it would make sense to adopt monetary systems that make it easier for us to do so. Note the plural here. It is not just a case of exchanging a monetary

system [...]. As each money system tends to lead to a particular set of consequences, we are likely to have to use three or four money systems simultaneously to produce the combination of characteristics that we want our society to possess" (Douthwaite, 1999, p. 10). The arguments for a monetary plurality, which have been presented and defended throughout this thesis as a fundamental element of any ecological monetary system of the future, rely on three core dimensions:

1) Increased effectiveness: a multi-currency system of programmable currencies based on monetary subsidiarity and appropriate design - form to fit scale and function - is more effective at delivering different monetary functions, than an all-purpose money. A diversity of special-purpose monies can overcome the intrinsic inconsistencies and incoherencies of all-purpose money and optimize its monetary effectiveness;

2) Increased resilience: a multi-currency system of diverse types of monies is better capable to absorb internal and external shocks while retaining its core functions due to enhanced dynamism, flexibility and capacity to self-organize, particularly at the lower levels where complexity is greater;

3) Better governance: a multi-currency system based in a strong monetary plurality requires a multi-stakeholder constellation with different governance models and a decentralized approach to monetary governance, which allows for greater participation, invites more conscious and transparent decision-making, and enhance accountability.

It is important to note here that the concept of monetary plurality adopted in this dissertation refers to what J. Blanc classifies as 'strong plurality' i.e., a plurality of different types of currencies, institutions and financial mechanisms as presented in section 5.1 (Figure 8 on page 165) of this dissertation (Blanc, 2016). This is a radical different conceptualization of monetary plurality from Hayek's vision of a multitude of competing privately-issued banking currencies (Hayek, 1976), or Zimbabwe's experiments with multi-currency system of essentially the same type of currencies, all entrenched in the IMS - the U.S Dollar, Euro, UK Sterling pound, South African Rand and Botswana (Buiguit, 2015).

R. Douthwaite is among the first heterodox economists to advance with a proposal for an integrated multi-currency system, based on strong monetary plurality, with a territorial-functional perspective at its core - see figure 14.

Proposed world currency system

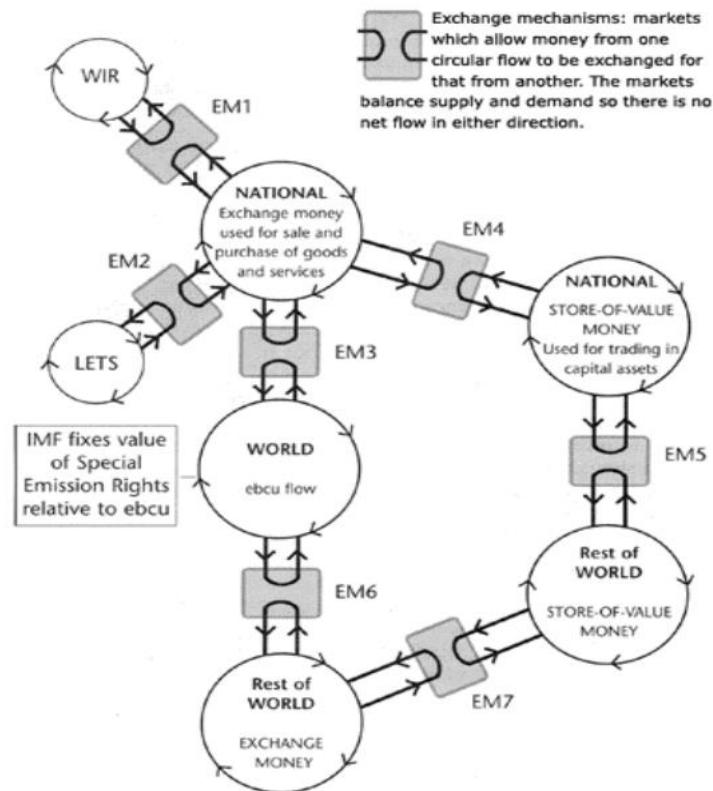


Figure 15 - Integrated multi-currency system envisioned by Richard Douthwaite (Douthwaite, The Ecology of Money, 1999)

This is a revolutionary proposal for classic monetary economics as it simultaneously deals with four different types of monies. It radically differs from proposals and previous studies of multi-currency systems, which dealt with only one type of currency. In this case, Douthwaite proposes an international unit of account based on energy-backed currency units (ebcu) with a fixed value; national and regional exchange currencies issued by each country's central bank under the supervision of the government; local user-controlled complementary currencies, such as LETS, Time Banks, and local currencies; and finally, a store-of-value currency to be used nationally and internationally for trading and balancing capital assets. These four types of currencies would be mediated by specific exchange mechanisms (EM 1-7 in figure 14) that would guarantee semi-permeable membranes around local and national currency areas. It is a territorial-functional system as Douthwaite aims to separate the three critical monetary functions - unit of account, exchange, and store of value - and simultaneously differentiate the scale of circulation.

Another author to share his vision of a multi-layered monetary ecosystem was Bernard Lietaer. In *The Future of Money*, B. Lietaer invites the reader to imagine a four-level monetary system operating in the 'distant' year of 2020. These four levels share some resemblance with R. Douthwaite's proposal:

"A Global Reference Currency
Three main multinational currencies
Some national currencies
Local complementary currencies" (Lietaer, *The Future of Money*, 2001, p. 290).

In the years after, Bernard Lietaer developed this proposal, particularly regarding the global reference currency, which was later coined TRC, or Trade Reference Currency (Lietaer, Arnsperger, Goerner, & Brunnhuber, 2012; Kiuchi, 2004). However, both Douthwaite's and Lietaer's integrated multi-currency systems have not been substantially upgraded or explored in the last two decades. The aim of this chapter is to develop further, and complexify, these proposals.

7.1 A territorial-functional-agent model for monetary plurality

Taking as the starting point Douthwaite's multi-currency system proposal, in this section, I will introduce some complexity to the main variables and later cross his proposal with Lietaer's, and other ecological-based monetary ideas.

The first add-on to the territorial-functional dual model concerns the 'who', i.e., the people, groups, or organizations that use the currency and determine its social circuit. For systematization, I will refer to them as "agents" to accommodate single individual users, NGOs, companies, or Governmental institutions. This is to complement the 'where' - territorial, spatial limits of use - and the 'what' - functional limits - within this model, making it a triple-model for understanding and planning monetary plurality. This triple model allows us to map and systematize different currency circuits, identify overlaps and potential areas for the establishment of new currencies, as well

as identify the need for interchange hubs for existing currencies within the monetary ecosystem.

The diagram presented in figure 15 helps to illustrate how such a model can be used to analyze spaces of monetary complementarity and competition based on the level of overlap, or "coincidence of spheres of use" (Blanc, 2016, p. 239). The higher the territorial-functional-agent overlap, the higher the potential for monetary competition. And the opposite is also true. At the same time, the model can also be used to single-out currency areas of territorial, functional, and agent competition or complementarity. In that respect, it is essential to note that, for example, there can be spaces of territorial-functional high overlap, but if the currencies belong to different agent circuits, then the potential for direct competition is most probably low. A business-to-business (B2B) means of payment circuit, such as the WIR, can have territorial and functional overlap with a local currency used between its citizens - for example The Talent Schweiz -, while having a sufficient level of autonomy that guarantees a sustainable, non-competitive co-use of both currencies (Huber & Martignoni, 2013).

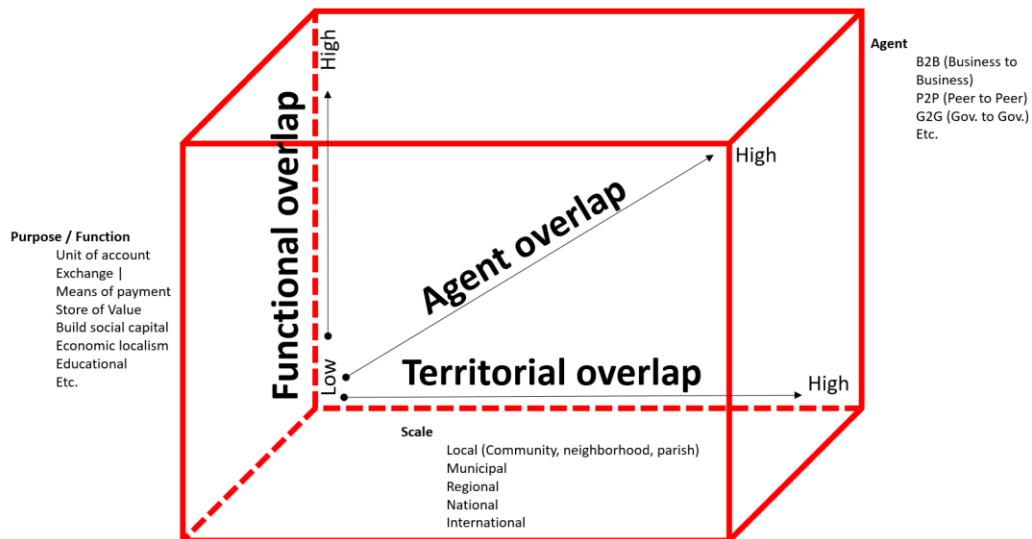


Figure 16 - The triple model cube for monetary plurality

From a functional perspective, three remarks need to be made here: 1) money performs a plethora of socio-economic functions that go well beyond the classic triad already mentioned. While some authors focus on the sociological, symbolical and institutional function of currencies - see for example (Fare, de Freitas, & Meyer, 2015) -, others highlight the educational or ecological functions (Seyfang & Longhurst, Growing green money? Mapping community currencies for sustainable development, 2013).

In figure 15, I have listed some of the most common ones in the IJCCR literature review - section 4.1.2; 2) all currencies are inherently units of accounts, and this is the primary and only function to be transversal to every given currency system. It is also common, particularly in CCs, that each currency performs more than just as a unit of account (Lietaer, 2001). Beyond the exchange function or means of payment, many CCs also perform social, educational, and ecological functions; 3) Different monetary functions and objectives within the same currency or monetary ecosystem are not necessarily complementary and compatible. Some authors have argued that there are inherently incoherencies, for example, between the store of value and the exchange function (Blanc et al., 2019). This is important for monetary designers to bear in mind and double-check.

From a territorial perspective, three remarks also need to be made: 1) not all currencies are or need to be territorially grounded. However, social, economic, and ecological embeddedness is a determinant variable in the regenerative capacity of a currency, as was demonstrated in chapter 6; 2) for each currency, there is an optimal scale and territory of circulation depending on its objectives and design features. This is what M. Fare calls "monetary subsidiarity" which was approached in section 5.2 (Fare, 2018); 3) when referring to territorial currencies in this chapter, I am not referring to the concept of nation-state currencies but rather referring to the geographical, spatial circuit and boundaries of the currency circuit.

The second add-on of complexity to the initial model proposed by R. Douthwaite concerns the matrix of cross-spectrum combinations and relationships between different monetary systems, which can yield very disparate configurations for the whole system. J. Blanc's proposal for "unpacking complementarity" (Blanc, 2016) with its four means of linking different monies - substitutability; simultaneity; supplementary; autonomy - and four types of relationships between them - commensurability; convertibility; co-use; and coincidence of spheres - provides here the foundational grounds to revisit the over-simplified exchange mechanisms in Douthwaite's proposal. For example, the case of EM2 does not make economic and monetary sense since Time Banks, and many LETS are often non-commensurable CCs, exhibiting substantial autonomy versus other currencies, therefore not requiring any exchange mechanism. On the other hand, Blanc's systematization makes it possible to categorize different EMs in

Douthwaite's model according to the type and quality of the relationship intended. Moreover, if we combine Blanc's proposal with the empirical insights gained from the efforts of grassroots CC initiatives to coordinate at the local, regional, and national interexchange hubs (Huber & Martignoni, 2013), new suggestion for three types of EMs emerges:

- DAEM: Decentralized Autonomous Exchange Mechanisms. These are autonomous exchange hubs belonging to the organization responsible for the currency, and that can uphold the terms and regulations of each monetary circuit, namely its convertibility (or not) to other currencies - given their formal agreement or consent. This could be an online exchange market between privately issued cryptocurrencies or a local exchange desk between two adjacent LETS or Time Banks. For a matter of monetary permeability and stability, it would be fundamental design criteria that DAEMs would only exchange with and between non-official, non-governmental currencies - such as commercial tokens or crypto currencies - and always seek mutual agreement or consent when dealing with different commensurable currencies;

- LCEM: Local Conversion Exchange Mechanisms. These local, municipal or regional exchange hubs guarantee convertibility, coordination, and stability between local and regional 'official' circuits. They are the primary body for monetary governance at the bioregional level and the official mediators with any government-issued currency. The LCEMs would be managed by a coalition of public and private issuers of local, municipal, and regional currencies that would guarantee the permeability and stability of these exchange currencies;

- GEM: Global Exchange Mechanism. This is the global hub for trading the "ebcu", or the "TRC" or any other form of global currency standard based on an agreed monetary value that gives stability and sustainability to the global financial system. The GEM is the mediator between the international organization issuing and managing the global standard and the private or governmental agents buying and selling it for purposes of international trade.

Replacing Douthwaite's EMs for DAEM, LCEM or GEM allows a clearer image of the type of possible interchanges between currencies, given their territorial-functional-agent circuits.

The third add-on to the initial proposal concerns the variables taken into account for determining the optimal currency mix for any given territory and the world. This is the crucial critical question regarding monetary plurality and an ecology of monies that remains primarily unanswered. Douthwaite's pioneering ideas revolve around a "one nation, four currencies" system based on the dual approach presented earlier: one global reference currency - the ebcu -, one global store of value currency, one currency per nation - the national currency such as the Dollar or the Pound -, and then a multitude of local or regional CC's. An update and improvement to this systemic view of monetary strong plurality involve considering new monetary realities, innovations, and arrangements, while dismissing obsolete and undesirable paradigms, such as the nation-state currency monopoly.

To answer the highly complex question of the optimal currency mix for a monetary ecology, one has to consider the socio-economic, political and cultural variables that have influenced the development of CCs from an empirical perspective, and combine them with an analytical model - such as the triple-model cube above - that provides a more normative approach. Regarding the first part of this equation and based on existing CC literature - highlighted in section 4.2.1 -, the main variables that can influence the adoption of multiple currencies are (not necessarily by order of importance):

- Level of economic inequality and economic injustice (positive correlation);
- Level of economic and technological literacy (positive correlation);
- Level of economic freedom (positive correlation);
- Level of social capital and social trust (positive correlation);
- Strength of social and solidarity economy networks (positive correlation);
- Amount of the monetary mass in circulation which is available to serve people's needs (negative correlation);

The variables mentioned above can provide an 'X-ray' of a given territory's socio-economic vitality. However, to fully capture the monetary reality of the ecosystem, these need to be complemented by measures of the socio-economic metabolism and the diversity, intensity, and frequency of material and non-material flows. This is an area where Ecological Economics can also step in and support the development of novel approaches (Daniels & Moore, 2008), mechanisms, and indicators (D'Amico,

Taddeo, Shi, Yigitcanlar, & Loppolo, 2020) of the socio-economic metabolism of our communities and regions. Such an image of the connectivity of the socio-economic sub-soil, together with the macro indicators of the state of that soil, and the elements on it, would provide us with a "3-D view" on the potential for monetary plurality for any given monetary ecosystem. This would be the key to a genuine ecological, monetary policy-making aiming to optimize the monetary currency mix to fulfill its social, economic, and ecological goals. From a systemic perspective, one would want to maximize and optimize the spaces of synergic complementarity and minimize potential competition and overlap between currencies.

The fourth and final add-on I would like to suggest to Douthwaite's and Lietaer's original models' concerns an upgrade to the 'ebcu' or 'TRC' supra-national value standard and the scaling down of the appropriate level for monetary coordination and governance. Starting from the latter and following the arguments stretched out in this thesis, I propose a planned, gradual de-nationalization of our main dominant currencies, first into monetary regions - such as the case of the Euro, the proposals for a North American Monetary Unity (Arndt, 2002) or the Asian Monetary Unit (Ogawa & Shimizu, 2011) -, and later to a common global standard of value for international trade. At the same, and in the opposing direction, a process of monetary decentralization and regional empowerment would ground monetary coordination and governance for exchange currencies at the bioregional scale integrating networks of interdependent municipalities (across national borders whenever the case). This would be a case of monetary bioregionalism consistent with the vision of a bioregional re-organization of the global economy and its goals as envisioned by Molly Scott Cato (Cato, 2012). Moreover, these same Municipalities would partner with local organizations and businesses for a "shared monetary governance" system (SMG) as proposed by Shira Destinie Jones (Jones, 2011). "Transparency and accountability can be optimized for monetary institutions through participatory decision-making processes involving seigniorage, issuance, and backing, subject to external regulation and scale in terms of both function and geography" (Jones, 2011, p. 27). These multi-stakeholder managing bodies of local and regional currencies would manage local complementary currencies, such as Municipal currencies, Time Banks, and LETS, in a bottom-up, participatory, transparent, and accountable manner. This way, a possible harmonization

of perceived opposing monetary visions is possible. A 'one world, one currency' vision is compatible with the dreams of multiple bioregional grounded currencies and the ideal of millions of local complementary schemes. As M. Brakken and colleagues explain in their trophic currencies proposal: "In analogy to the energy in trophic food chains, the overall value is greater on lower levels or towards the periphery and only gets refined and scarce on higher levels or towards the center. [...]In particular, we do not wish to recommend iterative movement down the chain of currencies from national to local. Rather we suggest that sustainable economies should begin by reconstituting gift, barter, and time exchanges where valuation is more flexible and expansive." (Brakken, Austin, Rearick, & Bindewald, 2012, p. 174).

Regarding the necessary upgrade to the "ebcu" or "TRC" proposals, I strongly agree with the proposals for a global carbon currency, or a carbon standard, particularly the ones "which use carbon currency as the global reserve currency, especially as a new unit of account, is an ideal and incentive compatible device to solve the two externalities that are challenging the sustainability of the global economy and undermining world order." (Qiao, Zefeng, & Xiao, 2022, p. 382). A carbon currency could both serve as a unit of account and as a reserve currency. This would replace the U.S. Dollar, or gold, as the international reference currency, overcoming many of these systems' shortcomings while at the same time effectively contributing to self-regulating mechanisms for carbon emissions (Qiao, Zefeng, & Xiao, 2022). The idea of a carbon currency is not new, and many different proposals exist. While some aim at internalizing CO₂ costs into the economic system, for example, through taxation or carbon pricing (Klenert, et al., 2018), others have proposed Personal Carbon Trading schemes as a "New Gold Standard for Sustainable Consumption" (Seyfang, 2009). More recently, there are also increasing voices supporting an IMF Carbon Coin using existing legal and financial mechanisms within the IMS - such as QEs and SDRs - to gradually bring our monetary system to align with our Paris Agreement and SDGs (Chen, van der Beek, & Cloud, 2019; van Gansbeke, 2022). The Holistic Market Hypothesis of Delton Chen and his Carbon Coin has not only inspired the sci-fi novel '*The Ministry for the Future*', but more importantly, has triggered several global private initiatives that are already implementing the vision of a parallel currency that is minted by each offset of carbon. KlimaDAO - <https://www.klimadao.finance/> - and the Global Carbon Reward project - <https://globalcarbonreward.org/> - are two inspiring actions towards a

global carbon standard where "money would derive its value from the real value added to the natural world, and the negative externalities it had offset or prevented. In other words, an economic value which was traded back and forth (money) would have its origins in real biochemical value." (KlimaDao, 2022). These two examples are highlighted to demonstrate that we already possess the technical, technological, and economic knowledge to implement a Carbon Currency system on a global scale. What is needed is the political leverage to operate the necessary changes towards a "New Bretton Woods" architecture (Rana, 2014).

7.2 A multi-currency ecological system

Figure 17 under provides a graphical representation of a conceptual model for an ecological monetary ecosystem based on a triple-layered currency design with a global carbon currency as the value standard for international trade and the reserve currency, a non-pre-defined number of bioregional exchange currencies and finally, a plethora of local complementary schemes at the local level. These levels are mediated by the existence of different exchange mechanisms as presented in section 7.1 - DAEM; LCEM; GEM - with a matching governance system. In this respect monetary subsidiarity is here explored from a territorial-functional-agent perspective and with three underlying principles:

1) Monetary complexity, diversity and flexibility increases from the center to the periphery and from the international to the local scale;

2) The level of necessary monetary coordination & participatory governance is higher at the 'mezzo' bioregional scale and dilutes to both the macro and the micro scale. At the macro due to the more fixed and stable monetary international arrangements, while at the micro due to the more anarchic, self-regulated, decentralized nature of relationships;

3) GEM, LCEM and DAEM are the core interchange and monetary coordination hubs replacing the current institutional frameworks for banking and finance. In this respect LCEMs would take on the role historically played by Central Banks at the national level - legal supervision, monetary stability, and monetary policy - but with a new mandate given the diversity of currencies, the reframed scale of intervention and the revised goals.

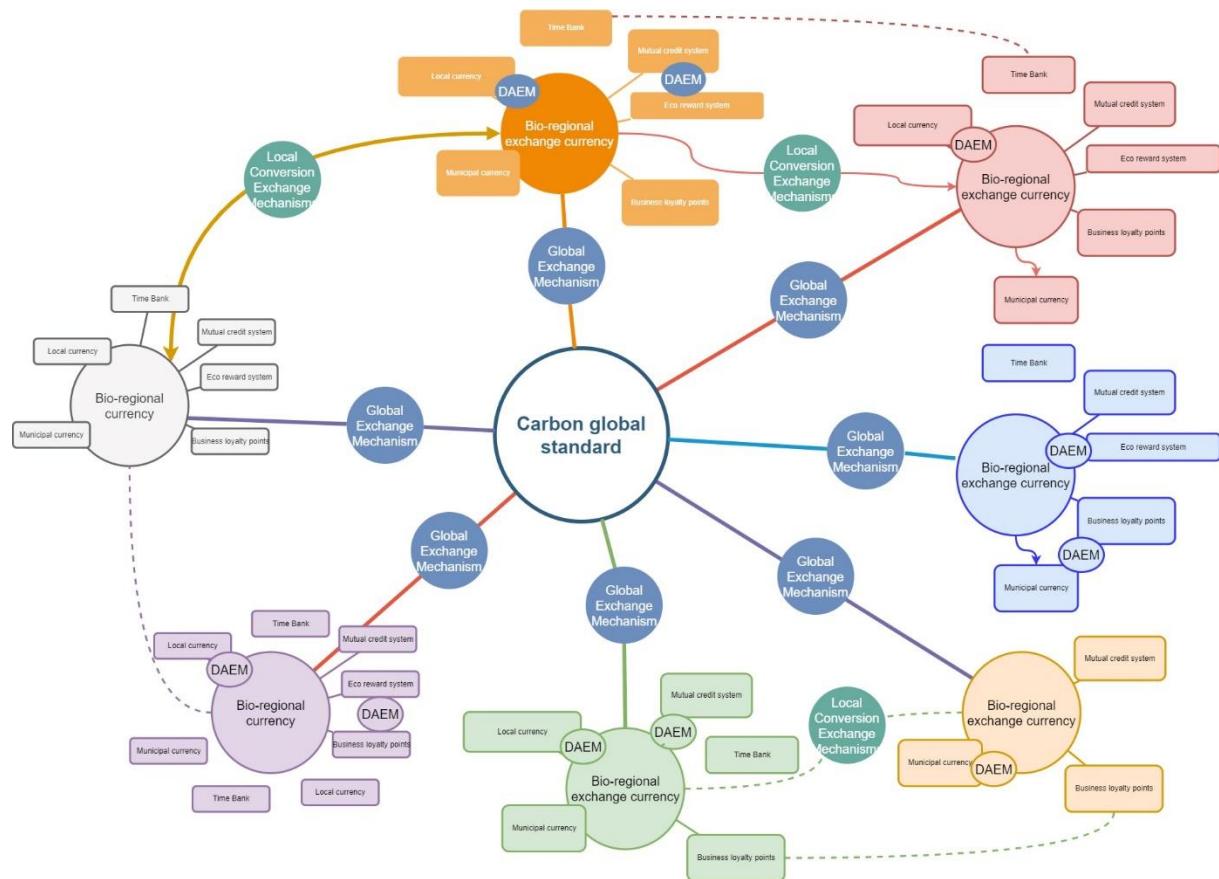


Figure 17 - A model for an ecological monetary ecosystem

It is important to note that within this proposed model there can be multiple different configurations, particularly at the lower levels. Bioregional currencies can, or not, be connected between them, corporate currencies or Time Banks can be supra-regional, and not all bioregions need to have the full spectrum of monetary possibilities. Moreover, the scale of each bioregional currency area and the amount of bioregions is not necessarily fixed and equal across regions. While some bioregions might follow a natural and historical cooperation and flows network approach, others might follow other kinds of socio-political arrangements (Cato, 2012). This is meant to leave open spaces for monetary innovation and emergence at the local, municipal and regional level, and avoiding too fixed or static monetary prescriptions. What is important from a systemic perspective is for the LCEMs and the GEMs to hold the quality of monetary relationships and the level of coordination to guarantee stability and appropriate governance. As J. Blanc and M. Fare (Blanc & Fare, 2013) stress there is a fundamental role of government institutions to provide the legal framework, the

institutional recognition and the right partnerships with CCs. This is particularly relevant at the bioregional level as a core function for LCEMs.

While the LCEMs are the elements within the system that guarantee the monetary stability and coordination between bioregions, it is of fundamental importance that the design of each bioregional exchange currency follows a set of monetary sustainability principles. As suggested in section 3.2.4 and reinforced by the examples of section 4.4 and the arguments in section 6.1, three core design conditions must be ensured for this programmable exchange currencies:

1) Such currencies should be issued free from interest. In particular circumstances and to provide counter-cyclical monetary policy measures, negative interest rates could be considered. The design condition is: $i \leq 0$;

2) Such currencies should be issued by full reserve systems, i.e., no debt-based currencies. In this cases the money multiplier is equal to 1 as the reserve ratio is 100%. The design condition is: $m = 1$;

3) Such currencies should be backed by real assets or commodities, i.e., no fiat currencies. An energy-backed currency (Ryan-Collins, Schusterand, & Greenham, 2012) or an ecologically sound resource, which is bioregionally relevant to the economic system, would make a good candidate.

These three conditions are the fundamental basis of the protocol to design and implement local and regional exchange currencies, and by doing so guaranteeing the stability and embeddedness of each bioregional currency.

The matching governance for this multi-currency system invites us to reconsider the concept of monetary sovereignty by fundamentally dettaching it from its Westphalian roots (Murau & Van 't Klooster, 2022) and envision a triple-layered governance structure with the Shared Governance Model (SGM) proposed by Shira Jones at its core. The Bioregional SGM implemented by the LCEMs, would be complemented by an international managing body for the global standard at the macroeconomic level, much aligned with the proposal of an IMF-led Climate Coin by Professor Frank Van Gansbeke (van Gansbeke, 2022) which could be named IMCF, or International Monetary Carbon Fund. Finally and at the micro level, local currencies would be mostly under a self-determined, free, flexible and anarchic governance.

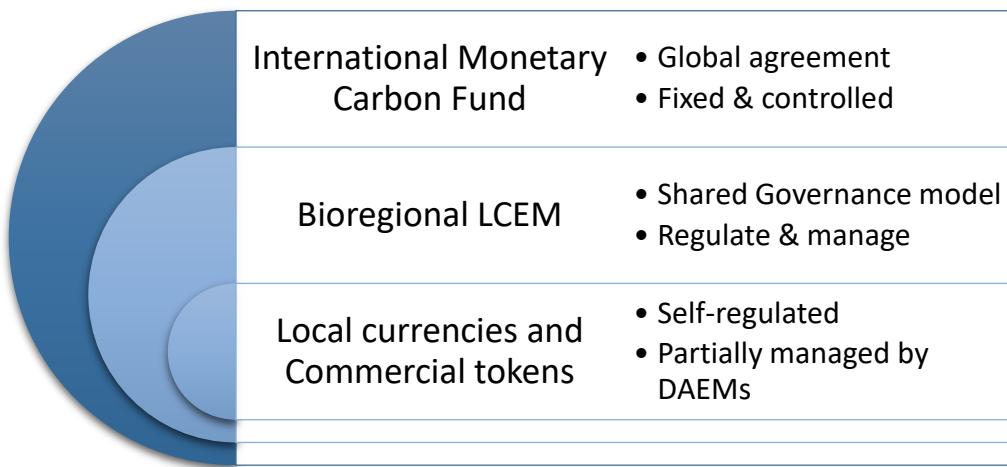


Figure 18 - A triple-layered Governance system

Figure 17 depicts a potential destination for the reconfiguration of our IMS into an Ecological Monetary System (EMS). What is crucial at this point is to envision a potential transition process from where we stand today to where we need to be within the fastest timeframe possible, taking into account the inherent socio-political complexity of such a radical process. As it has been highlighted in this thesis, money, and the monetary system, is a social, political institution deeply entrenched in our economic system. To transform the IMS into an EMS requires more than just the technical, technological or infrastructural tools, knowledge and processes. It requires an ambitious new Bretton Woods moment, which in my humble and naive opinion needs to go much further than what the 'The Reinventing Bretton Woods Committee' compiled in their 'visionary' work for the next 70 years of Bretton Woods (Uzan, 2019). Some authors argue that such reforms can only be done incrementally, i.e., the creation of a new global economic architecture "is not an outcome of a single event or meeting but a long-drawn-out process involving a legitimacy phase (thinking that the old regime needs to be replaced), interregnum phase (experimental and discussion phase), and a constitutive phase (formal negotiation phase)" (Rana, 2014, p. 13). For P. Rana, building on the work from E. Helleiner (Helleiner, 2010): "We are at an interregnum phase of the NBW, but the constitutive phase could fizzle out. This is for two reasons. First, as predicted by the theory of clubs, policies of IEIs [International Economic Institutions] have been relatively inflexible. In particular, the slow progress in governance reforms of the IEIs or the so-called "chairs and shares" (voting rights, management, and Board representation) reform to give greater voice to emerging markets –

particularly those in Asia, the PRC and India – commensurate with their growing economic and political power has led to questions regarding their legitimacy. Second, the recovery from the Asian financial crisis as well as the recovery from the GFC GEC turned out to be faster than expected. Faster-than-expected recovery has led to complacency in implementing reforms and in some cases dilution of the reform agenda" (Rana, 2013). In this dissertation I have argued in multiple occasions that an incremental, squeezed-in approach to monetary transformation will always fall short and be much slower than the more radical transformation urgently needed. So, the fundamental transition question remains: how can we navigate the spaces opened by the monetary landscape shock of the GFC, the pressures placed by the ecological destruction and the sequence of climate change induced natural disasters and the social upheaval - such as the 'School Strike for Climate' - to radically re-align the monetary regime? The perfect storm for a revolutionary monetary transformation is already here, what I believe is still lacking is an alternative narrative of a regenerative monetary ecosystem and a pathway to get there. While the first is arguably being co-written by several authors within Ecological Economics, and this thesis is a living part of that process, the transition pathway is not clear yet. Once again, Bernard Lietaer pioneered in trying to anticipate a roadmap for monetary transition in his 2020 vision set in 2001 (Lietaer, 2001). While some of his predictions did somewhat materialize - such as the rise of digital currencies, the loss of power of the U.S. Dollar, the rise of macro regional currencies and the emergence of a private carbon currency (Carbon Credits, issued by the Global Carbon Credits Corp) -, 2020 is already gone and the world is still far from a coherent multi-currency system as envisioned by Lieater or as portrait here in figure 16. Nonetheless, the world monetary architecture has seen some dramatic changes in the past 20 years and there's no doubt that our monetary reality "is slipping away from the theoretical consensus" (Van den Spiegel, 2020). Bottom-up niche innovations continue to spread-out, grow and occupy ever more monetary circuits, particularly at the local scale. Top-down re-constellations, and particularly MMT-type of reforms, are gaining momentum, namely with the rise of CBDCs. Meanwhile crypto currencies are an everyday reality for an increasing number of economic agents, even national states who have started to accept them as means for payment. Most of these trends, which were systematized in section 5.1 are already happening but without any type of coordination, with delayed regulation or supervision, and with inconsistent and often

incoherent governance models. These circumstances only create the conditions for further monetary and financial instability, uncertainty and volatility (Drakopoulos, Natalucci, & Papageorgiou, 2021). In order to face the increasingly VUCA in the financial system the emergence of Stablecoins has been proposed as a potential solution. And, "because they operate at the interface between traditional banking and cryptocurrencies, stablecoins also represent an ideal setting for understanding the key trade-offs cryptocurrencies involve, and insights from robust stablecoin design and regulation are highly relevant for related innovations in decentralized finance (DeFi), non-fungible tokens (NFTs), and Web3 protocols" (Catalini, de Gortari, & Shah, 2021, p. 1). Most unfortunately Stablecoins have proven not to be so stable afterall (Hoang & Bauer, 2020), however they provide interesting insights for the connections between emerging digital currencies and more traditional systems. Stablecoins could be seen as transitions currencies in financial markets towards a more decentralized monetary system. In that respect, I would claim that we could use CBDCs, Stablecoins and Municipal currencies as the necessary transition instruments to move the architecture of the IMS into the EMS. While the Global Carbon Coin is an international project that needs international collaboration and coordination at the IMF-World Bank institutional scale, the lower layers of the multi-currency system portraited in figure 17 could emerge by, in one hand officially recognizing, endorsing, investing in and empowering Municipal currencies, and at the same time, by gradually replacing the existing national currencies with sustainable CBDCs and properly designed Stablecoins. It is a matter of replacing the privately-issued dominant currencies of today with programmable public and commons currencies, which take into account the sustainability design principles highlighted above. A potential roadmap for the transition from the IMS to the EMS is presented here in figure 19. Taking into account the different territorial scales, as well as the timeframe from now to 2050 a meta pathway is envisioned based on the considerations highlighted in this dissertation, particularly in chapters 6 and 7. The pathway includes:

- the transformation of the International Monetary Fund into the International Monetary Carbon Fund;
- the gradual disappearance of the World Bank and other development regional banks - such as the Asian Dev. Bank and the European Bank for Reconstruction and Development;

- the change of mandate and arena of supervision and coordination for national Central banks;

- the separation between commercial banking and investment banking, limiting investment banking to the digital and crypto markets and gradually increasing reserve ratios back to 100% in commercial banking, ultimately leading to the replacement of private banks with public or cooperatively-owned banks;

- the rise of Municipal and bioregional currencies;

- and, finally the consolidation and maturity of local currency schemes.

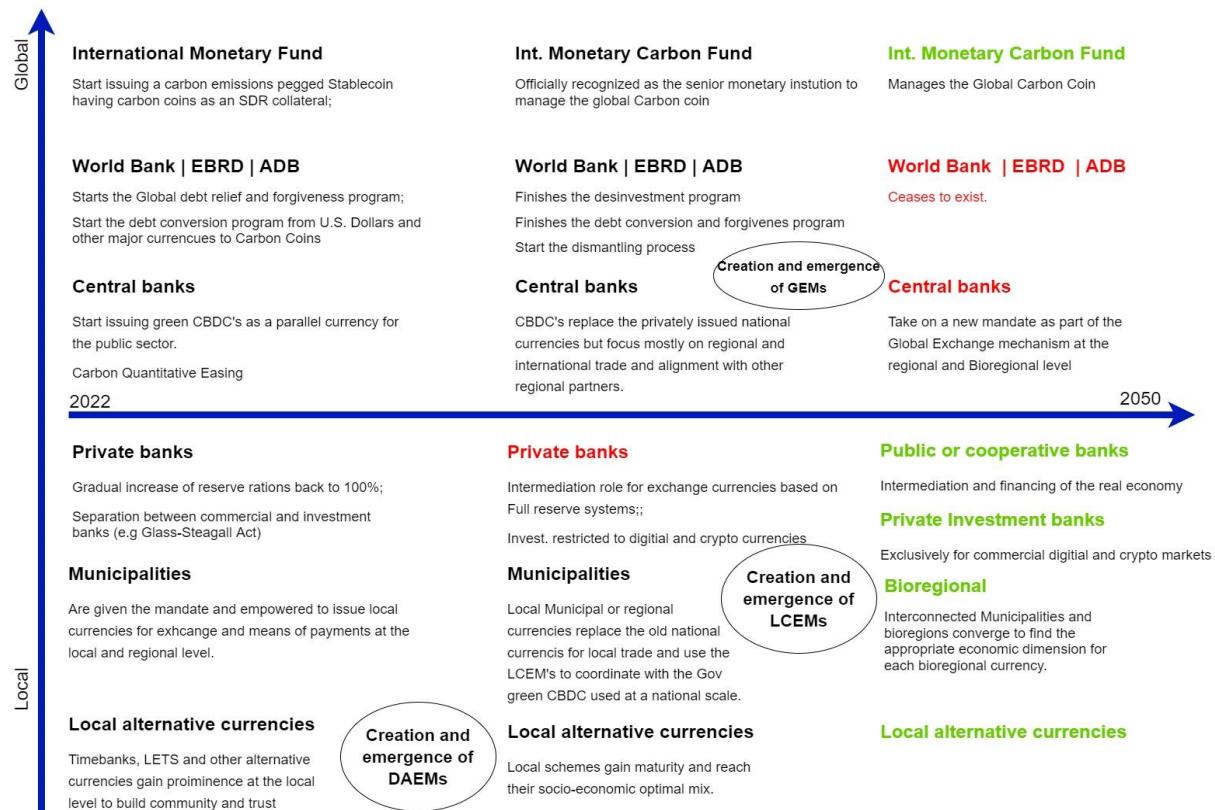


Figure 19 - Possible transition pathway from the IMS to the EMS

What was not included in this pathway is the role of privately-issued commercial digital and crypto-currencies, which within the model in figure 17 are a dynamic, emergent reality, self-regulated by DAEMs and mediated into the ecosystem through LCEMs. These were not integrated here due to the intrinsic anarchic model of governance that prevents such planning and forecasting of these currency markets. Moreover, with the recent developments in the Tokenization of the metaverse (Lee, 2021; Thomason, 2022), this is an increasingly virtual, fluid and unpredictable stream of innovation that at the moment is impossible to fully capture and anticipate here.

Is such a roadmap feasible and realistic? Will we do it? Perhaps it is a question of timing and in the past we were not collectively ready to assume that major shift in monetary and economic power. Or, as Nicholas Georgescu-Roegen direly concludes regarding humanity's resistance to radical changes to its exomatic comfortable lifestyles: "Perhaps, the destiny of man is to have a short, but fiery, exciting and extravagant life rather than a long, uneventful and vegetative existence" (Georgescu-Roegen, 1975, p. 379).

The purpose of this thesis is not to provide an answer to this rightful question, however some factors that probably play an important role in delaying proper action were already explore in chapter 5 and 7. I take them into consideration in order to propose not only the possible pathway depicted in figure 19 but also a compass, made of three vectors, to navigate the turbulent, misty seas of monetary transition. These emerge from the combination of the three design elements - appropriate scale and relationship; diversity and connectivity; balance between resilience and efficiency -, and the four regenerative processes - robust cross-scale circulation; participatory governance; symbiotic mutualism and collaboration; collective learning and creative adaptation - identified in chapter 6 which "form the fundamental pillars for a new monetary paradigm that can steer our monies to face the ecological and social challenges of the XXI century." (Alves, Santos, & Penha-Lopes, 2022, p. 15). Aligning these elements and their processes, with the triple-layered multi-currency ecosystem vision, we have the simple three vectors that inform the necessary monetary transition, and that were already presented at the start of this thesis - conclusion of section 3.2.4 -: Decentralization | Diversification | Democratization.

Figure 20 summarizes the EMS core design elements and regenerative processes that could potentially lead to a new set of socio-ecological impacts and crystalize the transformation from the IMS in figure 6. This is an evolution from figure 6 on page 200 of this dissertation.

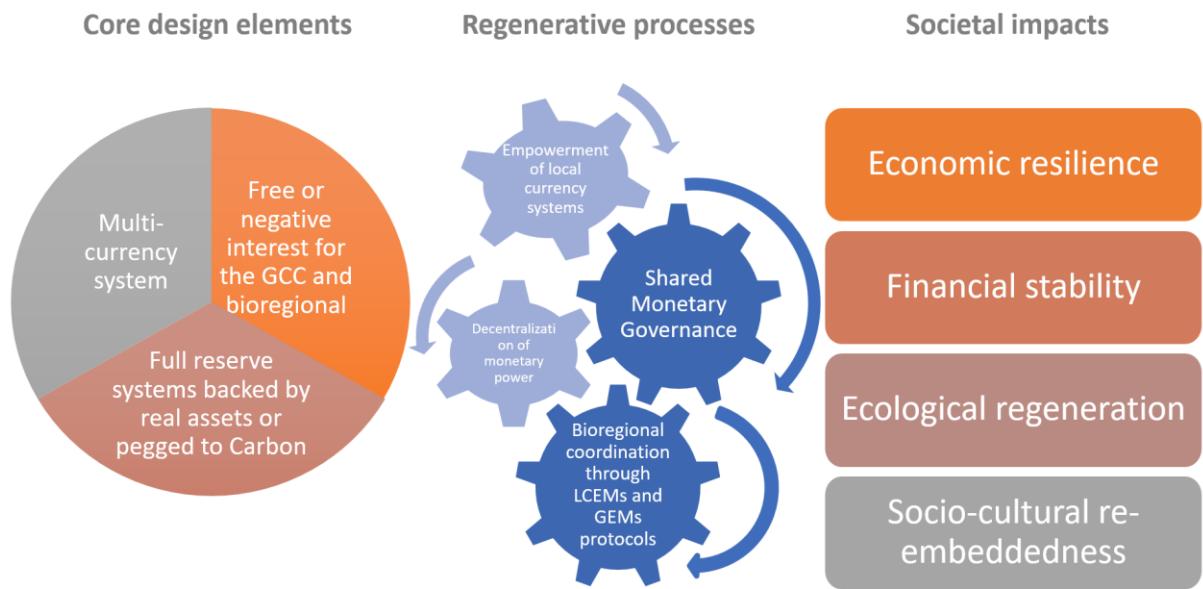


Figure 20 - The drivers of regeneration in the EMS

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8 CONCLUSIONS AND FUTURE RESEARCH

This thesis explores the money-sustainability nexus from a transdisciplinary and mix-methods approach. It aims to provide theoretical and empirical evidence to confront the initial hypothesis and answer the four research questions set in the introduction.

In chapter 3, where a critical analysis of the IMS is made in order to answer the first research question, four main conclusions are presented: 1) The design of the current international monetary system is of critical importance to social, economic and ecological sustainability; 2) The current international monetary system is a driver of financial and economic instability, economic inequality and ecological destruction; 3) The root cause of the unsustainability of the IMS lies deep in its intrinsic paradigm and only by intervening at the highest leverage points within the system can we fundamentally transform it and re-align it with sustainability; 4) An integral, complex, systemic, living-systems approach is needed to identify the core design elements and five detrimental processes that are critical to the IMS unsustainability.

In chapter 4, where alternatives monetary theories and practices are explored, three fundamental conclusions can be taken: 1) Strong monetary plurality is the historical norm, with the notable exception of the 20th century. Given the ongoing dynamics it is very likely that the future will bring us back to a monetary ecosystem based on a diversity of currency systems; 2) Monetary design is a rich and thriving field that allows monetary innovators to purposefully create, adapt and own the unique characteristics of each currency. This has opened up new possibilities for monetary competition and cooperation, as well as raised the responsibility bar for the designers of CCs, given the ethical and moral considerations that every architecture entails; 3) Within this fast growing field of monetary innovation, only a small fraction is directly engaging with or targeting sustainability in a holistic and integral way. Therefore, the potential for CCs to steer our monetary ecosystem towards sustainability is yet mostly untapped.

In chapter 5, a systematization of ongoing monetary dynamics is presented, using Multi-level Perspective and Transition Theory, and concluding that the strongest

drivers for a transformative reconfiguration and re-constellation of the current monetary system are the newer generations of crypto currencies and municipal/regional currencies. Both of these niche innovations are effectively exploring the fringes in the monetary regime left open by the landscape shock of the GFC and are squeezing their way in, forcing the existing institutions and socio-economic practices to adapt and evolve. CBDCs and Stablecoins have a great potential to be key instruments at the macro level for the envisioned monetary transition, while Municipal and Regional can better perform that leverage function at the micro and mezzo scale.

Chapter 6 revisits, updates and continues the work started by B. Lieater and colleagues in the "Money and Sustainability: The Missing Link" report, concluding that an ecological approach to our monetary system, anchored and supported by developments within Ecological Economics and the field of Sustainable Transitions, is of critical urgency and importance to replace neoclassic monetary theory, and provide a new monetary paradigm, coherent with a regenerative economic system. Building on the recent literature on regenerative economics, three design elements – appropriate scale and relationship; diversity and connectivity; balance between resilience and efficiency – and four regenerative processes – robust cross-scale circulation; participatory governance; symbiotic mutualism and collaboration; collective learning and creative adaptation – are proposed as the fundamental pillars for a new monetary paradigm that can steer our monies to face the ecological and social challenges of the XXI century.

Finally, in chapter 7 a multi-currency system with a carbon currency as the new value standard, a set of bioregional sustainable currencies for exchange, and a plethora of local, complementary currencies at the local level is proposed. Such a diverse, decentralized, interconnected, democratic, and embedded model is a pre-condition to a resilient monetary ecosystem that guarantees ecological, social, and economic sustainability. This necessary transition in the monetary system is a socio-political process that requires monetary innovators, reformers, and revolutionaries to act on multiple fronts simultaneously and to converge efforts to the most effective and transformative leverage vectors: monetary decentralization, democratization, and diversification. The three "D's" for an Ecological Monetary System serve as the compass to navigate the monetary transformation in the 21st century, for which a roadmap is proposed.

The overall conclusion of this dissertation is that the sustainability of our economic system and the prospects of human life on this planet rest on a profound transformation of our dominant monetary paradigm. The transition from an unsustainable and degenerative monetary system to an ecological monetary ecosystem fundamentally depends on the diversification, decentralization and democratization of money. This requires a new narrative about money's intrinsic nature, coherent with a socio-ecological paradigm; the radical transformation of our monetary architecture, its flows, governance systems, obsolete institutions, and Westphalian beliefs; and fully embracing monetary endogeneity, non-neutrality, and, more importantly, monetary strong plurality. A multi-currency monetary ecosystem purposefully designed toward sustainability is a vital component in the transition from the IMS to the EMS, and a core piece of any ecological theory of money.

Future transdisciplinary research in the necessary transition from a degenerative monetary system to an Ecological Monetary System, as the one proposed in this dissertation, should focus on four key topics. These are critical priorities for the development of a solid, coherent, and transformative ecological theory of money that can influence monetary reforms and a new monetary policy for the 21st century:

- Firstly, the under-researched field of Sustainable transitions, applied to the monetary system. The lack of studies applying TT and MLP to money was initially identified as a critical research gap and therefore explored in chapters 5, 6 and 7 of this dissertation. However, there are a number of important avenues of research that could and should be embraced in the future, particularly given the fast changing reality of monetary niche innovations, the growing complexity of the system, the apparent lack of systemic understanding of what is truly happening, and finally the need for better coordination and management of monetary systems. In particular the transition pathway from the IMS to the EMS briefly and superficially presented in chapter 7 is one of such areas where further research is well needed;

- Secondly, future research is invited to the growing field of monetary strong plurality and complementarity. Not only to further develop the insights and the proposals of the multi-currency ecological monetary ecosystem presented in chapter 7, but more importantly to provide better answers concerning the optimal currency mix

for each given economic landscape. Insights for the future are provided in chapters 6 and 7 of this dissertation, particularly around the potential role of developments in the study of the socio-economic metabolism of our societies within Ecological Economics and how that can inform an ecology of money;

- Thirdly, there are important theoretical developments on the interlinkages between ecological macroeconomics, an ecological value theory, and Ecological Economics monetary theory that would greatly benefit the consolidation and coherence of EMT as competing monetary theory. These still missing elements and pieces of the EMT undermine its theoretical validity and conceptual strength.

- Finally, the fourth avenue of future research concerns the recent developments in the Tokenization of our economies, particularly around the growing "reality" of the metaverse. This is a very recent trend, which I have barely touched upon in this dissertation. However, and based on the investments being made worldwide and the potential macroeconomic revolutionary impacts of such developments for our economic flows and notions of value creation, I strongly believe that future researchers should pay attention to the interface and the relationships between the digital and crypto developments in the metaverse and the real economy.

9 APPENDIX A - RESEARCH METHODS

9.1 Action-research approach

The participation in scientific and non-scientific events was a constant from 2016 to 2020. Throughout this period I've attended several different conferences, seminars and webinars related with the topic of this thesis. Table 3 below shows the list of such events attended. In all of them I had the chance to present and discuss my ideas and hypothesis, either through posters, presentations or organized workshops. The list reflects the transdisciplinary approach of the thesis as I navigated between different worlds, from the social and solidarity economy, to the World Economic Forum or Degrowth Conference - see the Degrowth Conference Poster in section 9.1.1. Although some revealed themselves to be more tangent to the core of this research, all provided valuable inputs and have contribute with some piece to this complex puzzle. More than being just meeting places of ideas, projects and people, these natural bumping spaces between academics, practitioners and the general public provide the spaces for new ideas, concepts and paradigms to emerge. I owe much to these moments, particularly those where I was the given the opportunity to organize and facilitate roundtables and participatory workshops. A small but great example is the Degrowth Conference in Malmö in 2018. Besides a panel presentation and a poster - Annex 9.1 - about the need for a profound monetary transformation, I held a participatory workshop entitled '*Reconciling money and sustainability: co-designing alternatives*'. Kristoffer Dittmer, Rolf Schroder, among other fellow money researchers, actively participated in this 2h session that was of great benefit to my development and to the ideas presented here.

Table 4 - List of conferences, seminars and webinars attended

Type	Name	Date & Place
Conference	As três ecologias	April 2016, Lisbon-Portugal
Conference	Ecological Challenges	Feb 2017, Oslo - Norway
Forum	Foro Global de Nueva Economía e Innovación Social	April 2017, Málaga - Spain
Conference	Int. Conf. on Social and Complementary Currencies	May 2017, Barcelona-Spain
Conference	Basic Income International Conference	Sept 2017, Lisbon-Portugal
Forum	Forum Finanças Éticas e Solidárias	Nov 2017, Lisbon-Portugal
Conference	Degrowth Conference	Aug 2018, Malmö-Sweden
Conference	World Investment Forum	Oct 2018, Geneva-Switzerland
Conference	Social and Solidarity Economy Conf.	Nov 2018, Lisbon-Portugal
Conference	Transitions to Where? Shared values and visions for sustainability transitions	April 2019, Lisbon-Portugal
Conference	Climate Change and Consciousness	April 2019, Findhorn-UK
Seminar	Money and Law: YSI Seminar	June 2019, Manchester-UK
Workshop	Complementary Currencies and Societal Challenges workshop	Nov 2019, Brussels-Belgium
Conference	Future Europe	Feb 2020, Lisbon-Portugal
Webinar	Social, Solidarity & the Commons Conference	Mar 2021, Lisbon-Portugal

Complementary to the events highlighted above on table 3 were the trainings that I've attended during the initial phases of the doctoral program. As with the events, these proved to be very interactive spaces to explore new ideas, test hypothesis and advance the research to new boundaries. In particular I would like to highlight the 'Nature-based design frameworks' one-week training which was a direct recommendation from my Ph.D. monitoring commission (CAT hereafter) and that provided me with the unique opportunity to explore biomimicry and Permaculture applications to the

design of monetary systems. A brief report on the insights gathered on that training is offered in section 4.3.1.

Table 5- List of relevant MOOCs and trainings

Type	Name	Provider	
MOOC	Money & Sustainability (30h)	2017	Institute for Leadership & Sustainability (IFLAS)
MOOC	Just Money - Banking as if Society Mattered (64h)	2017	Massachusetts Institute of Technology
MOOC	Towards Cooperative Wealth (60h)	2019	Synergia Institute
MOOC	Awakening the dreamer & Game-Changer trainer (72h)	2018	Pachamama Alliance
Training	Nature-based Design Frameworks (48h)	2018	Center for Ecology, Evolution and Environmental Changes

9.1.1 Degrowth Conference Poster - Malmö, 2018

Reconciling Money and Sustainability

Co-designing alternatives

U LISBOA
UNIVERSIDADE DE LISBOA

Filipe Moreira Alves
Center for Environmental and Sustainability Research
Faculty of Sciences and Technology – New University of Lisbon

 Graduate in Economics
Master in Economics and Public Policies
PhD candidate on the Doctoral Program of Policies for Sustainable Development and Climate Change

Hypothesis: It is possible to design a resilient, fair and sustainable monetary system which serves the Sustainable Development Goals and contributes effectively to the social, economic and environmental regeneration of our societies.

Our current monetary systems drives...

- Economic inequality
- Financial instability (Boom & Bust cycles)
- Environmental and Social unsustainability
- Unethical and un-moral behaviors
- Non-democratic control of money and power

Due to its embedded design....

- Fractional reserve banking and Fiat money
- Positive compound interest
- Money monoculture
- Private issuing and control of Money

How can we re-design a new monetary system that enables..

- Fair and transparent wealth distribution
- Economic sufficiency and cooperation
- Financial stability
- Environmental and Social regeneration
- Ethical and moral behaviors
- Democratic control of money

✓ Transparent
✓ Democratic
✓ Decentralized
✓ Equitable and fair
✓ Inclusive

✓ Grounded in the real economy
✓ Ecological accounting and fair value
✓ Internalize all environmental externalities
✓ Respect for biodiversity and ecosystem services
✓ Biomimicry

✓ Efficient and effective
✓ Resilient, stable and competitive
✓ Appropriate scale, form and function

New design inspired by Ecological economics....?

- Full reserve systems and backed currencies
- Free interest money and demurrage
- Monetary diversification and complementarity
- Monetary democratization and control

In case of questions, doubts, comments, suggestions, praises or potential future collaborations please contact: fmalves@fc.ul.pt



9.1.2 Teaching

"If you want to master something, teach it. Teaching is a powerful tool for learning"

Richard Feynman

Throughout my Doctoral program I was invited on several occasions to provide lectures or presentations to a wide variety of publics. From university students, to political parties or even participation in two documentaries - *É pra Amanhã*, episode Economia; RBI - um caminho de liberdade episode 10. From all of those invitations one stands-out as an important contribution for the development of this thesis: The Money Lab discipline that I taught together with Prof. José Luis Pinto at Instituto Superior de Economia e Gestão (ISEG) for three years - 2017 to 19. This was an optional discipline, available for final year grad students from Economics, Management and Mathematics. It was a very practical course that aimed at developing monetary design skills in the students with as-much-as-possible direct practical applications. In that respect, it was essentially a money design laboratory that provided me with a place to test different monetary design tools and methods, to play the Currency Game®, to invite monetary entrepreneurs to come and share their experiences, while challenging grad students' beliefs and behaviors around money. Moreover, the evaluation was essentially centered on a concrete project where students had to develop their own currency, identify its Mission-Vision-Aims and its unique design elements that serve the envisioned purpose.

9.1.3 Expert advice

Particularly in the last years of my research, an important part of my direct interaction with monetary innovators and creators was through expert advice. I was invited to collaborate with Municipalities, NGOs, private companies and communities that shared a common willingness to explore this growing field of complementary currencies. In many cases, these mostly informal relationships, triggered me to go deeper and find creative solutions for day-to-day challenges of those pushing the edge of monetary innovation. This dimension of the action-research helped me to:

1. Be "down to earth" and relate with real ongoing experiments;

2. Simplify and clarify terminology to serve different publics and be able to communicate effectively with all kinds of stakeholders;
3. Challenge assumptions and push forward with new challenges and insights.

Two examples help to crystalize this dimension of the action-research:

1) Collaboration with Partido dos Animais e Natureza (PAN). Since 2017 I was invited by different PAN Representatives to hold small panel discussions on the potentials around complementary currencies, particularly municipal currencies. We discussed the potentials for the Roaz in Setúbal in multiple occasions in 2017 and 2018, the possibilities and limitations for a regional alternative currency for the "Oeste" region and finally in May 2021 a presentation and discussion for the opportunities around a complementary currency that could finance an Universal Basic Income initiative;

2) Local currencies: There is a high interest for the development of new local and regional currencies in Portugal. I had the opportunity to meet with several groups of people and give contributions to its development. A recent example is the newly created Banco do Tempo in Campolide, Lisbon. The Banco do Tempo emerged through aEU-financed project - Medtowns - where the Junta de Freguesia e Campolide is a parter. They invited me to deliver a presentation and start a discussion on the use of complementary currencies at the neighborhood scale. Fast forward a few months, many e-mails and a few phone calls and there's a new community currency system in town;

9.1.4 Editorial experience

Following my research period at UOC in Barcelona, I was invited to be the guest Editor for the IJCCR regarding the contributions given at the International Conference in Barcelona in 2017. Two Special Editions were published in 2018 and 2019 respectively (Alves F. , 2018; Alves F. , 2019). This was a great opportunity to interact directly with many researchers and practioners, as well as continue my academic contribution to the field, this time from a 'different seat'. The two Editorial notes can be found on annex 9.4.

9.2 Semi-structured interviews template

The protocol for the semi-structured interviews with selected case studies is exhibited here. This set of questions and parameters was constructed together with Prof. August Corrons of UOC based on the IJCCR literature review that I did in 2016/7, plus our common conclusions regarding the most interesting characteristics of each currency birth, design and implementation to my research agenda.

Each interview took at least one hour and thirty minutes with several taking several hours or even days. Not all interviews were recorded. Some due to technical difficulties, other upon request of the interviewee.

Name of the complementary currency

IMAGE of the currency (if possible)

1. Short description

(max 500 words)

2. Design Details

<i>Primary objective of the currency</i>		
<i>Type of CC¹⁷</i>		
<i>Generation¹⁸</i>		
<i>Issuer¹⁹</i>	Name of the issuer	Type of org
<i>Management body</i>	Name	Type of org
<i>Governance system</i>		

¹⁷ Definition according to Seyfang 2015 (ME (mutual exchange); LC (local currency); BM (barter market); SC (service credits).

¹⁸ According to Blanc 2011 (G1, G2, G3, G4)

¹⁹ Private entity (NGO; Co-op; Charity; Foundation; Company); Public entity; PPP.

<i>Scale of use</i> ²⁰	Present	Future
<i>Number of users</i>	Present	Future target
<i>Issuing dates</i>	First issue	Last issue
<i>Denominations</i>		
<i>Monetary mass in circulation (M)</i>	Present	Future objective
<i>Velocity of circulation (V)</i>	Present	Future objective
<i>Hoarding</i>	(% yearly)	
<i>Usage</i>	(goods, services, both, limited)	
<i>Interest on loans</i>		
<i>Demurrage</i>	(Y/N; how much and who is it implemented?)	
<i>Safety against falsification</i>		
<i>Safety against speculation</i>		
<i>Base value</i>	(Time, energy, commodity-fixed; paired to a currency, other)	
<i>Base Unit</i>		
<i>Scalability</i>		
<i>Replicability</i>		
<i>Parity/Pegged</i>		
<i>Bonus or Malus</i>		
<i>Backing</i>		
<i>Costs</i>	(Issuing costs; Printing costs; Transaction costs; Management costs; Storing, degradation/substitution/elimination costs)	

²⁰ Local; Regional; National or International

2.1 Have you been inspired by other experiments in your design?

2.1.1 If Yes, name which.

2.1.2 What have you adapted or adjusted from your original inspiration?

2.1.3 Are you somehow still related with it?

2.2 Does your currency addresses any of the SDG's? Which? (list with the 17 to tick-box)

2.2.1 How can we validate/support your claims?

2.2.2 Do you perform any kind of impact assessment of the currency? If yes, which (specify the methodology used, stakeholders involved, dimensions of sustainability taken into consideration)

2.2.3 Have you considered gender, race and/or class issues in the design and implementation of your currency?

3. Implementation process:

3.1 Acceptability:

3.1.1 How would you rate the acceptability of the community (scale 1 to 10)?

3.1.2 How would you rate the acceptability of local businesses (scale 1 to 10)?

3.1.3 How would you rate the acceptability of the local power (scale 1 to 10)?

3.1.4 How would you rate the acceptability of the local NGO's (scale 1 to 10)?

3.2 Identify the key barriers for the implementation of the currency (list)

3.3 Identify key benefits from the use of the currency (list)

3.4 What are the most important elements of the currency that contribute to its success (open question)?

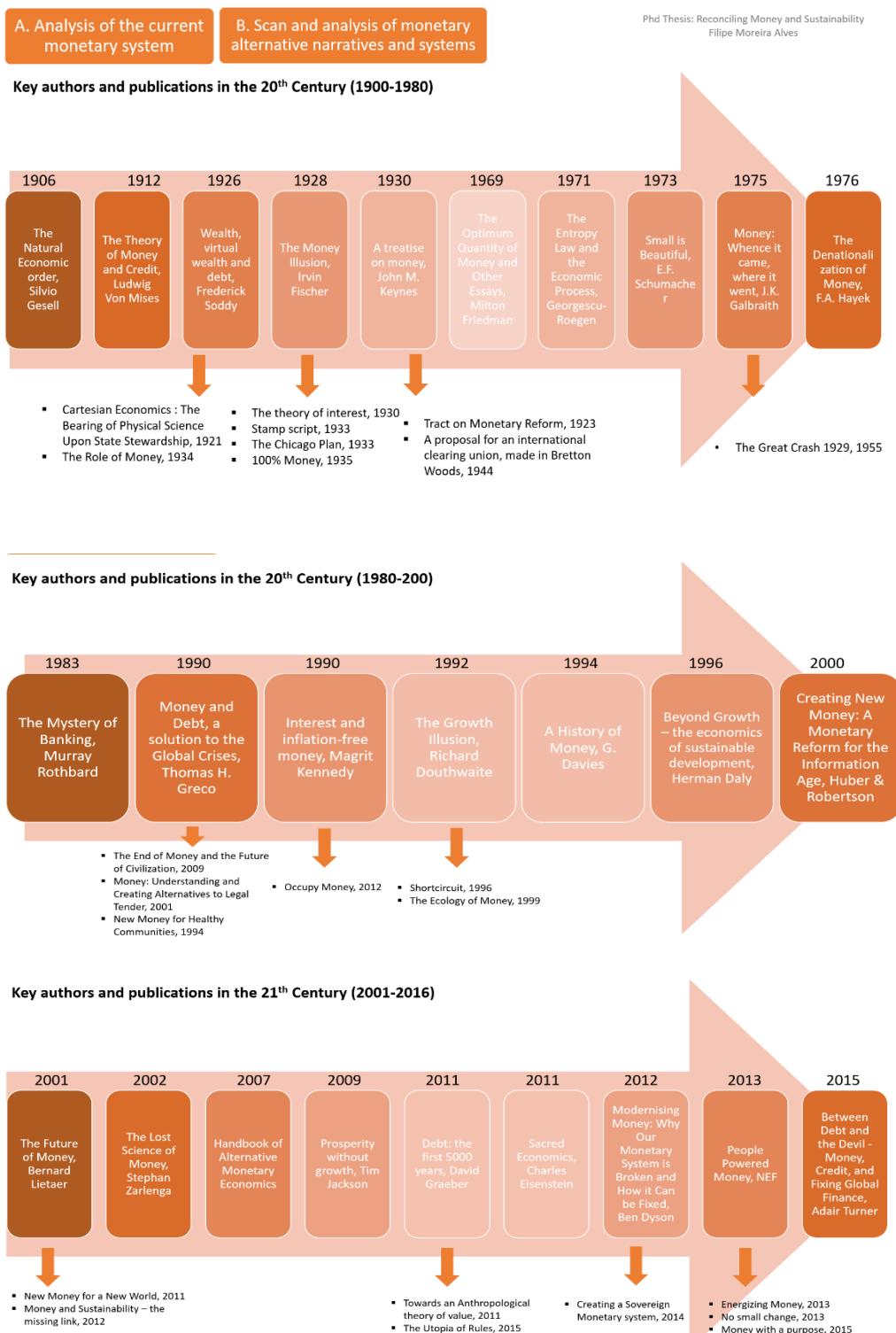
3.5 What are the elements of the currency would you change to increase its use and positive impact in the community (open question)?

4. Important elements in the socio-economic, cultural and institutional context:

- 4.1 Please identify key historical events that have contributed to the success and/or failure of the initiative;
- 4.2 Please identify the key institutions that significantly enable and/or block the initiative;
- 4.3 Please identify the key cultural characteristics that in your view enable and/or block the initiative;
- 4.4 Is there any correlation with macro-economic trends in the conventional economy;

Is there anything you would really like to know that we might help you with?

9.3 A flowchart of XX century heterodox monetary publications



9.4 IJCCR Editorial notes (2018 & 2019)

Alves, Filipe M. (2018) 'Editorial: Building community, promoting the commons, and surfing the digital wave' International Journal of Community Currency Research 2018 Volume 22 (Summer) 1-3 <www.ijccr.net> ISSN 1325-9547.

DOI: <http://dx.doi.org/10.15133/j.ijccr.2018.012>

EDITORIAL: BUILDING COMMUNITY, PROMOTING THE COMMONS, AND SURFING THE DIGITAL WAVE

Filipe Moreira Alves*

Guest Editor

* Researcher at Centre for Environmental and Sustainability Research – FCT-UNL, fmalves@fc.ul.pt

1. INTRODUCTION

"The development of community currencies has reached a crucial stage: it has become evident that the attempts of small groups of social activists to overcome the scarcity of money are not sufficient to create alternatives. It will also be necessary to enter a political struggle and campaign for appropriate framework in which economically viable community currencies can prosper" (Schroeder, 2011i).

A decade has passed since the great financial and economic recession of 2008, and in many respects, it has been a rich and prolific decade for complementary and alternative currencies worldwide. The curiosity, search for and openness to new monetary and financial solutions and designs brought a rapid multiplication of new experiments; the spread and replication of good practices at different scales; the creative diversification of currency designs to fulfil new and different functions; the potentiality of blockchain technology and the digital revolution; the increased 'municipalization' of complementary currencies; and a tremendous boost in research in this field. Of course, this time of growth and development also brought new challenges, new tensions, new people and many intriguing questions to explore and research. All of it has

made the past decade unique, and there's little doubt that these are great times to work in, research and develop the field of complementary currencies (CC). Public awareness and interest are on the raise, fueled by campaigns to "Move your Money" (ii), to create "sovereign money", to invest in Bitcoin or Ethereum, or join a Time Bank. Funding opportunities have become more common and projects such as Community Currencies in Action (CCIA) (iii) have made important contributions to the CC world and represent a stepping stone for the future. The willingness and acceptance of communities, municipalities and regions to welcome, develop and promote CC is stronger than ever, stretching across the political spectrum, making CCs attractive projects to build alliances for social integration and economic revitalization.

Within this socio-economic and political setting, Rolf Schroeder's words from 2011, cited above, remain relevant as the links and interdependence of the necessary monetary revolution and its inevitable socio-political counterpart becomes more and more apparent. As the field evolved from the scattered pioneering phase of the last decades of the XX century, through the building of networks, experience and knowledge characteristic of the beginning of the third millennium, to the slowly maturing communities of practice consolidating today, three key invitations present themselves. The first is an invitation to keep building a strong, resilient and sustainable community of practice. Second is the invitation to connect with other movements such as solidarity economy, the sharing economy, the Degrowth and post-growth and the commons. Third, the invitation to embrace and internalize the digital revolution and with it explore new socio-economic realms and possibilities. Three invitations, or three movements in the wave of transformation that we are now surfing, and that the Barcelona conference aimed at fully capturing and riding.

2. THE CONFERENCE

It was within this co-creative space of potential, new developments, challenges and opportunities that the IV International Conference on Complementary and Social Currencies (iv) took place in the vibrant city of Barcelona in May 2017, gathering more than 380 researchers and practitioners from 34 countries for four days of presentations, debates, and mutual co-learning and co-development of CC practice and research. With the support of the International Journal of Community Currency Research

(IJCCR), the Research Association on Monetary Innovation and Community and Complementary Currency Systems (RAMICS)(v) and fantastically hosted by the Universitat Oberta de Catalunya and Dr. August Corrons (Professor in the Department of Economics), the conference was an opportunity not only to gather the global CC community, but also to have a small glimpse of all that is happening in the field, and share valuable insights.

It was not by chance that the conference took place in Barcelona, a city and a region (Catalunya) leading the way in monetary innovation and experimentation. From digital currencies such as Faircoin(vi) to Municipal experiments such as the Grama (vii) and the growing value of the alternative ECO (viii), the strong presence of local and regional activists and researchers was an inspiring and fertile ground for this international event. Of particular interest for myself and in line with the program of the conference, four transversal topics were key: the relationship between multiple CC's as the interactions between them increase and the common space of complementarity expands; the relationship with the wider economic, legal and monetary systems as CC's gain scale and/or are implemented by different actors such as municipalities and even governments; the promises, challenges and opportunities of digital technologies and blockchain in particular; and finally, the true economic, social and environmental impact and effectiveness of CC's. These topics made up a big part of the conference, and therefore also of this IJCCR Special Issue, aiming to honor and publish some of the best works presented in Barcelona, while building the growing literature on CC and exploring some of its edges.

3. BUILDING COMMUNITY, THE COMMONS AND THE DIGITAL REVOLUTION
The opening paper of this Special Issue - IJCCR Publications: A Literature Review 2009-2016 - investigates the patterns, trends and overall conclusions of the IJCCR publications since 2009, offering the reader a unique view of past research as well as insights for future developments current research gaps. It is followed by two papers that explore growing edges related to the management of the commons and the role CC's can have in this crucial economic challenge for the XXI century. These are a practical and pragmatic Swiss case study - The District Currency - A New Currency Design for

Managing the Commons -, followed by an exploration of the values-based and theoretical principles underlying time credits as a tool for re-balancing power inequalities and promoting a new economy – Forms of Money Power and Measure of Economic Value. Time Based Credit for Care and Commons Economy. Our fourth paper adds yet another piece to the vast research done concerning the Palmas currency and banking system in Brazil, looking into the phenomena of the digitalization of the Palmas, the use of the e-Dinheiro platform and the different ways in which new digital technologies can be adopted by CC communities - A digital community bank: mapping negotiation mechanisms in its consolidation as an alternative to commercial banks. Continuing the topic of digitalization, our fifth paper focuses on the potential of block-chain protocols to host and develop CC's, presenting the Trustlines Network system architecture and unfolding its possible uses for digital CC's and for CC's exchange - Extending Blockchain Technology to host Customizable and Interoperable Community Currencies. Finally, our sixth and seventh papers look into the impact and the sustainability of CC's through the lens of empirical studies in Switzerland and Poland, presenting important insights for future CC developments and designs - Swiss impact currency: improving impactful currency systems for a sustainable economy in Switzerland; Sustainability of local complementary currencies - Conclusions from an empirical study in Poland. Our last paper of this Special Issue – Identifying Barriers and Solutions to Adoption of Social, Complementary and/or Virtual Currencies – offers exciting and valuable recommendations to CC practitioners on how to overcome emotional, management, technological and environmental barriers to CC implementation.

This Special Issue is the first of two, both building on works presented in Barcelona to showcase some of the best current CC research. Both Special Issues also aim to launch new research questions and trigger new insights for the development of the field and the growing scientific excellence of the IJCCR Journal.

I wish you a fantastic reading!

ENDNOTES

i Schroeder, R., Miyasaki, Y. and Fare, M. (2011) 'Community Currency Research: An analysis of the literature' International Journal of Community Currency Research 15 (A) 31-41

ii This was a very famous movement in 2010 in the US and Europe that got media attention and helped raised public awareness about the design of the banking systems. The link for the British movement: <http://www.moveyourmoney.org.uk/>

iii CCIA was a EU funded project through the Interreg Program that took place between 2012 and 2015: <http://communitycurrenciesinaction.eu/>

iv <http://dineroyvalores.com/>

v <https://ramics.org/>

vi <https://fair-coin.org/>

vii <https://www.gramenet.cat/moneda-local/>

viii <https://cooperativa.cat/es/otro-sistema-economico/la-moneda-social/>

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Alves, Filipe M. (2019) 'Integration of new narratives and worlds in CC research,' International Journal of Community Currency Research Vol. 23 (Winter) 1-2 <www.ijccr.net> <http://dx.doi.org/10.15133/j.ijccr.2019.001>

EDITORIAL: INTEGRATION OF NEW NARRATIVES AND WORLDS IN CC RESEARCH

Filipe Moreira Alves*

Special Issue Editor

*Researcher at Centre for Environmental and Sustainability Research – FCT-UNL, fmalves@fc.ul.pt

1. INTRODUCTION

This special issue is, for many reasons, an extra special issue. Not only it is the first ever publication of the International Journal on Complementary Currencies Research (IJCCR) in a language other than English. It also emerged through collaboration across many cultures, countries and languages - Portuguese, Spanish, Catalan and English -, and is filled with great research done in Spain, Central and South America. For those

reasons we are very proud of this winter issue, which started taking shape as an invitation and challenge to the Scientific Committee of the IV International Conference on Complementary and Social Currencies headed by Dr. August Corrons from our hosts, the Universidad Oberta de Cataluña (UOC), given the many and great contributions of Spanish-speaking-and-writing authors to the conference and to the scientific field. With this effort, we aim to honour those contributions and authors, and share some of the research presented and discussed in Barcelona in May 2017. Our hope is also to facilitate the spread of knowledge to a wider audience of activists, researchers, entrepreneurs and practitioners across the Spanish speaking world. As the second biggest native language in the world (i), with an estimated 512.9 million users, having this Special Issue in Spanish is also a symbolic departure from the hegemony of a single use language in the IJCCR, and an entrance into the rich and vibrant world of multiple, complementary languages.

As the famous heterodox economist Jean François Noubél (ii) claims, language is the invisible matrix in which our common narratives and visions of the world are built, very often unconsciously. Therefore, having the possibility to extend and enrich the IJCCR with new narratives and worlds regarding the practice and research of complementary currencies is an important step towards greater diversity, plurality and also inclusion. It is a step we take consciously, and a purposeful invitation for more international collaborations that transcend borders, cultures and even languages.

This issue is our second and last special edition of works presented and discussed in the IV International Conference on Complementary and Social Currencies, and gathers a total of eight articles from nine authors. Together with our summer edition of 2018, also with eight articles, the IJCCR concludes this two-tier special edition from Barcelona, ahead of this year 5th Bienal RAMICS international Congress “Going Digital? New Possibilities of Digital-Community Currency Systems” that will take place in Hida-Tokoyama, Japan.

2. INTEGRATING NEW NARRATIVES

Our special issue starts with an historical in-depth overview and analysis of Spanish social and complementary currencies by Dr. Wilko Von Prittzwitz. This is followed and

complemented by Andreu Honzawa using Organizational Theory to propose a systematization of four models of strategic management for complementary currencies, from a public policy perspective. Closely tied to Andreu's debate, is the next article from Lluís Muns Terrats, Marta Segura Bonet and Lluís Torrens Mèlich, which aims at crystallizing the main insights and key aspects regarding the planning and design of a complementary currency in the hands of public administration, in this case at the municipal scale. Although recognizing that each municipality, each territory and each socio-political context offers unique conditions, limitations and characteristics, the thirteen conclusions offered to public officials aiming at implementing a complementary currency is an interesting and valuable effort with plenty of food for thought.

In our fourth article, Miguel Hirota dives into a SWOT analysis (iii) of complementary currencies, and explores potential marketing strategies for CC's based on a discussion on the concept of "value", inviting CC promotor's to focus on the creation and sharing of added value and communicating it clearly to their users. Marta Bonet and Lluís Muns Terrats, then, build upon and go beyond some of the previous articles, arguing for the importance of traceability when promoting, implementing or monitoring a public-driven complementary currency. They make a case for the importance of 'knowing the traceability' of your CC, whether from an impact assessment perspective, a better decision-making process perspective or a more transparent, accountable and efficient way to measure, monitor and evaluate the circulation, acceptance and use.

Departing from Spanish case studies and Spanish authors, Dr. Georgina Goméz and Dr. Ricardo Orzi (6th and 8th article respectively) both reflect on Argentinian experiences. The former debates the timely and complex topic of monetary plurality, having Jérôme Blanc (iv) and Akinobo Kuroda (v) scientific developments with monetary circuits as background and the Argentinian experiences of the early XXth Century as the test field. The latter analyses the case of a time bank from a sustainability point-of-view, using the Earth Charter (2000) as a guide. Finally, our 7th article from Paula Sánchez de la Blanca Díaz-Meco looks into the contradictions and developments of a local currency experiment (UDIS) within an existing network of alternative trade and commerce (Rede COMAL) in Honduras, between 2003 and 2007.

The wide variety of topics and fields of research explored in these works give a glimpse of the rich debates that took place in Barcelona, and a small touch of the aliveness of the field in Spain and Latin America in the past years. Nevertheless, it is my belief that this first special issue in Spanish is not the last, and that it will stand as an important contribution from the IJCCR to all Spanish-speaking researchers, activists, practitioners and public officials whom will find in these pages not only historical records and processes, but also insights into a future which is already here, emerging, gaining momentum and reclaiming its space and power.

Saludos sostenibles,

ENDNOTES

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https://en.wikipedia.org/wiki/List_of_languages_by_number_of_native_speakers

(ii) <https://noubel.fr/en/>

(iii) https://en.wikipedia.org/wiki/SWOT_analysis

(iv) Blanc J. (2016) Unpacking monetary complementarity and competition: a conceptual framework. *Cambridge Journal of Economics* 41: 239--257

(v) Kuroda A. (2008b) What is the complementarity among monies? An introductory note. *Financial History Review* 15: 7-15

10 APPENDIX B - ALTERNATIVES

10.1 The Monetary Contamination of the Auroville Economy

Article originally published in the journal of Auroville - Auroville Today - in December 2016, as part of the New Economy group research.

“Money is the visible sign of a universal force, and this force in its manifestation on earth work on the vital and physical plains and is indispensable to the fullness of outer life. In its origin and in its true action it belongs to the Divine..”, The Mother.

Sri Aubindo and The Mother spoke more than a half a century ago, long before the full monetization, commodification and financialization of our societies, about money and its role in the development of humankind. They recognized its power and strength, both for good and for great evil. And although money has become increasingly central to our lives, choices and relationships with one another and with nature, permeating and subtly influencing our visions and actions, the necessary alternatives, the necessary diversity, the necessary critique is rather absent, silent and has lost its *momentum*. From my perspective, this is particularly true in Auroville, where I argue that a full monetary contamination of community life and common vision is currently taking place under everyone's nose and eyes and yet passes unchecked, unrivalled, unquestioned. Auroville stands today, more than ever, fully exposed to the laws of international markets and international finance that impose their rules, their prices and their own logic on this small community, once a utopian protected project towards human unity. Its monetary exposure comes from three main sources: the overflow of guests and visitors that bring thousands of Lahks well within the community and that due to

their growing scale start to disrupt and change the economic system and nature of Auroville, converting more and more community assets to Guest Houses, cafés, shops, or Yoga centers; the openness of commercial units to exports and trade in international markets which forces them into competition-like behaviours such as turnover maximization and higher capital intensity; and finally, the lack of self-sufficiency in terms of basic needs such as food which forces Auroville to be dependant in outside supply and by doing so subjecting itself to outside imposed rules and prices. These threefold factors added to the relevant issue that Auroville does not, surprisingly, have its own sovereign money compound to a progressive, invisible corruption of the Auroville economy by the neoclassic financial market logic which uses money as its own Trojan horse.

Now, this is not an inevitability and Auroville certainly possesses the resources, the creativity and the resilience to transform this process into an opportunity for community re-engagement, bonding and aliveness. In my opinion four core actions will be required in the near future: create and promote monetary diversity, specifically Auroville own internal money un-pegged from the Indian Rupee, that serves the community, empowers its people and decouples its economy from the international markets; increase investments and community focus into developing its own production capacity of basic needs, namely food; create buffer zones and regulate monetary contamination in commercial units by separating and controlling clearly financial flows allowing them to continue their exports but not allowing these to spill over to the community; and finally, better regulate and internalize the overflow of guests and visitors so that they do not become the priority and the focus of the karma yoga of the community but rather serve its higher purpose with other means rather than money. These proposals, to be effective, need a collective planned action which targets all of them simultaneously while envisioning a sustainable pathway for that once radical idea of a full no-money-economy, a gift economy, inside Auroville. And although many dangers lie ahead, namely the bureaucratization of economic life, it's possible, it's doable and Auroville has the people and the vision to pull it off and be a model for the future.



(year)

JOHN DOE

A VERY LONG AND IMPRESSIVE THESIS TITLE WITH A FORCED LINE BREAK



to an ecological monetary system

Filipe Miguel Moreira Alves

2022