

Routledge Frontiers of Political Economy

REALIZING AN ALTERNATIVE POLITICAL ECONOMY OF SUSTAINABILITY

**THE CONTRIBUTIONS OF RADICAL ECOLOGY
AND HETERODOX ECONOMICS**

Edited by Arturo Hermann

Contents

<i>About the Editor</i>	<i>xi</i>
<i>List of Contributors</i>	<i>xii</i>

Introduction	I
ARTURO HERMANN	

PART I

Ecofeminism, Social Ecological Economics, Bioeconomics, Steady State	15
---	-----------

1 Toward Ecofeminist Radical Political Economy in Action: Strategies for Sustainable Societal Transformations	17
ANNA SAAVE	

2 Challenging the Economic Mainstreaming of Sustainability and Social-Ecological Crises	38
CLIVE L. SPASH AND BENJAMIN BAUMGARTNER	

3 Herman Daly's Political Economy for Sustainability: The Steady-State and Other Policies for Ending Uneconomic Growth	57
GIANDOMENICO SCARPELLI	

4 The Bioeconomics of Nicholas Georgescu-Roegen: A New Epistemological Foundation for Economic Science	76
STEFANO ZAMBERLAN	

5 Bioeconomics and the Approach to Environmental Sustainability: The Ecological Transition: A New "Economic Myth"?	89
STEFANO ZAMBERLAN	

PART II	113
Heterodox Macroeconomics and Sustainability	
6 Principles of Post-Keynesian Ecological Economics	115
LOUIS-PHILIPPE ROCHON, SERGIO ROSSI, AND MAURIZIO SOLARI	
7 Green Finance	130
MARIA ALEJANDRA MADJ	
8 A Kaleckian-Schumpeterian Synthesis to Secure Sustainability	148
JERRY COURVISANOS	
9 Economic Policy and Sustainability in a Monetary Economy: A Monetary Theory of Production Approach	165
STEFANO FIGUERA AND ANDREA PACELLA	
10 The Social Role of Central Banking in Promoting an Equitable and Sustainable Society	183
JALAL QANAS	
11 Step by Radical Step: The Macroeconomics of a Degrowth Transition	206
COLLEEN SCHNEIDER AND CHARLES STEVENSON	
PART III	
Circular Economy, Civil Economy, and Other Heterodox Contributions	223
12 Shifting to Circular Economy Principles that Could Counter Environmental Changes and Reduce Inequalities	225
PASCAL PETIT	
13 Circular Economy and Philosophy of Economics	238
BENEDETTA GIOVANOLA AND STEFANO SPALLETI	
14 From Linear to Circular Model: ESG Criteria, EU Policies and the New Paradigm of Civil Economy	251
FRANCESCO POGGI	
15 Radical Ecology and Original Institutional Economics	270
ARTURO HERMANN	

6 Principles of Post-Keynesian Ecological Economics

*Louis-Philippe Rochon, Sergio Rossi,
and Maurizio Solari*

6.1 Introduction

For many economists, particularly those in the critical or heterodox tradition, ongoing global warming has resulted from economic activity, predominantly, though not exclusively, from industrialized capitalist societies (see Moore 2016). In this context, the need for changing economic theories and policies towards an ecological path is therefore not only apparent but crucial. The neoclassical approach – currently dominant – is indeed ineffective in depicting the economy and correcting it into a sustainable system. This approach is largely one where the economic system is self-correcting and converges to a stable, long-run equilibrium, that is wholly inadequate to analyse economic systems. This applies as well to issues surrounding environmental or ecological concerns, which are seen as neutral on the long run.

Moreover, by missing the monetary essence of our economies, mainstream economists are unable to provide a clear and trustable analysis of the real world, thereby proposing ineffective policies well summarized by the failures of the Kyoto Protocol and the Paris Agreements, after which carbon dioxide emissions have increased dramatically (see Figure 6.1). To reverse such a path, a change in perspective is urgently required.

Post-Keynesian economics is well equipped to fill this void (see among others Fontana & Sawyer 2016; Lavoie 2022, p. 633), especially by using concepts such as effective demand, fundamental identities, fundamental uncertainty, endogeneity of money, and different degrees of economic power among agents. This chapter aims to provide some foundations for a post-Keynesian ecological approach. To do that, Section 6.2 presents the monetary economy of production shaping all contemporary economies. Understanding the functioning of the economy is crucial, as well as positioning it in the world. Section 6.3 therefore explains the embeddedness of the economy into a larger whole, that is, nature or the earth's ecosystem. This understanding is necessary to propose a way to follow in attempting to reverse global warming. Section 6.4 focuses on this issue through two categories of interventions, namely the reformist and revolutionary ones, which can however be applied together, to mutually reinforce one another.

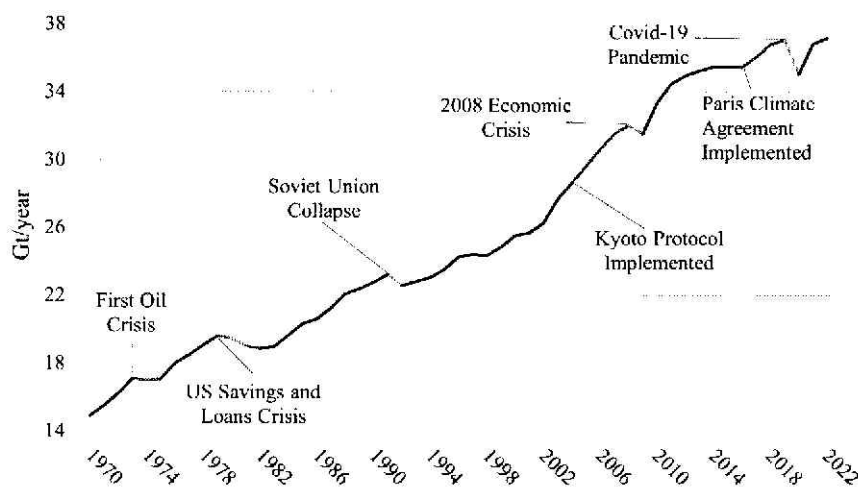


Figure 6.1 World fossil carbon dioxide emissions in gigatons (Gt) per year.

Source: Authors' elaboration based on Friedlingstein et al. (2003) and Solari et al. (2024, sec. 2).

6.2 Ecology and the Monetary System of Production

As is well known, economics is divided into two opposing visions of how the world operates (see Gnos 2017; Rochon & Rossi 2021a). In the micro-founded neoclassical theory, the economy will converge to a long-run, stable, equilibrium, which is unique and quantifiable, and acting as a centre of gravitation (Davidson 1999, pp. 307–308; Rochon & Rossi 2021b, p. 32). The assumed rationality of economic agents simply rules out *uncertainty*, at least in the sense that we simply do not know the future. Uncertainty is therefore just reduced to a probabilistic issue, where a finite set of possibilities exists, and economic agents rationally choose one – or a combination – of them. The deviations from the long-run equilibrium are hence conceived as short-term imperfections, which would be settled over time by the market mechanism (Monvoisin & Rochon 2006, pp. 12–13).

6.2.1 Ecological Path Dependency

However, for heterodox authors, the long-run trajectory is the succession of changing short-term expectations since the future is “unknown” (Robinson 1972, p. 3). Therefore, there is no predetermined natural equilibrium (Asensio 2017, pp. 135–136) and agents’ actions are led by their own forecasts about the future, even though such forecasts will not come true eventually (Setterfield 1999, p. 482). Although the past is “irrevocable” (Robinson 1972, p. 3), it nonetheless influences both the present, and the future.

This view has implications for the ecology, since from an ecological point of view, such path dependency implies that the economy cannot proceed in the same way as it did since the first Industrial Revolution, when considering the finiteness of

the planet (see Section 6.3) and the over-accumulation of greenhouse gases (GHG) in the atmosphere, as well as waste and pollution engendered by the economic process. In other words, the path of the evolution of the planet is not pre-determined but depends on changing (and alarming) ecological conditions. Changes are required, starting from the way of thinking and studying economics.

6.2.2 Ecological Economics and Power

Post-Keynesian economics is particularly fertile. It sees the economy as constrained by social and political contexts, fashioning economic agents' decisions and behaviour, the latter being therefore conventional rather than rational (Barrère 1990, p. 51; Lavoie 2022, pp. 96–97). This raises the issue of power and power relationships, especially concerning uncertainty about the future, thereby leading economic agents to exercise power over other agents, not only to enjoy a higher comfort in the present but also to secure their position against unpredictable events in the future. This is the case, for instance, of firms trying to reduce wages, or banks imposing a (high) rate of interest on credits (Monvoisin & Rochon 2006, p. 21; see also Rochon 2006). When the conventions consolidate, they build up institutions, guaranteeing and controlling the exercise of power related to them (Monvoisin & Rochon 2006, pp. 23–24).

To fully understand the role of economic power, we must elaborate on the notion of money, that is, the element characterizing and delimiting the economic sphere. To be sure, it is precisely the formation of products in monetary terms that makes them economic. Any human activity shaping differently (part of) the surrounding environment and engendering a utility form could be categorized as production. However, for this production to be economic, the monetary side of the picture must be engendered (Cencini 2005, p. 110). It is money, indeed, that allows the homogenization of otherwise heterogeneous products (Rossi 2001, pp. 77–78; Hudson 2004b, p. 309), making a society based on the division of labour possible. If commodities were incommensurable one to another, everyone would be constrained to produce all the products fulfilling her/his needs. The institution in charge of managing money is the banking system, that is, commercial banks plus the central bank. Money is endogenously issued out of nothing within the economic system (Rochon & Rossi 2013, p. 214; Solari 2023) on the demand of economic agents and through credit lines granted by banks (Moore 1988, p. 373).

To make it clear, we do not advocate for a dichotomous view of society: there is no monetary sphere aside from the real one. Income, that is, the monetary form of the social product, is a different definition of one and the same object, namely, produced goods and services (see Schmitt 1984/2021), thereby giving the plain signification of Keynes' first fundamental identity (Cencini 2005, p. 109):

National income $\equiv$ National product

In other words, workers do not receive the result of their efforts directly, but they obtain wages instead (see Solari 2023) since we all live in monetary

economies of production (see Graziani 2003 among others). Those wages are however tied to the real products since they are charged with the purchasing power to buy them (Rochon & Rossi 2013, p. 223). Income therefore reflects a power on commodities. Wages constitute, at first stance, the whole income engendered through production. Firms, however, can and do put a mark-up on selling prices, thus gaining profits, that is, a derived form of income (Keynes 1936/2013, p. 5; Schmitt 1984/2021, pp. 61–62, 64; 2017, pp. 65–67; Rossi 2008, pp. 41–42). Profits are distributed to several other economic agents eventually, such as shareholders through dividends, banks through interests, the State through taxes, and so on. In any case, income maintains its power on goods and services – except in the case of inflation and deflation, whose investigation, however, goes beyond the scope of this chapter.

Hence, there exists huge pressure to grasp income, which amounts to accumulating economic power. This is true both for firms (profit-seeking) and people (rent-seeking). As mentioned above, the formation of income cannot but take place through production, which is tantamount to saying that there exists a pressure to increase the overall economic production, too. This is another way to explain the economic growth-mantra, which has been at the very centre of our societies since the first Industrial Revolution, and which is factually problematic concerning the finiteness of planet earth. The next section addresses this point.

6.3 The Economy Embedded within Nature

As explained in the previous section, economic value is defined by the monetization of production, through the remuneration of workers (see Schmitt 1984/2021). This means that natural resources have no economic value since they are not the result of human work (Moore 2016, p. 93). To be sure, there is an economic activity for extracting, refining, and any other type of human transformation of natural resources. Nevertheless, the property and right to exploit any natural resource do not give rise to the formation of a new income but rather imply just a transfer of an existing or future one. For instance, the payment received by a landholder for the exploitation of her/his property is financed by an income formed or to be formed through a production activity (see Solari & Rossi 2025). In other words, the landholder's rent is an income derived from wages formed through the production process.

It is worth emphasizing, however, that no economic activity could be possible without the exploitation of natural resources, thereby engendering waste and pollution (Kemp-Benedict 2022, p. 211). Economic activity, as any other human activity, is subsumed to the third law of thermodynamics, that is, the unavoidable increase of entropy (Georgescu-Roegen 1971, p. 11, 129). The mechanization of production has further increased such an impact, along an exosomatic path (Lotka 1945, pp. 178, 188; Georgescu-Roegen 1971, p. 307). The goal should therefore be to integrate the ecological issue into economic thinking. At the time of writing, there are two main branches of economics precisely doing this (see Douai & Plumecocq 2017; Solari & Rossi 2025).

The first one is environmental economics, relying on neoclassical fundamentals and attempting to give a price to what is called “natural capital” or to the costs related to waste and pollution. The underlying idea is to set up some market where artificially engendered demand and supply interact, giving rise to an equilibrium. In other words, nature is reduced to a part of the economy, that is, part of input and output, to which nowadays no price or cost is related. The economics’ analytical tools would otherwise fully apply, thus allowing for the optimization of nature’s exploitation, that is, maximizing consumers’ utility and firms’ profits (see Solari & Rossi 2025). This leads to the concept of weak sustainability: the destruction of natural capital is not problematic as long as something else can take its place (Nordhaus & Tobin 1973, p. 522; Ayres et al. 2001, p. 158). In environmental economics’ terms, natural capital can be substituted by instrumental capital, thereby maintaining the standard of life unaffected overall (see Spash 2012, pp. 37–41 for an elaboration on epistemological weaknesses of mainstream economics).

As Polanyi (1944/2001, p. 188) already pointed out many decades ago, mainstream economists consider the environment as a set of resources, instead of recognizing that it is the *milieu* of life (see also Solari & Rossi 2025). The latter point of view makes it clear that it is the economy that is embedded within nature, rather than the opposite. Any living being on earth needs very particular conditions to make life possible, which amounts to saying that the very existence of human beings is possible only within the biological sphere. The economy is a subgroup of human activities and therefore embedded within this sphere, as Figure 6.2 depicts.

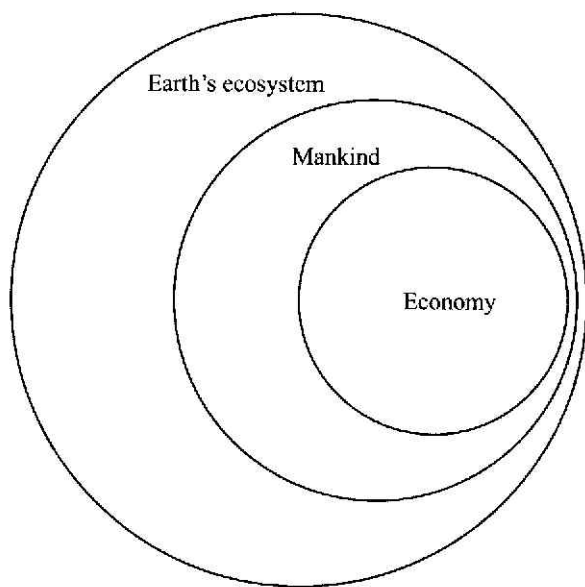


Figure 6.2 Mankind and the economy are embedded in nature.

Source: Authors' elaboration based on Daly (1993, p. 812).

Let us quote Spash (2012, p. 43) to translate it in epistemological terms: “everything is governed by the laws of physics, all biological entities are physical but not vice versa, so biological sciences are embedded within the physical and likewise the social within the biological and the economic within the social.” It is worth noting, however, that embeddedness does not amount to reductionism. The space a human being occupies in the world, for instance, cannot be reduced to the sum of the molecules composing it (Georgescu-Roegen 1979/2009, p. 109; Spash 2012, p. 43) since, for instance, only the human being as a whole can build-up and run a motor vehicle.

The economy being embedded within nature, as an organic part of the latter (Spash & Ryan 2012, p. 1095), economic decisions should integrate criteria reflecting the boundaries imposed by nature. Such criteria should be applied at the very beginning, when firms propose some production project and banks decide whether to grant or not the credit needed to start the production process (see Solari & Rossi 2025; Solari et al. 2024). Nowadays these criteria are just of commercial and financial fashion, following the effective demand principle and assessing solvability, respectively (Rochon 2006, pp. 180–181; Asensio 2017, p. 129). Now, to align the economy with ecological constraints, firms and banks should (be forced to) integrate ecological criteria (Solari & Rossi 2025), as we further elaborate in Section 6.4.

The original aim of the second branch in the matter, ecological economics, is precisely to integrate such a multi-disciplinary approach. Economics – as a science – cannot cover the entire picture but needs to be supplemented by ecology, sociology, anthropology, history, and so on. This is in line with Keynes’s views, where he once argued that “the master-economist must possess a rare combination of gifts. He must be mathematician, historian, statesman, philosopher – in some degree” (Keynes 1924, p. 322). The role of economics, however, is crucial, given the substantial impact that the economy – in the form of capitalism – has on nature (see Moore 2016). The limits of the earth’s ecosystem are not absolute: global warming is not “destroying” the planet, as too often we listen to, but it is changing the conditions of life, for both human beings and any other species. How to integrate such boundaries, consistently with the monetary economies of production in which we all live, is of major importance. The required multi-disciplinary effort mentioned above must be consistent with the monetary essence of our economies and the existence of several forms of power (see Monvoisin & Rochon 2006, p. 16, on these forms of power), which is not the case for environmental economics-rooted policies.

Even ecological economics, however, suffers from a lack of a robust monetary theory (Ament 2019, p. 11). We addressed that issue in this section and the previous one, according to the ontological key elements proposed by Ament (2020, p. 3) as well as with epistemological presuppositions and claims, and methodological positions, purported by Spash (2012, p. 45). It is now time to present some ways that should be followed. There exist two possible paths that could work together to address as rapidly as possible such an urgent problem. The next section elaborates on this.

6.4 Reformist and Revolutionary Policies Altogether

Two categories of interventions can be found by differentiating them on the required degree of rupture with the current state of the world. On the one hand, the so-called reformist policies could theoretically be applied even while maintaining the capitalist structure. On the other hand, the revolutionary ones imply a deep change in the actual system, as regards both material and ideological dimensions. However, even reformist policies could lead to a revolutionary change, when applied at a higher magnitude than has been the case through the Kyoto Protocol or the Paris Agreements. To do that, they should be combined with the revolutionary policies, as well as comply with the essence of money. In a similar vein, Rochon and Rossi (2013) cogently explained about a decade ago, money has always been endogenous and is at the core of economic activity, which the authors label as the “revolutionary” view, since it completely overturns the economic understanding. Let us address some policies for each of the categories, to better understand their respective characteristics and the way they should be merged.

6.4.1 Make Reformist Policies More Effective

The reformist policies aim to redirect economic activity unto a more sustainable path. Among them lie the environmental-economics-fashioned policies, at least those punishing non-ecological forms of behaviour (for instance, through taxation) and/or priming the ecological ones (mostly using subventions). Up to now, however, the results are poor, as shown by the persevering increase of GHG emissions, even after decades of such policies’ appliance (see Figure 6.1). This is due, on the one hand, to the low magnitude of the applied interventions. On the other hand, moreover, these policies only address the issue *ex-post*, namely, by sanctioning/priming already realized actions. As a matter of fact, by sanctioning a pollutant firm we do not induce it to decrease its emissions if it can increase its sales, thereby financing the additional taxation burden. Environmental economists often reply to this criticism by arguing that such policies will induce firms to develop some technological instrument reducing their impact on nature eventually. To put the accent on technological development, however, is a risky bet, since there is no certainty about either the birth of such a technology or its effectiveness (Pressman 2006, p. 75; Spash & Ryan 2012, p. 1096). This requires years or decades or tested proof.

Another frequent reply from environmental economists is that the increasing consumers’ sensitiveness about ecology will change behaviours and divert consumers from highly pollutant towards less pollutant products, thus leading firms to privilege the production of the latter eventually. Nevertheless, this neglects the fact that firms have a deep influence on these forms of behaviour through marketing and advertising instruments, which would be used to increase profits instead of reducing the ecological burden (Pressman 2006, pp. 77–78).

To make reformist policies more effective, they should be applied at the very root of the economic system, namely when economic decisions about *what*, *how*,

and *how much* to produce are taken. In other words, we should act on firms' project selection and on banks' decisions (Bellofiore 2023, p. 265) on granting or not the required credit lines, that is when the production becomes economic by its monetization (Rochon 1999, pp. 8–10). Lacking to do that would incur a failure (Ament 2019, p. 13). The intervention should be led by the State in a twofold way. On the one side, governments (and perhaps international institutions) should have quite a stringent control on the economic decisions mentioned above, through taxation and subvention, but also by regulating the quantitative extent of the production activity. On the other side, central banks should orient their monetary policies – for instance, the policy rate of interest for liquidity operations – to make non-ecological productions less profitable (or even costly) for banks (see Solari et al. 2024 for analytical elaboration on this).

These two sides should jointly operate since the State (i.e., the government plus the central bank) is the institutional cornerstone for both reducing the tension within the economic system (for instance, through the tax-subsidization scheme that transfers income from wealthy to poor people) and fixing some fundamental rules of the game (Ament 2020, p. 6). Ament (2020, p. 8) summarizes it by stating that a crucial question is “to whom, and for what credits are issued; upon whom and what tax debts are levied.” As Davidson (1999, p. 313) points out by elaborating on the concept of hysteresis, the economic system flows to an indefinite long-term state by changing its road continuously, not only because of exogenous shocks but also and especially through endogenous changes. The State should therefore intervene in directing the economy towards a full-employment situation, and sustainability from an ecological as well as social perspective.

Concerning monetary policy, it is worth noting that it should be (re)politicized in a way to differentiate the liquidity conditions between sustainable and non-sustainable activities (see Rochon & Vallet 2022; Solari et al. 2024), and therefore hitting firms and banks having and exercising the power to degrade nature. Mainstream monetary policy is indeed ineffective to impact on macroeconomic magnitudes, as Rochon and Vallet (2022, p. 86) cogently explain, since it operates indistinctly on all the commercial banks. The interest rate, however, is an exogenous variable under the control of the central bank (Rochon & Setterfield 2008, pp. 5–6; Lavoie 2022). There is, therefore, room to manoeuvre and rethink monetary policy by differentiating this rate of interest (see Solari et al. 2024 for analytical elaboration on this point). Money is not a neutral instrument (Ingham 2004, p. 91) and neither is monetary policy (Rossi 2023): the goal is to reorient this policy towards an eco-friendly direction.

6.4.2 *Towards a Revolutionary Change*

Yet, by effectively applying these policies, economic and policy decision-makers would be led to change their way of thinking about the economic system. A decoupling between economic activity and ecological degradation consistent with the entropy law is not possible. To give up the growth-mantra is just unavoidable, given the finiteness of the earth's ecosystem within which the economy is embedded.

The question is how to do that. The overall result would indeed be a reduction of economic activity, whether it would be led by social and political choices or by a deep and brutal change in ecological conditions. Nowadays, we are stuck in the second alternative, further exacerbated by the exercise of power to accumulate as many resources as possible within the present uncertain context (see Monvoisin & Rochon 2006, p. 26). Several contributions on stationary-state or degrowth have been produced by scholars, attempting to switch towards a socially and economically sustainable path, fashioned on a political agreement as large as possible (see among others Daly 1991; Cahen-Fourot & Lavoie 2016; Hickel 2021). The finiteness of planet earth unequivocally imposes a quantitative slow-down, even though it will raise multiple additional problems, the major one consisting of a reduction in work needed to ensure the required production.

Now, by pushing the effective demand concept to its limits, it is ascertained that aggregate demand and supply are identical. This means that equilibrium does not pertain to macroeconomic analysis (see Cencini 2005, pp. 71–75), the level of the latter being subsumed to political as well as private decisions. As a matter of fact, any given state of the world can (and often does) diverge from full employment (Setterfield 1999, p. 483). Since technological improvements decrease the need for human labour, by increasing labour productivity (Cesaratto et al. 2003), and adding up the required reduction of economic activity overall for achieving ecological sustainability, we argue for a reduction of working time by fairly redistributing it as largely as possible (Keynes 1928/2013, p. 329; see also Lavoie 2022, pp. 636–637). The “economic problem,” that is “the struggle for subsistence” (Keynes 1928/2013, p. 326), has indeed been potentially solved, even though the present unfair distribution of the social product and, upstream, of the working tasks, impede to reach such a major goal for humanity. To impose the required working time reduction by law is not technically challenging, while it would require a settling-in period economically speaking. The result, however, would hopefully mark an upswing for those who are nowadays excluded from the labour market. For those who are now employed at a hundred per cent rate, it would be a liberation of time to use for other purposes, including adopting more ecological behaviours, which often implies a larger consumption of time. From a macro-oriented approach, it is completely nonsense to employ people – as it is often the case nowadays – just to allow others to work eight or more hours per day. The fast-food industry is a crystal-clear example of that, adding up, moreover, health concerns to the ecological ones.

Present policies, regretfully, go towards the opposite direction. Beyond the aforementioned unnecessary job creation, which Graeber (2018) bluntly labelled as “bullshit jobs,” the last decades have been marked by globalization and the international diversification of manufacturing operations (IDMOs), that is, the production of detached components all around the world, which are assembled eventually, after having been displaced, perhaps several times, for thousands of kilometres. This implies a huge consumption of energy, whose impact is enormous. The very low transportation costs and labour remunerations in the Global South largely explain such an unecological path, underlying social and economic inequalities

between the Global North and the Global South thereby. To reverse this trend, a major change is required, notably by putting growth-mantra, profit-seeking (see Ament 2019, p. 12) and material comfort at a lower level than eco-sustainability and social – as well as individual – well-being. This needs to constrain the power of the industry, especially of transnational firms, which has arisen with globalization (Monvoisin & Rochon 2006, p. 24), giving rise to (quasi) monopolistic positions. Firms, indeed, attempt “to control the market rather than being controlled by it” (Pressman 2006, p. 76), with the aim to increase profits even though this implies degrading nature and other people’s conditions of life.

Although such a perspective could appear *naïve*, the post-Keynesian approach, considering money as a social instrument, suggests quite the opposite. Money allows for the homogenization of all social products, which is the base for both the division of labour and co-operation, both intra- and inter-societies (see Innes 1913/2004 on the social role of money). The mainstream schools of economics underline the first side (Ament 2020, p. 2), while the second is even more important. Humans have always been social beings and money is a crucial element of co-operation making socialization possible on a large scale and over time (Hudson 2004a, p. 101; Ament 2020, p. 5). Nevertheless, the power of firms to raise prices over the cost of production allows them to accumulate profits. When this power increases, the profit share also increases. As explained in Section 6.2, profits are a derived form of income, the latter making up a purchasing power on products. When income – in any form, but often in derived forms, such as profits, that we can classify as capital income – is over-accumulated in the hands of few people or firms, the latter acquire political, social, and economic power, thus being in a position to influence the direction of production and society generally speaking, as well as determine the way of relating to nature.

Moreover, and quite weirdly, instead of involving as many people as possible, democratic societies leave the crucial decisions on *what*, *how*, and *how much* to produce to a few non-elected people (see Dahl 1985, p. 115), the latter openly pursuing private interests – that is, the accumulation of income, wealth and power for a restricted part of the world population – rather than social well-being. The same applies to the decisions on the exploitation of nature, since the latter has been, and is still being, privatized for economic purposes (see Polanyi 1944/2001). In other words, while production, thanks to money, is co-operatively organized on global grounds, the fundamental choices, and power that go with them, are undemocratically assigned. Co-operative firms – curiously overlooked by the post-Keynesian school until now, whereas developed by the Marxist one (see for instance Satgar 2007) – are an interesting way to differently organize production, which would make the decision process far more democratic than it currently is (de Peuter & Dyer-Witthoford 2010, p. 35). By setting up firms owned and managed by workers, the latter would be actively involved in the whole economic process, including the decision-making phase. The decision power would be spread among a larger set of people. The loss of efficiency – often mentioned as a critique to co-operative firms – would actually be an advantage, given the necessary quantitative slow-down in production mentioned above. Co-operative firms, indeed, could hopefully lead to

resizing the role of profit, by privileging other elements, such as the overall usefulness of products, self-realization of workers, large social well-being, and of course ecological sustainability.

The reformist policies would not be alien to this perspective. Co-operatives would modify the production purposes' orientation, thus aligning them with the suggested new fiscal and monetary policies applied by the government and the central bank, respectively. We additionally argue, following the same path, that central banks should be democratized too, as Rochon and Vallet (2022) cogently explain. Along with co-operative firms, it could be a reappraisal of public direct intervention in production, after more than four decades of privatizations (Piketty 2013/2014, pp. 136–138). Public firms, indeed, would hopefully bring about social- and ecological-oriented productions.

All in all, given the urgency of the problem, we need a prompt revolutionary turning point. Both these typologies of policies, therefore, can and should be applied altogether: the reformist ones are insufficient if applied alone, but useful when inserted in a structural shift led by the revolutionary ones, the latter aiming to rethink the economy in favour of human beings, including the wellness of the earth ecosystem in which they are embedded.

6.5 Conclusion

The neoclassical school of economics has been proven ineffective in describing and analysing the economy, as well as any other equilibrium-based economic theory. This largely comes from the misleading conception of money, which impedes setting up an identity-based framework. It would be thus better to turn to heterodox approaches, among which the post-Keynesian one allows us to deeply understand the functioning of the monetary economies of production fashioning our world. By understanding that economic activity begins with the issuance of credit by the banking system, political and economic decision-makers can finally act at the very root of the system. The decisions on what has to be produced logically and factually precede the actual production, the latter impacting nature.

Based on the ecological economics' concept of embeddedness, we argue that the economy has to be resized in a way that limits it within the physical and biological boundaries of the earth's ecosystem. This is a *sine qua non* prerequisite to make sure that the conditions of life are perpetuated over time. It is therefore crucial to enrich the above-mentioned decision process by adding up ecological criteria, thereby discarding those production projects having heavy consequences on nature. To put it clearly, these criteria must be applied before or at least at the same time as the commercial and financial ones. A multi-disciplinary effort is required here, by integrating ecological, economic as well as social elements. The State – both governments and central banks – should play the prominent role it is called to assume by its institutional position, by correcting the increasing concentration of power and redirecting the economy towards a socially and ecologically sustainable path. The actual mainstream set of tax-subsidy interventions has been proven ineffective as applied up to now. This kind of intervention should be redirected to

acting *ex-ante*, thereby avoiding further nature degradation previously, instead of intervening afterwards. For instance, central banks around the world should differentiate their liquidity policies by hitting polluting activities and priming sustainable ones, through higher, respectively lower, rates of interest imposed on banks. Nevertheless, this would not be enough, since a quantitative decrease in economic activity seems unavoidable and would moreover be engendered by the policies we just depicted. The reduction of working time, through a fair redistribution of it, should become a cornerstone of the interventions, in a way to avoid a dramatic increase in unemployment and social turmoil thereby. On the theoretical side, this would hopefully reconcile post-Keynesian economics (traditionally framed within the growth-mantra as a way to achieve full employment) with ecological economics (claiming for a quantitative slow-down of economic activity) (Lavoie 2022, p. 637), building up a consistent and practicable post-Keynesian ecological economics framework. In order to achieve such a breakthrough, however, major shifts are required in material, intellectual as well as cultural dimensions. Profit-seeking and growth-mantra must be replaced by democratically, socially, and ecologically oriented ways of economic government, consistently with Fontana and Sawyer's (2016, p. 193) conclusions. We suggest – drawing from the Marxist tradition – the co-operative organization as an interesting way to re-organize production. The economy, indeed, must be resized to be instrumental for achieving social well-being and ecological sustainability, instead of sacrificing the latter for maximizing economic growth.

References

- Ament, J 2019, 'Toward an ecological monetary theory', *Sustainability*, vol. 11, no. 3, accessed 23 January 2024, <https://www.mdpi.com/2071-1050/11/3/923>. DOI:10.3390/su11030923.
- Ament, J 2020, 'An ecological monetary theory', *Ecological Economics*, no. 171, accessed 22 January 2024, <https://www.sciencedirect.com/science/article/pii/S0921800919306962>. DOI:10.1016/j.ecolecon.2019.106421.
- Asensio, A 2017, 'Rethinking the environment', in L-P Rochon & S Rossi (eds), *A Modern Guide to Rethinking Economics. New Directions in Post-Keynesian Economics*, Edward Elgar, Cheltenham & Northampton, pp. 129–150. DOI:10.4337/9781784717216.
- Ayres, RU, van den Bergh, JCJM & Gowdy, JM 2001, 'Strong versus weak sustainability: Economics, natural sciences, and "consilience"', *Environmental Ethics*, vol. 23, no. 2, pp. 155–168.
- Barrère, A 1990, *Macroéconomie keynésienne. Le projet économique de John Maynard Keynes*, Dunod, Paris.
- Bellofiore, R 2023, 'Against the streams: Alain Parguez and the theory of monetary circuit', *International Journal of Political Economy*, vol. 52, no. 3–4, pp. 256–269. DOI:10.1080/08911916.2023.2280373.
- Cahen-Fourot, L & Lavoie, M 2016, 'Ecological monetary economics: A post-Keynesian critique', *Ecological Economics*, no. 126, pp. 163–168. DOI:10.1016/j.ecolecon.2016.03.007.
- Cencini, A 2005, *Macroeconomic Foundations of Macroeconomics*, Routledge, London & New York.
- Cesaratto, S, Serrano, F & Stirati, A 2003, 'Technical change, effective demand and employment', *Review of Political Economy*, vol. 15, no. 1, pp. 33–52. DOI:10.1080/09538250308444.

- Dahl, RA 1985, *A Preface to Economic Democracy*, University of California Press, Berkley.
- Daly, HE 1991, 'Towards an environmental macroeconomics', *Land Economics*, vol. 67, no. 2, pp. 255–259.
- Daly, HE 1993, 'Steady-state economics: A new paradigm', *New Literary History*, vol. 24, no. 4, pp. 811–816.
- Davidson, P 1999, 'The elephant and the butterfly: Or the hysteresis and post Keynesian economics', in L Davidson (ed), *Uncertainty, International Money, Employment and Theory*, MacMillan & St. Martin's Press, Basingstoke, London & New York, pp. 305–317. DOI:10.1007/978-1-349-14991-9.
- de Peuter, G & Dyer-Witheford, N 2010, 'Commons and cooperatives', *Affinities: A Journal of Radical Theory, Culture, and Action*, vol. 4, no. 1, pp. 30–56.
- Douai, A & Plumecocq, G 2017, *L'économie écologique*, La Découverte, Paris.
- Fontana, G & Sawyer, M 2016, 'Towards post-Keynesian ecological macroeconomics', *Ecological Economics*, no. 121, pp. 186–195. DOI:10.1016/j.ecolecon.2015.03.017.
- Friedlingstein, P, O'Sullivan, M, Jones, MW, Andrew, RM, Bakker, DCE, Hauck, J, Landschützer, P, Le Quéré, C, Luijckx, IT, Peters, GP, Peters, W, Pongratz, J, Schwing-shackl, C, Sitch, S, Canadell, JG, Ciais, P, Jackson, RB, Alin, SR, Anthoni, P, ... Zheng, B 2003, 'Global carbon budget 2023', *Earth System Science Data*, no. 15, pp. 5301–5369. DOI:10.5194/essd-15-5301-2023.
- Georgescu-Roegen, N 1971, *The Entropy Law and the Economic Process*, Harvard University Press, Cambridge & London.
- Georgescu-Roegen, N 1979/2009, 'Methods in economic science', in CL Spash (ed), *Ecological Economics: Critical Concepts in the Environment*, Routledge, London, pp. 105–115.
- Gnos, C 2017, 'Rethinking the foundations of macroeconomics', in L-P Rochon & S Rossi (eds), *A Modern Guide to Rethinking Economics. New Directions in Post-Keynesian Economics*, Edward Elgar, Cheltenham & Northampton, pp. 17–27. DOI:10.4337/9781784717216.
- Graeber, D 2018, *Bullshit Jobs. A Theory*, Penguin, London.
- Graziani, A 2003, *The Monetary Theory of Production*, Cambridge University Press, Cambridge.
- Hickel, J 2021, 'What does degrowth mean? A few points of clarification', *Globalizations*, vol. 18, no. 7, pp. 1105–1111. DOI:10.1080/14747731.2020.1812222.
- Hudson, M 2004a, 'The archaeology of money: Debt versus barter theories of money's origins', in RL Wray (ed), *Credit and State Theories of Money*, Edward Elgar, Cheltenham & Northampton, pp. 99–127.
- Hudson, M 2004b 'The development of money-of-account in Sumer's temples', in M Hudson & C Wunsch (eds), *Creating Economic Order. Record-Keeping, Standardization, and the Development of Accounting in the Ancient Near East*, CDI., Bethesda, pp. 303–329.
- Ingham, G 2004, *The Nature of Money*, Polity Press, Cambridge.
- Innes, AM 1913/2004, 'What is money?', in RL Wray (ed), *Credit and State Theories of Money*, Edward Elgar, Cheltenham & Northampton, pp. 14–49.
- Kemp-Benedict, E 2022, 'Money and the environment', in L-P Rochon, S Kappes & G Vallet (eds), *Central Banking. Monetary Policy and the Environment*, Edward Elgar, Cheltenham & Northampton, pp. 200–218. DOI:10.4337/9781800371958.
- Keynes, JM 1924, 'Alfred Marshall, 1842–1924', *Economic Journal*, vol. 24, no. 135, pp. 311–372.
- Keynes, JM 1928/2013, 'Economic possibilities for our grandchildren', in A Robinson and D Moggridge (eds), *The Collected Writings of John Maynard Keynes. Essays in Persuasion*, vol. IX, Cambridge University Press, Cambridge, pp. 321–332.
- Keynes, JM 1936/2013, 'The general theory of employment, interest and money', in A Robinson and D Moggridge (eds), *The Collected Writings of John Maynard Keynes*.

- The General Theory of Employment, Interest and Money, vol. VII, Cambridge University Press, Cambridge.
- Lavoie, M 2022, *Post-Keynesian Economics. New Foundations*, 2nd edition, Edward Elgar, Cheltenham & Northampton. DOI:10.4337/9781839109621.
- Lotka, AJ 1945, 'The law of evolution as a maximal principle', *Human Biology*, vol. 17, no. 3, pp. 167–194.
- Monvoisin, V & Rochon, L-P 2006, 'Economic power and the real world: A post-Keynesian analysis of power', *International Journal of Political Economy*, vol. 35, no. 4, pp. 5–30. DOI:10.2753/IJP0891-1916350401.
- Moore, BJ 1988, 'The endogenous money supply', *Journal of Post Keynesian Economics*, vol. 10, no. 3, pp. 372–385.
- Moore, JW 2016, 'The rise of cheap nature', in JW Moore (ed), *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*, PM Press, Oakland, pp. 78–115.
- Nordhaus, WD & Tobin, J 1973, 'Is growth obsolete?', in M Moss (ed), *The Measurement of Economic and Social Performance*, National Bureau of Economic Research, Cambridge, pp. 509–564.
- Piketty, T 2013/2014, *Capital in the Twenty-First Century*, edited by A Goldhammer, Belknap Press of Harvard University Press, Cambridge & London.
- Polanyi, K 1944/2001, *The Great Transformation. The Political and Economic Origins of Our Time*, Beacon Press, Boston.
- Pressman, S 2006, 'Economic power, the state, and post-Keynesian economics', *International Journal of Political Economy*, vol. 35, no. 4, pp. 67–86. DOI:10.2753/IJP0891-1916350404.
- Robinson, J 1972, 'The second crisis of economic theory', *The American Economic Review*, vol. 62, no. 1–2, pp. 1–10.
- Rochon, L-P 1999, 'The creation and circulation of endogenous money: A circuit dynamique approach', *Journal of Economic Issues*, vol. 33, no. 1, pp. 1–21. DOI:10.1080/00213624.1999.11506132.
- Rochon, L-P 2006, 'Endogenous money, central banks and the banking system: Basil Moore and the supply of credit', in M Setterfield (ed), *Complexity, Endogenous Money and Macroeconomic Theory: Essays in Honour of Basil Moore*, Edward Elgar, Cheltenham & Northampton, pp. 170–186.
- Rochon, L-P & Rossi, S 2013, 'Endogenous money: The evolutionary versus revolutionary views', *Review of Keynesian Economics*, vol. 1, no. 2, pp. 210–229. DOI:10.4337/roke.2013.02.04.
- Rochon, L-P & Rossi, S 2021a, 'The state of macroeconomics', in L-P Rochon and S Rossi (eds), *An Introduction to Macroeconomics. A Heterodox Approach to Economic Analysis*, 2nd edition, Edward Elgar, Cheltenham & Northampton, pp. 51–79.
- Rochon, L-P & Rossi, S 2021b, 'What is economics?', in L-P Rochon and S Rossi (eds), *An Introduction to Macroeconomics. A Heterodox Approach to Economic Analysis*, 2nd edition, Edward Elgar, Cheltenham & Northampton, pp. 25–50.
- Rochon, L-P & Setterfield, M 2008, 'The political economy of interest-rate setting, inflation, and income distribution', *International Journal of Political Economy*, vol. 37, no. 2, pp. 5–25. DOI:10.2753/IJP0891-1916370201.
- Rochon, L-P & Vallet, G 2022, 'The institutions of the people, by the people and for the people? Addressing central banks' power and social responsibility in a democracy', *PSL Quarterly Review*, vol. 75, no. 301, pp. 83–102. DOI:10.13133/2037-3643/17727.
- Rossi, S 2001, *Money and Inflation. A New Macroeconomic Analysis*, Edward Elgar, Cheltenham & Northampton.
- Rossi, S 2008, *Macroéconomie monétaire. Théories et politiques*, Schulthess, Bruylant, L.G.D.J., Zürich, Bruxelles & Paris.
- Rossi, S 2023, 'The distributional impacts of inflation-targeting strategies', in S Kappes, L-P Rochon & G Vallet (eds), *Central Banking, Monetary Policy and Income Distribution*, Edward Elgar, Cheltenham & Northampton, pp. 261–273. DOI:10.4337/9781800376403.

- Satgar, V 2007, 'Cooperative development and labour solidarity: A neo-Gramscian perspective on the global struggle against neoliberalization', *Labour, Capital and Society/Travail, capital et société*, vol. 40, no. 1-2, pp. 56-79.
- Schmitt, B 1984/2021, *Inflation, Unemployment and Capital Malformations*, edited by X Bradley & A Cencini, Routledge, London & New York.
- Setterfield, M 1999, 'Expectations, path dependence and effective demand: A macroeconomic model along Keynesian lines', *Journal of Post Keynesian Economics*, vol. 21, no. 3, pp. 479-501. DOI:10.1080/01603477.1999.11490209.
- Solari, M 2023, 'Money creation - nature of', in L-P Rochon and S Rossi (eds), *Elgar Encyclopedia of Post-Keynesian Economics*, Edward Elgar, Cheltenham & Northampton, pp. 293-295. DOI:10.4337/9781788973939.
- Solari, M, Le Bloc'h, A & Rossi, S 2024, 'Ecological transition in a monetary economy of production: A heterodox approach', *Eurasian Economic Review*, preprint, accessed 16 February 2024, <<https://link.springer.com/article/10.1007/s40822-023-00252-w>>.
- Solari, M & Rossi, S 2025, 'Should we care about the environment in a market economy?', in H Bougrine, L-P Rochon & M Seccareccia (eds), *Intermediate Microeconomics: Theory, Policy and Competing Perspectives*, Forthcoming.
- Spash, CL 2012, 'New foundations for ecological economics', *Ecological Economics*, no. 77, pp. 36-47. DOI:10.1016/j.ecolecon.2012.02.004.
- Spash, CL & Ryan, A 2012, 'Economic schools of thought on the environment: Investigating unity and division', *Cambridge Journal of Economics*, vol. 36, no. 5, pp. 1091-1121. DOI:10.1093/cje/bes023.