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Redesigning Money to Curb Globalization: Can We
Domesticate the Root of all Evil?

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Abstract: This paper critically discusses the notion of money as a historical and cultural construct that has been apotheosized by the discipline of economics as a supreme measure of value, although detached from both material reality and human morality. It begins by synoptically reviewing the emergence of the mainstream concerns of economics and discussing the peculiarity of the money sign from a semiotic perspective. It then addresses the detachment of money from morality and from material flows as interconnected components of mainstream, neoclassical economic doctrine. It briefly also discusses the historical and conceptual relation between energy and money, viewed from the perspectives of ecological and Marxian economics. These considerations are then shown to be of fundamental relevance to an understanding of financialization and financial crises. Finally, it argues that a sustainable and resilient economy will require the establishment of a complementary currency that distinguishes between values pertaining to local human survival, on the one hand, and the values in which financial institutions speculate, on the other.

Key words: Money; Economics; Materiality; Morality; Semiotics; Energy; Financialization; Financial crises; Complementary currencies

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“Assuredly such a new economics will incorporate knowledge from the domains of other branches of social inquiry, but if the usefulness of the worldly philosophy of the twenty-first century is to match that of the nineteenth and early twentieth, it will need to be both deepened and enlarged, above all compared to the desiccated residue with which we are left today.”¹

– Robert Heilbroner (1999[1953]:321)

The purpose of this paper is to discuss *the implications of a semiotic perspective on money for visions of systems of alternative currencies that would enhance sustainability*. To conceptualize the relationship between the economy and sustainability from such a detached and philosophical vantage-point necessarily means applying wide-ranging and trans-disciplinary approaches.² We shall need to relativize the idea of money itself as a historical and cultural phenomenon with far-reaching implications that pervade every aspect of human society. As countless philosophers and social thinkers over the centuries have recognized, the phenomenon of money is recursively intertwined with central features of the human condition, from modes of cognition, religion, and morality to power, exploitation, warfare, and the nation state.³ It is also foundational to the sociological condition of modernity, frequently characterized in terms of inclinations toward abstraction, interchangeability, individualism, and alienation.

¹ For a lengthy selection of quotes from leading economists (including six 'Nobel Prize' winners: Friedman, Stiglitz, Coase, North, Leontief, and Solow) on the dangers of leaving economics to economists, see this website of the Post-Autistic Economics movement: <http://www.paecon.net/PAEmovementindex1.htm> Perhaps it takes financial experts (Soros 2008) to understand what money is, and one who has seen his fortune dissolve (Lietaer 2001) to figure out how to make it serve humanity, rather than vice versa.

² Drawing on the notion of 'post-normal' science, Mayumi (2009:1249) observes that “the social, technical and ecological dimensions of sustainability issues are so deeply connected that it is simply impossible to consider these various dimensions as separated into conventional disciplinary fields.”

³ Cf. Simmel 1990[1907]; Parry & Bloch 1989; Corbridge, Martin & Thrift 1994; Graeber 2011; McNally 2014.

The author is not an economist but an anthropologist with an interest in economic anthropology, economic history, and ecological economics. To organize the presentation I shall provide brief and synoptic background statements on five interrelated components of the discussion. These five topics are: 1. The emergence of the mainstream concerns of economics; 2. The relation between money, semiotics, and morality; 3. The historical and conceptual relationship between energy and money, viewed from the perspectives of ecological and Marxian economics; 4. Mainstream versus heterodox accounts of financialization and financial crises; and 5. The rationale, history, and prospects of experiments with alternative currencies. Needless to say, the aspiration to demonstrate, in a single paper, how all these vast fields of inquiry are interrelated requires that the central topics and arguments of entire disciplines are here reduced to brief generalizations and a selective list of references, inevitably constrained by the author's own field of vision.

The emergence of the mainstream concerns of economics

There is a wide consensus that modern economics has emerged as the understanding and explanation of capitalism (Heilbroner 1999[1953]:37, 312, 319). Although money, market exchange, and price relations have existed for millennia, it was the conceptualization of abstract land, labor, and capital as quantifiable and commensurable categories that created the discipline of economics (ibid., 27). The emergence of economics has thus reflected and reinforced historical processes of commercialization and monetization. Although various schools of economics advocate different economic policies, they share the underlying assumption that (general-purpose) money is a valid metric for quantifying human transactions, and that statistics and mathematics offer methods for thinking and deliberating about them (ibid., 314).⁴ Significantly, a standard textbook on the history of economics that has shaped the minds of generations of economists does not devote a single word to

⁴ Yet, Heilbroner assures us that, while mathematics "today pervades economics, formalizes it, and becomes its favored mode of expression, ...no one actually confuses mathematics with economics" (ibid., 314). Georgescu-Roegen (1971) exposed the limitations of what he called 'arithmomorphism,' which needs to be combined with a dialectical approach relying on "words, instead of numbers" (Mayumi 2009:1237). According to Mayumi (ibid.), "dialectical reasoning can be as correct as mathematical reasoning, but very often it can be even more penetrating."



reflecting on the phenomenon of money itself, without which economics as a discipline would not exist.⁵

The expansion of market trade in the late Middle Ages and early modern period contributed to a long-standing confusion about the relation between what Aristotle had called 'use value' and 'exchange value'. The intuitive distinction between a traded commodity's substance or usefulness and its abstract exchange value is valid, but rather than acknowledge that these two features of a commodity are analytically incommensurable, the history of economic thought has been plagued by unsuccessful attempts to derive the latter from the former. The challenge, as visualized by economists from the Physiocrats through Karl Marx to ecological economics, has been to relate the material aspects of economic processes to the accumulation of monetary value. In the pre-industrial world of the Physiocrats, it was the fecundity of the soil that was the ultimate source of wealth. For the economists of the Industrial Revolution, such as Ricardo and Marx, it was the power of labor. For many modern ecological economists, it is energy and 'natural capital' (cf. Mirowski 1988b; Martinez-Alier 1987; Hornborg 2014). What these perspectives have in common is the notion that some particular, physical input in the production of a commodity has a specifiable relation to the monetary income from selling it. The urge to relate money and accumulation to tangible, biophysical realities is commendable – and an expression of a widespread dismay at seeing them diverge in both thought and practice⁶ – but any attempt to derive the former in determined and definable ways from the latter is misguided. There is an important difference between observing that economic processes that augment exchange values and monetary accumulation simultaneously imply the dissipation and degradation of natural resources (Georgescu-Roegen 1971),⁷ on the one hand, and proposing theories of economic value

⁵ Heilbroner (ibid., 109-115) does mention that the Utopian socialist Robert Owen in the early nineteenth century 'naively' wanted to abolish money, but he never tells us why. There were, in fact, several movements to radically transform money in nineteenth-century England and the United States (North 2007:41-61).

⁶ As mentioned, this dismay can be traced as far back as Aristotle, but few have expressed it as persuasively as Frederick Soddy (1926), a prominent ancestor figure for ecological economics (Daly 1996:173-190).

⁷ Nicholas Georgescu-Roegen (1971) argued that the economic processes organized to enhance exchange values simultaneously entailed an inexorable physical dissipation of both matter and energy. One of his recurrent examples is the erosion of automobile tires into molecules of rubber randomly dissipated in the atmosphere. If his book had been written thirty or forty years later, the most relevant example he could have chosen would have been the dissipation of carbon from fossil fuels, but then



based on land, labor, or energy, on the other. The real challenge for an economics concerned with sustainability ought to be how to respond to the problems posed by Nicholas Georgescu-Roegen's (1971) observations, while avoiding the pitfall of advocating a materialist theory of value.

In view of the problems confronted by attempts to derive the economic from the biophysical, it is understandable that mainstream economics as a discipline and a profession has more or less abandoned such attempts. The logic of market exchange explored, for instance, by Alfred Marshall – whether identified in the exchange rates negotiated by Andean peasants at a rural vegetable market or in those used by Wall Street stock brokers – is an issue quite distinct from questions of the biophysical substance of commodity flows, material asymmetries in trade, accumulation, and inequalities. The weighing of cost against demand is conditioned by quantitative, relational factors (such as supply and purchasing power) that are distinct from the material content of exchange. The former – the intricate mathematics of market equilibrium – is what mainstream 'economics' is all about (Heilbroner 1995[1953]:210). The latter are concerns of classical political economy, raised today only by 'heterodox' schools such as Marxism and ecological economics.

A brief review of some of the main contributions to modern economic thought will illustrate this abandonment of 'materiality' in mainstream economics. Whereas Francois Quesnay and the Physiocrats argued that only agricultural labor, assisted by nature, produced economic value, Adam Smith recognized labor in general as a source of wealth. Both positions were related to morality in the sense that they built on notions of 'productive' versus 'unproductive' activities. Smith's most fundamental argument, however, was that the market exchange of commodities promoted a fair and efficient allocation of goods at optimal exchange rates that were to the benefit of all participants. David Ricardo extended Smith's understanding of the virtues of the self-regulating market to the international arena, and

the focus of his observation would not have been on the impossibility of full recycling but on the limited sink capacity of the atmosphere. The dissipation of matter in economic processes, in other words, poses problems at both ends: the limited supply of resources as well as the disposal of waste and pollution. Although physicists have contested the claim that the laws of thermodynamics and the concept of entropy also apply to matter (cf. Ayres 1998; Mayumi 2009:1243), they tend to agree with Georgescu-Roegen that complete recycling of matter is impossible. Regarding climate change, incidentally, Georgescu-Roegen (1975:358) already in 1975 recognized that "thermal pollution could prove to be a more crucial obstacle to growth than the finiteness of accessible resources" (cf. Mayumi 2009:1248-1249).



elaborated his shift to a labor theory of value. Both Smith and Ricardo attempted to show how market prices (exchange values) reflected the amount of labor time that had been invested in a commodity. In encouraging the displacement of British land requirements overseas, e.g. through his criticism of the protectionist Corn Laws, Ricardo further contributed to the conceptual developments accompanying the transition from agricultural to industrial society. This was importantly reflected in his proposition that the factors of production (land, labor, and capital) are substitutable for each other, an assumption that has been rejected as fundamentally flawed by the field of ecological economics (cf. Daly 1997a, 1997b).⁸ In effect, mainstream economics following Ricardo has assumed that the Industrial Revolution, by displacing resource requirements overseas as well as underground, had dissolved the age-old land constraint (Wrigley 1962; Wilkinson 1973; Mayumi 1991; Siefertle 2001[1982]; Pomeranz 2000).⁹ Also reflecting actual social processes in his time, Ricardo envisaged technological improvements as a source of economic expansion far beyond the constraints imagined by Smith. The ideology of 'cornucopianism' that pervades modern economics can be traced to "the bonanza of New World settlement and fossil fuel energy" (Albritton Jonsson 2014:168). Marx's understanding of technological progress and industrialization also built on a labor theory of value and the industrialists' desire to increase their profits (by lowering their wage costs). His assertion that industrialists derive their profits from the exploitation of labor can be traced to ideas of earlier economists, such as the urge of the Physiocrats to identify a factor of production (in their case, land rather than labor) that generates more economic value than it costs, and the awareness of Ricardo, Thomas Malthus, and John Stuart Mill that the rate of capital accumulation is constrained by wage levels.

Although Marxian and (neo-Physiocrat¹⁰) ecological economics¹¹ have continued to challenge mainstream or 'neoclassical' economics (represented by e.g. Marshall and León Walras), the general economic expansion in Europe and North America since the late nineteenth century

⁸ For brief rejoinders from neoclassical economists, see Solow (1997) and Stiglitz (1997).

⁹ We may ask to what extent 'comparative advantage' is in fact a euphemism for environmental and/or work load displacement, whether applied to inexpensive corn production in nineteenth-century Prussia or to the outsourcing of manufacture to twentyfirst-century China.

¹⁰ By 'neo-Physiocrat' ecological economics I mean those strands of this trans-disciplinary field that, like the Physiocrats, view Nature as the ultimate source of all economic value (cf. Hornborg 2014).

¹¹ Cf. Martinez-Alier 1987.



has encouraged the economic profession to largely confine itself to mathematical calculations of market equilibrium. To be sure, prominent economists during the past century have addressed a number of highly controversial issues – from John Hobson's critical understanding of imperialism to John Maynard Keynes' advocacy of government intervention – but the profession has been increasingly united by shared assumptions about the long-term benefits of general-purpose money, globalizing markets, and technological innovation, and about the usefulness of diagrams and algebra in representing economic behavior. Most significantly, in this context, very few mainstream economists today would consider economic 'value' to be measurable by any other metric than the money gained through market exchange. The sophisticated mathematical methods of economics are applied to this metric only, to the virtually complete exclusion of material metrics such as hectares of land, hours of labor, or Joules of energy. Although flows of biophysical resources such as embodied land, labor, and energy are unquestionably relevant to issues pertaining to sustainability, they have been expelled from the perspective of neoclassical economics. Whereas William Stanley Jevons in 1865 had expressed concern regarding the future exhaustion of coal reserves, Keynes in 1936 believed that they could be replaced with reserves of currency (Mitchell 2009:416).

Heilbroner (1995[1953]:317-318) concludes the final edition of his classic textbook by showing how unreasonable it is of economists to claim to conduct scientifically objective studies of human volition, the distribution of wealth and income, and other "highly mutable determinations of the sociopolitical order in which we live." What does it mean, he asks, to be 'objective' about "such things as inherited wealth or immiserating poverty?" Although he does not include general-purpose money and globalized market exchange in his category of mutable sociopolitical arrangements, this is an inescapable implication of an anthropological perspective. Though an economist rather than an anthropologist, Thorstein Veblen managed in 1899 to 'defamiliarize'¹² everyday behavior in American society by exposing its cultural and sociological aspects. Veblen provided a theoretical foundation for the school of institutional economics, which continues to challenge the assumptions and scientific aspirations of neoclassical economics. He pioneered cultural and sociological analyses of consumption

¹² The concept of 'defamiliarization' as an anthropological method has been elaborated by George Marcus and Michael Fischer (1986).

such as those much later presented by Jean Baudrillard (1972) and Pierre Bourdieu (1984). In the economic anthropology of the 1950s and 1960s, the debate between institutional and neoclassical economics was duplicated by the debate between substantivists and formalists, in which the former tended to emphasize the cultural specificity and contextuality of economic behavior, while the latter claimed to be able to identify similar patterns of calculation and maximization regardless of cultural context. Already in 1924, Marcel Mauss' classic *The Gift* (1990[1924]) had relativized the practice of commodity trade by contrasting it with the social implications of gift exchange among the Maori of New Zealand. In 1944, Karl Polanyi (1957[1944]) published his influential book *The Great Transformation*, which critically traces the social ramifications of the emergence of market capitalism in nineteenth-century Europe. Polanyi demonstrates how the establishment of economics as a discipline and world view can be understood as a cultural process accompanying and reinforcing historical transformations in economic practices. The ambition to understand modern economic thought as a cultural system, i.e. to approach the discipline of economics using the conceptual tools of anthropology, also characterizes Louis Dumont's *From Mandeville to Marx* (1977), Marshall Sahlins' *Culture and Practical Reason* (1976), and Stephen Gudeman's *Economics as Culture* (1986). Moreover, several anthropologists have dealt with the general topic of money as a cultural phenomenon (e.g. Crump 1981; Parry & Bloch 1989; Weatherford 1997; Hart 2000; Graeber 2011).

Heilbroner's [1995[1953]: 9, 308-310] point, inspired by Joseph Schumpeter, that individual economists see things the way in which they wish to see them, is perfectly illustrated by the diametrically opposite views of capitalism presented by Marx and Polanyi, on the one hand, and by mainstream economists (including Heilbroner himself), on the other. For Polanyi, as for Marx, the emergence of the disembedded market economy is a tragic story of human suffering, while for Heilbroner and most of his colleagues it is a story of emancipation: the very commoditization and abstraction of land, labor, and capital that Polanyi laments is for Heilbroner (*ibid.*, 24-29) what liberates economic logic from the fetters of social bonds, politics, religion, and culture.

Karl Polanyi and George Dalton were leading proponents of the substantivist school in economic anthropology, as was Paul Bohannan (1955), who in the early 1950s identified the existence of separate spheres of exchange and special-purpose currencies among the Tiv of

northern Nigeria. Although the ethnographic facts and explanation of such 'multi-centric' economies have been disputed, the very idea of distinguishing between separate spheres of value is worthy of reflection and consideration. The fundamental problems of global sustainability may not be inherent in the market principle in itself as much as in the implications of general-purpose money and the globalized *scale* of the market. General-purpose money makes all values commensurable, regardless of whether they pertain to the reproduction of human organisms, communities, ecosystems, or the world-system. It was the exploitation of globalized price differences (i.e. arbitrage), particularly regarding land and labor, which provided the conditions for the turn to fossil fuels in eighteenth-century Britain, which in turn inaugurated anthropogenic climate change and the so-called Anthropocene. If slaves had been paid standard British wages, and depopulated American fields had fetched standard British land rent, there might not have been an Industrial Revolution.¹³ A way of curbing the destructive consequences of economic globalization might be to rediscover the virtues of distinguishing local values (such as those concerned with food, shelter, energy, community, and place) from the values pertaining to global communication. Suffice it to say, at this point, that these virtues would be very difficult to grasp from the perspective of mainstream economics.

The relation between money, semiotics, and morality

In view of the extent to which market economies, capitalism, and the conceptual framework of conventional economics are founded on the logic of money, it is appropriate to present some general reflections on this unique semiotic phenomenon. Semiotics (from Greek *semeion* = sign) is the study of sign systems. A semiotic perspective on money would thus approach it as a kind of sign, comparable to other systems of signs such as language, gestures, clothing, etc. Signs are means of communication that presuppose subjects, meanings, codes, and interpretations. They are by no means restricted to the human species but seem to be pervasive in living systems at all levels of scale, from the internal biochemistry of individual organisms (Hoffmeyer 1996; Sebeok & Umiker-Sebeok 1992) to the various kinds of communication between the myriad organisms of an ecosystem (von Uexküll 1982[1940]; Nöth 1998; Hornborg 2001b). The analytical study of sign systems was pioneered by Ferdinand de Saussure (1916) and Charles Sanders Peirce (1931-1958), but the

¹³ Cf. Inikori 1989, 2002; Hornborg 2006.



strong linguistic focus of the former has not been conducive to wider comparative approaches such as those inspired by Peirce.

General-purpose money is a peculiar kind of sign. It seems impossible to classify as belonging to one of Peirce's three general categories of signs: index, icon, or symbol. The distinction between these three types of signs is based on differences between how they relate to their referents (i.e., what they refer to): an *index* relates to its referent through contiguity, an *icon* through similarity, and a *symbol* through convention. A money sign, whether a coin, a paper bill, a check, or an electronic digit, does not generally refer to a specific commodity or service in any of these three ways. A specific money object can, of course, contextually evoke e.g. the labor or sale that it represents, or its donor, or the monarch or nation whose imprint it bears, or even the purchase it is destined to perform, but its fundamental property is its capacity to assume any meaning at all that its owner bestows upon it. This is tantamount to saying that money is a sign without meaning, i.e. without a referent (cf. Rotman 1987). This semiotic property of money is undoubtedly the feature that qualifies it as both the most celebrated and the most condemned of human inventions.

A second, related observation is that the code by which money communicates information only has one character. This is concomitant to the observation that the money sign can stand for anything at all, which means that there is nothing that it can be opposed to. Other kinds of codes (such as alphabets, genetic codes, musical scores) have more than one character, which is a basic requirement for transmitting information. It could be objected that the *absence* of money constitutes a binary opposite to its presence, so that a money payment can be interpreted as a message encouraging whatever activity is being paid for, while its absence would discourage it, but the undifferentiated character of money cannot convey messages more meaningful than a signal to continue whatever is being done. It can be argued that this limitation has important implications for sustainability. In principle, the parallel existence of two distinct currencies pertaining to separate kinds of exchanges would grant market actors the capacity to transmit messages about the limits of commensurability and thus about the range of possible repercussions that may result from their transactions.



A third observation is that even if money is conceded to signify nothing but abstract quantity, such signification will mean very different things to different people, depending on the amount of money they have at their disposal. This inherently 'asymmetrical' aspect of commercial transactions completely contradicts the 'liberal illusion' of the generalized and unregulated market as free, fair, and of universal benefit (Reddy 1987:62-106). Asymmetrical exchange is certainly not specific to money-based economies, but money is a way of concealing such asymmetries by couching them in an idiom projecting the appearance of reciprocity and fairness. This intrinsic asymmetry between market actors, inherent in their divergent assets, applies regardless of whether there are asymmetries in the physical content of the exchange.

A fourth observation on the peculiarity of money is that "it is a form of social power that has no inherent limit" (Harvey 2010:43). There is always a limit to the amount of physical assets a person can own, but there is no inherent limit to the amount of money he or she can command. Thus, there is no limit to the amount of money a human can desire. This is another way of phrasing the implications of the mainstream abandonment, within economics, of concerns with the finite, material aspects of the economy. As conceptualized by neoclassical economics, 'the economy' can "expand without getting physically bigger" (Mitchell 2009:417). The Gross National Product was invented to measure "the speed and frequency with which paper money changed hands," and it "could grow without any problem of physical or territorial limits" (ibid., 418).

The emergence of general-purpose money has been recursively connected to the emergence of modern forms of social life and thought (Simmel 1990[1907]). Through centuries of discussions about the social implications of these processes, a central theme has been the relationship between money and morality. Already in the fourth century B.C. Aristotle denounced money-making for its own sake (i.e., 'chrematistics'), and four centuries later St. Paul warned that "the love of money is the root of all evil," but the sin of avarice seems to have been particularly condemned from the expansion of market trade in the eleventh to thirteenth centuries (Bloch & Parry 1989:18). Aristotle's position was revived in the thirteenth century by Thomas Aquinas, who classified avarice as a cardinal sin, and up until

the eighteenth century, the official condemnation of money-making in European civilization ran parallel to its increasing centrality in economic life (Macfarlane 1985:71). As is reflected in several of Shakespeare's works, money blurs the moral distinction between good and evil (ibid., 69). From the late Middle Ages, avarice was viewed as less and less sinful (Hirschman 1977), and in 1714 Bernard Mandeville's *Fable of the Bees* finally equated 'private vice' with 'public benefit,' which ever since Adam Smith's *The Wealth of Nations* has been the fundamental creed of economics (cf. Dumont 1977:63). The five centuries between Aquinas and Smith saw an unprecedented expansion of commerce and ultimately the promotion of money-making from vice to virtue. As Maurice Bloch and Jonathan Parry (1989:29) argue, in capitalist ideology, "the values of the short-term order have become elaborated into a theory of long-term reproduction." Another way of putting this is that "economics had to emancipate itself from morality" (Dumont 1977:36). Economics has detached itself from ethical considerations, even though this has often entailed a distortion of Adam Smith's own views on ethics (Sen 1987). As David Graeber (2011) has shown, however, economic obligations generate their own varieties of rationality that paradoxically tend to be both imbued with and divorced from morality. The historical inclusion of human obligations in the sphere of 'goods' exchanged through the medium of general-purpose money has generated pervasive ambiguities about how to draw boundaries between persons and (commoditized) things, as drastically illustrated by the phenomenon of slavery.¹⁴ Drawing on several millennia of human history, Graeber shows that societies in which economic indebtedness grows to the point where it more or less literally enslaves major parts of the population tend to reach thresholds where morality again intervenes in economics and there are large-scale cancellations of debt. In the normal operation of such economies, however, the mechanical rationality of managing money tends to be decoupled not only from considerations of face-to-face human morality, but from the exigencies of living sustainably on planet Earth. Not least in the Marxian tradition, the logic of money, accumulation, and globalized market exchange is recognized as inherently opposed to sustainability (Foster, Clark & York 2010; Klein 2014).

¹⁴ The historical parallels and continuities between slavery and wage labor, popularly recognized in the notion of 'wage slavery,' have been analyzed and discussed e.g. by Graeber (2007) and McNally (2014). Although much effort has been devoted to establishing the difference between these two forms of commoditization of labor, epitomized in the ideal of 'freedom,' the continuities are significant. For vast numbers of people over the past two centuries, the 'freedom' of wage labor has been tantamount to an obligation to sell their freedom.



It is important to consider the connection between the two kinds of detachment that mainstream economics has achieved over the past two centuries, and that we have addressed so far: the detachment from material processes and from morality. As Thomas Aquinas' condemnation of money-making was based on his conviction that merchants and money-lenders do not create value as laborers do, there is an interesting line of descent from Aquinas to the labor theory of value (Bloch & Parry 1989:3, reference to Tawney). It is thus no coincidence that schools of economics that today have moral objections to what they identify as forms of 'unequal exchange' that are invisible to mainstream economists – primarily Marxian and ecological economics – are precisely those schools which maintain a strong concern with material processes. It appears that arguments appealing to moral norms such as 'justice' and 'equality' need to be based on real asymmetries in the flows of embodied biophysical resources, whether labor time, hectares of land, or Joules of energy. It seems very significant that neoclassical economics is as impervious to moral arguments as it is to material metrics.

It is no coincidence that Aristotle's moral objections to money-making appeared in the first truly commercial civilization, established in the Aegean area several centuries B.C. (cf. Weatherford 1997:28-45). The metal coinage that was invented in the region around 700 B.C. undermined the ancient agrarian, tributary empires and provided the foundations of the so-called Axial Age (700 B.C.-A.D. 600). The transition from credit money, built on trust, to commodity money (precious metals) encouraged warfare, plunder, and slavery in this period (Graeber 2011). The Middle Ages (A.D. 600-1450) saw a return to credit money and tribute in kind accompanied by a cosmological emphasis on material production, rather than money itself, as the source of value, but the introduction of paper notes in Renaissance Italy in the fourteenth century initiated the transition from feudalism to modern banking and capitalism.¹⁵ From the late fifteenth century, the early modern capitalist empires again focused on precious metals, epitomized by the doctrine of mercantilism. The world view of the eighteenth-century Physiocrats retained a feudal emphasis on the material fecundity of land, but adopted an abstract analytical framework for understanding economic processes that was later to be conducive to conceptualizing the productivity of labor in early industrial

¹⁵ The idea of paper money appears to have originated in China in the ninth century A.D. (Davies 2002:181) and was conveyed to Italy in the thirteenth century by Marco Polo (Weatherford 1997:126).



Britain. As already noted, the labor theory of value thus traces its roots to medieval church doctrine and ultimately Aristotle, as opposed to the age-old inclination toward money fetishism, which has been particularly pronounced in periods emphasizing commodity money, such as the Axial Age as well as the period of capitalist empires 1450-1971.

The year 1971 marks the advent of electronic money and an electronic stock market (NASDAQ) as well as the abandonment of the Bretton Woods gold standard. Since then, there has certainly been a resurgence of credit money ('financialization'), as Graeber observes, but rather than an emphasis on material production (as in the Middle Ages) we have witnessed a further emancipation and fetishization of autonomous monetary value. It remains to be seen whether the events of 1971 were really another turning-point in the grand historical oscillations identified by Graeber, or a more temporary incident. The general historical trend toward a transition from metal through paper to electronic money has entailed a progressive separation of finance and monetary flows from 'real' flows of matter and energy. Recurrent attempts to discipline banks and politicians, constraining them from issuing excessive amounts of new money by tying major currencies to a metal standard (e.g. by the Bank of England in 1844, the U.S. Congress in 1900, and the agreement at Bretton Woods in 1944/1946) have all ended in a similar way. As the amount of paper currency in circulation has increased, diverging more and more from the value of a finite stock of bullion, the end result has repeatedly been devaluation and the severance of metal standards.¹⁶ The volatility of trust as the sole foundation of economic value has led to recurrent financial breakdowns, from the banks of Florence in 1343 to the Wall Street stock markets in 1929 and 2008.

The historical and conceptual relationship between energy and money, viewed from the perspectives of ecological and Marxian economics

¹⁶ Examples mentioned by Weatherford (1997) include the Banque Royale in 1720, the U.S. Congress in 1780, the Bank of England in 1917, President Roosevelt in 1933, and President Nixon in 1971.



Although the concept of 'energy' did not appear until the nineteenth century, humans appear to have had various corresponding notions for millennia. Pre-industrial societies, whether based primarily on hunting-and-gathering or agriculture, were no doubt aware of the fact that solar energy is the vital flow that ultimately animates all life on Earth, including wild plants, game animals, crops, draught animals, and human beings. With expanding commerce and money use, however, some social groups, particularly those specialized on trade, were able to view flows of money as more fundamental to their subsistence than flows of solar energy. The expanding use of money was thus accompanied by various cultural representations of money, of which the world-view of mainstream economics is an example (cf. Gudeman 1986). It has been suggested that the conceptual framework of neoclassical economics is in part inspired by the nineteenth-century European preoccupation with developing the concept of energy, and vice versa (Mirowski 1988a).¹⁷

The history of the relation between notions of energy and notions of monetary value is deeply paradoxical. Energy and economic value are both decontextualized, quantifiable abstractions developed to understand and manage the operation of the natural and social systems in which humans participate. Even if the sciences of physics and economics have common roots, a recurrent criticism of mainstream economics throughout the nineteenth and twentieth centuries has been that it ignores physical flows such as energy (Martinez-Alier 1987). There have been many attempts, frequently by people with a background in natural science, to rewrite the science of economics from the perspective of an energy theory of value (Mirowski 1988b). The response of neoclassical economics has generally been a "conspiracy of silence" (ibid., 818), but rather than dismiss the relevance of energy for economic theory, it is reasonable to expect the discipline and profession of economics to seriously consider, as did Georgescu-Roegen (1971), the implications for economics of the laws of thermodynamics. Although completely alien to the current preoccupations of mainstream economics, it would reintroduce a concern with material aspects that, as we have seen, has been expelled from economics since the deliberations of classical political

¹⁷ Significantly, however, the understanding of energy that may have inspired nineteenth-century economists was based on the First Law of Thermodynamics, but not the Second. To the extent that economics was inspired by physics, in other words, it failed to be concerned with the irreversible degradation of energy. This fundamental difference between physics and economics has crucial implications (Glucina & Mayumi 2010:22).

economy. Such a concern would undoubtedly require a fundamental reconceptualization, within neoclassical economics, of the prospects of economic 'growth' (Daly 1996; Hamilton 2003; Victor 2008; Jackson 2009; Glucina & Mayumi 2010). It would seem particularly relevant for economics to investigate the possible connections between financial crises and the declining 'net energy' or EROI (Energy Return On energy Investment) in modern production processes (Hall & Klitgaard 2011; Lipson 2011), particularly as the phenomenon of diminishing returns has been posited as a recurrent cause of large-scale societal collapse through history (cf. Tainter 1988).¹⁸ The strong historical correlation between economic growth and energy consumption suggests a causal link, and despite widespread claims that it is feasible to 'delink' or 'decouple' them, it has not been demonstrated (Jackson 2009:67-86; Glucina & Mayumi 2010:17-19).

As indicated above, a renewed concern with the material aspects of economic systems might also be conducive to renewing a concern, within economics, with morality. The foundation of both Marxian and ecological theories of 'unequal exchange' is the recognition that capital accumulation is based on asymmetric net transfers of biophysical resources such as embodied labor, land, energy, or materials (Emmanuel 1972; Bunker 1985; Odum 1996; Lonergan 1988; Foster & Holleman 2014; Hornborg 2014). Although it is misleading to equate such embodied resources with economic 'value' (as in labor or energy theories of value), which reproduces the old confusion between energy and money, the various deliberations on the discrepancies between them could add up to a theory of unequal or asymmetric exchange which, though objective and non-normative, raises moral questions. Common to all these deliberations is the understanding that market prices, to which the interests of economists tend to be exclusively confined, project an illusion of reciprocal exchange that conceals the asymmetric material transfers that are prerequisite to accumulation yet beyond the horizons of mainstream economic thought. The market mechanisms and ideological blinders that allow such asymmetric transfers to continue can be identified as objectively as the transfers themselves (cf. Erb et al. 2009; Dittrich & Bringezu 2010; Duchin & Levine 2012; Alsamawi et al. 2014; Simas et al. 2014), but the role of these material transfers in reproducing uneven global patterns of accumulation and development cannot fail to raise

¹⁸ Much of the concern with 'net energy' or EROI derives from Georgescu-Roegen's (1975) concept of 'accessible' (as opposed to 'available') energy (Mayumi 2009:1239).

moral issues that remain invisible for economists preoccupied with the intricacies of market equilibrium.

The abandonment, within mainstream economics, of concerns with the material aspects of economies has prompted voluminous protests from the start. The most elaborate and conspicuous of these dissident approaches are those of Marxian and ecological economics. Although there have been attempts by so-called eco-Marxists to reconcile these two approaches, significantly by conceding that the Marxian concept of labor-power is cognate to, or even a type of, energy (Burkett 2005; Foster & Holleman 2014),¹⁹ there are differences that are difficult to straddle.²⁰ While the two traditions share the conviction that market prices (exchange values) do not do justice to 'use values', and that the underpayment and unequal exchange of such use values are fundamentally problematic, they differ in terms of which use values are central to their analyses, and in terms of what the central problems are. The Marxian framework traditionally focuses on the industrialists' appropriation of the use value of labor, and on the resultant inequalities and polarization of social classes. The outlook of ecological economics, on the other hand, has focused on the appropriation of 'natural' use values such as energy, embodied land, and ecosystem services, and on the resultant degradation of the natural environment.²¹ For a synthesis of these two critiques of industrial capitalism to progress, the strong Marxian emphasis on its labor theory of value would need to be reconsidered. Even from a Marxian perspective, the unique significance

¹⁹ The recognition that human labor, particularly as it was conceptualized in classical political economy, is a biophysical form of energy has been elaborated e.g. by Rabinbach (1990) and in reflections on the parallels and continuities between slavery and the reliance on fossil fuels (Debeir et al. 1991[1986]; Mouhot 2011; Nikiforuk 2012).

²⁰ The obstacles to communication between orthodox Marxian and ecological economics can be illustrated by two revealing quotes, the first from Friedrich Engels in 1875 and the second from Robert Costanza in 1981. "No-one could convert specialized work into kilogrammetres and determine salary differences based on that criteria" (Engels quoted in Martinez-Alier 1997:231). "Can anyone seriously suggest that labor creates sunlight! The reverse is obviously more accurate" (Costanza quoted in Mirowski 1988b:817).

²¹ Although eco-Marxists such as Foster (2000) have attempted to repudiate the Promethean/modernist/urban bias of Marxian thought, it is nowhere more evident than in the casual reference, in the *Communist Manifesto*, to "the idiocy of rural life." If the wastefulness and environmental destructiveness of modern capitalist agriculture is properly understood, the frugality and ecological wisdom of traditional peasant agriculture ought instead to be celebrated as a key to sustainability (cf. Martinez-Alier 1987, 1997; Mayumi 1991; Biel 2000; Greer 2008). The nineteenth-century Marxist derogation of rural life is a reflection of the same modernist/urban illusion that pervades the conviction in mainstream economics, since Ricardo, that human economies can liberate themselves from land (Mayumi 1991).



attributed to labor-power, in relation to all other inputs in production, is an analytically flawed position (Keen 1993; Brennan 2000).²² Furthermore, the conceptualization, by both schools, of biophysical resources (whether human labor, energy, or land) as underpaid 'use values' is a misleading way of addressing the material aspects of the economy (Hornborg 2014). Paradoxically, this understanding of unequal exchange is fundamentally similar to the conviction of neoclassical economics that market prices may not do justice to 'externalities,' and that the challenge is to 'internalize' insufficiently compensated costs such as damages to the environment or to human health.²³ To criticize capitalism by attempting to redefine 'economic value' – a concept invented by merchants – is not an effective approach.

The notion of underpayment is misleading in several ways: 1. If the appropriated resources were to be fully compensated for their contribution to the value of the finished product, the incentive to conduct industrial production (i.e., profit) would disappear, as the rationale of industrial capitalism is precisely *not* to compensate labor and land for the exploitation of their productive capacities. 2. Moreover, if 'use values' are biophysical resources such as labor, energy, and land, they cannot be quantified in monetary measures, which means that it would be difficult to argue that they are underpaid, unless laborers are malnourished or ecosystems collapse (i.e., not provided with the monetary means of sustaining their basic metabolism). 3. Finally, ever since Aristotle, the concept of 'use value' has referred to the use to which a product can be put in satisfying a person's needs, but the use value of most modern commodities is largely or even entirely determined by symbolic factors (cf. Baudrillard 1972; Sahlins 1976), rather than by the volume of biophysical resources that they represent. To resolve these contradictions, materialist critiques of industrial capitalism would need to abandon notions of underpaid use values in favor of the incontrovertible observation that capital accumulation requires asymmetric transfers of biophysical resources. The asymmetric transfer, or appropriation, of biophysical resources such as

²² A common argument in defense of the Marxian labor theory of value is that it is merely an account of how capitalism actually operates, rather than a conviction about labor-power as uniquely generative of value. However, even nineteenth-century capitalism had to reckon with land rent costs for other forms of energy than labor (e.g., watermill sites, coal mines), and there is no reason to suggest – or to propose that capitalists at the time believed – that investments in such inputs are less generative of value than those in labor.

²³ Prominent illustrations of how the estimation of environmental 'externalities' has become a preoccupation of some strands of ecological economics include calculations by Odum (1996) and Costanza et al. (1997).



embodied labor, energy, land, and materials is certainly orchestrated by market prices (exchange values), but it only confuses matters to propose that those biophysical resources are in reality more authentic measures of value than the exchange values experienced by market actors. Moral indignation over the tendency of economic logic to generate social polarization and environmental degradation is entirely appropriate, but to express such indignation in terms of 'underpayment' is paradoxically to subscribe to the faith in a common metric of value which underlies the ideology of the market. It is not useful to claim that economic value is something else than what is established through market exchange. The insistence, by many ecological and most Marxian economists, that this is indeed the case, presents one of the greatest obstacles to dialogue between heterodox and mainstream economics.

Although the contradictions between heterodox and mainstream economics may seem fundamental and insurmountable, these various schools are united by a common trust in the phenomenon of general-purpose money. Although their political recommendations appear to be very far apart, they share the assumption that problems can be alleviated without questioning money itself. However, if the analyses and conclusions of Nicholas Georgescu-Roegen (1971) are taken seriously, neither proposals for economic redistribution (whether through price changes, taxation, subsidies, or a more radical reform of ownership) nor technological progress will solve the fundamental problems of sustainability confronting market-based economic processes orchestrated by general-purpose money in a universe obeying the Second Law of Thermodynamics. In pricing commodities representing dissipated resources higher than those resources themselves, contemporary forms of money and market exchange will inexorably reward an accelerating dissipation of resources. The problematic relationship between general-purpose money and thermodynamics inexorably also generates unequal exchange in the sense of objectively asymmetric transfers of biophysical resources from extractive sectors to core regions of the world-system. The societal implications of these material polarizations, asymmetries, and inequalities have been conceptualized in trans-disciplinary theory unraveling the connections between thermodynamics and political economy (Bunker 1985; Hornborg 1992, 2001a; Biel 2006, 2012). The uneven accumulation of technological infrastructure in core sectors of the world-system has been made possible by the interaction of money, prices, and the exchange of



biophysical resources over the past three centuries. From the days of the steam engine, the conditions for 'technological progress' were no longer restricted to human ingenuity, but *required* substantial differences in the prices of labor and resources between different parts of the world-system (Hornborg 2015). This intertwining of global societal exchange rates and local material productivity has remained beyond the horizons of economic thought. The inability of mainstream economics to perceive the material determinants of uneven development and environmental degradation continues to preclude effective solutions to these challenges of sustainability. We now also need to consider if the same fundamental myopia underlies its inability to foresee and avoid or remedy financial crises.

Mainstream versus heterodox accounts of financialization and financial crises

The final severance of the connection between the leading global currency and the physical substance of gold in 1971²⁴ once again signaled that more money was being issued than could be backed by bullion. As had occurred repeatedly in history, the widened scope for credit money opened a new era of financialization, in which the incentive to increase profits on capital was increasingly disconnected from production processes involving the physical use of labor and land. Capital itself became the most profitable of production factors, in Marxian terms signifying a shift from M-C-M1 to M-M1. From a semiotic perspective, financialization implies that money increasingly refers only to itself, rather than to some material substance or activity. The preoccupation with the apparent capacity of money to grow on its own is tantamount to fetishism, and raises the same intuitive concerns about the unproductiveness of 'chrematistics' as were voiced already by Aristotle. What both the Third World debt crisis in the 1980's and the Wall Street financial crisis in 2008 have made abundantly clear is that the vicissitudes of finance capital can have extremely serious consequences for land and labor. The so-called structural adjustment policies of the 1980's coerced less affluent countries to intensify the pressure on both land and labor (Körner et al. 1986; Altvater 1990:28-31; Stevis & Assetto 2001; Ravenhill 2005), and the austerity measures prompted by the financial crises in the U.S. and Europe since 2008 have been

²⁴ The agreement in Bretton Woods after the Second World War established the U.S. dollar as the international reserve currency, backed by gold, obliging other nations to maintain ample supplies of dollars for purposes of trade (see Strange 1994; Eichengreen 2011).



devastating for significant parts of the population even in more affluent nations. These crises have renewed the concern with how human welfare and environmental health might be insulated from the unpredictable cybernetics of finance capital, as reflected in several initiatives to promote complementary ('local' or 'community') currencies (see next section). They have also renewed concerns about the extent to which money should be permitted to disconnect from physical reality (whether a stock of gold or some other finite quantity), prompted by a widespread conviction that it is such disconnectedness that is the root cause of financial crisis. Several contributors to these debates have suggested that financial crises reflect structural problems of a tangible, material nature, such as declining returns on inputs in energy production (Hall & Klitgaard 2011; Lipson 2011; Tainter & Patzek 2012; Nikiforuk 2012).

Mainstream (neoclassical) economics do not search for material causes of financialization and financial crises. Neither the conclusions of the U.S. Financial Crisis Inquiry Commission (2011), the letter from the British Academy to Queen Elizabeth II on the global financial crisis (Besley & Hennessy 2009), nor a 'Nobel Prize'-winner's analysis of it (Stiglitz 2010) identify the relation between money and material factors as a relevant factor. These mainstream accounts emphasize the easy accessibility of inexpensive credit, insufficient societal regulation (based on an ideological faith in the self-regulating market), human weakness (wishful thinking, hubris, greed, fraud, irresponsibility), and the lack of comprehensive understanding of the financial system as a whole. If we disregard the role of human weakness, which is no doubt an invariant and incorrigible factor contingent on societal frameworks for action, the mainstream perception of the problem appears to boil down to insufficient regulation of credit and financial risk management, but in acknowledging the element of surprise ("why didn't anybody notice?") there is also a concession that mainstream understandings of the economy were deficient. For Stiglitz (2010), at the policy level this is basically the old disagreement between advocates of Keynesian government intervention (to which he belongs) and free-market fundamentalists regarding the best way of increasing aggregate demand.²⁵ At the level of transactions, the new financial instruments

²⁵ Stiglitz (2010:16-17) notes the irony that it was the American politicians' policy of minimizing the role of government in the economy that ultimately, with the bailouts, gave it unprecedented control. In

introduced in the years leading up to the Wall Street crisis were a means to spread the risks and to “exploit the poor,” but they simultaneously created “new problems of imperfect information” (ibid.,14-15).²⁶ Indeed, the conclusions of the Financial Crisis Inquiry Commission itself suggest that, even to this presumable authority on economic matters, the logic of the crisis remains largely opaque. Its fourteen pages are saturated with diffuse metaphors that would hardly be acceptable in other fields of social science: ‘toxic’ mortgages; the ‘spark that ignited’ events; the ‘bubble burst’; a ‘big miss, not a stumble’; ‘red flags’; a ‘highway [with] neither speed limits nor neatly painted lines’; ‘flying ever closer to the sun’; a ‘bulwark’ against panics; ‘reaped what we had sown’; ‘the contagion spread’; to ‘put fingers in the dike’; the system to ‘race ahead’ of our ability; ‘lit and spread the flame’; ‘rush for fool’s gold’; ‘added helium to the housing balloon’; etc. It is doubtful whether these metaphors are helpful in clarifying, to non-economists, the causes of the crisis and the economic theories that are believed to account for it. Such language represents an inside view of the American economy in which the rules of the monetary game are taken for granted rather than related, for instance, to global processes or to material aspects. Even in Stiglitz’ (2010) much more globally oriented account, comparatively little space is devoted to perspectives that transcend the deliberations on how money should be managed on Wall Street. He does mention, however, among factors that have contributed to the crisis, the rise in oil prices between 2003 and 2008, growing global inequalities that “shifted money from those [who] would have spent it to those who didn’t,” the policy in less developed and oil-producing countries to accumulate reserves, and the increasing economic globalization which made it possible for the United States to so excessively live beyond its means, as “the world’s consumer of last resort” (ibid., 4, 19, 20, 25). Several economists have gone beyond the Keynesian critique of what Stiglitz calls ‘free-market fundamentalism’ to argue that the stock market crash of 2008 was also the crash of neoclassical economic theory (Keen 2011; Mirowski 2013).

encouraging banks to become increasingly reckless, he argues, the bailouts have made “the problem of moral hazard...greater, by far, than it has ever been.”

²⁶ He is also explicitly critical of the self-serving behavior of financial institutions and the irresponsibility of the Federal Reserve. Rather than accuse bankers of excessive greed, however, he asks if we should really “blame the bankers for doing (perhaps a little bit better) what everyone in the market economy is supposed to be doing,” i.e., pursuing profit (Stiglitz 2010:6).



Marxian perspectives on financialization and financial crises tend to emphasize the structural contradictions and trajectories of capitalist systems of economic accumulation (Foster & Magdoff 2009; Harvey 2010; Screpanti 2014). Critically reconsidering the distinction between finance and fictitious capital, on the one hand, and the 'real economy' of production,²⁷ on the other, Marxian economists have addressed the complex relation between money as sign and the material substrate of goods and services to which it ideally might be presumed to refer. Finding it difficult to clearly distinguish the two, John Bellamy Foster and Fred Magdoff (2009:7) conclude that "both production and finance under capitalism are at one and the same time both real and monetary in nature," but they follow Paul Sweezy in observing that there has been an inversion "between the financial and the real" (ibid., 81). Financialization is explained in terms of the "search by capital for profitable outlets for its surplus despite the stagnation of investment opportunities within production" (ibid., 18, 79).²⁸ The stagnation of production is in turn explained by the problem of overproduction (sometimes referred to as 'underconsumption'), generated by the contradictory imperative of capital to keep "wages down while ultimately relying on wage-based consumption" (ibid., 27). Although experiencing a decline in real income 2000-2004, American households were able to increase their consumption by utilizing easy credit and thus increasing their debt (Harvey 2010:17). Their increasing access to credit was made possible by a combination of excess capital (offering low interest rates and other service costs on loans), high real estate values (facilitating mortgage), and creative 'securitization' by the financial institutions, i.e., the repackaging and transfer of risk in the form of increasingly opaque 'financial instruments,' minimizing creditors' worries about default. Profits from such financial activity began to exceed profits from manufacturing already in the early 1990s. Capital thus used "the vast surplus at its disposal not to invest in new productive capacity," but to increase its financial claims to wealth (Foster & Magdoff 2009:60). From a Marxian perspective, "the huge expansion of debt and speculation provide ways to extract more surplus from the general population and are, thus, part of capital's exploitation of workers and the lower middle class" (ibid., 61). Marxian analysts tend to view the financial crisis that struck the United States in 2008 as a symptom of declining global hegemony (ibid., 22, 75;

²⁷ Examples of 'real' economic activities include the automobile industry and home construction (Foster & Magdoff 2009:113).

²⁸ Marxian economists deliberate on whether stagnation generates Financialization, or vice versa (Foster & Magdoff 2009:106). The causal relation between them may well be recursive.



Friedman & Ekholm Friedman 2013; Kalb 2013). There is also an awareness of the significance of U.S. oil imports in the nation's escalating foreign trade deficit and debt (Harvey 2010:79).

If, as is often suggested, the current era of financialization was inaugurated by the abandonment of the Bretton Woods agreement in 1971, it is interesting to consider the proposal that the real physical 'standard' on which the value of the dollar had been based prior to that date was actually not gold, but oil (Mitchell 2009:414, 2011). A more general variety of this argument, presented by several proponents of ecological economics, is that the financial crisis is a reflection of the disjunction between the 'fictitious' paper economy and the genuinely 'real' economy of energy and material flows (Kallis et al. 2009; Hall & Klitgaard 2011; Heinberg 2011; Lipson 2011; Daly 2012; Townsend 2013; Smith-Nonini 2014). This approach, which can be traced at least back to Frederick Soddy (1926), observes that "underneath the economists' real economy, there is the ecological economists' *real-real* economy, the flows of energy and materials whose growth depends partly on economic factors (types of markets, prices) and in part from [sic] physical and biological limits" (Kallis et al. 2009:16).

Mainstream and heterodox economic theories appear to agree about some of the problems exposed by the financial crisis: in particular, the excess of capital in relation to demand, the absence of regulation of credit, the opaqueness of financial instruments for transferring risk, and the large extent to which financial policy derives from the economic interests of the financial sector rather than from those of the majority of people, or from rigorous analysis. Several analysts of the crisis claim to have predicted it, but from very different vantage-points (Stiglitz 2010; Foster & Magdoff 2009; Keen 2011). Much of the literature is couched in language referring to the chrematistic technicalities which preoccupy the financial institutions on Wall Street, i.e. the opaque 'financial instruments' which were designed precisely to confuse. It is thus not surprising that few external analysts are able to penetrate the logic of these complex modes of transferring economic risk. Their operation tends to be as inaccessible to outsiders as the details of advanced engineering, and as conducive to asymmetries of social power. In several respects, the language of Wall Street – and of the discipline of economics as a whole – represents a privileged domain of discourse that

suggests parallels with the intricacies of medieval theology. This lack of transparency is fundamentally at odds with ideals of democracy, accountability, and equality.

The fundamental disagreement between mainstream and heterodox theories boils down to their divergent assessments of the virtues of market exchange. Adam Smith's praise of the benefits of market exchange continues to pervade the discipline and profession of economics, even if it has been considerably modified in its neoclassical and Keynesian versions. Marxian economists, on the other hand, completely reject the idea that free market exchange could be expected to increase equality and sustainability. Instead, they argue, the global economy inexorably generates structural contradictions, polarization, conflicts, and unsustainable exploitation of labor and land. Market institutions are means of increasing unequal exchange and uneven accumulation, inevitably leading to economic crises and environmental degradation (cf. Foster, Clark & York 2010; Klein 2014). Marxists advocate a complete abandonment of capitalist markets in favor of centrally planned socialist economies with collective ownership of resources. Ecological economists, finally, emphasize the destructive consequences of the disjunction between the assumptions of economic theory and the conditions established by natural science. They identify this disjunction – i.e., the abandonment in mainstream economics of aspirations to connect flows of monetary exchange values to the biophysical conditions of ecosystems or the planetary biosphere – as the fundamental cause of both declining sustainability and economic crisis. Their policy recommendations range from alternative valuation criteria, tax reforms, and 100% reserve requirements on bank credit (Daly 2012) to radical shifts toward societies deliberately pursuing 'de-growth' (Schneider et al. 2010; Kallis 2011; Demaria et al. 2013; D'Alisa et al. 2014). However, neither neoclassical, Marxian, or ecological economics generally consider problems of inequality and unsustainability as inherent in the phenomenon of money itself.

The rationale, history, and prospects of experiments with alternative currencies

Mainstream (neoclassical) and most heterodox (Marxian and ecological) economics remain confined within a world-view fundamentally shaped by general-purpose money. In not fully acknowledging the implications of Georgescu-Roegen's (1971) observations on the entropy-increasing character of economic processes, deliberations on economic policies, no matter

how seemingly radical, that do not question the use of such money tend to promote increasing centralization, polarization, and environmental degradation. Although the many disadvantages of increasing scale and the obsession with economic growth were clearly articulated already in the 1970s (e.g., Schumacher 1973; Daly 1977), the conceptual lock-in of general-purpose money has continued to constrain the widespread aspiration, four decades ago, to envision an (alternative) emphasis on community, localized resource flows, and sustainability. Perspectives drawing on discourses on political ecology recognize that the inexorable tendencies toward globalized resource transfers, large-scale organizations, centralized power hierarchies, increasingly severe inequalities, local vulnerability, and ecological deterioration are inherent in the discourse on economics shared by mainstream and heterodox traditions (M'Gonigle 1999). But such insights from the wide spectrum of approaches here subsumed under the umbrella of 'political ecology' only rarely identify the phenomenon of money itself as the root of all these undesirable tendencies (ibid., 23), and even more rarely suggest an alternative.

Perspectives from heterodox schools such as Marxian and ecological economics converge in observing that monetary exchange values tend to obscure the biophysical substance of the goods and services that are exchanged. Both schools recognize that money can thus conceal asymmetric transfers of embodied labor or resources, generating polarizations and inequalities between those who accumulate and those who are impoverished. A problem identified by both schools is the inclination of mainstream economists to exclusively focus on the internal cybernetics of systems of monetary market exchange, deliberately or unintentionally ignoring causal connections between the semiotic and material aspects of economies. As Heilbroner (1999[1953]) shows, mainstream economics has become concerned only with the logic of a monolithic market, and with the systemic consequences of various kinds of policies to regulate it. From the perspective of Marxian and ecological economics, this means that important determinants of economic processes are excluded from view, surfacing only in the form of unanticipated crises. Financialization represents a decisive disjunction of the logic of money from the physical conditions of production and human life. The metaphor of a 'bursting bubble,' frequently used in describing financial



crises, illustrates that money in this form is ultimately a mere fantasy.²⁹ Credit is not a matter of 'borrowing money' in the sense of fetching it from a bank, but a promise to the bank to fulfill its fantasies of future debt service. Fantasies like these will work as long as people agree to subscribe to them, but, as financial crises have shown, when they no longer do so, money will dissolve into thin air. The volatility of cultural constructions such as the fantasy of money would not be a problem if it were not so inextricably intertwined with the material realities of human lives, from the tangible, physical metabolism of eating and working to housing and environmental impacts. For many millions of people worldwide, the recent financial crisis has created severely difficult problems of a very material nature. Many heterodox economists would point out that the problems generated by the failure of mainstream economics to acknowledge material aspects of the economy are experienced by these millions of people precisely at this tangible level of reality which economics excludes from view.

It is no doubt unrealistic to hope for a fundamentally revised discipline of economics, which links monetary flows to flows of embodied labor, land, or energy, but it may be slightly more realistic to suggest means of insulating people's basic material needs from the vicissitudes of financial fantasies. The point of departure for the proposal to be presented here is that it is the semiotic vacuity of general-purpose money that accounts for its complete detachment from material referents and its encouragement of generalized commensurability. This universalized and increasingly globalized commensurability – the assumption that almost all values are interchangeable – is a cultural conception that ultimately jeopardizes not only human civilization but even the biological conditions for human life (cf. Klein 2014). To curb the destructive societal and ecological processes currently generated by the phenomenon of money, it will be necessary to redefine our cultural conception of commensurability. Such a shift means distinguishing values pertaining to basic human survival from the values in which financial institutions speculate. This would not need to be a matter of legislation, as it would suffice to provide people with other options for survival than to sell their labor and buy their food on the same market as is used by corporations as an arena for capital

²⁹ The contradiction between money (which accumulates and cannot be wasted) and resources (which are depleted and can be wasted) "is the basis of the distinction between the *real* and the *financial economy*: the financial economy is not concerned with useful resources at all, but only with the recording and redistribution of claims" (Carlshamre 2013:161).

accumulation. If people would indeed tend to prefer the alternative option, a fundamental transformation of the global economy could conceivably occur without either legislation or coercion. *The idea is for national authorities to issue a complementary currency, which can only be used to purchase locally produced goods and services, and to distribute it as a basic income to all households in proportion to their size.* To define what is to be categorized as 'locally produced,' a reasonable procedure might be to restrict the use of this complementary currency (let us provisionally call it 'Points') to purchases of goods and services originating within a given radius (say, 30 km) from the place of purchase. A practical way of distributing Points to households would be to provide them with plastic cards which are automatically charged with new, electronic Points each month, in the same way that credit cards give access to salaries. It will immediately be recognized that this proposal deviates in important respects from the many experiments that have been conducted with so-called local or community currencies in various parts of the world. Before discussing its advantages, we shall briefly review some recurrent features of these experiments.

The widespread recognition that the growing dependence of local communities on the global market economy has had a number of unfavorable repercussions – such as greater vulnerability and disempowerment, loss of social cohesion, and the exploitation of local labor and resources by distant centers – does not need to be reiterated. The idea of countering such processes by resorting to a local community currency has emerged in various places and at various times. It was widely discussed in nineteenth-century Europe and the United States, and several social movements attempted to implement it (North 2007:41-61). The most well-known modern movement toward this goal is the ambition, beginning in Canada and the United Kingdom in the 1980s, to establish so-called Local Exchange (originally Employment) Trading Systems, i.e. LETS (Dobson 1993; Douthwaite 1999; North 2007:79-101), but similar initiatives have appeared in Austria, Germany, Hungary, New Zealand, United States, Australia, Argentina, Poland, Czech Republic, Slovakia, Sweden, Japan, Belgium, Greece, and several other countries. In some cases – most conspicuously Argentina at the turn of the millennium and more recently Greece – the idea of alternative currencies emerged as a survival strategy and an explicit response to severe financial



crisis.³⁰ These movements have become a field of academic study with its own journal, the *International Journal of Community Currency Research*. A special issue (Blanc 2012) provides a recent overview of the history and prospects of such experiments with alternative currencies. Recurrent shortcomings include widespread dismissal, absence of a national governance system, inefficient promotion of local consumption, personal exhaustion of leaders, insignificant impact, accounting difficulties, risks of free riding, and unclear incentives on the part of shopkeepers (ibid., 1-4). The editor concludes that, “thirty years after their first emergence, [community currencies] still have to prove they can change the present state of things, while research agendas are increasingly considering them” (ibid.). LETS are now on “a worldwide retreat” (Dittmer 2013:6). However, the shortcomings revealed by systematic research on these movements provide a foundation for designing a complementary currency system that is fair, widely utilized, government-regulated, easily administrated, and efficient. A key challenge is to design this system in such a way as to provide all significant social actors – households and business as well as authorities – with strong incentives to participate.

The predominant justification for most complementary currency systems that have appeared so far is that they represent “forms of micropolitical resistance” from below (North 2007:77). This means that they are generally grassroot initiatives largely contingent on the enthusiasm and ideological commitment of a restricted number of activists, with little or no support from authorities (Dittmer 2013). It also means that they are unlikely to reflect systematic analysis of the conditions under which they might succeed, including considerations of fairness, attractiveness, large-scale administration, efficiency, impact, and transparency. The system that is advocated here differs from most of these initiatives in the following respects: 1. It would be organized by the federal or municipal authorities. 2. The currency (‘Points’) would be distributed by the authorities as basic income to all households in the nation, in proportion to their size. 3. The Points would only be useful for purchases of local goods and services, i.e. goods and services originating from within a specified radius from the place of

³⁰ Although several different designations occur – e.g., local, community, or alternative currencies – the concept of ‘complementary’ currency seems most precise for the proposal presented here, as it does not aspire to replace normal currency with a geographically more restricted one, but to provide an option alongside it.

purchase.³¹ 4. All transactions with Points would be officially exempt from taxation. 5. To the extent that some individuals wish to save Points for later use, while others may temporarily want to borrow extra Points, special institutions would administrate such (electronic) transactions, but without offering or charging any interest. 6. Businesses would have the option of converting a portion of the Points they earn into regular currency, through the authorities, at adjustable rates calculated to compensate for the authorities' loss of tax revenue. 7. Parts of the authorities' expenditures for pensions and social security would be paid in the form of Points. Under these conditions, all significant social categories would benefit from the Point system.³²

By systematically considering this arrangement from the perspectives of the social actors concerned, it is possible to avoid most, if not all, of the disadvantages and shortcomings of LETS and related community currency systems. *Households* would be able to liberate some of their regular income by utilizing Points, whenever possible; they would also be less dependent on salaried work and less vulnerable to unemployment; finally, they would experience more local interdependence, cooperation, and sense of community. *Businesses* would find opportunities for tax-free income, some of which could be used to purchase local resources, some to flexibly employ local labor, and some to convert into regular currency; there would also appear new opportunities for diversified local enterprise to satisfy the increasing demand for a wide range of local goods and services. *Authorities* would reduce their costs for pensions, social security, medical care, transport infrastructure, and environmental protection, thereby avoiding risks of fiscal deficits. Some of the many societal benefits of this system are: *lower demand for long-distance transports* (i.e., reduced greenhouse gas emissions, energy use, transport costs, and traffic accidents); *more local recycling of nutrients and packaging materials* (i.e., reduced eutrophication, solid waste, and resource depletion); *less mechanized agriculture* (i.e., reduced resource use and environmental degradation, more physical exercise for significant parts of the population);

³¹ A convenient way of distinguishing the range of local goods would be to mark them as such, but such marking would of course vary between shops in different places. Rather than amount to a number of geographically distinct, local currencies, this system would mean *one* complementary currency for the whole nation, but with an in-built inclination to generate localized (but overlapping) circuits of exchange.

³² Of course, some people might consider looking for other jobs, e.g., business leaders who today profit from financial speculation or from industries such as the production of and international trade in foodstuffs or petroleum.

lower demand for export production of food (i.e., globally reduced vulnerability of rural populations, increased self-sufficiency and food security); *more localized food production* (i.e., less waste through overproduction, storage, and transport, fresher and healthier food with less preservatives, better transparency in relations between producers and consumers); *more diverse landscapes* (i.e., higher biological diversity and ecological resilience); *more diversified local business profile* (i.e., demand for a wide range of local goods and services); *greater financial resilience of federal governments* (i.e., lower costs for pensions, social security, and other major expenditures); and *more social cohesion* (i.e., less social marginalization, more sense of community and better psychosocial health). All these benefits could be achieved by establishing a complementary currency thus designed, enhancing financial, social and ecological resilience while not constraining the global market from encouraging vital industries (such as advanced medical equipment, pharmaceuticals, and information technology) that would continue to be in demand and that require global integration. The advent of electronic money in 1971 certainly unleashed an unprecedented fetishization of the global economy,³³ but it also opens completely new possibilities to design currencies that promote equality, democracy, and sustainability (Hart 2000). Two thousand years ago, St. Paul was no doubt right in that money is the root of all evil, but at this point in history Bernhard Lietaer (2001:7) is also right in that it is “the root of all possibilities.”

Electronic money has a potential for making the economy more sustainable and equitable for the same reason that it has promoted financialization and financial crisis, viz. its *lack of material form*. Following the delimitation of its ideal use articulated by Aristotle, money should merely be a medium of exchange between socially connected producers and consumers. It should be a *means*, not an end in itself. But money inevitably becomes an end in itself when it is attributed with *intrinsic* value, as when precious metals or bills are hoarded or stolen, or when interest accrues on bank accounts. This is money fetishism. However, money that is both *electronic* and *interest-free* has no intrinsic value. In this form, it can finally serve its makers, rather than make them its servants.

³³ Following the introduction of digital money, the proportion of foreign exchange transactions that pertain to speculation in currencies now dwarfs the insignificant percentage pertaining to the purchase and sale of real goods and services.

The fundamental goal of a complementary currency system such as sketched here is to *relocalize* much of the material metabolism of human societies, essentially because such a strategy is both more equitable and more sustainable than current trends.³⁴ This is “the precise opposite of the modern trend of globalization” (Lipson 2011:573; cf. Brennan 2003). In Marxian terms, it would mean an expansion of simple commodity circulation (C-M-C1) at the expense of capitalist circulation (M-C-M1) and financialization (M-M1). But it would not require violent revolution, merely the existence of an option that would be attractive and sensible to everybody. In fact, it would not even mean abandoning the insight of mainstream economics, from Adam Smith and onwards, that market exchange is an efficient way of allocating resources, because it does not challenge the market principle as such, only the *scale* of market organization. The chances of achieving the hypothetical ‘perfect information’ imagined by economists inevitably diminish with increasing market scale. Nor could this proposal for a relocalization of the market be dismissed as regression, as it would be based on recently emerging, trans-disciplinary understandings of economic processes and on new digital technologies. History is not reversible, but we can take stock of millennia of historical experience in order to envisage our future.

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³⁴ For a recent and persuasive statement of this position, see Lietaer & Dunne (2013).

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