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The Social Dimensions of Carbon Trading: Contrasting Economic Perspectives

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Abstract

Neoclassical environmental economics considers carbon trading to be a reliable market based instrument that allows for reducing CO₂ emissions at the lowest possible costs. Showing the economic potential of fossil energy for fuelling exponential economic growth, ecological economics reveals the strategic nature of CO₂ emissions control as a thermodynamic corollary of fossil fuel use, as well as the ecological peril of making profitable the trading of politically generated carbon commodities that are all but ecological substitutes. Critical institutional economics insists on the exclusionary nature of carbon exclusive allowance or credits, as well as the moulding of institutional conditions favouring the control of strategic CO₂ emissions as an institutional prerequisite. Property economics makes explicit that exclusive carbon control increases firms' capitalization value by securing concern's future income and profit as well as the direct relation between rights exclusivity, concern's security and financial derivatives creation. Together, carbon trading is an institutional modality created for meeting both the interests and the constraints of the industrial capitalist mode of development.

Introduction

In order to cope with climate change, global politics has generated institutional modalities that show high compatibility with the requirements of capitalist expansion, such as carbon emission allowances, carbon offset credits and carbon markets, all financial instruments that are generically referred to as carbon trading. Yet, carbon markets, as entirely politically generated entities are quite singular. While carbon is an essential resource which industrial activity depends on both as energy-input and waste-output entities exchanged in carbon markets, emission allowances and offset credits, are not physical commodities but dematerialized assets. This makes carbon markets particularly suitable for financial capture such as carbon derivatives developed in secondary markets (FOE 2009a). Moreover, the central role carbon markets play in climate global governance makes them vulnerable to lobbying and regulatory capture. Finally, such institutional innovation that favors private property rights might have socioeconomic and ecological repercussions at a scope never experienced before. The novelty of this situation, as well as its significance, makes it worth reopening and actualizing the debate on market and finance as policy instruments.

Carbon trading is presented by its proponents as the most reliable economic device to lower the overall compliance costs of reducing CO₂ emissions, and thereby facilitate the transition from a brown to a green economy. Undeniably, carbon trading has proved successful in creating profit and cash opportunities. According to the World Bank (2010), carbon trading resulted in 8.7 billion tones of carbon traded in 2009 with a generated value of US\$ 144 billion. Indeed, “companies at the vanguard no longer question how much it will cost to reduce greenhouse gas emission, but how much money they can make doing it” (Cogan 2006:1). Yet, during the same period, greenhouse gases emissions have kept growing not only at the global level but also at the national level for most countries supposedly committed to an overall limit (WMO 2010), while social inequities have shown a similar patterns (Matthews and Hammill 2009). Consequently, critics of carbon trading see this device as a private profit oriented institutional innovation that benefit the most powerful economic agents, mainly big business and finance, while leaving aside the less powerful actors, amongst which local community members, excluded from this wealth creation process, when not dispossessed from their customary rights through improper appropriation.

Critics towards carbon trading come rarely from renowned or well-established scholars. Within heterodox economics, critics appear dispersed. Scholars concerned with the exclusionary nature (Bromley 1992) of emission allowances, the capitalization and speculative potential of offset credits (Lohmann 2006a) and the cumulative nature of power expansion through accumulation and capitalization (Nitzan and Bichler 2009) are rare. Critical theoretical assessments of carbon trading are exceptions (Spash 2010); they often condemn the implicit recourse to inadequate theoretical representation (Spash 2010) and worry about power asymmetries that rule environmental governance processes (Martinez-Alier 2002; Spash 2007, 2010). Power imbalance are also raised by critics who claim that institutionalizing exclusive rights will increase the power of already powerful actors and exclude powerless, insolvent people (Lohmann 2006a, 2006b, 2010). While critics emanating from natural scientists, NGO representative and local communities are generally condemned by as being alarmist, idealistic or naïve, alternative economic approaches are too rarely developed, which is to be related with what Giampietro and Mayumi (2009) call an academic lock-in, i.e. the dominance of neoclassical economics in academic programs and the locking out of alternative

theoretical approaches. What seems to be missing is a theoretical integrative approach that could offer a comprehensive appraisal of the capitalist rooting of climate governance. This research can be seen as a humble contribution towards the filling of such a gap.

The paper will be structured as follows: Section 2 proposes a contrasting view of standard and alternative economic perspectives on carbon trading, starting with the environmental economic interpretation (section 2.1), following with explanations given by institutional economics (2.2), property economics (2.3) and ecological economics (2.4). Section 3 focus on the social repercussions of carbon trading in terms of rights exclusivity, correlative exclusion and social conflicts (section 3.1), discusses the place and role of carbon trading as economic growth incentive and triggering factor of carbon finance (3.2), warns against the ecological danger that might be associated with carbon trading (3.3) and addresses the impasse in which the institutional strategies of unequal actors might lead the climate governance process (3.4). It concludes on the necessity to widen the economic analysis of instruments such as trading scheme beyond the scope of conventional, environmental economics.

A differentiated appraisal of carbon trading

The neoclassical interpretation of carbon trading

Carbon trading as an economic instrument for achieving emission reduction and, thereby for lowering climate change, has emerged out of neoclassical economics textbooks. In the neoclassical framework, the market is considered an efficient system of resource allocation as long as external processes have internal, monetary counterparts¹. Having recognized that pollution instances correspond to “market failures”, neoclassical economists have been trying to incorporate them into the internal logic of market mechanisms and property rights. While Pigou (1920) proposed state intervention to make polluters pay for their “external costs”, Coase (1960) recommended extending the market scope by setting property rights to environmental resources. According to Coase (1960), bargaining between proprietors would then ensure that the level of pollution, not a bad in itself but a factor of production as any other, will correspond to the optimal one. Dales (1968) added to this theoretical design that the overall level of pollution should be set by the government on the basis on ecological considerations. Market transactions would react to this artificial scarcity and allocate emission permits efficiently. *Cap and trade was conceptualized*. It was further adapted to carbon emission by Tietenberg (1985) and others, before it was implemented at the international level in the climate regime, with carbon markets established as the centerpiece of an international strategy to reduce greenhouse gases. Today, most neoclassical and new institutional economic contributions on climate change (Woerdman 2004; Begg, Woerd & Levy 2005; Kooten 2004) take for granted the

¹ The neoclassical perspective considers that a market economic system is ideally self-regulated through its internal logic of relative prices, when private property rights are properly defined and competition assured. Internal prices integrate variables and processes that are external to the market system through the perceptions of individual agents. External processes have thus internal counterparts that guarantee both the self-regulation of the autonomous market economy and its adequate integration in its environment. For most heterodox economists, this representation of the economic sphere as a *closed system* (Kapp 1976; Varela 1979) has been responsible for both a misperception of economic sphere as reduced to the monetary dimension and the consequent mis-integration of economic activities in their social and natural environment.

efficient nature of market-based instruments and question the political or institutional barriers to their full operation.

In a effort to develop a cap and trade scheme for global CO₂ emissions, environmental economists have identified the following problems (Godard 2002): (1) the initial allocation of allowances or permits: while recourse to scheduled auctions would associate a monetary counterpart to CO₂ emissions, it would impact negatively the international competitiveness of participatory actors and favor a delocalization of polluting activities in less or un-regulated contexts; conversely, “grandfathering”, the allocation of permits at no cost in proportion to past emissions levels, does not constitute a monetary incentive to lower pollution while depriving public authorities of the monetary means to finance environmental policies; (2) the unequal market share of economic agents, which relates to the fact that powerful agents can transfer more easily their compliance costs onto the consumers, a process which reinforces initial asymmetries; (3) the regulatory capture that takes place when regulation processes get subjugated to private agents’ interests. In spite of these limitations, the carbon trading scheme is still being presented by environmental economists as a reliable instrument to meet an environmental objective at the lowest possible cost.

In the 1970’s and 1980’s, pollution trading mechanisms based on the cap and trade principle have been put into practice in US markets for lead, nitrogen oxides and other pollutants (Lohmann 2006). Carbon trading is the core instrument of the Kyoto Protocol (1997) and is a cornerstone of the European Union's policy to combat climate change. Launched in 2005, the European emission trading scheme works on the same principle, as does the Kyoto Protocol’s emissions trading mechanism that came into effect in 2008. Both scheme set the basic conditions for the overall limitation and trading of carbon emission allowances between parties with commitments.

However, in parallel to the emission trading mechanisms that relies on cap and trade principle, the Kyoto Protocol has established a second type of tradable carbon commodity, carbon offset credits. Carbon offset credits are financial instruments that have been designed in the CDM framework as an medium of exchange (a currency) by which one activity that reduces emissions at a higher cost can be swapped for another that does so at lower cost (Wara 2008). Carbon offsets allow firms within cap-and-trade systems to reduce the costs of their compliance by purchasing carbon offsets in lieu of allowances, the currency of cap-and-trade². Allowing the avoiding of domestic reduction measures by investing in economic activities abroad, carbon offsets credit soon became a much controversial issue in the climate policy debate. While proponents argue that carbon offsets allow reaching an overall carbon reduction at the lowest possible costs (Tucker 2001; Carr and Rosembuj 2008), critics oppose compliance problems (such as the difficulty to assess the additionality of offset projects). Above all, they argue that rather than encouraging the fundamental changes to lifestyle and corporate behaviors necessary to tackle climate change, carbon offsets provide a convenient loophole to appease regulators and personal consciences (Lohmann 2006; Smith 2007; Gilbertson and Reyes 2009; Spash 2010).

² In addition to the certified emission reductions (CER) generated from a CDM project, emission reduction units (ERU) generated by a [joint implementation](#) project and removal units generated by activities such as reforestation in the context of the LULUCF ([land use, land-use change and forestry](#)) program can be transferred as offset credits in the carbon markets.

Neoinstitutional economics and the strategic molding of institutional conditions

*Neoinstitutional economics*³ criticize the neoclassical bias towards private property regime (Ciriacy-Wantrup and Bishop 1975; Ostrom 1990, Bromley 1992). In this perspective, no market can be thought of but in relation with a set of conventions and entitlements that establish a predictable structure for changes in ownership over resources (Polanyi 1944; Kapp 1950; Bromley 1989). What is required is a structured set of rules and sanctions that results in social order (Bromley 1989). As in the neoclassical model, the definition of rights is crucial. However, formal rights derive from a legal relation and necessarily imply a correlate: if Alpha has a right, Beta faces the duty of respecting Alpha's right (Bromley 1989). Therefore, property, as a legal relation, is both exclusivity and exclusion. And institutional exclusion is a matter of organized power (Nitzan and Bichler 2009). This correlative nature of institutions and the *exclusionary nature* (Polanyi 1944; Bromley 1992) of property rights are central in the setting of carbon emission allowances, as creating new exclusive rights necessarily implies creating new exclusions.

Formal institutional conditions also determine the cost frontier between the private costs economic agents are legally bound to bear and the social costs that may be transferred to third parties (Kapp 1950; Bromley 1989). Thus, institutions impact the structure and amount of costs charged to private economic agents. Institutional conditions are therefore at the core of choices and behaviors of economic agents (Bromley 1989). This is why firms pursue multiple strategies that include political, technological, organizational, financial, and public relations components (Jones and Levy 2007). Economic strategies aiming at molding the institutional framework towards favorable conditions is a typical topic in critical institutional economics (Kapp, 1976b; Bromley 1989). By considering public policies and collective action as partly molded by economic actors' institutional strategies, institutional economics treats environmental policies as endogenous variables, which allows the closing of the analytical circle: while institutional arrangements determine economic conditions, economic conditions influence in return the structure of institutional arrangements (Bromley 1989). The causation appears circular and cumulative, inducing historically and culturally specific institutional trajectories that can lead to path-dependence and lock-in.

Property Economics and the capitalist rationality

Property economics criticizes the notion of property rights as developed by Coase and others (Coase 1960; Demsetz 1968; North & Thomas 1973) for having failed to recognize in property the constitutive institution of capitalist economies. Property economics rests instead on a preliminary distinction between property and mere possession, as only the former, with the creation of formal property titles, allows for fixing the economic (capitalist) potential of resources (de Soto 2000), what Veblen (1904) called the future earning capacity. This potential can be actualized through capitalization processes (Veblen 1904), whose primary form is the credit relation (Heinsohn and Steiger 1996). This far-reaching potential, which rests on the long term exclusivity property titles confer to their holder on the earning-capacity of assets, makes

³ Neoinstitutional economics must be distinguished from new institutional economics (Bush and Tool 2001). While represents of the former school (such as Kapp, Tool, Bush, Bromley or Hodgson) propose institutional analysis in line with the critical perspective of early American institutionalists and pragmatists (Veblen, Commons, Peirce, James, Dewey), the represents of the latter (Williamson, Demsetz, North) propose an analysis of transaction costs and institutions much in line with the neoclassical framework.

property the core institution of capitalism (Heinsohn and Steiger 1996, 2003; de Soto 2000; Steppacher 2008), and capitalization the driving force of the property-based economic expansion (Veblen 2004; Griethuysen 2010). While capitalist systems follow a development path that vary according to historical and cultural conditions (Hall and Soskice 2001), they commonly rest on property titles and their capitalist expansion, evolving along a circular and cumulative sequence of commodification and capitalization.

Expanding the earning-capacity of assets, capitalization practices induce a process of *circular and cumulative enrichment of proprietors*, whose earnings from capitalization *add up* to the income generated by the direct exploitation of resources (Veblen 1904; Heinsohn and Steiger 1996). Such processes result in the self-expansion of property-based economies, which may last as long as available resources can be appropriated and capitalized. In such processes, any resource or instrument that presents a potential economic value is rapidly integrated into the dynamics of exclusive appropriation and control (Bromley 1992; Nitzan and Bichler 2009). This includes natural and human resources, technology and know-how, as well as intangible elements of political and economical power (Nitzan and Bichler 2009). Allowing investment without previous savings (Steiger 2006), property confers to the capitalist economies a clear advantage over non-property, possession-based societies (Heinsohn and Steiger 1996; Soto 2000). Yet, the property expansion through capitalization and commodification needs to be supported and securitized by a set of rules and organizations that altogether constitute and shape the property regime⁴.

In making explicit the capitalist potential of formal property rights, property economics also pinpoints the peculiar nature of the peculiar economic rationality that emerges as a by-product of capitalization processes. By deciding which activities to finance, creditors and investors give the primary impulse towards the capitalization process and the expansion of the capitalist economic system. Therefore, economic rationality in a property-based economy is primarily defined from the point of view of the property of the creditor/investor (Steppacher 2008). This general orientation towards the monetary value of property imposes the solvency of economic agents, the monetization of economic activities and the relative profitability of economic activities. Together these requirements constitute the *economic rationality of a capitalist, property-based economy* (Steppacher 2008). In that peculiar, capitalist economic rationality, environmental and social considerations are subordinated to the capitalist requirements, such as monetary growth, time pressure, monetary cost efficiency, profit-based innovations and favorable institutional conditions (Steppacher 2008, Griethuysen 2010)⁵. In this capitalist rationale, considerations of an ecological and social nature are secondary (Steppacher 2008). They can only be considered by economic agents insofar as they are compatible with the requirements of capitalist expansion. *No exception to this rule, climate change, pollution or CO₂ emissions will be integrated in this rationale only when they secure or increase the status or value of property.*

⁴ The exclusionary nature of property rights (Polanyi, 1944; Bromley, 1992) reflects the dual nature of any institutional arrangement (Bromley, 1989). However, in the property regime, the exclusiveness of rights is not limited in time, which makes the reallocation of rights and duties an issue of a revolutionary nature, as this implies a restructuring of the regime as a whole.

⁵ This is clearly observable in the constraints of credit that “define the entire *hierarchy of economic decision-making* and the *evaluation process* associated with it. [...] The combined effect of [the contractual] conditions defines the *specific economic pressure* that prevails in property-based economies: the *pressure for exponential growth* imposed by interest, the proverbial *time pressure* imposed by the period for which the credit is granted, the *pressure to improve cost-benefit conditions* in order to be able to refund.” (Steppacher 2008:335-336, original emphasis)

Ecological economics and the industrial dependence

Ecological economics, as first elaborated by Nicholas Georgescu-Roegen, brings another essential perspective to the issue of carbon trading. Elaborating on thermodynamics, Georgescu-Roegen (1966, 1971, 1976) developed conceptual tools that prove essential for apprehending, quantifying and measuring the economic-ecological interactions. First of all, the *entropic nature* of the *economic process*, i.e. the physical fact that economic processes irremediably transform low entropy resources to higher entropy ones (Georgescu-Roegen 1971), shows the definite direction of economic processes (Georgescu-Roegen 1976) in their co-evolutionary relation with their ecological context (Gowdy 1994; Norgaard 1994). Making explicit the circular and cumulative causation between economic growth, resources exhaustion and environmental disruption (Georgescu-Roegen 1975; Kapp 1976a, 1976b), the entropic nature of the economic process sets the basic incompatibility of an ever growing material economic structure in a world of limited resources and environmental capacity.

The transdisciplinary concepts of *stocks*, *funds*, *flows* and *services* that Georgescu-Roegen (1971) established for assessing economic-ecological interactions, are other essential tools to bring into the climate debate (Steppacher and Griethuysen 2008). They allow distinguishing between stocks of a finite nature, such as mineral resources, and funds of a renewable capacity, which biotic resources are derived from. The ecological differences between stocks and funds underline the necessity of distinguishing absolute vs. relative scarcity of natural resources, as well as of setting up resources management practices that rely on those differences (Steppacher and Griethuysen 2008). The sharp contrast between the *biophysical incommensurability* of ecological stocks and funds and the possibility of trading emission allowances with offset credits (hybrid trading) cannot be overstated.

The different *economic potentials* of stocks and funds are far-reaching. For, unlike biotic resources, mineral resources allow for exponential growth (Georgescu-Roegen 1965; Steppacher 2008)⁶. Moreover, ecological stocks such as fossil fuels allow for a continuous flow of energy, which favored the emergence of the factory process, “one of the greatest *economic innovations* in history” (Georgescu-Roegen 1965:89, original emphasis). Factory production processes can be arranged *in line*, allowing the full employment of economic funds such as land, labor and equipment (Georgescu-Roegen 1965; Steppacher 2008). Therefore, when permanently fuelled by fossil energy, the industrial system is an engine of exponential growth and of optimal temporal allocation of economic funds. In the competitive business environment of the capitalist economy, this confers to the industrial mode of production a clear-cut competitive advantage over any production process that relies on discontinuous energy-matter coming from biotic and other renewable resources, such as agriculture.

However, correlate to the industrial power are its weaknesses. Because of their finite nature, mineral resources (and fossil fuels in particular) will allow the fuelling of exponential economic growth only for a historically limited time and with grave environmental consequences. As exponential growth occurs, stocks get irreversibly and increasingly depleted while ecosystems get disrupted by exponential entropic degradation (Clark and York 2005; Steppacher and Griethuysen 2008). In parallel, competitive processes fed by a finite amount of absolutely scarce resources induce increasing risks of conflicts among resource-dependent competitors. Control over fossil

⁶ “One steam engine, one coal field, and one iron deposit allow the production of as many steam machines as needed to exploit all accessible iron and coal deposit.” (Steppacher 2008:341)

energy thus becomes more and more strategic, not only for economic sectors whose core business directly relates with fossil energy extraction, transformation and distribution, but for the industrial process as a whole. The *technological dependence* of the industrial system upon fossil fuels is of systemic nature.

An integrated economic appraisal of carbon trading

In *Climate Capitalism* (2010), Newell and Paterson, two specialists in the field of the political economy of global environmental governance, address the imperative economic transition from carbon dependence to carbon emancipation. They claim for a profound reform of the capitalist system, where market and finance instruments should be mobilized, developed and firmly regulated. Far from being an exception in the literature on climate change and global environmental governance (Levy and Newell 2005; Ougaard and Leander 2010), this position reflects the concrete political bargaining on climate governance, both at international and national levels, where almost every climate policy proposal relies on carbon trading as the centerpiece of a strategy to reduce greenhouse gases. Interestingly, recourse to market and finance, while advocated by most neoclassical economists and liberal thinkers, is often presented by less liberally inclined analysts as a no-choice situation: better to mobilize and regulate carbon market and finance than letting them derive into allowances concentration, market exclusivity and speculative bubbles. Even inspired critics of carbon markets and finance that links the two issues, such as NGO Friends of the Earth (FOE 2009a), end up with a plea to design carbon market for environmental and financial integrity (FOE 2009b). Understanding why capitalist compatible institutional arrangements have been considered as reliable instruments for achieving emissions reductions, and identifying the social and ecological repercussions of such choice is at the heart of this section.

The strategic control of CO₂ emissions

While the property economic perspective has shown the dependency of the capitalist economy upon economic growth, the ecological economic perspective has made explicit the specific economic potential of fossil energy for materializing exponential economic growth and operating economic funds' full capacity by continuously fuelling the production process. This unique potential to fulfill two essential elements of competitiveness explains both the strategic nature of mineral resources, notably fossil fuels, and the technological dependence of the industrial system on a permanent access to fossil fuels, an issue that has been considered for decades. Yet, with the advent of the climate crisis (as a delayed corollary of world industrialization) and the associated public and political pressures towards CO₂ emission reduction, the strategic nature of the access to and control of CO₂ emissions has been growingly perceived.

Yet, given the entropic nature of economic processes, in general, of industrial activities, in particular, CO₂ emissions are an output just as *unavoidable* as the input of fossil energy" (paraphrasing Georgescu-Roegen 1976:13, original emphasis). This makes explicit the growing strategic nature of the industrial dependence on CO₂ emissions, as thermodynamic corollary of fossil energy use. In other words, controlling CO₂ emissions might be as strategic as controlling the access to fossil fuels, since no industrial activities may be realized without emitting CO₂. Given the growing strategic nature of carbon emissions, the exclusive nature of carbon allowances and carbon offset becomes itself an issue of a strategic nature. Holding exclusive right turns out to be condition for competitiveness, while assuring the correlative exclusion of non-rights

holders becomes imperative. Ultimately, in the competitive context of capitalist world expansion, a strict limitation of CO₂ overall emission could even be favored by emission right holders, should that allow them to eliminate competitors by depriving them the right to emit CO₂.

In the context of carbon trading scheme, the institutional status of carbon allowances and offset credits in terms of rights exclusivity, security and temporality has far-reaching consequences: while emission allowances consist of exclusive emission rights creating out of an open access situation (Bromley 1992), most offset credits rest on unclear, unsecured rights (Lohman 2006) which often compete with local, possession (or customary) rights that are not protected by property titles (Soto 2000; Steiger 2006). Therefore, besides the establishment of new rights and trading scheme, the climate regime creates new instances of social conflicts, notably between private businesses and local communities.

Capitalizing on carbon commodities

While neoinstitutional economics focus on the exclusionary nature of emission allowance and its consequent social instability, property economics sheds light on the potential for capitalization practices out of the economic security associated with exclusive emission rights. True, emission allowances do not constitute genuine property titles, since the allowances' allocation conditions are redefined on an annual basis, in sharp contrast with the quasi-perennial security provided by formal property titles. However, the difficulty for states to reduce the overall amount of allowances once allowed to economic agents (Spash 2010), and the related pressure to expand carbon markets by integrating new economic agents and activities, must be reminded here. Temporary rights, once established in favor of powerful agents, would be politically hard to suppress or reduce, should a strengthening of environmental regulation be required. Such institutional lock-in reinforces the temporal scope of the security provided by carbon allowances and offsets credits, increasing the capitalization value of the concerns that hold such entities.

Emerging out of such capitalist potential, two kinds of capitalization processes can be distinguished: 1) the direct capitalization by the concern of the increased security provided by carbon rights over future activity, and thereby future income; this additional security can be engaged in capitalization processes, whether to access external capital through credit or to generate supplementary capital through stock-option creation; such revenues from capitalization come *in addition* to the direct profits possibly made out of allowances and credits trading, leading to the cumulative reinforcement of the economic and political power of major polluting agents in the world economy; 2) the indirect monetary value that will be created through carbon derivatives and other financial innovations on secondary markets (FOE 2009a), as the creation of financial products derived from formally institutionalized assets, carbon commodities in this case, has become common practice. Indeed carbon markets, as entirely politically generated market where no physical commodities but dematerialized entities (emission allowances and offset credits) are exchanged are particularly suitable for financial capture. Moreover, carbon derivatives developed in secondary markets might dwarf the primary trading market (FOE 2009a). The causal relationships that link carbon markets to carbon finance, the significance of which is estimated in trillions of dollars, makes explicit the lack of regulatory framework to govern carbon derivatives and the necessity to politically design carbon finance markets.

Finally, taking into account the potentials for increase control on carbon energy, direct profits to be derived by the increase in competitiveness conferred by the holding of carbon commodities, and the indirect value creation of financial derivative out of carbon commodities, the active support of business and finance toward carbon trading is nothing but a surprise. Carbon trading could even be cited as an example of business and finance lobbying strategies, based on the necessity for business to secure access to atmospheric dump and the necessity for banks and other finance actors to develop financial products able to generate ever-higher monetary returns⁷.

The ecologically perilous road of carbon trading

The ecological economic perspective, in focusing on the biophysical dimension of carbon trading, sheds a disturbing light on the issue of carbon trading. As mentioned, defining carbon emission allowance and carbon offset credits as commodities to be traded rest on the scientifically invalid assumptions that mineral and biotic carbon can substituted via the reduction of natural resources and processes to their carbon counterparts. For, as part of natural cycles that occur at a geophysical spatial and temporal scale, mineral energy stocks are both non-renewable at the human scale and highly disruptive at the biotic scale. Both the extraction of fossil carbon and its atmospheric release (anthropic alteration of geological carbon cycle) must be distinguished with the physico-chemical exchanges of biological organisms with their environment (biological carbon cycle). Such differentiation is essential to assess the various ecological impacts world economic development has been induced, such as the disruption or interruption of natural processes and cycles, the accumulation of waste and the overall and systematic degradation of the biosphere, all impact that are incorporated in the notion of metabolic rift (Clark and York 2005).

Given the irreducible ecological differences between carbon emitted from fossil energy combustion and accumulated in the atmosphere and carbon exchanges between biotic resources and their ecosystems, every tentative to homogenize carbon flux to a common denominator raise important ecological risks. This underlines not only the scientific invalidity of establishing a homogenous carbon currency out of heterogeneous ecological processes, where not only spatial, but temporal scale are incommensurable; it also makes explicit the ecological peril of substituting the reduction of fossil carbon emissions with the creation of so-called carbon offset schemes that do not alleviate –or even aggravate- the ecological burden. Above all, it shows the irresponsibility of making profitable activities out of such fictitious substitution.

The climate governance lock in

Unruh (2000) coined the term *carbon-lock-in* to describe the fact that “industrial economies have been locked into fossil fuel-based technological system through a path dependent process driven by technological and institutional increasing returns to scale (Unruh 2000:817). Unruh concludes that “lock-in of carbon-based TIC [techno-institutional complex] has had the effect of locking-out alternative carbon saving technologies through a variety of systemic processes” (Unruh 2000:828). Unruh’s analysis remains, however, essentially techno-centric (Unruh 2002:317), while the role of institutions, often identified with private or public organizations (Unruh 2000, 2002, 2004), appears underestimated. More generally, the role of capitalist requirements in

⁷ Business and finance imperatives converge with the interests of other actors who might benefit from the numerous cash and status opportunities associated with the climate regime, such as private consultants, brokers, ONG and IO members and agencies.

orientating techno-institutional complexes has been mainly neglected. Filling this gap, by combining the technological carbon lock-in thesis with the inherently expansionary nature of property-based economy is essential, as this combination might explain why the climate governance has been locked into capitalist compatible institutional arrangements.

The institutional arrangements established by the international community in response to climate change show a high compatibility with the requirements of capitalist and industrial expansion path. In the heterodox, institutional perspective, such evolution is not surprising as international agreements are inevitably molded by the institutional strategies developed by powerful competing agents whose economic survival depends on a permanent access to fossil energy to keep being competitive in global race for profits. But the more the institutional framework gets molded by capitalist opportunities and constraints, the more institutional modalities that differ from the capitalist logic are discriminated. This is being seen in the many instances of the environmental governance, where ever more environmental issues are apprehended through a capitalist rationale, compartmentalized into exclusive rights, commoditized and capitalized. Such institutional path dependence leads to a lock-in situation, where institutional modalities that rest on a non-capitalist rationality are discriminated against.

Molded by the power and weaknesses of the world-level expansion of the capitalist and industrial mode of development, the international environmental governance has entered an involutory path, in which capitalist-compatible institutional modalities are prioritized while alternatives are discriminated, when not eliminated. Such institutional evolution reinforces the capitalist development path, which further locks societies into its peculiar rationale. Unable to perceive the ecological or social repercussions of capitalist expansion unless it affects property rights and privileges, the property economic rationale make societies incapable of conceiving institutional response that goes beyond property-based rationality, as the international regime on climate change shows. Indeed, explicitly anchored into a capitalist rationale, the climate regime might be the most obvious symptom of a deeper and far-reaching cultural lock-in.

Conclusion

Perhaps, as Spash (2010:189) states, “the most worrying aspect of the [emission trading scheme] debate is the way in which an economic model bearing little relationship to political reality is being used to justify the creation of complicated new financial instruments and a major new commodity market”. By providing a tentative alternative theoretical interpretation of carbon markets in terms of exclusive rights, capitalization processes and business institutional strategies, the paper has aimed at establishing a more adequate model of such complex reality.

Neoclassical economics proposes that a cap and trade scheme is a reliable economic tool to reach an environmental objective at the lowest compliance costs for CO₂ emitters. Such device might be flawed whenever offsets credits can be purchased, which correspond to activities that are not restricted by an overall limitation, as actual CDM projects taking parts in countries without reduction commitments. In this perspective, inherent limitations of the actual climate regime could be overcome through the establishment of a market of carbon allowances and offset credits at the world level.

Focusing on the biophysical dimension of economic processes, *ecological economics* reveals how limited the substitution between non renewable energy and renewable energy is, and shows that only the former can fuel a process of continuous economic growth. This stresses the physical and economic dependence of industrialized economies on mineral energy as a source of continuous production, economic growth and technological innovation (Georgescu-Roegen 1965). Considering CO₂ emissions as an output just as *unavoidable* as the input of fossil energy, ecological economics makes explicit that controlling CO₂ emissions might become as strategic as controlling energy sources. This has serious implications, as competitive processes fed by a finite amount of absolutely scarce resources induce increasing risks of conflicts among resource-dependent competitors.

Institutional economics directs the attention to the dual, correlative nature of institutional change associated with permit creation. The correlative nature of institutions and the *exclusionary nature* (Polanyi 1944; Bromley 1992) of carbon emission allowances and carbon offsets - the fact that creating new exclusive rights necessarily implies creating new social exclusions - might constitute the major flaw of carbon trading scheme from a social perspective, as it leads to ever widening inequities and impels social tensions and conflicts. Moreover, the lasting character of the exclusionary nature of carbon trading, which is related with the difficulty for states to reduce the overall amount of allowances once allowed to economic agents (Spash 2010), reinforces such dynamics that can be depicted as a governance lock-in.

Property economics pinpoints in the exclusive nature of carbon allowance and offset the capitalist potential of such financial instruments. Making explicit that exclusive rights confer a security to the rights holder, which can be engaged in various capitalization processes (Heinsohn and Steiger 1996, 2003; de Soto 2000; Steppacher 2008), property economics makes explicit the capitalist potential of cap and trade schemes, and sheds some light on the reason why carbon trading has gained so much support from business and finance. Moreover, it makes explicit the spontaneous nature of carbon financial practices that have emerged out of carbon markets, and brings forth to attention the speculative nature of financial practices which might dwarf the primary trading market (FOE 2009a).

Each of these different economic perspectives has shed a different light on the issue of carbon trading. However, a clear divide has appeared between the standard economic perspective of environmental economics and the heterodox approaches of ecological, neoinstitutional and property economics. While environmental economics, heterodox approaches end up with a conclusion that carbon trading consists of an institutional innovation that reinforces the capitalist and industrial forces that are the causal roots of the climate crisis. As such carbon trading is part of an institutional web that increasingly locks climate politics into an involutory path.

On the one hand, ecological economics shows that access to fossil energy and right to emit dissipated energy-matter correspond to the material prerequisite for economic survival in an industrial capitalist expansion. On the other hand, property economics reveals that increasing value of property-based capital through capitalization (both internal and external) is the financial prerequisite for economic survival in a property-based economic context. Finally, institutional economics makes explicit that molding the institutional framework in such a way that it secures and favor business and finance is the institutional prerequisite for economic survival in a competitive race for global profits.

While conceived by neoclassical economics as an efficient instrument for achieving emissions reductions at lowest costs, carbon markets are presented by heterodox economics as an institutional counterpart of the strategic nature of CO₂ emissions that emerged out of the capitalist industrial development path, as well as an institutional innovation that reinforces the capitalist and industrial forces that are the causal roots of the climate crisis. Therefore, carbon trading has not been adopted and implemented because of its pertinence in terms of with ecological sustainability, social equity and even economic efficiency, but because of its fundamental compatibility with the industrial dependence upon fossil fuels and the capitalist requirements of relative profitability and competitiveness.

In view of these limitations, it not surprising that the creation of emission trading schemes leads to appropriation of created rights by the most powerful economic agents: those who not only have the financial means to buy the rights but also generally hold dominant economic positions which allow them to transfer emissions cost onto the consumers and benefit from an additional comparative advantage with regards to other agents on the market. In addition, exclusivity on rights and resources, including lands, will inevitably lead to the exclusion of other parties, most often the local people, dispossessed from their informal, non-property, possession rights. Moreover, the additional security provided by emission rights will strengthen the potential for capitalization of these agents who will see their position on the capital market strengthened.

The deep inequalities dominating global development inevitably invade carbon markets and, once there, develop and keep increasing. Most probably, the consequences will be dramatic for those excluded from the system. They would be blocked from any later economic development as no economic activities could be undertaken without creating waste, thus incurring sanctions such as ‘environmental fines’ by environmental regulators upon the request of rights holders. The rupture between rich and poor nations would only run deeper. Further, as poor and excluded states and will show unable to stop their activities, global CO₂ emissions would not decrease. Rich nations may thus question and give up their own commitments. Should it be the case, emission trading would lead to the effective appropriation of environmental services by the well-off, additional social exclusion and increased environmental damage. Finally, and in all likelihood, the expansion of exclusive rights property on global collective goods will not lead to any visible ecological or social amelioration, but rather to further deterioration.

An increasing number of social scientists –including neoclassical economists– argue that economic problems should be tackled from a variety of perspectives. This explains why new cutting-edge approaches vigorously develop, such as neoinstitutional economics, ecological economics or property economics. This paper has proposed a tentative contribution to strengthen those approaches, by selecting and articulating partial elements into an integrated interdisciplinary study.

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