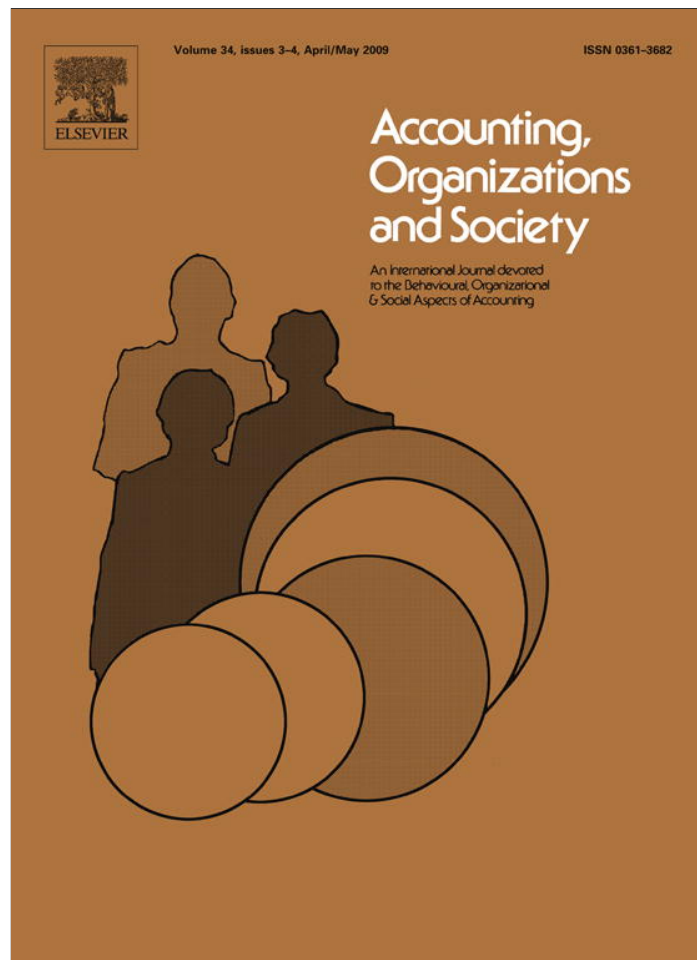


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Toward a different debate in environmental accounting: The cases of carbon and cost–benefit

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Abstract

Many champions of environmental accounting suggest that calculating and internalizing ‘externalities’ is the solution to environmental problems. Many critics of neoliberalism counter that the spread of market-like calculations into ‘non-market’ spheres, is, on the contrary, itself at the root of such problems. This article proposes setting aside this debate and instead closely examining the concrete conflicts, contradictions and resistances engendered by environmental accounting techniques and the perpetually incomplete efforts of accountants and their allies to overcome them. In particular, it explores how cost–benefit analysis and the carbon accounting techniques required by the Kyoto Protocol, the European Union Emissions Trading Scheme and other carbon trading mechanisms ‘frame’ new agents, spaces, relations and objects, and what the consequences have been and are likely to be.

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‘A re-examination of accounting systems and measurement protocols to include the environment in the routine, everyday calculations by which our economy is governed comes about as close as you can get to the heart of why we have this crisis... Accounting systems are required to hold routinely in mind factors that are deemed to be important and significant in weighing the pros and cons of any decision. There has been progress to reform and redesign the accounting system. But not nearly enough.’ (Al Gore, *Independent* (London), 7 July 2007).

‘...the source of environmental problems lies in part in the spread of markets both in real geographical terms across the globe and through

the introduction of market mechanisms and norms into spheres of life that previously have been protected from markets... The neoclassical project of attempting to cost all environmental goods in monetary terms becomes an instance of a larger expansion of market boundaries. The proper response is to resist that expansion, be this in the spirit of resistance to market society or more modestly to maintain the proper boundaries between spheres.’ (O’Neill, 2007, pp. 21–22):

In the statement above, Al Gore expresses what has arguably become conventional policymaking wisdom about the role of accounting in environmental sustainability. On this view, environmental crises are inefficiencies deriving from a failure to calculate all social costs, internalize externalities, or design enough properly-functioning markets. Even global

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warming, according to this perspective, is a mere 'market failure' (Stern, 2007, p. viii), correctable through improved pricing and information flow.

Introduction

Environmental accounting is supposed to address such crises in two ways. First, it makes environmental crises more visible to decision-makers, by classifying them in a way that makes explicit pre-existing equivalences or quantifiable relationships with commodities and other economic objects. Coding the statement 'we must pay more attention to the environment' as 'we must calculate the value of the environment', it provides a 'guide to analysis and a language of debate' (Porter, 1995, p. 86) that enables decision makers to trade one thing off for another more confidently by providing 'a clearer sense of the stakes' (Sunstein, 2005, p. 129). Second, environmental accounting helps transform environmental objects into commercial 'goods and services' whose value can be 'discovered' in markets themselves. Trade itself becomes comparative valuation and environmentalist action.

Like most received opinion, the view expressed by Al Gore has attracted its share of standard critiques. One of the most important is articulated in the epigraph from O'Neill. This is that the problem has been mistaken for the solution. Environmental crises are rooted not in inadequate costing, insufficient commodification or incomplete accounting, 'but in the very spread of market mechanisms and norms' into putative non-market spheres of society or nature (O'Neill, 2007, p. 21). Environmental accounting, on this view, does not reveal what has previously been only implicit, but rather misrepresents, and thereby endangers, a "'free" unpriced world of knowledge, the body and so on' (O'Neill, 1997, p. 550). 'Protection of our environment is best served, not by bringing the environment into a surrogate version of the commercial world, but by its protection as a sphere outside the world of commodity exchange and its norms' (O'Neill, 1997, p. 550).

As often happens, received wisdom and standard critique revolve around a shared metaphor. The metaphor in this case pictures an 'economy' as a territory whose boundaries can be contracted or expanded by, among other actions, delimiting or expanding accounting practices (Dove, 1999, pp. 2–3). Alternatively, environmental objects such as land or climatic stability can be transported across a boundary into the territory of an economy with the help of new

accounting and other technical and legal practices. Received wisdom and standard critique differ only about what happens to these invariant objects when they are shipped over the border. According to received wisdom, they benefit when calculation reveals their intrinsic value or at least a useful 'proxy' thereof (Barnes, 2001, p. 88), leaving behind at most only a 'philosophical' (Independent, 2007) residuum. According to the standard critique, however, the value of such objects is intrinsically or constitutively incalculable, meaning that their survival itself can be threatened when they are treated otherwise.

The metaphor of a territorial 'economy' influences a great deal of both scholarly and popular discourse, inspiring important work on all sides. Its influence can be detected in commonplace expressions ranging from 'in a world ruled by markets, a market solution must be made to work for the environment' (Evangelista, 2007) to 'our preachings and sermons will be for naught if we don't inscribe them on tablets that markets can understand' (Barnes, 2001, p. 88) to 'the market economy is not a neutral medium for conservation but rather a corrosive acid bath which dissolves many conservation practices it comes into contact with' (Lohmann, 1991, p. 100). However, like all metaphors, it opens one path of inquiry only by obscuring others.

Critical sociologists and anthropologists of markets such as Callon (1998a, 1998b, 1999, 2005) and Mitchell (2002) have recently proposed a fresh metaphor, that of 'framing', which, they suggest, helps open new paths of inquiry. Market exchange becomes possible, they argue, only through a laborious and ongoing process of construction of spaces for calculation and transaction, of accounting systems that determine both who is accountable and how and what to count and not to count, and of simplified, uncontroversial owners, products and modes of ownership. 'Agents and goods involved in calculations', Callon says, 'must be disentangled and framed if calculations are to be performed and completed' (Callon, 1999, p. 186). Nineteenth-century Chicago grain futures, for example, could emerge only when it became physically and socially possible to standardize grain and commensurate its present and future incarnations, transporting it in railroad cars and storing it in steam-powered grain elevators instead of the sacks that had previously entangled each bit of grain with its grower until it reached its final buyer (Cronon, 1991, pp. 97–147, cited in MacKenzie, 2009, 440–455; Espeland & Stevens, 1998, p. 318). Similarly, the automobile market is possible only because buyers

and sellers alike take it for granted that it is the car company that owns the product. Any possible claims of partial ownership by workers or communities near sources of raw materials are elided, along with other potential nuisances such as medieval notions of 'fair price'. In addition, many costs associated with the automobile sector – certain kinds of pollution, problems associated with forms of social organisation dependent on personal mobility, and so on – are put off on the community as a whole.

The metaphor of framing is clearly indebted to the insight of Polanyi (2002 [1944], p. 146) that '[t]he road to the free market was opened and kept open by an enormous increase in continuous, centrally-organized and controlled interventionism'. But instead of picturing a 'self-regulating' market being 'disembedded' or liberated from a larger social ground that previously contained and constrained it (Polanyi, 2002, [1944], p. 144), the metaphor pictures economies as 'embedded in economics', their every aspect – property, merchandise, actors, contract, product quality – not only described, defined and measured but constituted, nurtured, 'performed' and transformed by a multitude of practices of calculation and governmentality originating both in academia and 'in the wild' among economic agents at large (Callon, 2005, p. 9). 'Expert knowledge', in the words of Mitchell, 'works to format social relations, never simply to report or picture them' (Mitchell, 2002, p. 118). One instance of such expert knowledge is accounting procedures, which, as Peter Miller argues, are 'intrinsic to and constitutive of social relations, rather than secondary and derivative' (Miller, 2001, p. 392).

Double-entry bookkeeping, for example, 'was devised to account for business transactions, but once established, it altered these transactions by changing the way businessmen interpreted and understood them' (Carruthers & Espeland, 1991, p. 36). It influenced the premises of decision making rather than just being a tool for implementing them. Similarly, if application of economic theory often 'makes economic processes more like their depiction by economics' (MacKenzie, 2009, pp. 440–455), so *Homo economicus* traits can often be fostered in human beings merely through the commensuration involved in simple accounting innovations. Fining parents for showing up late to pick up their children from school, for instance, can paradoxically incentivize parental delinquency by replacing a moral stigma with a financial penalty (Gneezy & Rustichini, 2000). By the same token, making good behaviour a matter for financial reward (as when people

are paid for giving blood) can discourage it (Titmuss, 1996 [1972]). Net present value calculations and cost–benefit analysis have a similar potential to mould the behaviours that, ironically, they posit as invariant, in ways that increase (or decrease) their 'fit' with theory (Anderson, 1993; Radin, 1996; cf. Nussbaum, 2001, p. 195). As Plato understood, commensuration is often a social change and an achievement, rather than a report on the status quo (Nussbaum, 1986). 'We see the world remade, not the world we live in', Nussbaum remarks (Nussbaum, 1997, p. 1200).

By the same token, just as census work helps create categories such as 'the Hispanic vote' (Anderson, 1999, p. 43; Petersen, 1987, pp. 223–229) or 'the unemployed' that become effective collective political agencies subject to their own discipline (Espeland & Stevens, 1998, p. 331), so too, accounting helps produce agents and other entities. Thus the Kyoto Protocol's carbon monitoring system, which categorizes emissions sources according to physical location on national territories, helps ensure that nation–states are treated as the agents of global warming despite the fact that transnational entities such as multinational corporations, international financial institutions or social classes are, on some views, equally plausible candidates. Similarly, while the category of 'water quality' as used in accounting for the costs and benefits of hydroelectric dams comes into being through the rather ad hoc aggregation of attributes such as temperature, amount of dissolved solids, turbidity and pH (Espeland & Stevens, 1998, p. 317), it ultimately becomes an entity as 'real' in policy deliberations as any other. As will be argued below, such globally-recognized objects as 'certified emissions reductions' likewise exist only by virtue of a chain of disentangling, commensurating, simplifying and boundary-drawing calculating practices.

Framing, unlike boundary-crossing, is a never-ending process. Each act of framing, because it 'mobilizes or concerns objects or beings endowed with an irreducible autonomy' (Callon, 1998a, p. 39), is also a source of what Callon (1998a, p. 39) terms 'overflowing'. There are 'always relations which defy framing'. The 'constraints, understandings and powers that frame the economic act... and thus make the economy possible, at the same time render it incomplete' (Mitchell, 2002, p. 191). '[I]t is one and the same movement which causes calculative agencies to proliferate, while reinscribing them into spaces of noncalculability' (Callon, 1998a, p. 39). Only by the creation of overflows and new

entanglements is framing even possible. Every attempt to bring something ‘inside’ creates new ‘outsides’. Market agents and goods are always ‘boundary objects’ (Star & Griesemer, 1989) which, while partly resynthesized for a market, at the same time maintain and continue to develop characteristics relating to other contexts, as an actor plays a role without ever becoming it. Individuals framed as the mute, maximizing bundles of preferences of economic theory, for instance, are constantly – fortunately for the market – reasserting themselves as persuasive negotiators with voices and relationships (McCloskey, 1998, pp. 95–97). Similarly, money, framed as a unitary solvent of social ties, is, in the hands of its users, constantly fragmented into discrete, incommensurate categories – a process that turns out to be essential for accounting itself (Callon, 1998a; Zelizer, 1997). Indeed, framing institutions themselves cannot be separated from what they frame with any guarantee of stability. Frames for market negotiation are themselves negotiable. On close examination, the purported border of a market is ‘not a line on a map, but a horizon that at every point opens up into other territories’ (Mitchell, 2002, p. 292). Spaces of calculation and noncalculation cannot be walled off in rigid, mutually-exclusive spheres (cf. Walzer, 1983).

It follows that every attempt to identify and frame overflows themselves, or to internalize externalities, creates further overflows or externalities. What economic theory refers to as the category of externalities is not incidental and residual, but central and enduring. Full cost accounting is an ever-receding mirage. Just as the successful corporation, in the words of investment banker Robert Monks, must always play the role of an ‘externalising machine’ (quoted in Bakan, 2004, p. 70), so markets themselves ‘would be impossible if people were made to account for every cost’ (Mitchell, 2002, p. 290). Every market transaction must exclude ‘features of the world that actors do not have to take into account’, indirectly revealing ‘all the work that has to be done, all the investments that have to be made in order to make relations calculable in a network’ (Callon, 1999, p. 188).¹ In a sense, projects

such as Al Gore’s or Nicholas Stern’s can never be completed.²

In extreme cases, or what Callon calls ‘hot’ situations, even negotiations aimed merely at identifying overflows are incomplete or unachievable, interests are unstable, and the identity of actors is unclear, making continued framing exercises impossible or premature. Although ‘externalities are at the centre of public debates’, conditions are not ‘cool’ to carry out the spadework needed to establish commercial relations. In ‘cooler’ situations, processes through which products, their owners, and the rules of calculation are framed are often not only carried out, but can be ‘black-boxed’ as well. In certain commodity markets, for instance, it becomes possible to refer to the ‘efficiency’ of economies of scale while eliding the ‘inefficient’ violence or legal action that created the possibility of scale (e.g., large reserves of land or labour) and the requisite large demand in the first place (Lohmann, 1995), even Whiggishly assuming that such markets came about because they were ‘efficient’ *ab ovo*. Practical successes in framing living, breathing approximations of *Homo economicus* help make it plausible to ‘naturalize’ the species’ traits, reading them back into human nature. Similarly, practical successes in framing land, forests or wild fish as ‘manageable natural resources’ help make it possible to regard trade in ‘ecosystem goods and services’ as uncontroversial, even inevitable (Holm, 2007). Nevertheless, even when the stage-setting for acts of calculation and exchange is fairly successful, the ‘black-box’ in which the inevitable entanglements have been

¹ While the Marxist tradition has stressed the priority of exchange to commensuration, it has perhaps neglected exploring the way categories created by new commensurations help make possible new forms of exploitation and wealth, preferring instead to follow out a more classical attempt to locate a supposedly calculable ‘surplus value’.

² What is ‘external’ to one framing is, in addition, often itself the product of a previous framing. For example, the ‘intrinsic value’ of a wetland or wood that environmental economists and deep ecologists commonly speak of as resistant to accounting procedures is arguably itself a residuum of the previous framing of the wetland or wood as a fungible, calculable global commodity and the reduction of its role in specific local livelihoods; Raymond Williams famously remarked of the related term ‘landscape’ that a ‘working country is hardly ever a landscape. The very idea of landscape implies separation and observation’ (Williams, 1973, p. 120). As Espeland and Stevens (1998, p. 327) note, “The importance of incommensurable categories... depends... on the relative status of their oppositional form, commensuration. The extension of commensuration into more spheres of life may make incommensurable categories more meaningful, their defense more necessary. This extension may produce paradoxical effects, as when pricing children in law, labour and insurance shifted the terms of their value from primarily economic to moral and emotional. Children became priceless.”

stuffed and concealed has a permanent potential to become a 'jack in the box', complicating or disrupting hitherto smooth exchanges. Rural villagers and other non-professionals often contest framing processes in which they have not been enlisted, if they damage their perceived interests, dismissing environmental accountancy out of hand or even driving technical experts from their localities by force. Academics with an outsider's perspective and a willingness to 'regard our own world as a problem, a proper site for ethnographic inquiry' (Comaroff & Comaroff, 1991, p. 6) meanwhile often busy themselves with excavating and opening the black-boxes. Thus Espeland and Stevens (1998, p. 327) emphasize the 'largely invisible' yet 'vast resources, discipline and organization' that go into commensuration, while Mitchell (2002, p. 299) taxonomizes the diverse and unanticipated results of the 'violence and theory' that go into framing 'Egypt's economy' – including military intervention and the theory of economics itself. Even scholars such as Desrosieres (1996, pp. 336–367), who are more prone to emphasize the social value of keeping the 'black-boxes' closed and the costs of opening them, acknowledge, in effect that the dialectic of framing and overflowing is continuous.

As Espeland and Stevens (1998, p. 317) emphasize, commensuration can be understood as a system for 'absorbing uncertainties'. But where accounting practices required for a new market encounter complexities, uncertainties, nonlinearities and indeterminacies that they cannot immediately accommodate, they also often actively rework their objects, whether they involve human or non-human objects, to try to make them more 'passive' and tractable to the agencies of calculation. As Bowker and Star (2005, p. 254) remark of classification procedures generally, 'it is not a question of mapping a pre-existing territory but of making the map and the territory converge'. Commensuration in particular, as Espeland and Stevens note, 'has the power to transform what it measures' (Espeland & Stevens, 1998, p. 334). In recent years, Scott (1999) has been particularly energetic in documenting the mechanisms of, and blowbacks from, 'state simplifications' of human and non-human structures alike, from managed woodlands to village layouts.

In short, the metaphor of framing challenges the picture the objects of accounting as stable, pre-existing and transportable across borders. Instead of focusing on imagined pre-existing or intrinsic properties of environmental objects and agents, it

focuses on what produces and sustains the objects and agents. Rather than picturing essentialized objects moving across sharply-delineated boundaries between what is internal and external to an economy, the framing metaphor sees objects constantly being made and remade, and boundaries as fluid or poorly-defined. Correspondingly, it sees 'failure' of quantification as a matter of the social problems connected with achieving commensuration rather than flowing from the intrinsic properties of objects (Radin, 1996).

This casts doubt on the common notion that there is a monolithic entity called 'the market economy' or 'capitalism' that might someday expand to annex everything that is outside it, or whose hegemony is so complete that any environmental solution must be cast in its mold. As Callon stresses, 'speeches – optimistic as well as pessimistic – on "the inexorable growth of the marketplace" have no foundation in fact...the market must be constantly reformed and built up from scratch: it never ceases to emerge and re-emerge in the course of long and stormy negotiations in which the social sciences have no choice but to participate' (Callon, 1999, p. 266). But it also casts doubt on the idea that there are things that are by their nature resistant to such imaginary monoliths, or that criticism of one or another type of incipient market presupposes essentialism about markets. According to the new metaphor, it may not be fruitful to analyze environmental protection as a matter of either integration into, or isolation from, market economies. Rather, it suggests that closer attention be paid to specific contexts and nets of practices.

One test of a metaphor in inquiry is how it furthers concrete debate. Can restating current controversies over environmental accounting in terms of the metaphor of framing and overflowing rather than the metaphor of territories, boundaries and essentialized objects lead to new insights and resolutions? This paper considers what implications the analytical use of the metaphor might have for the strategies of both defenders and critics of two of the most ambitious attempts of the past half-century to expand accounting's scope in the service of environmental sustainability. These are the effort to evolve the accounting procedures required for a global carbon market and the effort to institute workable and uncontroversial forms of cost-benefit analysis. The paper proposes that the metaphor of framing and overflowing can help defenders and critics of both these relentlessly contested projects

better engage with, rather than bypass, each other's concerns. The metaphor offers multiple challenges to the old figure of territories and borders, putting productive pressure on both defenders and critics of the received wisdom expressed by Al Gore to reformulate their positions.

Constructing marketable 'emissions reductions', 1976–2007

The past decade's attempt to create a global carbon market as the centrepiece of official efforts to address global warming has entailed and presupposed some of the most potentially far-reaching innovations in accounting in modern times. These innovations were prefigured, like some others, by the work of economist Coase (1960, 1988), one of the first to urge that pollution be 'optimized' by being integrated into a market calculus. In a market without transaction costs and with perfect information, and inhabited by properly calculating, maximizing economic agents, Coase concluded, pollution dumps, as one 'factor of production' among many, would automatically be bargained into the hands of those who could produce the most wealth from them (or best 'improve' them, to use 17th century terminology), and thus the greatest good for society. Coase's successors, such as the economist Dales (1968), while continuing to emphasise the importance of allowing polluters formal rights to pollute, suggested that states would be better placed than an imaginary 'perfect market' to set overall pollution levels. In this way, pollution trading became mainly a way of finding the most cost-effective way for businesses to reach an emissions goal that had been set beforehand. The principle was simple. Facilities with high abatement costs would buy pollution rights from facilities with lower abatement costs, saving themselves money. Facilities for whom reductions come cheaper could meanwhile make money by cutting pollution and selling the unused pollution rights they were thus enabled to stockpile. The system would reward both sellers and buyers and result in reductions being made where they were least expensive.

Early in the history of pollution trading, governments and private firms sought ways of injecting still more inexpensive pollution permits, but of a different kind, into the market, to make meeting targets even easier (Liroff, 1986). In 1976, the US Environmental Protection Agency promulgated a policy allowing major new pollution sources to be sited in locations

where standards were not being attained as long as they obtained 'offset' pollution credits generated from other projects that saved or reduced emissions. Similarly, some 20 years later, the US successfully demanded that the Kyoto Protocol include mechanisms (the Clean Development Mechanism and Joint Implementation) that would offer inexpensive extra emissions permits for sale to industrialised countries and corporations from special carbon-saving or carbon-sequestering projects – schemes that capture and destroy greenhouse gases, put them out of harm's way in trees or underground reservoirs, use fossil fuels more efficiently, displace fossil fuel-fired power generation and so on. Such credits would have the effect of expanding the pollution 'cap' of the associated 'cap and trade' scheme. One objective, again, was to make target attainment cheaper for the private sector by allowing large emitters with high sunk costs in fossil fuel plant to delay costly structural reinvestment, while also supporting export of climate-friendly technology from industrialised countries to the private sector in Southern countries. As Karin Backstrand and Eva Lovbrand remark, 'from a critical international relations perspective the carbon offset market epitomizes continued neoliberal governance building on a capitalist compact between business and government elites in industrialised and developing countries' (Backstrand & Lovbrand, 2006, p. 70). This is the sector of the carbon market whose accounting procedures will be the particular focus of this section of the paper.

In order to become tradable for emissions allowances, 'offset' credits had to be made equivalent to emissions reductions. Just as present and future wheat of varying provenances and locations had to be made equivalent in the US Midwest in the years following the American Civil War, so too, in the 1970s and 1980s, various US authorities and regulated corporations eager to build a pollution offset market tried to commensurate reducing pollution from industrial installations with, say, buying up and scrapping old cars or halting production or making material process substitutions elsewhere (Driesen, 1998, 2003a, 2003b; Drury, Belliveau, Kuhn, & Bansal, 1999; Liroff, 1986). Environmentally, the experiment failed. For example, entrepreneurs sold credits for destroying cars that in fact already had been abandoned, while states lured industry by providing it with 'offsets' created through substitution processes that were already occurring for non-environmental reasons (Drury et al., 1999; Liroff, 1986, pp. 16, 117). Under one

California smog trading program, the Sacramento Metropolitan Air Quality Management District issued 5 tonnes/year of volatile organic compound pollution credits created by the decommissioning of B-52 bombers that had been based in the region. The credits were bought by companies such as Intel, Campbell's Soup and Aerojet, who were able to avoid installing pollution control equipment as a result. However, the credits arguably functioned to increase pollution above what it would have been otherwise, because the bombers had been slated for destruction anyway under the terms of the START treaty. In that sense, the B-52s continued to 'pollute from the grave' (Drury et al., 1999, p. 264). Such credits quickly earned the sobriquet 'any-way tonnes', meaning that they represented actions that would have happened anyway.

In the 1990s, such pollution offset accounting procedures went global with the advent of carbon trading. Traders, economists, consultants, non-government organizations and UN technocrats began to collaborate to set up institutions creating a hybrid emissions-permit commodity that mixed carbon emissions allowances with credits generated by greenhouse gas-saving projects. Economist and trader Richard Sandor, who in the 1970s had helped design and standardize financial derivatives such as interest rate futures at the Chicago Board of Trade, was one prominent figure who, in the 1990s, optimistically outlined a sequence of carbon market development which would provide capital for 'structural change' to tackle climate change. Sandor's main interest was in the development of informal spot and forward markets, followed by exchanges, organized futures and options markets, and over-the-counter trading. Together with most early players in the carbon market, he apparently regarded the foundational step of creating a uniform commodity (together with legal instruments providing evidence of ownership) as largely unproblematic except insofar as the standardization work involved might entail considerable 'transaction costs'. While such insouciance might be expected, as Espeland and Stevens argue, where the 'complex technical feats' involved in such 'highly elaborated modes of commensuration' are already built into 'practical organization of labour and resources' (1998, pp. 318, 329), what was remarkable about the carbon trading instance was that the commensurating institutions on which the existence of the commodity depended were just beginning to be established. A more likely source of the anticipatory 'black-boxing' practiced by San-

dor and others was the success of commensuration in previous market-building efforts, which may have encouraged an image of intrinsic measurability that has also been perennially evident among advocates of cost-benefit analysis (see below). However, most of those who came to be responsible for framing the market simply had their hand forced, however, difficult they may have regarded the task of commensuration. When, at the last minute of the Kyoto Protocol negotiations, the Clean Development Fund – an essentially juridical system with fines for exceeded emissions targets earmarked for green technology for the South – was transformed under US pressure into a Clean Development Mechanism, a trading scheme, offsets were made exchangeable with allowances by fiat. It became necessary to accept, without any discussion, that pollution permits granted to industry in industrialised countries could be made commensurable with Clean Development Mechanism carbon credits generated by a gigantic variety of projects in the global South. Indeed, by the time of the 1997 Kyoto Protocol, well before most of the necessary social and technological processes had got under way, offset credits generated by such projects were already being referred to as 'emissions reductions', as if they were not only already interchangeable with each other and with emissions allowances, but were identical to them. On the basis of this generally untested accounting assumption, a page and a half of abstract text in the Protocol gave rise, within ten years, to a bewilderingly diverse pipeline of carbon credit-generating projects numbering over 5390 which would be capable, if implemented, of licensing on the order of 4 billion tonnes of carbon dioxide releases, or 50,000 megawatts of coal-fired electricity generation over a period of 10 years, in industrialised countries such as the UK or Japan. These projects included, for example:

- factories in Korea or India refitted to capture or destroy hydrofluorocarbons such as HFC-23 or other powerful greenhouse gases such as nitrous oxide;
- projects taking methane from waste dumps in South Africa, coal seams in China, pig farms in Mexico or flaring towers in Nigerian oil fields and using it as a fuel for generating electricity;
- hydroelectric dams in Guatemala or Brazil 'replacing' electricity generated by fossil fuels;
- wind farms generating green electricity;
- efficiency projects distributing energy-frugal light bulbs or rearranging traffic signals;

- biofuel plantations providing feedstocks ‘substituting’ for fossil fuels;
- fuel switches; or
- tree plantations.

The construction of institutions and careers around a carbon market that by 2006 measured over US\$30 billion made it ever more difficult to question the coherence of the project of ‘making such projects the same’ climatically, to adapt Donald MacKenzie’s useful phrase (MacKenzie, 2009).

Commensuration, write Espeland and Stevens (1998, p. 325), ‘makes possible precise comparisons across vast cultural and geographical distances that allow transactions fundamental to global markets.’ Yet while it ‘overcomes distance (by creating ties between things where none before had existed)’, commensuration also ‘imposes distance (by expressing value in... abstract, remote ways)’ (p. 324) and implicitly denigrating ‘particularistic forms of knowing’ in favour of the ‘rigorous methods of distant, if less informed, officials’ (p. 331). From the start, carbon offset markets were characterized by huge figurative distances between traders’ conceptual, largely electronic universe of ‘abstract’, simplified, fungible carbon credit numbers and the universe of the ‘concrete’, diverse, particular, highly complex, often obscure local projects that produced them, together with the tangled chains of physical and social relationships that connected them to the ongoing history of the atmosphere. Those who were acquainted with the one seldom had much experience with the other. These figurative distances reflected, and were rooted in, the literal distances between computers on desks in the urban offices of carbon consultants, UN officials, bankers, hedge fund managers and ministries on the one hand, and, on the other, hydroelectric dam or wind farm sites in less industrialised countries, together with the social and technological micro-arenas in which flows of carbon dioxide and other GHG molecules were imagined and negotiated by scientists and technicians. The Executive Board of the Kyoto Protocol’s Clean Development Mechanism (CDM), negotiating with carbon entrepreneurs and private consultants, strove to establish standardized, consistent methodologies for calculating how much carbon had been ‘saved’ by various classes of project. Carbon consultants and their employers lost no time in taking advantage of CDM Project Design Document (PDD) templates that allowed them to

economize on credit production through uniform procedures that, while they entailed the production of PDDs of invariably enormous length and technicality, rigorously excluded discussion of issues such as local regulatory politics, corporate reliability, nonlinearity, economic uncertainty and climatological unknowns. In India, for example, consultants appear to have cut and pasted text about local consultations from the PDD of one flourchemical project to that of another hundreds of kilometres away, with identical quotations appearing from villagers and labour union leaders in each locale. The identity of the wording in both documents was explained away by suggesting that because the projects were ‘similar’, it stood to reason that the responses and even names of local people would be as well (Indian Express, 2005). This may seem merely a flagrant example of manipulation, but it is continuous with the standard practice of expert ‘formatting’ of public comments on proposed CDM projects. One Indian social activist remarked on being confronted with an official UN form for submitting comments on a CDM project that ‘the form for public input is so full of technicalities there seems to be no space for general comments’ (Lohmann, 2006, p. 194). Such simplifications are of necessity the norm for PDDs, and range from summary assumptions about future currency fluctuations (often needed in order to justify claims that projects would not be profitable without carbon finance) to standard emissions factors that generate scientifically questionable ‘equivalences’ between the climate forcing potential of different greenhouse gases such as HFC-23 and carbon dioxide (see below). The distance between numbers on computer screens, carbon projects in remote rural areas and ongoing scientific debates in research establishments became a resource for black-boxing commensuration difficulties that in many ways was key to market establishment.³

³ The long-distance calculation that ‘carbon footprint’ accounting involves can also conceal a politics of historical power imbalances. For example, in July 2007 Britain’s *Guardian* newspaper reported that ‘Kenya’s Kikuyu farmers are preparing for war with Britain... Behind the furore is the proposal by the UK’s Soil Association to ban imports of organic produce from poor countries like Kenya because of their “food miles” – the carbon emitted by air transport... A ban would mean labelling air-freighted products so that they effectively lost their organic status... Such a move would destroy the livelihoods of tens of thousands of smallholders across Africa’ (The Guardian, 15 July 2007).

Of course, just as the 19th-century Chicago grain futures exchange relied on a corps of grain inspectors to judge aggregated wheat shipments' compliance with new standards of assessment and exchangeability, and thus connect a physical product with a new system of categories, so too the Kyoto Protocol carbon trading system – although not the voluntary carbon market – early on set up an inspectorate to assess the (less measurable and 'physical') carbon-credit 'product' and create and calibrate instruments that might quantify it. Unlike their counterparts in the grain futures market, however, carbon market-makers in the UN and elsewhere felt that an independent inspectorate would be impossible and pointless to insist on (Lohmann, 2006, p. 62). From the beginning, not only advisory bodies such as the Intergovernmental Panel on Climate Change (Lohmann, 2001) but also regulatory institutions such as the CDM Methodology Panel and Executive Board were peopled by figures with vested interests in lenient rule-setting, such as carbon consultants who stood to profit from high project volume and officials from credit-buying countries. 'I don't see us as police', the chair of the CDM Executive Board recently remarked (Nicholls, 2007, p. S42). In the unregulated 'voluntary' markets for carbon credits, where buyers seek credits for reasons other than legal compliance, attitudes were even more relaxed. Laurent Segalen of Lehmann Brothers expressed a wide consensus when he affirmed that 'traders should be the ones designing and determining the standards' (Reklev, 2007, p. 27); the UK government was persuaded to consider promulgating government standards for the sector, which in 2006 had a worldwide annual value of US\$91 million, only in 2007 (Hamilton, Bayon, Turner, & Higgins, 2007, p. 6). At the same time, banks, brokers and buyers kept the pressure on for still greater simplification and streamlining of regulatory procedures for the compliance sector. At the 2005 climate negotiations in Montreal, Natsource head Jack Cogen reminded UN officials – whom he regarded as still overly sensitive to environmental and social questions – of the hazards of trying to overload the bandwidth carrying the price signal: 'The carbon market doesn't care about sustainable development. All it cares about is the carbon price' (Lohmann, 2006, p. 296; see also Olsen, 2007; Sutter & Parreño, 2007). What few whistleblowers emerged from this setting tended to be industry figures concerned primarily about whether persistent accounting 'fraud' and insuffi-

cient self-regulation among developers, buyers, sellers and the UN might ultimately cause the market to self-destruct in a bubble similar to the Dutch tulip bulb fiasco of the 17th century or the dotcom craze of more recent times (Michaelowa, 2007, p. 34).

Some such tensions can be expected to arise whenever a novel commodity is being created that depends fundamentally on the development of new accounting procedures. However, the framing of an amalgam carbon commodity also faced many entanglements and overflows that were unfamiliar to the bulk of 19th- and 20th-century trading systems, and that arguably were not susceptible to treatment in a straightforward way by any amount or degree of regulation. In large part, these entanglements and overflows stemmed from encounters involving innovation, path dependence, counterfactual history, nonhalting calculations and radical uncertainties and indeterminacies.

Accounting for innovation

Many parties to the emerging controversies over carbon markets agreed that social or technological innovation, particularly in industrialised societies, was crucial to reducing the flow of fossil-origin carbon into the atmosphere. They differed, however, in their views of the role of carbon markets and carbon accounting in fostering innovation. Carbon market proponents claimed that giving carbon a price would give entrepreneurs hoping to sell emissions permits (whether surplus allowances not needed to cover their own emissions, or 'offset' credits produced by carbon-saving special projects) incentives to develop greener technologies. Carbon market critics pointed out, however, that trading also provided incentives *not* to innovate among the biggest carbon permit buyers, who tended to be concentrated in precisely the sectors in which climate-friendly innovation was probably most important (power generation, oil and gas, steel, cement, chemicals, and so forth) (Driesen, 2003a). Trading also delayed the early start to structural reinvestment and research and development that is usually seen as a key precursor to change in such sectors, much of whose capital plant may have a 30- to 50-year lifetime (Stern, 2007). Such drags on innovation, critics argued, outweighed innovation incentives that might also be associated with trading (Driesen, 2003a, 2003c). They cited evidence from the US sulphur dioxide programme showing that innovation

was associated more with conventional regulation than with trading (Taylor et al., 2005, p. 372). Other critics pointed out, in addition, that innovation of the type required for addressing global warming is not historically associated with price, but with, for example, attempts to capture market share or with larger historical forces (Buck, 2006; Lovell, 2007). Even if a stable global price emerged within five to ten years, it would be too modest to stimulate much beside efficiency gains, particularly in the absence of a 'significant increase in publicly funded research and development for clean energy technology and changes to innovation policies' (Prins & Rayner, 2007, pp. 973–974). Price instruments, it was noted, may be 'quite effective for introducing changes on the margin, but there is little evidence of price incentives inducing a fundamental transformation in the economy or society' (Banuri & Opschoor, 2007, p. 22). Carbon trading simply could not 'deliver the escape velocity required to get investment in technological innovation into orbit, in time' (Prins & Rayner, 2007, p. 974).

This debate had profound implications for carbon accounting, if only because of the ambitious claims that had been made for it as a result of the prior choice of hybrid carbon markets as the 'magic bullet' of international climate policy. How much carbon projects saved depended partly on their effects on innovation. Yet no metrics were available either to assess or to predict these effects. Insofar as a carbon project spurred innovation in significant ways, its effects on carbon cycling were unquantifiable in the long term. Insofar as carbon crediting militated against fundamental social and technological changes in industrialised societies, each carbon credit carried long-term carbon costs, accounting for which was also beyond the current scope of the discipline, and was recognized to be so, due both to creativity's unpredictability (Malloy, 2000) and to its unquantifiable precursors and effects. No CDM project validators or verifiers were making such calculations, nor thought it necessary to try, in spite of the possible large carbon effects. To borrow a formulation of Mitchell's (2002, p. 209), excluding the effects on and of innovation from calculations about how much carbon could be saved or lost by particular projects was both 'necessary and impossible'. The need to disentangle carbon numbers from social history and confine them to, say, molecule counts or numbers of patents, under the assumption of a static technological structure, meant that accounting could not achieve its objec-

tive. This tension faintly echoed the see-saw, 60-year controversy over the use of discounting techniques in management accounting and whether they were realistic or led to suboptimal investment (Miller, 1999, p. 185). But the size of the potential overflows that resulted from the need to exclude innovation from carbon accounting rendered the issues far starker.

Accounting for path dependence and lock-in

Large-scale, difficult-to-manage overflows from carbon accounting also stemmed from the centrality of path dependence to the economics of climate change mitigation. Ironically, just as carbon trading was beginning to establish itself as a theoretical approach, a number of economists were assembling a body of theory that contested the assumption that historical accidents and starting points were unimportant to economic outcomes, merely delivering the economy, through a series of negative feedbacks, to its inevitable equilibrium (Arthur, 1999, p. 11). Starting points, positive feedbacks and multiple equilibria were not marginal or negligible economic phenomena, but often central, and nowhere more so than in responses to climate change, where 'locking in' new social and technological patterns was widely agreed to be crucial to overcoming a previously 'locked-in' fossil fuel dependence (Unruh, 2000, pp. 817–830). Work by economists such as W. Brian Arthur suggested that in contexts in which increasing returns were significant, leaving research and development of carbon reduction methods to private firms incentivized by price – the supposed wisdom of which was one of the premises of the carbon market – would not guarantee that the 'fittest technology in the long run sense will be the one that survives' (Arthur, 1999, p. 27). Unlocking path-dependent systems, as Prins and Rayner observed, 'is usually initiated by quite unexpected factors resistant to being accounted for in advance' (2007, p. 934).

This challenge to neoclassical assumptions from within the economics profession proved to be another implicit challenge to the stability of carbon accounting. In Callonian terms, a carbon commodity could be framed only by creating an important overflow the handling of which there existed no accounting procedures for. Experts could not quantify the role CDM projects had in foreclosing or promoting structurally diverse long-term carbon futures whose evolution was dependent less on price

than on the step changes associated with historical accident or nonlinear positive feedbacks. The best they could do was to quantify the role such projects might have in making various arbitrarily chosen ‘business-as-usual’ pathways marginally more carbon-efficient. The inappropriateness of a project of commodity construction as a response to the climate problem had led to an internal incoherence in the calculating procedures that the project required.

Accounting for future politics

All carbon credit accounting, and thus carbon accounting *tout court* in any market that attempts to make allowances and credits fungible, relies on expert assessment of counterfactual scenarios. The credits generated by a greenhouse gas-saving project built as a result of carbon finance are calculated by subtracting the emissions of a universe with the project from the emissions of a hypothetical ‘baseline’ or business-as-usual universe. Industrialised countries or corporations can then buy credits representing the emissions that are claimed to have been saved over the ‘baseline’ in lieu of reducing their own fossil fuel use.

To determine how much carbon a project is saving, and thus how many carbon credits it is allowed to generate, carbon accountants thus must (in Callonian terms) disentangle the project from the ‘baseline’ – that is, prove that it is feasible only by virtue of carbon credit income. This is called proving that the project is ‘additional’.⁴ Carbon market actors have by now made such attempts at disentanglement thousands of times. Yet the controversy that surrounds the resulting calculations mounts year on year. The CDM Methodological Panel’s ‘Tool for the Assessment and Demonstration of Addition-

ality’ provides one example. According to the tool, project proponents must be able to prove that a project would not be the ‘most economically or financially attractive’ investment among various alternatives, or at least that ‘barriers’ exist that would make it difficult for the project to go forward without carbon finance and that do not all apply to all the alternatives. In addition, proponents should be able to show that the project is not ‘common practice’ in the region where it is being implemented (UNFCCC, n.d., pp. 1–2). None of these criteria for disentangling a project from its baseline, despite having evolved through years of negotiation and compromise, has shown much promise in stabilizing the distinction against persistent and growing criticism.

The financial test, for instance, often compares the internal rate of return (IRR) of a project with and without carbon credit finance. But IRR figures depend on the assumptions and calculation method used. In addition, what counts as a viable IRR for one actor may not appear so to another, even if the number is strongly positive. A further problem is that lenders agree openly that due to CDM credit risks, they ‘do not lend to projects that are not good investments on their own, without the CDM’ (Haya, 2007). Partly as a result, many carbon project proponents, as one carbon banker, James Cameron of Climate Change Capital, notes, ‘tell their financial backers that the projects are going to make lots of money’ at the same time they claim to CDM officials ‘that they wouldn’t be financially viable’ without carbon funds (Financial Times, 16 February 2005). Such deceptions are not particularly difficult (Michaelowa, 2007) and, as trading experts had warned from the time the Kyoto Protocol was promulgated, ‘every government and every company’ had an incentive to practice them as a way of attracting top-up finance for projects that it was already implementing (Grubb et al., 1999, p. 229). Project proponents can claim that the data used are commercial secrets, for example, or even forge board minutes to claim that the CDM was considered in early stages of project development. The barrier test has proved equally unsuccessful in disentangling project from baseline. Any project can be said to be hampered by barriers – it may be in a remote region, it may face objections from local officials, it may face unexpected supply problems requiring extra loans, and so forth. Whether any of these would be decisive in the absence of carbon finance is resistant to verification. The criterion

⁴ The Marrakech Accords of 2001 marked out three candidates for project baselines without specifying which had to be chosen: existing actual or historical emissions; emissions of an ‘economically attractive course of action, taking into account barriers to investment; and “average emissions of similar projects undertaken in the previous five years, in similar...circumstances, and whose performance is among the top 20% of their category’ (Michaelowa, 2005). By contrast, the offset rule book of the Chicago Climate Exchange (privileged to members, who are required to pay US\$5000 in membership fees) is reported to judge ‘reductions’ against calendar baselines, so that ‘if a member company emits less carbon dioxide than it did a few years ago, it gets to sell those reductions as offsets – regardless of whether they are the result of...declining sales, plant closures, routine maintenance, or, say, rising sea levels’ (Bright, 2008, p. 90).

that a project not be 'common practice' is similarly open to a wide range of interpretation (Haya, 2007). Unsurprisingly, carbon market experts have long acknowledged that estimates of hypothetical 'emissions reductions' for many projects can be expected to differ by hundreds of percent given small changes in initial assumptions (Lazarus, 2003).

Even the most staunch supporters of the accounting procedures involved were commonly admitting by 2007 that a quarter (Sutter & Parreño, 2007), a half (Schlup, 2005) or more of all CDM projects were business as usual. One investigation of CDM projects in India concluded that a third of the sample was not 'additional' (Channel 4, 2007). However, such assessments are likely to have understated the problem. For example, the 402 hydroelectric projects in the CDM pipeline in China were expected to contribute 5.1 gigawatts (GW) of new generating capacity in 2007 alone, more than half of the estimated 9 GW expected to come on line that year. If all those projects were additional, as required, it would follow that business as usual in the Chinese hydropower sector had dropped by 65% from the 11.2 GW capacity that had come on line in 2006. Yet a review of the PDDs for 70 of these projects by Barbara Haya of the University of California found no evidence that China's ability to finance new dams without carbon credit income had dwindled over the year. In addition, some 77% of the Chinese hydropower projects submitted for CDM validation or currently registered are expected to start generating credits within a year of their validation comment period and 96% within two years. Large hydroelectric projects typically take 4–8 years to build (on top of several years of project preparation). That suggests that the great bulk of Chinese hydropower projects in the CDM pipeline started construction prior to beginning the CDM validation process. In Brazil, similarly, the 880 MW Campos Novos dam in Santa Catarina state started construction in 2001 and began generating electricity in May 2007. Yet it applied for CDM validation only in November 2007. While the CDM Project Design Document describes in length an unfriendly regulatory and investment environment in which the project was commissioned and built, it does not even attempt to argue that Campos Novos required the CDM to go forward. In Kenya, meanwhile, the Sondu Miriu Hydropower Project in Kenya had secured a loan in 1997 that enabled construction to begin in 1999, and completion of the project appears sufficiently

assured that the Japanese Bank for International Cooperation has signed an agreement to support an additional plant that would extend Sondu Miriu by using its outfall. Yet the project only entered the CDM pipeline application process in 2007. The additionality arguments in its PDD describe barriers that hydropower dams face in general in Kenya, but does not explain why Sondu Miriu requires CDM registration to go forward (Haya, 2007). An investigation by the UK Channel 4 *Dispatches* programme in 2007 elicited admissions from managers of carbon finance-supported projects in Bulgaria and Britain that their schemes, too, would have been instituted with or without carbon money (Channel 4, 2007; see also Central & Eastern Europe Bankwatch, 2005; Van Vliet, Faaij, & Dieperink, 2003, p. 154).

Because the net carbon effect of a successfully-calculated offset project whose credits license emissions elsewhere is designed to be zero or thereabouts (small margins of error are sometimes included in the calculations), such findings strongly suggest that CDM projects are having a net negative effect on climate change mitigation. In many cases, in fact, such projects are enabling increases in fossil emissions in both industrialised nations and the global South (Lohmann, 2006, p. 148). The threat of market collapse implied by this failure to separate out project and baseline has concerned market players as much as market critics. So far, however, most market experts, mindful of the 1997 stipulation in the Kyoto Protocol that offsets are identical to emissions reductions, have maintained, at least publicly, that the problems can be confined to inaccurate technique, incompetence and fraud, and someday reduced to tolerable levels through better methodologies and improved diligence and enforcement. Thus Einar Telnes, a Det Norske Veritas executive representing a forum of private firms that 'validates' and 'verifies' carbon projects, expressed concern in 2006 that carbon accountants' use of significantly different ways of tallying up credits 'could lead to a lack of confidence in the market as such... We don't want an Enron scandal where excess (CDM carbon credits) are issued without the actual reductions taking place... It is crucial that those verifying have the necessary knowledge. Many of them don't' (Point Carbon, 2006).

Many trading proponents have acknowledged intermittently that the problem may go deeper and may require a questioning of whether regulation of a carbon credit commodity, or even the commod-

ity itself, is possible. Early on, trading expert Michael Grubb stated unequivocally that ‘measuring or even defining savings that are additional to those that would have occurred in the absence of emissions credits’, was an ‘impossibility’ (Grubb et al., 1999, p. 138), a judgement shared by many others (for example, Fischer, 2005, p. 1807). In 2006, Mark Trexler, a businessman with 15 years’ experience in the carbon trade, co-authored an article that admitted that a resolution of the debate over how to decide whether a project would have happened anyway ‘seems as elusive as ever... There is no technically “correct” answer... Never has so much been said about a topic by so many, without ever agreeing on a common vocabulary, and the goals of the conversation’ (Trexler, Broekhoff, & Kosloff, 2006). However, analysts such as Grubb typically retract such judgements within pages of making them (Lohmann, 2001). Similarly, panellists at conferences on carbon trading who admit in the corridors that it is possible to show the additionality of nearly any project often chastise colleagues for saying so in public (Haya, 2007). The incipient market is being provisionally stabilized partly by an image of carbon accountancy whose veracity is privately doubted by many of its prominent practitioners.⁵

A second and more fundamental type of disentanglement, also required to construct the concept of verifiable ‘additionality’ or ‘nonadditionality’ – and thus also required for carbon credit accounting – is much less discussed among experts and policy-makers. For accounting to be possible and carbon credits to be saleable, each project must be framed as generating a determinate number of credits. That becomes possible only if the counterfactual scenario of the ‘baseline’ world is framed as singular, that is, separated out from a large number of other theoretically possible without-project scenarios. Only then can accountants quantify the emissions associated with it. Without this framing, it is pointless to attempt disentangling the project from the baseline,

and thus to try to distinguish additionality from nonadditionality, or to speak of additionality at all.

Here again, there are strong incentives for data manipulation. Buyers, sellers and intermediaries alike have both motive and opportunity both to fabricate conservative baselines and to exaggerate the novelty of offset projects: ‘the more conventional the baseline, the more additional funds or credits... can be recovered’ from a carbon project (Ott & Sachs, 2000). But the deeper difficulty is that to disentangle a single baseline necessitates framing the political question of what would have happened without projects as matter of technical prediction in a deterministic system about which near-perfect knowledge is in principle possible. ‘Social conditionalities... that do not easily lend themselves to prediction... (inter alia, socio-economic development, demographic trends, future land use practices, international policy making)’ are reduced to ‘technical and methodological uncertainties’ (Lovbrand, 2004, p. 451).⁶ Project proponents, by contrast, must be framed non-deterministically, as free decision-makers, if their carbon project initiatives are to be seen as ‘making a difference’.

This attempt at disentanglement, while saddling project validators with the unsustainable attribute of being able to determine the future through technical means, also creates a political overflow, provoking understandable opposition among activists with their own ideas of counterfactual possibilities and their own desire to be counted as free decision-makers. One example of this overflow can be found in the actions of residents of an area of Minas Gerais, Brazil, much of whose land a local company, Plantar, had been occupying to plant environmentally destructive eucalyptus plantations to produce charcoal to fuel its pig iron operations. Backed by World Bank, Plantar had applied for carbon credits on the ground that without its plantations, the company would be forced to switch to (less climate-friendly) coal as a fuel source. The residents vociferously opposed the accounting procedures involved:

⁵ As one analyst mordantly puts it, carbon credits are an ‘imaginary commodity created by deducting what you hope happens from what you guess would have happened’ (Welch, 2007). One well-attended session of the International Emissions Trading Association during the December 2007 UN climate negotiations in Bali bore the title ‘Additionality: Never-Ending Story or Workable Solution?’ (see also Lohmann, 2006, pp. 143–152).

⁶ Such assumptions about predictability are also made, of course, in cost–benefit analysis (see below). For example, there appeared in the 1990s a cost–benefit manual for Britain’s Department of Transportation evaluating road benefits according to time savings for motorists, which forecasts the total number of kilometers driven by different kinds of vehicles, laid out in four significant figures for every year until 2025 (Lohmann, 1997).

'The argument that producing pig iron from charcoal is less bad than producing it from coal is a sinister strategy. . . . What about the emissions that still happen in the pig iron industry, burning charcoal? What we really need are investments in clean energies that at the same time contribute to the cultural, social and economic well-being of local populations. . . . We can never accept the argument that one activity is less worse [sic] than another one to justify the serious negative impacts that Plantar and its activities have caused. . . . [W]e want to prevent these impacts and construct a society with an economic policy that includes every man and woman, preserving and recovering our environment' (FASE, 2003).

In a June 2004 letter to the CDM Executive Board, some 143 local groups and individuals, after insisting that 'the claim that without carbon credits Plantar. . . would have switched to coal as an energy source is absurd', went on to characterize the accounting procedure as a 'threat': 'It is comparable to loggers demanding money, otherwise they will cut down trees . . . [the CDM] should not be allowed to be used by the tree plantation industry to help finance its unsustainable practices' (Suptitz et al., 2004).⁷

In denying the plausibility of Plantar's counterfactual baseline (a switch to coal), project opponents need not be read as asserting that there was a single 'correct' counterfactual alternative (that is, that CDM accounting could have been plausibly carried out but just happened to have been performed incorrectly in this case). In context, they are more reasonably construed as reaffirming the political basis of such counterfactual claims. For them, the translation of decision into prediction was inextricable from environmental threats and physical repression of alternative land uses. Carbon accounting's repression of knowledge of the plurality of alternative futures was equated with an attempt to repress popular participation in the taking of alternative decisions. Like other 'anti-politics machines' (Ferguson, 1994) such as cost-benefit analysis, institutional efforts at framing a carbon offset commodity may at first seem to consolidate

expert power by allowing decision-makers to 'neutralise and hence legitimise politically charged decisions' undertaken in the absence of public debate (Lovbrand, 2004, p. 451). But experiences such as that of Plantar suggests that such a conclusion, by overlooking the fact that this disentanglement is radically incomplete, would be facile. As Sarewitz (1996) observes, looking to science to resolve such disputes about public choices is likely to be futile. If there is no such thing as additionality or non-additionality, then further doubt must be cast on claims that the carbon market will be a 'fast track' to climate change mitigation.

Nonhalting calculations

One perennial threat to the utility of certain kinds of accounting is what might be called nonhalting calculations – ones that, by a process of self-iteration, generate an unending series of significantly different numbers instead of stopping at a single, final figure. If the relevant calculations can literally never be completed, the failure to frame a commodity is likely to be complete: the overflows created by accounting have defeated its purpose.⁸

In the form of moral hazard, the problem has long been of at least theoretical relevance to the stability of, say, statistical tables used by fire insurers. Unless proper precautions are taken, a low prediction of fire incidence may itself affect the incidence of fires insofar as it provides incentives for policyholders to set their own fires, which outcome of course would necessitate a change in future predictions, which could occasion further changes in the frequency of fires, and so on. In the insurance case this can be handled by, for example, policing customers taking out insurance to ensure that they conform as much as possible to their portrayal as idealized 'non-gaming' agents in tables of risk statistics, or by avoiding the calculation if such policing cannot be carried out.

In carbon accounting, however (as in the contingent valuation procedures used by cost-benefit ana-

⁷ Recent moves by the World Bank and other UN agencies to open up native forests to carbon accounting are similarly viewed as providing an opening for governments to threaten to destroy their forests if they are not granted carbon credits (Griffiths, 2007).

⁸ This is analogous to what MacKenzie (2007, pp. 75–80) calls 'counterperformativity' in economics: the use of accounting techniques makes accounting's object less tractable to accounting itself. In the case of accounting, counterperformativity is often related to what Ian Hacking calls the 'looping effect of human kinds', which occurs when 'a causal understanding, if known by those who are understood, can change their character, can change the kind of person that they are. This can lead to a change in the causal understanding itself' (Hacking et al., 1995, p. 351).

lysts; see below), the problem is less tractable. First, baseline accounting procedures set up perverse incentives for credit seekers (including host governments, credit buyers and consultant validators seeking future contracts) not only to postulate but also to bring about ‘business as usual’ scenarios which are the highest-emitting possible, in order to make the proposed projects appear to be saving as much carbon as possible (Wara, 2007). For example, in many CDM host countries, the CDM is creating incentives for emissions-related environmental laws not to be enforced, since the greater the ‘baseline’ emissions, the greater the payoffs that can be derived from CDM projects.⁹ Logically, this is likely to necessitate continual recalculation of the baseline and continual alteration in the number of credits calculated. CDM accounting, in other words, is undermining its own stability.

Moreover, the accounting requirement that projects show that they are economically unviable without carbon finance gives green technology developers such as wind turbine manufacturers a perverse incentive to keep their products just slightly too expensive to be competitive with gas or coal. It also encourages project developers to pay high prices for the turbines (provided carbon credit sales outweigh the benefits from putting a competitive product on the market or paying lower prices). This also entails continual recalculation of the baseline, since the point at which wind is expected to cease to be ‘additional’ will continually recede (Austin, 2007, p. S46).

⁹ International carbon trading agencies are currently acting in a way that blurs the distinction between price incentives and prohibitions enshrined in legal codes, and thus between legality and ‘efficiency’, by normalizing the expectation that certain laws will be obeyed only if it becomes possible to earn carbon credits by doing so. In August 2007, the CDM Executive Board published forms for the submission of applications for a new type of carbon project called programmatic CDM or ‘programmes of activities’ (PoA). A PoA, it stated, could be additional and thus acceptable as CDM even if a law already existed that mandated the measures that the PoA would bring about, if that law was not being ‘enforced as envisaged but rather depend[ed] on the CDM to enforce it’, or if the PoA would ‘lead to a greater level of enforcement of the existing mandatory policy/regulation than would otherwise be the case’ (Figueres, 2007, p. S50). Oil companies have also applied for carbon credits for not flaring natural gas in Nigeria, a prohibition already mandated by the environmental laws of that country. Just as norms of commons regimes have historically been partly supplanted in many places by prices, so too now are legal safeguards (Lohmann, 2006, p. 148).

Finally, the material nature of the carbon accounting discipline as well as the institutions that practice it has so far ensured that carbon credits flow to well-financed, high-polluting operations capable of hiring professional validators of counterfactual scenarios, but not to non-professional actors eager to preserve or extend low-emitting livelihood practices or social movements actively working to reduce use of fossil fuels. As Backstrand and Lovbrand (2006, pp. 70–71) remark:

‘Rather than providing a multitude of benefits for all involved, the CDM market appears to be deeply embedded in global power structures that effectively marginalize local actors from global institutions and reproduce patterns of inequity. In a similar vein the technocratic and administrative control and verification apparatus that has been developed for CDM projects contradicts the image of the international climate regime as an expression of a less state-centric and just market order. Instead of promoting active participation of nonstate actors on equal grounds, the government-regulated and supervised seven-step project cycle of the CDM privileges the managerial perspective of Big Science and policy elites.’

What has been less noticed is that this privileging has climatic as well as other social effects. In cases such as that of Plantar or of CDM-supported hydroelectric projects in India which are supplanting low-emitting irrigation systems (Ghosh & Kill, *in press*), carbon crediting is undermining existing local, climate-friendly livelihoods. Hence this sector of the carbon market is likely to generate large climatic ‘opportunity costs’, again requiring, in principle, continual and dauntingly difficult revisions in accounting methodology to take into account the effects on carbon ‘savings’.

Accounting for uncertainties, ignorance and indeterminacies

As Callon, Mitchell and other writers have consistently stressed, the interactions that must be contained within what is framed as ‘the economy’ are not merely those among human agents. Non-human agencies and forces are also important. These non-human elements are not as passive and tractable as often assumed, instead often being akin to the ‘tricksters’ of folklore (Haraway, 1995). Among climate scientists this truth is recognized in the informal use of the term ‘monsters’ to designate

nonlinearities, uncertainties, indeterminacies, and in general various unknowns (and unknowables) that have large potential atmospheric consequences (Pearce, 2006). In an unstable climate system, for instance, runaway feedback effects triggered by obscure factors such as the reduced capacity of warming oceans to absorb carbon dioxide are capable of radically altering even such symbols of unchangeability as the Indian monsoons. In the past, climate change has often been characterized by deterministic but unpredictable (or 'chaotic') events and processes of extreme impact. These render problematic reliance on probabilistic bell curves and conventional 'risk management', which assume that individual variation averages out and no single event is capable of changing overall trends.¹⁰

One imperative of carbon credit accounting (derived from both policy and economic theory) is to reduce these 'monsters' to (or frame them as) probabilities. Demand is strong for scientists to produce tidy clusters of 'likeliest scenarios' to feed into economic or political models, complete with 'probabilities' of, say, a 2° or 5° temperature rise by 2100. This is necessary for credit accounting involving future biotic sequestration (Lohmann, 2005, 2001), but also for accounting for carbon outcomes more generally, and for cost–benefit analysis of action on climate change. For example, the Danish statistician Bjørn Lomborg has calculated that the cost of doing nothing about climate change would be US\$4.8 trillion (Monbiot, 2006), and the British government's Stern Report on Climate Change, suggests that, depending on what discount rate is chosen, each tonne of CO₂ causes social damage worth 'at least \$85' (Stern, 2007).

The Weberian drive to use such numbers to tame chance, or to make an uncertain, complex, nonlinear, largely unpredictable world amenable to management and governance, goes 'all the way down' into the technical work of climatologists and UN-designated scientific panels. For example, since the 1990s, scientists have been prevailed upon to create a new climatic entity analogous to 'water quality' as used in environmental accounting for hydroelectric dams – namely, the 'global warming

potential' (GWP) of various greenhouse gases. GWP is measured in carbon dioxide 'equivalents', so that the climate-forcing power of greenhouse gases such as nitrous oxide or methane can be commensurated with that of carbon dioxide. In this way, the decomposition of, say, the industrial gas HFC-23 in CDM projects in refrigerant plants in China can be commensurated and traded with carbon dioxide releases in Europe. In another example of how climate economics is framed, immense effort has been expended in trying to determine a maximum 'safe' level of temperature rise (the by now famous 2 °C figure) as well as the probabilities that one or another course of action will keep temperatures below that level. This framing arguably follows the strictures of rational choice theory more closely than those of atmospheric science. It attempts to integrate different types of value and uncertainty as a prelude to evaluating alternative outcomes based on probabilistic predictions about their consequences.

Insofar as such actions are associated with the imperatives of economic accounting for climate change, they deserve Callon's label of 'disentanglement', and like other forms of disentanglement they entail overflows. For example, figures for 'CO₂ equivalences' emanating out of the Intergovernmental Panel on Climate Change (IPCC), the UN's scientific climate advisory panel, are admitted to be gross oversimplifications: the effects and lifetimes of different greenhouse gases in different parts of the atmosphere are so complex and multiple that any straightforward equation is impossible. The original GWP figure for HFC-23 of 11,700 molecules originally put forward by the IPCC in 1995–1996 was revised in 2007 to 14,800, and the error band of this estimate is still an enormous plus or minus 5000 (MacKenzie, 2009, pp. 440–455). The practical effects of this new figure's jumping out of the 'black box' are considerable: HFC-23 destruction is the largest single credit earner in the CDM, accounting for 67% of the credits generated in 2005 and 34% of those generated in 2006 (World Bank, 2007, p. 27). The attempt to base climate change politics on findings of likely 'safe' degrees of warming, similarly, drastically foreshortens important scientific distinctions. In 2001, for instance, a controversy erupted between scientists themselves about the wisdom of presenting assessments of climatic futures in terms of (subjective) probabilities. Stephen Schneider of Stanford University had argued that

¹⁰ In the 1920s, Frank Knight (1921) introduced a rough distinction between risk and uncertainty that continues to be neglected. Risk can be described probabilistically, but uncertainty cannot be quantified in the same way. Writers such as Harremoës et al. (2002) have drawn further important distinctions involving ignorance and indeterminacy.

‘policy analysts needed probability estimates to assess the seriousness of the implied impacts; otherwise they would be left to work out the implicit probability assignments for themselves... a policymaker concerned with ‘avoiding dangerous anthropogenic interference in the climate system’ would propose stronger policies and measures if there was a 39% chance of exceeding the 3.5–7 °C warming ‘threshold’ than if the figure was 23%.’

But, Schneider himself asked, ‘what do these figures actually represent? Unless probabilities are assigned to individual scenarios and Global Circulation Model climate sensitivities, their joint distribution... will depend on the particular selection of scenarios and models’ (Schneider, 2001, p. 18; see also Hall, Fu, & Lawry, 2007; Pittock, Jones, & Mitchell, 2001; Schneider, 2002). Other scientists raised the question more strongly: ‘This condition of deep uncertainty differs from many risk-management problems, in that little solid information exists to inform subjective probabilities for the long-term economic, social and technological trends underlying different greenhouse-gas emission scenarios. It is unlikely that scientific evidence will soon resolve the assumptions about the socio-economic future made by different groups’ (Lempert & Schlesinger, 2001, p. 375; see also Hansen, 2007; Pielke & Sarewitz, 2000; Sarewitz, 1996; Sarewitz & Pielke, 2007). ‘The concept of probabilities as used in natural sciences should not be imposed on the social sciences’, warned other scientists insisting on a frequentist view. ‘There is a danger that Schneider’s position might lead to a dismissal of uncertainty in favour of spuriously constructed “expert” opinion’ (Grubler & Nakicenovic, 2001, p. 15; see also Shackley, Young, Parkinson, & Wynne, 1998, p. 176). By the same token, the IPCC has generally voted to suppress in its reports what is called ‘Type II’ climate change – the abrupt, messy, chaotic, surprising kind that results from the crossing of hidden ‘tipping points’. Instead, it tends to stress ‘Type I’ climate change, which follows smooth, well-behaved, accounting-friendly, global temperature curves. But this stance too is increasingly sparking scientific criticism, as has the position adopted by the Stern Report (Cole, 2007).

The tension between the imperatives of carbon accounting and the need to accommodate conceptually the unknowables of future climate change is paralleled in the contrast between different senses

and contexts of the concept of ‘conservatism’ – one used by carbon accountants and another by many small farmers and indigenous peoples. When faced with uncertainties and ignorance, carbon accountants tend to hedge their calculations toward the ‘conservative’ side by adding a margin of, say, 25%. Where probabilities cannot be quantified, however, the concept of accuracy/inaccuracy comes into question and the appropriateness of such margins cannot be verified, leading to inevitable overflows. This becomes important especially with respect to events and processes of extreme impact, which, however unexpected, could overwhelm almost any margin likely to be added. By contrast, many small farmers and indigenous peoples, especially in the global South, tend in contexts in which ‘conservatism’ is important to value resilience and ‘safety first’ practices over probabilistic calculations of gain and loss or arbitrary, numerical ‘safety margins’ as ways of handling unknowns, as has been noted by many scholars of rural society (Berger, 1979; Scott, 1976; Thompson, 1990). To a certain extent this reflects the rough contrast between a resource or accumulation conception of livelihood and one oriented around commons regimes and community survival. The processes by which such small farmers and indigenous peoples are likely to frame their own responses are certain, of course, to have their own overflows, but the differences of approach merit further study.

Attempts to measure and account for biotic carbon sequestration engendered overflows of a different kind. At first, forestry specialists imagined that they could measure precisely the amount of carbon a plantation project, say, was fixing, and therefore, the volume of pollution rights it could generate, simply by doing periodic measurements of tree growth, gas transfer in the canopy, and so forth. But it quickly became clear that quantifying the climatic impact of such projects would also necessitate investigating their effect on soils’ carbon production both inside plantation boundaries and downstream, requiring the hiring of additional experts. At the same time, sobering evidence emerged that error bars in such relatively simple matters as forest inventories and physical fluxes of carbon into and out of forests were so wide that they swamped the signal required for the establishment of a biotic carbon market. Unknowns concerning the response of soil biology and chemistry to global warming itself also became a significant consideration. Moreover, in order to complete their calculations, accountants

realized, they would have to monitor the effects of plantations on the human groups displaced or otherwise affected. For example, communities evicted by carbon plantations might clear forests elsewhere, migrate to cities where they might adopt lifestyles with a different carbon budget, and so on. Due to the persistence of greenhouse gases in the atmosphere, the activities of such groups would have to be monitored over a significant time period (between 42 and 150 years) whose length itself was a contested issue (Marland et al., 2001, p. 259; Dutschke, 2002, p. 381). In formulating a counterfactual baseline for carbon production without the project, accountants would also have to venture into economic predictions about trade patterns involving commodities produced on forest lands, such as soy, as well as predictions about future currency exchange rates. Not surprisingly, as such difficulties mounted, the very concept of ‘project boundary’ became increasingly disputed within the community of sequestration experts (Lohmann, 2001, pp. 36–45) – and with it the concepts of ‘carbon offset project’ itself and the status of the experts who attempted to frame it.

Constructing preferences, subjects, agencies and community through cost–benefit analysis, ca. 1934–2007

While it also originates from the US, cost–benefit analysis (CBA) is of much longer standing than the accounting techniques associated with carbon trading. The technique came into political prominence before the Second World War largely as an attempt by US engineering bureaucracies, particularly the Army Corps of Engineers, to cope ‘objectively’ with questions from a wide range of other interest groups about the big water developments then being pioneered in the wake of the Depression and the great Mississippi flood of 1927. In the US, the personal judgements of the technocratic elite, based largely on difficult-to-communicate craft knowledge and institutional interest, were not as insulated from challenge by elected elites and other agencies as they were in France or the UK. Cost–benefit numbers both promised a way of giving ‘evidence of fairness in the selection of water projects’ (Porter, 1995, p. 149) and helped justify the rejection of projects the Corps did not want to build. The difficulty was that in the early 1930s, these numbers were sometimes too narrow in scope – confined to tangible, relatively local costs and benefits such as capital outlay

and flood damage or maintenance expenditures avoided – to justify investments on a New Deal scale. Thus in 1934, a National Resources Board committee headed by Secretary of the Interior Harold Ickes, friendly to the idea of adding new projects to the list of candidates for federal funding, recommended what it called a ‘striking revision of costing technique’. The idea, the Board explained, was to ‘include not only private but social accounting’. ‘Intangible factors’, it proposed, could be quantified and added to projected water project benefits according to ‘a generalized formula’. The damage a project did to homes and the resulting loss in tax revenue, according to this idea, could be commensurated with and balanced against not just irrigation or power production, but also increased recreation opportunities, aesthetic improvements, and other unmarketed factors. Two years later the Flood Control Act of 1936 repeated these notions, but also emphasized the potential of expanded accounting techniques to check pork-barrel schemes and control federal spending, warning that the government could participate in schemes only ‘if the benefits to whomsoever they may accrue are in excess of the estimated costs’ (Hammond, 1960, p. 5).

In order to be able to argue that an ‘impartially’-determined public good would be served by a project, proponents thus had to learn to assign numbers to numerous indirect, ‘intangible’ and far-flung benefits and then, after subtracting or dividing by the costs, present the resulting number to oversight bodies. The Bureau of Reclamation once credited a dam it wanted to approve not only with the value of the wheat grown on the land to be irrigated, but also the gross value of the bread that might be baked from the wheat, as well as increased attendance at local cinemas. To justify a development on the West Coast, an agency might need to quantify its possible effects on the state of Maine, or estimate average prices for goods expected over a project’s entire 50- to 100-year life (Krutilla & Eckstein, 1958, pp. 199–264; Hammond, 1960, pp. 22–23). As with carbon offset calculations, CBAs performed by different teams for the same project could yield staggeringly different results – a problem that was destined to plague the technique throughout the next 70 years.

Unsurprisingly, in the 1940s, amid efforts to rein in spending, the Corps of Engineers’ cost–benefit numbers came increasingly under fire from competing railroad companies, utilities and other govern-

ment departments, and differences among CBA techniques became an embarrassment to the government. Yet an attempt by the Federal Inter-Agency River Basin Committee and the Bureau of the Budget to harmonize them only made things worse. The more explicitly each new ‘universal’ basis for CBA was set out, the less credible it became. The River Basin Committee’s report of 1950, for example, recommended that the opportunity cost of a good always be set equal to that good’s market price. This was criticized not only for equating the market price of a good to the value people currently placed on it, but also for attributing to the market the ability to prophesy future uses and valuation of the good. Yet the alternative was to fall back on what economist Hammond termed ‘imaginary’ data. In 1955, the Second Hoover Commission advised backing off from the quantification of intangibles altogether. ‘Verbal discussion of the intangible benefits and costs will communicate the facts to Congress more clearly than invalid benefit estimates’, concluded another critic. ‘Relevant figures may be submitted without forcing them into the benefit–cost framework’ (Krutilla & Eckstein, 1958, p. 41).

But CBA had become too well-entrenched to retreat, even if other supposedly ‘impersonal’ practices had been ready to take its place. Growing demand for techniques to commensurate unmarketed goods was creating the conditions for a more professionalized, identifiable CBA community. The Corps of Engineers started hiring more economists, who began to perform CBAs for other government agencies as well. At the same time, the new welfare economics was increasingly making its influence felt. The idea that a worthy project could be unfavourably assessed by a competent CBA became more difficult for officials and other professionals to countenance publicly than it had been in the 1940s. By the 1960s, as increasingly ambitious forms of accounting became established in the US Department of Defense under the championship of Robert McNamara, it was possible for an economist to write that the ‘economic valuation of benefits and costs of an institution, plan or activity must attempt to take account of values of any sort’ (Dorfman, 1965). As PDDs would later do, CBAs grew to immense size. Discussion grew intense about such issues as techniques of valuing lives. Should one (for example) tot up discounted future earnings, production or consumption? Calculate the discounted present value of expected losses others suffer as a result of one’s death? Look at jury awards in

compensation for death? As CBA became a serious academic economic specialty, some economists began to envisage CBA as a routine of such potential legitimacy that, ‘once set in motion by appropriate value judgments on the part of those politically responsible and accountable’, it ‘would – like the universe of the deists – run its course without further interference from the top’ (Sen, Das Gupta, & Marglin, 1972, quoted in Porter, 1995, p. 150).

Presidents Nixon and Carter applied CBA to a growing body of regulatory actions, but it was not until President Ronald Reagan’s Executive Order 12291 of 1981 requiring ‘regulatory impact analysis’ of all ‘major’ rules, and advising against adoption of any that did not pass a cost–benefit test, that it became entrenched throughout the regulatory apparatus of the US government. Under the Bill Clinton regime, CBA was sometimes used to advance rather than inhibit regulation, but George Bush reverted to the Reagan strategy of using it as an anti-regulatory device. In 2003, the Office of Management and Budget – charged with overseeing most government regulation – went so far as to consider assigning a monetary value to the liberty and privacy lost to new anti-terrorism legislation, while Harvard cost–benefit analysts asked subjects if they were willing to accept racial profiling at airport security checkpoints in exchange for saving time standing in line (Viscusi & Zeckhauser, 2003, pp. 104–105). Today CBA remains part of the ‘regulatory reform’ agenda at the individual US state level as well (Hahn, 2001, pp. 57–75). It is also widely used to evaluate policies and projects in other countries and at international financial institutions. Across the world, a range of quantifiable values have become regularly attached to health, biodiversity, noise, scenery, time and human life in a way that enables them to be inspected and weighed against each other from the convenience of spreadsheets in offices. Yet the more it is informed about such procedures, ‘the more the public seems likely to distrust it, again bringing the method’s legitimacy into question’ (Verchick, 2005).

In the view of one of its prominent contemporary apologists, CBA was designed ‘to induce government to simulate market outcomes’ (Posner, 2001, p. 323). In Callonian terms, what it helped ‘frame’ was not a literal market but rather concrete, physical market-like arenas of coordination, negotiation, persuasion, practical reasoning, decision-making and resource allocation, primarily but not exclusively situated in, and for use by, state agencies. Recasting public choice as virtual exchange

undertaken by bureaucracies or decision-makers, CBA, like carbon accounting, was all about creating a new commodity – not for trade, but rather for ‘trade-offs’. Lewis Kornhauser characterizes this commodity (or, rather, quasi-commodity – it is only quasi-bought and quasi-sold) as policies: ‘CBA prices policies, not the consequences of those policies’ (Kornhauser, 2001, p. 221). However, the quasi-commodity should perhaps be characterized more broadly, since CBA is most often used for comparative pricing or commodification of ‘worlds’ – worlds with and without a given policy, project or event. (Whereas in carbon offset accounting, the hypothetical world being quantified is a world without a given project, in CBA it is most often a world *with* a proposed project.) This quasi-commodity is not literally priced – the whole point of CBA is to go beyond existing prices, not just to say how much a policy or a project would cost in actual markets – but rather quasi-priced in a distinct currency consisting of overall welfare phrased in monetary equivalents. In a regulatory quasi-marketplace, officials try to aggregate the benefits of a public policy and compare them to the costs. More specifically, ‘[t]he very idea behind CBA is to commensurate winners’ gains and losers’ losses’ (Adler & Posner, 2001, p. 273) as a step toward determining whether there could be a ‘hypothetical costless lump-sum redistribution in the project world, from winners to losers, such that this amended project world is Pareto efficient relative to the status quo’ (Adler & Posner, 2001, p. 272). As in any market, consumers (in this case policymakers) were free to be foolish shoppers if they so chose, and pay a high quasi-price (or cause the public to pay it) for an inferior good (or policy, or project) – or a good that delivered an overall loss. But smart shoppers would know better, and make the right choice for their societies.

To make this quasi-market work, a numeraire had to be framed which was, in one form or another, welfare-commensurated-with-money (which on an extreme economic view is identical with welfare simpliciter). Traditionally, this was construed as the sum of compensating variations for a project or policy, or the dollar amounts hypothetically paid to or from individuals in the ‘project world’ such that given their ‘preferences’ they would be indifferent between that world and the status quo (Adler & Posner, 2001, p. 270); like carbon offset accounting, CBA depends heavily on reasoning involving counterfactual conditionals. In turn, these ‘preferences’ themselves had to be framed or con-

structed using techniques that would result in their being calculable and aggregatable – that is, well-behaved in the centres in which they were supposed to perform. ‘In practice, CBA proceeds by assuming that consumer purchasing decisions are a proxy for preferences and preferences are a proxy for utility’ (Heinzerling, 2002, p. 2314).

Two of the leading techniques developed after the Second World War for producing or eliciting such preferences or prices were hedonic pricing and ‘contingent valuation’ (CV). Using statistical techniques, hedonic pricing infers preferences from observable market behaviour. For example, preferences for workplace safety can be inferred or constructed by comparing wage levels of various jobs with their work-related injury rates. Highly intensive in its use of ingenuity, expertise and time, this procedure generally sidesteps the need to involve laypeople directly in the compilation of their preferences. Not so with contingent valuation, which involves a larger number of preference production zones and proceeds in several stages.

In CV, an early round of disciplining takes place in interview rooms or on questionnaire sheets. A sample of people are quizzed individually to determine the maximum amount of money they would be willing to pay, as individuals, for, say, clean air, the conservation of local lakes, the survival of blue whales – or, alternatively, the minimum amount they would accept for the loss of some such good. A survey seeking to monetize the sub-clinical health effects of increased levels of ozone, for example, may ask people how much money they would be willing to pay to have avoided having been tired easily one time during the last month. In general, questions are designed to format responses, including expressions of citizen responsibility (Sagoff, 1988), into a calculable pattern of quasi-consumer preferences. Questions about whether a price should be assigned at all, for instance, are not asked. Unwieldy compromises can result. For example, survey subjects who at first balk at answering questions about how much money they would be willing to accept for the loss of their homes may ultimately be forced to enter a bid for infinite compensation. (Ironically, CV theory ‘performs’ a quasi-marketplace that strives to be even less entangled with other arenas of social relations than the real marketplaces it supposedly takes as a model. CV subjects are not permitted to exit from the designated choice without their views being discarded, whereas buyers in actual markets are generally allowed to leave

rather than sell or buy. In addition, subjects in CV surveys are supposed to place their decisions in the context of other spending decisions, whereas many actual markets depend on a context of stimulation of 'impulse buying' (Heinzerling, 2002, pp. 2334–2335.)

A second stage of framing takes place at the surveyor's or economist's office, where the mass of emergent figures, agencies and objects emerging from the original survey are firmed up and resculpated. Responses that may have reflected a heterogeneous mix of considered views, hesitations, strategic gambits, free-association or expressions of frustration or boredom are reinterpreted and further simplified and edited, and controversies, uncertainties and conflicts black-boxed to the extent possible. As elsewhere, to borrow the words of Espeland and Stevens, 'commensuration can be understood as a system for discarding information and organizing what remains into new forms' (1998, p. 317). To take one obvious case, demands for infinite compensation emerging from the original survey must be thrown out or reinterpreted; they cannot 'realistically' be entered into an agency's calculus since they would trump all others automatically, leaving no room for weighing alternatives against each other and thus no policy pointers (Helm & Pearce, 1991; Turner, 1991; Viscusi, Magat, & Huber, 1987).¹¹ For example, in the late 1960s, the Roskill Commission considering sites for a third London airport reinterpreted bids for infinite compensation for homes that would be destroyed as demands for compensation of 200% above market value (Adams, 1989). Alternatively, a new interview team can be dispatched to brief recalcitrant subjects more thoroughly so that when they are questioned again they can help produce preferences which can be fed more easily into the computational process (Hanemann, 1994, p. 24). Just as various 'monsters' of climate change can be framed or tamed by running together uncertainty, ignorance and indeterminacy with probability, other so-called 'outliers' that result from

rebellious subjects' efforts to wrench apart the original CBA 'frame' can also be eliminated from the data set using justifications from statistical theory.

A third arena of disentanglement is one also used in hedonic pricing: meeting rooms or printed documents where experts or their patrons summarize CBAs to the public, at which point the now-hardened numbers take on their own life, often setting in train a 'bandwagon effect' capable of changing those opinions. These arenas, too, are structured in a way that helps reduce the authority of the original subjects to complicate the data by engaging in bargaining over how their actions are to be interpreted. In 1995, for example, economists in Working Group III of the Intergovernmental Panel on Climate Change, when criticized for having calculated the value of a statistical life of a US citizen at US\$1.5 million and that of a statistical life of a 'developing country' citizen at \$100,000, responded that they had merely been reading off 'people's appreciation for a risk-free environment' using published economic data in accordance with established procedures (Fankhauser, 1995, p. 167).¹² It is part of CBA's framing function, like that of the audit techniques described by Michael Power, that it brings about a 'loss of social thinking'. Represented as one embodiment of democracy, it tends to allocate problems 'to a particular class of experts who may profit from its own abuses' (Power, 1988, p. 312).

Like carbon accounting, in short, CBA has had to build up a large disciplinary infrastructure with a variety of social implications in order to 'make things the same'. As such, it can be seen as another example of the 'state simplification' or 'high modernism' surveyed by James C. Scott. Like the Prussian forestry practices Scott reviews (Scott, 1999, pp. 11–22), it involves processes that do not just redescribe, but also, as centralized calculation becomes more important, remold their objects in ways that render them more 'legible' to state agencies pursuing specific sets of goals. Nikolas Rose

¹¹ In a parallel case in carbon accounting, carbon credit retailers such as Mike Mason of the UK firm Climate Care argue that aviation offset prices must be kept within the reach of ordinary consumers regardless of scientific findings that suggest jet flights have especially high climate forcing effects due to the altitude at which they release greenhouse gases. 'You might want to be conservative...but if what you do is push it out of reach of many people, so that many fewer people buy it, you haven't actually done the planet a favour' (Channel 4 Dispatches, 2007).

¹² CBA was attractive to US and other industrial-country elites in this forum partly because its weaknesses in dealing with distributional and narrative issues were politically useful in a situation in which accusations of responsibility for global warming were tied to demands for proportional contributions toward alleviation. The Working Group III figures were used in further calculations which suggested that climate change would cost twice as much 'socio-economic' damage to the industrialised countries as to the rest of the world. For further discussion of the politics of 'statistical people' see Heinzerling (2000).

describes such processes in more abstract terms when he writes that ‘numbers do not merely inscribe a pre-existing reality. They constitute it’:

‘...the collection and aggregation of numbers participate in the fabrication of a “clearing” within which thought and action can occur. Numbers here help to delineate “irreal spaces” for the operation of government, and to make them out by a grid of norms allowing evaluation and judgement... These “calculable spaces” have made up the fields of government at both macro- and micro-levels... as these accountancy-shaped spaces are thrown over a whole range of other institutions... a whole variety of new calculable spaces are brought into existence.’ (Rose, 1999, pp. 212–213).

The ‘historical and social processes of constructing and solidifying equivalences’ involved in CBA, to adapt a phrase of Desrosieres, were no doubt expected by some experts to be able eventually to create ‘things that hold up well, independent of particular interests, in order to be able to act on them’ (Desrosieres, 1996, p. 336). Historians have habitually seen numbers as a response to turbulence (Cline Cohen, 1982) and the standardization provided by CBA a measure of accountability-deflecting ‘objectivity’ (Porter, 1995). Yet for those closer to the coal face, the ‘framings’ associated with CBA, like those associated with carbon accounting, have persistently and inevitably involved destabilizing overflows of many kinds. As economists Hanke and Walker wrote a quarter of a century ago:

‘In spite of years of refinement in the theory of cost–benefit analysis no one has succeeded in making it impartial or indisputable... no amount of technical wizardry will succeed in absolving us of the need to resolve... conflict through political processes.’ (Hanke & Walker, 1974, p. 908).

‘Far from resolving controversy’, geographer John Adams observed 20 years later, ‘cost–benefit analysis generates it.’ (Adams, 1995; see Herbst, 1993 for a parallel discussion of opinion polling).

At the same time, CBA’s failure to stabilise a market-like arena for policy choice has seldom given pause to, and certainly not overwhelmed, the institutions that produce CBA. The result, to revert to Callon’s words, has been a space that ‘must be constantly reformed and built up from scratch’ and that ‘never ceases to emerge and re-emerge’ from the entailments and entanglements it

itself helps bring about. For more than half a century, CBA and the decision-making arenas it ‘performs’ have engendered conflicts and dilemmas in ever-evolving but recurring patterns. Whatever strategies they pursue, specialist economists committed to refining and deploying CBA have found themselves at odds with public, governmental and academic opponents, and vice versa. Many of the arguments and rhetorical stances evident in the debates of 1955 have been echoed in 1965, 1975, 1985, 1995 and 2005; Amartya Sen alludes to a continuing ‘conversation between great soliloquists – very skilled in making their points, and somewhat less troubled than Hamlet (to be, say some, and not to be, announce the others)’ (Sen, 2001, p. 95). This pattern’s persistence calls into question both the idea that CBA technique might someday be elucidated or ‘purified’ to the point at which it is no longer controversial and the mirroring idea that it exemplifies a creeping and inexorable commodification of society and nature. Perhaps unlike carbon accounting, which at the present moment seems vulnerable to collapse, CBA has survived many moments of crisis. Yet the succession of entanglements and overflows visible in its history is structurally similar to those that are appearing around carbon accounting. This article will briefly consider some overflows that result from framing preferences, subjects, surveyors and the general public.

Framing welfare, framing preferences

Framing a quasi-market for public choice means constructing quantifiable, aggregatable preferences through techniques such as contingent valuation. Such techniques temporarily constrain their subjects’ exercise of rationality in a number of ways, fitting it, for as long as they are applied, to the Procrustean bed of what Amartya Sen calls a ‘market analogy’ (Sen, 2001, p. 111) (although, as we have seen, only certain parts of the analogy are stressed). For instance, for reasons of convenience in calculation, acts of valuation under CV are commonly not iterative. That is, the weights subjects give to the options on offer are not easily recorded within CV as tentative or open to revision, or as evolving in the very process in which they are given expression (Sen, 2001, p. 107), or as requiring a process of collective deliberation (Richardson, 2001, pp. 141 ff.), as many evaluations are in other social contexts. As Richardson points out, a number of types of ‘intelligent refashioning of ends... are avail-

able to ordinary deliberation but foreclosed by any model of decision that takes as its contentful normative basis a given set of willingness-to-pay information' (2001, p. 153; see also Richardson, 1994). In the words of Adler and Posner, preferences shaped and collected for CBA purposes are 'non-adaptive'; that is, they are not treated as subject to change pending the outcome of the project being evaluated, and thus not as if they might be partly dependent on the CBA itself (Adler & Posner, 2001, pp. 284–285). Yet even if 'sensible responses to collective conflicts' could be 'captured in terms of revised preferences', eliciting or constructing individual preferences still leaves out of the frame the kind of practical intelligence needed to generate those responses (Richardson, 2001, pp. 157–158). In addition, the hypothetical 'willingness to pay' of the CV subject must usually be interpreted as independent of what other subjects are willing to pay. This makes fewer considerations available to CV subjects during their deliberations than is usually the case during discussions about social policy. What one person is willing to pay to clean up an oil spill, for example, will usually vary depending on what others are willing to pay or on the conclusions of public consultations over what government action would be appropriate. Normally, people's views on the environment can be expected to be elicited in a context of being 'told what the real alternatives are, involving specification of what will be done by the others'. Yet this is 'simply not provided by the market-based questioning (either in the form "How much would you pay if you could singlehandedly bring about the change?" or the form "How much would you contribute, assuming whatever you want to assume about what others are doing?")' (Sen, 2001, p. 114).¹³

Similarly, to use non-iterative individual preferences to calculate welfare is leave open the possibility of terminating the calculation before all information has been collected that subjects them-

selves, or others, might consider relevant to the valuation (Adler & Posner, 2001, p. 278), or before any collective decision has been made about what sort of information will count as relevant. It is also to exclude processes of censorship or weighting that are applied in most other circumstances to individuals' views that are rooted in psychological problems or considered sadist, racist or otherwise socially unacceptable (Adler & Posner, 2001, pp. 295–297). Finally, insofar as it does not discount the willingness-to-pay figures of wealthy individuals, it excludes the egalitarian considerations commonly appealed to in democratic societies.

Applying CBA to environmental decision-making necessitated carving out spaces for calculation in still further frontier zones. For instance, according to many CBA practitioners, moral attitudes about 'nature' can be framed as compensating variations for the existence of environmental goods not enjoyed directly and then commensurated with prices for other goods. According to others, disinterested moral reasons must somehow be placed altogether outside the 'frame' used to elicit or define preferences, because they are irrelevant to welfare (Adler & Posner, 2001, pp. 276–277, 290–291). In general, CBA tends to exclude everyday reasoning about clusters of interlocked, mutually irreducible ends and how to develop them in light of the means available; reasoning about if and how a rule applies; and reasoning that involves acquiring, like a critic, student, artist or revolutionary scientist, a new language, taste, perception or goal that recontextualizes or comments on older ones (Isenberg, 1949; Rorty, 1979). To treat such patterns of rationality on the model of, say, comparing body weights to check babies' health or comparing prices when deciding on investments in land, corn, iron or microchips is a radical social innovation. It strives to displace those types of rational decision-making in which each person or group brings into play mutually incommensurable considerations (which normally encourages treating experienced and perceptive persons, not just sets of criteria or numbers, as touchstones of rational choice) or those even more complex types of practical reasoning involving speakers of different languages who do not share common adjudication procedures when looking at the same set of alternatives (which normally encourages treating intercultural conversation as a further important touchstone of rational choice).

At the same time that certain types of reasoning are excluded by the 'framing' performed by CV and

¹³ In the 1980s, a Karen villager in Northern Thailand simply rejected a Finnish forestry company's request that he indicate his land use preferences, indicating that such a question could intelligibly be posed only to the community as a whole (Ann Danaiya Usher, personal communication, 1989; see also Heinzerling, 2002, p. 2324). The parallel with opinion polling is relevant: as Andrew Ross (1998, p. 152) observes, 'how people respond to a slate of surgically prepped questions tells virtually nothing about the opinions they might find they held in common if the conditions of a properly radical democracy permitted them to do so'.

other CBA techniques, others are made mandatory. Subjects are required to commensurate and price many events, states or goods that are not commensurated or priced in everyday life – or whose commensuration is at present socially circumscribed or disallowed in other contexts. These include lifespan, biodiversity, disaster avoidance, terrorism prevention measures, noise, visibility, the existence of wildlife, pollution, scenery, ozone damage, pension provision, rights, futures with or without various development projects, and so on. In one experiment designed to test hypotheses about how to measure the ‘intrinsic’ value assigned to life, interviewees were even asked how much they would pay not to have a researcher kill a potted Norfolk Island pine tree shown to them. Any context of reasons that could help subjects make sense of the unfamiliar demand to commensurate such entities with each other and with money is sometimes explicitly pushed outside the ‘frame’. An analogy with opinion polling is useful: a Mori handbook instructs opinion pollsters who are asked what a question means to reply, ‘whatever you want it to mean’ (Barnard, 1992). Another pollster explains that any answers outside the choices on offer ‘get dumped or written off as “other”’ (Hitchens, 1994, p. 48).

Such processes of framing preferences in ways that are intended to ensure that they are well-behaved in centres of cost–benefit calculation have well-documented overflows. For example, preferences constructed through contingent valuation often turn out to be so *badly*-behaved that they are useless in welfare calculations. So much of the familiar contexts of practical reasoning have been removed by the framing process that some survey subjects, finding that the questions do not make sense, register zero or arbitrary valuations. Others, objecting to the commensuration of goods that they do not want to commensurate, enter, as noted above, infinite ‘protest bids’ for the good being quantified, or produce numbers reflecting ‘a defensive reaction to a perceived threat’ (Clark, Burgess, & Harrison, 2000). Still other subjects

‘provide valuations that are invariant across large and small parcels of wilderness or quantities of wildlife or that are inconsistent or intransitive. Their answers depend on the order in which questions are asked and are sensitive to the wording of the questions.’ (Adler & Posner, 2001, p. 290; see also Desvousge, 1993; Harvard Law

Review, 1992; Plott, 1993; Rosenthal & Nelson, 1992; Sen, 2001).

One economist seeking to measure the economic value of recreational inner-tubing on Arizona’s Salt River as part of an environmental assessment of the Orme dam tried and failed to build a regression model synthesizing a demand curve tracking both real payments inner-tubing enthusiasts made for their experience and willingness-to-pay data: ‘The curve didn’t work. It didn’t turn out to be measurable.’ The value of tubing was duly excluded from the final analysis (Espeland, 1999).

The presence of a large preponderance of data that must be discarded suggests that even the better-behaved data that emerge from contingent value surveys should be handled with caution (Adler & Posner, 2001, pp. 290–292). The process of framing preferences often removes so much social context that it becomes difficult to resolve the classic ‘radical interpretive’ dilemma described by Donald Davidson (Davidson, 1984) – that is, to make the choice between deciding that one is misinterpreting a speaker and deciding that the speaker has false beliefs.¹⁴ The need to deliver figures pushes analysts toward the latter, undermining the credibility of CV figures and setting the stage for further instability – as will be explored below – by constructing CV subjects as stupid and CV surveyors as arrogant.

Information deficits among survey subjects may lead to further calculational difficulties. Moreover, the problem of accounting for innovation that was evident in carbon accounting resurfaces in CBA. ‘Regulatory analysis is notorious for failing to take into account the technological innovations that ultimately make many regulations cheaper to implement than regulators anticipate’ (Heinzerling, 2002, p. 2314). The difficulty of nonhalting calculations also reappears. Projects implemented partly as a result of CV can themselves change preferences about them (Sen, 2001, p. 109; see also Sunstein,

¹⁴ Depending on context, the question ‘How much are you willing to pay for X?’ may be interpreted in a great variety of ways: for example, as an extortion demand; fleamarket vendor’s gambit; challenge to honor, prestige or some other form of ‘symbolic capital’; corrupt judge’s request for a bribe (or honest judge’s test of a defendant’s values); prostitute’s solicitation; invitation to discuss the ‘imaginary market’ a surveyor is attempting to construct; close friend’s idle query on a holiday walk; or obnoxious joke. Correspondingly, ‘How much are you willing to accept for place X?’ may be received as a different question depending on, say the profane or sacred standing of the X in question.

1993). As Sen sums it up, ‘When all requirements of market-centred evaluation have been incorporated into procedures of CBA, it is not so much a discipline as a daydream’ (Sen, 2001, p. 116). ‘Because it shuts off practical intelligence’, Richardson adds, ‘CBA’s interpretation of what people want is accordingly implausible’ (Richardson, 2001, p. 155). Adler and Posner, meanwhile, although they attempt to defend certain types of CBA, admit that the satisfaction of what they call ‘actual preferences’, or, in the terms of this paper, preferences constructed through textbook CBA, is simply ‘not equivalent’ to the ‘maximization of well-being... Actual preferences are not necessarily constitutive of welfare’ (Adler & Posner, 2001, pp. 270–271).

The instability and limited utility of the preferences framed by CV and other techniques means that preferences must be continually ‘reformed and built up from scratch’ through new framing exercises. Adler and Posner (2006) propose a process that they frankly call ‘laundering’, by which supposedly ‘distorted’ preferences¹⁵ are made more rational (the sum of compensating variations being transformed into ‘welfare equivalents’), yet retain their technical suitability for the quasi-market for policy options that CBA formats. Information that subjects would benefit from knowing but do not have at their disposal in the forums in which CVs are calculated is imported and preferences corrected accordingly. Preferences that are ‘objectively wrong’ representations of an individual’s valuations are also corrected. Racist or sadist preferences are censored to ensure that so-called ‘objective values’ are tracked, or are registered as 0. Adaptive values are frozen at a certain level to ensure that calculations halt at a unique figure. In other words, attempts are made to (re-)frame entanglements or overflows that were pushed outside the original frame, yet on which the framed ‘preferences’ depend for their intelligibility and utility. Other theorists have proposed expanding the concept of preferences to include those based on ‘commitment’ (Sen, 1977)

or ‘ethics’ (Harsanyi, 1955). What Richardson calls ‘intelligence’ is reintroduced by the back door.¹⁶

In fact, preferences are already routinely being ‘laundered’ in ad hoc ways in the everyday contemporary practice of CBA. Agencies deploying the procedure preserve CBA’s appearance of ‘tracking overall well-being’ or sustain the fiction that preferences revealed in hedonic pricing or contingent valuation reflect ‘complete thinking’ (Richardson, 2001, p. 167) only by flouting textbook norms. For example, in evaluating a proposed regulation involving labeling of meat and poultry products, the USDA relied not on subjects’ contingent valuations of nutrition disclosure, but rather on contingent valuation of the health benefits they would enjoy if they altered their behaviour in response to the labels. Similarly, the premise of modern workplace regulation is that workers are ‘uninformed about risks’ (Adler & Posner, 2001, p. 283), making CV-based calculations inappropriate. Many agency programmes discount or discard the preferences of various social groups – for example, the preferences of drug addicts not to implement antidrug programmes for airline employees. They also routinely ignore sadistic preferences: the FDA’s CBA of a regulation designed to curb distribution of cigarettes to children did not include as a cost the lost profits to industry, ‘because this profit stems from illegal sales to youths’, nor did it count the children’s lost consumer surplus. The FAA’s CBA for an airline security program, by the same token, did not consider the possibility that a system of racial profiling might be less costly than the system

¹⁵ The assumption that ‘undistorted preferences’ ready-made for accounting use exist in individuals is evident in the statement of a prominent environmental economist that ‘the absence of markets in environmental services creates a practical problem of measurement – i.e. one of finding out what people’s preferences actually are in a context where there are no apparent markets – but it does not create a conceptual problem of measurement’ (Pearce, 1991, p. 3).

¹⁶ Alternatively, the scope of CBA itself can be restricted so that it is simply not used to resolve issues of fairness, justice and deontological rights or commensurate moral commitments with other preferences. In practice, the application of CBA has always been limited by the political process and often by accountants themselves (Dove, 1999). In the 1940s, the US Army Corps of Engineers had no difficulty in maintaining that water projects in Michigan, Alaska and Pennsylvania were justified given the ‘welfare of the communities’ affected or the ‘importance of future development in the region’ despite low benefit/cost ratios ranging from 0.53 to 0.82 (Porter, 1995, p. 160). More than two decades later, the Roskill Commissioners found that the government simply disregarded their recommendation on the site for a third London airport following public ridicule of a CBA that attempted to aggregate costs of rail construction, noise, property and recreation losses, air travel, traffic growth, loss of a Norman church and human fatalities (Self, 1975). This was despite the fact that the CBA had been designed precisely to reduce the political heat that government officials would have to absorb for making a decision on the airport.

it ultimately endorsed. Official agencies correct for wealth distortions, meanwhile, by using a constant figure for the monetized value of life rather than the willingness to pay of individuals, which is likely to vary with wealth. Many such routine underminings of textbook CBA are likely to stem from agencies' fear of the 'overflow' consisting of public outrage that would result from uncompromising deployment of hedonic pricing, contingent valuation and commensuration across the board (Adler & Posner, 2001, pp. 285–287, 288–289) – the sort of outrage that surfaced in the case of the Intergovernmental Panel on Climate Change discussed below. As Vatn and Bromley put it, 'the most fundamental environmental choices will continue to be made without prices – and without apologies' (Vatn & Bromley, 1994, p. 145).

In short, with each reframing of the public policy quasi-market by CBA come further overflows (Heinzerling, 2002, p. 2329). CBA's project of efficiently satisfying the preferences of individuals can never be completed, partly because CBA cannot specify those preferences (Richardson, 2001, p. 155). The more rigorous that attempts to capture such overflows become, the more unwieldy the construction process gets. As Sen (2001, p. 95) notes, there is a 'tradeoff here between easier usability (through locked-up formulae) and more general acceptability (through allowing parametric variations)'. For example, replacing the question 'How much would you pay for X?' with the question 'What should be done for X using tax money?' in contingent valuation surveys would avoid some of the difficulties connected with the attempt to force respondents to consider X merely as a commodity of private interest, yet would threaten to defeat the purpose of the contingent valuation exercise (Jacobs, 1997, p. 219).

In a sense, therefore, the 'different debate' proposed in the title of this article has already been quietly proceeding, only under the radar of more theoretical disputes. While many CBA theorists still speak of 'distorted' preferences, as if there existed or should exist in each individual an underlying stratum of 'undistorted', pristine, invariant preferences waiting to be made explicit through expert technique (Adler & Posner, 2001; Harvard Law Review, 1992; Pearce, 1991), in practice government agencies deploying CBA do what they have to do to balance a wide range of political pressures without much regard for whether they are collaborating in the creation of preferences or not. Cost–benefit analysis is

itself reformatted and retranslated by less constrained forms of discussion.

By the same token, while writers such as O'Neill (2007, p. 130) and Raz (1986, p. 345) contend that it is part of the 'constitution' of certain goods that they are incommensurable with others, and writers such as Sen (2001, p. 113) and Nussbaum (1990, pp. 60–61) complain that standard CV cannot capture the 'nature' of certain types of valuation, again, it may be more illuminating, rather than pretending to be able to lay down the law about the violated 'nature' of various goods and kinds of valuation, to take seriously the reality that CBA is proceeding apace and helping to contrive real subjects and objects even if it entails complex overflows and will be forever incomplete. Surveyors can and do sometimes begin to get commensuration practices going during surveys, and subjects do 'learn' to price new things. As Viviana Zelizer documents, the borders between what can and cannot be priced or otherwise commensurated are in constant historical flux (Zelizer, 1985, 1997), and survey sessions and their associated practices are part of that flux. In describing this flux, many CBA critics run the risk of stalling the debate when they attribute conceptual 'errors' to CBA defenders. Defenders do the same when, as is typical, they fail to grasp that, in MacKenzie's phrase, CBA is all about '*making* things the same' – and that hardening a CV subject's responses into the useful objects called 'preferences' is invariably a more complex, difficult, time-consuming and altogether different matter than they acknowledge. An interesting parallel is the Plantar case, where the political issue revolves less around the formally undecidable question of the 'accuracy' or otherwise of the unique without-project future scenario for Minas Gerais delineated by experts, but rather about what local residents will stand for in practice in their battle with carbon project accountants and proponents. To talk about 'natures' and 'constitutions' in the style in which, in a past era, analytic philosophers used to talk about 'category mistakes', not only is limiting analytically, but also obscures or foreshortens complex historical processes as well as rivalries among accounting technique users that political and environmental activists need to consider in greater detail (Dove, 1999).

Framing subjects

At the same time that it constructs preferences, CV, like opinion polling, works to shape and disci-

pline expert-friendly subjects. While there is no need for CV to demand that its subjects transform themselves into *Homo economicus* to the extent of treating all values as homogeneous – assigning a monetary value to an option does not imply that is the only value it has, nor necessarily set in train a shift in the way it is valued overall (Nussbaum, 2001, p. 195; cf. Anderson, 1993; Verchick, 2005) – it does set up, at least temporarily, an often unfamiliar pricing practice that ‘formats’ survey subjects even when they find it difficult to interpret or respond to (Farber & Hemmersbaugh, 1993, p. 301). The pared-down, uniform structure of CV surveys, like that of CDM consultation forms, necessarily leaves little room for respondents to say ‘that’s an odd question’ or express discomfort with questions that seem contextless, unanswerable, trivial, or misleading. As in opinion polling, surveyors are trained not to conduct an everyday conversation with their subjects but to follow a simplified form of interaction that constrains both parties in novel ways. Still, the narrow range of questions that are asked are capable of guiding conversation and subject behaviour after the survey – a fact well-known to pollsters who are employed to shape as well as to report ‘public opinion’. According to one sociological study of CV, ‘the great majority of respondents will subordinate themselves and their ways of making sense to those of the survey designers. If [the survey] does not make sense... respondents will see these “failings” as their own’, many of them disgorging arbitrary numbers largely out of a desire to please or impress (Clark et al., 2000; Fischhoff, 1991). Such surveys constitute one of a battery of practices (together with economics courses, political speeches, and so forth) that, in some societies, naturalize cost–benefit calculations to such an extent that they become identified, at least in abstract theory, with practical reasoning itself. CBA-like ritual is read back into all individual decision-making as an unarticulated origin myth, justifying further extensions of the technique.¹⁷

¹⁷ Arguably, the spread of CBA has helped nudge the academic image of ‘rationality’ away from what Richard Rorty calls ‘reasonableness’ – tolerance, respect for the opinions of those nearest one, willingness to learn, nondefensiveness, and reliance on persuasion rather than force, which are traits over which no one has a monopoly – toward that of a ritual of measurement, calculation and aggregation which is the special province of an economic and bureaucratic priesthood (Rorty, 1991, p. 37).

However, resistance to this ‘formatting’ of subjects is also widespread, as is acknowledged by many CBA practitioners and defenders (Adler & Posner, 2001, p. 290). When one survey asked what Wyoming residents would accept in monetary compensation for loss of visibility due to pollution from a power plant, most interviewees rejected what they saw as the surveyors’ assumption that they could be ‘bought off to permit pollution’ and either refused to cooperate or, again, entered ‘protest bids’ requiring infinite compensation (Rowe, D’Arge, & Brookshire, 1980). Zero bids constitute another destabilizing response from subjects disgusted with the pricing game (Levy, Hammitt, Duan, Downes-LeGuin, & Friedman, 1984). One subject of a contingent valuation survey, after being asked questions aimed at finding out how much households would be willing to pay for a wildlife enhancement scheme in the UK’s Pevensy Levels, protested: ‘I think you can put a value on nature but not a value in money terms. A value is what we teach our children’ (Clark et al., 2000). In six Scottish contingent valuation studies, the surveyors themselves conceded that between one-quarter and one-third of respondents could not be made to take the questions seriously (Hanley, 1991). Most respondents to a contested New Zealand survey testing people’s willingness to pay to prevent development of an island offered figures that they clearly regarded as ‘gestures in a political process’ (Vadnjaj & O’Connor, 1994, p. 375). In such cases, CV subjects appear not only unaccustomed but also unwilling to be framed as quasi-consumers, or to participate in unfamiliar or circumscribed commensuration practices, even in the restricted language-game of the survey, instead expecting or demanding to be treated as citizens (Heinzerling, 2002, pp. 2330–2331; Sagoff, 1988; see also Radin, 1996). Efforts to exclude power relations and property rights from the CBA equation in favour of price adjustments and revisions of the ‘calculations by which our economy is governed’, or to reduce objections to the status of mere ‘philosophical’ musings about ‘intrinsic’ value, have often produced considerable opposition.

Proponents of CBA frequently frame this resistance in ahistorical terms, attributing it to subjects’ ignorance of the pre-existing ‘nature’ of their preferences or of rationality itself. Subjects’ reluctance to commensurate certain goods, they claim, is rooted in their lack of understanding of the fact that ‘every decision implies a monetary evaluation’ (Barde & Pearce, 1991, p. 1), that tradeoffs are always possible

and usually necessary ('measurement is essential, since trade-offs are inescapable' (World Bank, 1992; see also Frank, 2001)), or in their underestimation of CBA's ability to clarify choices by highlighting 'stakes', values or states of affairs which are, again, assumed to be pre-existing (Sunstein, 2005, pp. 129–130). Rational choices, the Whiggish assumption goes, have always involved at least implicit quantification of the alternatives. As one environmental journalist puts it:

'Knowingly or unknowingly, people who decide that they would rather pay more for electricity than destroy a forest to build a dam are implying a valuation of the forest – crudely put, somewhere between the increased cost of electricity and "priceless"' (Ungphakorn, 1988).

To insist that placing a dollar value on human life is morally illegitimate, claims Frank (2001, p. 71), carries the 'implication' that any measure that would prevent deaths should be instituted 'no matter how much it costs or no matter how little it affects the risk of death and injury' – an obvious absurdity. On the extreme view expressed by Frank and many other economists and scholars (e.g., Common, 1988), CBA only makes explicit what everyone already does implicitly, and with enough education or self-awareness would recognize that they do.

Views such as Pearce's or Frank's, which construct resisters to cost–benefit accounting as ignorant or irrational, have provoked fierce retorts from a long line of Aristotelian commentators from Otto Neurath (O'Neill, 1995) to Nussbaum (1986). As Nussbaum argues, many if not most choices are made on a basis which is 'qualitative and not quantitative, and rational just because it is qualitative' (Nussbaum, 1990, pp. 60–61; see also Anderson, 1993; O'Neill, 2007; Radin, 1996; Wiggins, 1987). Questioning the practice of placing a dollar value on, say, human life, is compatible with declining to expend indefinite amounts on extravagant injury-preventative measures (Heinzerling, 2002). If difficult, even tragic, choices have to be made, it does not follow that they have been made by comparing quantities:

'we often make comparisons among diverse values, and choices among options involving different values, without commensurating in this reductive way...the bare fact that we are able to make these comparisons of overall good and

bad does not, it seems to me, imply that we have all along been reducing them to a single metric of value' (Nussbaum, 2001, pp. 194–195).

Willingness to pay figures, in Henry Richardson's words, 'provide a poor interpretation of what people want' (Richardson, 2001, p. 155) in that they exclude the process by which human beings 'regulate and revise their aims' in light of information that surfaces in the course of social interaction (pp. 153, 155). If there is 'stupidity' here, Richardson suggests, it lies not with CV resisters but with the view that CBA could efficiently satisfy the preferences of individuals or provide a standard of public choice (Richardson, 2001). Here again, a venerable tradition of scholarly argument can easily be marshaled: to take just a few examples of many, Michael Oakeshott's or John Dewey's assault on the notion that "'rational" activity is behaviour in which an independently premeditated end is pursued and which is determined solely by that end' (Oakeshott, 1962, pp. 83, 89), Lindblom's (1959) skepticism about whether working bureaucratic practice could be made more 'rational' through first isolating ends, then seeking and comparing all available means, or David Wiggins's insistence that the 'deliberative specification of ends' constitutes 'most of what is interesting and difficult in practical reason' (Wiggins, 1987). It should not be surprising that lay resisters to CV or hedonic pricing techniques, too, are capable of replying in kind when CBA practitioners frame them as stupid or irrational. The Pevensey survey's respondents, for example, reckoned that asking individuals for their 'ill-considered preference[s] for one site in isolation' was 'to insult their intelligence' (Clark et al., 2000). Other places and the communities who lived in them also had valid claims on available resources – claims that the Pevensey subjects would need to learn about and discuss with the people concerned before working out and expressing their values to a central authority, rather than submitting pre-formatted preferences to experts for aggregation. In the same vein, the above-described attempt of economists in IPCC Working Group III to attribute opposition to their hedonic pricing of statistical lives (and thus to their interpretation of 'people's appreciation for a risk-free environment') to ignorance of economics methodologies contributed to a furore among Southern UNFCCC delegates that ultimately led to a permanent loss of prestige and power for the late David Pearce, one of the econo-

mists leading the attempt. Again, the attempt to 'contain' the overflow consisting of resistance to CBA within a newly-drawn frame for supposedly 'objective' calculation and the construction of strictly 'statistical' lives immediately occasioned fresh overflows.

Subjects often push back, too, when the 'frame' excludes them, as it did the Salt River inner-tubers when their values could not be translated into market values in methodologically acceptable ways (Espeland, 1999), or as it does many groups when it does not take into account their views. Indigenous groups often react when the frame disentangles land from their lives and identities by valuing it principally in terms of title or resource values (Espeland, 1999; Shanks, 1974). 'Without the land, the Indian cannot survive and with the Indian the land cannot be land, because the land needs to be taken care of in order to survive life', as one Yavapai from Arizona put it (Espeland, 1998, p. 201).

A similar dynamic results when economists translate reluctance to accept results of a CBA into a desire to 'opt out of the debate' (Common, 1992). This is an interpretation that follows naturally from the assumption that preferences revealed in hedonic pricing or CV already reflect 'complete thinking', making further conversation superfluous. Such a dynamic can also occur when economists interpret public skepticism about the validity of the 'preferences' supposedly revealed by CBA as 'opposition from those who do not want preferences to count, because the majority sometimes does not want what they want' (Pearce & Moran, 1994). One Pevensy survey subject sums up a common reaction to such expert translations:

'The way they can manipulate this is basically by saying, "Well, right. We're not going to fund [this conservation scheme] any more". Then there'll be a public outcry saying "Why not? You're supposed to be looking after the environment!" And they could directly turn round and say, "well, we took public opinion"' (Burgess, Clark, & Harrison, 1998).

The commensurating procedures of CBA, in enabling centrally-located officials to ventriloquize the 'common will' not only within but across societies, sometimes provoke even more powerful reactions. In countries such as Thailand, environmental accountants have on more than one occasion been physically driven out of local areas where they were doing nothing more than gathering

data for CBAs for proposed power projects whose realization still lay far in a hypothetical future. Where such blunt tactics are likely to be politically ineffective, laypeople may seek other means of circumventing the techniques that would translate their views into calculable 'preferences'. In Arizona, the Yavapai saw no choice but to participate in the formal environmental assessment of the Orme dam that would have disrupted their lives, yet simultaneously also changed the subject and opened other forums, re-enacting for journalists the Yavapai's earlier brutal resettlement and explaining to those who would listen why money was an inappropriate way to express the value of their land and culture. 'White men like to count things that aren't there. We have a way of life that will be destroyed if that dam comes through. Why don't they just say that?' The Yavapai also sought to communicate outside the CBA framework using non-market analogies meaningful to their white interlocutors. 'The land is our mother', one Yavapai teenager said. 'You don't sell your mother' (Espeland, 1999).

Such types of opposition are akin to those followed by opponents of the Plantar project discussed above in that they challenge the accountants' framing processes themselves, bursting them open by visibly 're-entangling' the subjects and objects formatted by CBA with the world outside, the revisability of ends, other people whose desires are not yet known, or with the history and futures they have been accustomed to debating within other frameworks. In this respect, these modes of opposition are also akin to claims that carbon offset accounting is incoherent because the way it selects for 'efficiency' at the margin cannot overcome challenges posed by historical 'lock-in' of fossil fuel-intensive structures.

CBA's success in 'performing' a new public of individuals legible to, responsive to, and instructed by centrally-located experts and officials, then, will probably always be limited. Entanglements with other sites and forms of social reasoning cannot be sliced away or prevented so easily. Al Gore's assumption that the 'factors deemed to be important' to the environment are accounting-ready, patiently waiting to be calculated, turns out itself to provoke resistance. Hence one limitation of the 'trust in numbers' thesis that views supposedly 'objective' quantitative techniques such as CBA as providing solutions to problems of distrust of discretionary decision-making by government agencies. The historical record demonstrates that

numbers generated by CBA are unlikely to be trusted, either. It is not that they are merely a cover for business as usual – the institutions involved generate their own political centre of gravity, and the numbers do intermittently help ‘change the subject’ of political discourse – but rather that they are perpetually incomplete and partial, often unbelievable, and of limited potency if not backed up by other bureaucratic or political practices. The more CBA is used, the more evident it becomes that it ‘is no less dependent on officials’ virtues than are its more intelligent alternatives’ (Richardson, 2001, p. 154) and that, however, it is construed, the technique itself engenders movements of opposition and self-redefinition.

Framing surveyors

In formatting subjects, cost–benefit analysts, like opinion pollsters, inevitably also format themselves. Simultaneously constituted, empowered and constrained by the practices they participate in, they produce numbers that make their actions, and those of their political patrons, vulnerable to scrutiny by experts while protected from challenge by many others. Yet the ‘gated community’ protection that CBA offers to its practitioners and patrons – and the privileges, centralized location and exclusions that go with it – itself ultimately opens up new vulnerabilities and negotiations for identity. What ‘works’ in this attempt to frame new economic/policy transactions also renders it incomplete. The frame itself turns out to be an unstable border object vulnerable to exchange.

For example, as Espeland (1999) notes, the legitimacy of commensuration often hinges on the disavowal of its constitutive effects. Its authority depends on being seen as a representation of ‘something that is already out there’. Accordingly, cost–benefit analysts, insofar as they follow a textbook model, must construct themselves, as much as possible, as beings that are ‘not there’ except as passive conduits or inscribers of knowledge originating elsewhere. In the CV interview room, this plays out, as suggested above, in a stance of conversational semi-passivity that attempts to avoid any ‘perception of interviewer pressure’ (Hanemann, 1994, p. 24). Interviewers pose questions but strive to exclude context. However, in a survey, as in any other conversation, complete passivity is unattainable. As geographer Jacquelin Burgess and her colleagues point out, questioner and respondent will always

be ‘locked in dialogue’, each acting on the other (Clark et al., 2000). In a dialogue, no one can black-box herself into invisibility or avoid influencing the person she is listening to (Lewontin, 1995, pp. 43–44). Even silence conveys a meaning, and some context, or set of contexts, is always implied. The question is not whether researchers act on their subjects, but how. Every interview is a step in the evolution of society’s views. Holding detachment up as an ideal is likely to increase not only difficulties of interpretation for both parties, but also awkwardness and possibilities for hostility and perceptions of disrespect.

In addition, cost–benefit analysts construct themselves as arrogant and elitist whenever, during further stages of preference processing, they discard ‘protest bids’ or statistical inconsistencies as manifestations of subjects’ irrationality, ignorance, stupidity or fickleness; edit them so that they reflect what subjects ‘must have really meant’; or disregard certain kinds of identities, all the while attributing to themselves privileged access to subjects’ values or the inner structure of practical reasoning.¹⁸ The result can be further resistance and difficulties in carrying out CBAs. ‘Trust in numbers’ turns out, again, to be more difficult to construct among lay-people in ‘the field’ than in the university lecture hall or textbook page. Because conversation is by its nature a social activity, the contingency of the ‘code books’ through which subject responses are translated into figures cannot be hidden for long (Espeland, 1999).

The difficulty facing the new policy-making space that CBA promised to frame, in short, was not that not enough ‘externalities’ were being, or could be, ‘internalized’, or brought across the economic border. It lay, rather, in the notion that an ‘internal’ and an ‘external’ could be fixed at all. Like the ‘frame or border of the economy’, the boundary of the CBA’s quasi-market for policy choice proved to be ‘not a line on a map, but a horizon that at every point opens up into other territories’ (Mitchell, 2002). The framing operation that brought into existence both a newly centralized expertise on the one hand, and a new market-inspired decision space on the other, turned out to be indefinitely problematic. As Callon urges, ‘we need to ask what the cost is, in terms of practical operations, for this neoclas-

¹⁸ Opinion pollsters also tend to attribute irrationality or fickleness to the public when their predictions fail, as they did in the New Hampshire democratic primary election of 2008.

sical economics to gather the instruments, prostheses and devices needed to constitute the *agencements* required in the emergence and survival of the very particular (and highly improbable) agencies that it promotes' (Callon, 1998b).

Conclusion

'Every category', Bowker and Star (2005) write, 'valorizes some point of view and silences another.' The categories created through commensuration for purposes of environmental accounting are no exception. For many years social scientists have enriched their analyses of power by studying how new equivalences and omnibus categories are created that compress space and time (Harvey, 1989), 'simplify' nature or culture in the service of the 'high modern state' (Scott, 1999), create 'bound and unbound serialities' (Anderson, 1999) and so on. Mingled with such analyses have come a growing number of investigations of 'borderlands' (Tsing, 2007) and of limits to the 'naturalization' of categories (Bowker & Star, 2005; Collins, 1992; Geertz, 1973; Latour, 1994; Wittgenstein, 1953) and of commensuration (O'Neill, 2007; Rose, 1999; Thompson, 1990). Environmental accounting, with its relentless generation of new equivalences and categories – as well as resistances to them – deserves a prominent place in such studies. Even on the narrowest conceptions of politics, environmental accounting both comes out of politics (for example, political pressures for a neoliberal 'market solution' to climate change, competition between government agencies and a need to shift accountability for public choice to centralized, supposedly impersonal mechanisms) and returns to it (for example, carbon accounting institutions giving rise to local opposition, CBAs being used for competing purposes). On a broader conception, environmental accounting never left politics; in its beginning is its end.

In exploring this theme, this article has distanced itself from the questions of whether 'internalizing' the 'externalities' of climate or social welfare into 'the economy' is a solution or a contribution to ecological crisis, and of whether it is better in the abstract to 'mend or end' efforts to 'mainstream' climate, welfare or environmental considerations by engaging in, say, carbon offset accounting and cost–benefit analysis. Instead, it has problematized the 'internal'/'external' metaphor itself in the course of suggesting that there may be a more fruitful debate to be had. For example: how disruptive

and damaging are the practical consequences of carbon accounting's attempts to frame a new omnibus category of 'emissions reductions'? Of cost–benefit's attempts to frame a new policymaking space and the individuals that are to inhabit it? Are there better ways for critics of environmental accounting to argue that it is a central source of environmental crisis than by warnings about the dangers of environmental goods being assimilated into a sharply-bordered, ever-expanding 'market sphere'? Would it not be more fruitful and historically informed for proponents of increased environmental accounting, too, to abandon the metaphor in favour of a programme for anticipating, evaluating and dealing with the perpetually proliferating overflows and entanglements that, for example, carbon accounting and cost–benefit analysis entail?

Carbon accounting and cost–benefit analysis, this article has shown, are parallel in many ways. Both are pioneer techniques, performing multitudes of new spaces, subjects and objects in their work to 'make things the same'. Both are indefinitely ambitious, calculating worlds with and without certain policies or projects. Both will remain perpetually incomplete while always holding out, to some of their proponents, the promise of completion, thus encouraging indefinite further investment in centres of calculation. Accordingly, both require the contributions of ever-expanding bodies of expertise, and the documentation connected with each technique is invariably enormous. Both, too, can be 'adopted by many warring factions' (Sen, 2001, p. 115), and crafted to yield vastly different results (Stirling, 1992; Sunstein, 2005, pp. 132–148). Yet while both techniques might seem destined to reinforce the political power of accounting expertise, each in fact helps engender intractable reactions and resistances to itself. Although each technique to a certain extent uses the public's distance from its centres of calculation to 'black-box' areas of measurement controversy, and thus maintain some public faith in the abstract idea of computability, in both cases, the more intimately acquainted people become with the relevant accounting practices, the less plausible and more contested they become.

Both carbon accounting and cost–benefit analysis work to frame major new market or purportedly market-like spaces in which conventional distinctions between physical science and economics and among legal, political and price incentives become blurred. Carbon trading's requirement to commen-

surate disparate properties, actions and potentials in the service of making carbon pricing possible parallels CBA's need to isolate well-behaved, commensurable preferences in the service of calculating welfare. Both imperatives generate zones of ignorance and 'stupidity' (Richardson, 2001) that are, in the long term, difficult to maintain given the goals each technique was ostensibly designed to help achieve. For example, carbon accounting's indifference to where or how emissions cuts are made discourages attention to path dependence, positive feedbacks and innovation; its conflation of reductions and offsets leads to a running together of probability with uncertainty, ignorance and indeterminacy; and its focus on means of achieving short-term efficiency obstructs social thinking about long-term directions and the drawbacks of having to monitor geographically distant effects. By the same token, techniques for constructing preferences for use in CBA typically exclude from their 'epistemic probe' (Sen, 2001, p. 114) alternatives that require public discussion to identify, while interpreting subject resistance as irrationality.

All translations have biases. So does the reframing of disputes over environmental accounting that has been suggested in this article. While this reframing aims to stimulate new approaches in what often seems a stalled debate, it is also intended to provide suggestions for strategic self-interpretation on the part of social activists, critical scientists and other intellectuals disturbed by the erasures, conflicts and exaggerated claims generated by environmental accounting techniques, or curious to see to what extent the extension of such techniques can be defended. Whether the article succeeds in this job is a matter for them to judge.

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