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The Economics and Ethics of Human Induced Climate Change

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Abstract

Human induced climate change poses a series of ethical challenges to the current political economy, although it has often be regarded by economists as only an ethical issue for those concerned about future generations. The central debate in economics has then concerned the rate at which future costs and benefits should be discounted. Indeed the full range of ethical aspects of climate change are rarely even discussed. Despite recent high profile and lengthy academic papers on the topic the ethical remains at best superficial within climate change economics. Recognising the necessary role of ethical judgment poses a problem for economists who conduct exercises in cost-benefit analysis and deductive climate modelling under the presumption of an objectivity that excludes values. Priority is frequently given to orthodox economic methodology, but that this entails a consequentialist utilitarian philosophy is forgotten while the terms of the debate and understanding is simultaneously restricted. We set out to raise the relevance of a broader range of ethical issues including: intergenerational ethics as the basis for the discount rate, interregional distribution of harm, equity and justice issues concerning the allocation of carbon budgets, incommensurability in the context of compensation, and the relationship of climate ethics to economic growth. We argue that the pervasiveness of strong uncertainty in climate science, incommensurability of values and non-utilitarian ethics are inherent features of the climate policy debate. That mainstream economics is ill-equipped to address these issues relegates it to the category of misplaced concreteness and its policy prescriptions are then highly misleading misrepresentations of what constitutes ethical action.

Keywords:
Climate change; economics; ethics; carbon budgets; discounting; compensation; harm; intergenerational equity; intragenerational distribution; justice; consequentialism; utilitarianism; incommensurability; risk; uncertainty; cost-benefit analysis; growth economy

[1] A version of this discussion paper will appear in a forthcoming book **Fehler! Nur Hauptdokument***The Ethical Underpinnings of Climate Economics.* Edited by Adrian Walsh, Säde Hormio and Duncan Purves. London: Routledge.

Introduction

Discussions relating to the ethical underpinnings of economics and their implications for understanding human induced climate change have typically been sustained at a superficial level of engagement due to the restrictions imposed by maintaining consistency with the tenets of mainstream economics. Belief in a Humean fact-value dichotomy is evident in the promotion of economics as a positive science and the persistence of regarding 'efficiency' as an uncontroversial and value free objective. This distinction, made by Hume (1985 [1739/1740]: 521) as a passing remark, was taken-up as a major philosophical distinction. Hume's concern was that some authors drew unwarranted moral direction from factual/empirical claims to knowledge. Later this became taken as a prescriptive difference with the analytical/factual/empirical being seen as scientific while the normative/ethical/moral was seen as a distinct area of knowledge; the former supposedly could not direct human action while the latter could provide such direction. In economics this is enshrined in the split between positive and normative economics, in philosophy the analytical vs. normative, and more generally the division between science and politics.

Under such reasoning, discounting the future becomes merely an aspect of empirical reality to be objectively observed in a positive economics. The logic of discounting is then enforced as part of resource efficiency as if this were not an ethical choice (e.g., Arrow et al. 1996). Even those who recognise the importance of ethics in economics wish to maintain an analytical economics separated from the ethics and fall back heavily on a narrow consequentialism (for example Stern 2014a). Thus, climate economists typically regard policy decisions as being made on the basis of weighing the costs of death and destruction against the benefits of increasing consumption, and deem this a necessary act of rational and efficient economic risk management (e.g., Stern et al. 2006). Under the mainstream economic framing the imperative

of growth cannot be questioned and is actually described as a means for controlling human induced climate change (GCEC 2014), rather than a fundamental cause of the problem in the first place.

None of this mainstream climate economics has gone without critique (Spash 1993; 1994b; a; 1996; 2002a; 2006; 2007e; d; c; b; a; 2008; 2010; 2011; 2014; 2015). The problems include the value loading of economic models, the reduction of strong uncertainty to risk management, ad hoc assumptions of cost-benefit analysis including the attribution of differential values of life to rich and poor, and the basic ethical narrowness of utilitarianism, especially in its preference version (Spash 2002a; 2007a; e). Yet, such issues have made no substantive impact on the practices of climate economists (such as Nordhaus, Pearce, Fankhauser, Velinga, Tol, Hope, Stern). Even those who note the problems and discuss some of the fundamental flaws in analysis, go on to defend the basic approach of mainstream economics. For example, Stern (2014a; b) repeatedly pours derision on the main climate modelling methods and approaches (e.g. integrated assessment model, expected utility, discounting, cost-benefit), but he claims all such economics must be kept as part of the information set (note, all these were also employed in the Stern Review and its policy recommendations). We might speculate that commitment to the orthodoxy comes prior to undertaking critical science and clearing out redundant approaches and misleading information.

That the work of economists is fraught with problems is relevant to both the theoretical approaches taken and the policy recommendations made on the basis of economic analysis (e.g., internalising externalities, adjusting prices, implementing tradable permit markets). While economists claim their analysis of pollution problems, such as Greenhouse Gases

(GHGs), is distinct from the policy instruments to be employed, in reality the two are heavily entwined. Indeed, mainstream economists are self-defining as those who favour market-based institutions to achieve efficiency and who promote them above all else. Decades of neoliberalisation in politics has impacted neoclassical economics, and its resource and environmental economic offshoot, so that the differences between the neoclassical and neoliberal have faded away (Fellner and Spash 2015). This is evident in the lack of any serious attention to planning and regulation as substantive and effective alternatives to price mechanisms and markets, and the failure to highlight the need to regulate international corporations, that operate as much as possible outside of the legal systems that are established and enforced primarily by nation States within their national jurisdictions.

In this Chapter we explore some key ethical issues within climate economics and place them in the broader public policy context of a growth economy. More specifically five aspects are discussed. First, there is the notion of intergenerational ethics, and how future generations are included into economic models, with a debate centred on choosing the appropriate discount rate. Second, the interregional context is raised as a central topic often neglected in economic debate, but one that has been highlighted by the environmental justice movement and is clearly central to concerns over equity in mitigation and the urgency attributed to impacts. Third, the current international mindset of regarding development as economic growth is explored as a central presumption of mainstream economics and the international policy community. The implications—justifying business as usual while deliberately creating harm of the innocent—are far reaching. Fourth, the issue of incommensurability is raised, in the context of compensation, and a distinction drawn between basic maintenance of living standards and liability for harm. Fifth, the way in which uncertainty is conceptualised as risk

is seen to predetermine the ethics that are applied, allowing prevalence of a narrow consequentialist approach as rational management.

Intergenerational ethics

From the outset, economists addressing human induced climate change framed the issue as primarily an intergenerational problem (d'Arge et al. 1982). This led economists to focus on the equity of resource distribution and the necessity of transfers from the present to the relatively distant future to achieve compensation for the deliberate harm of the innocent (Spash 2002a; Spash and d'Arge 1989). This focus arose because GHG control costs were assumed to be incurred immediately any mitigation action was taken, while the benefits of that control (i.e., harm avoided) would accrue in the distant future. Economists, obsessed by optimisation and economic efficiency, then looked for the optimal allocation of costs and benefits in a model that both questioned current practice (emitting GHGs) but also justified its continuation (control costs exceed benefits).

The economic perspective recognises that business as usual means the damages from human induced climate change are pushed onto as yet unborn generations, but does not condemn this as unethical in itself. The concern is limited to criticising the outcome as possibly inefficient as a means of maximising utility. Killing future people and destabilising the Earth’s climatic system for too little economic gain in the present is a poor resource allocation decision. If it achieved the maximisation of expected aggregated net benefits, or social welfare, then that would be fine. What is required, according to this logic, are potential Pareto improvements where some gain (e.g., the already rich) and theoretically none would lose (i.e., if there was actual redistribution of the gains to the actual losers).

In order to make such claims operational in economics, time horizons must be bound and flows over time of welfare, or utility, weighted. Discounting provides a means by which economists can effectively write-off future consequences as of little or no importance, compared to current ones, and do so without explicitly clarifying the ethical basis for their choice (e.g., Arrow et al. 1996). The ethics and economics of discounting are part of the theoretical approach to addressing resource allocation and making decisions within an economic consequentialist philosophy. This is linked to models which claim to optimise resource allocation on the basis of utility maximisation. Such models have been employed continuously from the start of the climate economics literature: Nordhaus (1977) through Stern et al. (2006) to the 2014 IPCC report of Working Group III on mitigation (Kolstad et al. 2014). The approach connects to economic welfare theory and assumes methodological individualism, whereby society is treated as an aggregate of individuals and well-being can be represented in a social welfare function (SWF). Yet, even a minute benefit that exists for an infinite time horizon would be infinite, dominate aggregation calculations and so destroy the economist's trade-off and net benefit analysis. This means, in addition to discounting, a fixed time horizon is always also required to avoid infinite values. Bounding the time frame appears logical, in the context of discounting, because future flows of welfare head asymptotically towards zero and, as a result, soon have so little weight as to effectively become insignificant.

In summary, the economic approach aims to aggregate social welfare overtime, using discounting, and cuts-off the long-term prospects that would make calculations meaningless. The foundational presumption for both discounting, and cut-off, is that future benefits and costs should have less weight in current decisions than those of the present. There are two main justifications for this. First is that individuals are argued to have a time preference bias which means they want to consume things now, and not wait, and they prefer to push harms

into the future. This preference utilitarian justification is criticised as leading to myopia, but remains central to the economic approach. Second is the presumption that economic growth will always be positive and increase the amount of consumption in the future. This makes the present generation the poorest in terms of aggregate social welfare.

Why then should the poorest (present generation) be required to transfer to the rich (future generation)? The argument is that investment in capital results in greater productivity which acts "as the minimum rate of return that is necessary to compensate for this adverse effect on the SWF of investing for the future" (Kolstad et al. 2014: 229). So, the economic logic is that the present needs to be rewarded (or compensated) for investing in the future (i.e., delaying consumption by creating capital) and capital growth will achieve this. Present growth rates are then aggregated and extrapolated, ignoring anomalies of non-growth periods, non-growing economies and the vast majority of human history where economies did not grow. A typical consumption growth rate adopted is 2 percent.

Establishing what the social discount rate should be for public policy projects is highly contested within economics, but as a technical issue not an ethical one. A standard formula combines the pure rate of time preference and the declining marginal utility of income to define the discount rate r:

$r = \delta + \eta g$

where δ (delta) is the rate of pure time preference, g (gamma) is the growth rate of per capita consumption, and η (eta) determines the effect of economic (consumption) growth on the discount rate. The term η is variously described as an inequality and/or risk aversion parameter. Inequality here refers to the assumption that the future will be consumption rich and the present is relatively consumption poor. Some argue the pure rate of time preference

should be zero (e.g., Cline 1992); Stern et al. (2006) used 0.1 percent on the basis of potential planetary extinction; while the IPCC's Working Group III cite Weitzman as recommending 2 percent (see Kolstad et al. 2014 Table 3.2).

An argument that has been employed by economists is that the social discount rate should be constructed on the basis of empirical observation (e.g., actual growth rates and time preferences). This was used to justify discounting by the IPCC in both its 3rd (Arrow et al. 1996) and 5th (Kolstad et al. 2014: 229) assessment reports. Economists who employ this argument believe that markets operate as perfectly as described in their microeconomic textbooks and discount rates are merely the price (or opportunity cost) of time. They may claim that all public projects should earn the market rate of return, and if they cannot they are not justified on the basis of efficient resource allocation. The implication is that there is a relevant, single, easily measurable rate that can be observed, rather than the reality of many rates existing in different countries and contexts that are conflated with the differential risks associated with alternative capital investments.

This naïve empiricist position is also indicative of the way in which economists, claiming to be analytical, divorce the implications of discounting from its full consequences and hide the implicit ethical position they adopt. Ethics is impossible to divorce from the discount rate chosen and is a good example of why the fact-value dichotomy, and the associated positive-normative distinction in economics, is an illusion. That an ethical judgement is inevitably adopted whatever rate is chosen, and on whatever basis it is chosen to be justified, is generally ignored by economists (Spash 1993; 1994a). To make the point as self-evident as possible, Table 1 shows the full range of potential positions on the social discount rate and specifies alongside each the ethical implications.

TABLE 1 ABOUT HERE

While the preceding explanation should make clear that determining a discount rate denotes a fundamental ethical judgment, economists have a tradition of treating discounting as a technicality (Price 1993). They persist in the belief that some scientific approach is to be implemented that is value free. In practice the social discount rate employed in climate models and assessments is chosen arbitrarily and varies widely, along with its justification (Pindyck 2013). For example, Nordhaus (2007) has applied a discount rate of 4.3 percent, Stern (2006) used a rate of 1.4 percent. The dominant convention in cost-benefit analysis has been to use relatively high (e.g., 5 to 10 percent) discount rates.

The 5th assessment report by IPCC Working Group III presents a selected literature and some data in order to claim that: “An appropriate social risk-free discount rate for consumption is between one and three times the anticipated growth rate in real per capita consumption” (Kolstad et al. 2014: 211). That same report calculates and presents differential rates for a selection of countries (Kolstad et al. 2014: 231). China is attributed a rate of 15.20 percent while, at the opposite extreme, Zaire has -5.52 percent. In terms of the consequences for action on climate change this would mean China can totally ignore future welfare and any damages because they have little weight in current decisions (i.e. after 30 years only representing 1 percent of an equivalent cost or benefit today). Such countries with fast growing consumption rates are meant to value the future less because the utility of consumption is declining. By contrast a country with a negative consumption growth rate would (on economic efficiency grounds) need to weigh future losses as more important than present gains, because future consumption is more valuable. Thus, given damages arise in the

future, on this economic logic, growth economies, the high GHG emitters, should ignore GHG control while the non-growth economies, low GHG emitters, should undertake action.

The lie of the technical calculation argument, and its naïve empiricist approach, is that its advocates are never prepared to implement or even discuss such conclusions. Instead economists simply ignore zero and negative discount rates when economies are in recession, because this is not 'normal'. Economies that fail to perform as the economic growth modellers predict are regarded as just temporary anomalies. So, as the World Bank's development indicators show, while a variety of countries have in recent times recorded persistent negative growth rates (e.g., in the European Union alone 16 out of 28 countries over the period 2009-2013 with all countries except Poland having one or more years of negative growth), these have not been allowed to influence the use of a generic positive discount rates in all climate economics (and elsewhere). Neither do economists take into account the evidence for individuals holding negative time preference rates, whereby they bring forward harms and delay pleasures (Baer and Spash 2008). The conclusion is that economists choose to use positive discount rates because this fits their *a priori* theoretical commitments and ideological beliefs—that society should increase consumption—not any empirical reality.

In any case, deriving a discount rate from the observation of markets has little to do with protecting the long-term interests of society, not least because human preferences are an inadequate basis for guidance as to moral action (O'Neill 1993). The use of discounting ignores the need for precaution in the face of a highly uncertain future with irreversible catastrophic scenarios. None of this prevents the endless rhetorical debate of climate

economists about discounting, which serves to distract from more substantive issues, including the ethical implications of their policy recommendations.

Interregional ethics

Impacts of human induced climate change, such as weather anomalies in specific parts of the world, are already occurring according to the IPCC 5th Assessment Report (IPCC 2013). This makes evident that the focus on intergenerational ethics has become highly misleading, and that there are ethical concerns relating to shifting costs onto others across space as well as time. In fact, intratemporal distribution was always relevant to the economics of mitigation strategies (see d'Arge and Spash 1991), even if ignored by most economists and their models. The interregional ethical implications of human induced climate change arise in two ways. First is the issue of who is seen to be responsible for GHG emissions, and so who should be undertaking mitigation measures. Second is how the consequences of climate change and ability to respond of those impacted are both differentially distributed across space as well as time.

On the mitigation issue the attribution of responsibility for control of GHGs has implications for who gets to burn fossil fuels, and so who gets to continue using the knowledge, technology and related infrastructure of the fossil fuel economy that has been constructed over two hundred years. The failure to undertake any significant mitigation measures during the last quarter century has meant much hope is increasingly placed upon geoengineering, and similar technological miracles (biotechnology, carbon capture and storage), that claim no systemic change is necessary and the continued use of fossil fuels is possible. Such techno-optimist positions rely on unproven future technological promises that have highly uncertain side effects. In addition, the much hyped, carbon capture and storage has limited applicability,

high costs and little impact on the required emissions reductions (e.g., see McGlade and Ekins 2015). There are no technologies available that can remove GHGs from the atmosphere after they have been released on the scale of current emissions, store them securely with low risk of failure, and do so at a resource and energy cost that makes any economic sense. That negates the argument for rich nations discharging their ethical responsibilities under human induced climate change by investing in technology and passing on the results to others (e.g., GCEC 2014; Stern 2014b). This leaves the immediate issue as preventing GHG emissions from occurring in the first place and doing so with existing technology and knowledge.

The prospect for development, when defined as traditional fossil fuel driven economic growth, is then highly constrained. This is a key issue of contention for countries wanting to follow the same path already taken by industrialised nation States. The nations of Europe and North America, as the first to industrialise, have had longer to burn fossil fuels and embody them in infrastructure, capital stock and military power that has enabled access to resources elsewhere. They have been responsible for the historical accumulation of GHGs that has created enhancement of the Greenhouse Effect. As other nations, such as Japan and Australia, industrialised they joined the club of GHG emitters. In recent times Brazil, Russia, India, China and South Africa (the BRICS nations) have become new major sources of accelerating emissions. China and India are presently heavily implicated in expansion of emissions from a massive build of coal fired power stations, and this is set to continue, regardless of their claimed intended reductions (or independently determined national contributions) under the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP) Paris Agreement in December 2015. The top six emitters of CO_2 in absolute terms, in 2014, were China (30%), the United States of America (15%), European Union (10%) of which Germany contributed over a fifth, India (7%), Russia (5%) and Japan (4%);

covering regions that together were responsible for 71% of global emissions (Olivier et al. 2015). Meanwhile, there are 120 countries producing only 1% of emissions (The World Bank 2016). Clearly, the responsibility for producing GHGs differs extensively across nation States in correlation with industrialisation and mass consumerism, with many having little or no responsibility for human induced climate change.

The position is even more stark when considering consumption inequity per capita because the vast majority of the world's population lack access to, and/or consumption of, the goods and services that are the products of the fossil fuel combustion economy. The largest per capita emissions come mainly from oil and shale oil producing nations and some small island states, but also in the top twenty, or so, are the USA, Canada, Australia (all in the 16-17 metric tons per capita range) and Russia (12.6 metric tons per capita). At the extremes are Qatar with 44.0 metric tons per capita compared to the low income country average of 0.3 metric tons per capita (figures for 2011 from The World Bank 2016). Again there is clearly gross inequity between countries based on industrialisation and resource extraction.

The basic issue here is that only a limited amount of GHGs can be emitted before exceeding atmospheric concentrations that threaten serious, significant, on-going and irreversible damages. For example, current proven reserves of fossil fuels represent at least three times the budget, in terms of carbon equivalent emissions, that can be used if the 50:50 chance of a 2°C target were being attempted (Spash 2016). Several questions then arise. An obvious one is on what basis should the GHG budget be allocated and who is required to leave their reserves untouched and in the ground? In addition, who gets to burn the fossil fuels that are extracted (e.g., industrial imperial China burning Australian coal), on what basis (e.g. purchasing power, military power, or fair share) and who must accept they cannot do so? Who then

benefits from this combustion (e.g., North Americans and Europeans buying Chinese products or the world's poor)? The overarching problem here is that claims are being made for the importance of equity (e.g., the Paris Agreement) but what that means is left totally unclear, and if left to business as usual—under the rhetoric of 'more growth for all'—will be a continuation of injustice.

One approach to equity is to divide the remaining GHG budget per capita, but this would not take into account the historical use. That is, some countries have already used far more than their 'fair share' of all permissible emissions across time. So, an alternative is to allocate on the basis of historic emissions. However, this might backfire by allowing new fossil fuel combustion infrastructure and absolute additions to the atmospheric concentrations, for example, as is now happening in China and India. Similarly, emissions would be encouraged to increase where little or none have occurred before and they might be more easily avoided due to lack of infrastructural lock-in. That is, the potential for non-fossil fuel development paths is too readily pushed aside in the scramble for rights to burn fossil fuels. At the same time, such a policy might fail to remove the global fossil fuel infrastructure where it already exists. The difficulty of addressing the latter problem is also a major political stumbling block for international policy. The modern industrial State has an accompanying military power that is in essence based upon fossil fuels for its ability to operate on a daily basis. Who will take away fossil fuel infrastructure from the USA, China, Russia, to name but a few military-industrial nation States?

Some aspects of dividing-up the remaining budget have been explored by Raupach et al. (2014) for a 2°C target. They contrast the positions of USA, EU, China and India with the Rest of the World (RoW). They pose three scenarios: business as usual, mixed and per capita

with 37%, 45% and 53% of the budget going to RoW under each option, respectively. The shift for the USA and EU in the move from business as usual to per capita scenarios is to cut their budgets from 26% USA and 18% EU to 4% USA and 7% EU. When they add-in the past cumulative emissions and those to which there is already a commitment, due to new infrastructure, the result is that the USA and China have already exceeded their allowance under their equity principle based on population.

Additional problems arise in deciding how to attribute budgets and emissions responsibility between production and consumption. Employing manufacturing production as the measure of emissions can allow Western mass consumer economies to push emissions responsibilities to industrially less developed countries, while continuing the consumption of their products. For example, Bangladesh produces cheap clothing for Western countries and under a production approach would need to account for the related emissions, rather than the richer countries that buy the products. However, neither consumer nor manufacturing responsibility for emission addresses resource extraction and supply so that nations like Norway and Australia avoid responsibility for carbon emissions due to their oil and coal production respectively. Ethically this is like stating “I only made the gun, I didn’t shoot anyone”, while knowing the use intended.

In addition to the mitigation issue there is the inequitable spatial distribution of impacts and the variation in ability to adapt to those impacts. Specific changes in regional climates are expected to differ substantially from the expected global averages, and so the resulting costs will be distributed unevenly. Greater costs are generally expected for developing countries. Altered growing seasons, for instance, would undermine the economic basis of agriculturally based economies. Africa is regarded as most vulnerable due to widespread poverty and

associated limited adaptation capabilities (Watson et al. 1997). The impacts of climate change are unevenly distributed and the beneficiaries of fossil fuel emissions are not the same as those who will be harmed by those emissions. For example, a country like Bangladesh is expected to suffer substantially through rising sea levels, while also lacking the means to react to such changes compared to nations that have the power to command resources and have accumulated infrastructure.

In general, economics has pushed equity and distributional issues out of its analysis on the basis that this is a political (value) issue and not an efficiency (factual) one. Mainstream welfare economics then focuses on Pareto improvements assuming the initial distribution of wealth is given. Exchange and trade through markets is then meant to increase the overall level of welfare. The analysis fails to recognise that markets are just one institution amongst many that constitute societal organisation (Chang 2002). Establishing markets as the means for resource allocation also establishes the principles for obtaining resources and so what is deemed equitable. In separating distributional issues from allocative efficiency of resources, economics claims it is only undertaking analytical research and that the resulting work employs objective (value free) evaluations. However, the methodology makes ethical judgments implicitly, not least in its prioritisation of efficiency above other social goals and markets above other institutions.

One response to the problem of distribution in economics is the claim that economic growth will provide so much wealth that nobody need worry. Everybody who has so far been left out (the vast majority of the world's population) will benefit from economic growth. This has been used in the past to avoid redistribution within a country, minimum wages, progressive taxation, inheritance taxes and so on. Today the same argument is being employed to claim

growth can both solve climate change and do so by providing gains so nobody need be worse off (i.e., Pareto efficiency). Thus Stern (2014b) argues that combining growth with technology will mean no need for difficult choices over burden sharing. He co-heads, with former Mexican President Felipe Calderón, an initiative to promote the ideology of growth in the context of human induced climate change (GCEC 2014).

Climate Ethics in a Growth Economy

Ecological economists have long pointed out the consequences of the growth economy subject to the laws of thermodynamics (Georgescu-Roegen 1971; 2009 [1975]; Martinez-Alier 1990). Prioritisation of affluence, based on material and energy throughput, means creating the same mass in terms of waste as the mass of resources that go into the production system (i.e., neither mass nor energy is created or destroyed). As fossil fuels are burnt CO_2 must be released and so there is a direct correlation of both with production and consumption in the modern fossil fuel driven economy. Climate change is then an inevitable structural part of the current economic system. Economists, such as Stern (2014b: 419), who label this the biggest market failure ever, have not grasped the basic functioning of the economy in biophysical terms, nor the fact that, socially, costs are shifted as part of the functioning of the economy, not as some error of the price system (i.e. an externality). Kapp (1978) long ago criticised the inaccuracy and unreality of the externality conceptualisation as used by economists.

One result of this misconceptualisation is a strong presumption in the economic approaches to climate change that, subject to some price corrections, economic growth will continue and indeed that it is a priority that it does continue. The assumption that it will continue is the primary justification behind discounting. The fear that it might be stopped by climate change

is a primary motivation in calls for action led by an elite of economists, financiers, bankers and political leaders (Spash 2014). The combination motivates mainstream economists to promote the growth economy as being ethical despite the apparent creation of unethical outcomes. That is, when growth and the drive for material affluence creates harms, the pro-growth economist feels the necessity to counter this by arguing the growth economy is the only way to create other more important good outcomes. This is the revelation of the consequentialist and utilitarian logic that is implicit in the ethics of mainstream economics.

Thus, the linking of growth to poverty alleviation has seen a revival (GCEC 2014), despite the infamous trickle down effect having been discredited (OECD 2011). Recognition that the current economic system benefits a minority is nothing new (e.g., the writings of Gramsci in the 1920s and 30s, see Hoare and Smith 1971), but consistently the opposite is claimed. So the message must be restated that there is nothing inherent in a growth economy that necessitates improving the lot of those at the bottom. Indeed, across the globe the exact opposite has proven to be the case in a system where subsistence wages are maintained for the majority, labour exploited and resources extracted for export leaving a degraded and polluted local environment. The resulting economic and societal organisation has been termed the "imperial mode of living" by Brand and Wissen (2013), because all those who benefit in terms of affluence do so at the cost of others (e.g., through appropriation of their environment, resources and ecological assimilative capacities). The beneficiaries accept, or more typically ignore, the harm their lifestyles create because this is the norm in the modern affluent society. Climate change is then the imposition of damages via a massive cost shifting exercise which aims to benefit the capital accumulating economies and sectors, and those who obtain (mainly by luck of location and birth) sufficient purchasing power to actively engage in the hedonistic pleasures of the consumer society.

The debate around climate economics has increasingly been shifting ground from the implications of an environmental catastrophe to the meaning for the growth economy. Apologists for growth claim they are agnostic about it, as if the issue were irrelevant to the environmental crisis, because the goal is really welfare creation and growth just happens along the way while protecting the capital stock and rates of return (Jakob and Edenhofer 2014). Natural capital can then include everything to do with the environment and provide competitive rates of return so that all will be right with the world (for a critique of natural capital see Spash and Clayton 1997). Those who know the political importance of growth—for maintaining the existing social structure of which they are on top—are far more ready to attack anyone questioning growth (as Stern has done publicly, see Spash 2014). Regardless of differences, both these pro-growth and agnostic/apologist camps end-up promoting growth as the only means for addressing poverty. The big success of the economic growth lobby in Paris was to link the whole climate agreement to a UN sustainable development agenda that in 2015 took as a core goal a minimum of 7% growth rates for developing countries (Spash 2016).

Emerging movements (e.g., degrowth and environmental justice) highlight the importance of breaking the imaginary of "affluent materialist lifestyles for all" that has been pervasive in the Western world and spread globally. They call for a different system that rejects capital accumulation and hedonistic satisfaction based on consumerism as the primary guiding principles for humanity. Ideas of the morally 'good life' for all, a meaningful life and Aristotle's virtue ethics contrast with the economic approach. While this might appear a utopian endeavour, it is no more, or less, so than the economic model that promotes sustained growth on a finite planet with finite resources and limited source and sink functions, or

pretending all can benefit from a system based upon exploitation and cost shifting, or pretending there are miracle technologies that will solve all social, ecological and economic problems.

The Ethics of Compensation

A key assumption in mainstream economics is that everything can be made commensurate. This can take different forms. In the capital approach, favoured by many statistical agencies, commensurability means reducing everything down to forms of capital (e.g. natural, social, human) which can be traded-off one for the other. In the cost-benefit literature commensurability means that all impacts can be equated to all investment expenditures, which enables financial returns to be traded-off with a variety of losses from life to leisure. In the literature connecting growth to climate change, commensurability means increasing consumption can be used to compensate for the creation of harm.

The issue becomes especially apparent when looking at climate change impacts. For example, the small island states can expect to be submerged due to sea level rise. Under the mainstream economic approach this will involve estimating such things as the value of habitat for humans and non-humans, the loss of cultures, extinction of some fauna and flora, and the likely death of a significant number of people. The changes do not fit the industrial manufactured commodity framing, in which economics has developed its conceptualisation of the world of goods and services, where all things can be equated. Coral bleaching, for instance, threatens the existence of the Great Barrier Reef, the Earth's largest single structural compound of living organisms, and this is likely to occur at even low increases in temperatures (Stocker et al. 2013), which means it is not some far distant event. The attempts to value such changes in terms of hypothetical market preferences lack all theoretical foundation.

Even mainstream economists like Stern (2014a) recognise there are problems here for mainstream economic analysis. His concern is for scale and the non-marginal character of the changes disturbing the theoretical validity of the economic approach embedded in integrated assessment models and welfare economics. That is, loss of major ecosystems is not a marginal change justifying economists in their assumptions of ceteris paribus and constant marginal utility of money as the measuring rod of all things. Yet, this has not prevented Stern from being fully prepared to claim rising future consumption can compensate for everything, and this (as mentioned earlier) is an underlying aspect of the justifications for his and others use of discounting (Baer and Spash 2008; Spash 2002a; 2007d). Nor did this, or any other of the long standing critiques in the literature, prevent global cost-benefit analysis from being central to the analysis and policy claims of the Stern Review.

Indeed, the Stern Review discusses picking a stabilisation target that is defended on grounds of welfare economics and a comparison of marginal costs and benefits. More specifically Stern et al. (2006: 295) state:

> "Our work with the PAGE model suggests that, allowing for uncertainty, if the world stabilises at 550ppm CO_2e, climate change impacts could have an effect equivalent to reducing consumption today and forever by about 1.1 per cent. As Chapter 6 showed, this compares with around 11 per cent in the corresponding 'business as usual' case—ten times as high. With stabilisation at 450ppm CO2e, the percentage loss would be reduced to 0.6 per cent, so choosing the tougher goal 'buys' about 0.5 per cent of consumption now and forever. Choosing 550ppm instead of 650ppm CO2e 'buys' about 0.6 per cent."

There is no account of the involuntary imposition of physical harm and threat of harm to people spread across countries and generations. Framing the policy question as a trade-off between fewer commodities and greater risk of harm to the innocent is an ethical decision. The structure imposed by standard economic analysis makes inevitable the reduction of lost lives to their equivalent in lost consumption, a move that is in many contexts and to many people morally indefensible, and that is indeterminate even if it is accepted as necessary. In the end, the numbers produced by the Stern Review are only meaningful if one accepts that the prospective human deaths (plus extinction of species and other losses) due to human-induced climate change can be defensibly converted into equivalent amounts of consumption today (Baer and Spash 2008).

As noted by Spash (2007e), Stern et al. make much of the ethical basis for decisions on climate change being important, but there is no breadth or depth in argument or literature. Instead various moral theories are stated to collapse into concern for three objects of desire: health, environment and income/consumption (Stern et al. 2006: 145). These objects are assumed commensurable (Stern et al. 2006 30–31). So, more consumption makes everything better, assuaging ethical concerns. For example, the displacement of people in developing countries is priced at three times per capita income (Stern, 2006: 134). This means there is a price that can be paid and enough per capita income is a solution. The whole point of this approach is to place climate economics within a growth economy framing.

The rebalancing exercise that is implied concerns maintaining standards of living. A typical intergenerational statement along these lines is that "...future generations should have a right to a standard of living no lower than the current one" (Stern et al. 2006: 42). The dubious ethics of the Paretian criteria and aggregating over generations is rarely recognised, i.e., being

consistent with making the future rich richer while harming the future poor. Yet there is another issue that concerns a category mistake. That is, the approach conflates the use of resources for creating standards of living with compensation for harming innocent people, and these are not moral equivalents (Spash 2002a). Concerns that are variously termed opportunity maintenance, meeting needs, achieving capabilities, sustaining welfare and so on, are what has been termed basic distributional transfers as opposed to compensatory transfers (Spash 1993; 1994b).

Basic transfers are concerned with distributional justice. There is no particular reason to limit compensation for damages to calculations about distributional transfers of this or that resource. In contrast, compensation can be defined as making amends for loss or injury and implicitly involves an asymmetry of loss and gain. Environmental damages under the enhanced Greenhouse Effect entail an asymmetric distribution of loss and gain over space and time. Compensation is the attempt to counterbalance negative consequences by creating positive welfare in the same proportion (e.g., as measured by a common metric such as utility). This requires the use of transfer mechanisms, but all transfers need not be compensatory. The reference point for compensation is the level of damages caused to the victim (e.g. an individual, community). The reference point for basic transfers is the welfare level, difference in welfare, or opportunity set of one group compared to another (see discussion in the context of intergenerational economics and ethics by Spash 2002a: 226-231). In simplified summary, generalised economic growth (even if it fulfils all its promises of utility and happiness creation) does not equate to discharging liability for creating harm to the innocent. Or to put the issue another way, equity under economic logic—commensurability and merging compensatory with basic transfers—can be achieved by evenly spreading social and environmental damages so all humanity suffers equally. The

arrogance of economists is that they talk as if they could actually make such calculations about the future and, even more arrogantly, do so optimally.

Risk and Uncertainty

Uncertainty is all pervasive in climate science, and the idea that it could be eradicated or limited through more research is a Cartesian dream applicable in a non-existent mechanical universe. Uncertainty will persist due to irreducible ignorance, social indeterminacy, non-linearity, irreversibility, surprise events, complexity and emergent properties. Human understanding is always and everywhere fallible. The problem is not one of establishing Humean cause-effect relationships, but rather of understanding the limits to human knowledge. Hence, the ramifications of a changing climate can only be outlined to leave us with "a rough sketch of many possible events rather than a detailed picture of the type and timing of exact impacts" (Spash 2002a: 90). The causal mechanisms that contribute to creating future climate are in competition and in themselves hard to discern in the open system reality within which humans operate and GHGs impact.

The closed system thinking of the scientific experiment is then often inapplicable and at best highly constrained in providing knowledge. For example, will the ice sheets melt, when and how fast? Even after they have melted, why they did so will remain uncertain because humans are always fallible. The pretence of science-policy that certainty can be provided, or, even more commonly, that risks can be specified in a deterministic sense, leads policy astray. The result has been to justify delaying action and funding more research, even though this itself is a dubious ethical stance. In fact, the rise of the precautionary principle was originally aimed against just such an approach.

Nevertheless, in the prevalent economic literature climate change is typically described as “a problem of risk management on an immense scale” (Stern 2014a: 398). This conveys the impression that the consequences of severe changes in atmospheric composition can be managed through managerial excellence, and sophisticated and sound risk management. The probabilistic and managerial approach to uncertainty has led to the creation by economists of numbers that appear precise, but are arbitrary and misleading for policy (Funtowicz and Ravetz 1994; Pindyck 2013: 860). The case against the Stern Review is a good example with its research claiming predictability using risk analysis to recommend a future 2°C to 3 °C policy as the lowest option, based on economic efficiency, with higher temperatures justifiable (Spash 2007e). There was a later volte-face by Stern (Stewart and Elliott 2013), but this has not damaged his credibility nor his enthusiasm in continuing to push the same consequentialism and risk management under the more recently adopted 2°C target.

The ethical position of the consequentialist logic being employed is that outcomes must be made determinate. That is why this literature starts by identifying strong uncertainty, that relates to social indeterminacy and partial ignorance preventing knowledge of probabilities and consequences (Spash 2002b), but must then convert it into weak uncertainty, that relates to knowable outcomes and probabilities (Spash 2002c). Once again economics makes a major categorical blunder. Despite sometimes citing those, such as Keynes and Knight, who made the ontological distinction between strong and weak uncertainty, the climate economist goes on to contradict their writings with the imposition of risk management.

Conclusions

Work on human induced climate change in economics tends to conceal more than it reveals and especially with regard to the underlying (moral, political and scientific) philosophy that it

supports. The belief in the relevance of simplistic cause-effect relationships helps build an analytical approach that claims to be separated from ethics, because the facts can be observed (e.g., discount rates). The analysis frames the discussion as consequentialist and preference utilitarian with a philosophy of science that is in part an appeal to naïve empiricism. Yet, the role of deductive models remains in higher esteem with the commitment to orthodox theory coming prior to factual observation. Thus, for example, a world of economic growth must exist because that is in the model and the evidence for negative discounting must be ignored.

A prominent aspect of climate economics has been the focus on future generations. Intergenerational ethics is reduced to efficiency analysis where the systemic shifting of costs on to unborn generations is ethically unproblematic given some judicious assumptions that favour the status quo (e.g. Pareto efficiency, fixed time horizons, sustained consumption growth). Thus the red herring debates over the discount rate, and its high profile contestation in expert language and mathematics, merely serve to cloak ethical judgment in the guise of technicality and scientific objectivity. This also conceals the role of this expert discourse in the promotion of a capital accumulating, materially based, hedonistic, growth economy.

As climate change not only extends over time, but also across space, intragenerational ethical considerations are central, although often sidelined by economists. A major ethical question is the attribution of responsibility and the implications for the mitigation measures deemed necessary and by whom action is required. The integration of historical responsibility is controversial, because today's wealthiest nations have built their wealth on fossil fuels and have already used more than their fair share of the total emissions possible without human induced climate change. They have erected a military-industrial complex that maintains resource supplies and is itself dependent upon the fossil fuel economy. This creates ethical

conflict and fundamentally relates to questions of power in the global economic order. The consequences of climate change create further ethical dilemmas because the distribution of impacts will be highly variable across space, and different nations have widely diverging abilities to respond to such changes, i.e., adaptation capabilities. Public policy in this area is highly problematic and involves ethical conflicts that cannot be dealt with by mainstream economic analysis, not least because it has a theory that has been deliberately divorced from considerations of power, politics and social structure as well as the biophysical reality upon which the economy depends. Human induced climate change reveals all the inadequacies of mainstream economics and its inability to offer any meaningful insight into the complex of social, ecological and economic systems. At a time when major systemic change is on the agenda, the theoretical approach of orthodox economics is unable to grasp anything outside small deviations in the current system. Amongst other things, the economists reliance on marginal analysis is utterly useless and irrelevant for addressing global climate change.

Most economists ignore how humanity is embedded in biophysical reality and rely upon models that propagate the myth that economies can operate independently of both environmental and social systems. Climate change would seem to be a wake-up call in that regard. However, the drive for maintaining a growth economy remains unabated and a sustainable new era of growth is now being advocated as an ethically sound development model and the best response to climate change. The presumption is that economic growth must continue and cannot be questioned—a position supporting discounting. However, this fails to consider the ethical implications of imposing a model of hedonistic material affluence as the only goal for humanity and embedding this in a model of society where ‘freedom’ is defined as choosing products in a market.

The ethics of economics on climate change must then be understood in the context of the economic commitment to growth. Climate economics builds on the assumption of a commensurable world, where environmental, social and economic meanings can be translated into a unidimensional framing in terms of capital and rates of return. Thus, economic models must produce numbers, and economic analysts arguments, that reduce the world to productivity and consumption. In this way the prospect of deliberately killing future humans and destroying ecosystems irreversibly can be 'rationally' converted and made equivalent with the loss of goods and services from not doing so. Even better this can be discussed in terms of being optimal and the process conducted as an objective technical exercise. The underlying ideological and ethical commitment is to increasing material and energy consumption as the best thing for humanity. Justifying this in the context of climate change means arguing that growth will provide the answer to both poverty and environmental degradation. Fundamental ethical questions over burden sharing can then be sidelined. Meanwhile, the persistence of economics with some fundamental category mistakes—concerning both uncertainty and compensation—allows precaution to be ignored in favour of risk management and harm of the innocent to be justified by the promise of an increasing availability of consumer goods.

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