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Managing climate change and promoting growth, development and equity.

Nicholas Stern

Chaire Développement Durable au Collège de France
2009-2010 and IG Patel Professor of Economics and Government at LSE

Lecture 2: The ethics of climate change:
the environment, the future and deprivation.

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Managing climate change and promoting growth, development and equity.

If informed scrutiny by the public is central to any such social evaluation (as I believe is the case), the implicit values have to be made more explicit, rather than being shielded from scrutiny on the spurious ground that they are part of an "already available" metric that society can immediately use without further ado.

A. K. Sen (1999, p. 80) Development as Freedom.

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Six Part Structure

- Section 1: Ethical issues and ethical perspectives
- Section 2: Discounting the future
- Section 3: Combining risks and ethics
- Section 4: Implications for targets and allocations
- Section 5: The deniers revisited
- Section 6: Implications for indicators

Ethical issues and ethical perspectives: effects

- Ethics of distribution, of the long term, and of responsibility are at heart of the problem: examine key aspects of effects and causes with ethical relevance.

- ***Distribution*** and ***timing*** of effects (covered in lecture 1):

  – The impacts of climate change are global; all countries are at risk.

  – The most economically deprived regions, e.g. Africa, will be hit earliest and hardest.

  – Effects of actions appear with lags of one or two decades.

  – They are persistent over long term.

Ethical issues and ethical perspectives: effects

- ***Magnitude*** and ***dimensions*** of effects (covered in lecture 1):
  - Physical and human geography could be transformed with BAU likely taking us to a 50% probability of above 5ºC in a century or so. The planet has not seen such temperatures for 30 million years.
  - Potential cause of migration of hundreds of millions of people around the world and thus likely severe and prolonged conflict.
  - All dimensions of life affected on a major scale: income/wealth; heath; education; environment…
  - Likely radical disruption of economics, societies, political systems.

Ethical issues and ethical perspectives: causes

- Causes are *global*, arise from *most activities*, come from *past actions* and associated with *wealth*.

  – Warming caused by a tonne of greenhouse gases is independent of where in the world it is emitted.

  – Most aspects of our daily lives are associated with greenhouse gases (directly or indirectly).

  – Current concentrations depend on past emissions: history matters.

  – Rich people generally emit more greenhouse gases.

  – Rich countries are responsible for the majority of current concentrations.

Ethical issues and ethical perspectives

- Many perceive a “double injustice”: rich countries have created majority of current concentrations and poor countries are hit earliest and hardest.
- Similarly rich groups and poor groups within countries.
- There are profound issues of responsibility for past, current and future actions.
- Questions of valuations of effects into far future.
- Fundamental questions about rights and duties between generations.
- And concerning relationships between humans, other species and the environment.

What ethical approaches can guide us? Standard economics

- The breadth and depth of the issues suggest that a wide variety of approaches to the ethics of climate change should be considered.

- Economics generally adopts the particular, narrow approach of ***standard welfare economics.***

- Looks only at the consequences of actions and assesses those consequences in a narrow way, i.e., the welfare or 'utility' of individuals in a community, where utility is derived from consumption of goods and services.

- Described by Sen as 'Welfarism'.

- This approach is based in 'consequentialism': does not directly take into account the nature of actions by which the consequences are caused.

- For example if Christians were killed by lions for the amusement of a Roman crowd is all that is relevant the death of the Christians and the pleasure of the crowd? And the lions? Or consider net 'pleasure' from secret dog-fight.

What ethical approaches can guide us? Rights/duties

- ***Deontological ethical systems*** focus on ethical qualities, the 'rightness' or 'wrongness' of actions in themselves, often setting out various duties and obligations. Can link rights/duties to consequences but the approaches are not identical.

- **Rights/duties:** the predicted impacts of climate change raise questions of rights and corresponding duties.

  - Do future generations have the right to enjoy a world whose climate has not been transformed to compromise basic physical security or result in other dangers?

  - Rights to participation in a society, be a member of society.

  - Rights to development including food, shelter, education, health…

  - Do we have duties to respect those rights? How are they influenced by our understanding of the consequences of our actions? (see Section 4).

- Within communities our own rights may be related to duties to respect those of others: there is a 'symmetry'. But does that apply across generations?

What ethical approaches can guide us? Virtues

- ***Virtue ethics:*** emphasises virtuous character as a guide to moral behaviour, rather than focusing on consequences or rules, in the tradition of Aristotle and Plato. We can recognise a 'good' person as we can recognise a 'good' violinist. Does not include taking pleasure in dog-fighting.

- Many argue virtue ethics offers a more plausible explanation of how individuals actually think about ethics (Anscombe, 1958; Wiggins, 2006).

- Some argue our existing values are not up to the challenge of climate change and a change in values – virtues – is the only promising ethical approach (Jamieson 1992).

- Our values or notions of virtue may have evolved through experience of how communities functioned well: this evolutionary basis may be inadequate for a global, very long-term and possibly irreversible set of issues.

What ethical approaches can guide us? A right to emit?

- Is there a right to emit?
- Some argue that there is a right to emit associated with existence or development.
- But the right to enjoy a common good (e.g., national parks or fresh air) does not imply the right to damage.
- We can choose to use energy that does not emit greenhouse gases.
- And who emits? Producers or consumers? Arguably both: consumer uses the good and producer gains income from production.

What ethical approaches can guide us? Sustainability

- Sustainable development: some argue that future generations should have a standard of living – or opportunities to attain a standard of living – no lower than the current one.

- Economists have suggested this means maintaining a constant overall stock of all forms of capital (physical, social, cultural, institutional). But how to or should we aggregate the different dimensions?

- It is impossible for the global and ecological system to be sustained in its entirety.

- This has lead to special rules for the preservation of critical environmental assets, e.g., Article 2 of the UNFCCC: “Stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”.

What ethical approaches can guide us?

- Irrespective of which broader ethical framework is adopted, most approaches will need some type of comparison of the consequences of climate change policies.

- We are likely to face trade-offs between incomes or rights today, which may be compromised by strong and rapid emissions reductions, and counterpart rights in the far-off future, threatened by climate change. Although good policies can reduce the intensity of, or perhaps remove, some trade-offs (see below).

- As Sen noted “the general case for taking full note of the result in judging policies and institutions is a momentous and plausible requirement” (1999, p 61).

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Discounting

- Discounting is the process of adjusting the value attached to some good accruing in the future to compare with the value it would be given if available today.

- It is used in cost-benefit analyses to aggregate benefits and costs accruing at different times to one point in time – usually the time is now and the calculation gives the “present value”.

- The ratio of the future value of an extra unit of the good and its value today is defined as the ‘discount factor’. For example if the value attached to a good now is 1 and to the same good next year is 0.98 the discount factor is 0.98.

Discounting

- The rate at which the discount factor decreases over time is defined as the ‘discount rate’. In the example above, the discount rate between this year and next is 2% if the numeraire is the given good.

- Formally, the discount rate is simply the proportionate rate of fall of the value of the numeraire.

- The discount rate will depend on:

  – (i) which good is selected as numeraire (it will generally differ across goods);

  – (ii) which period is being considered (it will not generally be constant over time);

  – (iii) to whom the good accrues (for the same good and the same period it will generally not be the same across people).

Discounting

- If we have little of good A now and are likely to have more of good A in the future then we might discount heavily: extra of A now would be much more valuable than in the future.

- But for good B, we might think it will be more scarce and more valuable in the future. This would imply low (or negative) discounting with B as numeraire; and a change in relative values of A and B over time.

- If we will be much richer (poorer) in the future we would be likely to discount strongly (or strongly negatively).

- If we are myopic we might discount the future simply because it is in the future (aside from any issues of richer or poorer). This is ‘pure-time discounting’.

Discounting

- A very aggregated indicator or measure of human well-being or welfare is given by utility of consumption, u(c), and the pure-time discount rate, (δ).

- $u(c) = c^{(1-\eta)}/(1-\eta)$ and the marginal utility, u′, is $c^{-\eta}$

  Utility depends on the aggregate consumption of goods and services via an isoelastic function, where η is the elasticity of marginal utility of consumption.

- The social discount rate (SDR), defined here as the rate of fall of the marginal utility, is given as:

  SDR: η x g

  Where g is the growth rate of consumption.

- If there is pure-time discounting (we multiply u(c) by $e^{-\delta t}$) then SDR is $\eta g + \delta$.

Thinking about η

- η = the elasticity of marginal utility of consumption. This captures our attitude to inequality between different consumption levels (ourselves at different times, across people or across generations depending on interpretation). It may also reflect in some theories attitudes to risk if we think of consumption in different possible outcomes of risky situations.

- η = 2 would imply can lose up to 96% from “leaky bucket” in moving marginal unit from A to B, where A five times as wealthy as B, and still have an improvement because marginal utility for B would be 25 times that of A.

- Thus if there was more than 4% left in the bucket on arrival (at B from A) it would still be an improvement.

Thinking about η

- But evidence on implied values from the behaviours of collective distributional decisions on taxes or transfers is very variable in terms of implied values (see Atkinson and Brandolini 2007). Deriving implied values generally requires making assumptions on markets, taxes and behaviour, e.g., how tax rates affect incentives and supply of effort.

- Evidence on η from behaviour towards risk very unreliable, as is expected utility model for individual behaviour.

- Implied savings rates as a function of η are very sensitive to assumptions on production, particularly technical progress (higher technical progress implies lower optimal savings, see Mirrlees/Stern 1972).

- Most standard cost-benefit analyses have η = 0.

- Probably most clear and transparent to consider “thought experiments”, e.g., leaky bucket.

Discounting and δ

- The pure-time discount rate could alternatively be interpreted as reflecting the probability of the existence of the human race/planet, e.g., a meteor might obliterate the planet (this is separate from the role of anthropogenic climate change).

- Pure-time discounting is discriminating by date of birth. Should we attach lower values simply because of difference in time, when we know our descendents will exist and have (say) same income as our own.

- John Maynard Keynes, Frank Ramsey, and many others have argued against the ethical myopia of pure-time discounting.

Pure time discount rate (%) δ	Probability of human race surviving 100 years
0.1	0.905
0.5	0.607
1.0	0.368
1.5	0.223

- Pure-time discounting cost-benefit analysis in narrower circumstances (e.g., the survival of some particular project in a particular location) is a different issue.

The marginal method

- Discounting is a marginal approach where the evaluation of marginal changes depends on the path over time (e.g., consumption) under consideration.
- The discount rates and the discount factors will therefore be different for different paths.
- As climate change involves looking at very different future growth paths it is a mistake to use a marginal method around a given path, e.g., currently observed or historical rates of growth for strategic choices and comparisons among future paths that will likely be very different from today.
- A choice among paths means choosing the implied discount rates not visa versa. Thus discount rates are not separate or exogenous determinants of our choices.
- Must recognise therefore that discount rates are endogenous in this fundamental set of non-marginal choices.
- Many errors in literature on discounting in context of climate change derive from failure to understand this basic point.

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Can we read-off discount rates from markets?

- Notwithstanding the basic error highlighted in slide 22, some argue that relevant discount rates can be ‘read-off’ from market interest rates or rates of return, just as relative valuations of apples and pears might be inferred from relative market prices.

- But, there is no market on which one can ‘read off’ anything similar to a revealed collective preference or appropriate rate for 100 years or more.

- Further, such markets that exist are full of imperfections of information, of taxation, and of ability to bear risk so that rates of interest and return would, in any case, be unreliable guides. Note that these imperfections imply different interest rates for different people.

- Even if one persisted with this route one would find that long-run, real (i.e., inflation-adjusted), low-risk rates of interest on consumption or other loans are around 1.5%, not the 6% that analysts often use.

- Must also take care with the multi-good nature of this problem: different discount rates for consumption and the environment. The former may improve – for a while – but the latter may not: thus consumption discount rates might be positive and environmental discount rates negative.

Discounting

- Thus cannot “import” a rate from outside markets.
- Or from standard public sector cut-offs in investment criteria (e.g. 3.5% in UK): these are usually relevant for marginal, medium-term country-level project analyses. They do not apply to radical long-term changes for the world.
- Basic theories of modern public economics are key: non-marginalities; risk; imperfections; many goods.
- Standard approaches to discount rates of narrow relevance here.
- Thus there is no reasonable alternative to a direct examination of the ethics when considering inter-temporal valuations.
- Issues considered further at symposium at Collège de France in June.

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Combining risks and ethics

- Inaction (or BAU) in face of climate change involves huge risks, as we have seen. Actions to reduce emissions will involve investments and costs, as will action on adaptation.

- How do we analyse the appropriate scale of action and nature of policies?

- Some researchers have built integrated assessment models (IAMs) to try to structure quantitative analyses (see also Stern Review) of appropriate actions and policies in terms of expected costs and benefits. Some of these attempt to derive the scale of policy.

- Many scientists have tried to define “avoiding dangerous climate change”, for example in terms of temperature increases (e.g., not more than 2^{o}C) or concentrations (e.g., not more than 450 ppm CO_2e) and then have asked how to achieve this.

Combining risks and ethics

- We can compare the approaches of previous slide as a ‘cost-benefit’ and a ‘risk-management’ approach. The cost-benefit approach does not necessarily work through an IAM but would need some sort of overall modelling.

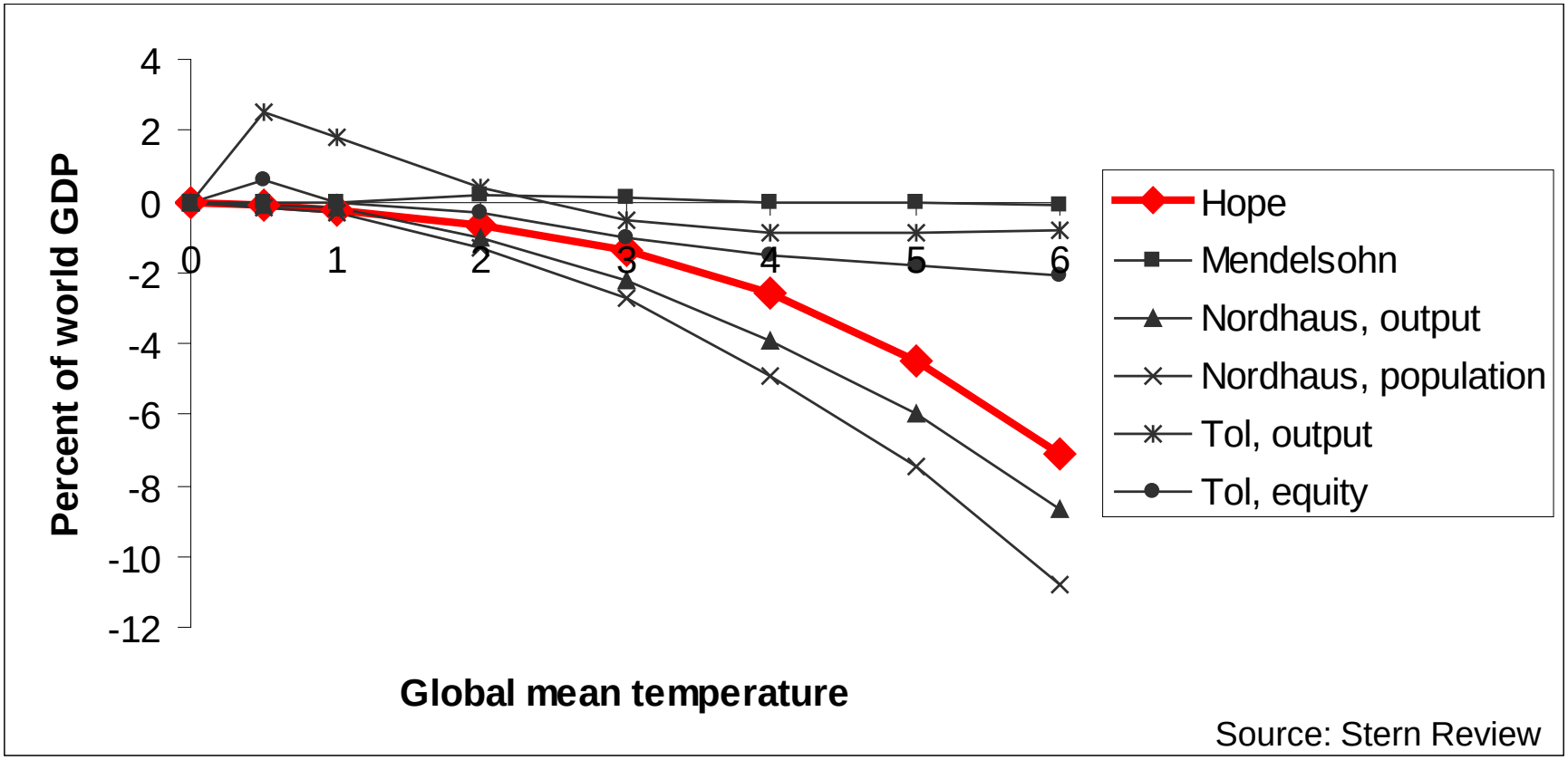
- The cost-benefit approach via IAMs is forced to take a highly aggregative approach (e.g,. to health, education, income, loss-of-life, etc.) and to grossly simplify effects and risks in order to gain computability.

- The result has been very naïve approaches to effects, intertemporal evaluations, and distributional valuations.

- Has also been associated with the gross-underestimation of risks (see below).

- In my view the risk management approach is more informative and transparent on fundamental issues of scale and nature of potential effects (careful discussion of targets in this context is, of course, crucial).

The IAM approach. Gross underestimates of dangers



- Remember that the planet has not seen 3ºC for 3 million years and 5ºC for 30 million years.
- Nordhaus has 50% GDP loss from 18ºC temperature increase (Ackerman, et al. 2009).
- Hope model was used in one (out of the 27) chapter of the Stern Review.

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The IAM approach: sensitivity of total cost of climate change to key model assumptions

Damage function exponent (γ)	*Consumption elasticity of social marginal utility (η)*		
	1	*1.5*	*2*
2	10.4 (2.2-22.8)	6.0 (1.7-14.1)	3.3 (0.9-7.8)
2.5	16.5 (3.2-37.8)	10.0 (2.3-24.5)	5.2 (1.1-13.2)
3	33.3 (4.5-73.0)	29.3 (3.0-57.2)	29.1 (1.7-35.1)

Source: Stern (American Economic Review, May 2008).

- Damages or costs of climate change measured in terms of average percentage loss of consumption (averaged over time, space and possible outcomes).
- η defined as in slide 19 above.
- γ measures how fast global damages rise proportionally with global temperature increase.
- Estimates of damages in table rise sharply with γ. For low γ they fall with η. They are very high, except for low γ high η. Even then risks are large.

The IAM approach. Sensitivity to pure-time discounting

Theorem:

- (i) For any specification of probability distributions of future damages, there is a set of pure-time discount factors which makes the expectation of the inter-temporal integral of discounted damages less than any given number. In other words we can make (expected total discounted) damages as small as we please by choosing sufficiently heavy pure-time discounting.

- (ii) For any given set of pure-time discount factors, there is a probability distribution of damages, which makes the expectation of the inter-temporal integral of discounted damages larger than any given number. Thus, we can make (expected total discounted) damages as large as we please with a sufficiently severe set of damages.

- See Stern (American Economic Review, May 2008; and EEA lecture 2009).

Combining risks and ethics: conclusions on IAMs and risk management

- In IAMs it is clear that assumptions on both (i) values/ethics and (ii) magnitude of risks, are crucial to results.
- Under most reasonable assumptions in IAMs the estimated costs of inaction or unmanaged climate change are very large.
- But there are great sensitivities to assumptions and the approaches to ethics and dangers are necessarily very crude.
- In my view it is better to describe the risks as fully and directly as we can and then ask how we can reduce them, with what policies and with what costs. This is the risk-management approach.

Remarks on thinking about risk (I)

- Modern behavioural economics has shown: (a) that people assess risks inconsistently and poorly; and (b) often show extreme impatience for the very short term.

- Thus there is a severe challenge in policy discussion to express risks as simply and clearly as possible.

- This is essentially a story of anticipating and managing risk and cannot be resolved by learning from mistakes – by the time damages appear strongly it is too late. Communication and leadership are crucial.

Remarks on thinking about risk (II)

- Much of the above discussion has been on the basis of ‘known’ or ‘assumed’ probabilities.
- What if we do not know the dangers: they could be of a kind we cannot anticipate or imagine?
- What if we cannot estimate probabilities? There are issues of ambiguity (or ‘uncertainty’ in Knight’s sense).
- In these circumstances a ‘Precautionary Principle’ seems sensible.

A remark on ‘avoiding some trade-offs’

- Much of ethical analysis involves some for of ‘trading-off’ current and future costs and benefits.

- But (see next lecture) emissions are an externality and a market failure which should be corrected, i.e., without policy market prices do not reflect costs of emissions and thus give misleading signals.

Theorem:

- If the climate change externality falls on future generations in the form of a deteriorated environment, and each generation cares only about its own consumption, then the current generation can shift the balance of its legacy from standard goods (e.g., capital or infrastructure) towards environmental goods and improve the welfare of future generations, **without making** the current generation worse off.

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Implementing risk management: How should we define targets for policy on climate change?

- **Temperatures?** They indicate some of the dangers but are uncertain and not directly controlled by our actions.
- **Concentrations?** They drive global warming but again are uncertain and not directly controlled.
- **Emissions?** There is a better chance of controlling them directly and they feed into concentrations, temperatures and consequences in ways we can try to model. But they are ‘further’ from consequences.
- All three have played a role in discussions of targets.

Implementing risk management: How should we define targets for policy on climate change?

- In lecture 1 we focused on targets for emissions, predicated on targets for temperatures and concentrations.

- A global emissions path likely to give a 50-50 chance of achieving 2ºC was indicated in slides 18 and 19 of lecture 1: from 47 Gt CO_2e p.a. now, to 44 in 2020, to below 35 in 2030 and below 20 in 2050.

- This implies emissions per capita for the world of roughly 7 tonnes CO_2e now, 6 in 2020, 4 in 2030 and 2 in 2050.

- How should the totals be distributed?

Actual emissions and permits for emissions

- There is a clear distinction between the distribution of action and the distribution of emissions permits (e.g., in trading schemes) across countries.

- Global emissions need to be around 2 tonnes per capita in 2050: and actual emissions will have to be clustered around that level; there will be few below average and therefore there can be few major blocks of people above average.

- This does not imply however that the permit allowance in a trading scheme for each country should be 2 tonnes per capita.

Actual emissions and permits for emissions

- We argued in Section 1 of this lecture (slide 11) that there is no obvious foundation in ethics of a ‘right to emit’.

- How should permits be allocated? These could be associated with a trading scheme whereby a holder of a permit for Y tonnes can sell permitted emissions if he/she emits below that and must buy if he/she emits above. Thus permits are financial assets which can be allocated, bought and sold.

- We can think of the difference between concentrations of 285 ppm CO_2e in the mid-nineteenth century and the 500 ppm CO_2e maximum (falling eventually to 450) associated with 2^{o}C as a total carbon space or a reservoir which covers the period 1850-2050.

- At 435 ppm CO_2e currently,150 ppm of this has already been taken and only 15 remains to 450, or 65 to 500. Alternatively we can think of there being only a certain amount of total emissions ‘remaining’.

Actual emissions and permits for emissions

- From one perspective those who have consumed more of the ‘carbon space’ have less right to consume later.

- To give equal permits in 2050 would be to say everyone has the same sized glass at the end of a 200 year party (‘starting’ at onset of rapid industrialisation), not withstanding previous drinking.

- Should we ‘start the clock’ when we began to understand the consequences of our actions? Or are we responsible anyway (e.g., as with asbestos) whether or not we understood the consequences?

- We could ‘start the clock’ 20 years ago (IPCC was founded in 1988 and UNFCCC in 1992) and related arguments would still apply. UN Stockholm conference on the environment was 1972.

- But surely we should broaden the notion of equity if a permit is a financial asset. We do not usually think of equity in terms of the allocation of a single good (e.g., apples).

Actual emissions and permits for emissions

- Most people in thinking about transfer systems in public policy would suggest giving more of some benefit to poorer people than to rich; indeed they would suggest taxing the rich.

- Thus should rich countries receive zero or negative permits? Generally the idea of equal per capita permits seems only very weakly egalitarian.

- The idea of equal ‘emissions rights’ has no convincing foundations: in ethics – there is no obvious right to emit or right to damage the commons; in environment – this is not a flow process only, it is also a stock; and in economics – it makes more sense to look at the allocation of a financial asset from the perspective of existing distributions of consumption, income and wealth.

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Arguments for inaction based on questioning the science

- 'Deniers': defined here as those who assert that we should not act strongly to reduce emissions.
- The arguments for inaction on scientific grounds were assessed and shown to be weak in lecture 1.
- There will be fluctuations for reasons other than greenhouse gases but the basic science and evidence points to a strong underlying trend as a result of greenhouse gases.
- There will be uncertainties, unresolved issues and more research to do – but there is very strong evidence the risks are very large.
- There will be some mistaken analyses and predictions in a very substantial literature. But so far fairly few have been discovered and none provide, when corrected or assertions are deleted, evidence that we can be confident the risks are small.
- To assert the science tells us with confidence that we can act as if the risks are small is **irrational**.

Arguments for inaction based on adaptation

- *"We can readily adapt to whatever comes our way".*

  – Adaptation will and must take place but, for example, at 4 or 5^{o}C and higher it is unlikely to prevent consequences being severe or catastrophic.

  – Mass migration, as is likely, when many areas become uninhabitable is adaptation but likely to lead to extensive conflict. With effects of this magnitude adaptation does not take impacts from immense to small.

  – To suggest that adaptation is easy and effective in face of these magnitudes of risk is to be **reckless**.

Arguments for inaction based on heavy discounting of the future

- The argument that we will be much better off in the future than now if we ignore climate change is to misunderstand the potential magnitude of the effects. This is not therefore a convincing argument for discounting.

- To assert that the future does not matter much simply because it is in the future is to assert either (i) that there is an implausibly high probability of the end of the world or (ii) that we should discriminate heavily by date of birth between two individuals who will exist and have the same consumption patterns.

- Many would regard this position as **unethical**.

Arguments for inaction: summary

- Thus:
  - to assert that the science points to no serious risk seems *irrational* given the evidence;
  - to assert that we can adapt to whatever happens seems *reckless*; and
  - to argue that future generations do not matter seems *unethical*.
- The costs of taking action do matter. Good policy works to control them. And from most reasonable perspectives the costs of strong and urgent action are much less than for weak or delayed action (see also lecture 3).
- But should see the issue in large measure as about the cost-effective management of very high risks. The treatment of risks and ethics should be explicit.

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Implications for indicators

- Economic and social indicators help understand what is happening in our society and help guide policy. They should reflect our values and concerns by identifying and clarifying the key influences on those values and concerns.
- This purpose should structure what we try to measure and how we try to measure it.
- Indicators must be multi-dimensional (health, education, environment, income, wealth) and cover great variation within society (age, gender).
- They also have to consider change over time, how current situations and actions influence future possibilities and outcomes, and they have to examine factors that influence future outcomes that can, in turn, be influenced by policy.
- We can not hope to capture all these dimensions in one number.
- These relevant dimensions make it clear we cannot be sure about the effects of any structure of policies on future outcomes. Thus we must be clear about risk. This includes climate change.

Implications for indicators

- Thinking about the management of the environment, and the financial crises of the last few years, assessment and management of risk must lie at the heart of our indicators.
- Concern with risk has not been evident in many standard approaches and must now be fundamental to national and international indicators and statistics.
- Millennium Development Goals cover a number of dimensions; all are at risk from climate change.
- On the environment we require analysis and measurement of key aspects of water, air, forests, natural resources, and bio-diversity. We also now recognise the crucial importance of risks associated with greenhouse gases and climate change.
- Statistics must be simple, structured and accessible, like a dashboard of a car. This is a helpful analogy to guide the presentation of statistics, including the indication of danger and risk.

Implications for indicators

- Climate change is an important example of how we might think about social indicators and risk.

- As we covered in lecture 1, accumulation of greenhouse gases over time determines concentrations or stocks, which determines the trapping of energy and thus global warming and climate change. Indicators of emissions, cumulative emissions and concentrations are key indicators of risk. So too are current climate changes and effects such as loss of polar ice.

- Water consequences, both current and in terms of future risks are central to climate change, and should be at the heart of environmental and sustainability indicators.

- Policies to reduce the risks of climate change concern dealing with market failure. We must face in our economic decisions an indication of the costs we inflict on others by emitting greenhouse gases. A carbon tax, emissions trading and regulations are all examples; and they require evidence on potential effects on emissions.

Implications for indicators, ethical discussions and research.

- Climate change is a striking example of how well-chosen indicators can help us understand risks and guide policy.
- Well-chosen indicators can make a huge difference to what is decided, what happens and the risks we take as communities.
- Therefore how we shape these indicators is important. Public discussion of these indicators is also important. And it is why the integrity and independence of our statistical offices is crucial.
- A structured, well-informed discussion, which indicators can promote, will help us better understand not only the issues at stake but also our own values (John Stuart Mill).
- Further work on both indicators and ethics should play a crucial role in public discussion of public policy in general and climate change in particular.

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