AGENDA

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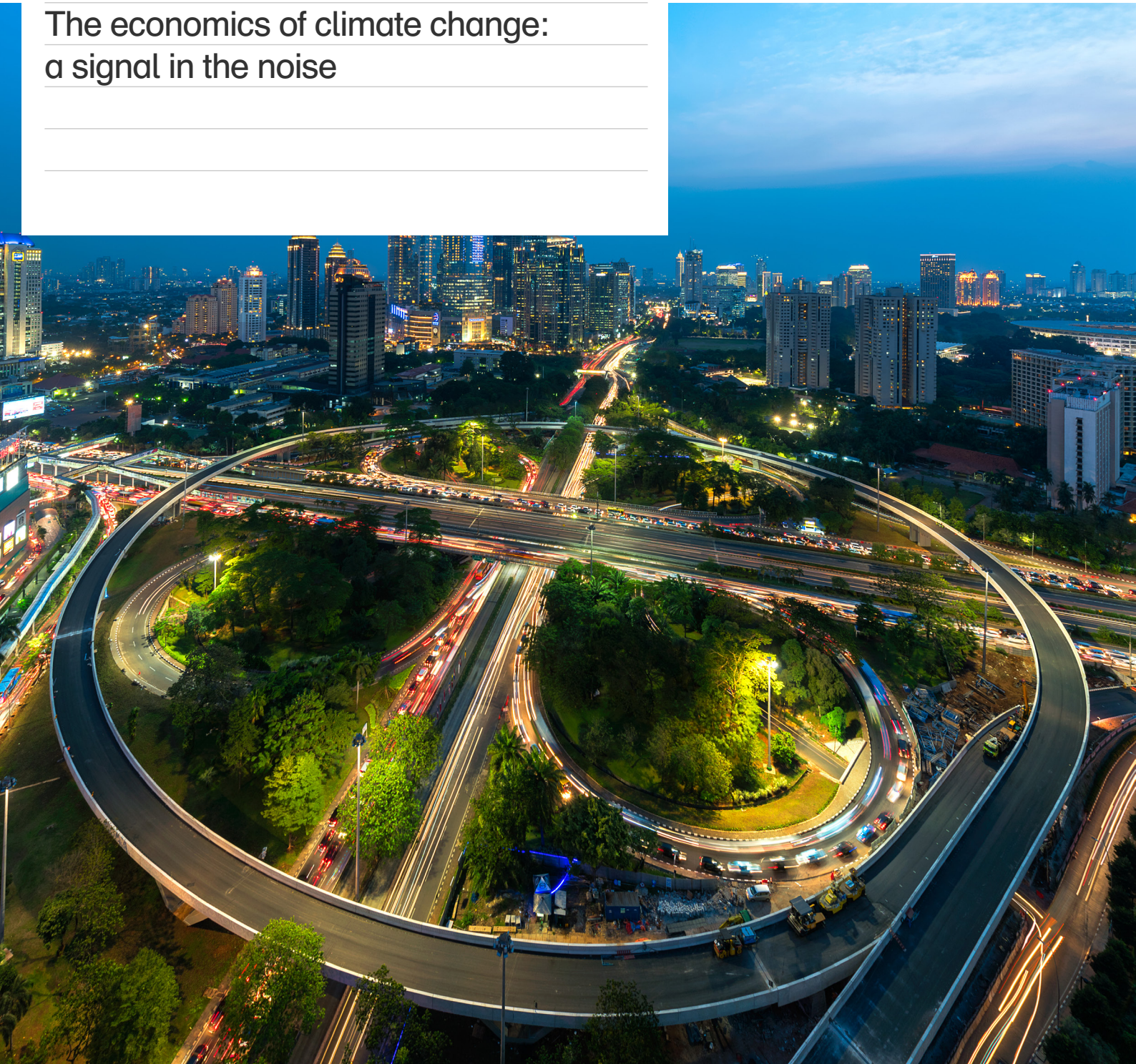
The economics of climate change: a signal in the noise



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With many countries around the world signing up to targets of net zero carbon emissions, what is the role of economics in the climate change debate? Economics can help to support the pathway to decarbonisation in four key areas, but it is important to communicate economic recommendations effectively to all stakeholders

Under the 2015 Paris Agreement, national governments across the world are committed to ensuring that global warming is limited to between 1.5˚C and 2˚C above pre-industrial levels.[1] To achieve this, many countries have committed to achieving net zero carbon emissions by 2050 or earlier.[2] Emissions are at net zero if gross emissions are fully offset by carbon sinks, whether natural or artificial (e.g. through carbon capture and storage, CCS). Reaching net zero will entail large changes to the way each sector of the economy operates—to minimise carbon emissions where possible and fund offsetting where a reduction to zero is not feasible.

Significant progress to decarbonise has already been made across European economies. The most recent evidence available indicates that by the end of 2019, net carbon emissions across the EU-27 and UK were 25% below 1990 levels.[3] However, much of the focus to date has been on the energy sector, with relatively small changes made in other sectors of the economy. Closing the remaining gap to net zero will involve a greater degree of change to the way businesses operate. There will need to be a more visible impact on consumers than has been the case so far, with, for example, the eventual removal of petrol- and diesel-powered cars and the replacement of gas-fired boilers in houses and apartments. Governments, firms and regulators from around the world are increasingly seeking to understand how to transition to a net zero future.

Economics has a central role in supporting policymakers, businesses, regulators, and investors in transitioning to a net zero economy in a way that preserves livelihoods and promotes high standards of living for all. In this article, we set out a number of important issues that economics (and economists) will be required to address.

Climate change and economics

Environmental costs, such as carbon emissions, represent an externality—a wider cost imposed by individual production or consumption. Historically, economic activity has not reflected the cost of environmental externalities, allowing for the economy to deliver huge improvements in quality of life, at least in the short run, but at the cost of a growing level of carbon emissions. As a 'stock' pollutant, CO_2 emissions are estimated to persist in the atmosphere (and warm the planet) for decades or even centuries.[4]

Economics is required to inform responses to two key questions on the path to net zero:

- what does a net zero economy look like?
- how do we get to a net zero economy?

As set out above, *any* economy in which gross emissions are fully offset by carbon sinks would answer the first question. However, not all net zero futures are created equal. As an example, if petrol- or diesel-fuelled vehicles were banned before the deployment of an alternative charging infrastructure for electric vehicles, this would undoubtedly move us closer to our net zero goals, but at a severe—and most likely unacceptable—cost to socioeconomic wellbeing. More generally, different approaches to decarbonisation will have impacts on different interest groups and stakeholders across the economy.

Economics can help us answer the question of what trade-offs need to be made to deliver net zero. These trade-offs are at the centre of how the transition to net zero will happen in Europe.

If economics, as an analytical tool to identify and make trade-offs, helps us determine *where* we are going, economics as the science of incentives and behaviour in markets is key to informing *how* to bring about the transition to a net zero future. This includes consideration of incentives within markets to transition to cleaner production technologies, consumer incentives, and market conditions that strongly incentivise innovation—such as low barriers to entry that enable new firms or incumbents that best develop and apply green technologies to seize market share.

As well as an innovation problem, decarbonisation is also an *investment* problem, with substantial investment required to deliver net zero. This will include accounting for carbon emissions within investment appraisal, public sector impact assessments and the development of financial markets to channel funding towards sustainable investments.[5]

Limits to the market?

The existing architecture of economic regulation and competition policy imposes constraints and restrictions on the actions of market participants. The economics underpinning these 'rules of the game' were first designed to address non-environmental market failures (e.g. market power), and generally did not consider the externalities posed by carbon emissions. A key issue for economics now is the extent to which competition law and policy may need to be adapted to best support net zero goals—either for competition authorities to directly consider environmental externalities within their decision-making, or for government to directly intervene to promote decarbonisation.

This is not to say that competition law or policy necessarily requires change. Indeed, many of the behaviours that competition policy was designed to address—such as abuse of dominant positions by firms with market power or coordinated behaviour to manipulate markets—would be expected to hinder rather than support decarbonisation.[6] Ultimately, pro-competitive policy that encourages firms to innovate more and use scarce resources more efficiently is an essential part of the journey to net zero.[7]

However, there may be areas in which existing competition policy comes into conflict with environmental objectives. This can include restrictions on coordination between firms (to innovate, share information or minimise costs), merger control, and state aid regulation on government subsidies to firms or investments. Economics has an important role to play in identifying where competition and environmental objectives can be in conflict, informing an assessment of the costs and benefits of intervention and determining which interventions are optimal, if any.

Sectors of the economy characterised by the provision of essential services by natural monopolies—for example, utilities such as water and electricity distribution—are often subject to more interventionist economic regulation by government or regulators. Regulation of such sectors involves some level of monitoring or control of revenues, investment and/or production, to increase the consumer benefits and minimise the extent of consumer harm.

Globally, competition policy and economic regulation are typically managed at a national level, with there being a few

examples of supranational regulation (such as the EU). To the extent that different national or supranational systems diverge in the scale and scope of interventions in the market to effect decarbonisation, this can distort the level playing field between firms in different ways. Firms could exploit different carbon taxation regimes, choosing to manufacture in jurisdictions with lower carbon taxes. Equivalently, the relaxation of competition policy around coordination or merger control could give some firms a commercial advantage over peers that are subject to more competition-focused regulation. This may affect appropriate approaches to trade and tariffs, in the absence of international coordination or appropriately designed trade-based mechanisms.

Investing to go green

Moving from the broad view across markets taken by governments and regulators, economics also has an important role in informing how decarbonisation should filter down to individual firm-level or investment-level decisions. Economic assessment forms a key input into investment appraisal and decision-making. Effective economic appraisal adds value to investment decisions by refining the complex set of information relating to a set of investment options into a tractable set of characteristics for the decision-maker to consider. This can include the 'monetisation' of non-financial costs and benefits, to simplify comparisons and evaluate streams of costs and benefits over time.

Historically, in line with other applications of economics, many economic appraisals of investments did not consider environmental externalities. Determining how to factor carbon emissions into investment appraisals will form a key part not only of investment decisions taken at the firm level, but also of the way government conducts impact appraisal. One approach for accounting for carbon externalities within economic appraisal is to place a monetary value on the impact of carbon emissions. If implemented correctly, this has the advantage of integrating the cost of carbon within existing tools such as net present valuation and benefit–cost ratios.

However, identifying the right price, or even a reasonable range, for the externality of carbon emissions is far from straightforward. Too low a price will place insufficient weight on carbon reductions, while a price that is too high could lead to inefficient investment decisions that cost more, have fewer non-carbon benefits, and could squander money that could be more effectively used to reduce carbon emissions elsewhere. This issue is further complicated by the challenge that the appropriate value of carbon emitted now will depend on the level of carbon emissions in the future.

Even if the correct price can be established, another key decision that needs to be made is the discount rate to be applied to the benefits of reducing carbon emissions in the future.[8] It may be inappropriate to assume that the cost placed on environmental externalities—which are society-wide—should be discounted at the same rate as flows of financial revenues and costs—which reflect the opportunity cost of capital for the investor. Ensuring that the appropriate rate used to discount the benefits of reducing carbon emissions will be instrumental to incorporating it within investment appraisal.

Finally, there is an important trend in financial markets that is relevant in increasing the level of capital available. Over the last few years, there has been significant growth in investments focused on environmental, social and governance (ESG) factors. In Europe, this trend has been particularly pronounced, with ESG fund assets under management having risen from just under £400bn in 2016 to over £800bn by the end of 2020. According to data from *Morningstar*, sustainable fund assets now amount to 9.3% of total European assets, and quarterly flows represent approximately 40% of overall European quarterly fund flows, with there being record inflows during the ongoing COVID-19 pandemic.[9]

The upward ESG trend has been driven by growing investor focus on sustainable investing, with fund managers increasingly taking into account non-financial metrics of company performance relating to ESG. This has fuelled an increasing number of ESG fund launches in the European market, with more than a twofold rise since 2016 and more than a fivefold rise since 2015.

There is market consensus that over the next few years, this trend will continue due to further expanding investor appetite and forthcoming EU green finance rules, which could propel total assets in sustainable investment products in Europe to €7.6tn and lead the number of ESG funds to outnumber conventional counterparts by 2025.[10]

(Radically) uncertain?

Governments, regulators, firms and investors face a daunting task to chart an economically optimal path to a net zero future, and there is one more challenge for everyone to face: the extent of *uncertainty* surrounding climate change. This great uncertainty arises because, among other reasons, the impact of climate change is uncertain in terms of its socioeconomic consequences, as well as technological disruptions. In other words, the social cost of carbon is currently unknown to policymakers and scientists alike, as is the performance and cost of technological change needed to address the effects of climate change.[11]

The radical uncertainty involved in climate change implies that we might need to assess and address it differently from other more 'plannable' phenomena. Potentially, the 'standard' economic tools of expected values, utility frameworks and more traditional discount rates are not the right ones for understanding the consequences of climate change. Instead, we might need to pivot towards a precautionary principle that mandates preventative policies that prioritise the protection of human health and the environment over any other objective.

Tools that are currently not standard, such as a minimum–maximum regret rule—which stipulates that policymakers choose the policy that society at large would regret least over all states of the world—might be more appropriate for evaluating the benefits of certain public policies in light of the climate challenge. This would emphasise the use of carefully considered scenarios as a central part of policy, corporate strategy, and investment decisions (noting that these are used in some, but by no means all, decisions at the moment).[12]

A question of fairness

In determining how to transition to net zero, economists and policymakers (including regulators) will need to carefully consider the impact of policies in terms of *distributions* of outcomes (across geographies and sociodemographic groups) rather than focusing on average, or total, outcomes.

This is also likely to necessitate a change in the tools that are widely used by economists, making greater use of tools such as quintiles of income distributions or agent-based models that provide greater flexibility and detail on where the costs and benefits of the move to net zero will fall.

Delivering decarbonisation while reversing the progress towards higher living standards of recent decades would represent a bitter achievement. It is therefore important that we use the economic tools available to manage and mitigate the impact of the changes that must be made on the most vulnerable in our society.

Lost in translation

In this article, we have set out a few of the ways in which policies to decarbonise the economy will use economics to determine the trade-offs that need to be made to transition to a net zero economy and to structure incentives for investors, firms and consumers to bring about the transition.

To maximise buy-in from affected stakeholders, these policies need to be explained and justified in an intuitive and comprehensible way.

Too often, the economics underpinning policy is hidden within dense technical documents. However, the many policies required for decarbonisation will cumulatively have large impacts on the lives of individuals—as consumers, employees, business owners, investors and citizens. A failure to explain why these changes are the best options for achieving the overall policy goals will make it more likely that the policy goal will not be achieved.

Therefore, economists must work to communicate clearly and accessibly the complex analysis that will support the policies used to deliver net zero. Failure to do so could damage trust in institutions and threaten the willingness of society to take the steps required to decarbonise.

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[1] United Nations (2021), 'The Paris Agreement: Nationally Determined Contributions (NDCs)', https://bit.ly/2ZFOxe9.

[2] We refer to carbon emissions as shorthand for emissions of gases with a global warming potential (greenhouse gases), of which carbon dioxide is only one example.

[3] European Commission (2020), 'Global CO2 emissions continue to rise but EU bucks global trend', 9 September, https://bit.ly/2ORHjl8.

[4] Intergovernmental Panel on Climate Change (2001), 'Climate Change 2001: The Scientific Basis, Contribution of Working Group 1 to the Third Assessment Report of the Intergovernmental Panel on Climate Change', https://bit.ly/3bs06er, p. 38.

[5] For more on this topic, see Oxera (2020), 'The Heathrow judgment: implications for new infrastructure schemes', Today's Agenda, March, https://bit.ly/3dzEi3i.

[6] For more on this topic, see Oxera (2021), 'The role of sustainability in merger control', Today's Agenda, February, https://bit.ly/3aleTCG.

[7] European Commission (2020), 'The Green Deal and competition policy', Renew Webinar, 22 September, https://bit.ly/2ZAu2Q8.

[8] Discount rates are discussed in two *Agenda in focus* articles: see Oxera (2020), 'A formula for success: reviewing the social discount rate', *Agenda in focus*, September, https://bit.ly/3qIycBu; and Oxera (2020), 'Social discount rates: inequality and the long term', *Agenda in focus*, December, https://bit.ly/3aEZCm0.

[9] Bioy, H. (2020), 'ESG Funds Assets Hit £800 Billion', *Morningstar*, 9 November, https://bit.ly/3um3iRK; and Riding, S. (2020), 'ESG funds attract record inflows during crisis', *Financial Times*, 10 October, https://on.ft.com/3sem7nU.

[10] Riding, S. (2020), 'ESG funds forecast to outnumber conventional funds by 2025', *Financial Times*, 17 October, https://on.ft.com/3dNqZN1.

[11] Taleb, N. N. (2020), *Statistical Consequences of Fat Tails: Real World Preasymptotics, Epistemology, and Applications*, arXiv preprint, https://bit.ly/3kcXC7R.

[12] See also, in this month's *Agenda in focus*, a discussion of multi-criteria analysis by Dr Rupert Booth: Oxera (2021), 'Investment appraisal in the round: multi-criteria analysis', *Agenda in focus*, February, https://bit.ly/3kcp85j.