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Why does the economics of climate change matter so much, and why has the engagement of economists been so weak?

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ABSTRACT

We point out in this paper that academic economists have contributed disturbingly little to discussions about climate change. We suggest that economists are failing the world -- and their own grandchildren. As one example, the [Quarterly Journal of Economics](#), which is currently the most-cited journal in the field of Economics, has never published an article on climate change. Various other bibliometric data, for a range of economics journals, are presented in the paper. We argue that some form of intervention is now urgently required -- by editors and senior professors -- to break out of the dismal prevailing Nash equilibrium. Otherwise history will judge our profession harshly.

Why does the economics of climate change matter so much, and why has the engagement of economists been so weak?

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We hope it is obvious, but we will set out the case that action on climate change is one of the greatest, arguably the greatest, challenges for public action of our times. Economics must be at the heart of serious analysis of the issues and of the public policy necessary to tackle them. Yet, currently, our discipline is hardly visible. As we shall show, the published articles in our leading journals are disturbingly few and far between, and nowhere near commensurate with the magnitude of the problem and the potential and necessary contribution of economics. We are sorry to say that we believe economists are failing the world, including their own grandchildren and great-grandchildren.

If the public, or incoming social science students at universities, are asked about the most important issues facing the world, climate and environment are near the top of their list. Yet our economics students see very little of those subjects in their course work, and they observe that few of their teachers are engaged upon research on these issues. This must surely change. We hope the Royal Economic Society can play a strong role in creating that change.

This is a moment for our discipline to engage in a careful discussion of priorities and what it can contribute. Of course, there is some information in the revealed preferences of research choices taken, but at the same time, as economists, we should also recognise both that we can benefit from sharing ideas about what really are the crucial issues and what we can contribute, and that there is a possibility that incentive structures within the profession may be way short of perfection. We

believe that action is now needed by research economists, economics-journal editors, and bodies such as the Royal Economic Society.

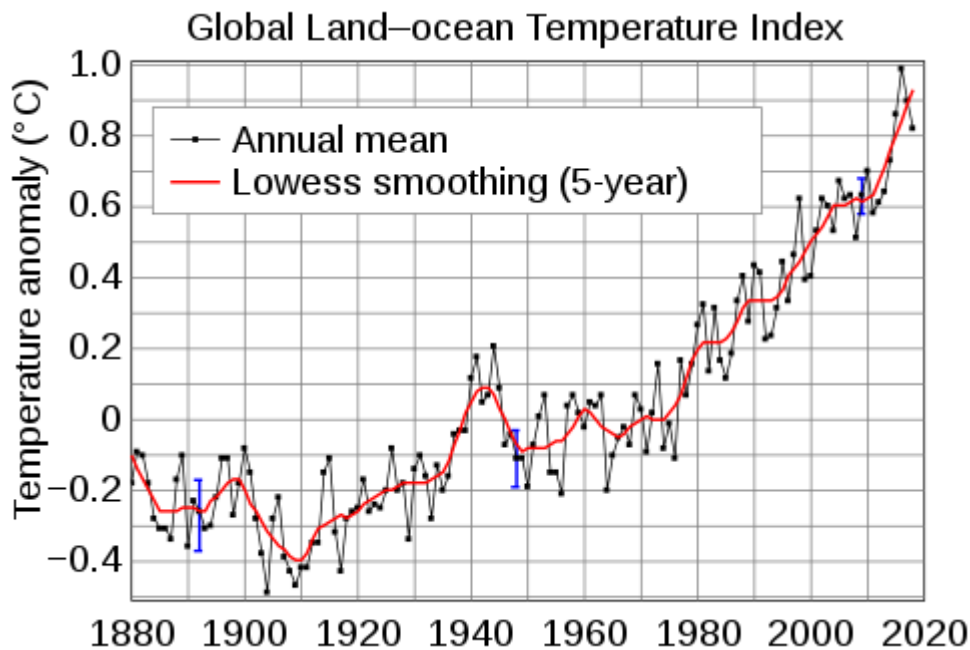
Why is climate change so important? Urgency and scale

Atmospheric concentrations of carbon dioxide are now over 400 parts per million (ppm), and the last time that occurred the average global surface temperature was around 3°C above the late 19th century (the usual benchmark). Sea levels were then 10-20 metres higher than now. That was roughly three million years ago; *homo sapiens* has been here for around 250,000 years. Our basic civilisations, with the cultivation of grains and associated human settlements and surpluses, rose during the Holocene period, since the warming after the last ice age, covering roughly the last 10,000 years. That benign period saw, approximately, plus or minus 1°C. We are now, at 1°C, on the edge of that experience. Further, we are adding 2ppm CO₂ per year and thus likely heading for 3°C or more in the next century or so, unless we make radical and rapid change to our processes of production and consumption.

The stakes are immense. Lives and livelihoods across many parts of the world would become undermined or destroyed at 2 or 3°C. Hundreds of millions, perhaps billions, would have to move, with likely intense, widespread and extended conflict. The effects we are now experiencing at 1°C are already severe. The report of the Intergovernmental Panel on Climate Change of October 2018 showed that the difference in impact between 1.5 and 2°C was very large. That 0.5°C increase would imply that, for example, the length of droughts would double, the occurrence of extreme weather events would more than double and all the coral would be gone. That is why the UNFCCC Paris

Agreement (COP21) of December 2015 (to which more than 190 countries have subscribed) wisely set the target of holding temperature increases to “well below 2°C” with efforts to hold to 1.5°C.¹

Figure 1: Temperature Over 140 Years



Global mean surface temperature from 1880 to 2018, relative to the 1951–1980 mean. The black line is the global annual mean, and the red line is the five-year local regression line. The blue bars show a 95% confidence interval.

To have a reasonable chance of holding below 2°C we have to cut emissions by around 40% absolutely in the next two decades. Much bigger cuts are necessary for 1.5°C. In those two decades, at a world growth rate of output of around 3%, total product will double. Infrastructure will more than double. Thus in two decades we have to cut, globally, emissions per unit of output by at least 80%. If the new economy we added in the doubling had zero emissions that would, by itself, be

¹ We focus on climate change here but it should be clear that these changes will have, and we already see, profound change in biodiversity. Further, and see below, air pollution from burning fossil fuels is deeply damaging to health now.

nowhere near enough; that would leave emissions unchanged. We must also radically change existing structures. If we build new infrastructure anything like the old, we will lock-in high-carbon emissions for decades and 3°C and above would likely be unavoidable.

These simple numbers indicate very clearly the scale and urgency of the necessary change. The investments of the next two decades are decisive for the planet and the future of our children and their children. These investments will be settled by decisions taken in the coming few years. Good economics can and should play a fundamental role in guiding the policy framework that will influence those decisions. That is why it is so important that our profession accelerates its work now.

At this point, it makes sense to remind ourselves of the science that underlies all this. It is not the outcome of some impenetrable fancy modelling – it is basic and began nearly two centuries ago. Ultra-violet energy comes in from the sun and much is reflected back from the earth's surface as infrared. The molecules of greenhouse gases (this defines such gases) oscillate at a frequency that interferes with infrared and stops it escaping, thus warming the atmosphere and the world. The French mathematician, Fourier, recognised that something was trapping energy (by looking at heat balance and temperature) in the early 19th century; the Irish scientist Tyndall, identified the gases at work experimentally in the mid-19th century; and the Swedish scientist Arrhenius calculated likely quantitative effects around the turn of the 19th/20th century. Quantum mechanisms identified the frequency-interference mechanisms by the 1930s. That established the basic science. As concentrations of GHGs (CO₂ being the main one) rose rapidly with fossil-fuelled growth from the end of the second world war, the data in support of the basic science, via temperature increases, and other climate changes came pouring in and has become stronger and stronger. The stupidity of the denial of the climate science has long been obvious.

This routine logic tells us (roughly speaking) that concentrations, and thus temperatures, rise whilst emissions are net positive. To stabilise temperatures, emissions must be net zero. The sooner we go to net zero, the lower the temperature at which we stabilise. To stabilise at 1.5°C, we have to get CO₂ net zero by, roughly, 2050 and at 2°C by, roughly, 2070. It is with this logic in mind that the UK government, in June 2019, set a target for zero overall emissions (CO₂ plus other GHGs) by 2050.

How do we respond? The great opportunity

We can surely see clearly why we must tackle the problem and the required scale of action. Thus we turn to the question of how we do it. Here a very positive story is emerging. The change must be radical but it can deliver, over the next few decades, strong and inclusive growth and poverty reduction. It can boost output (in a demand-constrained world) and sharpen supply in the short to medium term. It is already setting off a wave of Schumpeterian technical progress, which will be powerful over the coming decades. And we know there is no long-run high-carbon growth story. It would self-destruct on the very hostile environment it would create. This is an alternative and attractive story of growth. It could help deliver on the Sustainable Development Goals agreed at the UN in September 2015. This is not about growth forever. That is a different issue. It is about fundamental structural change over the next two or three decades.

Change would indeed have to be radical; it requires real resources for investment and innovation. And the management of some major sectoral and technological changes and dislocations. But the benefits are not just narrowly economic. We can have cities where we can move and breathe and be productive; ecosystems that are robust and fruitful, and a sustained and reinvigorated biodiversity. This is a different way of producing, consuming and living, which is both feasible and attractive (see discussions such as those in Claborn and Brooks 2019). And, fundamentally, it dramatically reduces the immense risks of climate change.

The potential and fascination of economics

None of this can happen without good policy. That is where economics must play its role. In addition, it should be clear that we need analytical contributions from right across our subject. Public economics should be central to the analysis of policy. And it must be public economics as if time matters (see, Stern 2018). We are not comparing alternative long-run equilibria or steady states, but are examining how to foster and manage rapid transitions over the next two decades. We need a new approach to theories of growth and technical change which recognises the importance of economies of scale in production (look at solar panels), which re-examines processes of technical change (look at electric vehicles, lighting and heating, air and sea transport), and which puts the management of systems (look at cities, land-use, forests etc.) at centre-stage.

Economic history has much to tell us about waves of technical change and industrial revolutions. Industrial and regulatory economics is crucial here. Legal and financial aspects of economics will be of central importance. Action must be global and international economics, trade and investment will be at the heart of the story. The big growth will be outside the rich countries; this is about development. Much of this will be about political will and institutions – political economy is central. And behavioural change is fundamental.

This must be an economics of the understanding of profound and existential risks. It is not about the management of small perturbations due to climate risks around some largely exogenous growth path. Sadly, far too much of the economic modelling has treated the problem in this way. We should not shoehorn the problem into familiar structures just because they are familiar. That approach simply fails to capture the issues at stake.

Further, we have to take the ethics and moral philosophy seriously. We will be making the change in large measure for the life chances of future generations. We are also making the changes for the health and well-being of this generation in our own communities and beyond; we should note here that air pollution from burning fossil fuels is a major source of death and illness across the world, including our own country, and is particularly threatening for the young and for poor people. The management of change will require careful attention to social justice and the cohesiveness of societies. We have to examine the moral issues directly. That includes discounting, of course. And we must remember that the social weight we attach to an increment of resources to future generations will depend on how well-off we expect them to be. Badly-managed climate change could undermine the lives and livelihoods of the big majority and kill many of them. It is surely clear that discount factors (and their proportional time derivatives, discount rates) cannot be seen as exogenous to our own actions on climate change. Neither can they be hooked over from some imperfect capital market (and such markets do not, in any case, reflect moral preferences). See Stern (2015), chapter 4 and 5, for further discussion of some of the ethical issues.

Without good economics from across our whole subject, we risk unsound and bad policy. We surely have a duty to get involved. At the same time, the issues and analyses are fascinating. It is not just their importance that makes them exciting but also their analytical content. Persuasive evidence on the causal implications of the natural environment for human wellbeing has begun to emerge (such as Luechinger 2009 and Levinson 2012). There are new ways to put an explicit value on environmental influences (see, for example, Atkinson et al. 2012 and Maddison et al. 2019).

That is why it is so disappointing that we are, as a profession, moving so slowly, as the following evidence demonstrates.

[Evidence that economists are failing our children and grandchildren](#)

If one looks at the main academic journals of economics, it is hard to avoid the view that economists are letting down the world.

Perhaps the most striking example is the case of the Quarterly Journal of Economics. This is, according to the 2019 Web of Science impact-factor ranking, the top-ranked journal in the field of economics. It has been edited from Harvard since the late 1800s, and has published approximately 4700 articles since it began. The QJE is justifiably a famous and in many ways admirable journal. Countless young economists in UK departments might view it as the single most desirable place in which they could publish an article.

It is therefore natural to ask (see Table 1) the following question. *How many articles has the famous QJE published on climate change? We are sorry to report that the answer is zero.* This is fewer than the QJE has published on either baseball or basketball. If there is a gloomier reflection on our discipline than Table 1's zero for the QJE, we are not sure what it might be.

It would be fair to point out that some economics journals have done marginally better. Table 1 gives the numbers for a well-known set of European and US general economics journals, namely, journals that publish broadly across the field of economics (as opposed to being specialist journals like the Journal of International Economics or Journal of Labour Economics). There we also provide numbers for the Economic Journal, the Journal of Political Economy, the Review of Economic Studies, the American Economic Review, Economica, Econometrica, American Economic Journal – Applied Economics, and the Journal of the European Economic Association.

For the technical record, we did our search on the Web of Science, beginning with the composite search term "Climate OR Carbon OR Warming", because that is a way to pick up multiple

combinations of the key words that might be relevant. Then we went through the list by hand, and thus could excise articles about the climate of industrial relations, warm-glow altruism, and so on. We neglected Presidential Addresses, the AER Papers-and-Proceedings volumes, Book Reviews, Comments, Replies, and Special Issues. It should be emphasized that we did not make these deletions because we view such contributions as of little value. Rather, our aim was to provide a picture of what might be thought of as standard, representative economics as portrayed in the leading journals of our profession.

We would accept that there are likely to be small errors, and occasional debatable aspects, in our classification system. But we hope readers might agree that these are unlikely to matter for the thrust of our current argument. Academic economics -- at least as represented in mainstream general journals of the kind listed in Table 1 -- has contributed remarkably few articles on one of the greatest scientific, economic and policy issues of our era. Some readers may view Table 1's numbers as shocking.

This lack of research on climate-change issues by economists and social scientists was pointed out in a more general way a decade ago in an article by Goodall (2008). She collected bibliometric data on 60 journals across a wide range of social sciences, including the subject of economics. She reached gloomy conclusions. Goodall and Oswald (2019) make the related point that since the year 2000 the 50 journals in the elite so-called FT Journals list have published only 11 articles on species decline and bioversity (out of 47,000 articles).

Why are economists, in particular, so close to being terribly neglectful of their scientific duty? First, some economists may object to the evidence that global warming is human-made. Yet, partly because the evidence base is now so strong, we are doubtful that this is the reason for the paucity of publishing. Second, some non-economists might argue that the subject of economics is run by

individuals who do not care about the real world and are obsessed with theoretical models. We do not believe that. In our lifetime, we have seen economics as a discipline become demonstrably more empirical, and we both view the subject of economics, and many of our scholarly colleagues themselves, as intensely practical and genuinely concerned with matters of importance. Third, we think the real and underlying reason is different. We are of the opinion that the lack of climate-change research in economics stems, in large measure, from risk-aversion among younger (and some older) economists who are focused principally, for career reasons, primarily on how per se to produce published articles in prestigious journals. Many economists appear to believe that the way to do that is to send to mainstream journals the kind of article that the journals' referees will view as performing well relative to conventional and standard perspectives of mainstream analyses -- and perhaps supportive of those referees' own previous style of work. Such conservatism may be natural, especially among the young, and perhaps has even been fostered in the UK's universities by the Research Excellence Framework, but it has obvious scientific disadvantages. To put all this in different language, we suspect that modern economics is stuck in a kind of Nash equilibrium where the reason there are few economists who write climate-change articles is because other economists do not write climate-change articles.

This suggests that some form of statement of priorities is now required to break out of the bad equilibrium. Research counts sometimes help that. So, too, could editorial boards. This idea might be for mainstream journals to deliberately favour, and be seen publicly to favour, climate-change research. Lip service will not be sufficient. Editors will have to act.

In conclusion

One day, our grandchildren and great-grandchildren will look back on this generation -- our generation -- of economists. They will judge us. They may conclude that climate change was driven

to a considerable extent by economic forces operating in an environment where public policy and its analysis failed to recognise that profound challenges and market failures were emerging. We are concerned that our grandchildren and great-grandchildren may see that economists, in large measure, stood silently by and continued in a narrow way to ignore climate-change issues and to write journal articles on topics of less importance. They may also note that half a century before our time it was already firmly understood that global warming was anthropogenic in nature (Benton 1970; Madden and Ramanathan 1980). If we do not move quickly, we think our profession is likely be judged harshly by those humans of the future -- including by our own offspring.

Natural scientists are doing their job; it is time for economists and other social scientists to do theirs. Action, by us all, including especially by the editors of journals and senior professors in our universities, is now urgently required.

Table 1: The Paucity of Climate-Change Research in Mainstream Economics Journals

<i>Journal name</i>	<i>Number of articles ever published on climate change</i>
QJE	0
EJ	9
REStud	3
Econometrica	2
AER	19
JEEA	8
Economica	4
JPE	9
AEJ – Applied	3

These are chosen as 'general' economics journals.

Total articles by these journals (all topics) = 77,000 approx.

Source: Own calculations using the Web of Science (Clarivate Analytics). Search done in August 2019.

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