

“It is much too soon to act” – Economists and the climate change¹

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Tomorrow is not only very close, but in many respects it is already here

K. E. Boulding

Introduction

Nicholas Georgescu-Roegen wrote that “economic thought has always been influenced by the economic issues of the day. It also has reflected – with some lag – the trend of ideas in the natural sciences”.² In this article I show that in the case of global warming and climate change that lag was long. The thought of economists, in fact, for many years did not reflect at all the knowledge achieved by climate science consensus: many distinguished economists with a neoclassical background have ignored the problem or, when they have dealt with it, they denied it, dismissed it with superficial jokes or underestimated it in terms of its economic effects. For a long time only a few economists took seriously the warnings of climate scientists.

In more recent years orthodox economists have become more aware of the catastrophic outcomes of climatic disturbances, but at this point the traditional policies they recommend could be insufficient.

Economists and the climate change: the forerunners

In 1968 the late Herman Daly – who in the following years became the pioneer of ecological economics – wrote:

“... since the Industrial Revolution the tremendous consumption of carbon fuels has resulted in an increased concentration of carbon dioxide in the atmosphere. Since this gas increases the heat retention of the atmosphere, thus raising the average

¹ This article is a revised and expanded version of the article appeared in Italian, with the title “È troppo presto per agire. Gli economisti e il cambiamento climatico”, in the review *Nuova Economia e Storia*, XXVII, No. 1-2, 2021.

² N. Georgescu-Roegen (1971), “The Entropy Law and the Economic Problem”, in *Distinguished Lecture Series No. 1*, Department of Economics, The University of Alabama, p. 4.

temperature, it may well be that the ultimate effect of the Industrial Revolution will be the melting of the polar ice cap and the inundation of large parts of the world.”³

The quote shows that at the end of the 1960s of last century the basic mechanism of global warming and its potential effects were already known to some economists. Nevertheless in the years immediately following only very few economists mentioned the problem in their writings. In the economic literature of that period, in fact, references to climate change and to the potential consequences on the economic system were small in number and very cautious.⁴ Even *The Limits to Growth* – the first Report to the Club of Rome released in 1972, by many considered excessively pessimistic about the future of mankind – dealt with the issue only *en passant* arguing that “It is not known how much CO₂ or thermal pollution can be released without causing irreversible changes in the earth's climate”;⁵ however, the Authors proposed to apply the precautionary principle.⁶ A similar caution emerges from the third Report to the Club of Rome, released in 1976 and coordinated by the Nobel laureate economist Jan Tinbergen.⁷ However in 1975 Nicholas Georgescu-Roegen already mentioned the dangers of thermal pollution deriving from the accumulation of carbon dioxide in the atmosphere.⁸

In the second half of the 1970s, some economists began to carry out specific studies on the possible economic effects of global warming: we can remember in particular William Nordhaus, who – after a first article in 1973⁹ – published his first comprehensive work on the topic in 1977,¹⁰ and Ralph D'Arge, who delivered a paper at the World Climate Conference which took place in 1979 in Geneva, organized by the World Meteorological Organization.¹¹

³ H. E. Daly (1968), “On Economics as a Life Science”, *Journal of Political Economy*, vol. LXXVI, No. 3, p. 399. In the passage quoted Daly referred to a speech of the physicist Edward Teller.

⁴ Consider, for example, the following quote from a book published in 1977 by a leading environmental economist:

“It is [...] possible that the continually expanding use of fossil fuels will so increase carbon dioxide content of the atmosphere that the planet will tend to heat up, the ice caps will melt, inundating the coastal cities, and other unforeseen climatic effects will occur. Whether such events are a genuine danger is still a matter of uncertainty and even dispute among scientists”: A. V. Kneese (1977), *Economics and the Environment*, Penguin Books, p. 32.

⁵ D. H. Meadows, D. L. Meadows, J. Randers, W. W. Behrens III (1972), *The Limits to Growth*, A Potomac Associates Book, Universe Books, p. 81.

⁶ “This ignorance about the limits of the earth's ability to absorb pollutants should be reason enough for caution in the release of polluting substances [included CO₂ - ed.]”, *ibid.*

⁷ The Report made a list of global problems and proposals to address them, stressing the uncertainty about climate change induced by the use of fossil fuels: “It can be expected that world climate will itself be affected by the ever-increasing production of energy; but we do not know when, or how”: J. Tinbergen et al. (1976), *Reshaping the International Order*, A. Elsevier, p. 324.

⁸ N. Georgescu-Roegen (1975), “Energy and Economic Myths”, *The Southern Economic Journal*, Vol. 41, N. 3, p. 358.

⁹ W. D. Nordhaus (1973), “World Dynamics: Measurement without Data”, *The Economic Journal*, Vol. 83, No. 332, pp. 1156-83. The article was written to criticize *The Limits to Growth*, it was not dedicated specifically to global warming.

¹⁰ W. D. Nordhaus (1977), “Economic Growth and Climate: The Carbon Dioxide Problem”, *The American Economic Review* Vol. 67, No. 1, pp. 341-6.

¹¹ R. C. d'Arge (1979), “Climate and Economic Activity”, in World Meteorological Organization, *Proceedings of the World Climate Conference*, Geneva, 12-23 February 1979, WMO No. 537.

Anyway, apart these few signs of interest, the vast majority of economists, i.e. the neoclassical mainstream – which prevailed (and still prevails) in universities (especially in the US) and which had (and has) influence on governments – in the 1970s showed no interest, much less concern, about global warming.

The alarms of scientists and the first reactions of mainstream economists

During the 1980s the scientific evidence on global warming became clearer, so much so that several important international initiatives followed one another and fundamental publications appeared.

In 1987 the Report of the United Nations World Commission on Environment and Development, titled *Our Common Future* (also known as “Brundtland Report”), addressed the climate emergency at length and with worried tones, making the fight against it one of the cornerstones of “sustainable development”.¹² The following year the United Nations General Assembly, with the Resolution 43/53, having recalled the risks of disastrous events for humanity due to global warming, made a long list of requests, exhortations and recommendations to governments, international organizations and scientific institutions “to treat climate change as a priority issue to undertake and promote specific, co-operative action-oriented programmes and research”, in order to achieve an adequate protection of the climate at a global level, for the benefit of present and future generations.¹³

In November 1990, in another world conference on climate change held in Geneva, hundreds of scientists warned that, without a drastic reduction in greenhouse gas emissions, the Earth's average temperature would rise so much as to cause serious damages to living beings. In the following year the first report of the Intergovernmental Panel on Climate Change (IPCC) – established in 1988 with the task of collecting data and carrying out scientific assessments – concluded that there was unequivocal evidence of the carbon dioxide accumulation in the atmosphere and of the trend in the Earth's average temperature to increase.¹⁴

In the face of the repeated alarms briefly mentioned, economists reacted in different ways. The most common reaction was the lack of any reaction: the vast majority of economists continued to ignore the global warming and to have a “business as usual” approach.

A second reaction consisted in a superficial approach to the problem: many economists concluded hastily denying its existence or minimizing its relevance. These positions were largely based on opinions of the few scientists which considered the climate change a natural (not due to human activities) process or a “mistake” due to measurement errors. It cannot be excluded that these opinions were influenced by powerful oil lobbies.¹⁵ Thus, in 1991 Lawrence Summers, at the time chief

¹² World Commission on Environment and Development (1987), *Our Common Future*, UNEP - Oxford University Press; see in particular Ch. 7, par. II. 1 “Managing Climate Change”.

¹³ See <https://www.ipcc.ch/site/assets/uploads/2019/02/UNGA43-53.pdf>.

¹⁴ See https://www.ipcc.ch/site/assets/uploads/2018/03/ipcc_far_wg_i_full_report.pdf.

¹⁵ In 1989 the big international carbon emitters set up the Global Climate Coalition (GCC) in order to make lobbying to cast doubts on the effects of greenhouse gas emissions. The GCC dissolved in 2001. Jeffrey Sachs, Director of the Center for Sustainable Development at Columbia University and President of the UN Sustainable Development Solutions Network, wrote that oil, gas and car companies are very big and capable to exert a strong influence. They “hope, plan and lobby for the world to remain heavily dependent on oil and gas, despite the risks to ourselves and to future generations. ... Some companies have gone so far as to promote antiscientific

economist of the World Bank (and later US Secretary of the Treasury), stated that “the danger of an apocalypse due to global warming or anything else is non-existent”.¹⁶ Also in 1991 Gary Becker (Nobel laureate in the following year) declared that greenhouse effect produced by CO₂ emissions is “still a controversial issue”.¹⁷ Herbert Simon (Nobel laureate in 1978) stated that global warming was not an economic problem “but rather a technical problem”.¹⁸ In the same year Milton Friedman (Nobel laureate in 1976) declared that pollution was not a serious problem, recommended not to take initiatives leaving the solution to the free market, and called the Clean Air Act a “monstrosity”.¹⁹

Finally, a third, not numerous, group of economists explored the question in depth, although reaching different conclusions about possible policy options.

The 1992 *World Report* issued by the World Bank and dedicated to the environment identified the possible policy options:

1. “*Do nothing*. Finance additional research but incur no other costs until the extent and implications of warming become clearer”;
2. “*Take out an insurance policy*. Adopt precautionary measures that entail modest costs now but will reduce the costs of a stronger response in the future should it become necessary...”;
3. “*Take immediate action to stabilize or reduce total output of greenhouse gases*”.²⁰

The latter policy option had been substantially proposed by David Pearce, Anil Markandya and Edward Barbier in 1989, in a report (which later became a book) for the United Kingdom Department of the Environment. In this work – albeit with some caution resulting from the uncertainty about climate dynamics – they argued that “damage from global warming and sea-level rise due to greenhouse gases is of particular concern”; consequently, Authors recommended to start immediately an appropriate policy, since “the longer the world community delays action on the greenhouse effect, the greater will

propaganda and to sow doubt in the public mind regarding well-known and mainstream science”: J. D. Sachs (2014) *The Age of Sustainable Development*, Columbia University Press, p. 396. More recently the Secretary-General of United Nations, Antonio Guterres, declared that “Shamefully, some companies have even tried to block the transition to net zero – using wealth and influence to delay, distract and deceive”: U.N. (2023), *Secretary-General’s Opening Remarks at the Climate Ambition Summit*, 20 September (<https://www.un.org/sg/en/content/sg/statement/2023-09-20/secretary-generals-opening-remarks-the-climate-ambition-summit>). See also N. Oreskes and E. M. Conway (2010), *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*, Bloomsbury Press.

¹⁶ L. Summers (1991), interview by Kirsten Garrett, “Background Briefing”, Australian Broadcasting Company, second programme, World Bank and IMF annual assembly in Bangkok. Quoted in E. Toussaint (2020), “Climate: Sorcerers’ apprentices at the World Bank and the IMF”, CADTM (<http://www.cadtm.org/Climate-and-environmental-crisis-Sorcerer-s-apprentices-at-the-World-Bank-and>).

¹⁷ Interview in C. Ravaioli (1992), *Il pianeta degli economisti ovvero l’economia contro il pianeta*, ISEDI, p. 12 (my translation from Italian). Becker added that the problem of pollution in general was “a real problem”, but “felt beyond reason, overstated” (ibid.).

¹⁸ Ibid., p. 24.

¹⁹ Ibid., pp. 15, 42-5, 58.

²⁰ World Bank (1992), *Development and the Environment*, World Development Report, World Bank – Oxford University Press, p. 159. <https://documents1.worldbank.org/curated/en/995041468323374213/pdf/105170REPLACEMENT0WDR01992.pdf>

be the 'committed' level of warming (...). Delay is therefore not costless: the damage from greenhouse gases will simply be the greater the longer we delay".²¹

The second policy option identified by the World Bank was proposed by the World Bank itself:

"Bringing together the various estimates of economic costs and benefits leads to a simple conclusion: the balance of the evidence does not support a case for doing nothing, but neither does it support stringent measures to reduce emissions now – the costs are too high in relation to the prospective benefits.... The wisest course is to make modest immediate reductions in emissions of greenhouse gases and investments designed to lower the cost of achieving larger reductions should this become necessary in the future".²²

Basically to the same conclusion came, in this period, the aforementioned William Nordhaus. He assessed the impact of climate change for each sector of the United States economy using his Dynamic Integrated Climate Economic (DICE) model, and concluded: "Reducing the risks of climate change is a worthwhile objective, but humanity faces many other risks and has many other worthy potential investments [...]".²³ Then he proposed a "flexible" policy that consisted in avoiding immediate and drastic interventions to reduce emissions, in increasing investments if the threat of global warming worsened and in relaxing policy if science or technology improved the situation.²⁴

In the same period the policy to avoid drastic interventions was shared by the Oxford economist Wilfred Beckerman. He wrote: "... the cost of any major cut in CO₂ emissions would be incomparably greater than the damage that global warming is likely to bring [...]".²⁵

The "dumb mistake"

After the Earth Summit held in Rio de Janeiro in 1992, during which a climate convention was approved,²⁶ the attitude of most economists did not change significantly: they continued to neglect the risks of climate change. In some cases the data that worried climate scientists and led to the organization of many international conferences and agreements were deemed insufficient or contradictory, not serious enough to induce containment emissions policies. Along with the skeptical economists, after Rio some scientists and journalists produced books and articles to deny in principle

²¹ D. Pearce, A. Markandya, E. Barbier (1989), *Blueprint for a Green Economy*, Earthscan Publications, pp. 12, 18. We can also include in the group of the "concerned scholars" of the beginning of the 1990s William Cline of the Institute for International Economics. Using a long-term perspective and a low discount rate to compare benefits versus costs over time, he came to the conclusion that an aggressive programme of emissions abatement was warranted: W. R. Cline, (1992). *The Economics of Global Warming*. Peterson Institute for International Economics

²² World Bank (1992), *Development and the Environment* (see above, note 20), pp. 160-1.

²³ W. D. Nordhaus (1991), "Economic Approaches to Greenhouse Warming", in R. D. Dornbusch and J. M. Poterba (eds.), *Global warming: Economic policy responses*, MIT Press, p. 63.

²⁴ W. D. Nordhaus (1991), "Economic Approaches to Greenhouse Warming", (see above, note 23), p. 63.

²⁵ W. Beckerman (1992), "Economic Growth and the Environment: Whose Growth? Whose Environment?", *World Development*, Vol. 20, No. 4, p. 489.

²⁶ https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf.

the anthropogenic global warming, or to recommend waiting for better data before acting. Along this line I can mention, among others, the works of Julian Morris, at that time co-director, with Roger Bate, of the Environment and Technology Programme of the [Institute of Economic Affairs](#) (IEA). In 1994 – while the United Nations Framework Convention on Climate Change (UNFCCC) entered into force – Morris and Bate wrote a book in which they argued that, in absence of incontrovertible data, policies to reduce carbon emissions were not appropriate.²⁷ Morris in 1997 reiterated his ideas in another book²⁸ in which he admitted that man's emissions of greenhouse gases play a role in altering climate, but not crucial; moreover, he wrote that the estimates and predictions of IPCC were exaggerated. He also wrote that the cost of imposing limits on emissions of carbon dioxide and other greenhouse gases would have been too high. In the same period other scholars embraced the argument of the limited predictive power, or even of the roughness, of climate models.²⁹

In the meantime, during the 1990s the view of William Nordhaus quickly became dominant among economists, according to which the upheaval of the climate induced by the greenhouse effect would not be a serious problem for the economic system because it would only affect agriculture, forestry and coastal activities which, at least in the most industrialized countries, represent only a small fraction of GDP:

“Climate change is likely to have different effects on different sectors. In general, sectors of the economy that have a significant interaction with unmanaged ecosystems – that is, those that are heavily dependent upon naturally occurring rainfall, runoff, or temperatures – may be significantly affected by climate change. Agriculture, forestry, and coastal activities fall in this category. Most of the U.S. economy has little *direct* interaction with climate, and the impacts of climate change are likely to be very small in these sectors”.³⁰

This idea was shared, among others, by the aforementioned Beckerman³¹ and by Thomas G. Moore, former member of President Ronald Reagan's Council of Economic Advisers.³² In 1997 Thomas C. Schelling, before the winning of the Nobel Prize (awarded in 2005), wrote: “Agriculture is practically

²⁷ R. Bate, J. Morris (1994), *Global warming: Apocalypse or Hot Air?*, Institute of Economic Affairs.

²⁸ J. Morris (ed.) (1997), *Climate Change: Challenging the Conventional Wisdom*, Institute of Economic Affairs.

²⁹ See for example M. L. Parsons (1995), *Global Warming: the Truth Behind the Myth*, Insight Books.

³⁰ W. D. Nordhaus (1991), “Economic Approaches to Greenhouse Warming” (see above, note 23), p. 40.

³¹ W. Beckerman (1995), *Small Is Stupid*, Duckworth, p. 91.

³² Moore wrote: “An examination of the record of the last twelve millennia reveals that human kind prospered during warm periods and suffered during cold ones... Climate affects principally agriculture, forestry and fishing. Manufacturing, most service industries and nearly all extractive industries are immune to climate shifts. Factories can be built in Northern Sweden or Canada or in Texas, Central America or Mexico. Banking, insurances, medical services, retailing, education, and a wide variety of other services can prosper as well in warm climates (with air-conditioning) as in cold (with central heating). A few services, such as transportation and tourism, may be susceptible to weather”: T. G. Moore (1995), *Global Warming: a Boon to Humans and Other Animals*, Hoover Inst. - Stanford University, pp. 3-4. The last statement is very interesting because testifies that this kind of literature “has pretended that climate change is no more than a change in the weather”: S. Keen, in J. Morgan (2021), “From finance to climate crisis: An interview with Steve Keen”, *Real-world economic review*, No. 95, p. 135. Three years later Moore repeated his message that “warmer is better, colder is worse” in T. G. Moore (1998), *Climate of Fear. Why We Shouldn't Worry about Global Warming*, Cato Institute.

the only sector of the economy affected by climate and it contributes only a small percentage—three percent in the United States—of national income”.³³

The idea that climate change can have at most some effect only on "outdoor" activities and therefore a modest impact on the economic systems of industrialized countries, was defined by Herman Daly a "dumb mistake". He argued that, first of all, it is not true that agriculture is the only economic sector affected by the extreme events induced by climate disruption (just ask, Daly wrote with bitter irony, the insurance companies and citizens of New Orleans after the passage of hurricane Katrina).³⁴ Moreover, Daly wrote that measuring the importance of an economic sector on the basis of its contribution to the national GDP makes no sense if there are in place dynamics that modify prices: "it should be evident", he wrote, "that in the event of a climate-induced famine the price of food would skyrocket and the percentage of GNP going to agriculture, which is not a constant of nature, could easily rise from 3 percent to 90 percent".³⁵ The idea that the loss of "3 percent" of GDP in agriculture could be easily substituted by a 3 percent of GDP in other sectors is absurd, because dollars are fungible, but the real component of GDP is not: "The fungibility of dollars does not imply the fungibility of food and, say, of information services. ... If I am hungry I want a meal, not a recipe.... True, agriculture accounts for only 3 percent of GNP, but it is precisely the specific 3 percent on which the other 97 per cent is based!".³⁶

Despite the compelling validity of this criticism, for many years the majority of economists' papers held firm the assumption that manufacturing, mining, transportation, communication, finance, insurance, non-coastal real estate, retail trade, wholesale trade and government services will be unaffected by climate change.³⁷

The Economists' Statement on Climate Change and the persistence of the "dumb mistake"

In 1997 – the year during which, in December, the Kyoto Agreement was signed – there was a surge of interest for the global warming among economists; up to that point, in fact, there had been little interest.³⁸ In that year *The Economists' Statement on Climate Change* was published with the objective to promote market-based solutions to the problem. The *Statement*, coordinated by "Redefining Progress" (an [environmental economics](#) think tank founded by [Ted Halstead](#)), was a brief declaration in which one reads, among other things, that

"the balance of evidence suggests a discernible human influence on global climate.
As economists, we believe that global climate change carries with it significant

³³ T. C. Schelling (1997), "The Cost of Combating Global Warming", *Foreign Affairs*, November-December, p. 9.

³⁴ Katrina was a tropical cyclone that struck the Gulf of Mexico and in particular the cost of Louisiana in August 2005. New Orleans was devastated and more of 1.800 people lost their lives.

³⁵ H. E. Daly (2007), "When Smart People Make Dumb Mistakes", in *Ecological Economics and Sustainable Development*, Edward Elgar, pp. 188-9 (originally in *Ecological Economics*, Vol. 34, No. 1 (2000), pp. 1-3).

³⁶ *Ibid.*, pp. 189-190.

³⁷ S. Keen (2021), "The appallingly bad neoclassical economics of climate change", *Globalizations*, 18:7, p. 1153.

³⁸ See A. H. Goodall (2008), "Why have the leading journals in management (and other social sciences) failed to respond to climate change?", *Journal of Management Inquiry* 17: 408-420. See also A. Oswald, L. Stern (2019), "Why are economists letting down the world on climate change", *VoxEU-CEPR* (<https://voxeu.org/article/why-are-economists-letting-down-world-climate-change>).

environmental, economic, social, and geopolitical risks, and that preventive steps are justified. Economic studies have found that there are many potential policies to reduce greenhouse-gas emissions for which the total benefits outweigh the total costs. ... The United States and other nations can most efficiently implement their climate policies through market mechanisms, such as carbon taxes or the auction of emissions permits”.³⁹

The original drafters of the *Statement* were Dale Jorgenson, Paul Krugman, William Nordhaus, Kenneth Arrow and Robert Solow (the last two had won the Nobel Prize in previous years) and it was signed by more than 2,600 economists, including many [Nobel Prize](#) laureates at that time (besides original drafters: Gerard Debreu, John Harsanyi, Lawrence Klein, Wassily Leontief, Franco Modigliani and James Tobin).

The *Economists' Statement* and the increase in the number of economic studies dedicated to this issue in the second part of the 1990s were important steps but should not be overestimated: the Statement, in fact, was a very generic text, on which (almost) everyone could agree, while the increasing number of economists' works for the most part continued to adopt methodologies that led to a systematic underestimation of the severity of global warming economic effects, with the consequent proposal (much appreciated by governments) to postpone or to avoid policies to reduce greenhouse-gas emissions.⁴⁰ In particular, William Nordhaus, who at that time had become the leading authority for these studies, continued to draw from his models the “dumb mistake”, i. e. the conclusion that sectors other than agriculture and coastal activities, “... are estimated to be relatively invulnerable to climate change (ignoring indirect impact through others sectors)”.⁴¹ He based his scientific activity on the assumption that “Climate change is unlikely to be catastrophic in the near term, but it has the potential for very serious damage in the long run”.⁴² From this, he repeated the proposal not to intervene immediately with a strong reduction in greenhouse gas emissions, but rather gradually and increasingly over time. A policy, therefore, which entails the obvious risk of “turning off the tap when the house is already completely flooded”.

In 2005, Carl N. Mc Daniel wrote enlightening words, useful to understand the attitude of the economists of that period (and in part also of the present period):

The possibility of unforeseen human catastrophes, along with the certain devastating effect climate change will have on biodiversity, greatly concerns the majority of natural scientists; however, the dire consequences of rapid climate change seem to trouble only a few economists... Nordhaus and neoclassical economists in general do not

³⁹ <https://web.archive.org/web/20160304023618/http://rprogress.org/publications/1997/econstatement.htm>.

⁴⁰ On the methodologies used see C. S. Bahinipati, U. Patnaik (2015), “Climate Change Economics: A Review on Theoretical Understanding and Controversies”, *GIDR W.P.* No. 226; J. M. Harris, B. Roach, A.-M. Codur (2017), “The Economics of Global Climate Change”, *GDAE* Tuft University; S. Keen (2021) (see above, note 37). The latter article lists the few scholars that did not share the idea that climate change could have only a trivial impact on the economic system as a whole (p. 1150). See also D. Zengelis (2021), “Climate change: how economists underestimated benefits of action for decades”, *The Conversation* (<https://theconversation.com/climate-change-how-economists-underestimated-benefits-of-action-for-decades-170825>).

⁴¹ W. D. Nordhaus, J. Boyer (2000), *Warming the World. Economic Models for Global Warming*, MIT Press, p. 77.

⁴² W. D. Nordhaus (2008), “Reply to F. Dyson (2008), The Question of Global Warming”, *The New York Review*, 25 September (<https://www.nybooks.com/articles/2008/09/25/the-question-of-global-warming-an-exchange/>). For an analysis of Nordhaus' work see S. Keen (2022), *The New Economics. A Manifesto*. Polity Press, Ch. 4.

deny that climate change is likely, but they are perfectly happy to do little to avoid it because, in their view, the economic costs are likely to be relatively low. They hold this view for two fundamental reasons: first, economists believe that products traded in markets would be minimally affected by warming and that non market resources like species and ecosystems have little value; and, second, they believe that any particular life-support feature has a substitute or can be replaced by human invention at low cost”.⁴³

The “Copenhagen Consensus”

The idea that the abandonment of fossil fuels and energy reconversion was not a priority was expressed by the important economists that in 2004 collaborated with Bjorn Lomborg, a Danish professor of Statistics who in 2001 had published the controversial book *The Skeptical Environmentalist*.⁴⁴ That book launched a very optimistic message about the current and the future situations of mankind including the risks of catastrophic climate change; so, not surprisingly, it was very well received by large part of public opinion: “*The Economist*, the *New York Times*, and *Washington Post*, among others, published reviews that lavished praise on Lomborg’s “truth” about the real state of the world”.⁴⁵ But, “in contrast to the enthusiastic reception of Lomborg’s book in the popular media, the two most important prestigious peer-reviewed science journals in the world, *Nature* and *Science*, published scathing reviews, as did *Scientific American*...”.⁴⁶ The judgment on Lomborg’s work expressed by prestigious science journals and by eminent scientists did not prevent the participation of distinguished economists to the “Copenhagen Consensus”, a research promoted by Lomborg – later transposed into a book – aimed at examining the challenges that humanity had (and must) face and the related remedies.⁴⁷

More precisely, a group of famous economists – including Nobel Prize winners Thomas C. Schelling, Robert W. Fogel, Douglass C. North and Vernon L. Smith – identified the 10 most pressing world problems, examined 17 possible remedies and listed them on the basis of urgency answering “... the focal question... ‘where should the world invest, say, \$50 bn *extra* over the next four years to do the most good?’”⁴⁸. Well, the three identified remedies to climate change (“Optimal carbon tax”, “The Kyoto Protocol” and “Value-at-risk carbon tax”) were put in the last three places of the list.⁴⁹ The reason for that was the alleged lack of certainties about the negative consequences of atmospheric warming in comparison to the huge certain costs of energy conversion.

It is interesting to glean among the observations that each economist of the Copenhagen Consensus wrote in a personal capacity at the end of the volume. Fogel stated: “The environment is considered

⁴³ C. N. McDaniel (2005), *Wisdom for a Livable Planet*, Trinity University Press, pp. 179, 184.

⁴⁴ B. Lomborg (2001), *The Skeptical Environmentalist: Measuring the Real State of the World*, Cambridge University Press.

⁴⁵ C. N. McDaniel (2005), *Wisdom for a Livable Planet* (see above, note 43), p. 221.

⁴⁶ *Ibid.*, p. 222.

⁴⁷ <https://copenhagenconsensus.com/copenhagen-consensus>. See B. Lomborg (ed.) (2004), *Global Crisis Global Solutions*, Cambridge University Press.

⁴⁸ *Ibid.*, p. 3.

⁴⁹ *Ibid.*, p. 606.

to be important, but it is not yet time to do anything massive about climate change”;⁵⁰ North: “...climate change cannot compete with the other urgent issues we confront, although it is clear that some steps must be taken now to forestall adverse consequences down the road;”⁵¹ Vernon Smith: “It is clear from both the science and the economics of intervention that those of us who care about the environment are not well advised to favour initiating a costly attempt to reduce greenhouse gases (ghgs) build-up in the atmosphere in the near future based on the available information. Although the ultimate dangers may turn out to prompt action, the current evidence indicates that it is much too soon to act *relative to the many other important and pressing opportunities that demand immediate attention*”.⁵² Finally Schelling went so far as to write: “Future generations will be much richer than current ones, and it thus makes no sense to make current generations ‘pay’ for the problems of future generations”.⁵³

The *Stern Review* debate

Since the October 2006, for a time, the debate on economic policies to tackle human-induced climate change was focused on the *Stern Review*, the Report to the British [Chancellor of the Exchequer](#), prepared by a team of experts led by Lord Nicholas Stern, former chief economist of the World Bank.⁵⁴ The *Review* was a very long and comprehensive analysis not easy to summarize; but I still try to list below what in my opinion were the key messages:

- 1) “An overwhelming body of scientific evidence now clearly indicates that climate change is a serious and urgent issue”;⁵⁵
- 2) “... the body of evidence and the growing quantitative assessment are now sufficient to give clear and strong guidance to economists and policy-makers in shaping a response”;⁵⁶
- 3) “business as usual will entail continuing increases in global temperatures well beyond levels previously experienced by humankind”;⁵⁷
- 4) “... prompt and strong action is therefore clearly warranted”.⁵⁸

These messages, and in particular the last one, were quite different from that offered by the vast majority of literature on that topic, so the *Stern Review* provoked an heated debate among economists. Even though there were several favourable reactions,⁵⁹ most economists criticized the *Stern Review*,

⁵⁰ R. W. Vogel (2004), “Expert Panel Ranking” in B. Lomborg (ed.) (2004), (see above, note 47), p. 613.

⁵¹ D. C. North (2004), *ibid.*, p. 625.

⁵² V. L. Smith (2004), *ibid.*, p. 635 (italics in the text). From that statement I took the title of this article.

⁵³ T. C. Schelling (2004), *ibid.*, p. 627. It’s difficult to understand on what grounds Schelling predicted that future generations will be “much richer” than the generation living in 2004; in any case those grounds were weak, considering that after only three years his own generation was impoverished with the financial crisis of 2007-2008 and with the subsequent economic recession, for which millions of people loss job and house.

⁵⁴ The Report was published on the web and then in a book form: N. Stern (2007), *The Economics of Climate Change: The Stern Review*, Cambridge University Press.

⁵⁵ *Ibid.*, p. 3.

⁵⁶ *Ibid.*

⁵⁷ *Ibid.*, p. 201.

⁵⁸ *Ibid.* p. 641.

⁵⁹ See for example G. Heal (2008), “Climate economics: A meta-review and some suggestions”, NBER Working Paper 13927.

in particular for the level close to zero of discount rate used; critics argued that this approach would have caused too heavy investments in cutting emissions and then a waste of resources (on the contrary, an high discount rate would lead to a low level of investment).⁶⁰ Consistently with his positions, Nordhaus criticized *The Stern Review*.⁶¹

The sunset of misconceptions and the signs of attention from mainstream economists

In 2018 the [Nobel Prize](#) for economics was awarded to William Nordhaus precisely for his studies on the economic consequences of climate change. On that occasion many of his colleagues and the mainstream press presented him as a sort of "hero" of the environmental protection. But others took the opportunity to criticize the methodology he applied, which led to an underestimation of the risks of climate change for many years and consequently to a postponement of strong policies against global warming in order to achieve a higher current GDP growth. However, in the Nobel Lecture Nordhaus seemed more worried than in the past: "Global warming is the most significant of all environmental externalities. It menaces our planet [...]. It is particularly pernicious because it involves so many activities of daily life, affects the entire planet".⁶² And if it "affects the entire planet", it affects all sectors of the economic system, not only agriculture and others "outdoor activities". So, the "dumb mistake", although its spectre still haunts literature from time to time,⁶³ now seems a largely outdated idea, also for the disasters that occur with increasing frequency affecting all economic sectors and the very life of millions of people. In fact, the disrupted climate not only ruins crops and reduce fishing (however vital resources for mankind), but destroys infrastructures, interrupts supplies of raw materials and the flow of trade, causes loss of human life and mass migration. Moreover, affecting real economy, it brings about upheavals in the banking and insurance sectors, with bad consequences on financial stability.⁶⁴ Also the second *core belief* of neoclassical economists who dealt with global warming, i.e. the idea that it is better to avoid an immediate strong reduction in greenhouse gas emissions to safeguard growth and employment, now seems outdated, even among the usually prudent international organization, such as the IMF.⁶⁵

⁶⁰ See *The Economist* (2009), "Is it worth it? What economists have to say about mitigating climate change", December 5th, pp. 6-10.

⁶¹ W. D. Nordhaus (2007), "A Review of the Stern Review on the Economics of Climate Change", *Journal of Economic Literature*, Vol. XLV (September 2007), pp. 686-702. On this controversy and in general on the reactions to the *Review*, see C. S. Bahinipati, U. Patnaik (2015) (see above, note 40). Even if not formulated by a full-fledged economist, it is worth mentioning the criticisms to the *Stern Review* made by Nigel Lawson, former Secretary of State for Energy and Chancellor of the Exchequer in Margaret Thatcher's government. Lawson's criticisms had notable echo insofar they were formulated not in an academic paper but rather in an elegant booklet with wide circulation: N. Lawson (2008), *An Appeal to Reason: A Cool Look at Global Warming*, Duckworth Overlook. Lawson, who previously opposed the Kyoto Protocol, in this booklet repeated the usual arguments for doing nothing: "the science of global warming is far from settled" (p. 5), models used by IPCC are unreliable, the impact of climate change will be moderate and for this reason urgent actions are unnecessarily expensive.

⁶² W. D. Nordhaus (2018), *Climate Change: The Ultimate Challenge for Economics*, Nobel Prize Lecture, p. 441 (<https://www.nobelprize.org/uploads/2018/10/nordhaus-lecture.pdf>).

⁶³ See D.J. Arent et al (2014), "Key Economic Sectors and Services", in C. B. Field et al, *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. Part A: Global and Sectoral Aspects. Cambridge University Press.

⁶⁴ See C. Lagarde (2020), *Climate change and the Financial Sector*, ECB, (https://www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200227_1~5eac0ce39a.en.html).

⁶⁵ See IMF (2020), *World Economic Outlook – A Long and Difficult Ascent*, Ch. 3. More recently IMF considered "climate shocks" one of the factors - together with the pandemic and the war in Ukraine - that "contributed to a

After the Nobel Prize was awarded to Nordhaus, economists' interest in the topics of global warming and climate change has seen a certain increase, as confirmed by the number of articles published on this topic.⁶⁶ Another sign of attention was the success of a statement which appeared in 2019 on Wall Street Journal signed by many US economists – including 27 Nobel Prize winners, 4 former presidents of the Federal Reserve and 2 former Treasury secretaries. The Statement affirms that “Global climate change is a serious problem calling for immediate national action”, and this “action” should be a carbon tax.⁶⁷ Another Statement, launched in 2019 by the European Association of Environmental Economists (EAERE) and signed by over 1700 economists from around the world, confirms the recent interest in this topic.⁶⁸

As regards recent individual positions by leading economists, it is worth remembering the articles against climate change denialism published by the Nobel Prize winner Paul Krugman.⁶⁹

The need for a new economic paradigm

As documented in the previous paragraph, in recent years it finally seems that most orthodox economists have become more aware of the catastrophic outcomes of climatic disturbances; but at this point the traditional policy they recommend could be insufficient to meet the goals set at international level. In fact, that policy consists mainly of pollution permits and carbon taxes, but if the permits are offered with great generosity and if carbon taxes are low, these policies are ineffective.⁷⁰ In order to counter climate change effectively economists should abandon the “... irrational commitment to exponential growth forever on a finite planet subject to the laws of thermodynamics”.⁷¹ This commitment is based on the assumption that GDP growth is always a good thing, and for this idea many distinguished economists for decades did not take into account the warnings of climate scientists, arguing that it was not worth giving up some points of GDP growth to implement an immediate and strong action to stabilize or reduce total output of greenhouse gases.

reversal in decades-long poverty reduction trends”: IMF (2023), *World Economic Outlook – Navigating Global Divergences*, p. 2.

⁶⁶ The increase of interest was already found in 2015 (see P. Howard, D. Sylvan, 2015, *Expert Consensus on the Economics of Climate Change*, Institute for Policy Integrity) and later confirmed (see E. McLaughlin, 2021, *How have economists thought about climate change?*, <https://www.economicsobservatory.com/how-have-economists-thought-about-climate-change>).

⁶⁷ <https://clcouncil.org/media/EconomistsStatement.pdf>. Among the signatories of this Statement we can find Lawrence Summers, who, as I reported earlier, in the past stated that there was no danger of a climate apocalypse.

⁶⁸ The document (<https://www.eaere.org/statement/#:~:text=A%20price%20on%20carbon%20offers,towards%20a%20low%2Dcarbon%20future>) has been released with the aim of obtaining the setting of a price on carbon dioxide emissions that is adequate to combat climate change.

⁶⁹ See for example P. Krugman (2017), “Conspiracies, corruption and climate”, *The New York Times*, 11 September.

⁷⁰ See Dixon-Declève et al. (2022), *Earth4All: A Survival Guide to Humanity*, A Report to the Club of Rome, New Society Publishers, Ch. 7, par. *The Energy Turnaround in the Earth4All Analysis*. As the IMF put it: “Tangible policy responses to reduce greenhouse gas emissions have been grossly insufficient to date”: IMF (2020), *World Economic Outlook* (see above, note 65), p. 61.

⁷¹ H. E. Daly (2014), “Climate policy: from ‘know how’ to ‘do now’”, in *From uneconomic growth to steady-state economy*, Edward Elgar, p. 88 (originally in Sophie Foundation, Tenth Anniversary Booklet, June 2007).

Also for this reason Herman Daly for a long time advocated a “paradigm shift” in economic theory, suggesting a new paradigm not focused on growth.⁷² We need such a paradigm to counter climate change, or a “climate revolution”.⁷³ Otherwise, as professor Steve Keen wrote, “if climate change does lead to the catastrophic outcomes that some scientists now openly contemplate (...), then these Neoclassical economists will be complicit in causing the greatest crisis, not merely in the history of capitalism, but potentially in the history of life on Earth”.⁷⁴

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⁷² See H. E. Daly (1973), “Introduction”, in H. E. Daly (ed.), *Toward a Steady-State Economy*, W.H. Freeman and Co., pp. 1-10; H. E. Daly, J. Farley (2011), *Ecological Economics. Principles and Applications*, Island Press, p. 23ss.

⁷³ T. Brookes, G. Wagner (2021), *Economics Needs a Climate Revolution*, Project Syndicate (<https://www.project-syndicate.org/commentary/neoclassical-economics-fails-with-climate-change-by-tom-brookes-and-gernot-wagner-2021-06>).

⁷⁴ S. Keen (2021) (see above note 37), p. 1170.