

CO₂

Global Warming

The Greenhouse Gas Illusion

JULIAN HODGE INSTITUTE OF APPLIED MACROECONOMICS

ANNUAL LECTURE

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Michael Beenstock has been a Professor of Economics at The Hebrew University of Jerusalem since 1987 where he teaches econometrics and macroeconomics. He started out his professional career at H.M Treasury in London and at the World Bank before entering academia. He held positions at the London Business School and the Sir John Cass Business School.

His interests are wide-ranging and interdisciplinary and he has published on topics outside the field of economics as well as several books and over 100 papers in various fields of economics. His current interest in climatology illustrates his broad range of interests. His book on Heredity, Family and Inequality is to be published next year by MIT Press.

Julian Hodge Institute of Applied Macroeconomics

In May 1999, Cardiff Business School and Julian Hodge Bank announced a major new initiative, the establishment of the Julian Hodge Institute of Applied Macroeconomics. The main aim of the institute is to carry out research into the behaviour of the UK economy, and to study in particular its relationship with the other economies of Europe. The Institute's research work further extends across international trade, money and banking, international finance and econometrics, in a collaboration between around twenty academics, mostly in Cardiff, and some thirty PhD students.

The institute's director since it was founded has been Professor Patrick Minford, of Cardiff Business School, who is also the Economic Adviser to Julian Hodge Bank. Apart from its research projects the institute carries on the forecasting and modelling work which Minford began at Liverpool University and has been mainly in Cardiff for more than a decade, producing forecasts and policy analysis of the UK and other major economies.

Global Warming. The Greenhouse Gas Illusion

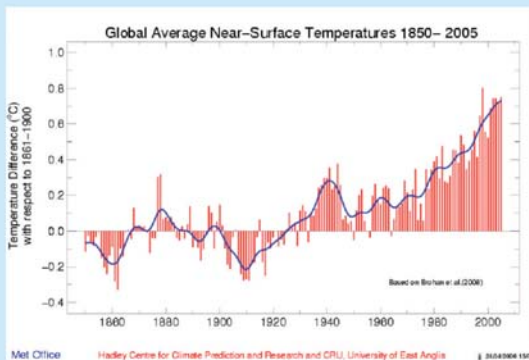
Good evening. I presume everyone knows about the anthropogenic theory of global warming. It has been headline news, especially with the recent Copenhagen conference. The basic argument is that the atmosphere contains greenhouse gases that allow heat into the earth's atmosphere from the sun, but they interfere with its subsequent escape into the stratosphere. The key greenhouse gases are carbon dioxide, methane and nitrous oxide. Global temperature in the twentieth century rose,

there doesn't seem to be much dispute about that, but not by very much, 0.7 degrees. This is not a great movement, but most of this movement occurred since 1970. You'll see in diagram 1 that it occurred also in the first part of the twentieth century, but it occurred particularly in the second part of the twentieth century. Scientists noticed the sun was getting hotter in the 20th century and the obvious explanation for global warming seemed to be that the sun was getting hotter (diagram 2).

Global Temperature since 1850

Figure 1.3 The Earth has warmed 0.7°C since around 1900.

The figure below shows the change in global average near-surface temperature from 1850 to 2005. The individual annual averages are shown as red bars and the blue line is the smoothed trend. The temperatures are shown relative to the average over 1861 – 1900.



Source: Brohan et al. (2006)

Diagram 1

But although the sun ceased to get hotter (diagram 2) especially after 1970, the world carried on getting warmer.

Global temperature was rising and an explanation had to be found. The prime suspect had to be something that moved in the last part of the 20th century, especially since 1970. The culprit was identified to be of atmospheric carbon dioxide, which

increased more rapidly in the second half of the 20th century than in the first half (Diagram 3 shows CO₂ versus temperature). The main source of this greenhouse gas is carbon emissions due to energy use in particular. However, other greenhouse gases increased more rapidly in the second half of the 20th century. Thus was a culprit found that was responsible for global warming since 1970. That's basically it, and this has informed the various IPCC reports.

Solar Irradiance

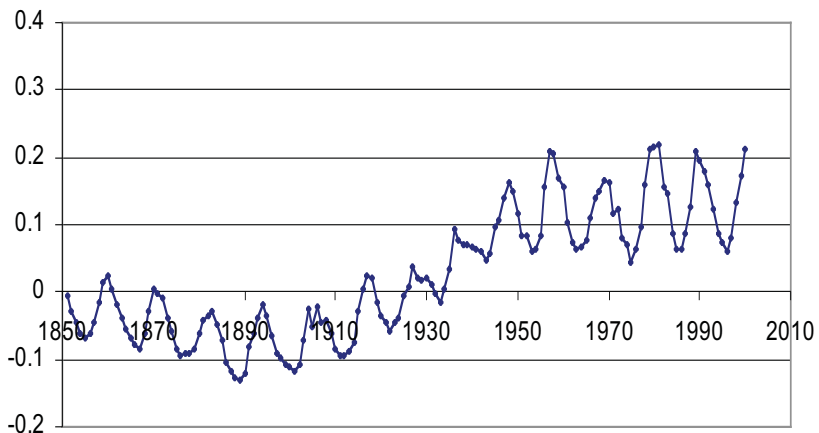


Diagram 2



The last IPCC report was published in 2007. Various alarming projections have been published by IPCC, which led to the Copenhagen conference. The increase in greenhouse gases especially in the last three decades of the 20th century, fits the timing of the increase in global warming that was going on in any case in the 20th century, but they now found the reason. What we need is a statistical test to determine whether this

reason is just a fluke, or whether it's something genuine. I will try and persuade you that it was a fluke, that it wasn't genuine and it was an illusion. I don't care what the motivations were. I know there is much criticism of the way IPCC works. I can see how naïve data analysts can make genuine mistakes. They can think they have found the cause for something that happened, simply because the timing seems right.

Temperature v CO2

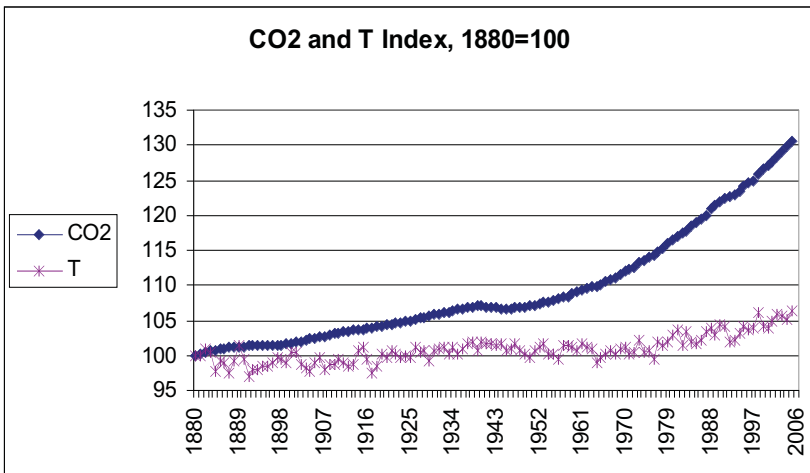



Diagram 3

There have been many criticisms of the anthropogenic theory. I'll just mention one out of many that is pertinent here, because it fits in with the Macro Econometric or Macro Economic issues that the Julian Hodge Institute gets into. Imagine trying to understand what's happening in the British Economy by writing down a model, not using the laws of physics of course but using the so called laws of economics, and then trying to parameterise this model to fit the facts. There is a lot of this going on in economics too, not just in climatology. In fact economists took these ideas from the climatologists. You can easily get rival models fitting the same facts, we call it observation equivalence, but with completely different predictions about the future. This is basically what has gone on in the climate change literature. Climatologists have put models together, they make minor changes in parameters, and they seem to fit the facts. But they forecast the future differently, One model can predict that in the 21st century, global temperatures will increase by five degrees, while other models predict temperature to fall by two degrees or three degrees. The IPCC took the models predicting an inferno on earth, rather than the others. Maybe they had some political agenda. What I've been doing is, not to work that way, but to look at the issue in a

classical way. There is a global warming theory, so let's test the anthropogenic theory using classical statistical tests. I think Colin Robinson asked for something like this at a previous Julian Hodge Lecture.

Climatologists are even more volatile than the climate. A famous editorial from News Week from April 18th 1975, spoke about the climatologists who are pessimistic that political leaders will take any action to compensate for climatic cooling. Indeed a new ice age was in the making. People are old enough in this audience to remember. I remember this in the 1970s, we were all worried that a new ice age was about to begin, but very rapidly the climatologists changed their minds. It would make some very interesting sociological work to understand the capricious nature of climatology; why just as short a time ago as 1970, we were supposed to enter a new ice age and now we are supposed to enter a new inferno. One wonders how seriously to take these things.

Diagram 1 shows global temperature since 1850, this is the latest data. There are all sorts of people working out there constructing this data. I don't want to get into the details, but you can see that the temperature is trending upwards. You can



see that in the 1960s there was considerable cooling going on, which caused climatologists to think that a new ice age was about to begin. But then the temperature starts warming up again in the 1980s and 90's, but since about 1995 or so, global temperature stabilised. I shall return to the implications of this stability. I just want you to see the facts and here are some other facts, which are very topical because these data come from the work of Mann, who has been the focus of attention in the 'Climate Gate,' scandal. People wanted to see how he calculated these data. Only three years ago, Mann came up with a startling result. He said that global temperature, going back 2000 years, looks like a hockey stick. In the recent past, global temperature has soared and is higher by far than it has ever been in the last two thousand years.

The new version of Mann's data came out last year in which the infamous hockey stick now looks like a misshapen tennis racket. The world gets hotter and cooler and hotter and cooler. A thousand years ago in the times of the Crusaders it was pretty hot. I don't know how they clambered around in their armour in the baking heat. But then in the Middle Ages it got cooler again. You see the Thames freezing over in paintings of the time. How did it happen? Towards the late

1600's, the Little Ice Age as it is called, came to an end and it began to get warmer again. Since the 18th century there has been a long upswing in temperature, but since 1995 the temperature seems to have stabilized. This does not mean that it will remain stable. What you see on diagram 2 is the heat coming out of the sun, that's the best way to describe it. The sun is out there shining on us, it gives heat, sometimes it gives more sometimes less. You can see the sun spot cycle very vividly on this graph, going up and down, it's pretty regular, but look at the trend. Try and cut through the sun spot cycles and you can see that since round about 1880 the sun began to get hotter, but stabilised in the latter part of the 20th century. So basically, the reason for the global warming in the 20th century, certainly up until 1970, was the increase in solar radiance.


Temperature continued to rise even though the sun had stopped getting hotter. So they found the culprit. It reminds me of what used to happen in school. The teacher asks who spoke? The first kid says it wasn't me. So does the second and all of the kids. He comes to the last kid and says it must have been you because all the other kids said no. The same applies to IPCC in its efforts to find a culprit. There was global warming especially since 1970; it couldn't be this or that, so it must be have been carbon.

I have been trying to see whether that is a genuine effect of greenhouse gases on global climate, or whether it's just a statistical illusion. I want to explain what spurious correlation is. I know people use this word commonly, spurious, it has become part of the vernacular, but it is a statistical concept. There are all sorts of phenomena that are trending in the world for various reasons. If one thing trends upwards and another thing trends upwards, then they look highly correlated, but they could have nothing to do with each other. There are many examples of that e.g. the flow of water in the Jordan River is negatively correlated with the GDP in the UK with $r = -0.83$. We could imagine all sorts of ridiculous reasons for this correlation, including obscure connections between the UK economy and the economies of Jordan and Israel. We know the Jordan is drying up because of over-use of water. Everyone knows that the correlation is nonsense, but we need some kind of statistical test to show that it is nonsense, because regular correlations look very high and look statistically sound but are obviously stupid. That's what spurious correlation is.

The test for spurious correlation was developed by economists in the 1980s. One of these was a British economist, Clive Granger, who also won the Nobel Prize for it. He died last year, some economist

students here must have heard of him. These economists devised this test to see whether time series are spuriously correlated or genuinely correlated. Suppose that these trends are not what we would call linear trends. Instead of one variable trending in a straight line as it were, another variable is trending such that there is a trend in the trend, so that the rate of increase is getting bigger (as with the level of CO_2 in diagram 3). Generally speaking when variables are trending at different rates, so one is linear and one is non linear, they cannot be genuinely correlated, just as they cannot be genuinely correlated if one series is trending and the other is not. For a while, however, they might seem to be correlated. If the variables that trend nonlinearly happen to share some common denominator which is growing linearly, then there may be some genuine relationship between the variables with linear trends and the variables with nonlinear trends.

Global temperature and solar irradiance have linear trends. Greenhouse gases, on the other hand, have nonlinear trends. Normally this would be sufficient to reject the hypothesis that temperature depends genuinely on greenhouse gases. However, these greenhouse gases have a common denominator, which has a linear trend. We call this the greenhouse trend. The question




is, does this greenhouse trend explain global warming in a non spurious way? The answer is no. So we reject the hypothesis that global warming is genuinely related to anthropogenic phenomena such as carbon emissions and greenhouse gases. The putative relationship between temperature and greenhouse gases turns out to be spurious. The increase in greenhouse gas concentrations and the global warming that has taken place since 1970 is nothing more than a statistical fluke.

You might think that's the end of the matter. Greenhouse gas theory is rejected by the data and it's all spurious. However, there is something else going on. Perhaps the scientists at the IPCC were not so crazy. If greenhouse gases have nonlinear trends, the change in greenhouse gas concentrations must have linear trends. I find that there is genuine relationship between global temperature, solar irradiance and the rate of change in greenhouse gas concentrations.

According to this model, we think that the main drivers of global temperature are two things. Firstly the heat of the sun, about that there's little argument among scientists, but it's not the level of greenhouse gases that matters, but the change in greenhouse gases. This change in greenhouse gases

means to say that the effect of greenhouse gas on global temperature is temporary and not permanent. Had we found that there was a non-spurious relationship between the level of greenhouse gas and the level of global temperature that would have meant that an increase in greenhouse gas would raise global temperature forever. But what we find is that it's not a relationship between the level of global temperature and the level of greenhouse gas, it's a relationship between the level of global temperature and the change in greenhouse gas. This means to say that when there's an increase in the level of greenhouse gas, as has taken place in the second part of the 20th century, it causes a temporary global warming, and that is what the IPCC people should have picked up.


The bottom line of this story is that the IPCC mistook a temporary effect for a permanent effect. It's as simple as that. They didn't think about it. They didn't because they aren't statisticians, they're modellers. It's surprising that in some disciplines statistics is almost like a foreign subject. The idea of statistical testing of hypotheses is like a foreign concept. In climatology the vast majority of papers, certainly the research papers behind the IPCC report, contain no statistical testing of anything. All there is, is a sort of model fitting and saying this seems to fit without any statistical test to see whether that thing



was flukey or whether it was genuine. So there was something there, they weren't completely stupid. But what was there was a temporary greenhouse effect and not a permanent effect. People ask me whether greenhouse gas has anything to do with global warming; I say yes but not what you think. It's a temporary effect.

What does this model predict? If the sun continues to remain stable, which it has done roughly since 1990, and if "business is as usual", meaning GDP growth is not reined back as the IPCC planned with the Copenhagen conference then the increase in global temperature since 1970 will be reversed. Why? Because the acceleration of greenhouse gas in the second half of the 20th century, especially the latter part, has a temporary effect. It causes the temperature to go up and once that acceleration has stopped, it just goes down again. That's point number one. If, in addition, the sun cools, then this model predicts that all the global temperature increase of the 20th century will be reversed. The 0.7 degree increase of temperature in the 20th century will be undone in the 21st century. Indeed it may have already begun.

The last thing I want to say is about policy. Maybe it's obvious. There are no foundations to the predictions of the IPCC of temperature increases of 1-5 degrees in this century. Actually if you look at the history of global temperature, over thousands of years, global temperature has sometimes moved by six degrees. However, it has taken several thousand years to do it. What the IPCC is predicting is that what in the past took thousands of years, is going to happen within a few decades. There's no need for carbon abatement policy because the main trend in global temperatures is nothing to do with carbon. It's a temporary effect. That's not what this argument is about; it's about Copenhagen. If they all thought that carbon had a temporary effect on global warming there would have been no Copenhagen conference. They thought it was a permanent effect so therefore there was a Copenhagen conference. The Stern Review is also much ado about nothing. It's basically solving a problem that doesn't exist. It was very fortunate that the Copenhagen conference failed as they were about to commit to a policy which was based on a statistical illusion, whose cost would have been enormous. However, as it happens, there is



always one part of the world that has taken all this too seriously, and that's the Europeans with their carbon abatement policy. They've got themselves onto something that is self destructive; though not for the first time. But I understand Britain isn't part of these unfortunate arrangements.

There have been doom watchers through the ages. I don't know where this psychology comes from. The first time it happened in the modern period was the famous Victorian economist, Jevons, who predicted the end of the industrial revolution by 1910. It would end because coal was running out. The next thing in my memory was in the 1970s; that the world is running out of natural resources; this was called the Club of Rome. It wasn't just a minor thing, it was beginning to

influence policy and the Club of Rome was very influential with their cybernetic models, predicting that the world was coming to an end; but it didn't. Then sometime in the late 1980s/early 1990s the new thing was global warming. These things just keep coming up. What puzzles me is how come they were so persuasive this time? They were pretty persuasive in the 1970s, the Club of Rome people. This is where the word 'sustainable' development comes from. Then out of the blue comes the global warming scare and the establishment of IPCC. When I agreed to give this talk, it was a "fact" that carbon emissions are responsible for global warming. How can someone stand up and say it's not a fact, it's an illusion? But, since arriving in England, I've been reading the papers about climate-gate and criticisms of the IPCC. The tide seems to be turning. Thank you

A history of past lectures

The first Julian Hodge Institute of Applied Macroeconomics Lecture was delivered in 2000. Since this time the lecture series held in Cardiff has included some of the world's leading economists.

- 2000 Sir Alan Walters - former Chief Economic Adviser to Mrs (now Lady) Margaret Thatcher.
- 2001 Professor Otmar Issing - Board Member and Chief Economist, European Central Bank
- 2002 Sir Alan Budd - Member of the Bank of England's Monetary Policy Committee and Chief Economic Adviser to the Treasury from 1991-1997.
- 2003 Professor Bennett T. McCallum - H.J. Heinz Professor of Economics at Carnegie Mellon University, Pittsburgh.
- 2004 Professor Danny Quah - Professor of Economics at the London School of Economics and Political Science.
- 2005 Professor Nicholas Crafts - Professor of Economic History at the London School of Economics and Political Science.
- 2006 Ludovit Odor Member of the Bank Board of the National Bank of Slovakia.
- 2007 Paul De Grauwe Professor of international Economics at the University of Leuven, Belgium.
- 2008 Colin Robinson - Emeritus Professor of Economics, University of Surrey.
- 2009 Dale Henderson, Visiting Professor of Economics at Georgetown University.

Before this a series of lectures associated with Sir Julian Hodge commenced in 1970 entitled the Jane Hodge Memorial Lectures.

- 1970 The Rt. Hon. Sir Leslie O'Brien GBE , Governor of the Bank of England.
- 1971 M. Pierre - Paul Schweitzer, Managing Director of the International Monetary Fund (IMF).
- 1973 David Rockefeller LLD, PhD, Chairman, Chase Manhattan Bank.
- 1973 H.R.H. The Prince Philip Duke of Edinburgh.
- 1976 His Excellency Sheikh Ahmed Zaki Yamani.
- 1984 Robin Leigh Pemberton, Governor of the Bank of England.
- 1990 Sir George Blunden, Deputy Governor of the Bank of England

The Julian Hodge Institute of Applied Macroeconomics therefore carries on the very proud tradition of promoting debate and understanding of present day economic issues.

