The Great Debate UK

» SEE ALL ANALYSIS AND OPINION

Managing catastrophic risks and climate change

MAR 18, 2010 14:06 GMT

CATASTROPHE | CLIMATE | ENVIRONMENT | GRACIELA CHICHILNSKY | RISK

-Graciela Chichilnisky is the Architect of the Carbon Market of the Kyoto Protocol and the author of 'Saving Kyoto', New Holland Publishers, UK, 2009. Chichilnisky is a Professor of Mathematics and Economics at Columbia University in New York, Director of Columbia Consortium for Risk Management and Managing Director of Global Thermostat Inc. The opinions expressed are her own.-

We live surrounded by uncertainty. Tsunamis, the eruption of super-volcanoes, violent floods and storms, asteroid impacts that eliminate entire species as the dinosaurs that went extinct 60 millions years ago, the recent 8.8 earthquake in Chile, not to mention the global financial crisis. Some disasters are worse than others, but they all have one thing in common. They are catastrophic risks. This means risks that occur very rarely – but when they happen they have truly major consequences.

How should we prepare for the unknown catastrophe – how should we manage catastrophic risks?

In our daily lives we tend to weigh risks by their probability of occurrence. In this view, a 10 percent risk of losing your home is half as important as a 20 percent risk. This approach is reasonable and prudent and it is how bankers evaluate financial risk of a non-performing mortgage and how the U.S. Congress evaluates budget risks. It is a simple and reasonable approach that was first conceptualized by John Von Neumann as he developed the foundations of risk management that rules our lives today.

But it is the wrong way to evaluate and manage catastrophic risk.

A catastrophic risk is so rare that it can be badly underestimated when we weight the losses by its probability. The global financial crisis of 2009 was one in a 100-year event, and we ignored it because it is so infrequent. This is a bad mistake, since preparing for a catastrophe can prevent the worst from happening.

New Orleans is a painful reminder of this. Chile's recent earthquake led to less fatalities than Haiti's even if it was much more powerful – because the Chileans were well prepared. Preparing for the inevitable financial crisis as it was coming could have spared many people the loss of their homes and the many financial bankruptcies that rocked the world's financial systems.

So, how to manage catastrophic risks? Here is how. Do not weigh the event by the probability of its occurrence. Consider the worst case scenario and protect against it. The decision of how much to spend should be weighed of course by other considerations – since we all operate within budgets - but knowing for a fact the frequency of the event and discounting for it is the wrong approach.

Take the case of global warming. The entire world seems stuck in trying to decide the un-decidable – is global warming going to happen, yes or no?

SEARCH

SEARCH

New to Forex? Download FXCM's free guide
Download Free Now

10 Strategies for Preserving Your Wealth
Download free guide

7 Options strategies every investor should know
Download Free Guide

dianomi

AUTHOR PROFILE

MORE REUTERS NEWS

Fund managers flee euro zone financials
U.S. jobs data overshadows debt woes, stock rebound
Emergency borrowing from ECB soars
Cameron vows crackdown on rioters
What's Farsi for Schadenfreude? Critics revel in riot woes

TAG CLOUD

2010 election Afghanistan apple banking bank of england banks Barack Obama Bernd Debusmann Britain budget China climate change conservatives currency david cameron debt deficit economy environment EU euro Europe Federal Reserve financial crisis Germany; gordon brown Greece India inflation international women's day iwd James Saft Japan labour laurence copeland Obama Pakistan politics recession tax The Great Debate twitter Uncategorized united states women

This is the wrong question.

Of course it is worth finding out, if possible, whether climate change is happening. Scientists are doing this right now and we should make every effort to elucidate the question fairly and openly. But it may be impossible to do so right now since the science is very new. In any case, it does not matter. This is the wrong question for managing the potentially catastrophic risks of climate change.

Everybody I know insures their home against fire, and in fact accident insurance is mandatory for drivers. Yet the probability that one's home goes up in fire in the near future is rather low – less than one percent in most cases. This is significantly lower than the probability of catastrophic climate change.

Yet everybody buys fire insurance for their homes, a costly form of insurance that bank mortgages require. According to people in the most sceptical nation – the USA – the probability that humans are inducing climate change is almost 25 percent. We seem to be stuck in requiring a majority to be convinced before we act.

Yet with a 25 percent change of a home fire it would be considered irresponsible and antisocial not to buy fire insurance.

For the same reason we must insure against climate change, and it is irresponsible and antisocial not to do so. Why are we not doing so? Because we underestimate rare events, that's why.

Of course, the question is cost. How much does it cost to insure against climate change? This is an important question that has been considered by many, and the answer seems to be between one percent and 2.5 percent of the value of the asset – the world economy.

This compares very favourably with the premium we pay for catastrophic risk insurance of homes and buildings – as shown in the book Saving Kyoto I co-authored with Sheeran Kristen.

The issue requires clarification, because with the carbon market that the author created within the Kyoto Protocol in 1997 – international law since 2005 – the net cost to the global economy of protecting against climate change is zero. Some lose and some gain but the net cost is zero. Since protection against climate change takes the form of investment on renewable energy – which is desirable for other unrelated reasons such as energy security – protecting against climate change today is an obvious solution that cries for action.

This blog can provide step by step solutions to achieve this goal, while helping economic development in the world economy and decreasing the wealth gap between industrialized and poor nations – a win-win solution all around

« PREVIOUS POST NEXT POST »

Comments

19 comments so far | Comments RSS

MAR 19, 2010
9:55 AM GMT

As a Cambridge maths graduate who doesn't buy house insurance(!), I have two issues with this article:

1) I don't think it's correct to say that people tend to assess risk by probability. Quite apart from the fact that most people don't understand probability in the first place, simply observing the world around me leads me to believe that, if anything, people OVER-estimate the risk of unlikely events: the MMR vaccine scare is ample evidence of that, but there's no shortage of others. Sometimes people will underestimate the risks associated with their own actions (drivers who text, teenagers who experiment with drugs), but I'd say it's very rare indeed for them to do so in respect of external events.

2) My father used to design pressure vessels for nuclear reactors. As far back as the 1960's, he was dealing with "one in ten thousand year" events on a daily basis. And as a software designer, I have always tried to live up to the old maxim that a good programmer is someone who looks both ways before crossing a one way street. It's flat wrong to suggest that these approaches to risk are novel. The question, rather is why these well-known techniques have not in the past been more widely applied – to the extent that even eminent professors appear to think they are the first to discover them!

Posted by Ian Kemmish | Report as abusive

MAR 19, 2010
12:29 PM GMT

There are many good reasons to do something about renewable energy if it leads to lower costs. There is very little point in doing anything about climate change (a stupid term as the climate has always changed – global warming is what people mean) unless the world is prepared to do something about population growth. Every saving we make will be negated by the increase in population. Dealing with climate

change is like fiddling while Rome burns. It is population that is the issue and not whether or not we use low energy bulbs. Every issue that has a human dimension has over population behind it – deforestation, water resources, over building on greenfield sites, polution etc. For heavens sake lets tackle what matters.

Posted by p savage | Report as abusive

MAR 19, 2010
12:45 PM GMT

A few years ago a workmate's house burned down. It was uninsured so as to give him money to spend on other things. We chipped in to tide him over for a week or two but it was a catastrophe (for him). If an asteroid or comet hits western Europe in 2042 it will not be a catastrophe for me, I'll be dead, anything I put towards an insurance fund for that event is only providing a meal ticket for the insurance folk. Just like house insurance if you do the necessary to safeguard your house yourself. Just remember, in the final analysis you only have to die once!

Posted by Jimmer XXX | Report as abusive

MAR 19, 2010
1:57 PM GMT

As a geologist who has followed the climate debate very closely, I consider that the increases in carbon dioxide and in global temperature are entirely within the scope of natural variability. CO2 has a residence time in the atmosphere of 5 to 15 years, not 100 years plus, as speculated in the 2007 IPCC report. Terrestrial vegetation and the colder oceans can easily absorb incremental carbon dioxide at rates far higher than those produced by industrial emissions. The current rise in CO2 is likely caused by gases absorbed during the Little Ice Age that are returning to the atmosphere from sojourn in the deep ocean, where CO2 residence time is 400 years.
Compared with those mega-scale processes, human efforts to reduce emissions are trivial. Rather than invent a plausible new rationale for Carbon Capture based on incalculable actuarial risks, it would be better to plan how the world can adapt to and manage what will be a very gradual process.
The climate has always been changing and the defining characteristic of humans is our adaptability. Don't let the environmentalist's scare scenarios panic us into making unwise economic investments.

Posted by Malcolm McClure | Report as abusive

MAR 19, 2010
2:09 PM GMT

The problem with the global warming debate is how much do we believe? We are bombarded by lies, as an engineer I am able to calculate the costs asociated with light bulb usage, telephone chargers, standby usage etc. Every claim I see about what I can save on my energy bills is exagerated to a ludicrous extent.
If I can disprove the things I know about are lies, how on earth can you expect me to believe the things I do not understand?
We all want to save the planet, but I personally will only believe the science that has it's basis in truth.

Posted by B. Finch | Report as abusive

MAR 19, 2010
3:05 PM GMT

There's 100% chance that my co2 breath will give life to plants;thus giving oxygen. Could scientists stop twoddling test tubes and go grow something usefull.They're funded by government to say whater conclusion is requested.THC cured cancer in rats in south african lab,but it will never be used to cure us,as thats unprofitable for government who authorise chemical abuse of citizens,pressuring the public to panic themselves into an early grave.

Posted by Dave Evans | Report as abusive

MAR 19, 2010
3:14 PM GMT

1) Insurance industry don't deal with risks whose probabilities are unknown. They have got to stay in business, this type of contracts may take the form of a derivative and be traded on the market.
It is significant how companies with a potential disruptive impact in case of a worst case scenario do NOT insure themselves. See BP for example. Potential losses above 500million are self-insured. This is because BP may have more knowledge on how to deal with that particular risk and because since insurance is not able to assess probability the premium would be very high indeed.

2)Insurance industry is worried about global warming becasue of the possible conseguences it may carry (see hurricanes). This will in turn deteriorate their pool by forcing them to cut the number of policy to be sold and profits as well.

3)Until we do not understand the global warming we won't buy insurance against it. What if your crop go bust because of an hurricane next summer? How will you prove that it was because of global warming? Insurance will never pay you out until somebody find the evidence supporting your claim. In the maintime you're already bunkrupt. So why bother and buy global warming coverage when insurance company are equipped with an army of lawyers?

Risk Management student at Nottingham Business School.

Posted by Davide Preziosi | Report as abusive

MAR 19, 2010
3:18 PM GMT

There are a number of debatable assertions in this article with regard to "catastrophic risk". Let me briefly discuss a few (with references).

1. It remains uncertain whether past changes in tropical cyclone activity have exceeded the variability expected from natural causes. However, future projections based on theory and high-resolution dynamical models consistently indicate that greenhouse warming will cause the globally averaged intensity of tropical cyclones to shift towards stronger storms, with intensity increases of 2–11% by 2100. Existing modeling studies also consistently project decreases in the globally averaged frequency of tropical cyclones, by 6–34% [1]. Intensity increases of 2-11% combined with frequency decreases of 6-34% certainly do not suggest a larger risk of catastrophes.

2. The Earth's climate system is highly nonlinear: inputs and outputs are not proportional, change is often episodic and abrupt, rather than slow and gradual, and multiple equilibria are the norm. While this is widely accepted, there is a relatively poor understanding of the different types of nonlinearities, how they manifest under various conditions, and whether they reflect a climate system driven by astronomical forcings, by internal feedbacks, or by a combination of both [2]. So it is difficult to characterize or quantify the risk.

3. There is a huge literature concerned with analyzing the likelihood of extreme events in complex systems such as the earth's climate system, earthquake seismology, financial markets, etc. The analytical approach is not always clear. Consider, for example, the following:

"Power-law distributions occur in many situations of scientific interest and have significant consequences for our understanding of natural and man-made phenomena. Unfortunately, the detection and characterization of power laws is complicated by the large fluctuations that occur in the tail of the distribution—the part of the distribution representing large but rare events— and by the difficulty of identifying the range over which power-law behavior holds." [3]

"We present an overview of recent research applying ideas of statistical physics to try to better understand puzzles regarding economic fluctuations. The data support the picture of economic fluctuations…in which a financial market alternates between being in an "equilibrium phase" where market behavior is split roughly equally between buying and selling, and an "out-of-equilibrium phase" where the market is mainly either buying or selling." [4]

4. The origins of the current financial crisis are still under debate. Nevertheless we can say with some confidence that government deregulation of financial markets and institutions combined with massive regulatory failure allowed market players to take on too much risk. And if the risk methods of those market players had been accurate we surely wouldn't have the crisis.

[1] Thomas R. Knutson et al., 2010, Nature Geosciences, Tropical cyclones and climate change, published online 21Feb2010, doi:10.1038/NGEO779

[2] Jose A. Rial et al., 2004, Nonlinearities, Feedbacks and Critical Thresholds Within the Earth's Climate System, Climatic Change, Vol 65, 11-38.

[3] Aaron Clauset, Cosma Rohilla Shalizi and M.E.J. Newman, 2009, Power-Law Distributions in Empirical Data, SIAM Review, Vol 51, No 4 (Dec 2009) 661-703.

[4] H. Eugene Stanley, Xavier Gabaix, Parameswaran Gopikrishnan and Vasiliki Plerou, 2006, Economic Fluctuations and Statistical Physics: The Puzzle of Large Fluctuations, Nonlinear Dynamics, Vol 44, 329-340.

Posted by Steve Numero Uno | Report as abusive

MAR 19, 2010
9:13 PM GMT

New Orleans disaster was due to unrepaired Levy broke not the storm,
Haiti was because of lack of money to build per code, let alone buy insurance.
Saying Haiti should have bought insurance is like asking to eat cake if they do not have bread.
People in this world have more pressing needs like food, clean water , shelter , economic growth and do not have money for insurance against everything. Life is uncertain deal with it. As for Carbon racketeers need to be charged under RICO organized crime laws.

Posted by Understand | Report as abusive

MAR 20, 2010
12:51 AM GMT

I am no expert, but you stated that Chile was better prepared to deal with earthquakes than Haiti. A quick look at epicenters on Google Earth will reveal that the Chilean quake occurred in a sparsely populated area, and the Haitian quake directly under a city adjoining the capital city. Don't you think that might have been a factor in the human destruction in the two countries? I certainly do.

Posted by KJ Bacon | Report as abusive

MAR 20, 2010
1:48 AM GMT

Oh dear, its looking like the citizens are not buying one iotta of the nonsense rhetoric from the government. I didnt give the UN any authority over me, i do not recognise

them as an authority, merely fascist gangsters who think theyre in charge.

Posted by Dave Evans | Report as abusive

MAR 20, 2010
2:23 AM GMT

Why has NASAheld the FUEL-CELL patent 30 years? Why have they debunked anyone suggesting alternative fuels? Why did the imf bank set up the UN? Money money money! If the establishment cared,we wouldnt be discussing this.All that is happening,is a cashing in on peoples reluctance to DO something,rather than be lied to.I cant live with liars.Lies are destructive,more than any emmisions.Carbon Monoxide would be a better debate,this debate on co2 is bogus.

Posted by Dave Evans | Report as abusive

MAR 20, 2010
4:31 AM GMT

Wouldnt co2 from the deep ocean,turn into carbolic acid before ever reaching the atmosphere?
Do people realise concrete absorbs co2,turning it into calcium carbonate?

Posted by Dave Evans | Report as abusive

MAR 20, 2010
5:31 PM GMT

Managing catastrophic risk is a hard problem, and most people get it wrong. Because the value factor in the risk picture is “all of it”, all probabilistic computations blow up and give wrong answers, even ones that try to account for long tails. (Think of division by zero.)

In addition to recovery planning for the almost worst case, where you still survive, catastrophic risks should be managed by reducing the magnitude of the worst case. Partition and distribute your resources so that any single event doesn’t cause you to lose everything. Don’t put all your eggs in one basket.

If there’s no place to hide some of your resources — there’s only one planet for us, after all — then you have two choices: do everything you can to prevent the event from happening, or deny the risk entirely. Free-market advocates are willing to risk the collapse of 20th and 21st century civilization to preserve their faith.

Climate change won’t cause extinction of Homo sapiens, but it will lead to catastrophic consequences for billions of us. “Not a problem” for denialists, though.

Posted by Dean | Report as abusive

MAR 21, 2010
9:56 AM GMT

Another side of the coin is that if we de-carbonise our systems to reduce climate change and extreme climate change does not happen, we end up with a cleaner, less-polluted environment. How bad is that? It might cost us some money, but I think we ought to do it anyway.

Posted by Bob Irving | Report as abusive

MAR 21, 2010
12:19 PM GMT

The result of climate change will be a gradually increasing movement of populations to more amenable areas. We already see this in economic migration, but this is a fairly harmless example. What may happen are a series of wars over the years where entire populations of countries move in on others. It has happened in the past, therefore it is safe to say it will happen again. Not something that can be insured against with cash, should an invader come upon you and maybe it is you who will be the one wanting to be doing the moving!

Posted by Jimmer XXX | Report as abusive

MAR 22, 2010
1:49 AM GMT

Saving the Earth is everyone’s agenda. Understanding how to educate the Global Mass on Climate Change is seemingly nobody’s ambition. Recent natural disasters in Chile and Haiti reflects the capabilities of their disaster management efforts. What I think that we should focus on a P R O MP T – R E S C U E protocol financed by each and every culprit nations of Global Warming, chartered and governed by a world body like WHO .. We all are forced to adopt and live with this phenomenon named Climate Change while adjusting ourselves into more Greener Living ..

Posted by Gamini Gunasekera - Mendis | Report as abusive

MAR 23, 2010
6:30 PM GMT

If we are wrong about climate change then life is okay, if we are correct and it is happening then life as we know it will change dramatically.
Climate change in the past has happened fast and had horrible consequences for this planets organisms including people. The periods such as the Younger Dryas, and more recently the medieval Little Ice Age were not good for many people.

Posted by Mark Robertson | Report as abusive

MAR 31, 2010
9:32 PM BST

What is going on with the National media?
The Vermont Yankee Nuclear power plant up until a few weeks ago was leaking radioactive Tritium into the Connecticut river and NOBODY SAYS A WORD. The ground around the plant is contaminated with radioactive CESIUM and still NOT A PEEP! Have the powers that be acquired so much clout that they can influence the

National scene to this extent?

Posted by j | Report as abusive