

# Quark Soup by David Appell

WEDNESDAY, OCTOBER 21, 2015

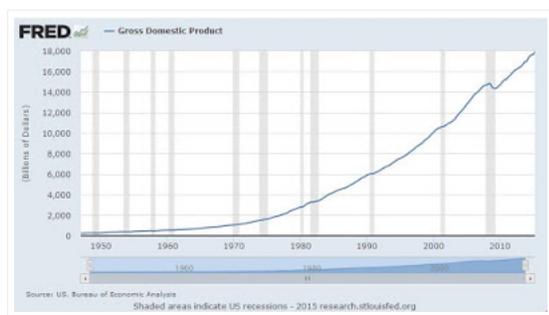
## Global Warming, Productivity Loss and Economic Costs

There is an important paper published in *Nature* today:

"Global non-linear effect of temperature on economic production,  
Marshall Burke, Solomon M. Hsiang & Edward Miguel,  
*Nature* (10/21/2015) doi:10.1038/nature15725  
<http://www.nature.com/nature/journal/vaop/ncurrent/full/nature15725.html>

Since it puts an economic model atop a climate model, I'm automatically somewhat dubious. The climate models have enough uncertainties. Economic models have so much uncertainty that modelers there don't even try to establish error bars or confidence intervals. Or at least it seems that way to me, with my quite limited knowledge of economics.

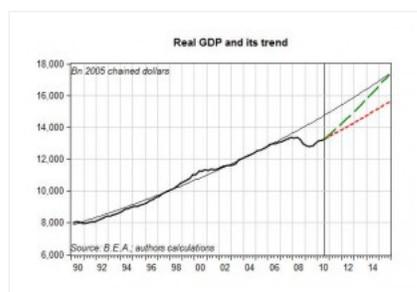
For example, suppose you wanted to project U.S. GDP to the year 2100. [Here](#) are the historical data, from FRED:



Clearly the Great Recession of 2009-2010 took a big bite out of GDP -- a bite that, so far, looks to be permanent.

If you were to project GDP in 2100 based on the historical values from before the Great Recession, 1950-2008, you'd clearly get a number that is much bigger than if you project from using the full 1950-2014 data.

I should put up a nice little graph here showing this. Bad blogger. Instead I'll just use [this](#):



The point is, economic projections seem to have at least as difficult time anticipating nonlinear events, like the Great Recession, as do climate models based on the well-established laws of physics.

With that said, here are some results from the paper. First, [they use results](#) from others that found

"...overall economic productivity is nonlinear in temperature for all countries, with productivity peaking at an annual average temperature of 13°C (55°F) and declining strongly at higher temperatures. The relationship is globally generalizable, unchanged since 1960, and apparent for agricultural and non-agricultural activity in both rich and poor countries. These results provide the first evidence that economic activity in all regions is coupled to the global climate and establish a new empirical foundation for modelling economic loss in response to climate change."

In graphical form:

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**Rule #1: You can never ask too many questions.**

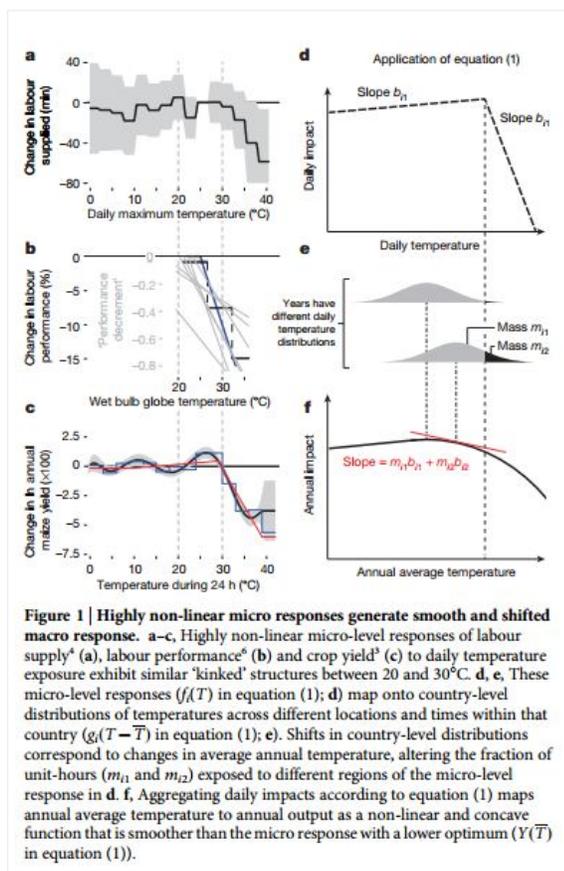
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- Hockey Sticks
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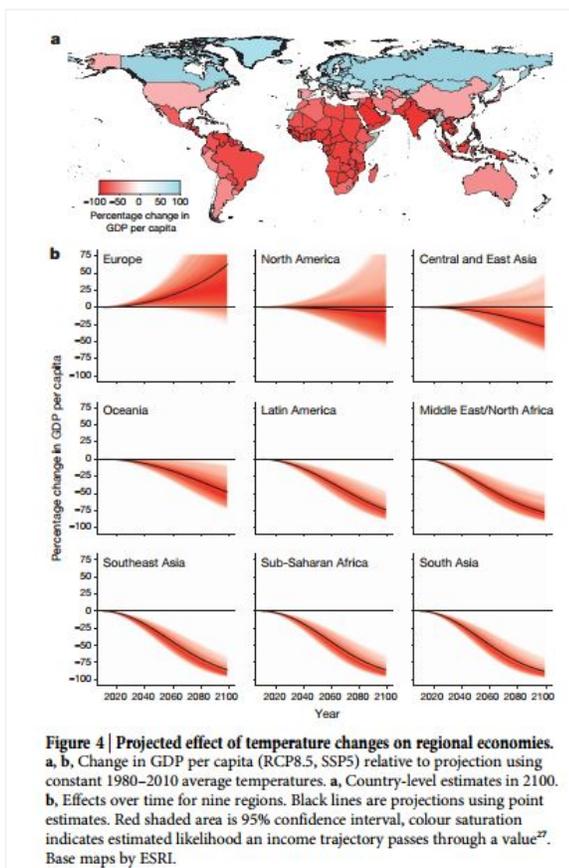


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55°F isn't very warm. Salem, Oregon's [normal annual average](#) (1981-2010) is 53.7°F, so we're talking about a latitude just a little south of here. (I'm two miles south of the 45th parallel.)

Using this knowledge and the results from global climate models, Burke et al make the following projections for national per capita GDPs, which divides the world up into winners (blue), slight losers (pink), and serious losers (red):



Europe wins big. So do Canada and Russia.

The US loses between 0% and 50% of per capita GDP. That's a big range, but big consequences if you're on the wrong side of it. (Consequences I find difficult to imagine near the 50% side. I'm spoiled by the times I've lived in.)

China loses more. This is why the Chinese will want (and are wanting) to stop global warming -- not from the goodness of their hearts, but because they know they are vulnerable to it.

And -- same old same old story -- the poor get slammed.

Perhaps you can consider these the best case scenarios? Are there nonlinear economic events that are positive, not, like the Great Depression or Great Recession, negative? I can't think of one...perhaps the aftermath of WWII, at least for the US, certainly not many countries. It seems economies hum along at an exponentially increasing rate until they stutter and miss a step, a step that is almost impossible to catch up on.

The authors conclude:

"If societies continue to function as they have in the recent past, climate change is expected to reshape the global economy by substantially reducing global economic output and possibly amplifying existing global economic inequalities, relative to a world without climate change. Adaptations such as unprecedented innovation or defensive investments might reduce these effects, but social conflict or disrupted trade—either from political restrictions or correlated losses around the world—could exacerbate them."

I don't know what to make of this paper -- it seems so easy to dismiss the economics as about as reliable as, say, CBO projections of GDP made in 2005 for 2015 -- who foresaw the crash? Yet crashes exist.

Posted by David Appell at 10/21/2015 07:01:00 PM 



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