

**MacroPlus  
Comment**

**Global warning**

- *Scientists are now yet more certain (95%) that mankind is the main cause of climate change*
- *This increase in probability is bound to percolate through to investors' risk perceptions*
- *21<sup>st</sup> Century climate change stands to bring increasing economic damage*
- *The ultimate permutation of individual changes may amplify damage disproportionately*
- *These developments will increasingly impact asset prices and influence policy*

**Climate science turns up the heat**

**The balance of climate risks is changing**

For climate change to affect asset prices it is necessary neither that the science be certain, nor that its implications become manifest immediately. All that is necessary is that, as the *risk* of its materialising changes, the balance of probabilities as assessed by investors changes, and that this in turn gets priced in. Which is exactly what markets do.

An important change in the assessment of risk has just occurred, with the publication of the Intergovernmental Panel on Climate Change's (IPCC) latest and most comprehensive assessment of the physical science of climate change<sup>1</sup> since 2007.

To illustrate the way in which changing perception of probabilities gets priced in, consider a case from quite a different area: the probability of the euro area being formed. From the mid-1990s it was uncertain whether monetary union would happen or not: there were believers, and there were doubters. These two views found specific expression in the financial markets as the (weighted) average of two possible outcomes (Figure 1):

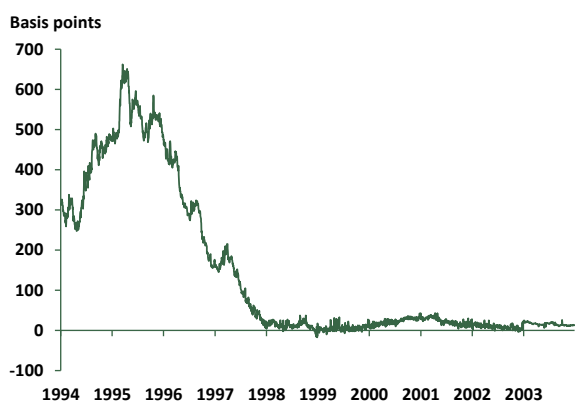
1. **Monetary union would happen**, in which case Italy's membership would lead to a convergence of its (government) bond yields with those of Germany; or
2. **Monetary union would not happen**, in which case the spread between German and Italian yields would persist.

The actual, observed, spread at any moment thus represented the balance of investors' individual assessments of the probability that monetary union would occur. Over the ensuing five years there were still believers, and there were still doubters: but the narrowing of the spread over the late 1990s indicated that the *balance* of investors' views was evolving. For those who bet the right way – on union taking place – it was one of the money-making trades of all time.

**The IPCC are now 95% certain climate change is man-made**

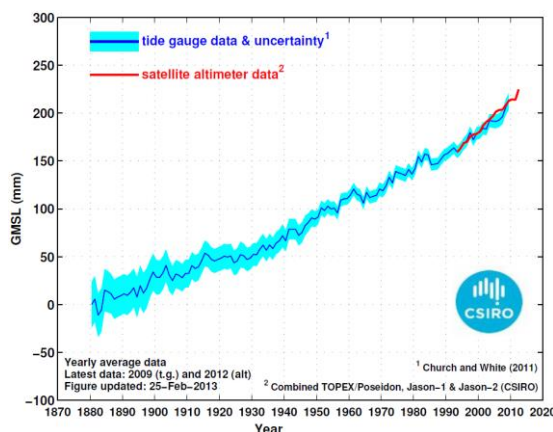
Now that the IPCC has raised its probability<sup>2</sup> of mankind being the dominant cause of global warming since the 1950s from *Very Likely* (90% probability) to *Extremely Likely* (95% probability), the implications are bound to percolate through into investors' assessments of the balance of risk, and hence into a plethora of asset prices.

Figure 1: Italian 10-year Bond spread over German Bunds, 1994-2004



Source: Macrobond (2013)

Figure 2: Global Mean Sea Level (GMSL), 1880-2012



Source: CSIRO (2013)

Note: This chart can be accessed at the following web address: <http://www.cmar.csiro.au/sealevel/>

## The changing climate

The headline message from the IPCC's latest summary is clear:

*“Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and oceans have warmed, the amounts of snow and ice have diminished, sea level has risen (see Figure 2), and the concentrations of greenhouse gases have increased.”<sup>3</sup>*

Many significant changes are predicted

Predictions of climate change are uncertain. That said, the confidence around likely changes has been reaffirmed, and in some cases strengthened, in this report. Scientists agree that, unless there is a marked reduction in greenhouse gas emissions, by the end of this Century:

- The rise in global surface temperature is *likely* to reach 2°C, and could be as high as 5°C
- More frequent hot days and nights over most land areas are *virtually certain*
- Global mean sea level will *likely* rise by between 0.3m and 0.8m relative to 1986-2005 – higher than the 0.2m to 0.6m range predicted in 2007
- Extreme precipitation events will *very likely* become more intense, particularly over the mid-latitude land masses and wet tropical regions
- While monsoon winds are *likely* to weaken, monsoon rain is *likely* to intensify due to increases in atmospheric moisture, and monsoon seasons are also *likely* to become longer
- Increases in intense tropical cyclone activity is *more likely than not* in the Western North Pacific and North Atlantic

## The eye of the storm

Economic damage may not be linear

Hard-headed reinsurance companies judge that an increase in extreme weather events can be fully explained only by climate change. Each of the changes above stands to bring economic damage. However, the ultimate effect of these individual changes may prove to be rather greater than their simple sum; and hence more important from an economic perspective. Tropical cyclones, for example, may or may not increase in frequency, but the evidence is that they will increase in intensity. In turn, more intense tropical cyclones coupled with higher sea levels could do disproportionately serious damage. And such a risk is all the greater when, in parallel, populations are moving into exposed coastal areas, and property values are increasing.

## Current exposure

Future impacts will be brought forward by markets

Climate change is relevant now, notwithstanding its slow-moving and long-term nature. But in addition future events, suitably discounted, will also be reflected in market prices and hence in policy. The balance of risks will change continually, including importantly for investors. New evidence has the potential to move asset prices markedly on occasion and, as risks increase, it is likely that the extent of the policy response will increase, albeit with a lag.

Firms have exposure in a number of areas

Thus companies will be affected both by present and future climate change and by policies to address it, through: physical exposure; regulatory exposure; competitive exposure; and reputational exposure. Firms that will prosper will tend to be those that recognise its importance and relevance to their business, understand potential implications and impacts, and plan ahead.

## Horizon scanning

While many aspects of this complex issue are in a continual state of flux, there are four particular developments to watch for:

- First, changes in probability and risk emanating from the remaining parts of the IPCC's 5<sup>th</sup> Assessment Report – relating to impacts, adaptation, vulnerability, and mitigation – due to be released next year;
- Second, China and US policy ambition. Unless there is a global deal to reduce emissions, the ambition of these two emitters will remain central to the outlook for global temperatures;
- Third, adaptation policy rising up the political agenda – leading to calls for building more resilient infrastructure able to cope with a wider range of climatic conditions; and
- Fourth, companies with a low-carbon, resource-efficient, strategy improving performance relative to those ignoring secular risks and climate-change impacts – a subject to which we will return. ■

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<sup>1</sup> IPCC, 2013. Working Group I Contribution to the IPCC Fifth Assessment Report – *Climate Change 2013: The Physical Science Basis*

<sup>2</sup> IPCC likelihood terms: *Virtually certain* (99-100% probability); *Extremely likely* (95-100%); *Very likely* (90-100%); *Likely* (66-100%); *About as likely as not* (33-66%); *Unlikely* (0-33%); *Very unlikely* (0-10%); *Exceptionally unlikely* (0-1%)

<sup>3</sup> IPCC, 2013. Working Group I Contribution to the IPCC Fifth Assessment Report – *Climate Change 2013: The Physical Science Basis – Summary for Policymakers*