What Do Financial Markets Reveal about Global Warming?

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Main Objective

- Assess the economic impact of global warming from a **new** perspective.
Outline

- Standard perspective
- Our perspective
- Preliminary results
Observed changes in climate

- Intergovernmental Panel on Climate Change (IPCC) (2007):
  
  "Warming of the climate system is unequivocal."

Annual Average Temperatures in the US: 1976-2008
Source: National Climatic Data Center.
**Standard Perspective**

- Effects of *temperature change itself*

<table>
<thead>
<tr>
<th>Study</th>
<th>Warming</th>
<th>Impact on GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mendelsohn et al (2000)</td>
<td>2.5 C</td>
<td>0.0%</td>
</tr>
<tr>
<td>Nordhaus and Boyer (2000)</td>
<td>2.5 C</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Nordhaus (2006)</td>
<td>3.0 C</td>
<td>-3.0%</td>
</tr>
</tbody>
</table>
It is therefore no surprise that cost-benefit analyses of climate change recommend only limited greenhouse gas emission reduction.
Our Perspective

- **Focus on extreme events** caused by temperature change not temperature change itself.

  “The **significance** of gradual climate change, e.g., increases in the mean temperature, lies mainly in changes in the intensity and frequency of **extreme events**” (IPCC, 2007, Impacts, Adaptation and Vulnerability, Ch 7)
“The **significance** of gradual climate change, e.g., increases in the mean temperature, lies mainly in changes in the intensity and frequency of **extreme events**”
Extreme events *adversely* affect firms. Stern (2007): annual losses have been around 0.2% of World GDP since the 1990s, and could reach 0.5 - 1% of world GDP by the middle of the century.

Effects are highly *uncertain*. IPCC’s estimate for global warming at the end of the 21st century goes from 1.1°C to 6.4°C.
Global Warming and Cost of Borrowing

Adverse Impacts
Uncertainty

-risk↑

Cost of borrowing ↑

Investment & Economic Growth↓
Our preliminary results reveal that global warming increases the average cost of borrowing by **0.009%** per month or **0.11%** per year.
Conclusion

- The impact of global warming may be much larger than previously thought, and climate policy may therefore be more ambitious than previously considered.