Discussion of
Dissecting Climate Risks:
Are they Reflected in Stock Prices?

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Overview

▶ **Research question**
  - Are climate risks (physical risk and transition risk) priced in U.S. stocks?

▶ **Methodology: Two–step approach**
  1. Run two types of textual analyses to establish the risk factors
  2. Run "classic" CAPM/APT regressions to ascertain if the factors were priced

▶ **Main results**
  - Only one climate risk factor (U.S. policy actions and debate) is priced
    - Investors hedge against transition risk rather with investments in firms with a strong intention to becomer green than in already "green firms"
  - Neither the occurance of natural disasters nor global warming as measures of physical risk are priced
  - International summits on climate are not priced either

My discussion

1. Research question is topical and relevant
   - Paper contributes to the literature by applying Latent Dirichlet Application (LDA) as a new textual analysis to finance subjects
   - Existant literature has found mixed results on impact from climate risks on asset prices
2. After brief recap of methodology I will focus on few general comments on ...
   - ... the use of LDA vs. narrative textual analysis
   - ... policy messages
   - ... potential avenues of further research

Methodology (1): Construction of climate risk factors via LDA

- ▶ Apply LDA (see *Blei et at, JMLR, 2003*) as an unobserved machine learning method (but cross check with narrative textual analysis)
- ▶ Climate-related data:
    - Refinitiv News Archive for sample period 1/1/2000 to 31/12/2018
    - Start with 13 million articles; Remove multiple versions: 7 million articles
    - Filter for containing "climate change" or "global warming": 34,000 arcticles
    - Apply narrative analysis instead of LDA for U.S. climate-policy factor: 3,500 articles
- ▶ Four "topics" (or "climate risk factors) are identified (e.g. U.S. climate policy)
- ▶ Time series of share of a topic across all articles at time t, $t = 1, 2, ...$
    $\rightarrow$ Intensity of news coverage over time
    $\rightarrow$ Time series of respective climate risk factor

Methodology (2): When is a climate risk factor priced?

- ▶ Sort stocks based on sensitivity of the stock's returns to the respective climate risk factor
- ▶ Compute returns of a **long–short spread portfolio** that is long in high climate beta stocks and short in low climate beta stocks, controlling for other risk factors
- ▶ Risk factor is considered "priced" if this long–short spread portfolio earns a statistically significant average return (positive alpha)
- ▶ Take U.S. climate policy as example: News coverage reassures investors that transition risks would **not** materialize
- ▶ Increase of this factor $\cong$ transition risk would not materialize
- ▶ Investors hedge against a decrease of the factor (adverse outcome) by buying stocks with negative climate betas and sell those with positive betas and long-short portfolio should return a positive alpha
- ▶ Test for positive alpha in CAPM and several *Fama-French* type extensions

Methodology (3): Central Hypotheses and outcome

Topic	Impact	Significant
Natural disasters	Negative	No
Global warming	Negative	No
U.S. Climate policy	Positive	Yes
International climate conference	Negative	No

▶ U.S. climate policy factor significant only in later subperiod (after Nov 2012)

▶ Positive impact of U.S. climate policy factor cannot be ascertained by LDA
$\rightarrow$ Additional narrative textual analysis needed where direction of impact is beyond doubt

▶ How illuminating are the results of non-significance of the other three factors? $\rightarrow$ Next slide

Comments: Questions on the central hypothesis

- ▶ Why should international **natural catastrophes** or **global warming** news be reflected in U.S. stock price moves?
  - The natural disasters mostly happened far away (Figure 3(a))
  - Unless there is a direct impact on the U.S. economy, why should these natural(!) phenomena affect U.S. stock prices?
  - Is it a case of "investor myopia"?
- ▶ Impact of **international summits** on economy may be ambiguous:
  - The relatively long horizon of pledged actions
  - Perception about legally binding nature of summit outcome has evolved over time (and also depends on national legal framework)
  - A divergent impact on "brown" and "green" parts of the economy
  - Signals going out went in opposing directions ("success" or "failure")
- ▶ By far most pronounced moves of the **climate policy factor** are observed between 2007 and 2011: Why is the factor not priced back then? (Only in the later period statistical significance is observed!)
- ▶ Is it conceivable that the climate policy factor has different sign of sensitivity before November 2012 (Figure 3(d))?

General comments: LDA vs narrative textual analysis

- ▶ Paper comprises two different methodological approaches to construct risk factors: **LDA textual analysis** and **narrative textual analysis**

- ▶ Narrative analysis allows to identify the direction of the factor impact by construction
  Example: Define transition risk factor by "manually" checking if an article on a relevant policy decision increases or decreases transition risk
  → "classic" narrative analysis appears superior in cases where the direction of impact is ambiguous

- ▶ Regime shifts (like in this paper prae vs. post Nov 2012) cannot be captured by LDA due to its **static approach**
  → Why not doing a period-by-period analysis from the start and not look at the total period?

Policy messages

- **Confirmation** of previous results:
  - Physical climate risk not priced
  - Transition risk **is** priced but only relatively recently
- Really **new** results:
  - Investors hedge against transition risk rather with investments in firms with a strong intention to becomer green than in already "green firms"
  - But **why**? Why do they take a bet rather than buying the "green stocks" directly which should offer a higher hedge efficiency?

Avenues of further research

- Has **"investor myopia"** regarding physical climate risk decreased recently (Newer data after 2018 may shed light)?
- Has physical climate risk become priced as a consequence of **events in recent years** (wild fires, drought)?
- Which role does the **slow–burning nature** of (physical) climate risk play?
    - Are investors sanguine because they expect **technological innovation** to mitigate this risk before it fully materializes?
    - Are the adverse outcomes expected to occur maybe beyond the typical **investment horizon** and portfolio will look very different when risks are expected to materialize?