Pricing Poseidon: Extreme Weather Uncertainty and Firm Return Dynamics

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1. What are the research questions ?

• How much firm-level uncertainty do extreme weather generate, and how persistent is it?

• Are investors' volatility expectations of such uncertainty efficient, and does this change post-salient events?

• Through which economic channels does the uncertainty operate?

• Do idiosyncratic extreme weather shocks affect firms' expected returns?

2. Why are the research questions interesting?

• Addresses policymakers' concern about climate risk mispricing threatening financial stability.

• prior studies focus on climate transition risks, not physical extreme weather risks.

• Guides firms' risk management and investors' portfolios.

3. **What is the paper's contribution?**

•Develops a framework distinguishing between "incidence uncertainty" and "impact uncertainty" , linking extreme weather uncertainty to cash flows, volatility, and expected returns.

• Quantifies "impact uncertainty" using option-implied volatility;Documents investor under-reaction;Uses textual analysis to map uncertainty into five economic channels.

• Uses a difference-in-differences design with continuous exposure measures to isolate causal effects, and validates results across other extreme weather.

• Provides evidence supporting mandatory climate risk disclosure, as disclosures on business continuity or insurance could reduce uncertainty.

4. **What hypotheses are tested in the paper? List them explicitly.**

• H1:Hurricanes raise IV of exposed firms; this uncertainty persists for an extended period.

• H2:Investors underreact to hurricane-induced uncertainty;this underreaction diminishes after Hurricane Sandy.

• H3:Uncertainty operates via 5 channels - business interruption, physical damages, insurance, supply, demand ;more discussion => more relevance.

• H4: Pre-Sandy: idiosyncratic volatility doesn't affect returns; post-Sandy: positive effect.

(a) Do these hypotheses follow from and answer the research questions?

• Yes.

(b) Do these hypotheses follow from theory or are they otherwise adequately developed?

• Yes.H1 derive from the paper's theoretical framework and prior uncertainty studies. H2 builds on behavioral finance and saliency theory.H3 is motivated by corporate finance logic and textual analysis methods.H4 follows Merton's (1987) underdiversification theory.

5. Sample: comment on the appropriateness of the sample selection procedures.

• The sample selection is appropriate and well-justified. Includes 37 U.S. hurricanes (1996–2019)from NOAA covering major events, sufficient variation.Firms data links 4 databases; excludes financial firms which is reasonable.Uses firms with zero hurricane exposure as controls,avoiding selection bias. Excluding firms hit by other hurricanes within 180 days prevents overlapping event interference.

6. Dependent and independent variables: comment on the appropriateness of variable definition and measurement.

• DVs: IV measures uncertainty, VRP tests underreaction,CAR measures returns, call discussions identifies channels.IVs: LandfallExposure(establishes share), ForecastExposure, PostSandy.All variables is valid and appropriate.

7. Regression/prediction model specification: comment on the appropriateness of the regression/ prediction model specification.

• Each hurricane is a separate time-period in a continuous-treatment DID; collapsing data into pre/post alleviates serial correlation; interacting a "post-Sandy" dummy allows testing of learning; specification aligns with current best practice.

8. What difficulties arise in drawing inferences from the empirical work?

• Though hurricanes are exogenous, firms may choose establishment locations to avoid hurricane-prone areas, biasing exposure measures. The sample focuses on U.S. hurricanes; results may not apply to other regions or slow-onset events.

9. Describe at least one publishable and feasible extension of this research.

•Use U.S. slow-onset&Chinese typhoons, test uncertainty traits & investor underreaction in China via the paper's IV/VRP framework.

Nowcasting Firms' Operating Activities from Satellite Data on Thermal Infrared Radiation

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1. What are the research questions ?

• Can satellite thermal infrared (TIR) data capture real-time operating activity in Chinese listed firms' factories?

• Does this TIR signal contain new information that predicts future financial performance and stock returns?

2. Why are the research questions interesting?

• Traditional data provide infrequent and delayed snapshots of firms' operations, and may be subject to managerial distortion. The research explores TIR as a real-time, objective alternative data source, filling the gap in capturing early-stage production activities.

• For investors, TIR offers a new indicator to predict stock returns; for policymakers, it provides a high-frequency tool to monitor industrial operations; for researchers, it enables studies on firm behavior that were previously constrained by data limitations.

3. **What is the paper's contribution?**

• Develops a novel and direct measure for firms' early-stage operating activities using satellite-based TIR, addressing the inability of traditional data to capture real-time production .

• It validates TIR's effectiveness, demonstrates TIR can predict future sales growth, and finds TIR forecasts stock returns with no exploitation by sophisticated investors.

• It extends literature on alternative and satellite data in finance, focus on early-stage production and linking thermodynamic principles to corporate finance research.

• It provides investors, analysts, and policymakers a new tool to assess firm fundamentals outside traditional reporting cycles.

4. **What hypotheses are tested in the paper? List them explicitly.**

• H1: Corporate TIR is positively related to firms' future operating performance, controlling for current stock performance.

• H2: Corporate TIR is positively related to firms' future stock returns, controlling for current stock performance.

(a) Do these hypotheses follow from and answer the research questions?

• Yes.

(b) Do these hypotheses follow from theory or are they otherwise adequately developed?

• Yes. Build on theory that economic activity transforms energy and emits heat and thermodynamic laws--energy consumption produces TIR, linking TIR to production intensity.

5. Sample: comment on the appropriateness of the sample selection procedures.

• Focuses on Chinese listed manufacturing firms -- 2014Q2–2022Q4, 2,959 firms, 28,236 factories . Manufacturing firms are suitable avoiding noise from non-production activities.

• Excludes factories with insufficient TIR data, events that distort TIR and partial production disruptions. This reduces measurement error.

• Covers firms from both Shanghai and Shenzhen Stock Exchanges, with a large number of observations, enhancing the generalizability of results.

6. Dependent and independent variables: comment on the appropriateness of variable definition and measurement.

•Key independent variables: year-over-year change in plant-adjusted TIR, aggregated to firm level (equal- or investment-weighted).

• Dependent variables: sales growth, COGS growth, capex, employment, operating margin, raw & abnormal returns, announcement CARs.

• Controls include firm characteristics and local weather/GDP. Measures strip out weather noise and align with literature.

7. Regression/prediction model specification: comment on the appropriateness of the regression/ prediction model specification.

• Includes firm fixed effects and year-quarter fixed effects, reducing omitted variable bias. ; DID for COVID shock; Fama-MacBeth and portfolio sorts for return tests; dynamic horizons to rule out reverse causality. Specification follows standard asset-pricing and accounting conventions.

8. What difficulties arise in drawing inferences from the empirical work?

•Measurement limitations.TIR from non-production activities may contaminate the measure, even with bare-land adjustment.

• The sample focuses on manufacturing firms; TIR may be less relevant for service firms with low energy consumption, limiting the inference to manufacturing sectors.

• The paper finds no link between TIR and sophisticated investors' trading, but it cannot rule out unobserved channels, making inferences about investor inattention tentative.

9. Describe at least one publishable and feasible extension of this research.

• Compares TIR's predictive power for listed manufacturers in China and the US, tests how market information environments affect TIR value, controls institutional differences, and enhances external validity to guide global investors.