MERCon 2026

Impact of Cyclone Ditwah on the Colombo Stock Exchange

An Event Study on Market Reactions to Natural Disasters

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MOTIVATION

A National Scale Shock, an Unstudied Market

Cyclone Ditwah struck Sri Lanka on 28 November 2025.

USD 4.1B[1]	**209,000+**	**247 km**	**58,340 ha**
physical damage (~4% of GDP)	people displaced across 25 districts	of roads and 35+ bridges damaged	Paddy land affected

ASPI fell 3.04% on first trading session after landfall, extending to a weekly loss of 5.35%, worst since mid November 2022.[4]

No peer-reviewed study had systematically quantified this impact

[1] World Bank, “Damage from cyclone Ditwah in Sri Lanka estimated at $4.1 billion,” World Bank Press Release, Dec. 2025, accessed: Jan. 2026.
[2] World Health Organization, “Sri Lanka floods and landslides – cyclonic storm Ditwah November 2025, no. 3,” WHO South-East Asia Region, Tech. Rep., Dec. 2025, [Online]. Available: https://www.who.int/sout heastasia/news/detail/02-12-2025-sri-lanka-ditwah25. [Accessed: Jan. 2026].
[3] OCHA, “Sri Lanka: cyclone Ditwah – situation report 3,” UN Office for the Coordination of Humanitarian Affairs, Tech. Rep., Dec. 2025, accessed: Jan. 2026.
[4] Business Recorder, “Cyclone-ravaged Sri Lanka’s shares log worst week in over three years,” 2025, accessed: Jan. 2026.

FRAMING

Four Research Questions

RQ1

Market Shock

Did Cyclone produce a statistically significant shock to aggregate CSE returns?

RQ2

Speed of Reaction

Was the impact limited to landfall day, or did it accumulate over subsequent days?

RQ3

Anticipation

Was there a statistically significant pre event market reaction?

RQ4

Sector Heterogeneity

Which sectors were negatively affected? Do parametric / non parametric tests agree?

DATA

Daily Trading Data

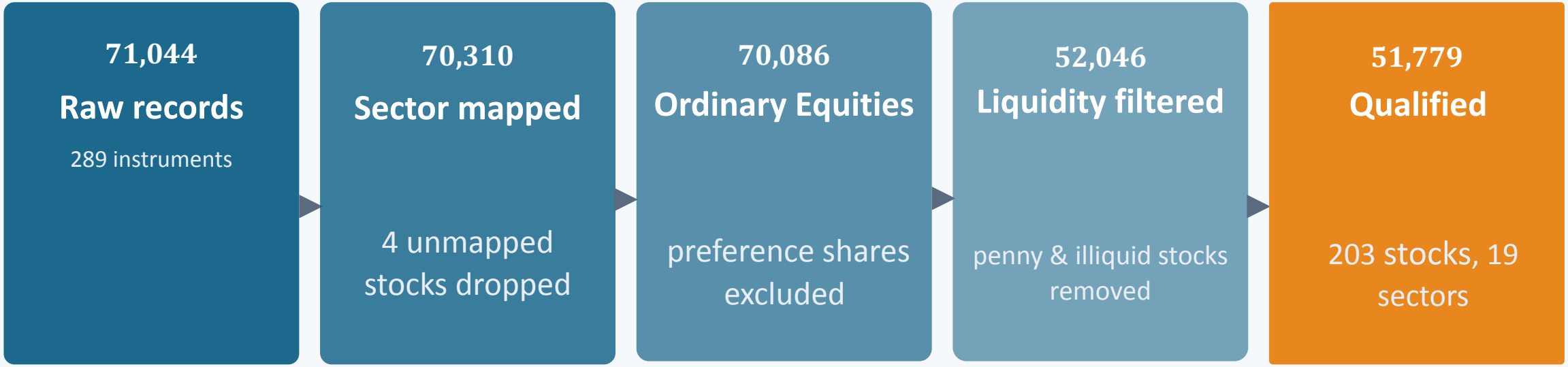
- Built a purpose-specific dataset by **scraping daily OHLCV data** for **289 CSE-listed stocks** from the exchange's public data interface using a custom Python pipeline,
- Cross-checked a sample against published CSE prices for accuracy.
- The dataset spans February 2025 to February 2026 ; over **71,000 raw daily records** across **19 sectors**.

Initial Dataset

71,044	289	19	Feb 2025 – Feb 2026
Raw OHLCV Records	Stocks	Sectors	Coverage Window

Data Cleaning

Data cleaning funnel to a regression-qualified sample



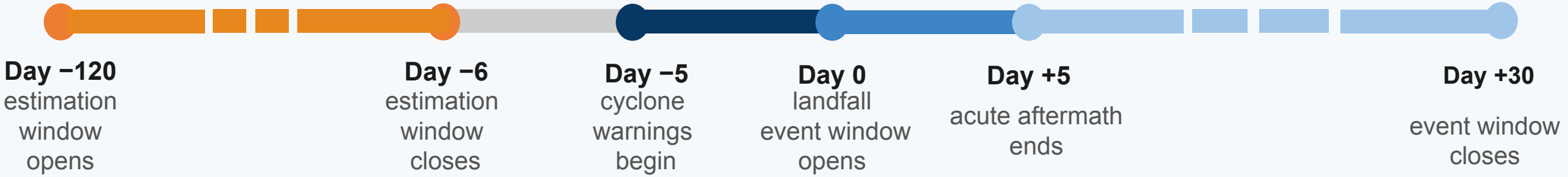
Final Dataset

51 779	203	19	Feb 2025 – Feb 2026
Raw OHLCV Records	Stocks	Sectors	Coverage Window

Event Study Framework & Market Model

We apply MacKinlay's classical market model event study[1]

- Each normal stock is estimated from a pre event window of 115 days



❖ **4 Event windows:**

Pre Event [−5,−1] **Landfall Day [0,0]** **Immediate Aftermath [0,+5]** **Complete Window [−5,+30]**

[4] A. C. MacKinlay, "Event studies in economics and finance," Journal of Economic Literature, vol. 35, no. 1, pp. 13–39, 1997

Event Study Framework & Market Model

Market model - A linear function w.r.t ASPI[4]

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}$$

Abnormal return $AR_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i R_{m,t})$

Cumulative Abnormal Return (CAR) aggregates AR over any sub-window $[t_1, t_2]$

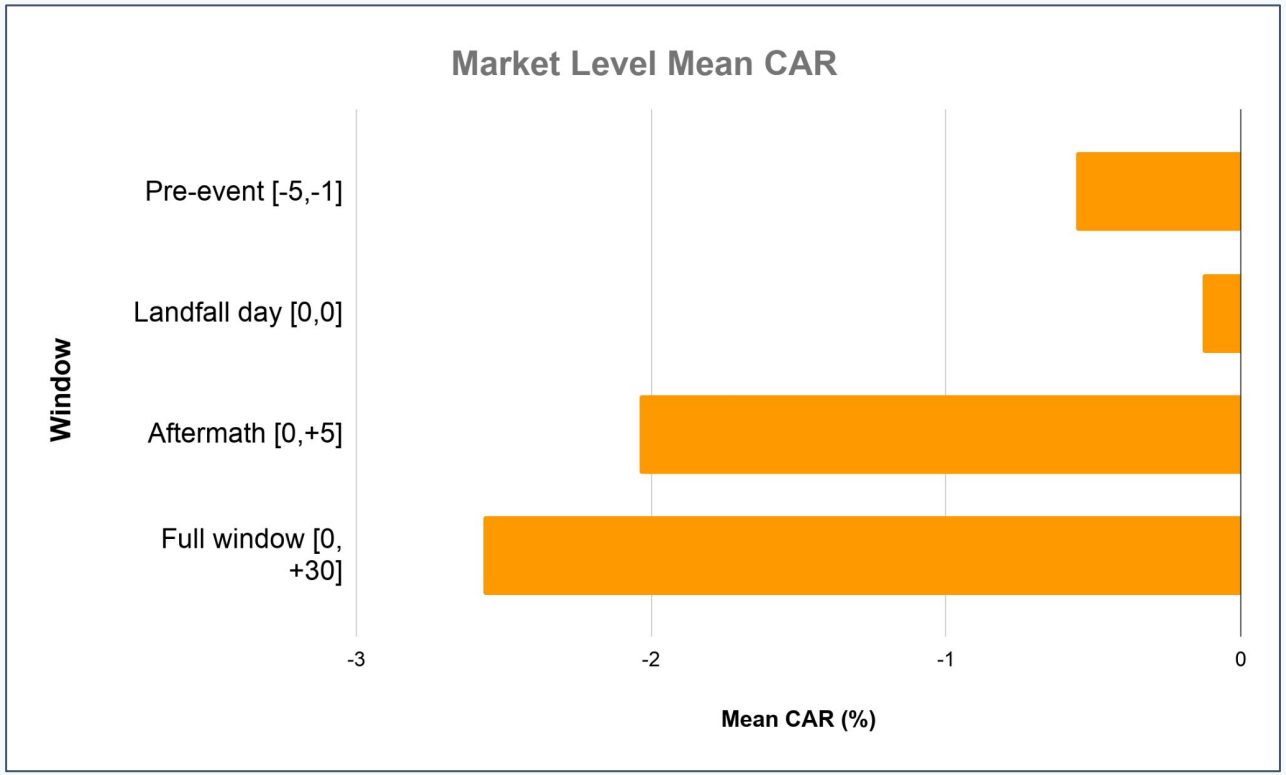
Dual significance testing

- **Parametric:**
  Cross sectional t test on mean CAR (Brown & Warner, 1985)
- **Non-parametric:**
  Wilcoxon signed-rank test on median CAR ; robust to fat tails

All tests two-tailed, $\alpha = 0.05$

[4] A. C. MacKinlay, “Event studies in economics and finance,” Journal of Economic Literature, vol. 35, no. 1, pp. 13–39, 1997

A Statistically Significant Shock



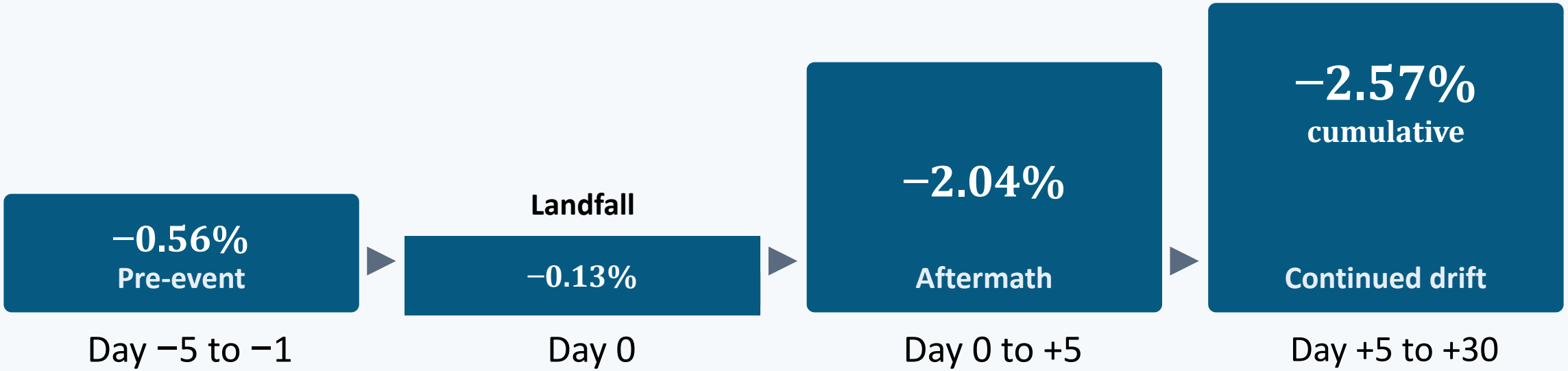
Window	CAR	p-value
Pre event	−0.56%	0.035*
Landfall day	−0.13%	0.446
Aftermath	−2.04%	<0.001**
Full window	−2.57%	0.013*

Full-window CAR = **– 2.57%** (p = 0.013)

- Confirms a broad, significant shock
- A cross sectional SD of 14.56% reveals wide dispersion across 203 stocks.

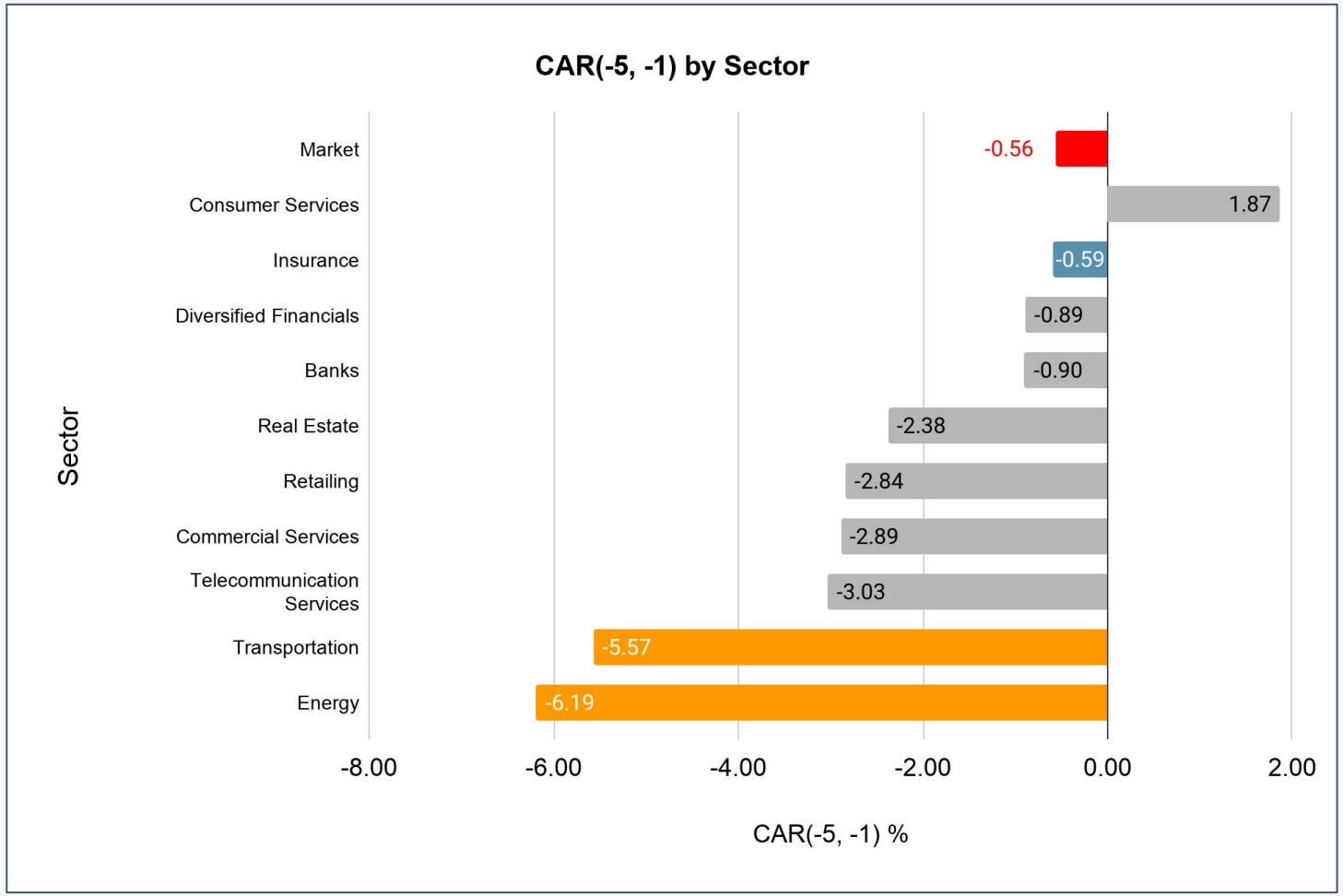
**p<0.05 **p<0.01. Landfall-day CAR alone is not significant — see RQ2.*

Losses Accumulate Over Days



- Landfall day CAR economically negligible (−0.13%, p=0.446)
- Largest single window loss occurs in **aftermath (0, +5)**. Drift continues through Day +30.
- Consistent with gradual information diffusion in markets.

Investors Predicted Before Landfall



Market wide

Aggregate pre event CAR of **−0.56%** (p=0.035) confirms broad, if modest, anticipatory selling

Physical exposure

Sectors with assets directly in the storm's path Energy (-6.19%) and Transportation (-5.57%) sold off earliest by investors

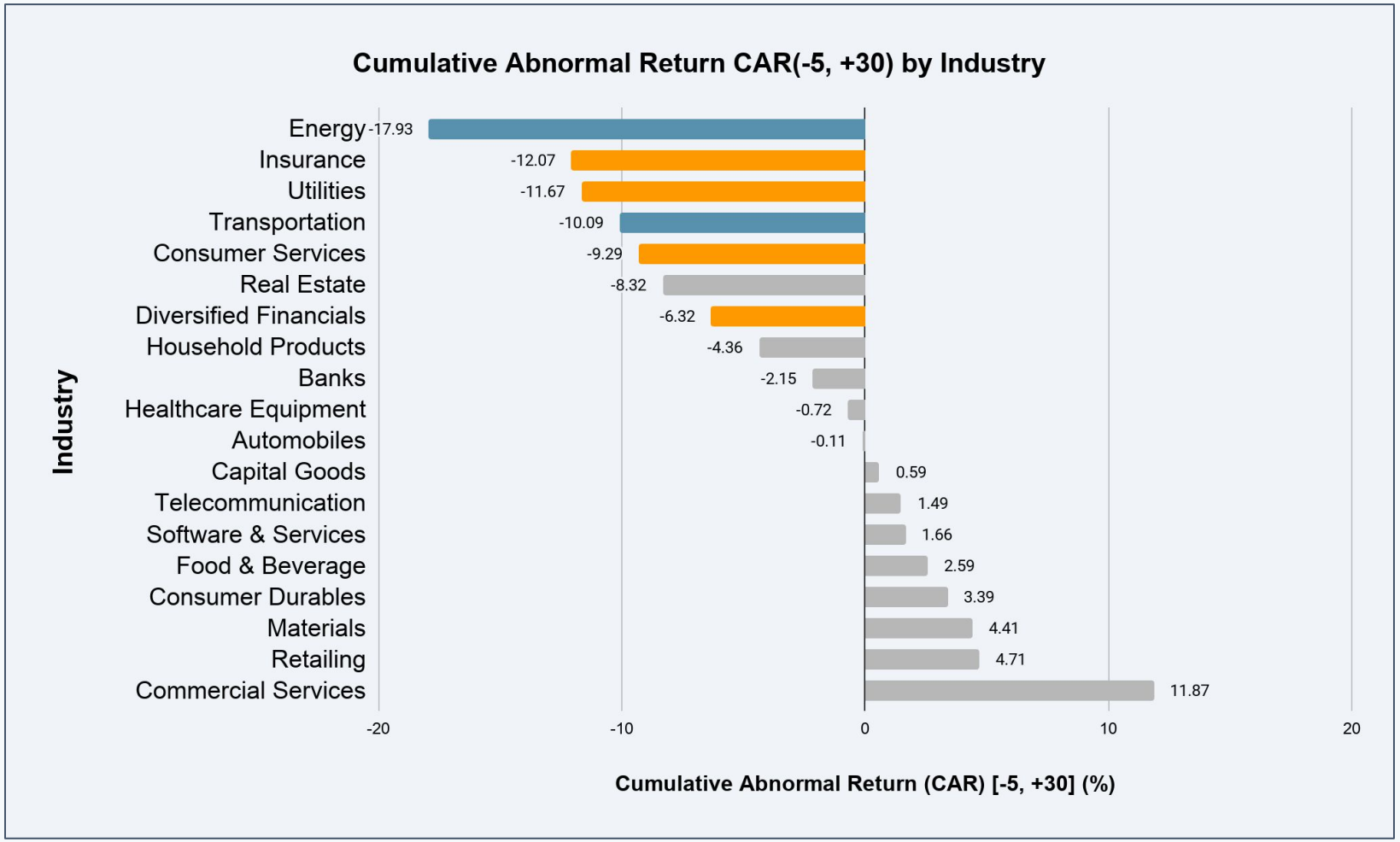
Financial exposure

Insurance moved less (-0.59%) but for a different reason liability repricing as claims exposure grew with each forecast update.[5]

Foreseeable disasters are partially priced in advance.

[5] K. A. Froot, “The market for catastrophe risk: a clinical examination,” Journal of Financial Economics, vol. 60, no. 2–3, pp. 529–571, 2001.

Full Window CAR Varies Across Sectors



Significant, both t-test & Wilcoxon

Large estimate, small N – caution

Not statistically significant

Energy shows the largest loss (-17.93%) but only 3 qualifying stocks. Too thin to confirm.

Robust, broad repricing is confirmed for only **4 of 19 sectors**: **Insurance, Utilities, Diversified Financials, Consumer Services.**

Aggregate market measures obscure this heterogeneity.

Where Parametric and Non Parametric Tests Agree

Sector	N	Mean CAR	t-test p	Median CAR	Wilcoxon p	Verdict
Insurance	9	−12.07%	0.002	−12.23%	0.004	**Confirmed**
Utilities	9	−11.67%	0.027	−11.27%	0.027	**Confirmed**
Diversified Financials	29	−6.32%	0.007	−7.30%	0.008	**Confirmed**
Consumer Services	20	−9.29%	<0.001	−7.29%	<0.001	**Confirmed**
Energy	3	−17.93%	0.357	−27.50%	0.500	**Insufficient N**
Transportation	2	−10.09%	0.047	−10.09%	0.500	**Artefact (N=2)**

- Transportation satisfy the t test (0.047 < 0.05) but fails on the Wilcoxon test (0.5 > 0.05)
- When both tests agree, confidence is high. When they diverge, a thin sample or a single outlier is the cause.

DISCUSSION

Findings on Market Disaster Response

01

Not Instantaneous

Markets do not absorb disaster shocks in a single day. Losses accumulate over a few trading days

02

Partially Anticipated

Foreseeable disasters are priced in advance.
Pre event losses show investors repricing risk as warnings intensified.

03

Sector-wise Concentrated

Aggregate market measures obscure heterogeneity.
Single Market-Wide CAR is insufficient for sector targeted decisions

LOOKING AHEAD

Limitations & Future Work

Limitations

- Single factor market model (Only ASPI). No Fama French factors available
- Several sectors represented by only few qualifying stocks, resulting wide confidence intervals
- Firm specific factors (corporate actions) are not accounted
- Single disaster, single exchange. Generalisability untested

Future work

- Multi factor asset-pricing models as CSE data matures
- Corporate actions database to control firm specific factors
- Cross market replication to test generalisability
- Cross event replication across other market disasters

CONCLUSION

Markets absorb disaster shocks slowly, unevenly, partly in advance

Market Wide CAR
-2.57% (p=0.013)

Partially anticipated
before the landfall

4 of 19 Sectors
Robustly Confirmed

- First systematic event study to quantify Cyclone Ditwah's impact on CSE market
- Gives stakeholders empirical basis for pricing, targeting, and studying disaster risk in markets.

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Thank you!

Data: huggingface.co/datasets/tharu-jwd/cse-market-data

Code: github.com/dehanf/Disaster-Shock-Market-Response

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