Impact of Cyclone Ditwah on the Colombo Stock Exchange: An Event Study on Market Reactions to Natural Disasters

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***Abstract*—Natural disasters inflict severe macroeconomic shocks on financial markets, yet frontier exchanges remain understudied. Using a classical event-study framework on 71,044 daily records for 289 CSE-listed stocks (February 2025 - February 2026), this paper examines how the Colombo Stock Exchange absorbed Cyclone Ditwah, which struck Sri Lanka on 28 November 2025, causing USD 4.1 billion in damages (≈4% of GDP), leading to CSE's worst weekly decline since November 2022. Market-model parameters estimated for 203 qualifying stocks across 19 sectors reveal three key findings: frontier markets do not absorb disaster shocks instantaneously, as losses accumulate over five trading days rather than on the landfall day; foreseeable disasters are partially priced in advance, with statistically significant pre-event losses confirming early investor repricing as meteorological warnings intensified; and aggregate market measures obscure sectoral heterogeneity. While the overall Cumulative Abnormal Return (CAR) of -2.57% is statistically meaningful, only four sectors (Consumer Services, Insurance, Diversified Financials, and Utilities) show consistent, broad repricing supported by both parametric and non-parametric tests. These findings inform investors' pricing of disaster risk in frontier markets, policymakers designing sector-targeted stabilisation interventions, and researchers studying market efficiency under severe informational uncertainty.**

***Index Terms*—Event Study, Colombo Stock Exchange, Abnormal Returns, Sector Heterogeneity**

I. Introduction

Sri Lanka's economy, still recovering under an International Monetary Fund (IMF) Extended Fund Facility arrangement following the 2022 sovereign debt crisis [1], suffered a major setback when Cyclone Ditwah struck Sri Lanka on 28 November 2025 [2, 3]. The World Bank estimated direct physical damage at USD 4.1 billion (approximately 4% of GDP [4]), affecting 58,340 hectares of paddy, damaging 247 km of roads and more than 35 bridges, and displacing over 209,000 people across all 25 districts [2, 5].

Financial markets responded sharply as the Colombo Stock Exchange (CSE) All-Share Price Index (ASPI)[1] fell 3.04% on the first trading session after landfall, extending to a weekly loss of 5.35%; the worst since mid-November 2022 [6].

Despite these effects, no peer-reviewed study has systematically quantified the impact of Cyclone Ditwah on individual stocks or market sectors. This gap matters for multiple stakeholder groups: investors who need to price disaster risk into portfolios; policymakers who must design market stabilisation interventions; and researchers who require empirical evidence on emerging-market resilience. This paper addresses this gap using an event-study framework to quantify disaster-driven abnormal returns at both market and sector levels. To our knowledge this is the first such analysis on Cyclone Ditwah. 🤗 `Data` and `code` for this work are publicly available.

This study is organised around four research questions:

1) **RQ1 (Market Shock):** Did Cyclone Ditwah produce a statistically significant shock to aggregate CSE returns?
2) **RQ2 (Speed of Reaction):** How quickly did the market incorporate the disaster shock? Was the impact concentrated on landfall day, or did it accumulate over subsequent trading sessions?
3) **RQ3 (Anticipation):** Was there a statistically significant pre-event price reaction?
4) **RQ4 (Sector Heterogeneity):** Which CSE sectors were negatively affected, and does the sector-level evidence differ between parametric and non-parametric tests?

II. Literature Review

This study applies the event-study framework of MacKinlay [7], the standard method for isolating the price effect of a discrete event on security returns. The framework estimates each stock's counterfactual "normal" return using a pre-event market model, then treats the difference between actual and predicted returns as the abnormal return attributable to the event. These daily abnormal returns are aggregated into CARs to measure total valuation impact across any chosen window.

The market model is chosen over the constant mean return model for its ability to remove market-wide variation from each stock's return, reducing estimator noise and increasing test power [7]. This property is particularly important in a

[1]The All-Share Price Index (ASPI) is the primary benchmark for the Colombo Stock Exchange. It tracks the collective price movements of all listed companies, providing a clear snapshot of the market's overall health and direction.

frontier market context, where aggregate index movements during structural reforms under the IMF Extended Fund Facility would otherwise contaminate the abnormal return signal. Brown and Warner [8] establishes that, even with daily data that exhibit non-normality and cross-sectional dependence, market-model-based event study procedures remain well-specified when these characteristics are accounted for. Their finding directly motivates the cross-sectional t-test used in this study, which absorbs contemporaneous correlation across stocks sharing the same event date, a condition MacKinlay [7] terms *total clustering*.

Since Cyclone Ditwah constitutes a total-clustering scenario, we supplement the t-test with the non-parametric Wilcoxon signed-rank test [9], which requires no distributional assumptions and tests the median rather than the mean. This dual-test approach allows us to distinguish sectors in which losses were broadly distributed across constituent stocks from those in which a single outlier firm drove the aggregate result.

Worthington and Valadkhani [10] apply analogous logic to 42 severe natural disasters on the Australian equity market, finding that the most acute price impacts occur at or shortly after the event date but that full market adjustment often requires several subsequent trading sessions; a pattern consistent with more recent disaster-finance literature [11]. Nikkinen et al. [12] extend this line of inquiry to exogenous shocks across 53 equity markets, finding that the magnitude and duration of return effects vary substantially by region and degree of market integration, with less-integrated markets exhibiting different shock dynamics than developed exchanges. This heterogeneity motivates sector-level disaggregation in this study, as the CSE is likely to exhibit adjustment patterns that differ from those in developed markets. Findings by Froot [13] show that if catastrophe risk reprices insurance before losses are confirmed, the same logic should apply to listed insurers on a frontier exchange, producing detectable pre-event abnormal returns as disaster warnings escalate.

III. Dataset and Data Preparation

A. Dataset Preparation

Daily OHLCV (Open, High, Low, Close, Volume) data, which are the standard representation of a trading day's price activity for all CSE-listed stocks, were collected via a custom Python web-scraping pipeline querying the exchange's public data interface. The raw dataset comprised 71,044 rows. Table I summarises the key characteristics.

TABLE I
Primary dataset characteristics

Attribute	Value
Coverage	289 instruments
Date range	03 Feb 2025 – 27 Feb 2026
Raw records	71,044 rows
Fields	Symbol, date, open, high, low, close, volume
Missing Values	None
Collection method	Python web scraping
Benchmark index	CSE All-Share Price Index (ASPI)
Sectors	19 CSE sectors

Data integrity was verified through manual spot checks on a representative sample of stocks. Scraped OHLC prices on selected dates were cross-referenced against CSE price data, and price trends were visually inspected against charts published on the exchange website. No material discrepancies were identified during this process.

Daily ASPI data were collected separately through the same pipeline using the CSE website and merged by date to provide the market benchmark return, R_m, required by the market model. Sector classifications were derived from CSE sector listings, with each stock manually mapped to one of 19 industry groups.

B. Data Cleaning

Sector mapping: A manually verified sector mapping was applied to all stocks; 4 unmapped stocks (`BBH.N0000`, `CALC.U0000`, `CALI.U0000`, `CSF.N0000`) were removed, leaving 70,310 records.

Share-class filtering: Only ordinary equities (suffixes `N0000` and `X0000`) were retained; preference shares (`P0000`) were excluded to preserve the market-model assumption that returns are driven by market-wide and firm-specific factors, leaving 70,086 records.

Outlier removal: Two price records (`COLO.N0000`, 2025-10-08; `CIC.X0000`, 2025-10-07) were dropped: on each date, the recorded closing price reflected a corporate restructuring event that was not yet incorporated into the published price series, producing a one-day return of anomalous magnitude inconsistent with any plausible market movement.

Microstructure filtering: Eight penny stocks[2] and 70 consistently illiquid instruments were excluded to prevent artificial returns from bid–ask bounce and stale-pricing bias[3] in beta estimates, leaving 207 instruments and 52,046 records.

Regression qualification: Stocks with under 60 clean trading observations in the estimation window (Day -120 to Day -6) were excluded, removing 4 thinly traded stocks and yielding a final sample of **203 stocks** and **51,779 rows**.

IV. Methodology

The event-study framework estimates each stock's expected return in the absence of the cyclone, treating the observed deviation as the abnormal return from the disaster shock.

A. Event Definition and Windows

The event date ($t = 0$) is 28 November 2025 (cyclone landfall). Two non-overlapping windows are defined:

- **Estimation window:** Day -120 to Day -6 ($\sim$115 trading days), Following the range of 100–250 trading days recommended by MacKinlay [7]. The window closes at Day -6 to prevent anticipation effects from contaminating beta estimates.

[2] Low-priced, speculative shares excluded to prevent percentage-return distortions from small absolute price moves.

[3] Bid–ask bounce and stale pricing introduce artificial return patterns in thinly traded stocks that would bias beta estimates. [7, 8]

- **Event window:** Day -5 to Day $+30$ (36 trading days). The five pre-landfall days correspond to the period of official cyclone warnings [2]; the 30 post-landfall days extend beyond the publication of official damage assessments by the World Bank and OCHA [4, 5], ensuring the full information diffusion period is captured.

All day indices are expressed in trading days, not calendar days, to avoid bias from weekends and public holidays.

B. Market Model

Individual stock returns are modelled as a linear function of market returns over the estimation window [7],

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{1}$$

where R_{it} is the daily return of stock i on day t, R_{mt} is the ASPI return, α_i is the stock-specific intercept, β_i is the market-sensitivity coefficient, and ε_{it} is a zero-mean error term. The β_i parameter captures each stock's market sensitivity, estimated from pre-event data to form the counterfactual return during the cyclone period.

C. Abnormal Returns and CARs

Abnormal returns in the event window are the residual between the actual return and the counterfactual predicted by the fitted model. If the cyclone had no effect, abnormal returns would average to zero across the event window. A consistently negative CAR therefore provides evidence that the cyclone caused value destruction beyond what normal market fluctuations would predict [7],

$$AR_{it} = R_{it} - \left(\hat{\alpha}_i + \hat{\beta}_i R_{mt}\right) \tag{2}$$

CARs aggregate over any sub-window $[t_1, t_2]$ [7],

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} \tag{3}$$

We report CARs for four windows: pre-event $[-5, -1]$, landfall day $[0, 0]$, immediate aftermath $[0, +5]$, and the complete event window $[-5, +30]$. Sector-level CARs are the cross-sectional mean of individual stock CARs within each sector.

D. Statistical Testing

a) Parametric cross-sectional t-test: For each window $[t_1, t_2]$, the CAR_i values across all stocks (or stocks within a sector) are tested against a null mean of zero [7, 8],

$$t = \frac{\overline{CAR}}{s/\sqrt{N}} \tag{4}$$

where $\overline{CAR}$ is the cross-sectional mean, s is the standard deviation, and N is number of stocks (two-tailed, $\alpha = 0.05$).

b) Non-parametric Wilcoxon signed-rank test: Because CSE return distributions exhibit fat tails and skewness typical of frontier markets [8, 12], we apply the Wilcoxon signed-rank test [9] as a robust check on sector-level median CARs. Concordance between parametric and non-parametric results strengthens confidence; divergence signals that a sector mean is driven by a small number of extreme stocks rather than a uniform industry-wide repricing [7].

E. Hypotheses Testing

For each research question, we state a null hypothesis (H_0) and an alternative hypothesis (H_1). All tests are two-tailed at a significance level of $\alpha = 0.05$.

a) RQ1 – Market-Wide Shock.:

- H_0: Cyclone Ditwah produced no statistically significant change in aggregate CSE returns; the market-wide mean CAR is equal to zero.
- H_1: Cyclone Ditwah produced a statistically significant change in aggregate CSE returns; the market-wide mean CAR is significantly different from zero.

b) RQ2 – Speed of Reaction.:

- H_0: The market-wide mean CAR on landfall day $[0, 0]$ is not significantly different from zero; the shock was not concentrated on the event date.
- H_1: The market-wide mean CAR on landfall day $[0, 0]$ is significantly different from zero; the shock was concentrated on the event date.

c) RQ3 – Pre-Event Anticipation.:

- H_0: The market-wide mean CAR over the pre-event window $[-5, -1]$ is equal to zero; no statistically significant price reaction occurred before landfall.
- H_1: The market-wide mean CAR over the pre-event window $[-5, -1]$ is significantly different from zero; investors began pricing in disaster risk before the official event date.

d) RQ4 – Sector Heterogeneity.: For each sector s, tested over the full event window $[-5, +30]$:

- H_0: The mean and median CAR for sector s is equal to zero; the cyclone produced no significant valuation effect in that sector.
- H_1: The mean and median CAR for sector s is significantly different from zero; the cyclone produced a significant valuation effect in that sector.

Where the t-test and Wilcoxon test [9] yield conflicting results for a sector, the Wilcoxon result is treated as the more reliable indicator of a genuine sector-wide effect, given the fat-tailed return distributions typical of frontier markets.

V. Results

A. RQ1: Market-Wide Shock

Figure 1 plots the ASPI daily close from February 2025 to March 2026. The index peaked near 23,600 in mid-November 2025, then fell from 22,844 (26th November) to approximately

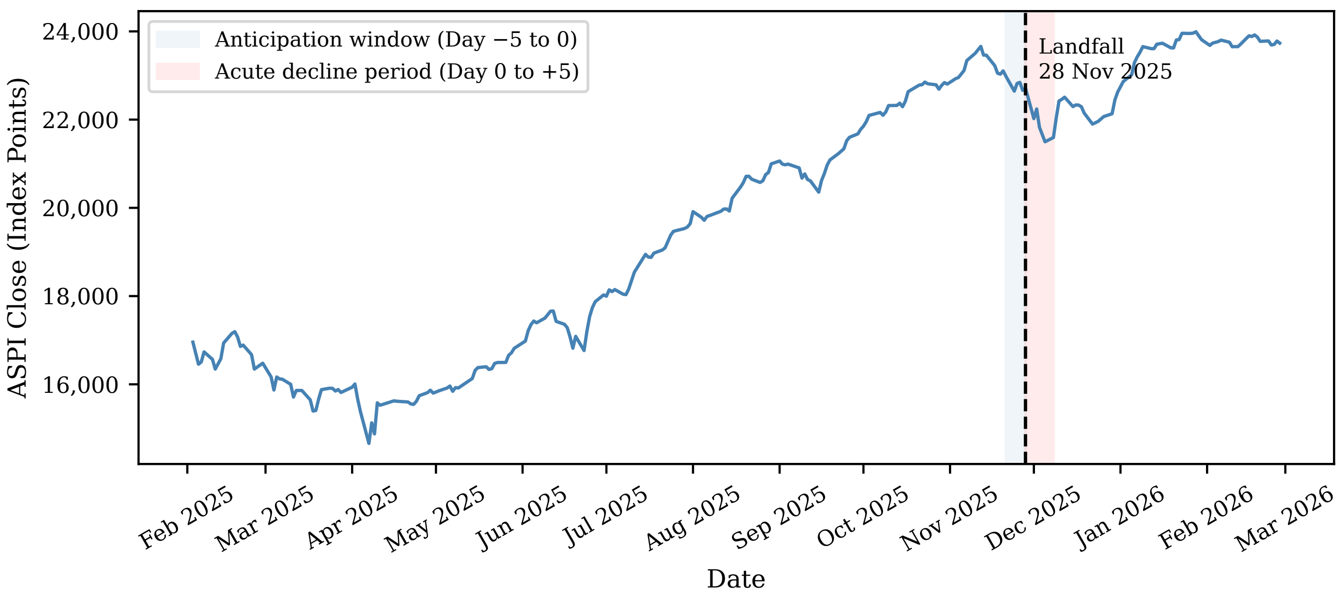

Fig. 1. ASPI daily close, Feb 2025–Mar 2026.**Note:** Dashed vertical line marks landfall (28 Nov 2025). Shaded region = acute decline period (Day 0 to Day +5).

21,431 on 5th December; a peak-to-trough drop of approximately 6.2% over six trading days. The index subsequently recovered above 23,000 by January 2026.

Table II reports the market-wide mean CAR across all 203 qualifying stocks. The full-window mean CAR of -2.57% is significant ($p = 0.0125 < 0.05$), confirming a broad aggregate shock. The cross-sectional standard deviation of 14.56% signals high dispersion across individual stocks, motivating the sector-level disaggregation in RQ4.

TABLE II
MARKET-LEVEL MEAN CAR ($N = 203$ STOCKS)

Window	Mean CAR (%)	Std Dev (%)	P-value
Pre-event $[-5,-1]$	-0.56	3.75	0.0346
Landfall day $[0,0]$	-0.13	2.33	0.4457
Aftermath $[0,+5]$	-2.04	6.02	0.0000
Full window $[-5,+30]$	-2.57	14.56	0.0125

B. RQ2: Speed of Market Reaction

The landfall-day CAR$(0,0)$ of -0.13% is economically negligible and statistically insignificant ($p = 0.4457 > 0.05$). However, the aftermath window (Days 0 to +5) had the largest single-window loss of -2.04%, which was significant ($p < 0.001$), while the full-window loss of -2.57% confirms that the shock continued accumulating through Day +30. This pattern of gradual repricing, with no single-day spike, is consistent with gradual information diffusion typical of frontier markets [7], where damage assessments were published incrementally rather than being fully known at landfall.

C. RQ3: Pre-Event Anticipation Effects

The pre-event market-wide CAR$(-5,-1)$ of -0.56% (Table II) indicates that abnormal losses were already accumulating before landfall. At the sector level, Table III shows Energy with the largest pre-event loss (CAR$(-5,-1) = -6.19\%$) and Transportation second (-5.57%), consistent with investors pricing in disaster risk as official cyclone warnings intensified during the five trading days before landfall. Insurance recorded a smaller pre-event CAR of -0.59%, which was notable given it holds no physical infrastructure at risk.

D. RQ4: Sector Heterogeneity

1) Sector CAR Estimates: Figure 2 plots mean CAR trajectories for a selection of sectors across the event window, and Table III reports full point estimates for all 19 sectors.

The energy sector recorded the largest full-window CAR at -17.93% reflecting infrastructure disruption and power-outage effects [14, 15]. However, with only three qualifying stocks, this estimate is statistically insignificant ($p = 0.357$) and should be interpreted with caution. Insurance sector records the second largest full-window CAR at -12.07% (with $p = 0.002$) and with the steep immediate-aftermath CAR$(0,+5)$ at -6.39%, reflecting anticipated claims exposure. Transportation recorded a full-window CAR of -10.09%, consistent with the cyclone's documented damage to 247 km of roads and 35 bridges [16], though with only two qualifying stocks, this result should be interpreted cautiously. Sectors recording nominally positive full-window CARs — Commercial Services ($+11.87\%$, $p = 0.612$) and Retailing ($+4.71\%$, $p = 0.652$) did not generate statistically significant gains. The anomalous single-day CAR of $+3.60\%$ recorded by Retailing on landfall day remains unexplained and warrants further investigation.

2) Significance Tests: Table IV reports parametric and nonparametric significance results for the full event window. The market-wide shock is significant ($t = -2.52$, $p < 0.05$). The Wilcoxon test identifies four sectors with significant median CARs: Consumer Services ($W = 3$, $p < 0.001$), Insurance

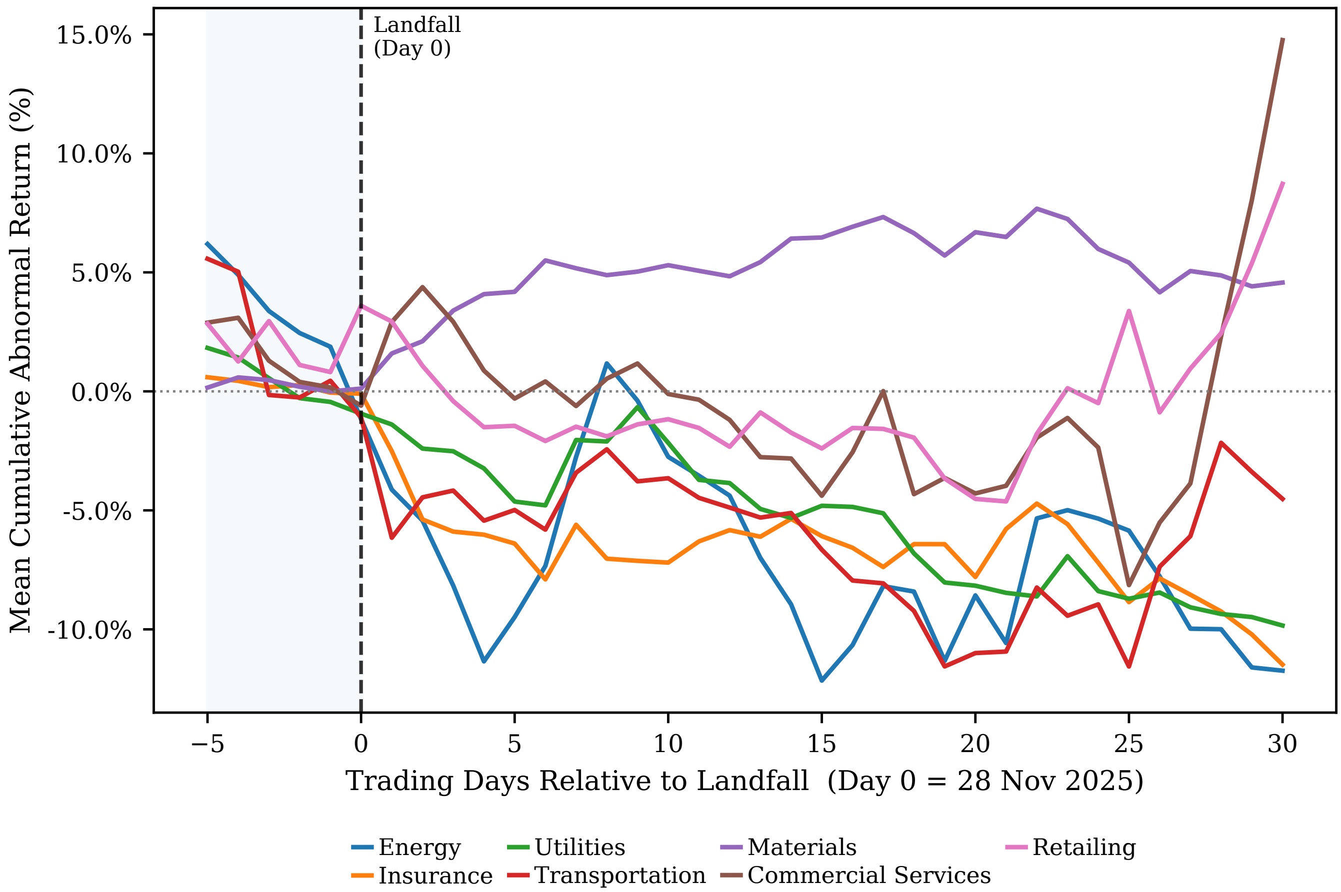

Fig. 2. Sector-level CARs anchored at Day 0 (landfall).
Note: Pre-event values show reverse accumulation back from Day 0; post-event values show forward accumulation from Day 0.

TABLE III
SECTOR-LEVEL CAR ESTIMATES (%)

Sector	**N***	**CAR**$(-5,-1)$	**CAR**$(0,0)$	**CAR**$(0,+5)$	**CAR**$(-5,+30)$
Energy	3	−6.19	−1.16	−9.48	−17.93
Insurance	9	−0.59	−0.10	−6.39	−12.07
Utilities	9	−1.83	−0.94	−4.63	−11.67
Transportation	2	−5.57	−1.10	−4.98	−10.09
Consumer Services	20	1.87	−0.76	−6.75	−9.29
Real Estate	11	−2.38	−0.04	−5.29	−8.32
Diversified Financials	29	−0.89	−0.50	−2.74	−6.32
Household Products	1	0.48	−0.12	−1.89	−4.36
Banks	16	−0.90	−0.02	−0.67	−2.15
Healthcare Equipment	7	−0.77	0.25	0.71	−0.72
Automobiles	1	1.40	−0.06	−0.88	−0.11
Capital Goods	27	−0.44	0.07	2.23	0.59
Telecommunication Services	2	−3.03	0.57	−2.99	1.49
Software & Services	1	−1.50	0.17	−3.80	1.66
Food & Beverage	31	0.95	−0.40	−3.25	2.59
Consumer Durables	6	−0.97	−0.26	−0.74	3.39
Materials	17	−0.16	0.12	4.18	4.41
Retailing	8	−2.84	3.60	−1.45	4.71
Commercial Services	3	−2.89	−0.60	−0.30	11.87

* Number of qualifying stocks in the sector after data cleaning.

TABLE IV
SECTOR-LEVEL STATISTICAL SIGNIFICANCE: FULL EVENT WINDOW CAR$(-5, +30)$

Sector	**N**	*t*-**test (mean CAR)**			**Wilcoxon (median CAR)**		
		Mean (%)	t	p	**Median (%)**	W	p
Energy	3	-17.93	-1.19	0.357	-27.50	1.0	0.500
Insurance	9	-12.07	-4.52	0.002^{**}	-12.23	0.0	0.004^{**}
Utilities	9	-11.67	-2.70	0.027^{*}	-11.27	4.0	0.027^{*}
Transportation	2	-10.09	-13.45	$0.047^{\dagger}$	-10.09	0.0	0.500
Consumer Services	20	-9.29	-4.91	$< 0.001^{**}$	-7.29	3.0	$< 0.001^{**}$
Real Estate	11	-8.32	-1.56	0.151	-3.83	20.0	0.278
Diversified Financials	29	-6.32	-2.90	0.007^{**}	-7.30	97.0	0.008^{**}
Household Products	1	-4.36	–	–	-4.36	–	–
Banks	16	-2.15	-1.13	0.276	-3.87	46.0	0.274
Healthcare Equipment	7	-0.72	-0.17	0.871	-3.54	11.0	0.688
Automobiles	1	-0.11	–	–	-0.11	–	–
Capital Goods	27	0.59	0.25	0.808	3.04	166.0	0.594
Telecommunication Services	2	1.49	0.59	0.659	1.49	1.0	1.000
Software & Services	1	1.66	–	–	1.66	–	–
Food & Beverage	31	2.59	0.94	0.357	0.01	235.0	0.809
Consumer Durables	6	3.39	0.49	0.643	6.40	6.0	0.438
Materials	17	4.41	1.80	0.091	2.45	47.0	0.174
Retailing	8	4.71	0.47	0.652	3.84	13.0	0.547
Commercial Services	3	11.87	0.60	0.612	0.26	2.0	0.750
Market (all)	203	-2.57	-2.52	0.013^{*}	–	–	–

$^{*}p < 0.05$; $^{**}p < 0.01$; – not computable ($N = 1$) or not applicable.

† N = 2; df = 1. The t-statistic is driven by near-zero standard error rather than informative sampling variation. This result is not treated as evidence of sector-wide significance.

($W = 0$, $p = 0.004$), Diversified Financials ($W = 97$, $p = 0.008$), and Utilities ($W = 4$, $p = 0.027$). Transportation's t-test produces a large t-statistic ($t = -13.45$) and a nominally significant p-value ($p = 0.047$), but with only two qualifying stocks, this result is an artefact of near-zero cross-sectional variance rather than a meaningful statistical inference. The Wilcoxon test, which cannot reject the null for N = 2 at any conventional level (p = 0.500), confirms that no sector-wide effect can be established. Transportation is therefore treated as having insufficient coverage for significance testing.

VI. DISCUSSION

a) RQ1 – Market Shock: The market-wide CAR of -2.57% ($t = -2.52$, $p = 0.013$) confirms a statistically significant aggregate shock. However a cross-sectional standard deviation of 14.56% across 203 stocks suggests that individual firms experienced different outcomes, and the mean alone is a poor summary of the cyclone's effect to the market. The -2.57% figure also sits well below the raw -6.2% peak-to-trough ASPI decline visible in Figure 1. The market model accounts for each stock's normal sensitivity to index movements. What remains after these adjustments are returns that cannot be explained by market-wide factors alone. An investor holding the full index absorbed -6.2%, but roughly 3.6 percentage points of that drop would have occurred under normal market conditions given prevailing betas. Only -2.57% is the cyclone's bill [7].

b) RQ2 – Speed of Reaction: The landfall-day CAR of -0.13% ($p = 0.4457$) is economically negligible and statistically insignificant, which is unusual, given the scale of the disaster. The lack of immediate reaction suggests that the market did not price in the destruction due to unavailable information. The full magnitude of the shock and economic consequences was systematically quantified by international agencies over the following weeks [4, 5]. The aftermath window (Days 0 to $+5$) produced the largest single-window loss at -2.04% ($p < 0.001$), and the shock had not resolved by Day $+30$, where the full-window CAR is -2.57%. The partial ASPI recovery of 3.6% in late December [17] does not inflate the disaster estimate: the market-model framework strips out normal seasonal movements, so the CAR of -2.57% already reflects the disaster impact net of any festive-quarter rebound.

c) RQ3 – Anticipation: Market-wide, the CAR$(-5, -1)$ reached -0.56% ($p = 0.0346$), small in magnitude but significant, meaning investors were already moving before landfall as official cyclone warnings intensified [2]. At the sector level, Energy and Transportation drove most of that early movement, with pre-event CARs of -6.19% and -5.57% respectively. These are sectors with physical assets directly in the storm's path (power infrastructure, roads, bridges). Investors selling those stocks before landfall were pricing in the likelihood of asset destruction. The insurance sector provides an interesting case where its pre-event CAR of -0.59% is far smaller. What it has is claims exposure that grows with every updated forecast track. The sell-off in Insurance before landfall reflects a financial rather than physical channel, liability repricing as the storm's probable landfall zone narrowed [13]. Both mechanisms are consistent with the well-established observation that markets begin incorporating information about foreseeable events before the formal event date [7], but they operate through entirely different economic logics. The Consumer Services sector's positive pre-event CAR of $+1.87\%$ likely reflects seasonal tourism demand and short-term optimism about emergency accommodation needs, both unrelated to the cyclone's destructive potential. This reversed sharply once the storm's path was confirmed: the aftermath $\mathrm{CAR}(0, +5)$ of -6.75% wiped out the gain, and the full-window CAR of -9.29% reflects the sector's true exposure.

d) RQ4 – Sector Heterogeneity: The results showed four sectors: Consumer Services, Insurance, Diversified Financials, and Utilities having significant CARs under both the t-test and the Wilcoxon signed-rank test. Although a significant t-test alone could be one extreme firm pulling the sector mean, a significant Wilcoxon result means the majority of stocks in that sector moved in the same direction, and the repricing was broad, not concentrated in a single name. For these four sectors, the cyclone caused industry-wide valuation adjustments. Although Transportation's t-statistic of -13.45 ($p = 0.047$) looks significant, with only two qualifying stocks ($N = 2$), the standard error collapses toward zero, and the t-statistic becomes mechanically large. The Wilcoxon test, which cannot reject the null at any conventional level for $N = 2$ ($p = 0.500$), is the more honest summary. Hence, we cannot determine whether transportation was broadly hit or whether one stock drove the result. Similarly, Energy's full-window CAR of -17.93%, which is the largest point estimate in the table, with three qualifying stocks, the t-test returns $p = 0.357$. The wide confidence intervals around that figure make it indicative at best. These results demonstrate that reporting both tests is crucial. The t-test is sensitive to large individual shocks, while the Wilcoxon is sensitive to consistent directional movement across a sector. If both tests agree, confidence is high. However, if the tests differ, as in Transportation, the divergence signals that a single firm may be driving the sector mean, but the sample is too thin to confirm whether the effect was broad or concentrated.

VII. Limitations and Future Work

a) Single-factor market model: The market model regresses individual stock returns on the ASPI alone. A Fama-French three-factor specification [18] would provide a richer counterfactual and may reduce omitted-variable bias, but factor data for the CSE are not publicly available at daily frequency, limiting its current feasibility.

b) Small-sector reliability: Four sectors contain a single qualifying stock (Automobiles, Software & Services, Household Products) and two sectors contain only two stocks (Transportation, Telecommunication Services). Point estimates are reported for completeness but have wide confidence intervals.

c) Confounding events: The estimation window spans a period of ongoing IMF programme negotiations and macroeconomic uncertainty. Firm-specific confounders during the event window cannot be individually controlled without a comprehensive corporate actions database.

d) Generalisation: This study examines a single disaster on a single frontier exchange. Cross-event and cross-market replication studies would establish whether the sector heterogeneity and anticipation effects documented here are robust features of emerging-market responses to natural disasters.

VIII. Conclusion

This paper provides the first systematic event-study quantification of Cyclone Ditwah's impact on the Colombo Stock Exchange. The central finding is that frontier markets do not absorb severe natural disaster shocks in a single trading session. Cyclone Ditwah's market-wide impact gradually accumulated over 30 days, consistent with incremental information diffusion and not instantaneous price discovery. Pre-event losses confirm that meteorological warnings carry real information that investors act on. At the sector level, broad-based repricing was established for Consumer Services, Insurance, Diversified Financials, and Utilities; for Energy and Transportation, thin coverage prevented statistical confirmation despite large point estimates. These results suggest that disaster risk in frontier markets is sectorally concentrated and slow to fully resolve.

Replicating this design across multiple frontier exchanges and disaster types would establish whether gradual diffusion and sectoral concentration are general features of emerging-market disaster responses, or artefacts specific to the CSE.

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