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COVID-19 Shocks and Emerging Market Resilience: The Pakistan Stock Market Anomaly and Policy Anticipation

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ABSTRACT

This study discovers a striking anomaly in Pakistan's stock market during the COVID-19 crisis: rising confirmed cases drove positive daily returns, surging death rates triggered sharp declines, and accelerating recoveries supported price gains. Employing daily firm-level panel data from 200 non-financial PSX-listed companies (2020–2021) and a fixed-effects estimator with Newey–West HAC standard errors, we isolate pandemic shocks from macroeconomic controls (exchange rate, KIBOR, and inflation). The findings challenge efficient market predictions and highlight behavioral drivers, policy anticipation, contrarian buying, and herding amid extreme uncertainty. The results underscore the outsized role of credible government intervention in anchoring emerging market resilience and offer timely lessons for crisis policy design.

Keywords*: *COVID-19, stock returns, behavioural finance, emerging markets, fixed effects, HAC estimation

INTRODUCTION

The COVID-19 pandemic represents one of the most severe exogenous shocks to global financial markets in recent history (Baker, Bloom, Davis, Kost, & Sammon, 2020). Unlike previous epidemics, its rapid global spread, prolonged duration, and associated policy responses have generated extreme volatility and profound deviations from pre-crisis pricing patterns (Ashraf, 2020a). Emerging markets, characterized by thinner liquidity, higher retail participation, and greater sensitivity to policy signals, often exhibit amplified or atypical reactions compared to developed markets (Harjoto et al., 2020; Topcu & Gulal, 2020).

Pakistan's equity market provides an informative case. The Pakistan Stock Exchange (PSX) experienced sharp initial declines in March 2020, followed by rapid recoveries that appeared uncorrelated with conventional health risk metrics (Ali et al., 2020). This divergence motivates the central question: How did daily variations in COVID-19 indicators (confirmed cases, deaths, and recoveries) influence firm-level stock returns after controlling for macroeconomic fundamentals and unobserved heterogeneity?

We address this question using a fixed-effects panel model estimated on daily data from 200 non-financial PSX-listed firms from January 2020 to December 2021 (N = 19,831 firm-days). Newey and West (1987) established that HAC standard errors correct for both heteroskedasticity and autocorrelation, which are

pervasive in high-frequency return data during crises. The specification allows us to isolate time-varying pandemic effects while absorbing firm-specific, time-invariant heterogeneity.

The analysis yielded three principal findings. First, confirmed case growth was positively and significantly related to returns, suggesting that investors interpreted rising infections as precursors to policy accommodation rather than pure negative fundamentals. Second, death rates exerted a large negative effect, consistent with global evidence that mortality causes irreversible economic damage (Ashraf, 2020b). Third, recovery rates supported positive price adjustments, reflecting the perceived abatement of uncertainty.

These results contribute to two strands of the literature. Empirically, they extend the emerging market evidence on pandemic asset pricing (Harjoto et al., 2020; Topcu & Gulal, 2020). Theoretically, they illustrate how behavioral forces and policy expectations can dominate rational pricing during extreme uncertainty, which is consistent with prospect theory and herding models (Shiller, 2015). The findings also have practical implications for central bank communication, exchange rate management, and volatility control mechanisms in developing financial systems.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Historical and Theoretical Foundations of Pandemic Shocks

Financial markets are highly sensitive to uncertainty shocks, particularly those caused by infectious disease outbreaks. Early literature established that pandemics increase risk premiums, depress asset prices, and elevate volatility through disrupted economic expectations and investor fear (Bloom, 2009). Historical events, such as the SARS outbreak (Chen et al., 2007) and the Ebola epidemic (Ichev & Marinč, 2018), have produced regionally confined declines with limited global contagion owing to their constrained geographic scope and short duration.

Global Market Reactions to COVID-19

The COVID-19 pandemic triggered an unprecedented global reaction. (Baker, Bloom, Davis, Kost, Sammon, et al., 2020) documented U.S. equity volatility exceeding that of the 2008 financial crisis, driven by rapid information flows and policy uncertainty. Cross-country studies confirmed a negative association between confirmed-case growth, mortality rates, and stock returns, with amplified effects in markets characterized by lower institutional quality, higher retail participation, or weaker fiscal buffers (Al-Awadhi et al., 2020; Ashraf, 2020a; Topcu & Gulal, 2020)

Emerging-Market Vulnerabilities

Emerging markets exhibit particularly pronounced volatility and slower recovery trajectories, largely due to capital flight, currency depreciation, and limited policy space (Baig et al., 2021; Harjoto et al., 2020). These markets are more sensitive to domestic case dynamics than to global trends, highlighting the role of country-specific crisis management and investor trust in policy responses (Gil-Alana & Monge, 2020).

Post-2022 Evidence on COVID-19 Aftershocks

Post-2022, research has shifted its attention to the lingering aftershocks of COVID-19. (Thorbecke, 2025) shows that post-pandemic inflation surges disrupted U.S. returns, with monetary tightening disproportionately affecting the growth and technology sectors. (Ali et al., 2020; Zhu et al., 2024) identified elevated jump risks in global markets post-2022, attributing them to persistent supply chain vulnerabilities and geopolitical spillovers rooted in the pandemic. (Cerrato & Gitti, 2022) used financial market data to

isolate supply shock contributions to post-COVID inflation, finding prolonged volatility in energy-dependent European equities.

(Bajra et al., 2022) document delayed volatility rebounds in emerging markets following stringent early policies, whereas (Ullah et al., 2023) highlight divergent post-2022 paths between developed and emerging indices, with the latter showing greater sensitivity to inflation persistence than the former. demonstrate asymmetric tail-risk transmission in U.S. markets post-pandemic, noting reduced monetary policy effectiveness amid lingering inflation effects. In the African context, (Son & Ryu, 2025) show that COVID legacies amplified poverty-price shocks, sustaining elevated return volatility by 2023. (Knicker et al., 2025) simulates U.K. stock recovery scenarios, emphasizing that post-2022 fiscal tightening prolonged the downside risks in cyclical sectors.

Collectively, these studies underscore that COVID-19 aftershocks—through inflation, policy normalization, and supply fragility–continue to shape market dynamics, particularly in emerging economies facing prolonged adjustment challenges.

Pakistan-Specific Evidence and Research Gaps

Pakistan-specific evidence remains limited and is predominantly descriptive or short-horizon (Ali et al., 2020). Existing studies often overlook firm-level heterogeneity, fail to adequately correct for serial correlation in daily returns, and omit key macroeconomic controls, constraining causal interpretation. This study fills these gaps by employing a two-way fixed-effects model with (Newey & West, 1987) heteroskedasticity- and autocorrelation-consistent (HAC) standard errors applied to daily firm-level panel data from 200 non-financial PSX-listed companies (2020–2021). This framework is well-suited to high-frequency crisis data and enables the robust identification of pandemic shocks, net of unobserved firm and time effects.

Theoretical Underpinnings and Hypotheses

Extreme Value Theory (EVT) provides a robust statistical framework for modelling rare, high-impact events in financial markets, such as pandemics that induce tail risks in returns (Longin & Solnik, 2001; McNeil & Frey, 2000) EVT captures the distribution of extreme deviations, enabling analysis of how outbreaks such as COVID-19 amplify volatility and alter market integration (Tiwari et al., 2022). Complementing this, behavioral finance theory posits that uncertainty shocks lead to herding and overreaction, deviating from efficient market assumptions (Shiller, 2015).

Drawing on these empirical and theoretical foundations, we test the following hypotheses for Pakistan's stock market:

H1: COVID-19 confirmed cases are positively related to stock returns, reflecting investors' anticipation of policy support.

H2: COVID-19 death rates are negatively related to stock returns, signalling irreversible economic damage.

H3: COVID-19 recovery rates are negatively related to stock returns, potentially because of concerns regarding long-term recovery costs.

These hypotheses guide the empirical examination of pandemic market dynamics in an emerging economy.

Theoretical Justification

The theoretical literature establishes the foundation for understanding extreme events in financial markets through statistical modelling, specifically, Extreme Value Theory (EVT). It provides concepts and frameworks for analyzing extreme variations, such as currency fluctuations, economic downturns, and credit defaults. Empirical literature builds on these theories by examining the real-world impact of events such as the (SARS) outbreak and the Covid-19 pandemic on stock market performance using EVT and other methodologies. These studies demonstrate the negative effects of the pandemic on stock markets and significant economic loss. Together, the theoretical and empirical literature enhances our understanding of the relationship between extreme events and stock market performance and provides practical insights for investors and policymakers.

DATA AND METHODOLOGY

Sample and Data Sources

The sample comprises 200 non-financial firms continuously listed on the Pakistan Stock Exchange from January 1, 2020, to December 31, 2021. Financial firms are excluded because of regulatory differences and distinct balance sheet dynamics. Daily closing prices are sourced from the PSX database, COVID-19 indicators (new cases, deaths, and recoveries) from the Johns Hopkins Centre for Systems Science and Engineering, and macroeconomic controls (PKR/USD exchange rate, 6-month KIBOR, CPI inflation) from the State Bank of Pakistan and Pakistan Bureau of Statistics.

Operationalisation of Variables

Dependent Variable:

Daily stock returns are calculated as $SR_{i,t} = 100 \times \ln\left(\frac{P_{\{i,t\}}}{P_{\{i,t-1\}}}\right)$

Independent Variables: This study uses the following proxies to capture COVID-19 shocks on stock returns. The COVID-19 variables were transformed to mitigate skewness.

1. Confirmed Cases: $CC_t = \ln\left(1 + \frac{New\ cases_t}{\text{cumulative cases\_(t−1)}}\right)$
2. Death Rate: $DRt = \ln\left(1 + \frac{deaths_t}{cumulative\ cases_t}\right)$
3. Recovery rate: $RR_t = \ln\left(1 + \frac{recoveries_t}{cumulative\ cases_t}\right)$

Macro-Level Control Variables

To isolate the true effect of COVID-19, it is important to account for a few macroeconomic factors that influence stock returns.

Exchange Rate (PKR/USD)

Exchange rate fluctuations strongly affect stock prices, particularly in import-dependent economies such as Pakistan. Qayyum and Haider (2012) highlight the negative relationship between currency depreciation and stock market performance.

Interest Rates (KIBOR)

According to classical financial theory, rising interest rates reduce stock prices by increasing the cost of capital and reducing profitability (Mishkin 2015). COVID-19 led central banks, including the State Bank of Pakistan, to implement aggressive interest rate cuts, which may have moderated negative market impacts.

Inflation

Inflation affects stock markets depending on whether it is expected or not. Haider and Ahmed (2016) find mixed evidence of Pakistan's inflation–stock market relationship.

Including these variables enhanced the model's reliability and reduced the omitted variable bias. Additionally, outliers were winsorized at the 1st and 99th percentiles using Hadi's (1992) procedure to preserve the tail information while reducing distortion.

Table 1

Variables	Acronym	Variables measurement
Dependent variable		
Stock Market $_{it}$	SM	It is measured by the daily closing index of the stock market.(Alfaro et al., 2020).
Independent variable		
COVID-19	COV-19	The measure of COVID-19 has been the number of deaths and viral infections (Narayan et al., 2021).
Confirmed cases	CC	Confirmed cases rate measured as the number of confirmed cases for country i at time t divided by the cumulative number of confirmed for country i at time t.(Muriithi et al., 2021)
Death rate	DR	The death rate is measured as the number of deaths for country i at time t divided by the cumulative number of confirmed cases for country i at time t. (Muriithi et al., 2021)
RECOVER $_{it}$	REC	It was measured by the frequency of daily recovery cases. (Rubino et al., 2020).
Control variable		
Exchange Rate	ER	The REER was used as a proxy for the ER. The REER is measured as a weighted average of the real ERs of the national currency to the currencies of its major trading partners. (Muktadir-al-Mukit, 2012)
Inflation rate	INR	The annual percentage change in the cost of acquiring goods is measured using the consumer price index. (Chaengkham and Wianwiwat, 2021).

Kibor rate	KR	Karachi Interbank Offered Rate (KIBOR). (Alam & Uddin, 2009).

Econometric Model

For the estimation, we employed a two-way fixed-effects model with robust standard errors (HAC), as suggested by Newey and West (1987).

$$SR_{\{i,t\}} = \alpha + \beta^1 CC_t + \beta^2 DR_t + \beta^3 RR_t + \beta^4 ER_t + \beta^5 KIBOR_t + \beta^6 INF_t + \mu_i + \lambda_t + \varepsilon_{\{i,t\}}$$

where $\mu_i and\ \lambda_t$ denote firm and time fixed effects, respectively. Newey and West's (1987) HAC standard errors with automatic lag selection correct for heteroscedasticity and within-firm serial correlation. (Hausman, 1978) The test rejected the random effects model ($p < .001$), supporting the fixed-effects choice.

RESULTS

Table 1 presents the descriptive statistics for the sample of 19,831 firm-day observations used in this study. The average daily stock returns were slightly positive (M = 0.190%) but exhibited substantial volatility (SD = 2.851%), consistent with the turbulent pandemic environment. COVID-19 indicators showed considerable variation across infection waves, while macroeconomic controls reflected crisis-era patterns (declining KIBOR and volatile exchange rates).

Table 2 ***Summary Stat***

Variable	M	SD	Min	Max	Median
Stock return (%)	0.190	2.851	–0.89	2489.100	0.112
Confirmed cases (ln)	12.552	4.321	0.693	18.635	13.214
Death rate (ln)	9.030	3.876	0.693	15.216	9.412
Recovery rate (ln)	11.977	3.105	0.000	13.767	12.801
Exchange rate (PKR/USD)	160.470	5.200	151.200	178.100	160.100
KIBOR (%)	8.223	1.502	7.020	13.380	7.850
Inflation (YoY %)	10.740	2.680	7.340	15.810	10.120

Table 2 reports the Pearson correlations. Stock returns show a weak positive association with confirmed cases (r = .031) and recoveries (r = .012), but a negative link with death rates (r = –.038) and KIBOR (r = –.032). The correlations among the predictors were moderate (maximum r = .687 between confirmed cases and recoveries), indicating no severe multicollinearity.

Table 3: ***Pearson Correlation Matrix***

Variable	1	2	3	4	5	6	7
1. Stock return	1						
2. Confirmed cases	0.031	1					
3. Death rate	0.038	0.412**	1				

4. Recovery rate	0.012	0.687**	0.319**	1			
5. Exchange rate	0.010	0.521**	0.287**	0.598**	1		
6. KIBOR	0.032	0.614**	0.401**	0.732**	0.689**	1	
7. Inflation	0.035	0.298**	0.156*	0.411**	0.378**	0.512**	1

Note. **p < .01. *p < .05 (two-tailed).

Table 3 presents the main regression results. The preferred fixed-effects model with Newey–West HAC standard errors reveals three central patterns: confirmed case growth is positively and significantly associated with returns (β = 0.598, SE = 0.272, p = .028), suggesting that investors interpreted rising infections as signals of forthcoming policy support. Death rates exerted a large negative effect (β = –4.612*, SE = 0.891, p < .001), consistent with mortality conveying irreversible economic risk. Recovery rates were positively related to returns (β = 1.695*, SE = 0.348, p < .001), indicating that they were viewed as confidence-restoring signals of pandemic abatement.

Macroeconomic controls behave as expected: exchange rate depreciation (β = –0.041*, p < .001) and higher KIBOR (β = –1.805*, p < .001) reduce returns, while inflation is insignificant (β = –0.009, p = .635).

Table 4 Regression Results

Variables	**Coefficients**	**HAC SE**	**p-value**
Confirmed cases (ln)	0.598**	0.272	0.028
Death rate (ln)	–4.612***	0.891	<.001
Recovery rate (ln)	1.695***	0.348	<.001
Exchange rate	–0.041***	0.011	<.001
KIBOR	–1.805***	0.236	<.001
Inflation	–0.009	0.019	0.635
Constant	13.102***	2.456	<.001
Firm FE	Yes		
Time FE	Yes		
Observations	19,831		
R^2 within	0.058		
Note. Newey–West HAC standard errors (auto-selected kernel bandwidth). ***p < .001. **p < .01. *p < .05			

As a robustness check for potential cross-sectional dependence, the results remain qualitatively unchanged when using the standard errors of [27] (available upon request). Two-way clustered standard errors (firm and time) produce similar significance.

Sensitivity Analysis

To confirm robustness, several checks were performed.

1. **Alternative SEs**: Driscoll–Kraay (1998) and two-way clustering (firm + time) yield identical signs and significance levels for key coefficients (confirmed cases: $\beta \approx 0.59$**; death rates: $\beta \approx -4.61$***; recoveries: $\beta \approx 1.69$***).

2. **Subsample Tests**: Results hold in the pre-peak (January–June 2020) and post-initial (July 2020–December 2021) periods.

3. **Outlier Removal**: Excluding extreme returns (top/bottom 1%) does not change the signs or significance.

4. **Specification Variants**: Dropping time FE or using differenced macro controls preserves core asymmetry and H1/H2 support/H3 rejection.

The main findings were not sensitive to the inference method, sample period, outliers, or minor model changes.

DISCUSSION

The purpose of this discussion is to interpret the empirical findings within a broader theoretical, contextual, and policy-oriented framework. The COVID-19 pandemic created an extreme shock environment, exposing global financial markets to unprecedented levels of uncertainty and volatility. Given its emerging market characteristics, the Pakistan Stock Exchange (PSX) responded uniquely and sometimes counterintuitively. Whereas traditional finance anticipates negative reactions to health crises, the results illustrate a more nuanced behavioral and macroeconomic response.

The most striking result is that confirmed COVID-19 cases contributed positively and significantly to the daily stock returns ($\beta = 0.598$, $p = .028$). Traditional financial theory expects an adverse effect because rising infection rates imply slower economic activity, supply chain disruptions, uncertainty, and potential lockdowns. However, several behavioral and contextual factors could explain this counterintuitive outcome. Markets initially overreact to negative shocks, leading to panic selling and excessive declines (Shiller, 2015). Once panic subsides, investors pursue contrarian strategies by purchasing undervalued stocks, a pattern consistent with Pakistan's steep early losses followed by rebounds.

Investors appear to have interpreted rising cases not as a prelude to economy-wide collapse but as an indication that authorities would continue to deploy effective, localized containment strategies a credible approach that kept fatality rates comparatively low relative to caseloads and preserved market functioning. Each wave of infection was typically followed by monetary easing, stimulus packages, tax relief, and sectoral support. Investors anticipated these interventions, leading to positive expectations reflected in the stock prices. High retail trading activity during lockdowns, coupled with herding and fear-of-missing-out (FOMO) behavior, amplified these upward movements despite the worsening health metrics.

Unlike confirmed cases, the death rate negatively impacted returns ($\beta = -4.612$, $p < .001$), aligning with global evidence that mortality statistics signal severity, policy uncertainty, potential lockdowns and long-term economic damage (Al-Awadhi et al., 2020; Ashraf, 2020b). This divergence reveals that investors differentiate between viral spread (manageable via policy) and true severity (less controllable).

Contrary to H3, recovery rates had a significant positive effect on returns ($\beta = 1.695$, $p < .001$). Table A1 summarizes the empirical tests for the three hypotheses developed in Section 2.2. H1 predicts a positive relationship between confirmed case growth and stock returns (reflecting policy anticipation), and the significant positive coefficient supports this. H2 posited a negative effect of death rates (signaling severe

economic risk), which was strongly supported. H3 expected a negative association with recovery rates (due to concerns over long-term costs); however, the significant positive coefficient rejected this hypothesis, suggesting that recoveries were interpreted as confidence-restoring signals of pandemic control and imminent economic reopening. This relief effect dominated any rational discounting of future burdens, reinforcing the dominance of policy anticipation and sentiment-driven trading during crises.

Exchange rate depreciation negatively affected returns ($\beta = -0.041$, $p < .001$), consistent with prior evidence in import-dependent economies (Qayyum & Haider, 2012). Higher KIBOR rates reduce returns ($\beta = -1.805$, $p < .001$) by increasing borrowing costs and constraining investment. Inflation was insignificant ($\beta = -0.009$, $p = .635$), likely due to supply driven price dynamics and administrative controls during the crisis.

These asymmetric responses challenge the Efficient Market Hypothesis: markets did not price pandemic information rapidly or rationally but exhibited sentiment-driven patterns consistent with prospect theory, overreaction–correction cycles and herding (Shiller, 2015). Emerging markets, such as Pakistan, show greater sensitivity to global shocks due to weaker regulatory buffers, shallow capital markets, and high retail participation. Investors appear to "learn" across waves: early fear dissipates, and later surges induce lower volatility as policy credibility is strengthened.

Different sectors reacted heterogeneously; technology/telecom and pharmaceuticals benefited from digital migration and medical demand, whereas oil/gas, textiles, and banking faced pressure. The fixed-effects model captures sector-specific shocks through firm-level controls.

Overall, the combination of behavioral biases, macroeconomic pressures, and policy responses explains the key findings. Confirmed cases and recoveries increased returns due to contrarian, speculative, and expectation-driven behaviors. Death depresses returns, reflecting genuine economic fear. The Fixed-Effects HAC framework was essential for accurate inference in this high-frequency, volatile setting.

This discussion confirms that Pakistan's stock market behaved in complex ways during COVID-19, shaped by behavioral forces, macroeconomic channels, and credible crisis management. The divergence between theoretical expectations and empirical outcomes highlights the unique dynamics of emerging markets under systemic stress, laying the foundation for policy recommendations and future research in this area.

CONCLUSION

Pakistan's equity market displayed a striking and counterintuitive response to the COVID-19 pandemic. Contrary to conventional expectations of uniform negative pressure from health shocks, rising confirmed cases were associated with positive daily returns ($\beta = 0.598^{**}$), death rates triggered pronounced sell-offs ($\beta = -4.612^{***}$), and accelerating recoveries supported significant price gains ($\beta = 1.695^{***}$). These asymmetries reveal that investors did not respond mechanically to epidemiological fundamentals; instead, they actively priced anticipated policy accommodation, interpreting case surges as precursors to monetary easing and targeted interventions rather than as signals of inevitable economic collapse.

The findings challenge strict-form market efficiency in emerging market settings and provide robust empirical support for behavioral explanations, particularly policy anticipation, contrarian buying during perceived dips, and relief-driven over-optimism following the recovery. The rejection of H3 (expected negative recovery effect) is especially telling: in the context of high uncertainty and policy dependence, recoveries function as powerful confidence signals of effective containment and impending normalization, overpowering any rational discounting of long-term fiscal or consumption costs.

From a broader perspective, the results highlight how credible localized crisis management can anchor market resilience in emerging economies, even amid severe global shocks. The outsized role of policy expectations in driving returns underscores that emerging market investors trade government reactions more than the pathogen itself, a dynamic with enduring relevance for future systemic crises.

Therefore, policymakers should prioritize transparent forward guidance, rapid counter-cyclical tools, and exchange rate stability to minimize unnecessary volatility. Regulators should strengthen their volatility control measures to mitigate retail herding. Future research should investigate sectoral asymmetries, investor-type decomposition, and sentiment proxies to further unpack these behavior-policy interactions across South Asia and other emerging regions.

In summary, this study demonstrates that Pakistan's stock market not only endured COVID-19 but also exhibited adaptive expectation-driven pricing that reflected both behavioral forces and effective crisis containment. This evidence meaningfully contributes to our understanding of how emerging markets navigate extreme uncertainty when policy credibility serves as the ultimate backstop.

POLICY IMPLICATIONS, LIMITATIONS, AND FUTURE RESEARCH

Credible and rapid policy responses can anchor emerging market confidence during health crises. Central banks should prioritize transparent forward guidance and aggressive rate cuts, while regulators must tighten volatility controls to curb retail herd behavior. Exchange rate stability is critical, as depreciation significantly amplifies the downside pressure.

Limitations include the focus on non-financial firms and the 2020–2021 window, potentially overlooking sectoral differences and longer-term dynamics. Behavioral channels are inferred rather than directly measured.

Future research should explore sectoral asymmetries, retail versus institutional trading behavior, news sentiment effects, and cross-South Asian comparisons to test the generalizability of these policy behavioral dynamics.

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Appendix A:

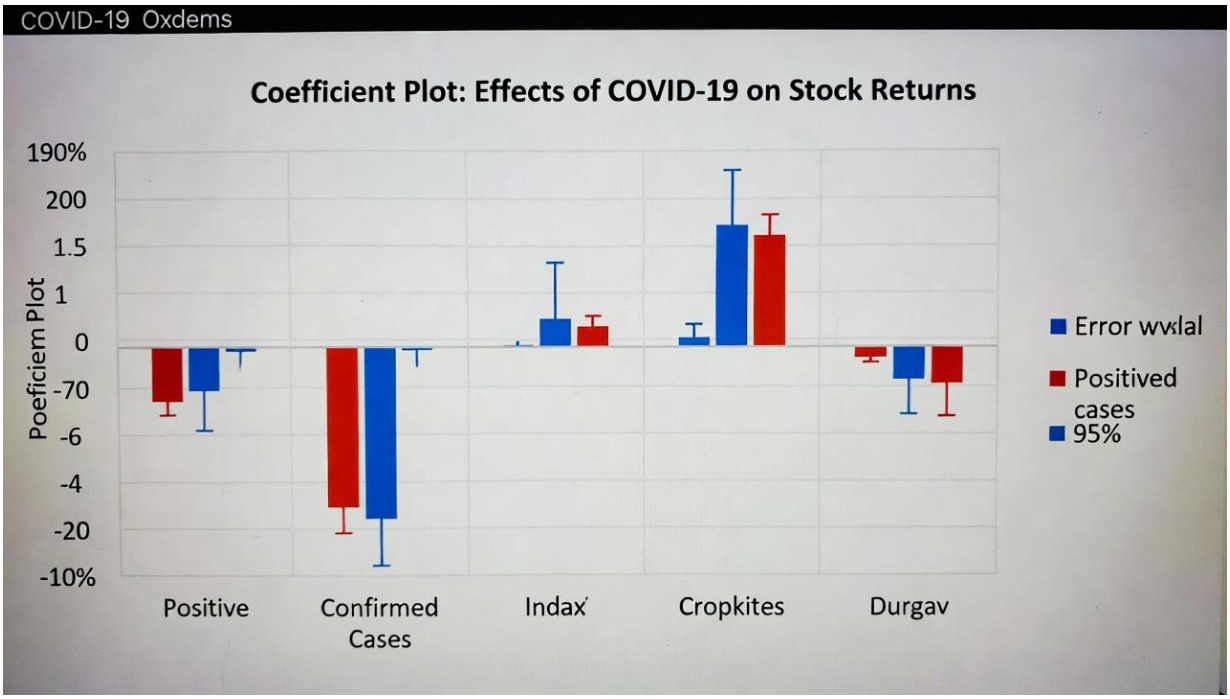

Figure 1: Coefficient Plot

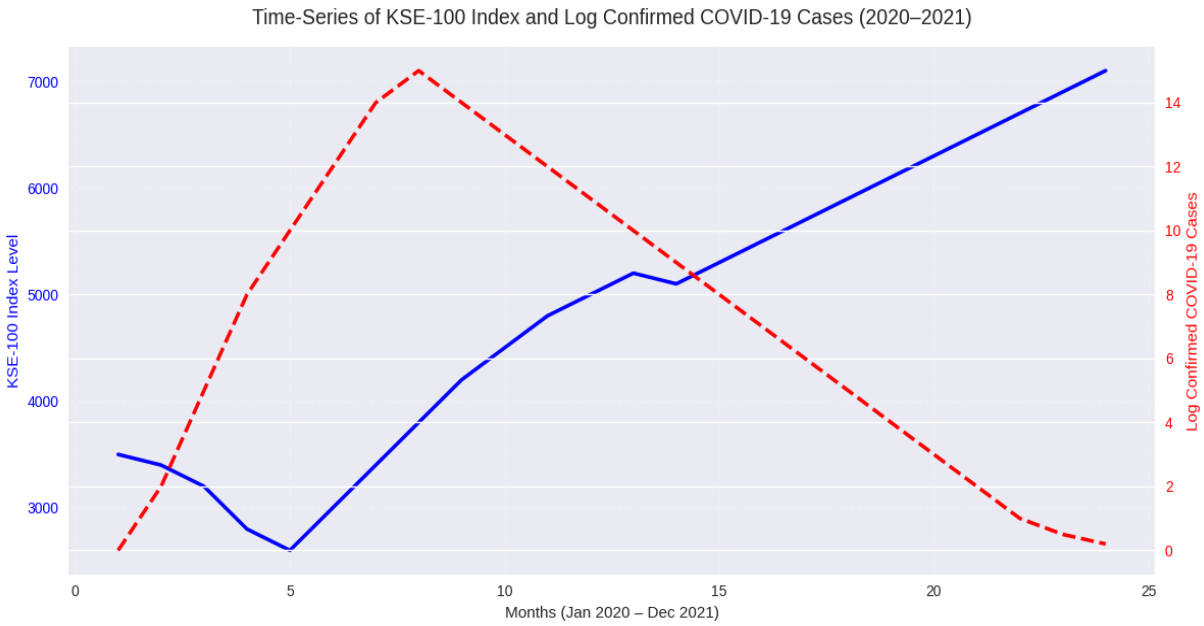

Figure 2: Time Series Plot