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Semi-Strong Market Efficiency and Post-COVID Investor Reactions to Dividend Announcements: Evidence from Developed Markets

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Abstract

This study examines semi-strong market efficiency in developed markets by analysing stock price reactions to dividend announcements during the post-COVID period (2021–2025). Drawing on the Efficient Market Hypothesis and behavioural finance theory, it assesses whether dividend information is rapidly incorporated into prices or whether abnormal returns persist due to underreaction or overreaction. The sample includes oil and gas and telecommunications firms listed on the New York Stock Exchange (NYSE) and Hong Kong Stock Exchange (HKSE). Using an event study methodology, abnormal returns are estimated through the market model over a (−15, +15) event window. Average abnormal returns (AAR) and cumulative average abnormal returns (CAAR) are calculated to evaluate the speed and completeness of price adjustment. Findings reveal sectoral and cross-market differences. The HKSE oil and gas sector reflects near semi-strong efficiency, while the HKSE telecommunications and NYSE oil and gas sectors show delayed adjustment. The NYSE telecommunications sector exhibits short-term overreaction followed by reversal. Overall, results support an adaptive view of market efficiency. Practically, investors may exploit short-term mispricing, and improved dividend disclosure can enhance market efficiency.

Keywords

Semi-Strong Market Efficiency; Dividend Announcements; Event Study; Abnormal Returns; Post-COVID Markets; Behavioral Finance; New York Stock Exchange (NYSE); Hong Kong Stock Exchange (HKSE).

Introduction

The Efficient Market Hypothesis (EMH) The Efficient Market Hypothesis (EMH) was formalised by Fama (1970) and states that security prices reflect available information very quickly; hence, it would be difficult to make consistent abnormal (risk-adjusted) returns. While EMH has remained mainstream in the field of finance, a large literature indicates that informational efficiency is not constant and can differ over time and across market conditions, especially during periods of large shocks. Studies examining the COVID-19 period report that even developed markets experienced temporary departures from efficiency, which is consistent with time-varying efficiency frameworks (Ozkan, 2021).

The period following the pandemic (2021–2025) represents a unique environment to reconsider semi-strong form efficiency. After the initial pandemic shock, equity markets experienced reopening and recovery dynamics alongside persistent uncertainty, including inflationary pressures, interest rate tightening, commodity price volatility, and sector-specific disruptions. In such an environment, efficiency may recover unevenly, and price adjustment may depend on liquidity conditions, investor sentiment, macroeconomic expectations, and institutional features of the market—an idea consistent with adaptive views of market efficiency (Okorie & Lin, 2021; Lo, 2024).

Behavioral finance further challenges strict EMH assumptions by emphasizing bounded rationality, cognitive biases, noise trading, and limits to arbitrage. Empirical evidence suggests that investor sentiment can significantly influence stock returns and may generate temporary mispricing (Iqbal et al., 2023; Iqbal & Gul, 2024). Theoretical perspectives on investor sentiment also argue that market reactions to public announcements may vary depending on prevailing psychological and macroeconomic conditions (Fazil & Iqbal, 2025). Despite the rapid expansion of research during the COVID-19 crisis, comparatively less focused work examines whether semi-strong efficiency and behavioral reactions persist into the post-pandemic phase using consistent event-based methodologies.

Semi-strong form efficiency concerns the speed and completeness with which publicly available information is incorporated into prices. Event study methodology provides a direct test of this form of efficiency by estimating abnormal returns around clearly identified announcements and assessing whether abnormal performance is confined to the event window or persists afterward. Recent methodological guidance emphasizes that identification strategies, inference procedures, and robustness check materially influence conclusions in event-based studies (Miller, 2023).

Dividend announcements provide an especially suitable context for post-COVID efficiency tests because they are time-stamped public signals often interpreted as indicators of cash flow strength and managerial confidence. Corporate payout decisions are shaped by internal firm characteristics and external macroeconomic determinants (Fazil et al., 2025), and dividend policy remains central to investment decision-making (Iqbal et al,, 2025). During the pandemic, markets responded measurably to dividend announcements, with variations in magnitude and direction relative to pre-pandemic periods, suggesting state-dependent informational content (Prakash & Yogesh, 2025). Research also highlights shifts in dividend smoothing and payout adjustments during crisis periods (Cejne & Zechner, 2021), implying that post-pandemic dividend reinstatements, increases, or unexpected changes may carry heightened informational value.

Moreover, structural shocks including climate-related risks and macroeconomic instability—have been shown to influence firm financial performance and stability (Fazil et al., 2024; Wahab et al., 2025). Although much of this evidence originates from developing economies, it underscores the broader principle that external risk regimes alter market expectations and information processing. Studies examining climate-induced financial disruptions further demonstrate how exogenous shocks can influence financial stability and risk perceptions (Wahab et al., 2022; Wahab et al., 2024). Such findings support the argument that post-COVID markets may exhibit altered pricing dynamics even in developed exchanges.

This study bridges the market-efficiency and behavioral finance literature by examining semi-strong form efficiency and post-announcement price reactions to dividend announcements within a unified empirical framework for the post-COVID period (2021–2025). The analysis focuses on oil and gas companies listed on the New York Stock Exchange (NYSE) and the Hong Kong Stock Exchange (HKSE). The oil and gas sector provides an appropriate setting because dividend policy is closely linked to cash flow expectations and commodity price dynamics, and sector-specific shocks may amplify informational effects (Garcia-Amate et al., 2025).

The NYSE and HKSE represent major developed markets with advanced trading infrastructures but differing institutional characteristics and investor compositions. Investor heterogeneity—including differences in risk perception and advisory preferences—can influence how information is processed (Kumari et al., 2025a; Kumari et al., 2025b). Thus, these exchanges provide a suitable comparative context for testing information assimilation and behavioral reactions.

Using event study methodology, this study evaluates whether dividend-related information is rapidly incorporated into prices (consistent with semi-strong efficiency) and whether post-announcement return patterns reveal overreaction, underreaction, or delayed adjustment during the post-pandemic regime.

Three key contributions are made. First, the study provides fresh evidence on semi-strong efficiency in developed markets during the post-COVID period (2021–2025). Second, it integrates behavioral diagnostics—such as post-announcement drift, reversals, and delayed adjustments—within a single event-based framework, drawing on investor sentiment and noise-trader theories (Iqbal et al., 2023; Fazil & Iqbal, 2025). Third, it offers insights into the timing and completeness of price adjustments to dividend news during a period characterized by structural shifts in risk perceptions, payout policies, and macroeconomic uncertainty.

Literature Review

Efficient Market Hypothesis: Theory and Empirical Evidence

The Efficient Market Hypothesis (EMH), which was first formulated by Fama (1965, 1970), states that Security prices are fully and instantaneously efficient reflecting the available information, that abnormal risk-adjusted returns cannot be achieved systematically according to the Efficient Market Hypothesis (EMH). Fama (1991) developed an improved empirical methodology to test market efficiency through categorizing tests into return predictability (weak form), event studies (semi-strong form), and tests of private information (strong form). Among these, it is believed that event studies are the most direct way to measure the semi-strong efficiency because they isolate the reaction of the market to the revelation of information in the public domain and measure how quickly and fully the market adjusts prices.

While early empirical research has documented significant evidence of support for random walk behavior among developed markets, more recent evidence is suggestive of market efficiency which is time varying and sensitive to structural shocks. The Covid-19 pandemic gave rise to new debates about informational efficiency as even well-developed markets were plagued with temporary informational inefficiency, increased volatility and sluggishness in information processing (Ozkan, 2021; Phan & Narayan, 2020). Subsequent research argues that post-pandemic markets are likely to show adaptive efficiency, where level of efficiency changes according to changing economic and institutional conditions (Lo, 2024).

In the developed markets, research continues to identify significant reasons for semi-strong efficiency in normal conditions; however, in event-based research, price corrections may not always be instantaneous, and in periods marked by uncertainty or regime shifts. Evidence on abnormal returns from dividend and earnings announcements during and after the Covid-19 crisis is consistent with the idea that there is a variation in the magnitude and persistence of abnormal returns across sectors and exchanges, which may suggest that efficiency may depend on liquidity, information transparency and investor composition (Al-Khasawneh et al., 2024; Mazur et al., 2021). In contrast, emerging and frontier markets often possess weaker forms of informational efficiency, and this has been attributed to thin trading, market frictions, and greater information asymmetry . Recent work on analyst approaches to the post-COV recovery phases in developing markets is consistent with the notion of divergent adjustment and return predictability, supporting the idea that efficiency is not homogenous across types of markets (Narayan et al., 2021; Haroon & Rizvi, 2020). Collectively, this literature seems to suggest that while developed exchanges like the NYSE and HKSE are generally considered efficient, structural disruptions and sector-specific shocks like the ones seen in and following the Covid-19 crisis, can create circumstances where semi-strong efficiency may be worth renewed empirical testing.

Semi-Strong Efficiency and Events Studies

Semi-strong form efficiency believes that stock prices reflect all publicly available information - including announcements of earnings, declaration of dividends and reports of macro-economic developments - without any systematic delay and without any systematic bias (Fama, 1970). Suggested under this framework, abnormal returns should be observed only within a narrow window of the event surrounding public release of new information, and no predictable drift in returns after announcement should remain. Event study methodology has therefore become the dominant empirical methodology for testing semi-strong efficiency because it isolates the market reaction to identifiable information events, and measures abnormal performance against some benchmark of an expected return.

Fama (1991) stressed that the event studies are the best direct evidence of the semi-strong efficiency because it focuses on the adjustment of prices to the public disclosures. More up-to-date methodological work emphasizes the centrality of event studies but underscores the value of care in specifying models, performing identification and inference procedures, to avoid drawing biased conclusions (Miller, 2023). In the developed markets, the general result of event-based analyses appears to be rapid price adjustment, although there is a growing body of literature to indicate that the rate and completeness of adjustment may differ across market regimes and periods of high uncertainty. The pandemic and its aftermath of the Coronavirus disease (COVID-19) have made news about the dynamics of information assimilation. Research looking at market reactions during the crisis and recovery phases reveals that informational efficiency may be weakened for a period with evidence of delayed adjustment, increased volatility, and abnormal return persistence, even in developed exchanges (Narayan et al., 2021; Mazur et al., 2021). Subsequent studies assert that efficiency can be adaptive and

state-dependent and increases as markets settle down but remains sensitive to shocks in a sector and macroeconomy (Lo, 2024). This time-varying perspective is also relevant for the post-COV19 period (2021-2025) that is marked by economic reopening, inflationary pressures, monetary tightening and disruptions in the energy markets.

The existence of abnormal returns after public announcements calls into question basic questions about the degree to which markets are semi-strong-efficient or whether there are behavioral influences on price adjustment. There is still empirical evidence on the post-announcement drift and asymmetric reactions to corporate disclosures, payout and earnings news, which are consistent with investor sentiment, attention constraints, and heterogeneous expectations slowing down or distorting the integration of information (Bernard & Thomas, 1989; Chordia et al., 2020). In the post-pandemic environment, where levels of uncertainty and sectoral shocks are still too high, such behavioral frictions may well be multiplied, providing motivation for the incorporation of behavioral finance perspectives into modern tests of semi-strong efficiency.

Behavioral Finance- Overreaction and Underreaction

Behavioral finance questions the EMH assumption of fully rational investors by taking some insights from the psychology field, cognitive biases, and limitations for arbitrage. Rather than if prices always contain information efficiently, behavioral theories indicate that investor sentiment, attention constraints and heuristic decision-making may distort the process of forming prices (Baker & Wurgler, 2007). While early research was closely related to earnings related anomalies, more recent studies show evidence that behavioral effects linger over various corporate disclosures and are especially strong during periods of greater uncertainty.

One of the best-documented anomalies not consistent with a strict semi-strong efficiency is post-earnings drift (PEAD), which is consistent with systematic underreaction to the earnings news (Bernard & Thomas, 1989; Hirshleifer et al.,2009). Despite decades of research and the betterment of information technology, PEAD is still observable in developed markets, which would imply that information processing frictions still affect the price adjustment (Chordia et al., 2020). The persistence of such anomalies puts the idea of markets immediately incorporating public disclosures. Recent research points to limited investor attention as one of the key mechanisms of underreaction. Investors selectively pay attention to salient information and ignore less visible information that is value-relevant (Hirshleifer and Teoh 2005; DellaVigna and Pollet 2009). In uncertain environments with high uncertainty, as the post-COVID recovery period may be, attention constraints may be exacerbated in the context of information overload, macroeconomic instability, and rapid changes in monetary policy. Empirical evidence based on the Covid-19 period suggests that sentiment-driven trading and the attention-base effects were significant on the market reactions leading to delayed adjustment and continuation of returns (Narayan et al., 2021; Baig et al., 2021).

Overreaction is the opposite behavioral bias which is characterized by excessive initial price reactions followed by reversals. Contemporary research studies indicate a tendency for overreaction during the crisis and recovery phases when uncertainty and sentiment volatility levels are high (Haroon & Rizvi, 2020). Moreover, cross-market analysis indicates that the underreaction or overreaction might not be of the same magnitude as it may well depend on the liquidity, institutional holding and components of investors, all of which vary between exchanges like the NYSE and HKSE (Rakshit & Neog ,2022). Although much of the early literature on anomalies concentrated on the announcement of earnings, more recent work extends the behavioral explanations to dividend policy changes. Dividend announcements, particularly after suspensions or cutbacks due to crisis, can cause asymmetric reactions because of whether the news is seen as a sign of financial resiliency or distress (Mazur et al., 2021). In the post-COV environment, reinstated or increased dividends could be a focus of excess investor attention, which may cause short-term overreaction, while complicated adjustments to payouts may cause underreaction if investors underweight the long-term implications.

Collectively, the literature suggests that overreaction and underreaction may co-exist and also be state-dependent in that they vary with macroeconomic regimes, market structure, and investor sentiment. In the post-COVID period (2021 - 2025), which will be marked by economic reopening, inflationary pressures and energy market volatility, behavioral frictions may occupy a more prominent role in the formation of prices. These dynamics raise the question of the veracity of the semi-strong interpretation of informational efficiency and reveal the importance to simultaneously test informational efficiency and behavioral price response in a common empirical context.

Dividend Announcement and Market Reaction

Dividend announcements are a major public information event since they are commonly interpreted as indications of firm profitability, the stability of cash flows and the managerial expectations of future performance. Early signaling models and event studies evidence showed that changes in a dividend contained value-relevant information and produced abnormally high returns surrounding the announcement dates (Aharony & Swary, 1980; Asquith & Mullins, 1986). In efficient markets, these abnormal returns are expected to be concentrated into a narrow announcement window, as is consistent with semi-strong form efficiency.

However, more recent research suggests that dividend announcement effects are context dependent and may differ under different economic regimes. The behavior of corporate payouts was significantly affected by the pandemic of 2020 due to the pandemic of Coronavirus, many companies had to lower or suspend or restructure dividends to

keep a cash reserve (Krieger, Mauck, & Pruitt, 2021). As a result, dividend reinstatements and increases in the post-pandemic period during 2021-2025 may have a stronger informational content compared to the stable periods, which may lead to stronger investor reaction. There is empirical evidence that market reactions to dividend announcements during and after the Covid-19 were heterogeneous in sectors and exchanges, which reflects difference in uncertainty and liquidity and investor sentiment (Al-Khasawneh, Ali, & Hassanein, 2024; Rakshit & Neog ,2022).

Moreover, the news about dividends can cause asymmetric price responses. Studies show greater responses to decreases in dividends than increases, which is in line with the loss aversion and signaling asymmetry models (Benartzi et al.,1997). In post-crisis environments, such asymmetry may be amplified by the fact that investors will take reductions in payouts as distress signals, while increases are viewed with suspicion because of uncertainty over sustainability (Mazur, 2021). Recent evidence also suggests that the dividend announcement effects are sensitive to sector exposures to risk factors, especially in industries that are highly correlated with commodity prices as well as macroeconomic shocks (Mehrotra & Chadha, 2025).

Behavioral perspectives go on to propose that the attention and sentiments of investors affect the integration of dividend news in prices. Dividend reinstatements or unexpected increases can also receive disproportionate amounts of media attention and retail investor participation which can result in short-term overreaction. Conversely, complex payout adjustments may result in underreaction if investors do not take full processing of the cash flow over time (Iqbal et al.,2025). Evidence from post-COVID markets suggests that abnormal returns surrounding corporate announcements sometimes linger for longer than the information announcement window and suggest incomplete or delayed information assimilation (Narayan et al., 2021).

These findings imply that the effects of signaling dividends are not equally uniform but possibly dependent on the market structure, investor composition and economic conditions prevailing. In an exchange like the NYSE and HK exchange, which were more developed, especially in the post-pandemic phase of recovery, dividend announcement is a relevant scenario to jointly measure semi-strong market efficiency and behavioral price dynamics. Examining dividend responses in the oil and gas industry is particularly relevant, as it is a sector that was exposed to pandemic-related demand shock and energy price volatility and geopolitical uncertainty throughout 2021-2025.

Synthesis and Research Gap

The existing literature has three key takeaways. First, there is empirical evidence on market efficiency, which is especially semi-strong efficiency, which appears to be time-varying. While it is common to observe swift information incorporation in developed markets under stable conditions, research around the coronavirus shock shows that informational efficiency can be impaired under conditions of increased uncertainty, with the evidence of delayed adjustment and abnormal persistence of returns (Narayan et al., 2021; Ozkan, 2021). These findings support the argument that efficiency may be adaptive as opposed to static (Lo, 2024).

Second, behavioral anomalies like overreaction and underreaction continue to be documented even in developed markets, which oppose the strict interpretation of semi-strong efficiency. Studies focus on the roles of investor sentiment, limited attention and heterogeneous beliefs in the shaping of post-announcement price dynamics (Chordia et al., 2020; Baig et al., 2021). In post-pandemic markets with economic reopening, inflationary pressures, and sector-specific volatility especially in energy markets - behavioural frictions may be amplified and will increase the chances of temporary mispricing.

Third, dividend announcements elicit disparate responses in the markets. The informational content and price effects of the changes in dividends are influenced by the state of the macro economy, the sector and the investor's interpretation (Krieger et al., 2021; Al-Khasawneh et al., 2024). In the aftermath of the pandemic (i.e., Covid-19), dividend reinstatements, increases and policy adjustments may have increased signaling value because of previous payout suspensions and liquidity issues, suggesting that the post-pandemic reactions to dividends may be different from previous ones. Despite the wide array of research on market efficiency, dividend signaling and behavioral anomalies, these areas of literature are frequently investigated in isolation. Most studies either focus solely on semi-strong efficiency, but do not explicitly test for overreaction or underreaction, or on behavioral anomalies, but do not put the analysis within a formal framework of testing for efficiency. Moreover, there is still limited comparative evidence from major developed exchanges, such as the New York Stock Exchange (NYSE) and the Hong Kong Stock Exchange (HKSE), at the sectoral level and in the post-COV recovery phase (2021-2025).

This study fills in these gaps by simultaneously investigating the effects of dividend announcements, semi-strong market efficiency and investor overreaction and underreaction in one empirical framework. Focusing on the oil and gas (and telecom) sectors listed in the NYSE and HKSE, the analysis combines event study methodology with portfolio-based analysis to assess both the immediate announcement effects and post-announcement effects on prices. By placing the exploration in the post-pandemic market

setting, this exploration offers to a greater understanding of the inquiry into whether the developed markets have re-established semi-strong efficiency or whether behavioural distortions keep on influencing the price framing in the structure changed capital markets.

Data and Methodology

This research uses the event study approach to investigate the effect of dividends announcements on stock returns during the post-COVID era. The sample is composed of oil and gas (and telecom if applicable) companies listed on the New York Stock Exchange (NYSE) and the Hong Kong Stock Exchange (HKSE) from 1st January 2021 to 31st December 2025.Daily stock prices data (adjusted closing prices) and market indices values were collected from official exchange databases and verified financial data providers. Dividend announcement dates and cash dividend information was gathered from official exchange filings and company disclosures to make sure that event dates were correctly identified.

Firms were included in the sample according to certain selection criteria to ensure reliability and validity of results of event study. First, for the calculation of the expected and abnormal returns, firms had to be continuously listed across the estimation window and the event window to calculate the numbers. Second, the firms that announced cash dividends for the year of analysis were considered because dividend announcements are the focal event for the analysis. Third, to isolate the pure effect of dividend announcements on stock prices firms were excluded if other confounding corporate events such as earnings announcements, stock splits, mergers, or major restructuring activities took place within the event window. Additionally, companies with incomplete information on prices or evidence of thin trading were excluded to avoid the possibility of biased parameter estimates and distorted abnormal returns.

Event study methodology is very used to assess the effects of corporate events on stock returns and to test semi-strong form market efficiency (MacKinlay, 1997; Miller, 2023). Under semi-strong efficiency abnormal returns should only occur around the announcement date and should not persist in the after-announcement period.

The event of interest is the cash dividend announcement, and the date of the announcement is labelled day 0.

The window of the event is given as:

$$[-15, +15]$$

The 30-day event window (−15 to +15 days) allows for a comprehensive examination of market behavior surrounding dividend announcements. Specifically, it facilitates the detection of potential information leakage prior to the announcement date, captures the immediate market reaction on and around day 0, and enables analysis of any post-announcement drift or price reversal that may indicate underreaction or overreaction. Such a window is particularly appropriate for developed markets such as the NYSE and HKSE, where price adjustment to publicly available information is generally rapid, yet short-term behavioral effects may still emerge in the days following the announcement.

To estimate normal (expected) returns, an estimation window of:

$$[-250, -30]$$

trading days prior to the event date is used.

This window avoids contamination from the event and provides sufficient observations for reliable parameter estimation.

Daily stock returns are calculated as:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}}$$

Where:

P_{it}= closing price of stock *i* on day *t*

P_{it-1}= closing price of stock *i* on day *t-1*

Market returns are calculated using the relevant market index:

$$R_{mt} = \frac{M_t - M_{t-1}}{M_{t-1}}$$

Where:

M_t= market index value on day *t*

M_{t-1}= market index value on day *t-1*

The primary model used to estimate expected returns is the Market Model, which controls for market-wide movements:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$

Abnormal returns are computed as:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt})$$

Where:

$\alpha_i, \beta_i$are estimated over the estimation window.

The market model is widely preferred due to its ability to reduce return variance and improve statistical power (MacKinlay, 1997).

Under this model, expected return equals market return:

$$AR_{it} = R_{it} - R_{mt}$$

This assumes $\alpha = 0$and $\beta = 1$.

Under this model:

$$AR_{it} = R_{it} - \bar{R}_i$$

Where $\bar{R}_i$is the mean return of stock *i* during the estimation window.

This assumes expected return equals historical mean return.

For each day in the event window:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} A\,R_{it}$$

Where *N* is the number of firms.

For each firm:

$$CAR_i(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} A\,R_{it}$$

$$CAAR(\tau_1, \tau_2) = \frac{1}{N}\sum_{i=1}^{N} CA\,R_i(\tau_1, \tau_2)$$

CAAR is used to evaluate overall market reaction across the sample.

To assess whether abnormal returns differ significantly from zero, parametric t-tests are employed:

$$t = \frac{AAR_t}{SD(AAR_t)/\sqrt{N}}$$

Similarly, for cumulative returns:

$$t = \frac{CAAR}{SD(CAAR)}$$

The use of parametric tests is justified by large sample properties and established event study methodology (MacKinlay, 1997).

Robustness checks may include non-parametric tests (e.g., sign test, rank test) to account for potential non-normality.

Under semi-strong form market efficiency, significant abnormal returns are only expected to be received on or immediately around the announcement date (day 0) representing the rapid incorporation of publicly available information into stock prices. Once the information comes out the prices should adjust to their new equilibrium level very rapidly and no statistically significant post-announcement drift should remain. If cumulative abnormal returns (CARs) continue to increase positively after day 0, this implies underreaction, that is, that investors take in information progressively rather than instantaneously. Conversely, if a large initial reaction is then followed by a reversal of the price this is consistent with overreaction where investors overestimate the informational impact on the price and then adjust their valuations downwards. In addition to firm level analysis, portfolio level examination is performed to minimize noise firm specific and obtain a better representation of the dynamics of price adjustment at the sector level, which would give a better assessment of informational efficiency.

Empirical Results and Discussions

Table 1: ***Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR) for HKSE Oil and Gas Sector***

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Days	AAR	CAAR	STD DIV	T-Statistic
-15	0.005772	0.005772	0.019285	0.299293
-14	-0.00178	0.003995	0.015479	0.258074
-13	-0.00289	0.001109	0.020675	0.05366
-12	0.000999	0.002108	0.015277	0.137992
-11	0.003021	0.005129	0.018385	0.278978
-10	-0.0035	0.001629	0.015634	0.104202
-9	-0.00505	-0.00342	0.009333	-0.3661
-8	0.000759	-0.00266	0.012508	-0.21249
-7	0.007321	0.004664	0.014685	0.317591
-6	0.00628	0.010943	0.013865	0.789295
-5	-0.00084	0.010103	0.011124	0.908208
-4	0.004154	0.014257	0.006826	2.088569
-3	-0.00069	0.013564	0.026194	0.517807
-2	-0.00431	0.009257	0.016567	0.558757
-1	-0.00389	0.00537	0.012344	0.435032
0	-0.00111	0.004255	0.006168	0.689863
1	-0.0077	-0.00233	0.02252	-0.1033
2	0.006876	0.00455	0.013105	0.347168
3	0.003233	0.007783	0.028348	0.274553
4	0.003503	0.011286	0.010366	1.088769
5	-0.00803	0.003253	0.024635	0.132037
6	0.003407	0.00666	0.012286	0.542045
7	0.009668	0.016327	0.020081	0.813098
8	0.004082	0.020409	0.018322	1.113943
9	-2.2E-05	0.020388	0.016805	1.213166
10	-0.00086	0.019527	0.029134	0.670241
11	-0.00651	0.013015	0.015714	0.828245
12	0.003607	0.016622	0.019229	0.864418
13	-0.01255	0.004072	0.006988	0.582755
14	-0.00435	-0.00028	0.013752	-0.02048
15	0.005618	0.005337	0.0169	0.315767

Table 1 presents Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR) around dividends announcements in oil and gas sector at the Hong Kong Stock Exchange in the post-COV-19 period. The results show poor statistically significant abnormal returns around the announcement date. Although AAR varies from positive to negative values between the two windows of the event, only Day -4 is statistically significant at conventional levels (t = 2.09), indicating mild anticipation beforehand or potential information leakage. On the day of announcement (Day 0), AAR is negative but not statistically significant, which suggests that the information about the dividend is quickly integrated into the model without producing any long-term abnormal performance. CAAR is stable and positive throughout most of the window with no significant post-announcement drift.

These results are very much in agreement with semi-strong market efficiency, as abnormal returns are dissipated rapidly following public disclosures (Fama, 1991; MacKinlay, 1997). In the post-Covid recovery market, energy sector uncertainty may reduce over-reaction, arguing that the developed markets have adaptive but relatively efficient pricing (Lo, 2024; Ozkan, 2021).

Figure 1: AAR and CAAR Trends for HKSE Oil and Gas Sector (±15 Days)

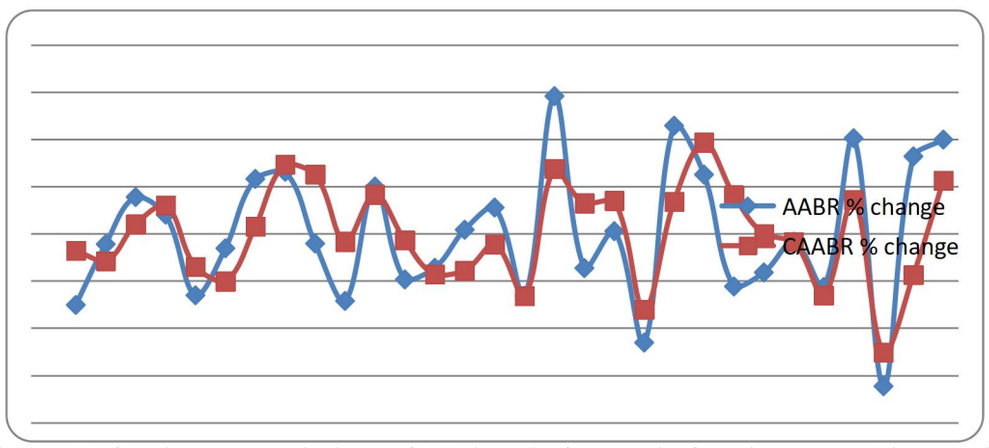

Figure 1 shows the dynamic behaviour of AAR and CAAR for the event window of 15 days before and after the event. The graphical pattern supports the fact that there is no significant clustering of abnormal return around Day 0. While CAAR displays moderate upward movement before the announcement, there is nothing sharp or sustained following the announcement. The short lived decrease around day +1 is followed by a slow recovery, however without statistical persistence.

From a behavioral point of view, the lack of strong reversals and/or long periods of drift indicate little evidence of systematic over or under reaction. Event study literature focuses on the fact that in semi-strong efficient markets, there should be a rapid change in prices with few continuation patterns (Miller, 2023). Moreover, research on dividend policy during and following the onset of the pandemic suggests that dividend announcements may have a similar retention of informational value but elicit more muted reactions in developed exchanges because of transparency and liquidity improvements (Krieger et al., 2021). Overall, the graphical evidence supports the statistical results showing that the HKSE Oil and Gas industry shows near semi-strong efficiency in the post-pandemic period.

Figure 2: AAR and CAAR Trends for HKSE Oil and Gas Sector (±10 Days)

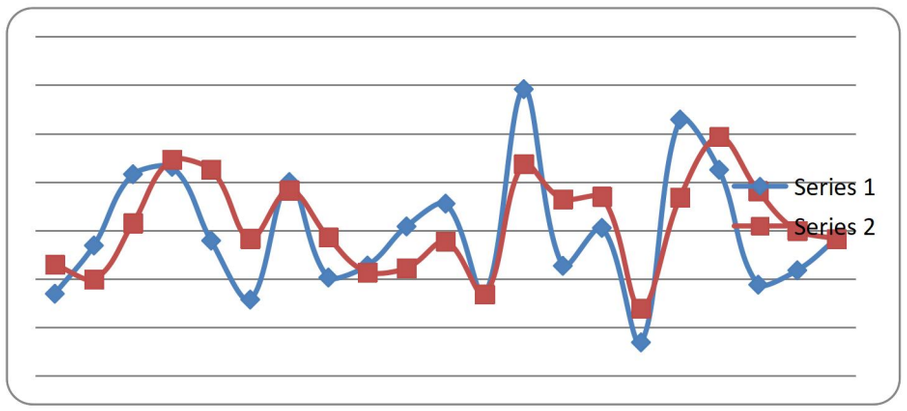

Figure 2 shows the behaviour of AAR and CAAR in the time window of minus 10 days before and after dividend announcements in the HKSE oil and gas sector between 2021-2025. The pattern suggests moderate variations in abnormal returns both before and after the event date without a sharp spike on the day 0. CAAR is relatively stable with slight upward movement before the announcement and mild continuation afterwards. The lack of any persistent post-announcement drift implies efficient incorporation of dividend information. This result is in line with semi-strong market efficiency, in which abnormal returns are brief and fade away soon after public disclosures (Fama, 1991; MacKinlay, 1997).

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Figure 3: AAR and CAAR Trends for HKSE Oil and Gas Sector (±5 Days)

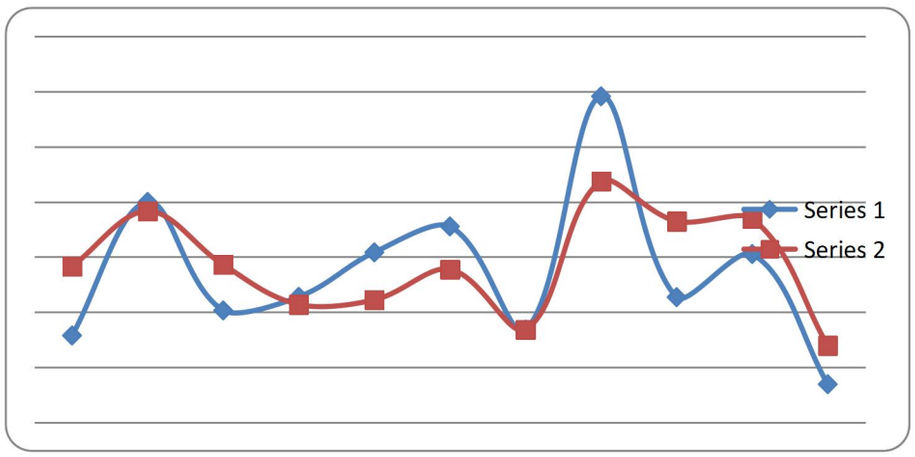


Figure 3 shows AAR and CAAR behaviour within the narrower event window of 5 days either way. Minor clustering of abnormal returns around the announcement date, but no significant clustering of abnormal returns is evident from the graphical trend. Although a slight increase is seen just before the event, the adjustment that happens after day 0 is immediate and does not show sustained drift or reversal. This implies poor evidence of overreaction or underreaction. In the context of the post-COVID recovery, such quick stabilization supports the arguments for adaptive efficiency which suggest that developed markets process dividend information efficiently despite the increased level of sectoral uncertainty (Lo, 2024; Miller, 2023). Overall, the price adjustment seems to be timely and in line with semi-strong efficiency.

Table 2: *Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR) for HKSE Telecom Sector (−15 to +15 Days)*

Days	AAR	CAAR	STD DIV	T-Statistic
-15	0.011469	0.011469	0.05789	0.19811
-14	0.030003	0.041471	0.072506	0.571975
-13	0.000255	0.041726	0.021795	1.914457
-12	-0.00744	0.034291	0.015938	2.151492
-11	-0.00084	0.033453	0.030635	1.09199
-10	-0.0187	0.014753	0.057188	0.257978
-9	-0.02242	-0.00767	0.031235	-0.24548
-8	-0.00795	-0.01562	0.024088	-0.64855
-7	-0.00562	-0.02124	0.010822	-1.96279
-6	-0.0016	-0.02285	0.013712	-1.66606
-5	-0.00956	-0.03241	0.038735	-0.83668
-4	-0.02144	-0.05385	0.063484	-0.84827
-3	-0.02301	-0.07687	0.075211	-1.022
-2	-0.01529	-0.09216	0.042351	-2.17602
-1	0.002193	-0.08996	0.01233	-7.29627
0	-0.01342	-0.10339	0.041444	-2.49461
1	0.016179	-0.07378	0.04802	-1.53655
2	0.02123	-0.05255	0.054153	-0.97048
3	0.015395	-0.03716	0.042466	-0.87505
4	0.001235	-0.03592	0.023137	-1.55272
5	0.000974	-0.03495	0.018442	-1.89512
6	0.013496	-0.02145	0.027122	-0.79102

7	0.011106	-0.01035	0.013642	-0.75856
8	0.007234	-0.00311	0.024666	-0.12624
9	0.010654	0.00754	0.010526	0.716303
10	-0.00245	0.005092	0.012947	0.39329
11	0.002548	0.00764	0.011914	0.641236
12	0.014155	0.021795	0.029756	0.73246
13	0.008432	0.030227	0.025302	1.194661
14	-0.0094	0.020829	0.02621	0.79468
15	-0.01442	0.006407	0.0352	0.182015

AAR and CAAR in the dividend announcing environment around dividends in an HKSE telecom industry is as reported in Table 2. The results show strong negative CAAR during the pre-announcement period, with negative CAAR up to -10.3% on the announcement date (Day 0) with statistically significant t-values on several days (e.g. Day -2 and Day 0). This suggests that the stock prices fell cumulatively before and at the time of announcement and suggests either anticipatory trading or pessimistic market expectations. Post-announcement, CAAR gradually comes back to normal and becomes positive by Day +9, suggesting that there is delayed price adjustment. The persistence of abnormal returns over Day 0 runs counter to strict semi-strong efficiency, which calls for quick information incorporation (Fama, 1991; MacKinlay, 1997). Instead, the gradual correction pattern is consistent with underreaction behaviour and is consistent with the limited attention and slow information diffusion theories (Hirshleifer et al., 2009). However, in the post-COVID environment, increased uncertainty could have further increased cautious investor response and as a result, dividend signals were not assimilated as quickly (Ozkan, 2021).

Figure 4: AAR and CAAR Trends for HKSE Telecom Sector (±15 Days)

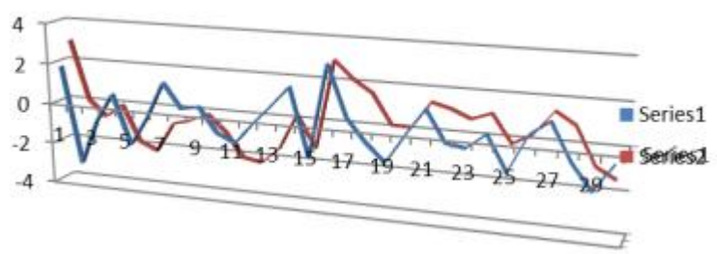


Figure 4 shows AAR and CAAR over the entire period of the +-15 days. The downward CAA trend into Day 0 confirms cumulative negative abnormal performance going into the announcement. After the event, CAAR steadily reverses i.e. gradually corrects. The extended drift pattern is suggestive of the information about the dividend not being instantaneously incorporated. Such persistence is consistent with behavioural underreaction, in which investors react gradually to public disclosures (Bernard & Thomas, 1989). Post-COVID market instability may have amplified the level of information processing as frictions since telecom firms are dealing with regulatory and demand changes. The evidence therefore shows some deviation from semi-strong efficiency.

Figure 5: AAR and CAAR Trends for HKSE Telecom Sector (±10 Days)

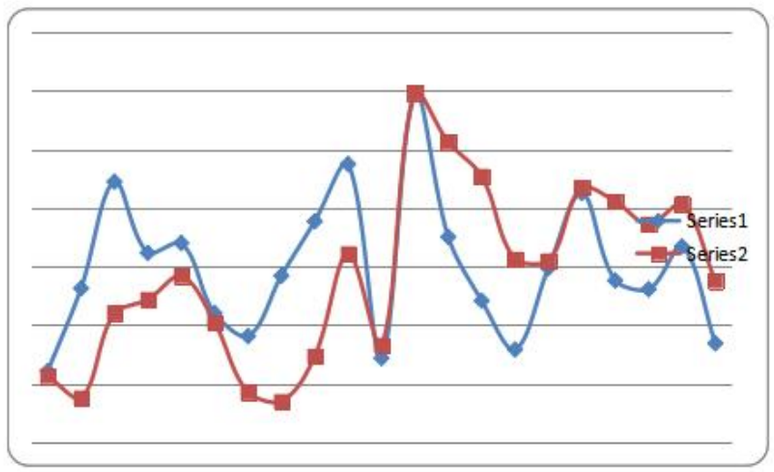
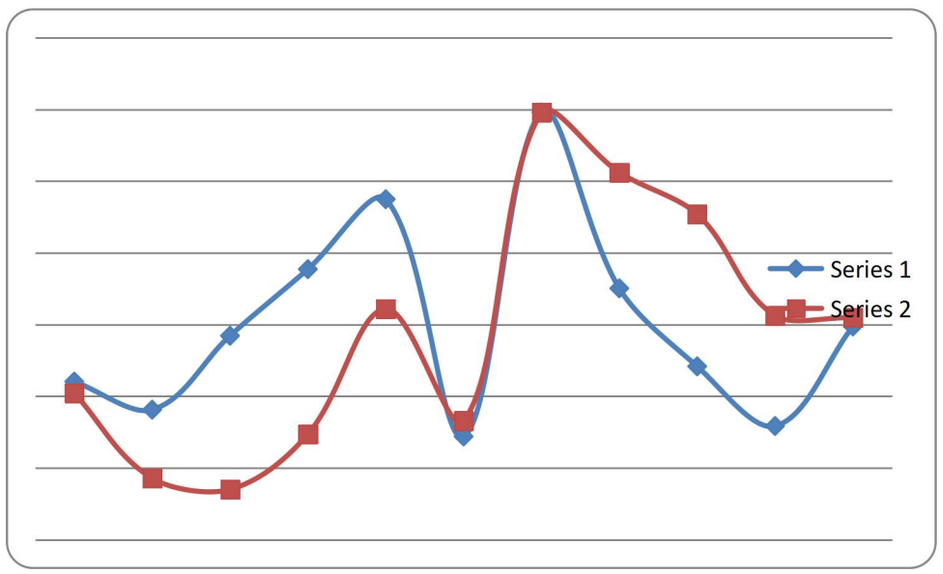


Figure 5 refines it to the window of the 10th day before and 10 days after the announcement and shows a drastic drop in CAAR just before announcement and then a step by step recovery. The absence of a sharp one-day spike indicates that the reaction of the market was spread out over a number of trading days rather than being concentrated on Day 0. This diffusion effect is in line with adaptive efficiency theory which states that efficiency is not the same across market states (Lo, 2024). The gradual recovery after the announcement implies that investors needed time to review the information about dividends in the context of macroeconomic background of the post-pandemic recovery.

Figure 6: ***AAR and CAAR Trends for HKSE Telecom Sector (±5 Days)***



Within the window of ±5 days the continued recovery of CAAR after Day 0 in Figure 6 adds to the evidence of delayed adjustment. AAR volatility around announcement date suggests uncertainty but there is no good reason to believe the full correction is coming right away but this is good evidence for underreaction rather than overreaction. In efficient markets abnormal returns should disappear quickly (Miller, 2023). However, the persistence here appears to be suggestive of temporary mispricing. Behavioral finance literature attributes such patterns to inattention of investors and cautiousness when re-assessing their investments during high uncertainty periods (Hirshleifer et al., 2009). Overall, telecom industry exhibits low semi-strong efficiency compared to the oil and gas industry during the post-COV environment.

Table 3: ***Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR) for NYSE Oil and Gas Sector (−15 to +15 Days)***

Days	AAR	CAAR	STD DIV	T-Statistic
-15	-0.00021	-0.00021	0.009413	-0.02231
-14	-0.00433	-0.00454	0.005175	-0.8765
-13	-0.00718	-0.01172	0.009898	-1.18403
-12	3.02E-05	-0.01169	0.006964	-1.67863
-11	0.000105	-0.01158	0.006044	-1.91673
-10	0.001552	-0.01003	0.009469	-1.05951
-9	-0.00275	-0.01278	0.006777	-1.88582
-8	-0.00189	-0.01467	0.007884	-1.86009
-7	0.001287	-0.01338	0.005797	-2.30764
-6	-0.00055	-0.01393	0.008405	-1.65669
-5	-0.00309	-0.01701	0.004585	-3.71032
-4	-0.00145	-0.01846	0.00534	-3.45764
-3	-0.0001	-0.01857	0.007192	-2.58165
-2	0.00078	-0.01779	0.009727	-1.82867
-1	0.000534	-0.01725	0.006399	-2.69653

0	-0.00067	-0.01792	0.003749	-4.77999
1	-0.00114	-0.01839	0.006705	-2.74315
2	-0.00123	-0.01963	0.004816	-4.07608
3	0.000986	-0.01864	0.006961	-2.67831
4	0.000768	-0.01787	0.005269	-3.39212
5	0.005263	-0.01261	0.003222	-3.91448
6	0.000299	-0.01231	0.003259	-3.77816
7	0.005458	-0.00685	0.015807	-0.43362
8	-0.00118	-0.00803	0.007489	-1.07241
9	-0.00116	-0.00919	0.006371	-1.44273
10	0.000664	-0.00853	0.011421	-0.7467
11	0.0023	-0.00623	0.004684	-1.32971
12	0.001287	-0.00494	0.003342	-1.47865
13	0.002128	-0.00281	0.004629	-0.60784
14	0.004511	0.001697	0.00728	0.233133
15	-0.00285	-0.00115	0.005634	-0.20379

AAR and CAAR around dividend announcements around the NYSE oil and gas sector is presented in Table 3. The results show predominantly negative CAAR, mostly throughout the event window, reaching -1.79% on the announcement date, and negative until approx. Day +13. Several t-statistics near Day 0 and immediately after (e.g. Day 0 = -4.78; Day +2 = -4.08) are statistically significant for indicating meaningful abnormal performance. Persistence of negative CAAR despite the announcement implies that prices took a long time to adjust and incorporated the information about dividends. Such longer time periods of drift are inconsistent with strict semi-strong efficiency (which predicts rapid absorption of public information) (Fama, 1991; MacKinlay, 1997). In the post-COV recovery period, the oil and gas industry was exposed to a greater deal of volatility and geopolitical shocks that could further increase uncertainty and potentially slow down the investor's reassessment (Ozkan, 2021). The gradual correction after Day +5 is consistent with partial correction in line with behavioural underreaction (Bernard & Thomas, 1989).

Figure 7: AAR and CAAR Trends for NYSE Oil and Gas Sector (±15 Days)

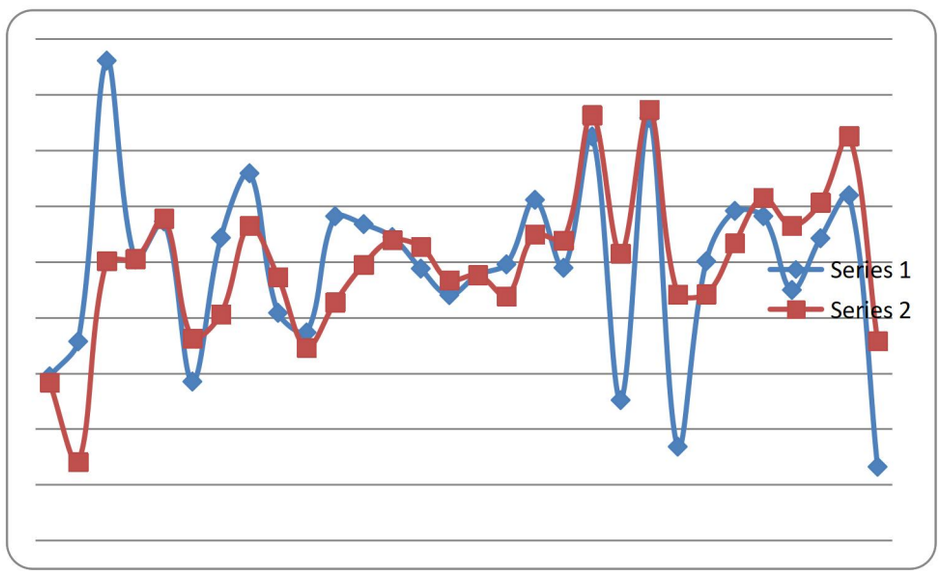


Figure 7 shows AAR and CAAR for the entire window of ±15 days. The graph is consistent with a sustained downward CAAR trend leading up to and after the date of announcement. As opposed to a sharp reaction of a day's period, the movement seems cumulative, with little immediate reversal. This prolonged drift pattern suggests that dividend information was integrated gradually (as opposed to instantaneously). The focus of such event-study literature is on the fact that such persistent abnormal returns are not

in line with strict semi-strong efficiency (Miller, 2023). The extended negative trajectory points to investor caution as well as possible reassessment of dividend sustainability in the uncertain post-pandemic energy environment, providing more evidence of underreaction.

Figure 8: ***AAR and CAAR Trends for NYSE Oil and Gas Sector (±10 Days)***

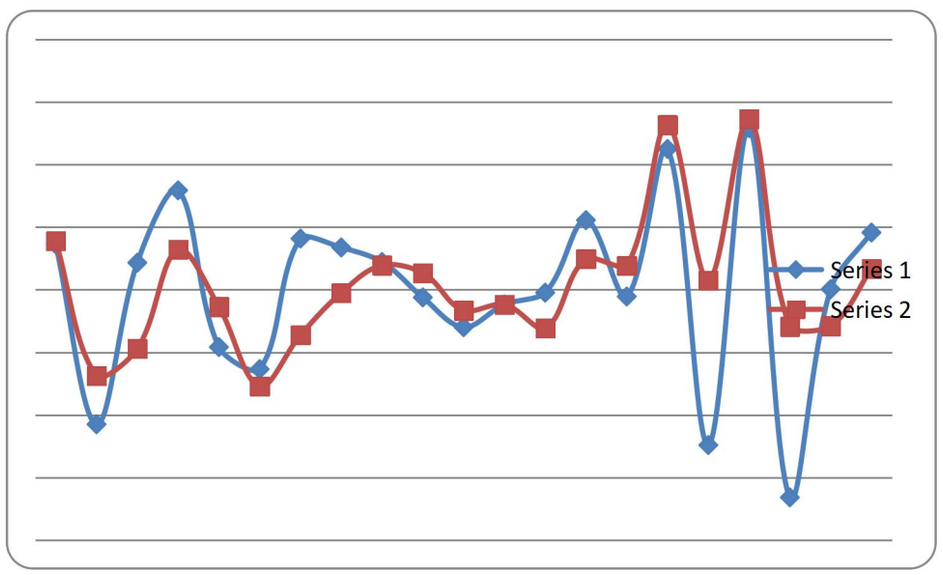
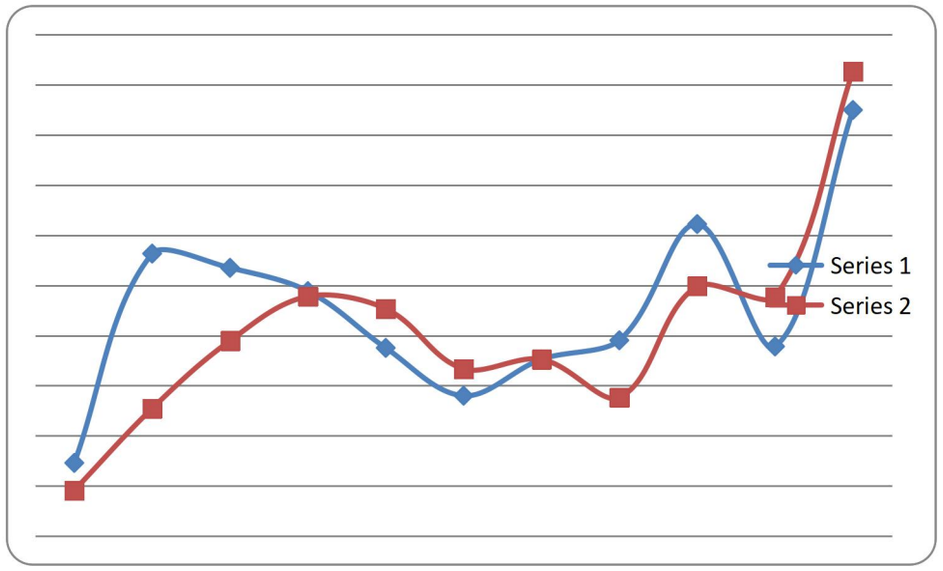


Figure 8 narrows down to the ±10 day period and shows sustained negative CAAR just after Day 0. The lack of a sharp corrective spike suggests that the price adjustment was spread over a number of trading sessions. This slow incorporation is in line with limited-benefit and information diffusion theories that hold that investors incrementally process complex financial signals (Hirshleifer et al., 2009). In the context of the post-COVID oil market, the dividend announcements may have been assessed along with other wider macroeconomic and energy prices uncertainty contributing to slower market reaction. The above pattern therefore suggests partial deviation from semi-strong efficiency.

Figure 9: ***AAR and CAAR Trends for NYSE Oil and Gas Sector (±5 Days)***



Within the narrower window of errors, of about plus or minus 5 days, Figure 9 shows continuous negative CAAR just after the announcement followed by modest recovery. A delay in the full rebound supports the occurrence of delayed adjustment as opposed to overreaction. In efficient markets, abnormal returns should disappear soon after disclosure (Fama, 1991). However, the persistence observed here is consistent with temporary mispricing, which is consistent with behavioural underreaction. Post-COVID structural volatility in energy markets likely added to uncertainty, increasing the reaction time of investors. Overall, the graphical evidence supports the statistical results, which show that the NYSE oil and gas sector is less semi-strongly efficient in the period 2021-2025.

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Table 4: *Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR) for NYSE Telecom Sector (−15 to +15 Days)*

Days	AAR	CAAR	STD DIV	T-Statistic
-15	-0.00079	-0.00079	0.006121	-0.12906
-14	-0.00523	-0.00602	0.015039	-0.40033
-13	0.002017	-0.004	0.007374	-0.54288
-12	0.000216	-0.00379	0.014727	-0.25715
-11	0.004376	0.000589	0.008407	0.070074
-10	-0.00025	0.00034	0.010767	0.031583
-9	0.002106	0.002446	0.013332	0.18347
-8	0.003723	0.006169	0.004952	1.245776
-7	0.002363	0.008532	0.009339	0.913642
-6	0.00218	0.010712	0.006652	1.61047
-5	0.003195	0.013907	0.009292	1.496617
-4	-0.00172	0.012182	0.006287	1.937635
-3	-0.00134	0.010844	0.008143	1.331665
-2	0.000714	0.011558	0.005029	2.298282
-1	0.003422	0.01498	0.009505	1.5759
0	0.000853	0.015833	0.002488	6.364211
1	-0.01919	-0.00421	0.0535	-0.07875
2	-0.00174	-0.00595	0.008289	-0.7179
3	-0.0014	-0.00735	0.009727	-0.7558
4	-0.00244	-0.00979	0.006405	-1.52919
5	0.006724	-0.00307	0.015527	-0.19776
6	-0.00443	-0.0075	0.01726	-0.4344
7	-0.00025	-0.00775	0.01287	-0.60209
8	0.000603	-0.00715	0.013064	-0.54701
9	-0.00328	-0.01043	0.006567	-1.58802
10	0.0057	-0.00473	0.006585	-0.71806
11	-0.00025	-0.00498	0.007261	-0.68526
12	0.004049	-0.00093	0.0129	-0.07186
13	-0.00581	-0.00674	0.016064	-0.4197
14	0.000372	-0.00637	0.014785	-0.43086
15	-0.00205	-0.00842	0.009215	-0.91394

AAR and CAAR around dividend announcements is presented for the NYSE telecom sector in Table 4. The results show that there was a gradual rise in CAAR over the pre-announcement in the run up to the announcement date (Day 0) and it reached 1.58% on the announcement date and the t-statistic is extremely significant (6.36). This implied that dividend announcements have informative value and are expected with positive sentiments by investors. However, immediately after the announcement (Day +1) CAAR drops sharply and goes negative which indicates a rapid correction. This action is indicative of short-term overreaction and subsequent reversal and is not consistent with the semi-strong efficiency (Fama, 1991). The behavioral finance literature attributes such reversals to over-optimism on the part of investors and subsequent reassessment (De Bondt &

Thaler, 1985). In the post-COV environment, increased sensitivity to corporate payout decisions may have increased initial reactions. Overall, while prices adjust quickly, temporary reversal suggests adaptive rather perfect efficiency (Lo, 2024), while making decision about stock trading and price adjustment take place with a greater speed

Figure 10: AAR and CAAR Trends for NYSE Telecom Sector (±15 Days)

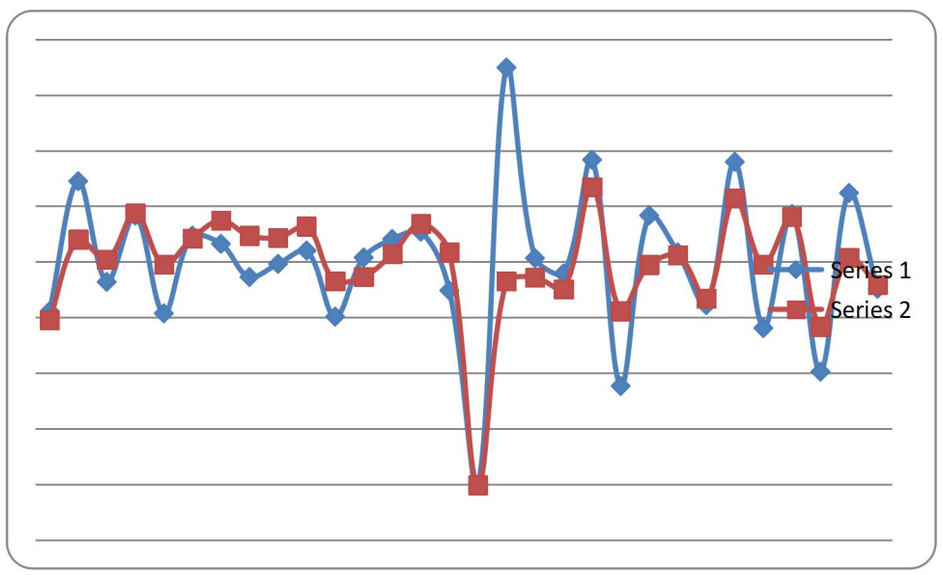
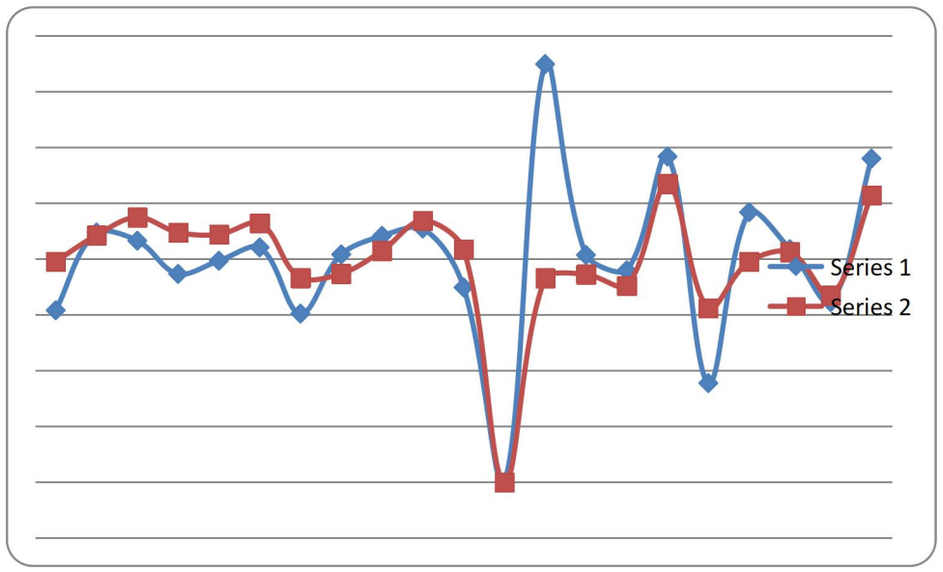


Figure 10 illustrates AAR and CAAR over the time span of 15 days before and 15 days after. The graph shows a steady increase in CAAR just before Day 0 then a sharp decline just after the announcement was made. This spiking and reversal is something that is characteristic of short-term overreaction. Rather than gradual diffusion the reaction is concentrated in the date of the event, which implies strong attention of investors. However, the speed with which the correction occurs suggests that the initial price movements overcorrected to the intrinsic value. Event-study theory would have us believe that in totally efficient markets, such reversals should not exist (MacKinlay, 1997). The pattern observed therefore points to temporary mispricing in line with behavioural overreaction.

Figure 11: AAR and CAAR Trends for NYSE Telecom Sector (±10 Days)



The event window is thus narrowed down in Figure 11 and the immediate post-announcement correction is confirmed. The positive abnormal performance at Day 0 is not maintained and CAAR decreases over the ensuing days. This implies that dividend announcements were initially perceived by investors as powerful positive signals but later judged afresh. Such dynamics are consistent with models of limited attention and sentiment to salient announcements followed by adjustment of expectations (Hirshleifer et al., 2009). In the post-pandemic telecom industry, where dividend stability is an indicator of financial strength, greater investor attention may have been compounding short-run reactions.

Figure 12: AAR and CAAR Trends for NYSE Telecom Sector (±5 Days)

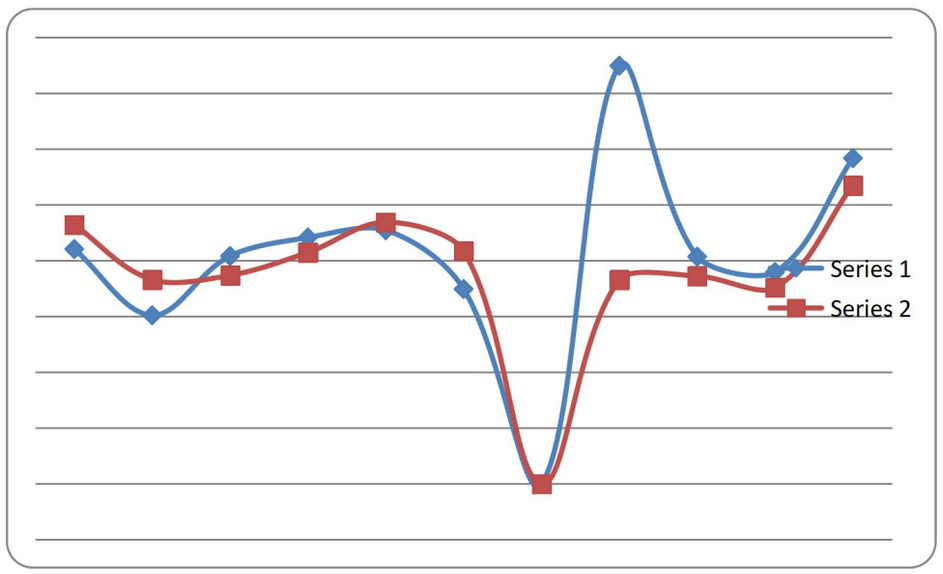


Figure 12 shows that there is a strong spike on Day 0 and the reversal within the ±5-day window. The rapid adaptation after the first shot implies that markets react to stimuli in a fast way but they can reach equilibrium prices temporarily. This action endorses the hypothesis of adaptive markets that claim that efficiency is developed at various economic regimes (Lo, 2024). Even though, their abnormal returns fade away within several days, the fact that investor sentiment had a short-lived overreaction shows that price formation in the post-COVID recovery was influenced by investor sentiment. In this way, the telecom market of NYSE is almost semi-strong with short-term distortions in behavior.

Conclusion, Implications, and Future Research Directions

This paper explored semi-strong market efficiency and investor behavioural reactions to dividend payouts in the oil and gas and telecom industry of the NYSE and HKSE in the post-COVID period (20212025) through event study. Through comparing AAR and CAAR on the various event windows, the results indicate that the efficiency varied between sectors and exchanges. The HKSE oil and gas industry mostly followed the semi-strong efficiency, but HKSE telecom industry followed underreaction in form of slow post-announcement adjustment. The NYSE oil and gas market exhibited consistent negative CAAR which means that the market did not price in timely they were delayed as opposed to the NYSE telecom market in which the market overreacted and regained itself after a short time. In general, the developed markets were generally efficient and featured sector-specific behavioural distortions, which is consistent with the Adaptive Markets Hypothesis (Lo, 2024), which sees efficiency as time-dependent and context-dependent.

One of the contributions of the study to the literature is the furthering of semi-strong market efficiency testing into the post-COVID regime, which is characterized by structural economic change, increased volatility, and significant changes in corporate dividend policies. By so doing, it supports the position posited by Fama (1991) that efficiency is a concept that should be determined empirically in the changing institutional and macroeconomic environments. In addition, the study presents findings of underreaction and overreaction thus supporting behavioural theories that underline limited attention, sentiment, and slow diffusion of information on the same empirical framework that is applied to test semi-strong efficiency (Hirshleifer et al., 2009). The heterogeneity in the sector witnessed in the NYSE and HKSE also points out the fact that informational efficiency is unequal even in developed markets. The rate and nature of price adjustment are found to be affected by industry-specific uncertainty, risk exposure, and investor composition, which agree with the opinion that market behaviour is adaptive to changing environments (Lo, 2024).

Practically, the results indicate that telecom industries can have short-term trading opportunities because dividend announcements can overreact or underreact temporarily but oil and gas industries, especially within the system of high volatility regimes, can have slower information assimilation, yielding opportunities of abnormal returns. Portfolio managers and other investors are thus advised to base dividend-based trading plans on sector properties and the existing macroeconomic factors. Adding behavioral cues to dividend pronouncements can be a performance-enhancing move in short-run portfolios, and risk management theories need to take into consideration regime-sensitive efficiency, particularly in the recovery phase after systemic shocks.

There are also significant policy implications for the results. Even though developed markets are mostly efficient, they can create temporary inefficiency when the market faces macroeconomic stress. Timely disclosure and transparency are also important in reducing delayed price adjustment as highlighted in event-study literature (MacKinlay, 1997). Investment learning and enhancing the quality of disclosure can assist in diminishing behavioral biases in dividend interpretation. The dividend announcements in the

post-COVID environment can be accompanied by an increased signaling value because of the previous dividend suspension and liquidity issues, which makes the importance of effective corporate communication even more significant.

The study has several limitations irrespective of its contributions. It only analyses two sectors, and this might not be generalizable to other industries. It considers only cash dividend announcements, and the rest of the corporate events could intervene in price movements. The empirical methodology was based on the parametric event-study tests described by MacKinlay (1997) and has not specifically included the cross-country macroeconomic controls. These limitations would be overcome to increase robustness and external validity. Future studies can build on this study by including multi-factor asset pricing models which include the Fama-French five-factor model to determine the strength of abnormal returns estimates. Distinguishing between dividend increases, decreases, omissions and reinstatements can also offer further information on the asymmetric market responses especially during post crisis situations. To absorb dynamics of intraday adjustments and the effects of microstructures, high-frequency data might be utilized. The analysis would be extended to more developed and emerging markets, which would enable future researchers to more comprehensively compare post-COVID efficiency patterns across markets. The use of behavioural proxies like indices of investor sentiment, media tone, or search volumes would be useful in directly testing underlying behavioural mechanisms, and regime-switching or time-varying parameter models would enable future researchers to test adaptive market efficiency formally.

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