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Original Article

Exploration of the Influence of Dividend Announcements on a Firm's Stock Prices - An Empirical Study

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Abstract

For decades, the question of whether dividend announcements influence firms' stock prices has been the focus of debates in academia and amongst practitioners. While some notable scholars have found that dividend announcements cause stock prices to move, others suggest otherwise. To this end, this study critically reflects on the existing body of literature that discusses contemporary arguments on the influence of dividend announcements on stock prices and empirically tests the validity of existing findings within the United Kingdom context, using one of the FTSE 100 companies operating in the pharmaceutical industry as a case study. To unfold the crux of the discourse, the study adopts an event study methodology, underpinned by the efficient market hypothesis, to measure stock returns over specific periods. This methodology enabled the creation of a platform to examine short-term stock price reactions to a specific firm's dividend announcements over the chosen period. The data collected in the process were subjected to rigorous regression analysis for in-depth study. To empirically test the preceding findings, adjustments were made for other related factors beyond dividend announcements. The study found insufficient evidence to claim that dividend announcements did not impact stock prices during the period examined. The study made a significant contribution to existing debates on the influence of dividend announcements on stock prices by providing empirical evidence on the extent to which dividend announcements may or may not influence firms' stock prices.

Categories: Banking and financial services, International financial markets and institutions

Keywords: dividend, stock prices, announcement, regression, ftse 100

JEL Classifications: F30, A19, N10, E39, O16, F38

Introduction

The dividend distribution policy debate has been ongoing in academia for many years because of its significance in corporate finance. In emphasising this, Lintner asserts that both academics and practitioners consider dividend policy an important topic in Corporate Finance because it is the fundamental basis on which firms' dividend distribution policies rest (Lintner, 1956). In their work, Barros et al. concur that dividend policy primarily concerns firms' decisions about the percentage of earnings to reinvest and the proportion to distribute to shareholders (Barros et al., 2020). To clarify the discourse, earnings announcements are official reports that provide detailed information about a firm's financial performance, offering insights into revenue, profit margins, and the firm's growth over a period, which can be quarterly or yearly. This makes the topic an important concept in Corporate Finance. In contributing to the debate, Baker and Weigand argued that dividend payouts/distributions are a major challenge for managers (Baker and Weigand, 2015). In their earlier work, Black contends that the more one observes the dividend picture, the more it looks like a puzzle

because the pieces often do not fit together (Black, 1976). Despite a series of empirical studies on dividend policy in the contemporary world, identifying the underlying motives driving dividend distribution in firms remains a challenge (Goyal, 2019) (Franc-Dąbrowska et al., 2020).

However, early discourse on dividend distribution largely focused on whether dividend announcements affect share prices. To answer this fundamental question, it is important to reflect on existing theories and arguments, as this would facilitate the synthesis of perspectives on classical finance theories. In doing so, it would be possible to identify the relationships between corporate decision-making, investor expectations, and market dynamics. It will also inform the understanding of the role dividend policy plays in shaping corporate strategies and influencing financial performance. In view of the ongoing debate on the effect of dividend announcements on stock prices, this study aims to achieve the following objectives:

To identify the impact of dividend announcements on UK stock prices.

To analyse the relevance and validity of existing dividend theories.

To test the theories using empirical evidence covering 5 years, using AstraZeneca as a case study.

Literature review

In recent work, Hayes describes a dividend announcement as a public communication by a firm declaring its intention to distribute a portion of earnings to shareholders at a future date (Hayes, 2024). It is evident from contemporary studies that academics and practitioners are interested in the extent to which dividend announcements impact firms' stock values (Gordon, 1959) (Lintner, 1962). While some academics argue that dividend announcements affect stock value, findings from some research present a contrary argument. To ascertain these arguments, it is important to carefully review empirical evidence that explicitly demonstrates the effect of dividend announcements on stock prices.

In a quest to ascertain the effect of dividend announcements on stock prices, Asquith and Mullins analysed a sample of 168 firms listed on the New York Stock Exchange (NYSE) from 1963 to 1980 (Asquith and Mullins, 1983). They found that as much as 70% of the companies' stocks investigated had a positive market reaction at their first dividend announcement. Based on this finding, Asquith and Mullins concluded that dividend announcements convey unique information to investors (Asquith and Mullins, 1983). In their subsequent study, Frankfurter and Wood argued that dividend announcements often lead to a rise in dividend psychology, as investors are more likely to interpret dividend changes as signals of management's confidence or concern about future firm performance (Frankfurter and Wood, 2002).

In another study, Vieira and Raposo investigated the effect of dividend announcements on stock prices in the United Kingdom, French and Portuguese stock markets, using a large sample of dividend announcements by companies listed on the London Stock Exchange, Euronext Paris and Euronext Lisbon (Vieira and Raposo, 2007). The study did not find a significant effect of dividend announcements on stock prices. Furthermore, Gurgul analysed 310 dividend announcements of some selected firms, which comprised small and large companies listed on the German stock market (Gurgul, 2012). The study found abnormal trading volume on the announcement day, regardless of the dividend level (higher, lower, or stable).

To confirm that dividend announcements impact share price movements, Pettit collected the announcement dates of dividend changes of 625 firms that were quoted on the New York Stock Exchange from January 1964 to June 1968 (Pettit, 1972). The sampled firms' dividend data collected in the process covered a series of portfolios based on the degree of dividend changes and trends in earnings changes. This methodological approach enabled the researcher to identify and test abnormal returns that precede dividend announcement dates for 14 portfolios based on multiple aspects of dividends and earnings. The study found that the stock prices reacted to dividends and earnings announcements during the study periods. Again, this finding appears to be consistent with Lintner's earlier finding (Lintner, 1962).

In another study, Kane, Lee and Marcus investigated how the stock market responds when firms announce earnings and dividends simultaneously, with significant focus on whether the two announcements provide corroborating information about firms' value (Kane et al., 1984). The methodology adopted involved empirical analysis of stock market reactions to

corporate earnings and dividends announcements. To achieve the main objective of the study, the researchers analysed market reactions to earnings and dividend announcements published by some firms within 10 days of each other. This involved observation of 352 quarterly dividend and earnings announcements between the 4th quarter of 1979 and the second quarter of 1981. The study found that changes in dividends and earnings have a positive relationship with cumulative abnormal returns (CARs) shortly after the announcements.

In 2009, Mallikarjunappa and Manjunatha carried out a study that investigated how the stock prices in Indian stock markets react to dividend announcements (Mallikarjunappa and Manjunatha, 2009). The study found that the average abnormal returns were not equal to zero on the announcement date, but the cumulative average showed significant fluctuations in the cumulative average abnormal returns. Based on this finding, the study concluded that the Indian market efficiency is below the semi-strong form of the Efficient Market Hypothesis. In addition, Aharony and Swary found that markets react negatively and positively to dividend announcements depending on whether it is a positive or negative announcement on dividend payouts (Aharony and Swary, 1980).

Following Aharony and Swary's study, Kane et al. investigated whether earnings and dividend announcements influence each other (Aharony and Swary, 1980) (Kane et al., 1984). The study found a significant interaction effect. Based on this finding, the authors concluded that investors often give credence to unanticipated dividend changes when corroborated by earnings announcements and vice versa. This appears to be consistent with Lintner's position (Lintner, 1962). Lintner became more assertive about this position when groups of managers across 28 firms were interviewed, and findings revealed that a significant number of the managers emphasised the important role that dividend distribution policy plays in a firm's corporate finance decision-making process (Lintner, 1962). The managers were convinced that investors prefer a stable dividend payout to unpredictable and risky capital gains.

To further elaborate on the dividend distribution stance, Lintner argued that managers often resist the temptation to cut the dividend payout rate rather than raise it to respond to earnings changes (Lintner, 1962). Lintner argues that managers often make every effort to avoid changes to the dividend ratio that may likely be reversed (Lintner, 1962). It was this strong argument that prompted researchers' interest in the topic, particularly discussion of the partial adjustment model of dividend policy to address capital market imperfections. This means that information asymmetries exist in market environments. In contributing to the discourse, Bhattacharya argued that outside investors have imperfect information about a firm's profitability and future cash flow (Bhattacharya, 1979). As such, managers with inside information can use the dividend ratio as a signal to the market about the expectations of a firm's financial performance (Dasilas and Leventis, 2011). In line with this assertion, Baker et al. previously argued that the dividend-signalling hypothesis suggests that an increase or decrease in dividends positively or negatively influences stock price (Baker et al., 2003). Other studies such as Lintner and Gordon concur that investors differentiate between capital gains and dividends (bird-in-hand fallacy hypothesis) (Lintner, 1962) (Gordon, 1959). The findings of their studies led to the emergence of three classical discussions on the discourse:

1. The Bird-in-the-Hand Hypothesis: A Preference for Certain Profit.

Lintner asserts that dividend payments increase firms' value (Lintner, 1956). This view stemmed from the belief that investors' preference for "a bird in the hand," i.e., the certainty of receiving a dividend at a specific date, is considered safer than "two in the bush," i.e., an uncertain potential future capital gain. In furtherance of this argument, Gordon posits that investors are indifferent to returns on their capital and would rather receive their dividends today than wait for an uncertain future capital gain (Gordon, 1959).

Consistent with Lintner and Gordon and Baker and Haslem argued that most investors are risk-averse; as such, they are more in favour of receiving their dividend now, as dividends are less risky than potential future capital gains (Lintner, 1956) (Gordon, 1959) (Baker and Haslem, 1974). They further explained that dividend changes often convey information about management's expectations of a firm's future performance. In support of Gordon, other studies such as Baker and Haslem and Baker et al. have also found that the most important determinants of dividend policy are current income and expected future income (Gordon, 1959) (Baker and Haslem, 1974) (Baker et al., 2003). This finding appears to be consistent with Lintner's "Bird-in-the-Hand" stance (Lintner, 1956). On this note, Baker et al. suggest that firms must

prioritise dividend payouts (Baker et al., 2003). In emphasising the influence of dividend announcements on share price, Graham and Dodd argued that an average of $1 of dividend payout can have as much as four times the impact on share prices as $1 of undistributed earnings (Graham and Dodd, 1934). They also argued that firms that have a generous approach to dividend payouts often experience a tremendous rise in their share prices.

2. The Partial Adjustment Model of Lintner (1956): An Attempt to Explain Firms' Dividend Policy.

In emphasising the significance of dividend payout, Lintner advocates neutrality of dividend decisions in firms (Lintner, 1956). The author contends that managers often aim to maintain consistency and stability by adopting a long-term dividend payout ratio. The underpinning rationale for this suggestion is the conviction that the decision to adjust the dividend payout ratio over time should depend on firms' profits and past dividend payouts. In Lintner's view, markets often react positively or negatively to dividend payout announcements (Lintner, 1956). On this note, Al-Malkawi et al. suggest that it is much more rewarding for firms to adopt a consistent approach to dividend payout ratio to avoid a negative reaction from their shareholders (Al-Malkawi et al., 2014). They argued that most companies adopt a long-term dividend policy centred on a partial adjustment model that is independent of earnings.

In addition, Lintner's work found that as much as two-thirds of the firms investigated adopted a long-term dividend payout policy with an average ratio of 50% (Lintner, 1956). The study also found that the adjustment to the dividend payout ratio is made yearly over time. Subsequently, Lee and Mauck concur that progressive adjustments to payout enable firms to maintain consistent dividend distribution over time, regardless of rising or declining earnings (Lee and Mauck, 2016).

3. Dividend Irrelevance Theory/Argument.

In the 1960s, Miller and Modigliani put forward a strong argument that contradicts Lintner's and Graham and Dodd's stances on dividend distribution (Miller and Modigliani, 1961) (Lintner, 1956) (Graham and Dodd, 1934). In justifying their position, Miller and Modigliani argued that under certain conditions, a firm's dividend policy may not affect its value or its shareholders' wealth (Miller and Modigliani, 1961). They argued that the value of a firm is determined by its investment decisions and earning power, not by whether it pays dividends or retains profits.

Hence, it must be noted that Miller and Modigliani's argument was based on three assumptions (Miller and Modigliani, 1961):

· The Perfect Capital Markets Assumption: They assumed that in financial markets, information is freely available to all participants, and there are no transaction costs and no differences in taxation between capital gains and dividends.

· The Rational Investors Assumption: They assumed that all investors are more interested in investments that offer the best returns/wealth. As such, such investors do not believe that there are differences between capital gains and dividends.

· The Certainty of the Future Assumption: They assumed that future earnings and investment plans are known with certainty.

Over the years, Miller and Modigliani's argument of dividend irrelevance has created a huge debate in academia (Miller and Modigliani, 1961). To test Miller and Modigliani's stance, Black and Scholes examined the relationship between dividend yield and rate of return using the Capital Asset Pricing Model (Azekkar et al., 2023) (Miller and Modigliani, 1961) (Black and Scholes, 1974). The study involved the collection of 25 portfolios of common stocks listed on the New York Stock Exchange from 1926 to 1966 with the sole purpose of assessing the effects of dividend policy on stock prices. The study found that dividend payouts during the studied period did not affect share prices. This finding appeared to be consistent with Miller and Modigliani's position on dividend irrelevance (Miller and Modigliani, 1961). This suggests that regardless of the dividend policy favoured by a firm, it does not affect the firm's value.

To this extent, this study empirically tests these arguments to ascertain the validity of the claims being made by formulating two hypotheses based on a single case, AstraZeneca Plc: The null hypothesis (H0) will test the Miller and Modigliani Dividend Irrelevance Theory/Argument, that under certain conditions, a firm's dividend policy may not affect

its value or its shareholders' wealth and concluded that the value of a firm is determined by its investment decisions and earning power, not by whether it pays dividends or retains profits (Miller and Modigliani, 1961).

The alternative hypothesis (H1) will test the Lintner bird-in-the-hand hypothesis, which found that dividend payments increase firms' value (Lintner, 1956). Lintner argued that the certainty of receiving a dividend at a specific date is considered safer than "two in the bush," i.e., an uncertain potential future capital gain.

Hypothesis testing was used to facilitate the separation of fact from random chance and to enhance the setting up of a strict error threshold (alpha level of 5%). In addition, hypothesis testing was used to enable the testing of economic theories, such as the Lintner bird-in-the-hand hypothesis (Lintner, 1956).

AstraZeneca Plc was chosen as a case study as it is one of the FTSE 100 companies listed on the London Stock Exchange that consistently pays dividends twice a year. This makes it possible to examine the relationship between the firm's dividend announcements and the stock prices over a specific period.

It is important to stress that using a single case to empirically test these two sets of views has one major drawback:

The findings cannot be generalised, as firms operating in different sectors are usually influenced by different factors that are peculiar to each industry. It is therefore unrealistic to assume that the behaviour and events taking place in one industry can be assumed to apply to all industries and market environments.

Research Method

Research into dividend announcement effects frequently employs the event study methodology grounded in the Efficient Market Hypothesis (Fama, 1970). This is often used in finance as it enables the examination of the impact of dividend announcements on stock prices and abnormal returns around the event date. In their contribution to the discourse, MacKinlay asserts that the method is favoured as it allows immediate testing of market reactions and controls for broader market movements (MacKinlay, 1997). In the context of this study, applying an event study methodology is appropriate, given the focus on short-term stock price reactions to AstraZeneca's dividend announcements. Besides the event study method, the use of regression analysis is recommended for an in-depth study, adjusting for factors beyond dividend announcements alone.

The study focuses on the influence of dividend announcements on the share prices of a firm listed on the London Stock Exchange from 2015 to 2020. To ensure that the complete event window for the final 2020 announcement could be examined, stock price data were collected through January 2021. Therefore, while the event-study calculations incorporated a limited number of trading days extending into January 2021, the analysed dividend announcements and the formal study period remained confined to 2015-
2020. To substantiate the study's findings, an event-study methodology was adopted to examine normal and abnormal returns following dividend announcements. This approach enables the examination of investors' reactions to dividend announcements during the period under study.

Research approach

The study relies on secondary data and adopts a quantitative approach to investigate the impact of dividend announcements on AstraZeneca PLC's (AZN) share price from 2015 to 2020. A deductive approach was employed since the study is theory-driven. This approach was deemed appropriate as it makes it enables the study to answer the research question, verify and challenge the existing theories and assertions on dividend discourse.

Research design

The study adopts an explanatory design to describe the impact of dividend announcements on AZN's stock price by examining market reactions. It also tests dividend theories using empirical evidence from analysis of AZN's stock.

Data Collection Methods

The study dataset was collected from AstraZeneca Public Limited Company (AZN PLC), which is one of the British Financial Times Stock Exchange (FTSE) 100 companies listed on the London Stock Exchange. The company was selected based on two criteria:

1. Its consistent announcements of dividend declarations and payment dates from 2015 to 2020, regardless of earnings performance. Based on the company's historical dividend announcement records during the study period, a total of 12 dividend announcements and corresponding payouts were identified and included in the analysis. For clarity, the event date was taken to be:

(i). The day that the company publicly announced the dividend.

(ii). The actual dividend payment date, which is the actual date that the company made the dividend payments.

2. It is also one of the British FTSE 100 companies listed on the London Stock Exchange.

Data Type and Collection Process

The quantitative data used for the study were gathered from secondary sources. The data were extracted from AstraZeneca's stock price movements and dividend announcements from 2015 to 2020. The data collection process used a carefully structured approach to ensure the reliability, accuracy, and relevance of the information used in the analysis. This comprises AstraZeneca's historical daily stock price from the Bloomberg Terminal. To enhance consistency of corporate actions, such as dividends and stock splits, only daily closing prices were collected. Simultaneously, market index data for the FTSE 100 Index were collected from Bloomberg and used as the benchmark for measuring AstraZeneca's performance relative to the overall UK stock market performance. This is important in an event study, particularly when estimating normal returns during the selected event windows.

Subsequently, dividend announcement dates and amounts were gathered from AstraZeneca's Annual Reports and Bloomberg Terminal. The report for each year from 2015 to 2020 provided official records of dividend declarations, including interim and final dividends, and the exact announcement dates. Using corporate disclosures enhances the authenticity and verifiability of the data, minimising potential inaccuracies in the process.

The data collected were organised chronologically by matching each dividend announcement to the corresponding stock price and market return data around the event windows (which were defined as periods around each dividend announcement date, spanning from 5 days before to 5 days after the announcement). All collected data were cross-checked to ensure consistency between Bloomberg and AstraZeneca's corporate reports.

Data Analysis Technique

The study adopts a quantitative event study method with regression analysis to analyse the effect of dividend announcements on AstraZeneca's stock price from 2015 to 2020. The dividend announcements represent the events of the study. The analysis of the study's data is based on 12 events. The rationale for adopting this approach is that AstraZeneca's dividend announcements were made yearly in Q2 (30/06/2019) and Q4 (31/12/2019) through to January 2021 (AstraZeneca, 2024).

It also helps to identify any abnormal returns; it is important to note that for any event study in finance, only business days are used. Non-trading days were removed from the collected data to prevent errors and distortions in return calculations.

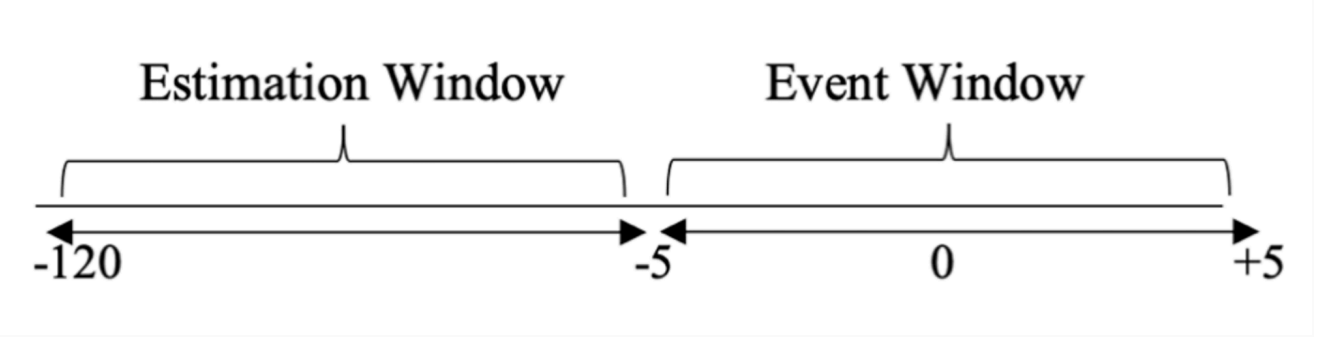


FIGURE 1: Event window used in the event study analysis, covering five trading days before the dividend announcement date (t−5) and five trading days after the announcement date (t+5).

Figure 1 illustrates the event window used to examine investor reactions to dividend announcements. The event window extends from five trading days before the announcement date to five trading days after the announcement date (−5, +5). This window is distinct from the 120-day estimation window used to calculate expected returns and from the overall study period (2015-2020), during which the dividend announcement events were observed. The three-time horizons: Study period: 2015-2020 Estimation window: 120 trading days prior to the event window
Event window: −5 to +5 trading days around each dividend announcement.
Source: Authors' own creation.

The event study method assesses whether there is an abnormal return associated with dividend announcement events over these 5 years by comparing actual daily stock returns with expected returns (Figure *1*). The event window was defined to be larger than the specific period of interest (MacKinlay, 1997). This permits examination of periods surrounding the event. In the context of this study, the period of interest expanded to multiple days, including the day of the announcement and the day after the announcement. This was done to capture the price effects of announcements that occur after the stock market closes on the announcement day (MacKinlay, 1997). The periods prior to and after the event were also of interest. Based on this assumption, it was deemed appropriate to calculate the daily returns by using the formula below to measure the percentage gain or loss in the stock's price from one day to another (formula 1):

$$R_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

P_t = stock price on the trading day

P_t - 1 = Stock price on previous trading day

P_t - P_t - 1 = Change in stock price

Source: Authors own Formula.

The estimation window of 120 days before the event was used to assess the normal relationship between AstraZeneca and the chosen benchmark, the FTSE 100. An event window of 5 days before and 5 days after the announcement was considered sufficient for the aim of the study because it enables isolation of each announcement. By adopting this approach, a tight event window enables the filtering out of irrelevant background noise and links abnormal returns directly to AstraZeneca's events.

Given that the data analysis is conducted using Excel, the 'LN' function is used to calculate the daily returns of both AZN and FTSE100. Once the daily returns for both securities are calculated, a regression analysis can then be conducted using the returns from the 120-day estimation windows only. Regression analysis is used to measure the magnitude of the event's impact and the influencing factors (Thrane, 2020). In the regression model, the dividend surprise was measured based on the difference between the dividend that AstraZeneca announced and investors' expectations were before the announcement. A positive value suggests a higher-than-expected dividend, while a negative value indicates a lower-

than-expected dividend (Table *1*). The expectations were formed based on the analyst forecast and AstraZeneca's dividend history (Bloomberg Terminal, 2024). Regression was performed only on the estimation windows to obtain the coefficients α and β for the normal behaviour of the stock's return, before the market knew about the event. After grouping the estimation windows from all events, the "Regression" analysis tool from Microsoft Excel, version 10, was used to return the two required coefficients. The market model regression is given by formula 2:

$$E\left(R_t\right) = \alpha + \beta R_{\mathrm{FTSE100}}$$

$E_{(RAZN/t)}$ - expected return of AZN

$R_{FTSE100,t}$ - market return (i.e. FTSE100)

α and β - coefficients estimated from normal behaviour

Source: Authors own Formula.

Once α and β were identified, the coefficients were used to calculate the expected return of AZN as per the above formula in Microsoft Excel, version 10. Expected returns were calculated for the 10-day event windows only, as these are the periods during which the impact of the dividend announcements can be tested, and any abnormal returns can be identified. The 0 indicates no change in the stock price from the previous trading day. Expected returns were then used to isolate the abnormal returns (ARs) during the 5-day event window before the event and the 5-day post-announcement window. Therefore, to identify the AR, this formula was used to measure the difference between the actual return and the return that would normally be expected. The formula was purposely used in this study to examine whether dividend announcements affect AstraZeneca's stock price (formula 3):

$$AR_i = \sum_{t=1}^{T} AR_{it}$$

$AR_{AZN,t}$ = Abnormal stock return at time t

$R_{AZN,t}$ = Actual return on stock price at time t

$E(R_{AZN,t})$ = Expected stock (normal) return at time t.

Source: Authors own Formula.

The ARs were calculated for each event. The number of abnormal returns for each event varies from 7 to 10 days. To evaluate the total impact of a dividend announcement, CARs were calculated by summing up the Abnormal Returns per event. The results were then summarised in a separate Excel sheet and used to calculate the Cumulative Average Abnormal Return (CAAR), interpret the results, and test hypotheses to conclude AstraZeneca's stock price reaction to dividend announcements. It is important to note that only the trading days were considered. The non-trading days were excluded from the calculation to present valid results (MacKinlay, 1997).

In addition to calculating ARs and CARs, a one-sample t-test was used to carry out hypothesis testing to examine whether the CAR resulting from dividend announcements is statistically significant. If the difference is greater than zero, it implies that dividend announcements influence AstraZeneca's stock price (Meyer et al., 2017). Furthermore, some stock return data were missing around certain event dates. To solve this problem, the missing days were carefully managed by focusing only on available trading days and adjusting event windows where necessary, making sure that the calculations remained stable and comparable across all events (MacKinlay, 1997). In addition, the event study method presents limitations, as it assumes that markets react solely and immediately to the event of interest. However, in the real world, external factors such as pharmaceutical news, regulatory changes, or Brexit-related developments may have influenced AstraZeneca's stock price during the event window. To reduce this impact, the short 5-day before and 5-day after announcement window was chosen to minimise the chance of confounding news affecting results (MacKinlay, 1997).

It is important to mention that the adoption of a regression model for the event-study framework is primarily based on the notion that it would create a platform that would enable us to examine whether dividend announcement or dividend surprise has a statistically significant effect on stock returns while controlling for other factors. In addition, studies have found that regression analysis provides a formal statistical framework for testing whether unexpected dividend information generates abnormal stock returns (Thrane, 2020) (MacKinlay, 1997). Given the nature of this study, it is important to distinguish between the market model estimation outputs and the event-study inference procedures. In the study, the market model estimation outputs were estimates over the estimation window before the event window. The main estimation outputs were alpha, beta, residuals, and residual variance/standard error. Hence, the market model provides the counterfactual benchmark, i.e. what AstraZeneca's return would be expected to be in the absence of the examined events.

In addition, as soon as the expected returns have been estimated, the event window was then used to examine whether the AR differs significantly from the expected returns (see formula 3). The CAR was adopted to measure the total abnormal performance of AstraZeneca's stock over the examined event window period, while the CAAR measures the average cumulative abnormal performance of AstraZeneca's stock. Hypothesis testing was used to determine whether the examined AR, CAR, and CAAR are statistically different from 0.

Ethics considerations

Although the study relies on secondary data, ethical considerations were rigorously upheld. Given that the data were generally accessible, no consent was required from individuals or organisations (Bos, 2020). The data collection and analysis were conducted in accordance with the UK Data Protection Act and copyright and licensing regulations. Data integrity is maintained throughout, and all sources used were cited accordingly. By relying exclusively on publicly available credible information and well-documented secondary data sources, the research process ensures that all ethical considerations regarding data use and copyright compliance were fully respected. Before data collection, the London South Bank University research ethics application process was followed. All research staff at LSBU must submit an ethics application for research that involves data collection, whether or not it involves human participants (LSBU, 2024). As part of the ethics approval process, an ethics application was completed and submitted to the LSBU's College of Society and Professions' ethics panel for review. Following review of the ethics application, the LSBU's College of Society and Professions' Ethics & Integrity Panel Lead approved the application on the 28 November 2024.

Reliability and validity

When conducting research, it is important to adopt an approach that ensures the reliability and validity of research results. On this note, Sürücü and Maslakci assert that ensuring the reliability and validity of the research to yield sound results is an important aspect of the research process (Sürücü and Maslakci, 2020). They further argued that if research is reliable, the same result should be obtained if such investigation is carried out by another researcher who adopts the same process (Heale and Twycross, 2015). Therefore, to ensure the reliability and validity of this research results, reputable secondary data were extracted from sources such as Bloomberg, the London Stock Exchange and audited financial reports. In cases where minor inconsistencies were noted, priority was given to information disclosed directly by AstraZeneca. Reliability has also been enhanced by adopting an event study methodology, which, in Armitage's view, provides a clear and consistent analysis of the data used, along with consistent formulas and regression analysis (Armitage, 1995). Since validity concerns the accuracy and truthfulness of research findings, financial metrics such as ARs and CARs, well-defined estimation and event windows, and hypothesis testing were employed to assess the significance of the results (Klein and Moescherger, 2003).

Results And Discussion

Reaction of AZN stocks

As examined in Table *1*, AstraZeneca's calculated CARs from dividend announcements generally triggered positive reactions. From the 12 events studied, 66.6% of reactions to dividend announcements were positive and 33.3% were negative.

Dividend Announcement	CAR	Interpretation
30/06/2015	2.33%	Positive reaction
31/12/2015	0.10%	Positive reaction
30/06/2016	13.48%	Positive reaction
31/12/2016	1.65%	Positive reaction
30/06/2017	-6.55%	Negative reaction
31/12/2017	3.80%	Positive reaction
30/06/2018	-0.20%	Negative reaction
31/12/2018	0.63%	Positive reaction
30/06/2019	0.71%	Positive reaction
31/12/2019	-1.06%	Negative reaction
30/06/2020	1.13%	Positive reaction
31/12/2020	-0.53%	Negative reaction

TABLE 1: The dividend announcements that illustrate variability in market reaction from 2015 to 2020.

Evidence from Table 1 suggests that AstraZeneca's calculated CARs from dividend announcements generally triggered positive reactions (Please note that the post-event date extends from 31st December 2020 to 7th January 2021).
Source: Authors' own creation. CARs, Cumulative Abnormal Returns.

However, the dividend announcement on 30 June 2016 stood out most prominently, with a CAR of 0.134764100 (13.4764%). This unusually strong market reaction was largely linked to the AstraZeneca Investor Science event at ASCO, where the pipeline/oncology news was announced. Similarly, the EU approval of Zavicefta in June 2016 - the AstraZeneca's new antibiotic was a contributory factor to the increase in the company's share price in June 2016 (AstraZeneca, 2016). Furthermore, in June 2016, the company announced an increase in dividend payout. This, along with news of the development and approval of a new product, triggered positive investor reactions. This investor reaction to the noted factors is consistent with Lintner's assertion that investors often interpret dividend announcements as signals (Lintner, 1962) (Figure *2*).

These events are considered potential factors that may have influenced investor sentiment and market behaviour during the study period. However, given the study design and methodology, it is not possible to establish a direct causal relationship between any individual event and the observed abnormal returns. Accordingly, these events are presented as plausible explanations for the market reaction rather than confirmed causes.

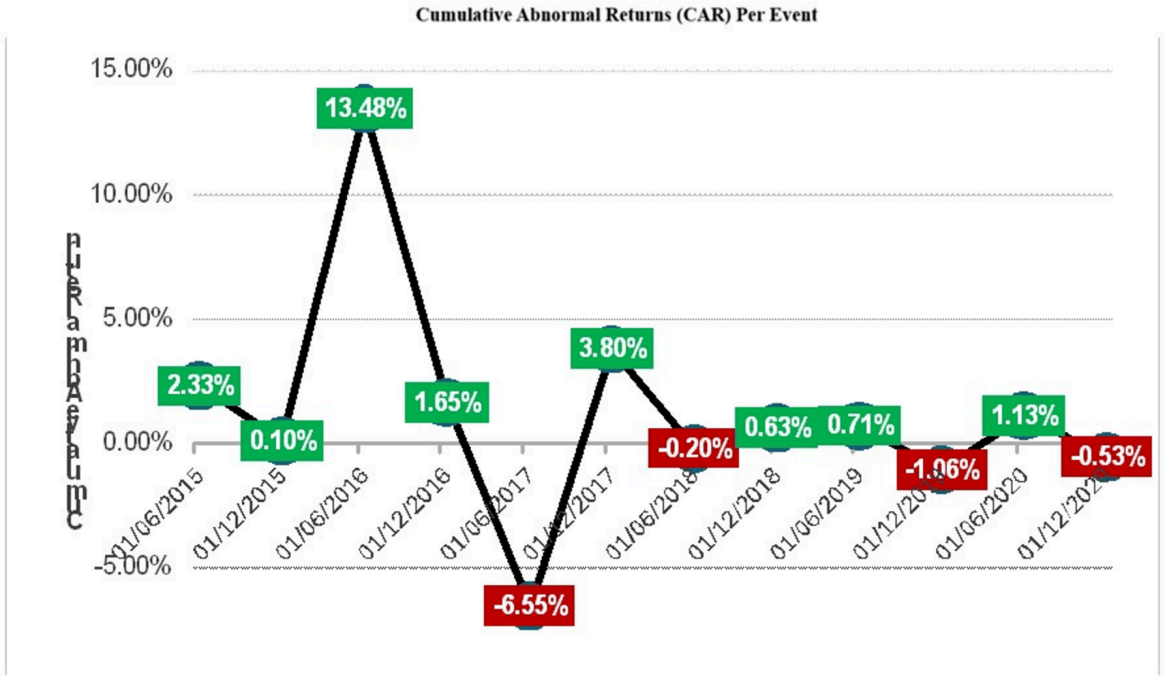


FIGURE 2: Cumulative abnormal returns per event.

The figure shows the CAR per event and summarises the examined investors' reactions to AstraZeneca's dividend announcements. The examined data suggest a non-uniformly positive reaction to dividend announcements.
Source: Authors' own creation. CARs, Cumulative Abnormal Returns

Based on the data, investors' reactions to AstraZeneca's dividend announcements were not uniformly positive (see Figure *2*). The data show negative abnormal returns, notably on 30 June 2017, with a CAR of -6.55%. This event could rationally be explained in the context of investors being concerned about the company's drug-development pipeline and the unpredictable expected results of its MYSTIC lung-cancer trial AstraZeneca (AstraZeneca, 2024). This is vital because the company's future growth is dependent on successful new medicines, most importantly, its immuno-oncology drugs. This explains why the investors were nervous ahead of the MYSTIC trial results. Hence, when the results were announced, the tests failed. This had a significant effect on the company's share price. This suggests investors should not always view dividend declarations as signs of strength. This finding is consistent with Lintner's position because, either way, investors reacted to the announcements (Lintner, 1962). These mixed outcomes are reflected in the CAAR, which was calculated at 0.0129. This points to a generally positive but inconsistent reaction to AstraZeneca's dividend announcements from 2015 to 2020.

The negative CAR observed during this period may be associated with investor reactions to the announcement of the MYSTIC trial results, which were considered an important development within AstraZeneca's oncology pipeline (Tirrell, 2017). However, as the present study did not include a formal attribution analysis, the MYSTIC trial is discussed as a potential explanation for the observed market reaction rather than a confirmed cause. Other firm-specific, industry-related, or broader market factors occurring during the same period may also have contributed to the observed stock price movements.

Data analysis and hypothesis testing

The regression analysis conducted over the 120-day estimation window helped to confirm that the market model was appropriate for this study. The beta (β) coefficient was calculated as 0.69, and the alpha (α) value was very close to zero, indicating a moderately strong relationship between AZN's returns and broader market sensitivity, as shown in Table *2*.

Summary Output								
Regression Statistics								
Multiple R	0.48082							
R Square	0.23118							
Adjusted R Square	0.23061							
Standard Error	0.01403							
Observations	1350							
ANOVA								
	df	**SS**	**MS**	**F**	**Significance F**			
Regression	1	0.079736	0.07974	405.3457	4.99E-79			
Residual	1,348	0.265165	0.0002					
Total	1,349	0.344901						
	Coefficients	**Standard Error**	**t Stat**	**P-value**	**Lower 95%**	**Upper 95%**	**Lower 95.0%**	**Upper 95.0%**
Intercept	0.00025	0.00038173	0.64273	0.52050837	-0.0005	0.00099	-0.0005	0.00099
X Variable 1	0.69319	0.03443025	20.1332	4.99E-79	0.62565	0.76073	0.62565	0.76073

TABLE 2: The regression analysis conducted over the 120-day estimation window.

The regression analysis was conducted over the 120-day estimation window. The beta (β) coefficient was calculated as 0.69, and the alpha (α) value was very close to zero, indicating a moderately strong relationship between AZN's returns and broader market movements.
Source: Authors' own creation.

The beta value of 0.693 has a $p < 0.001$, which is below the set significance level of 5% (see Table *3*). This suggests that AstraZeneca's (AZN) stock returns move in the same direction as the FTSE 100 Index. This means that while the company's stock was influenced by general market trends, it still has a noticeable amount of its own independent movements. This shows that firm-specific dividend announcements can cause stock prices to react differently from the overall market. In a perfectly efficient market, a b closer to 1 would suggest that company-specific events have little effect. However, since it is less than 1, it suggests that AstraZeneca's stock price probably experienced abnormal returns caused by its own announcements, such as dividend announcements.

The standard deviation of the sample was calculated as 0.04385 (see Table *3*), meaning that abnormal returns around AstraZeneca's dividend announcements varied by about 0.04385 (4.39%) from the average return. A higher standard deviation indicates that the stock's abnormal returns were spread out, indicating that some announcements caused strong reactions while others had little to no effect. This finding could be argued to be in line with the Miller and Modigliani (Miller and Modigliani, 1961) argument of dividend irrelevance.

To statistically test whether dividend announcements had a significant impact on AZN's stock price, a t-test was conducted on the CARs. This was to confirm whether the examined AZN stock price reaction was large enough to be unlikely to have occurred by chance. In the process, the null hypothesis (H_0) was that when CAAR = 0, it indicates no impact, while the alternative hypothesis (H_1) proposed that if CAAR ≠ 0, it indicates an impact. Table *3* revealed a positive mean CAR of 0.0129 around dividend announcement dates. The one-sample t-test result suggests that the mean CAR was not significantly different from zero ($t = 0.349$, $p = 0.499$). Based on these results, the study did not find sufficient evidence to reject the null hypothesis, suggesting that dividend announcements did not have a statistically significant impact on stock prices. With these results, the null hypothesis was not rejected, since there was no significant difference between the two variables under investigation. As such, the study found insufficient evidence to reject the null hypothesis. This implies that there is insufficient evidence to conclude that AstraZeneca's dividend announcements during 2015-2020 consistently generated abnormal stock returns (See Table *3*). The t-test conducted on AstraZeneca's CARs. As the p-value = 0.499, which exceeds the 5% significance threshold, the null hypothesis cannot be rejected. This suggests that dividend announcements did not generate significant abnormal returns for the sampled firms during the study period. Consequently, the findings imply that the market did not react strongly to dividend announcements, or that any price adjustments associated with the announcements had already been anticipated and incorporated into share prices.

Dividend Announcement	CAR
30-06-2015	0.023255324
31-12-2015	0.000974024
30-06-2016	0.1347641
31-12-2016	0.016548809
30-06-2017	-0.06551118

31-12-2017	0.038031775
30-06-2018	-0.0019717
31-12-2018	0.006316749
30-06-2019	0.007142666
31-12-2019	-0.01055001
30-06-2020	0.011281327
31-12-2020	-0.00532028
Mean	0.012913468
Standard Deviation	0.043851745
T-Test	0.349718072

TABLE 3: The t-test conducted on AstraZeneca's cumulative abnormal returns (CARs).

To statistically test whether dividend announcements had a significant impact on AZN's stock price, a t-test was conducted on the CARs. The t-test result of 0.34 indicates that there was no strong statistical evidence that the dividend announcements had a significant impact on AZN stock price. Source: Authors' own creation.

Discussion

The findings of the study produced a mixed picture when measured against the research objectives. The first objective, aimed at identifying the impact of dividend announcements on stock prices, showed that while certain events resulted in notably high CARs, the overall pattern remained inconsistent, and statistical testing indicated that AstraZeneca's dividend announcements did not have a significant effect on its stock price during the observed period. This is consistent with the M&M (1961) dividend-irrelevant argument but in contrast to Gordon's claim that investors prefer current certain dividends to uncertain future capital gains - the bird-in-the-hand argument (Gordon, 1959). This explains why Lintner suggests that a firm must have a target ratio, create a stable dividend policy and adjust dividends gradually because of the value that investors ascribe to dividend announcements (Lintner, 1956). So, the bird-in-the-hand theory argues that investors value a certain dividend today more highly than an uncertain capital gain in the future, which contradicts M&M's assumption of investor indifference. Consistent with the M&M position, this study did not find significant evidence to suggest that AstraZeneca's dividend announcements had a significant effect on its stock price during the examined period.

In testing the second objective, the results showed limited support for the Dividend Signalling Theory and the Dividend Valuation Model, as only a few announcements elicited strong positive stock reactions. This suggests that dividends may sometimes signal a firm's strength but not reliably. The overall lack of significant results aligns more closely with Modigliani and Miller's Dividend Irrelevance Theory, which argues that in efficient markets, dividends do not influence firm value, as reflected in investors' inconsistent responses (Miller and Modigliani, 1961). In addition, Gordon's Growth Model, which argues that rising dividends increase stock value, appears inconsistent with this study's findings because, despite AstraZeneca maintaining stable dividend growth, share prices did not respond consistently (Gordon, 1959). Compared with previous studies, these results align closely with Pettit's work, which found that dividend announcements do not always lead to significant abnormal returns, especially in markets influenced by broader economic events (Pettit,

1972). However, the outcomes differ from studies such as Lonie et al., which reported strong positive stock price reactions to dividend increases in the UK (Lonie et al., 1996). Differences in findings may be due to AstraZeneca's position in the pharmaceutical industry, where stock valuations depend heavily on research breakthroughs, regulatory news, and global market conditions rather than dividend announcements alone.

The final objective of empirically testing dividend theories using AstraZeneca as a case study was achieved through event study methodology and hypothesis testing. Although individual dividend events occasionally generated short-term market reactions, the overall findings indicate that dividend announcements are not a reliable predictor of stock price movement for AstraZeneca. By providing updated evidence from a leading pharmaceutical firm in the UK market, this research contributes to the understanding that while dividend policy is relevant, it is often seen alongside other factors in influencing stock prices.

Limitations of the Study

The study relied mainly on secondary data sources from Bloomberg and AstraZeneca's financial reports. Although secondary data limits control over the data collection process and raises concerns about accuracy and completeness, these risks were mitigated by cross-verifying the information from multiple sources and prioritising official company disclosures (Shipman, 1988). Additionally, some stock return data were missing on some event dates. To address this issue, missing data were carefully managed by focusing only on available trading days and adjusting event windows as needed to ensure that calculations remained stable and comparable across all events. The adoption of the event study approach also presented limitations, as it assumes markets react solely and immediately to the event of interest. Realistically, external factors such as pharmaceutical news, regulatory changes, and Brexit-related developments may have influenced AstraZeneca's stock price during the event window. To reduce this impact, a short 10-day window was chosen to minimise the chance of confounding news which may impact the results. Although this cannot be eliminated, the chosen short 10-day window resolves the problem. It is also worth noting that the study was based on a single firm within the pharmaceutical industry. As such, the findings cannot be generalised, as firms operating in different sectors are usually influenced by different factors that are peculiar to each industry. It is therefore unrealistic to assume that the behaviour and events taking place in one industry should be assumed for all industries and market environments.

Contribution of the Study

The findings offer important theoretical and practical implications:

Theoretically, they showcase that dividend announcements alone may not be strong market signals in modern markets. Practically, investors should avoid relying solely on dividend declarations when making investment decisions, particularly in sectors like pharmaceuticals, where new developments may have greater influence. It must be recognised that while stable dividend policies may support investor confidence, they are unlikely to drive significant stock price increases alone.

The study contributes to the understanding of how investors process and react to financial information when multiple announcements occur simultaneously.

Conclusions

The study examined the impact of dividend announcements on stock prices in the UK stock market, using AstraZeneca PLC as a case study. To unravel the crux of the discourse, the study examined the impact of dividend announcements on a firm's stock prices, assessed the relevance of dividend theories, and tested existing theories with empirical evidence from AstraZeneca.

The findings indicate that AstraZeneca's dividend announcements generally resulted in small positive CARs. However, market reactions were inconsistent, with some announcements producing negative CARs. Hypothesis testing using a t-test revealed no statistically significant abnormal returns. Therefore, the study found insufficient evidence to conclude that AstraZeneca's dividend announcements during the period under study consistently generated abnormal stock returns. In view of this, the study concludes that there is insufficient evidence to claim that dividend announcements

trigger reactions that consistently impact AstraZeneca's stock price. In addition, the random fluctuations in share prices in a few periods were largely due to some internal and external factors that are peculiar to the market structure in which the case study company operates. It is also important to stress that this is a small-scale study that focuses on a single case. To make a valid and generally acceptable claim on the effect of dividend announcements on stock prices, there is a need for further research that focuses on multiple cases across different market structures.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Taye T. Osadiya, Veronica Burlac

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Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:

- **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work.
- **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.
- **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Data Availability Statements

The datasets (and/or code) supporting this study are available from the corresponding author upon reasonable request. Declaration of Generative AI Use We did use Generative AI (Copilot) to proofread a few sections of this paper.

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