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Research paper

Measuring information asymmetry surrounding earnings announcements

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Abstract:
The primary objective of this research is to measure the information asymmetry before, during, and after earnings announcements and how it relates to the drift in post-earnings announcements over an extended period. The study uses the bid-ask spread as an information asymmetry proxy and employs a market model to assess daily data on Indonesia's equity market before, during, and after the earnings announcement. Data were analyzed using the t test and least squares regression. The study provides empirical evidence showing that the bid-ask spread increases significantly before the earnings announcement, indicating information uncertainties between sellers and buyers. The findings show that the market reacts to accounting information indicated by a significantly reduced bid-ask spread soon after the market digests the information, following the concept of semi-strong market efficiency. The study shows a cumulative abnormal return and bid-ask spread strongly correlated a few days following earnings. However, the analysis found no long-term association between bid-ask spread and post-earnings announcement drift. The study found that stock market sellers and buyers use accounting data to set prices and that earnings releases reduce the bid-ask difference. The study suggests that the market regulator supports timely disclosure of this information.

Keywords: Bid-ask spread, earnings announcement, information asymmetry, market efficiency.
Classification: MSC2010 or JEL Classifications: C12, G14, G15

1 Introduction

Information asymmetry is an essential issue in the capital market, as it impacts the investment choices made by stock market participants [24]. Another researchers [18] argued that an unequal distribution of information might influence the decision to buy and hold investments. Therefore, effective management of information asymmetry provides security for individual investors who, by nature, lack access to the same knowledge as inside investors. Furthermore, some scholars have linked the issue to market mispricing [31], market failure [25], and market inefficiency [41].

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The quality of accounting information is a significant factor in mitigating information asymmetry [28]. Another researchers [32] also observed a consistent and gradual increase in the bid-ask spread before earnings announcements, resulting in increased uncertainty in the market. Public disclosure of information during an announcement diminishes the need for private pre-announcements. Consequently, there would be a substantial rise in stock price volatility and trading volume when earnings announcements are made, resulting in another outcome. Furthermore, investors benefit from high-quality accounting information, enabling them to monitor management and facilitate efficient and effective investment decision-making. Additionally, it enhances capital allocation efficiency and increases returns for investors.

A market exhibits the presence of information asymmetry on systematic elements through the bid-ask spread [27]. The bid and ask spread, also known as the bid and offer spread, is the disparity between the bid prices proposed by potential buyers and the quoted ask or offer prices set by sellers [42] . When an investor expresses their desire to purchase a stock, the broker will inquire about the price at which it is sold. Alternatively, the broker will furnish the bid price when an investor plans to sell their shares. The spread must be large enough to cover expenses and generate a satisfactory return on investment for stakeholders. Thus, it represents the highest price a buyer is willing to make a transaction or the lowest price at which a seller is prepared to participate.

Based on its scale, the bid-ask spread can be classified as narrow, moderate, or wide [3]. These categories provide insightful analysis of market circumstances, liquidity levels, and possible trading expenses associated with certain assets. Usually found in large-cap equities with substantial trading activity, narrow spreads indicate great liquidity. Usually found in mid-cap equities or less actively traded large-cap stocks, moderate spreads indicate good liquidity but some risk of price effect. Conversely, wide spreadswhich surpass specific thresholdspoint to reduced liquidity and are typically associated with small-cap companies or those with limited trading volume, hence increasing transaction costs for investors [29] [15].

Investors can utilize bid-ask spread data in diverse ways according to their trading or investment approaches. Online traders, who often concentrate on short-term price fluctuations and liquidity, emphasize the bid-ask spread as it directly influences trading costs and execution efficiency [26] [6] [23]. A wider spread translates to higher costs since traders buy at the higher ask price and sell at the lower bid price. To mitigate these costs, traders prioritize assets with narrower spreads. Additionally, traders leverage the spread to time their trades strategically, such as placing limit orders within the spread to secure better prices or waiting for the spread to narrow before executing trades.

While long-term investors may not focus as intently on the bid-ask spread as short-term traders, it still plays a role in their decision-making. When entering or exiting positions, long-term investors incur costs from the spread, and a wider spread can diminish overall returns, particularly for sizable trades [17] [14]. More-

over, a sudden widening spread in a specific asset could indicate underlying issues like reduced liquidity or market stress [8], prompting long-term investors to reevaluate their investment strategies.

Due to its significance, the bid-ask spread has begun to be investigated in other financial domains, which has recently expanded beyond the stock market. Current study [34] implemented this concept in the derivatives market, utilising the Wang transform to derive bid and ask formulas for cap and floor contract prices within a Liouville fractional Vasicek (LfVasicek) interest rate model. The results indicated that interest rate values are more likely to fall within the bid-ask intervals as tension levels increase. The concept has also been applied to the options market. Another researchers [2] utilised a fractional geometric Brownian motion model with multiple risk sources and fuzzy parameters to develop a formula for calculating the price of geometric Asian power options with floating strike prices and transaction costs. Their research integrated sophisticated mathematical instruments, including stochastic calculus, fuzzy set theory, and numerical methods, emphasizing the bid-ask spread's ability to encapsulate market liquidity, uncertainty, and complexity. In addition to that, the concept has also been investigated in hedging transactions [12]. The researchers used a mixed fractional Brownian motion model with liquidity constraints to examine quantile hedging in a complete financial market. In this context, the bid-ask spread indicates the additional costs and hazards resulting from the long-range dependence and liquidity constraints inherent in mixed fractional Brownian motion.This study focuses on measuring bid-ask spread as the proxy of information in event of earnings announcement. During an earnings release, the difference between bid and ask prices shows that buyers and sellers have different opinions on the information shared during the announcement period. Therefore, a study on bid-ask spreads examines how market prices adjust rapidly to changes in supply and demand, ultimately reaching a new equilibrium. The power of supply and demand determines the stock market transactions, indicated by the spread in the bid and ask prices. Buyers often seek the lowest price when buying individual equities, while sellers anticipate selling at a higher price. Investors anticipate that the difference between the price at which they sell an investment and the price at which they buy it will be sufficient to cover the costs associated with the transaction and the expected returns.

Empirical research has been conducted to evaluate the impact of earnings announcements across various capital markets. In the study conducted by another researchers [36], an analysis of the Tokyo Stock Exchange (TSE) was undertaken. The study's findings indicate notable reductions in intraday day prices within five minutes after the earnings announcement. A study on the London Stock Exchange disclosed that more information asymmetry occurred during earnings announcements, which relates to the increase of bid-ask spreads, suggesting that market liquidity decreases at an earnings announcement [21]. Another study investigated the relationship between liquidity and information asymmetry in the context of

unforeseen disclosure events within the Australian mining industry [27]. The study revealed a substantial increase in abnormal bid-ask spreads before financial report announcements, followed by a rapid decline after the occurrence. The effect above is particularly prominent in smaller enterprises, particularly when any other announcement within the preceding month does not precede announcements. The research above suggests that the influence of earnings announcements on bid-ask spread may vary depending on the market's unique characteristics.

The primary objective of this research is to measure the information asymmetry phenomenon before, during, and after earnings announcements and how it relates to the post-earnings announcement drift (PEAD) over an extended period. This study aims to address the gap in the literature regarding the relationship between bid-ask spreads and PEAD. Specifically, it seeks to investigate how changes in the bid-ask spread surrounding earnings announcements affect the magnitude and persistence of post-announcement price movements. Understanding this relationship is crucial for investors, as wider bid-ask spreads may signal higher trading costs and lower liquidity, potentially exacerbating the effects of PEAD. Furthermore, the implications of these dynamics extend to market efficiency and the behaviour of traders, particularly in how they respond to new information in the context of their trading strategies. By exploring the interplay between bid-ask spreads and post-earnings announcement drift, this research aims to provide insights that can enhance understanding of market behaviour and inform investment strategies. Ultimately, the findings will contribute to the broader discourse on market efficiency and liquidity, offering valuable implications for practitioners and academics in finance.

The core objectives of the study areas lie in four areas. First, the study measures the information asymmetry before the earnings announcement, indicated by the bid-ask spread. Second, the research continues to measure whether the earnings announcement may reduce the bid-ask spread. Third, the study measures the significant relationship between cumulative abnormal return and bid-ask spread a few days after an earnings announcement. Fourth, it measures the relationship between bid-ask spread and post-earnings announcement drift.

2 Theoretical framework and literature review

The concept of market efficiency theory strongly correlates with market liquidity [47] [33]. Liquidity in stock markets holds great importance for several stakeholders, including traders, regulators, stock exchanges, and listed companies. Another researchers stated that market liquidity is the capacity to expeditiously sell an asset without causing substantial depreciation in its value [13]. A capital market is considered liquid when participants can engage in transactions with low trading costs [35]. In addition to that, a liquid capital market was defined as exhibiting a low bid-ask spread [5].

Conversely, when the transaction volume is insufficient to sustain market turnover,

a stock's illiquidity increases, increasing the likelihood of other associated risks. An illiquid market is associated with a low trading frequency and the potential for both losses and gains among investors due to heightened price volatility [21]. Illiquidity within stock markets directly impacts the cost of equity, leading to increased business expenses. Furthermore, it also has a dampening effect on corporate investments and overall economic activities. The presence of low liquidity within the stock market is associated with enhanced long-term investment and increased countries' productivity growth [4].

One of the critical indicators of measuring illiquidity is the bid-ask spread. The bid-ask spread is a widely used indicator of market illiquidity [23]. The bid represents the price the market is willing to buy, while the ask represents the price the market is ready to sell. In other words, a study about bid-ask spreads views market reaction from the supply and demand perspective by which the selling and buying prices react quickly and establish a new price equilibrium. Supply and demand determine transactions in the stock market determine. In other words, as market liquidity suggests, bid-ask prices facilitate stock price movements, determining stock returns. When purchasing individual stocks, buyers prefer the lowest price; however, sellers expect to sell higher. Investors expect the spread between the selling and buying price to cover the transaction costs and the expected returns.

Several researchers use bid-ask spread as the proxy of information asymmetry [19] [46] [27]. Its movement is frequently linked to specific events and examined by calculating abnormal returns. Researcher examines the information asymmetry surrounding financial acquisition and relates it to the cumulative abnormal returns during the event [37]. The study reports higher information asymmetry surrounding acquisition and increased abnormal returns due to uncertainty. Similarly, other researchers [20] documented a significant increase in the bid-ask spread of stock prices in the USA, UK, Brazil, China, Germany, and Spain during the Covid-19 pandemic. Another event study also reported higher bid-ask spread and price volatility during the Russia-Ukraine conflict on the US market [10]. These findings indicate that uncertainty during a particular event may lead to higher information asymmetry, indicated by increased bid-ask spread in a stock market.

This study examines the information asymmetry proxied by bid-ask spread and links it to the abnormal returns during earnings announcement events. Several researchers [32] noted and reported imbalanced information before the release and documented a consistent upward trend in the difference between call and put, which implied volatility as the earnings announcement date approaches, based on a diverse range of earnings announcements. Like the study above, another researcher examined the effects of the constituent elements of the bid-ask spread on earnings releases on the London Stock Exchange, employing intraday data [21]. The study reveals a notable increase in the cost component of information asymmetry during earnings releases. In contrast, the cost components of stock holding and order processing experienced a significant decrease over a similar period.

In addition to the above findings, another researchers examined the US market and report that bid-ask spreads are wider before and narrow more slowly after announcements [22]. They also noted that following positive news, ask prices adjust almost instantaneously to the final ask price, and the bid side of the quote remains to adjust. However, different outcomes may happen in emerging markets due to market inefficiency [44].

Various discussions and studies have been linked to the impact of earnings announcements in market efficiency theory [38] [16]. Nevertheless, empirical research is being conducted in various markets, viewpoints, and methodologies to address this issue. Researchers commonly measure market reactions to earnings announcements by quantifying the extent of abnormal returns. Abnormal return refers to the disparity between the actual and anticipated returns that arise before the release of earnings information or as a result of the unauthorized disclosure of information. An abnormal return is considered positive when the actual return exceeds the expected return and negative when the expected return exceeds the actual return. Regardless of whether they are positive or negative, abnormal returns might pique investors' interest in doing transactions during the announcement period, with the expectation of achieving a financial gain or minimizing losses.

In addition to the above discussion, this study considers the argument of other researchers, who stated that when firms release more information on earnings surprises, stock prices might keep moving in the same direction for an extended period [45]. This phenomenon is known as post-earnings announcement drift (PEAD) and contradicts the efficient market hypothesis, which states that stock prices should incorporate all public information [38]. These positive (negative) post-earnings announcement drift scenarios may cause price volatility following the earnings announcement [1]. It may affect the stock prices in weeks or months [45]. The anomaly takes longer in an inefficient market due to the lack of investors who can exploit the mispricing opportunities and eliminate the drift.

Based upon theoretical background and literature review, the following hypotheses are examined in this study:

H1: Bid-ask spread significantly increases before the earnings announcement.

H2: Earnings Announcement Significantly Reduces Bid-Ask Spread.

H3: A significant relationship exists between cumulative abnormal return and bid-ask spread a few days after an earnings announcement.

H4: A significant relationship exists between bid-ask spread and post-earnings announcement drift.

3 Methodology

This study uses event study as the primary statistical measurement and bid-ask spread as the information asymmetry proxy. An event study is a statistical method of empirical investigation of the relationship between security returns and a specific

economic event. Researchers suggested this measurement as they believe it gives direct evidence of information efficiency [39]. This method measures an unanticipated event's effectiveness on stock prices [43], one of the primary ways to test market effectiveness, particularly in the semi-strong form [30]. The method is a powerful tool to help researchers assess the financial impact of corporate policy changes [11].

3.1 Data and Sample

The study examines the whole population of the IDX market, which published their financial statements for the year ending on December 31, 2018. During the period, Indonesia's economy was relatively stable, both before the COVID-19 outbreak and after the decade-long global financial crisis. The study utilizes a short-time horizon and daily data of the Indonesian equity market to measure the bid-ask spread from day 0 to 30 after the earnings announcement and compare them to the estimation window of 120 to 30 before the earnings announcement.

The data used in this study are secondary information compiled from various reliable sources, as outlined in Table 1. The table displays that this study uses www.idx.co.id as the primary data source. This official website of Indonesias financial market provides real-time publishing for market information. The website is also the means of reporting in which market members may submit their submissions.

The population for this study consists of all firms listed in the Indonesia Stock Exchange (IDX) that have reported their earnings announcement for the period ending on 31 December 2018. In the second quarter of 2019, the Indonesia Stock Exchange (IDX) reported 634 listed entities. Nevertheless, before 31 December 2019, some companies did not publish their reports publicly on the IDX website for several reasons. The sample selection removed 13 firms from the dataset, including five that did not provide their earnings announcement, five that were delisted, two that merged, and one that was suspended. Consequently, it decreases the sample size from 634 to 621 firms, representing 98.26 percent of the population. The samples are deemed adequate to describe the market representatively.

3.2 Measuring bid-ask spread and Significance Test for Information Asymmetry (H1 and H2)

The bid-ask spread is quantified using the below formula. The variables "Ask" and "Bid" in this formula indicate the ask and bid prices, respectively, as provided by the IDX for stock. The variable N represents the stock's total number of trading days within a specific calendar year.

$$BidAsk = (Ask - Bid)/((Ask + Bid)/2)/N \tag{1}$$

Where:

BidAsk is the bid-ask spread of the stock at the announcement date;
Ask is the average ask price of the stock at the announcement date;
Bid is the average bid price of the stock at the announcement date;
N is the number of days.

3.3 Measuring abnormal returns

The study uses the market model to measure abnormal returns. The market model is a statistical model that relates the return on stock to the return on the stock market portfolio. Researchers recommended the Fama-French-Carhart model for assessing event studies using monthly data or examining the abnormal returns over long-term periods. However, the market model is recommended for daily data assessment [40] [9] [7].

The daily returns of the firms' stock prices are calculated using the following formula.

$$R_{i,t} = ln(P(i,t)/P(i,t-1)) \tag{2}$$

Where
$R_{(i,t)}$ = Daily return
$P_{(i,t)}$ = Closing price on day t;
$P_{(i,t-1)}$ = Closing price on day t - 1;
The study calculates the abnormal returns by using the following equation.

$$AR_{(i,t)} = R_{(i,t)} - (\alpha_i + \beta_i R_{mt}) \tag{3}$$

Where:
$AR_{(i,t)}$ = Abnormal return;
$R_{(i,t)}$ = Daily stock returns;
$R_{(mt)}$ = Daily market index returns;
αi = Intercept of firm and market returns in estimation window;
β_i = Slope of firm and market returns in estimation window.

The study computes the cumulative abnormal returns of the stocks after determining the abnormal return. The following formula calculates cumulative abnormal return (CAR) and total abnormal returns (AR) for the firm stock prices during the event period.

$$CAR_{i,t} = \sum_{t=1}^{n} AR_{i,t} \tag{4}$$

Where:
$CAR_{(i,t)}$ = Cumulative abnormal return;
$AR_{(i,t)}$ = Abnormal return.

3.4 Estimation Model and Significance Test of Hypothesis H3 and H4

The study uses the following estimate model to assess the relationship between bid-ask spread (BidAsk) and firms' cumulative earning announcement returns (CARs). The control variables and constant in this study consist of earnings per share (EPS), total asset (Size), and debt-to-equity ratio (DER). The variables above serve as supplementary explanatory variables in the regression model, aimed at assessing the extent to which the control factors influence the examination outcomes.

$$CAR_{i,t} = \beta_0 + \beta_1 BidAsk + \beta_2 EPS + \beta_3 Log(Size) + \beta_4 DER \quad (5)$$

Where:
$CAR_{i,t}$ = Cumulative abnormal returns post-earning announcement;
BidAsk = Changes in Bid-Ask Spread from Q3 to Q4 2018;
EPS = Earning per share reported in Q4 2018;
Log(Size)= Natural log of total assets on Q4 2018;
DER = Debt-to-equity ratio on Q4 2018.

The study uses the least-square regression (OLS) to test H3 and H4 and examine the significant relationship between changes in bid-ask spread and cumulative abnormal returns (CAR) in short and extended periods. The study's confidence levels are 90, 95, and 99 percents, corresponding acceptable errors of 10, 5, and 1 percents. The sample size will fall between the estimated population mean of 1.645, 1.96, and 2.58 standard deviations, according to the 90, 95, and 99 percents confidence intervals. Therefore, when the absolute t-value is 2.58 or higher, a distribution is deemed abnormal at a 99 percent confidence level (Sig***). The distribution is abnormal at a 95 percent confidence level (Sig**) if the value falls between 1.96 and 2.58. The distribution is deemed abnormal at a 90 percent confidence level (Sig*) if the result falls between 1.645 and 1.96. A value of less than 1.645 indicates that the distribution is expected; therefore, the AR, CAR, or CAAR are insignificant.

4 Findings and Discussion

4.1 Bid-Ask Spread Changes Post-Earnings Announcements

Table 1 illustrates the fluctuations in the bid-ask spread throughout the transition from the third quarter to the fourth quarter of 2017. The table illustrates the distribution of firms experiencing an increase in bid-ask spread within different time windows. Specifically, it reveals that within the time windows of (0, +5), (0, +10), (0, +15), and (0, +30), there were 285 (or 46 percent), 279 (or 45 percent), 285 (or 46 percent), and 322 (or 52 percent) firms, respectively, with an increase in bid-ask spread. The corresponding percentage changes in bid-ask spread were 143, 107, 143, and 140 percents, respectively. In contrast, it is observed that 336 firms,

accounting for 54 percent of the total, had a decrease in bid-ask spread by -72 percent in the specified window. Similarly, 342 firms, representing 55 percent of the total, witnessed a decrease in bid-ask spread by -68 percent. Additionally, 336 firms, comprising 54 percent of the total, observed a decrease in bid-ask spread by -72 percent. Lastly, 299 firms, constituting 48 percent of the total, experienced a drop in bid-ask spread by -50 percent in the respective windows. The data suggests that approximately 50 percent of the companies listed in the IDX experience an increase in the bid-ask spread near the announcement date.

Table 1. Bid-Ask Spread Post-Earning Announcement

Window	No of Firms	No of Firms (%)	Average Bid-Ask Spread
(0, +5)			
Increase	285	46%	143%
Decrease	336	54%	-72%
(0, +10)			
Increase	279	45%	107%
Decrease	342	55%	-68%
(0, +15)			
Increase	285	46%	143%
Decrease	336	54%	-72%
(0, +30)			
Increase	332	52%	140%
Decrease	299	48%	-50%

4.2 Bid-Ask Spread and Abnormal Returns Post-Earnings Announcements

This research examine the bid-ask spread as a measurement tool for assessing information asymmetry. The bid price represents the market's willingness to buy, while the asking price indicates the market's willingness to sell. This research investigates market responses from the perspective of supply and demand, with a specific emphasis on the prompt adjustment of selling and buying prices. Therefore, it examines the bid-ask spread after disseminating earnings releases, juxtaposing it with the mean spread seen within the estimating period. Table 2 presents the bid-ask spread for the event and estimation windows and the accompanying average aggregate return (AAR) for the respective dates.

Table 2. Bid-Ask Spread (B/A) and Average Abnormal Returns (AAR)

Day	B/A Mean (0, +30)	B/A Mean (-120, -31)	Changes	ARR
0	3.62%	3.21%	13%	-0.26%
1	3.19%	3.21%	-1%	-0.28%
2	3.15%	3.21%	-2%	-0.52%
3	3.21%	3.21%	0%	-0.35%
4	3.30%	3.21%	3%	-0.37%
5	3.54%	3.21%	10%	0.07%
6	3.23%	3.21%	0%	-0.00%
7	2.96%	3.21%	-8%	-0.04%
8	2.95%	3.21%	-8%	-0.14%
9	3.43%	3.21%	7%	-0.26%
10	2.96%	3.21%	-8%	-0.39%
11	3.13%	3.21%	-2%	0.05%
12	3.51%	3.21%	9%	-0.15%
13	3.44%	3.21%	7%	-0.11%
14	3.36%	3.21%	5%	-0.19%
15	3.56%	3.21%	11%	-0.13%
16	4.24%	3.21%	32%	-0.14%
17	3.99%	3.21%	24%	-0.08%
18	3.92%	3.21%	22%	0.02%
19	3.60%	3.21%	12%	-0.13%
20	3.71%	3.21%	15%	-0.14%
21	3.53%	3.21%	10%	-0.02%
22	3.70%	3.21%	15%	-0.37%
23	3.41%	3.21%	6%	0.05%
24	3.82%	3.21%	19%	-0.02%
25	3.83%	3.21%	19%	-0.04%
26	3.48%	3.21%	8%	0.01%
27	3.74%	3.21%	17%	-0.16%
28	3.79%	3.21%	18%	0.11%
29	3.80%	3.21%	18%	-0.11%
30	3.55%	3.21%	10%	-0.05%
Min	2.95%	3.21%	-8.00%	-0.52%
Max	4.24%	3.21%	32.00%	0.11%
Mean	3.50%	3.21%	9.06%	-0.13%

Furthermore, the study includes Table 3, which exhibits the statistical data

about the bid-ask spread and the average abnormal return (AAR) during 30 days, from 0 to day +30. The table presents data indicating that the most observed change, totalling 0.32, occurs on day +16, while the minimum change, reaching -0.08, is documented on days +7, +8, and +10. The second day exhibited the lowest average annualized return (AAR), while the highest AAR of 0.0011 was observed on the twenty-eighth day. The mean bid-ask spread exhibits a magnitude of 0.09, indicating an upward displacement in the bid-ask spread following the release of earnings information. Consequently, this results in a reduction in the average abnormal returns by an average of 0.13%.

Table 3. Bid-Ask Spread and the ARR Post-Earnings Announcements

Description	N	Min	Max	Mean	Std. Dev
Changes in Bid-Ask Spread	31	-0.0835	0.3206	0.0908	0.0984
AAR	31	-0.0052	0.0011	0.0013	0.0015
Valid N (Listwise)	31				

The bid-ask spread during the announcement period is shown in Figure 1, with the average spread observed in the estimation window of (-120, -31), which remains unchanged by the announcement. The provided graph depicts a conspicuous increasing trajectory in the bid-ask spread for the time intervals of day +0, day +5, day +9, and from day +12 to day +30. The study documented negative changes on days +1, +2, +7, +8, +10, and +12. The visual depictions demonstrate that the bid-ask spread surrounding the earnings announcement displays a broader range than the spread recorded throughout the unconstrained period of the estimation window.

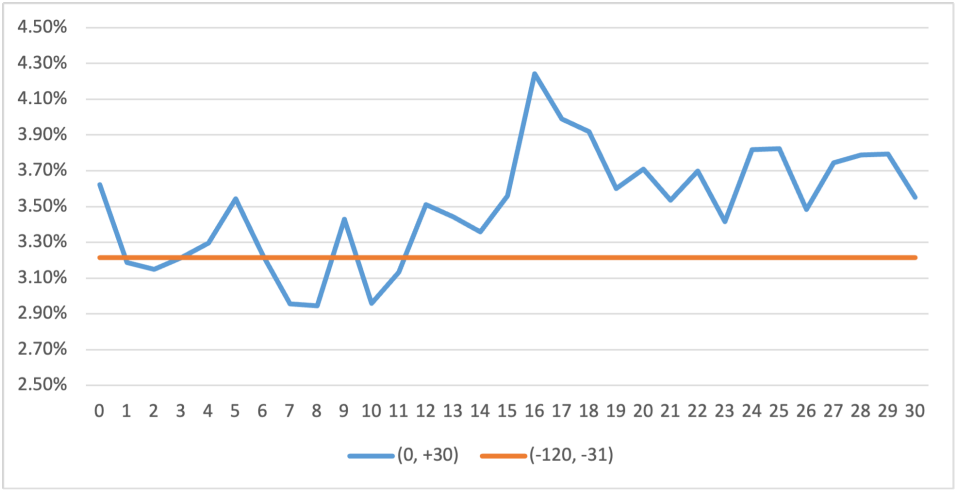

Figure 1: Bid-Ask Spread Responses on Post-Earning Announcement

4.3 Bid-Ask Spread and Earnings Announcements Returns

The regression analysis results about the association between cumulative abnormal returns and bid-ask spread over several time frames, specifically (0, +5), (0, +10), (0, +15), and (0, +30), are presented in Table 4. The examination is performed with and without incorporating a control variable. The coefficient values of -0.0272** and -0.0264 were observed in the initial week following the earnings announcement, as presented in the table. The values indicate a statistically significant association with a confidence level of 95 oercent, irrespective of the presence or absence of control variables. The presented table illustrates the lack of relevance of coefficient values across several time frames, namely (0, +10), (0, +15), and (0, +30). The coefficient values for including and excluding control variables are -0.0203, -0.0191, -0.0011, -0.0213, 0.0204, and -0.0014, respectively. The findings indicate a statistically significant correlation between the bid-ask spread and the earnings release. However, it must be noted that this association is only evident outside the announcement time. Moreover, there is scepticism over the existence of a post-earnings announcement drift. The data displayed in the table indicates that the control variables do not exert a statistically significant influence on the relationship between the bid-ask spread and the cumulative abnormal returns recorded during post-earning announcement periods.

Table 4 CAR and BidAsk With and Without Control Variable (CV)

Window	C	BidAsk	EPS	Log(Size)	DER	R^2	F-Stat
Without CV							
(0,+5)	-0.31	-0.03**				0.03	3.41***
(0,+10)	-0.18	-0.02				0.04	3.12***
(0,+15)	-0.11	-0.02				0.03	3.08***
(0,+30)	-0.03	-0.00				0.06	6.63***
With CV							
(0,+5)	-5.51	-0.03**	-0.01	2.07	0.01	0.03	2.58***
(0,+10)	-3.92	-0.02	-0.00	1.48	0.02	0.04	3.09***
(0,+15)	-3.65	-0.02	-0.00	1.40*	0.01	0.04	2.47***
(0,+30)	-2.09	-0.00	-0.00	0.84	-0.00	0.06	4.63***

This study proceeds with the examination of control variables, namely earnings per share (EPS), total assets (Size), and debt-to-equity ratio (DER), in order to examine their effects. The analysis involves a comparison between the model that includes the control variable and the model that does not include the control variable. The above table displays the comparable significance patterns of both models over all examined windows for the EPS and DER control variables. Both results were shown to be significant only in the initial window, while their significance

diminished in subsequent broader windows. The findings suggest that the control variables do not significantly influence the model's output. The abnormal earnings announcement returns pattern is mainly consistent regardless of whether the model incorporates or omits control factors. Upon analyzing the control variables about the firm's size, it is evident that the control variables do not influence the examination outcome.

The research findings indicate a noticeable decline in the bid-ask spread, which decreased from 13 percent on day 0 to -1 percent on day +1. The findings are consistent with Gregoriou's (2013) assertion that earnings releases reduce information asymmetry and the bid-asking spread. It demonstrates a noteworthy correlation between cumulative abnormal returns and bid-ask spread immediately following the earnings announcement. The observed trend suggests the presence of semi-strong market efficiency in the IDX market, as seen by the decrease in bid-ask spread immediately after the event. The findings are consistent with the study conducted by Lei et al. (2020), indicating that the market response to the public announcement is influenced by the atypical bid-ask spread following the earnings announcement. However, this relationship is transient, limited to a brief timeframe, and the relationship to the post-earnings announcement is insignificant. This conclusion aligns with the characteristics of a semi-strong form of market efficiency.

5 Conclusion

The research findings indicate an increase in bid-ask spread before the market digests the information released in the earnings announcement. The study indicates that the market reacts to accounting information reported in the earnings announcements, following the semi-strong form of market efficiency. The reaction is noticeable, with a significantly reduced bid-ask spread soon after the market absorbs the accounting information provided in the release. The study reports that a significant relationship exists between cumulative abnormal return and bid-ask spread a few days after an earnings announcement. However, examination for a more extended period reports an insignificant relationship between bid-ask spread and post-earnings announcement drift. The findings show that earnings announcements reduce information asymmetry between stock buyers and sellers in the short term, following the concept of semi-strong market efficiency.

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