Master Thesis

Has the Information Content of Quarterly Earnings Changed During the Covid-19 Pandemic?

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Preface

The content of this thesis is the sole responsibility of the author and does not reflect the view of either the supervisor, second assessor, Erasmus School of Economics or Erasmus University.

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Abstract

This study examines whether the information content of earnings has changed after the emergence of the Covid-19 pandemic by using abnormal share returns as a measure in the three-day period surrounding quarterly earnings announcement dates. The results provide evidence that the value relevance of the quarterly earnings decreased during Covid-19 since the extent of a firm's abnormal share returns in response to unexpected earnings was significantly lower during that time. The findings suggest that the reported earnings were less useful for stock valuation purposes during the pandemic. In addition, the results also show that the profitability of the companies has substantially declined, and earnings consensus surprises increased during the pandemic.

Introduction

The emergence of Covid-19 has caused significant economic downturns and uncertainties around the world, affecting more than 200 countries (Zhang et al., 2020). The rapid spread of the virus and the rising number of cases has triggered actions from the governments that had significant economic impacts. Many countries have imposed strict restrictions and lockdowns to slow the spread of the virus, which caused a dramatic drop in employment, consumer spending, and economic output (Coiboin et al., 2020). Since most businesses are forbidden to remain fully operational during the imposed lockdowns, they experienced a significant decline in their revenues that lowered their stream of expected future cash flows. (Mazur et al., 2020) Consequently, a sudden change in the firm's expected future cash flows and economic uncertainty arise with the emergence of the pandemic had a dramatic impact on financial markets around the world.

Since the outbreak of Covid-19, there is an increasing number of studies that focus on stock market reactions to the financial crises caused by the pandemic (Hong et al., 2021; Machmuddah et al., 2021; Ramelli and Wagner, 2020). The overall consensus is that the return predictability decreased while the price volatility and volume of the stock trade significantly increased following the emergence of the pandemic. However, those studies did not examine whether the value-relevance of the reported earnings has changed during the Covid-19.

The Covid-19 pandemic can be seen as one incidental event that is not repeated every year, but the world is still yet to recover from the pandemic and due to increased globalization and the growing population, it is possible to have a new pandemic at any time soon. Therefore, it is crucial to understand how the market participants respond to the accounting information provided by the companies following the emergence of the Covid-19 and whether the value relevance of the earnings has changed compared to a period prior to the pandemic.

This study uses abnormal share returns in the three-day period surrounding quarterly earnings announcements to measure the information content of the earnings before and after the emergence of the Covid-19. Accordingly, the value relevance of the earnings for both periods are computed. The combined sample includes 16300 firm-quarter observations for US-listed firms. To test whether the information content of the quarterly earnings has changed

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following the emergence of the Covid-19, this study conducts multivariate estimations that use abnormal earnings as the main independent variable and includes control variables identified by prior literature that can potentially affect the abnormal share returns.

Findings from the multivariate test indicate that the value-relevance of the quarterly earnings has significantly decreased following the emergence of the Covid-19, as measured by abnormal share returns. The result of univariate tests shows that the abnormal earnings have substantially increased during the Covid-19 period, which is in line with the expectation that the economic and firm-level uncertainties that arise with the pandemic have made it harder to estimate the earnings per share for firms. Even though the cumulative abnormal returns also increased in the Covid-19 period, the rise of abnormal returns is not proportional to the increase in abnormal earnings. Thus, the market participants react less to the abnormal earnings during the Covid-19 period, and this provides evidence that the information content of the earnings has declined during the Covid-19 period.

The contribution of this study to the existing literature is twofold. First, this paper is the first to investigate the changes in value-relevance of earnings during the Covid-19 pandemic. It is crucial to understand whether the investors perceive earnings number more relevant and make economic decisions by relying more on them when the market risk and uncertainty is high. Secondly, there is mixed evidence in the existing literature about the value-relevance of earnings during economic downturns and uncertainties. Prior studies have covered previous financial crises and economic cycles that affected the information content of the earnings. Relatedly, this paper will provide further evidence about the usefulness of accounting information during crises and economic downturns.

The remainder of the paper is organized as follows. Section 2 summarizes the prior studies that are most closely related to the research question of this study and presents the hypothesis of the paper. Section 3 describes the research methodology to assess the differences in value-relevance of the quarterly earnings at the announcement dates for pre-and post-emergence of the Covid-19 that includes the calculation of abnormal share return and description of abnormal earnings. Section 4 describes the sample selection criteria along with the descriptive statistics of the sample. Section 5 presents the results of the estimating equations identified in section 3. Ultimately, section 6 presents the final discussions and concludes the study.

2. Literature Review and Hypothesis Development

2.1. The Value Relevance of Accounting Information

One important research agenda in financial accounting is how well accounting information represents the stock prices and returns. In this case, Ball and Brown (1968) were one of the first studies to initiate research on the usefulness of the accounting numbers provided by the companies. They conclude that unexpected earnings have a significant association with the abnormal share returns, and firms with positive abnormal earnings generally have positive abnormal stock returns and vice versa. Consistent with Ball and Brown (1968), the prior research generally uses earnings (net income) numbers to assess the information content of the accounting information, and they document that earnings are value relevant for stock valuations (Bamber, 1986; Beaver, 1968; Collins et al., 1997; Nichols and Wahlen, 2004).

Barth et al, (2001) states that the accounting information can be considered value relevant if it has a predicted relationship with the market values of the equity, i.e., stock price and returns. Accordingly, Beaver (1968) provides three theoretical links between earnings and share prices. First, the theory assumes that the current period earnings contain information that the stakeholders can use to predict future expected earnings. Secondly, the current and future expected earnings provide information to anticipate future expected dividends. Ultimately, the theory assumes that a firm's share price reflects the present value of all expected future dividends. Based on these assumptions, Beaver (1968) further suggest that a firm's reported earnings have information content if it leads to a change in investor's perception about future earnings. Since the earlier news is already incorporated in the stock price, investors require new information to revise their forecast of earnings that will correspond with a change in the market value of the firm (Nichols and Wahlen, 2004). Similarly, Ball and Brown propose that observed revision of share prices related to the release of earnings numbers would provide evidence that the information reflected in the reported earnings are useful. As a result, Beaver (1968) reports that the return volatility increases around the date of the announcement of the earnings.

Prior literature documents that the value relevance of earnings can differ depending on many factors. First, previous studies suggest that negative earnings and nonrecurring items can

negatively affect the value relevance of earnings (Basu, 1997; Elliott and Hanna, 1996; Hayn, 1995). According to Hayn (1995), the losses are transitory and negative earnings cannot persist indefinitely. Similarly, when earnings contain nonrecurring or transitory items, the persistence of the earnings also decreases. Nichols and Wahlen (2004) report that investors react less when the earnings have lower persistence. Consequently, the negative and non-persistent earnings are less value-relevant for investors.

Several studies have concluded that the value relevance of earnings can also vary depending on a firm's profitability and financial health (Barth et al., 1998; Elliott and Hanna, 1996). For instance, Elliott and Hanna (1996) report that the value relevance of earnings mainly decreases in the presence of write-offs and when a firm experiences a decline in earnings. Moreover, they further suggest that longest write-off sequences are associated with smaller firms with high default probabilities. Similarly, Barth et al., (1998) suggest that value-relevance of the equity book value increases while value-relevance of the earnings decreases for firms classified as being less financially healthy than other firms.

Furthermore, prior studies also conclude that the information content of earnings can vary with economic cycles (Johnson, 1999, Jenkins et al., 2009, Bilgic et al., 2018). Johnson (1999) suggests that earnings persistence and the value relevance of the earnings are positively associated with the economic growth and the level of economic activity. When the economy is expanding, and the growth rates are high, the earnings are more persistent compared to a period of economic recession (Johnson, 1999). Relatedly, high persistence is associated with a stronger earnings response from investors, and thus, earnings are more value-relevant during economic expansions than recessions. In contrast, Jenkins (2009) states that earnings are more conservative during contractions than during expansions and the investors perceive current earnings more useful more firm valuation purposes during that period. Therefore, they conclude that the value relevance of current earnings is higher during economic contractions compared to economic expansions.

Since the value relevance of earnings can differ during the economic cycles, it can be expected to see a change in the usefulness of the accounting information when there is economic uncertainty and financial crisis. Clinch and Wei (2011) examine the information content of the earnings at a multi-country level. They concluded that the information content of the earnings has improved in the US during the global financial crises but decreased in

China and no significant change in Australia. In contrast, Bepari (2015) documented a decline in value relevance in Australia during the global financial crises. Other researchers report that accounting value relevance has decreased during the Asian crises of 1997-1998 (Graham et al., 2000). Finally, Bilgic et al. (2018) conclude that the information content of earnings diminished during the global financial crises in Turkey.

2.2. Earnings Response Coefficient

The prior studies that focused on the relationship between unexpected earnings and security returns have mainly used the earnings response coefficient (ERC) to assess the earnings-return relationship and evaluate the information content of the reported numbers. The earnings response coefficient (ERC) measures the magnitude of a security's abnormal share return in response to the unexpected component of that firm's reported earnings (Collins and Kothari, 1989). Simply, ERC is the change in the share returns in response to the abnormal earnings in which the magnitude of share return provides evidence about the usefulness of the reported figures.

The relation between earnings and security returns can vary depending on different circumstances and thus the earnings response coefficient (Collins and Kothari, 1989; Easton and Zmijewski, 1989). First, Collins and Kothari (1989) report that the ERC is positively associated with growth prospects and earnings persistence. Their results are compatible with the findings of Johnson (1999), which states that earnings are more value-relevant during economic expansions. According to Johnson (1999), earnings are more persistent when production is high, and relatedly, the earnings response coefficient is greater in economic expansions. Additionally, Basu (1997) reports that the earnings response coefficient is higher for positive earnings changes compared to negative earning changes. As mentioned earlier, negative earnings are not persistent since they cannot last indefinitely, and consistent with Hayn (1995), Basu (1997) also concludes that the negative earnings are less value-relevant for investors.

Furthermore, Collins and Kothari (1989) further suggest that the ERC is negatively associated with systematic risk. For firm valuation purposes, the higher systematic risk implies a smaller present value of a given increase in expected future dividends. Therefore, in

general, investors react less to the reported earnings of a firm with a higher Beta. Similarly, Stein and Wang (2016) contend that market response to earnings consensus surprises are likely to be less sensitive when the firm-level uncertainty is high and conversely, the market response tends to be higher during times of lower uncertainty.

2.3 Covid-19 and the Stock Markets

The arrival of the Covid-19 pandemic has caused a significant economic downturn around the world as the global economic contraction was subjected to 3.6% in 2020. (World Bank.com) The economic uncertainty that arises with the emergence of Covid-19 has also affected the stock markets around the world. Initially, the emergence of the Covid-19 has caused substantial fluctuations in the financial markets. In the US, big indexes like Dow Jones, Standard & Poor's, and Nasdaq had a significant drop in the stock prices of the corporations during mid-March and then recovered to reach new peaks in later months. (Zhang et al.,2020) A similar trend was also observed in the Asian financial markets as prices of companies' shares fell considerably in response to the outbreak of Covid-19. (Machmuddah et al., 2020)

Several studies have investigated the effect of Covid-19 on different financial markets. First, Zhang et al. (2020) examine the country-specific risk and systematic risk across worldwide financial markets during the Covid-19 outbreak and found that global market risk and volatility have increased due to uncertainties. Similarly, Hong et al. (2021), which investigates the association between Covid-19 and US stock market instability, has concluded that the price volatility has significantly increased following the breakout of Covid-19 and suggests that the pandemic has caused market inefficiency that creates profitable opportunities for traders and speculators. In addition, Machmuddah et al. (2020) also report that the daily closing stock price and volume of stock trade were significantly different before and after the Covid-19 emergence in the Indonesian stock market. Furthermore, Singh et al. (2020) state that the financial markets experienced negative returns at the start of the pandemic and then gradually recovered, suggesting that the initial outbreak has caused panic selling and noise trading in stock markets across the world.

The pandemic shutdowns have mostly affected the short-term cashflows of the companies. Consequently, Dechow et al. (2020) state that the Covid-19 pandemic has a greater impact on "low duration" equities. The firms with lower durations have relatively more of their value

embedded in near-term cash flows. They further suggest that value stocks also have low duration, and thus a short-term drop-in macroeconomic activity will result in a higher decline in market value for these stocks. Therefore, the pandemic has a different impact on distinct equities, and firms with low duration are expected to be more sensitive to the pandemic.

To summarize, the impact of Covid-19 on stock markets has attracted substantial interest from researchers. Based on the extant literature, the overall conjecture is that the emergence of Covid-19 has raised uncertainties for financial markets worldwide, and the global market risk and volatility have increased in response to the pandemic. The impact of the pandemic is also different for specific equities as the pandemic is likely to affect the short-term cash flows of the companies. Consistent with these arguments, it is clear that the pandemic has influenced the financial markets and investor behaviours. Previous studies have focused on the impact of financial crises on stock markets and the value-relevance of accounting information during economic downturns. However, the existing literature is yet to examine the usefulness of accounting information during the pandemic when the financial markets have seen dramatic movements. Therefore, this paper aims to fill this research gap by investigating information content of the earnings during the ongoing Covid-19 pandemic.

2.4 Hypothesis Development

As mentioned above, the Covid-19 pandemic had a significant impact on financial markets around the world. Many studies reported that the overall market risk and uncertainty have increased in response to the pandemic. The main conjecture is that the price volatility and volume of stock trade increased dramatically following the emergence of the pandemic. One crucial question is whether the value relevance of reported earnings has changed during the Covid-19 pandemic. On the basis of existing literature, it is known that the value relevance of earnings can be contextual and differ depending on economic factors. (Bernard and Stober, 1989; Bilgic et al., 2018; Johnson, 1999; Jenkins et al., 2009). The emergence of the Covid-19 pandemic has caused economic downturns and increased economic uncertainties. (Coiboin et al., 2020) Therefore, the deterioration of the firm performance and the rise in business failure risks can affect the information content of the reported earnings to be different during the Covid-19 pandemic compared to the pre-pandemic period.

There are number of reasons to believe that the value relevance of the earnings can be different during the Covid-19 pandemic compared to a period before. In this case, two different arguments can be made. One view is that the usefulness of accounting information can decrease during the Covid-19 pandemic depending on several reasons. First, prior studies suggest that firms are more likely to engage in earnings management during financial crises and economic downturns. (Chia et al., 2007) Hodgson and Stevenson-Clarke (2000) state that when the probability of business failure increases, the investors tend to perceive earnings as less informative due to the likelihood of earnings manipulation. Based on existing literature, it is known that managers can engage in earnings management for capital market incentives and contracting motivations (Healy and Whalen, 1999). Since the possibility of exhibiting lower earnings is likely to rise during the Covid-19 pandemic, the managers can engage in income-increasing earnings management to compensate for the insufficient operational performance. In this way, managers can meet or beat the analyst's expectations and avoid a negative impact on their compensation (Charitou et al., 2007).

On the contrary, the managers can also engage in income decreasing earnings management through "big bath" during economic downturns (Bepari et al., 2013). In addition, Stein and Wang (2016) have found that firms can opportunistically manage their earnings downwards when there is economic uncertainty. Consistent with these ideas, managers may choose to report significant losses during the pandemic when the market tolerance is high to losses so that they can enhance the probability of future reported profits. Additionally, firms can manipulate the earnings to obtain more beneficial debt covenants that benefit the firm during the financial crises (Healy and Whalen, 1999). Ultimately, the value relevance of the earnings decreases when the companies manipulate their earnings. (Marquardt and Wiedman, 2004)

Second, during the pandemic, it is likely that the earnings numbers can become transitory due to economic uncertainty. During financial crises, the reported earnings may contain transitory items which can transform the earnings into a noisy measure of a firm's performance. (Xu et al., 2011; Bepari et al., 2013) When reported earnings contain transitory items, they can be considered less persistent and thus less useful for future predictions (Jenkins et al., 2009). Similarly, Johnson (1999) documents that earnings are less persistent during economic recessions, and consequently, the earnings response coefficient is smaller for when the earnings are not persistent. Therefore, investors may perceive the reported earnings less value-relevant during the Covid-19 pandemic compared to a period before.

Third, the economic downturn resulted from the emergence of Covid-19 has increased the probability of firms exhibiting lower earnings. Prior studies conclude that negative earnings are less informative and less persistent (Hayn,1995). As a result, the reported earnings may lose their information content during the Covid-19 pandemic. Finally, Blaankespoor et al. (2017) suggest that during economic uncertainties, some investors can disregard fundamental financial information reported by companies and instead revert to trading on recent stock return movements and specific trends. Correspondingly, during the Covid-19 pandemic, the investors may choose to neglect accounting information provided by the companies and make investment decisions based on stock movement momentums and trends that will cause noise trading in the stock markets. Therefore, this may lead to lower earnings response from the investors at the earnings announcement dates.

The previous arguments suggest that the value-relevance of the earnings should decrease during economic downturns. However, there are also reasons to believe that the information content of the earnings can be more valuable to investors during the Covid-19 pandemic. To begin with, some studies have concluded that earnings management has significantly decreased during the 2008-2009 global financial crises. (Filip and Raffournier, 2014; Kumar and Vij, 2017) Several arguments can be made about why it is possible to observe lower earnings management during economic downturns. First, Chia et al. (2007) report that firms are subject to closer scrutiny from their auditors, creditors, and stakeholders during the financial crises, which gives managers less area to manipulate the reported earnings. Secondly, the motivation for managers to engage in earnings management may decrease since there would be a higher market tolerance for poor performance during financial crises. (Filip and Raffournier, 2014)

The possibility of litigation risk is likely to increase during economic downturns. (Jenkins et al., 2009) According to Watts (2003), the litigation cost can be reduced by reporting more conservative numbers. Consistent with this idea, Jenkins et al. (2009) further suggest that the expectation for more conservative earnings numbers should increase during the economic uncertainties. When firms report more conservative numbers, the bad news are reflected more timely than good news and thus reduces shareholder litigation. (Watts, 2003) Ultimately, Filip and Raffounier (2014) expect more value-relevant earnings when firms report more conservatively during the financial crises.

Another argument is that investors can overreact to unexpected and dramatic news events. (De Bondt & Thaler, 1985) During the Covid-19 pandemic, the financial markets have seen movements on an extraordinary scale. (Zhang et al., 2020). In this case, Clinch and Wei (2011) state that earnings can have greater information content when the investors are affected by behavioral reactions. Consistent with this idea, investors may perceive reported earnings number more useful during the pandemic and make investment decisions by relying more on accounting information provided by the companies.

Consistent with all the arguments presented above, this study expects that the value-relevance of the earnings to be considerably different during the Covid-19 period. Accordingly, the main hypothesis of this study is stated as follows:

Hypotheses I: The value relevance of reported earnings is different before and after the emergence of the Covid-19 pandemic.

The notion of the information content of this study is similar to the Ball and Brown (1968, p. 161), which state that "An observed revision of stock prices associated with the release of the income report would thus provide evidence that the information reflected in income numbers is useful." This notion of information content is similar to that of Kothari (2001, p.116), which suggest that "If the level or variability of prices changes around the event date, then the conclusion is that the accounting event conveys new information about the amount, timing, and/or uncertainty of future cash flows that revised the market's previous expectations." Therefore, consistent with Ball and Brown (1968), this paper measures the information content of the earnings based on abnormal share returns around the firm's quarterly earnings announcement. Accordingly, the alternative hypothesis of this study is stated as follows:

Hypothesis II: The extent of a firm's abnormal share return in response to unexpected earnings is significantly different following the emergence of the Covid-19.

3. Methodology

This study uses event study methodology around the quarterly earnings announcements and panel data regression analysis to evaluate whether the information content of the earnings has changed following the emergence of the Covid-19. Consistent with Ball and Brown (1968), the measure of the information content of the earnings is based on abnormal share returns around the firm's quarterly earnings announcement date. Accordingly, this study computes cumulative abnormal returns (CAR) for firms at the event window, which is the sum of all abnormal returns surrounding the announcement dates. Consistent with the prior literature, the event window covers day (-1, 0, +1), where day 0 is the announcement date of the firm's quarterly earnings. The coefficient on abnormal earnings is the earnings response coefficient (ERC) which measures the magnitude of abnormal share return in response to an unexpected component of that firm's reported earnings. Consequently, the ERC will provide evidence about the usefulness of the quarterly earnings. In this way, this study will assess the value relevance of the earnings before and after the emergence of the pandemic. To test whether the information content of the earnings has changed during the pandemic, this study uses estimating equation defined in section 3.3 to identify the differences in the value relevance of the earnings between two periods.

3.1 Abnormal Share Return Metric

Consistent with the prior research (Beaver, 1968; Landsman et al 2012), this study measure abnormal share returns according to the following formula:

$$AR_{it} = R_{it} - (\alpha_i + \beta_1 * R_{mt})$$

In the formula, abnormal share return for firm i for day t equals to the share return for firm i at day t (R_{it}) minus the value-weighted market return at day t (R_{mt}) in which α_i, and β_1 are firm i's market model parameter estimates calculated during the non-event period. Consistent with Landsman et al (2012), this study set the non-event period from $t - 60$ to $t - 10$ and to $t + 10$ to $t + 60$ relative to the I/B/E/S quarterly earnings announcement date. Subsequently, the cumulative abnormal returns (sum of all abnormal returns) for each firm at the event window (-1, 0, +1) of quarterly announcement dates are collected from WRDS by using event study tool.

3.2 Abnormal Earnings Metric

Based on the existing literature, the metric of abnormal earnings relies on actual reported earnings per share and analyst forecasts consensus. Accordingly, this study identifies abnormal earnings according to the following formula:

$$AE_{it} = EPS_{it} - FEPS_{it}$$

In the formula, abnormal earnings for firm i at time t equals to the actual earnings per share reported at I/B/E/S announcement date (EPS_{it}) minus the most recent mean summary of analyst forecast of earnings per share before the earnings announcement ($FEPS_{it}$).

3.3 Regression Equation

To test whether the information content of earnings has changed following the emergence of the Covid-19 pandemic, this study uses following regression equation:

$$CAR_{it} = \beta_0 + \beta_1 ABNORMAL\ EARNINGS + \beta_2 POST + \beta_3 ABNORMAL\ EARNINGS * POST + CONTROLS_{it} + \varepsilon_{it}$$

In the equation, the dependent variable CAR is the cumulative abnormal return defined in section 3.1 at the event window for each firm. The CAR is obtained from the WRDS event study tool, and it is measured with a market-adjusted model in which abnormal returns are computed in excess of CRSP value-weighted market return assuming a market beta of 1. The variable Abnormal Earnings is an independent variable defined in Section 4.2 that represents the firm's unexpected earnings. The variable Abnormal Earnings is regressed on the dependent variable CAR to assess the information content of the reported earnings. Accordingly, the coefficient β_1 is the earnings response coefficient which measures the extent of a security's abnormal share return in response to the unexpected component of that firm's reported earnings. In this case, if positive unexpected earnings lead to positive abnormal share return and vice versa, then this provides evidence that the reported earnings have information content.

The other independent variables are POST, Abnormal Earnings*POST, and control variables. POST is an indicator variable that equals one if an observation relates to a period after the emergence of Covid-19, and it equals 0 if it relates to a pre-Covid-19 period. The variable of interest is the interaction of Abnormal Earnings with Post. The coefficient on the variable of interest will provide evidence whether the information content of the quarterly earnings has changed during the pandemic. Accordingly, the coefficient on the variable Abnormal Earnings*POST will be positive if the information content of the quarterly earnings is greater during the Covid-19 period and negative if the information content of the quarterly earnings was higher in the pre-Covid-19 period.

The remaining regressors are control variables that are identified based on the existing studies that can potentially affect the abnormal share returns. First, Bamber (1986) found that trading reactions to annual earnings announcements are higher for smaller firms than larger firms. Consistent with Landsman and Maydew (2002) and Landsman et al. (2012), this study controls for firm size in which the variable SIZE is the market value of equity measured at fiscal year-end. Since the market value of the listed companies is highly skewed, this study takes the natural logarithm of the market value of the companies while computing the firm size. Prior research also documents that investor reacts more to the unexpected earnings for firms with greater growth potential (Collins and Kothari, 1989). Similar to Lerman and Tan (2021), the B/M variable is included in the regression model to control for the firm's growth potential, and the B/M variable is the ratio of the book value of equity to the market value of equity measured at fiscal year-end.

4. Sample and Descriptive Statistics

4.1 Sample

This study uses all publicly listed US firms to examine whether the information content of the earnings has changed during the pandemic. First, the pre-pandemic and post-pandemic periods are identified, and the reported quarterly earnings are assigned based on the announcement dates. The pre-pandemic period captures earnings announcement dates from

01/01/2019 to 31/12/2019, while the post-pandemic period contains earnings announcement dates from 01/03/2020 to 01/03/2021. To fully observe the effect of the pandemic on abnormal returns, this paper did not include any observations from January and February 2020 since it can be considered as a transitory period in which the pandemic has started but did not have a significant impact on economies.

The announcement date of the quarterly earnings reported earnings per share and analyst forecast consensus for every firm is collected from Institutional Brokers Estimate System (I/B/E/S), and unexpected earnings are computed. The calculated unexpected earnings contain outliers that resulted from firms with significantly high earnings per share numbers and specific analyst forecast errors. Therefore, the outliers are excluded at 2% and 98% quantile for both pre-and post-periods. The identified controls variables SIZE, which represents the natural logarithm of the market value of equity, and B/M, which is the ratio of the book value of equity to the market value of equity, are collected from CRSP.

Next, the cumulative abnormal returns for each firm at the event window for every quarter are collected from the WRDS database using the event study tool. The estimation window is set to 60 days and a gap of 10 days ($t - 60$ to $t - 10$ and to $t + 10$ to $t + 60$) relative to the I/B/E/S quarterly earnings announcement date. The event window is -1, 0, +1 and requires a minimum of 50 days of return data availability during the estimation window in both the pre-event and post-event non-event periods. Finally, the abnormal earnings are combined with the cumulative abnormal returns for each firm at each quarter. After removing the missing values for the variables and outliers in unexpected earnings, the final sample consists of 16300 firm-quarter observations, in which the pre-pandemic dataset has 8708, and the post-pandemic dataset has 7592 observations.

4.2 Descriptive Statistics

Table 1

Descriptive Statistics for Pre-Pandemic Period

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
ACTEPS	8708	0.48	1.17	-14.30	-0.02	0.85	45.36
ESTEPS	8708	0.45	1.14	-14.07	-0.02	0.81	44.58
AE	8708	0.03	0.16	-0.85	-0.02	0.08	0.88
AE (M)	8708	0.10	0.13	0.00	0.02	0.11	0.88
CAR	8708	0.00	0.11	-0.85	-0.04	0.05	1.30
CAR (M)	8708	0.07	0.08	0.00	0.02	0.09	1.30
POST	8708	0.00	0.00	0.00	0.00	0.00	0.00
SIZE	8708	7.43	1.98	1.29	6.11	8.68	13.84
B/M	8708	0.59	0.65	0.01	0.21	0.79	9.10

Table 2

Descriptive Statistics for Post-Pandemic Period

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
ACTEPS	7592	0.34	1.23	-10.81	-0.15	0.71	44.96
ESTEPS	7592	0.26	1.16	-10.29	-0.17	0.58	45.61
AE	7592	0.08	0.25	-1.08	-0.02	0.17	1.20
AE (M)	7592	0.17	0.21	0.00	0.04	0.22	1.20
CAR	7592	0.01	0.12	-0.82	-0.05	0.06	2.43
CAR (M)	7592	0.08	0.09	0.00	0.02	0.10	2.43
POST	7592	1.00	0.00	1.00	1.00	1.00	1.00
SIZE	7592	7.48	1.97	2.47	6.03	8.74	14.49
BM	7592	0.69	0.95	0.00	0.19	0.90	19.29

Table 1 and 2 presents descriptive statistics for both pre-and post-pandemic period that shows summary statistics for CAR, independent and control variables for estimation equation given in section 3.3, plus two additional variables AE (M) and CAR (M). The mean CAR is 0.00 for the pre-pandemic period and 0.01 for the post-pandemic period. These numbers are significantly small since the positive and negative values eliminate each other and lower the magnitude of the mean CAR. Therefore, a new variable CAR (M) is introduced into the tables, which shows the magnitude of the cumulative abnormal returns by excluding signs. Using this variable will make it easier to understand whether the cumulative abnormal returns have increased following the emergence of the Covid-19. In this case, the mean CAR (M) is slightly higher for the post-pandemic period, which is 0.08 compared to the pre-pandemic period of 0.07. This indicates that the cumulative abnormal returns surrounding the announcement dates have marginally increased during Covid-19.

The variable ACTEPS represents actual reported earnings per share while the variable ESTEPS represents I/B/E/S mean analyst forecast estimate to calculate abnormal earnings. The mean ACTEPS drop substantially during the Covid-19 period with an average of 0.34 compared to the period prior to the pandemic that was 0.48. The results show that the profits of the firms dramatically decreased after the emergence of the pandemic, which is in line with the expectations since the majority of businesses experience a significant decline in their revenues due to imposed restrictions and lockdowns.

The mean Abnormal Earnings (AE) is remarkably higher for the post-pandemic period with the mean value of 0.08, which was 0.03 for the pre-pandemic period. Similarly, a new variable, AE (M), is introduced into the tables, which shows the magnitude of the Abnormal Earnings by excluding signs. In this way, the extent of abnormal earnings will be more evident. The mean AE (M) for the post-pandemic period is 0.17, which is significantly higher compared to 0.10 of the pre-pandemic period. In both cases, the abnormal earnings have increased during Covid-19, which is in line with the predictions. The rise in economic and firm-level uncertainties during the pandemic make it challenging to provide accurate earnings forecasts for firms. Finally, the control variable SIZE is the natural logarithm of the market value of equity, and the mean SIZE is 7.43 for the pre-pandemic period and 7.48 for the post-pandemic period. The other control variable B/M is the ratio of the firm's book value of equity to the market value of equity. The mean B/M is 0.59 for the pre-pandemic period and 0.69 for the post-pandemic period

5. Results

Table 3

Value-Relevance of Earnings During Pre-Pandemic Period

	Dependent Variable-Cumulative Abnormal Return	
	CAR	
	(1)	(2)
Abnormal Earnings	0.155***	0.150***
	(0.007)	(0.007)
SIZE		0.002***
		(0.001)
B/M		-0.005***
		(0.002)
Constant	-0.003**	-0.015***
	(0.001)	(0.005)
Observations	8,708	8,708
R^2	0.053	0.056
Adjusted R^2	0.053	0.056
Residual Std. Error	0.102 (df = 8706)	0.102 (df = 8704)
F Statistic	486.156*** (df = 1; 8706)	171.697*** (df = 3; 8704)
Significance levels		*$p<0.1$; **$p<0.05$; ***$p<0.01$

Table 3 present the results from regression of CAR (Cumulative Abnormal Return) on Abnormal Earnings defined in section 3.1 and 3.2 for pre-Covid-19 period (01/01/2019 to 31/12/2019). Model (1) shows the output of CAR on Abnormal Earnings without the control variables and Model (2) shows the output including control variables SIZE and B/M. SIZE is the natural logarithm of the market value of equity measured at fiscal year-end and B/M is the ratio of firm's book value of equity to the market value of equity measured at fiscal year-end. After excluding observations that have missing values for the independent variables and CAR, the final sample consist of 8708 firm-quarter observations of US CompStat firms. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5.1 Information Content of Earnings In The Pre-Covid-19 Period

This section reports the findings from the regression of CAR on Abnormal Earnings for the pre-pandemic period, which provide evidence about the value relevance of the reported quarterly earnings before the emergence of the Covid-19. The sample for the pre-pandemic period consists of 8708 firm quarter observations with R-Square of 0.056 and F-statistics of 171.7. The result of both Model 1 and 2 show strong evidence of a positive association between abnormal earnings and cumulative abnormal returns at the event window. In model 2, the coefficient on Abnormal Earnings is 0.150, which is economically and statistically significant at a 1% level. This implies that, for every additional unit increase in abnormal earnings, the cumulative abnormal return increases by 0.15 percentage points when controlling for firm size and firm's growth potential. Consistent with the existing literature, these findings provide evidence that the quarterly earnings during the pre-pandemic period were value-relevant to investors as they react to the reported earning numbers.

Regarding the control variables, introducing SIZE and B/M has slightly decreased the coefficient on Abnormal Earnings from 0.155 to 0.150, indicating that the selected controls are economically significant. The coefficient on SIZE is 0.002 with a p-value of 0.001, which indicates that SIZE is positively associated with the CAR, and the results are statistically significant at a 1% level. The prior research has found mixed results for firm size. In this case, even though the economic magnitude is not large, the cumulative abnormal returns was slightly higher for bigger firms in the pre-Covid-19 period. On the other hand, the coefficient on variable B/M, which is the ratio of a firm's book value of equity to the market value of equity, is -0.005 and statistically significant at a 5% level. This suggests that the ratio of book to market value is negatively associated with cumulative abnormal returns. The results for variable B/M are in line with the prior findings of Collins and Kothari, (1989) and investor reacts more to the unexpected earnings for firms with greater growth potential.

Table 4

Value-Relevance of Earnings During Post-Pandemic Period

	Dependent Variable-Cumulative Abnormal Return	
	CAR	
	(1)	(2)
Abnormal Earnings	0.074***	0.074***
	(0.005)	(0.005)
SIZE		0.00005
		(0.001)
B/M		0.002
		(0.001)
Constant	0.005***	0.004
	(0.001)	(0.006)
Observations	7,592	7,592
R^2	0.026	0.026
Adjusted R^2	0.026	0.026
Residual Std. Error	0.116 (df = 7590)	0.116 (df = 7588)
F Statistic	202.416*** (df = 1; 7590)	67.921*** (df = 3; 7588)
Significance levels		*p<0.1; **p<0.05; ***p<0.01

Table 4 presents the results from regression of CAR (cumulative abnormal return) on Abnormal Earnings defined in Section 3.1 and 3.2 for post-Covid-19 period (01/03/2020 to 01/03/2021). Model (1) shows the regression of CAR on Abnormal Earnings without the control variables and Model (2) shows the output including control variables SIZE and B/M. SIZE is the natural logarithm of the market value of equity and B/M is the ratio of firm's book value of equity to the market value of equity. After excluding observations that have missing values for the variables, the final sample consist of 7592 firm-quarter observations of US CompStat firms. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5.2 Information Content of Earnings In The Post-Covid-19 Period

This section reports the findings from the regression of CAR on Abnormal Earnings for the post-pandemic period to assess the value-relevance of earnings. The result of Model 2 in Table 2 shows that there is a positive association between abnormal earnings and cumulative abnormal returns in the three-day period surrounding quarterly earnings announcements after controlling for firm size and firm's growth potential. Similar to the pre-pandemic period, the results indicate that the reported earnings are value-relevant during the Covid-19 period. The coefficient on Abnormal Earnings is 0.074, which is positive and statistically significant at a 1% level. This implies that, for every additional unit increase in abnormal earnings, the cumulative abnormal return increases by 0.074 percentage points, holding all other variables constant.

In contrast to pre-Covid-19 period findings, introducing control variables did not have any notable effect on cumulative abnormal returns at the event window. The coefficients on control variables SIZE and B/M are positive, but the magnitude is small, and they are economically and statistically not significant. The results indicate that the control variables SIZE and B/M do not seem to be related to abnormal share returns during the post-Covid-19 period.

Taken together, the findings, the coefficients on Abnormal Earnings are positive for both pre- and post- Covid-19 periods, and the coefficients are both economically and statistically significant. Therefore, the results suggest that the quarterly reported earnings numbers are value-relevant to investors as they react at the announcement dates. However, the coefficients on abnormal earnings differ considerably for the two periods. The coefficient on abnormal earnings is significantly higher in the pre-pandemic period with 0.150 compared to the post-pandemic period, which is 0.074 after controlling for firm size and firm's growth potential. These findings provide preliminary evidence that the information content of the quarterly earnings has decreased following the emergence of the Covid-19 pandemic since the investors reacted less to the unexpected earnings during the post-pandemic period. Based on these findings, this study predicts a negative sign for the interaction of Abnormal Earnings with Post in the estimating equation presented in Section 3.3.

Table 5

The Difference in Value-Relevance of Earnings in the Pre- and Post-Pandemic Period

	Dependent Variable-Cumulative Abnormal Return	
	CAR	
	(1)	(2)
Abnormal Earnings	0.155***	0.153***
	(0.007)	(0.008)
POST	0.008***	0.008***
	(0.002)	(0.002)
SIZE		0.001***
		(0.0004)
B/M		-0.0004
		(0.001)
Abnormal Earnings*POST	-0.081***	-0.080***
	(0.009)	(0.009)
Constant	-0.003**	-0.011***
	(0.001)	(0.004)
Observations	16,300	16,300
R^2	0.041	0.041
Adjusted R^2	0.041	0.041
Residual Std. Error	0.108 (df = 16296)	0.108 (df = 16294)
F Statistic	231.062*** (df = 3; 16296)	140.426*** (df = 5; 16294)
Significance levels		*p<0.1; **p<0.05; ***p<0.01

Table 5 presents the results of regression of CAR (cumulative abnormal returns) on Abnormal Earnings defined in section 3.1 and 3.2. POST is an indicator variable that equals one if an observation relates to period after the emergence of Covid-19, and it equals 0 if it relates to a pre-Covid-19 period. The variable of interest is the interaction of Abnormal Earnings with Post. SIZE and B/M are control variables in which SIZE is the natural logarithm of the market value of equity and B/M is the ratio of firm's book value of equity to the market value of equity. After excluding observations that have missing values for the variables, the final sample consist of

16300 firm-quarter observations of US CompStat firms. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5.3 The Difference in Information Content of Earnings Between Pre-and Post-Covid-19 Period

Table 3 presents the result of the main estimating equation presented in section 3.3, and the findings provide evidence that the value relevance of the quarterly earnings has decreased following the emergence of the Covid-19 pandemic. The coefficient on the interaction of Abnormal Earnings*Post is -0.08, which is negative and statistically significant at 1% level. This suggests that holding all other variables constant, the cumulative abnormal returns at the announcement data changes 0.08 percentage points less on average in the post-Covid-19 period compared to the pre-pandemic period for every additional unit increase in abnormal earnings. Accordingly, this supports the main hypothesis of this study which states that the value relevance of earnings is different before and after the emergence of the Covid-19 pandemic.

Regarding the other variables, the coefficient on the abnormal earnings is positive and statistically significant at a 1% level as expected. Introducing control variables has decreased the coefficient on the abnormal earnings from 0.1550 to 0.1528, indicating that the selected controls are economically significant. The variable SIZE is positively associated with the cumulative abnormal returns of the firm with the coefficient of 0.001, and it is statistically significant at a 1% level. On the other hand, the coefficient on B/M is negative, but the coefficient is not statistically significant.

The coefficient on the POST variable is 0.008, and it is significant at the 1% level. A positive coefficient on POST indicates an increase in the cumulative abnormal returns for firms in the post-pandemic period. Holding all other variables constant, the cumulative abnormal returns at the event window is 0.008 percentage points higher in the post-pandemic period. However, the POST dummy only indicates whether the cumulative abnormal returns are higher during vs. prior to the pandemic period, and it does not mean that the value relevance of the earnings increased during the pandemic.

The previous findings provide evidence that the value relevance of the quarterly earnings has decreased following the emergence of the Covid-19 pandemic since the coefficient on the interaction of Abnormal Earnings and POST is -0.08. However, the cumulative abnormal returns are also slightly higher during the Covid-19 period, and higher cumulative abnormal returns mean higher reactions from investors at the event window. In this case, the level of abnormal returns should be evaluated to understand the extent of a firm's abnormal share return in response to unexpected earnings. The abnormal earnings should be significantly greater in the post-pandemic period so that slightly higher cumulative abnormal returns do not indicate higher value relevance of reported earnings. In this case, the mean value of the Abnormal Earnings is obtained by eliminating the signs and only focusing on the magnitude of the figures in section 4.2. The results show that the average abnormal earnings were 10 % for the pre-pandemic period and 17 % for the post-pandemic period. These figures are in line with the expectations that the unexpected earnings are greater during the pandemic period. Accordingly, the results show that the abnormal earnings are substantially higher in the post-pandemic period, but the increase in abnormal returns is very small in magnitude, indicating that investors reacted less to the abnormal earnings in the post-pandemic period and thus value relevance of the earnings has declined.

6. Discussion

The findings from section 5.3 provide evidence that the information content of the quarterly earnings has decreased notably during the Covid-19 period. The results support the paper's hypothesis that the value relevance of reported earnings is different before and after the emergence of the Covid-19 pandemic. There are several explanations for the obtained results. First, the mean actual reported earnings per share drop from 0.48 to 0.34 in the pandemic period, indicating that the profitability of the companies has substantially diminished. Consistent with Elliott and Hanna (1996) and Hayn (1995), the results show that the value relevance of earnings decreases in the presence of write-offs and when a firm experiences a decline in their earnings.

Second, the pandemic shutdowns have mainly affected the short-term cashflows of the firms. The imposed restrictions and lockdowns have lowered the companies' revenues, and the reported earnings numbers have become transitory. Prior research suggests that when

reported earnings contain transitory items, they are less persistent and thus less useful for future predictions. Accordingly, the previous studies conclude that investors react less to transitory and non-persistent earnings. The findings of this study are in line with the prior research (Elliott and Hanna, 1996; Hayn, 1995; Nichols and Wahlen, 2004) that the information content of earnings decreases when earnings become transitory and less persistent.

Furthermore, the magnitude of abnormal earnings also increased in the Covid-19 period as the mean abnormal earnings rise from 0.10 to 0.17. The prior studies reported that the overall market risk and uncertainty increased during the pandemic. The finding of this paper also shows that the level of unexpected earnings surged after the emergence of Covid-19. This indicates that it becomes harder to predict the earnings of the companies. As a result, when more risk is related to the firm's expected returns, the investor's reactions to a given amount of unexpected earnings will be lower. The results are consistent with Stein and Wang (2016) and Collins and Kothari (1989), which suggest that the market response to earnings consensus surprises is likely to be less sensitive when the firm-level uncertainty is high.

7. Conclusion

This study examines whether the information content of reported earnings changed after the emergence of the Covid-19. Consistent with prior research, the measure of the information content of earnings is based on abnormal share return at the announcement dates using 16300 firm-quarter observations for US-listed firms.

Findings from the univariate comparisons in section 4.2 indicate that the reported earnings per share declined and the abnormal earnings surged during the Covid-19 period. On the other hand, the mean cumulative abnormal returns at the announcement dates slightly increased in the Covid-19 period. The result of univariate tests provides preliminary evidence that the extent of a firm's abnormal share return in response to unexpected earnings has declined in the pandemic period. Findings from the multivariate tests in Section 5 also confirm the results of univariate tests. The results of Sections 5.1 and 5.2 provide evidence that the earnings are value-relevant in both periods as investors react to the abnormal earnings. But the reaction to the unexpected earnings was stronger in the pre-pandemic

period. Similarly, the result of estimating regression with post and interaction variable also shows that the value relevance of the earnings has substantially decreased as the magnitude of a firm's abnormal share returns in response to unexpected earnings was lower during the pandemic period.

Taken together, the findings, the emergence of Covid-19, has lowered the revenues of the companies, and the reported earnings numbers have become transitory and less persistent. The results also show that the firm-level uncertainties increased as the abnormal earnings were greater during Covid-19 pandemic. Consistent with prior literature, this study also concludes that earnings are less value-relevant when they are transitory and less persistent. Furthermore, the market response to earnings consensus surprises was significantly lower when unexpected earnings were greater.

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