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Innvirkningen av Covid-19 på verdirelevansen til bokført egenkapital og resultat: En empirisk analyse

Masteroppgave

NTNU

Kunnskap for en bedre verden

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Abstract

The purpose of this study is to examine the impact of Covid-19 on the value relevance of book value and earnings in the United States. To examine the value relevance, we employ a price regression model to measure the relationship between stock price, book value of equity and earnings. Changes in the relative explanatory power and the coefficient estimates between the non-recession period (NRP) and the Covid-recession period (CRP) are examined.

The findings suggest that there was a decrease in the value relevance of earnings during the CRP, however this decrease is likely explained by the increase of loss firms. We found no significant change in the value relevance of book value of equity in the CRP compared to the NRP. This suggests that researchers may not need to control for the Covid-19 recession when evaluating the value relevance consequences of new accounting standards.

This study contributes to the existing body of research on how exogenous shocks affect the value relevance of accounting information. Although some studies have examined the impact of the 2007-2008 financial crisis, no high-ranking journals have yet, to the best of our knowledge, published studies on the impact of Covid-19.

Sammendrag

Formålet med denne studien er å undersøke virkingen av Covid-19 på verdirelevansen til bokført egenkapital og resultat i USA. For å undersøke verdirelevansen bruker vi en prisregresjonsmodell for å måle sammenhengen mellom aksjepris, egenkapital og resultat. Vi undersøker endringer i den relative forklaringskraften og koeffisientene før, under og etter resesjonen forårsaket av Covid-19.

Funnene tyder på at det var en nedgang i verdirelevansen til resultat under Covid-19, men denne nedgangen forklares sannsynligvis av økningen i bedrifter med rapportert underskudd. Vi fant ingen signifikant endring i verdirelevansen av egenkapital under Covid-19 sammenlignet med perioden uten resesjon. Dette antyder at forskere kanskje ikke trenger å kontrollere for Covid-19-resesjonen når de undersøker nye regnskapsstandarder sin påvirkning på verdirelevans.

Denne studien bidrar til den eksisterende forskningslitteraturen om hvordan eksogene sjokk påvirker verdirelevansen til regnskapsinformasjon. Selv om noen studier har undersøkt virkningen av finanskrisen i 2007-2008, er det så vidt vi er klare over, ingen høyt rangerte tidsskrifter som har publisert studier om virkningen av Covid-19.

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1.0 Introduction

The purpose of this study is to examine how the Covid-19 crisis affected the value relevance of book value of equity and earnings in the United States. To answer the problem, we analyse changes in coefficients and the incremental value relevance of the accounting items book value of equity and earnings. This study contributes to the existing body of research on how exogenous shocks affect the value relevance of accounting information. Although some studies have examined the impact of the 2007-2008 financial crisis, no high-ranking journals have yet, to the best of our knowledge, published studies on the impact of Covid-19.

The concept of value relevance in accounting has been researched on numerous occasions throughout the years. It started when Ball and Brown (1968) researched associations between a company's share price and its accounting items, in order to determine whether investors use these items when valuing firm equity (Barth et al., 2001). If an accounting item explains variation in share price it is deemed value relevant (Barth et al., 2001). Although the concept of value relevance as known today has been researched for several decades, it has only been known as value relevance since the 90s according to Barth et al. (2001).

Ball and Brown (1968) demonstrated that the market typically reacts in the same direction if actual income differs from expected income. Their finding implies that the market considers accounting information in the valuation of firms. Value relevance literature, and our study, does not directly observe investors' use of accounting information in assessing firm value, but does however investigate which accounting items correlate with share price (Barth et al., 2023).

For accounting to be of high quality, it has to be perceived as useful by different groups of people, investors being a central group. Knowing how well different accounting items reflect the information used by investors provides useful insights for standard setters (Barth et al., 2001).

In value relevance research, some researchers seek to understand how stock prices change over a short period, sometimes as short as a day (Beisland, 2009). Such event studies separate themselves from studies Beisland (2009) refers to as association studies. Association studies typically consist of analyses of value relevance over longer periods, from just a few months to several years. Research on the impact of crises are typically association studies, and one such study by Kane (2015) shows that recessions impact value relevance metrics. The study points

out how the global financial crisis of 2007-2008 magnified the need for research surrounding macroeconomic decline, and how this impacts value relevance. The findings also indicate how crucial controlling for recession in research is. If one performs value relevance research using sample periods that include a recession, without controlling for said recession, the results could be hard to interpret and conclude from (Kane et al., 2015). The need for research on external factors that influence value relevance of accounting information is also made clear by Dunham & Grandstaff (2022), who finds that the effects of economic situations on value relevance remain unclear. The view of Dunham & Grandstaff (2022 p. 264) is that "analysis of how value relevance has changed over time must include some control for economic conditions over time."

By researching the value relevance of earnings and book value in the years leading up to, during, and after the Covid recession period (CRP) we aim to contribute to the literature by showing how these accounting factors were impacted by the Covid-19 recession. This study is conducted on a US data sample which allows us to isolate the effects the pandemic had on value relevance as the recession there was relatively short-lived.

1.1 The Covid-19 pandemic

The S&P 500 is regarded as one of the major benchmarks for the overall performance of the stock market. The index was at an all-time high in February 2020 when the outbreak of the Covid-19 virus began in the U.S. At the beginning of March, a sequence of lockdowns was implemented in the United States to curb the transmission of the virus. This resulted in a collapse of consumerism and various industries, with travel & leisure being the most affected sector (Vidovic, 2022). This triggered a crash in the stock market. Between February 2020 and the end of March 2020 the S&P 500 plummeted almost 34%. However, the index recovered swiftly and hit a new all-time high only five months later in September 2020, as seen in Figure 1. In contrast, after the 2007-2008 financial crisis, it took the S&P 500 more than five years to recover and hit a new all-time high in February 2013.

The tourism sector was negatively impacted and temporarily brought to a standstill (Yiwei et al., 2022). As tourism halted, airlines, airports, hotels and motels experienced a sharp decline in use, and restaurants saw practically zero sit-in guests (Dube et al., 2021). While tourism struggled, the technology sector, particularly the software industry, experienced significant increases in adoption of their products and services. Fully or partially digitised products and/or

services saw a substantial increase after Covid-19 hit, with LaBerge et al. (2020) estimating an adoption acceleration of six years.

Figure 1: S&P 500 Total Price Return
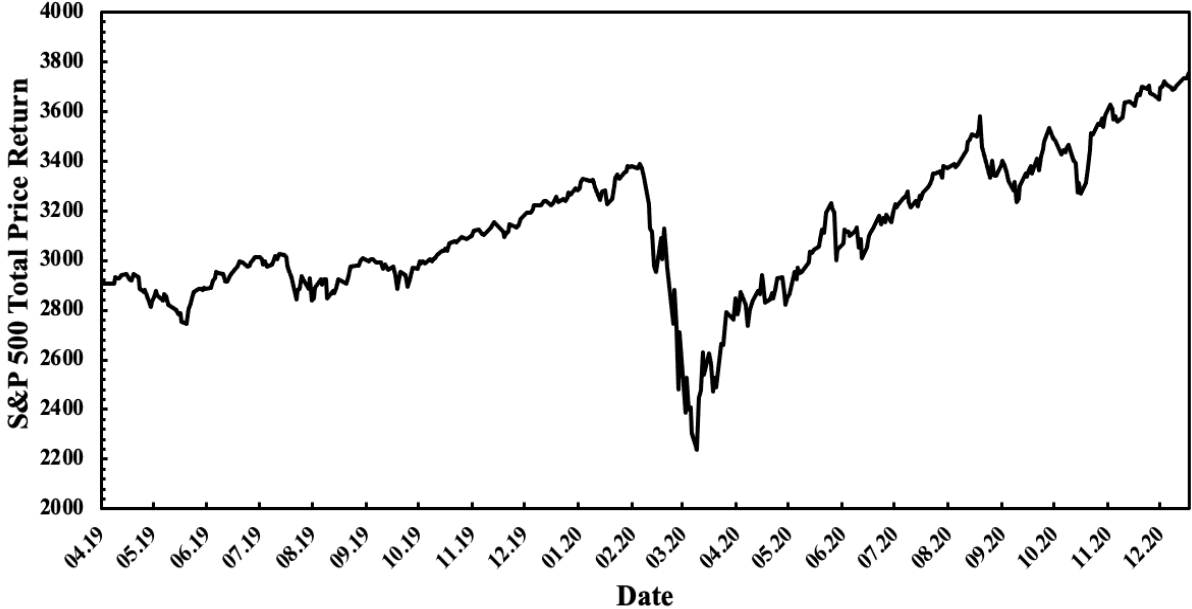
Figure 1: The price return measures the rate of return from investments relying solely on capital appreciation, meanwhile income generated by dividends and interest is not considered. Source: S&P Dow Jones Indices

GDP is the most used single measure of a country's overall economic activity and therefore another important indicator of economic health (International Monetary Fund, n.d.). As seen in Figure 2 the real GDP growth in 2020 was negative 2.8% which is lower than it was in 2008-2009 when it bottomed out at 2.6%. The figure also shows that the GDP growth recovered swiftly the following year, despite the rise and spread of the Alpha and Delta variant causing further lockdowns.

Figure 2: Change in GDP Growth
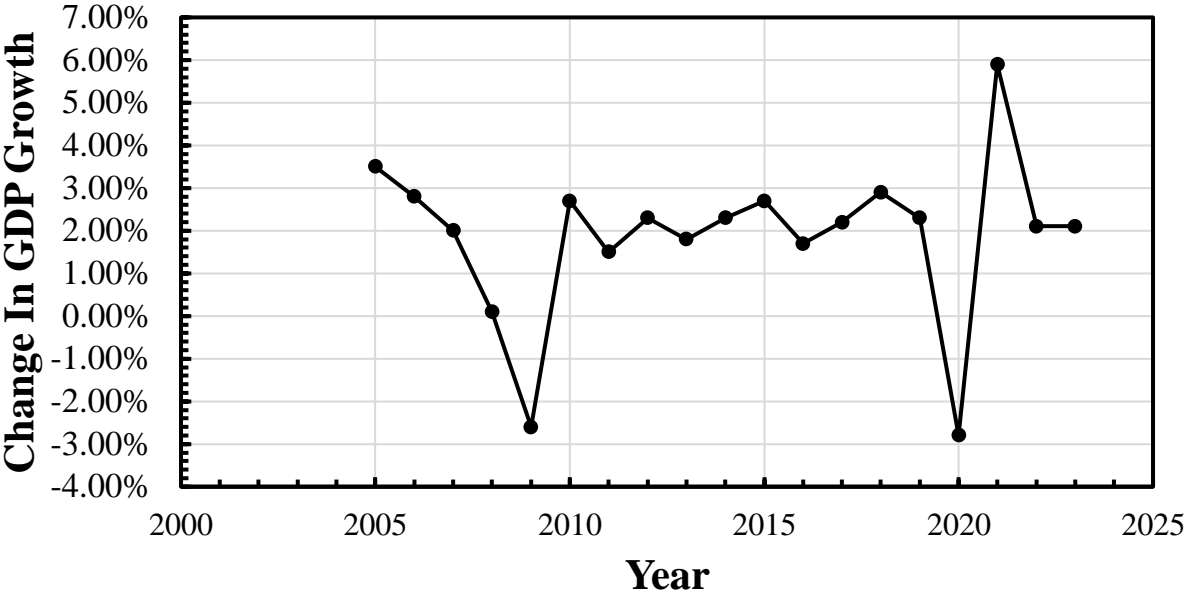
Figure 2: Source: International Monetary Fund

The National Bureau of Economic Research (NBER) is a private organisation recognised as the official arbiter of when recessions occur in the U.S. According to NBER the recession lasted from February 2020 to April 2020, totalling only two months. This makes the recession unique as it was one of the deepest, but also shortest, recessions in United States history (National Bureau of Economic Research, 2023). In comparison, according to the same bureau, the Great Recession lasted for 18 months.

The reason for the fast recovery in the United States compared to other countries and previous recessions was due to aggressive and hasty macro policies (Milstein & Wessel, 2024). Milsten & Wessel (2024) point out several policies that led to a speedy recovery. The main monetary policies that were put in place by the Federal Reserve was a reduction of the interest rate to 0.25%, repurchasing immense amounts of debt securities, facilitation of low interest loans to securities firms and lending money directly to corporations where the borrower could defer repayments by six months. These measures guaranteed a steady flow of credit to both individuals and businesses, thus averting the escalation of economic harm (Milstein & Wessel, 2024).

2.0 Literature review and research hypotheses

While Francis & Schipper (1999) provides a thorough and more detailed discussion of the construct that is value relevance, Barth et al. (2001, p. 95) explains that "value relevance research examines the association between accounting amounts and equity market values." As such, the value relevance literature does not attempt to directly observe how investors use financial information in valuation, but instead, how the accounting items correlate with share price (Barth et al., 2023). This is consistent with the fourth interpretation presented by Francis & Schipper (1999). Under the view of this interpretation, "value relevance is measured by the ability of financial statement information to capture or summarize information, regardless of source, that affects share values" (Francis & Schipper, 1999 p. 327). As specified, the accounting information does not have to be the original source, and thus showing that it is correlation, not causation, with the share price that is being researched.

Financial information can be used in a multitude of ways. One of the primary objectives of financial information is however to provide investors with information relevant to their valuation of firms. Two main accounting items used by investors are book values of equity and earnings.

Holthausen & Watts (2001) argued that value relevance studies provided limited implications for standard setters as only associations are researched. Holthausen & Watts (2001) also argue that value relevance research does not take into consideration other factors that influence accounting standard setting, using contracting as an example. Barth et al., (2001) contradicts the arguments from Holthausen & Watts (2001) and concludes the value relevance literature does provide useful information for standard setters. Barth et al., (2001) argues that the fact that financial statement information has uses other than equity investment, which value relevance focuses on, does not diminish the significance of researching value relevance.

2.1 Value relevance of book value of equity and earnings

Multiple studies have analysed long-term trends in value relevance research. A majority of these studies are conducted on U.S. data, (see e.g., Collins et al., 1997; Francis & Schipper, 1999; Lev & Zarowin, 1999). Barth (2022) states that the earlier studies focused on earnings by itself, and only later include book value of equity (BV). This shift followed the recognition that earnings were not the only accounting item relevant to firm value (Ohlson, 1995). Ohlson

(1995) presents evidence that shows how BV acts as a proxy for future normal earnings, and thus is a relevant factor in the valuation of stocks.

Collins et al., (1997) found that the combined value relevance of BV and earnings had increased slightly over time. The slight marginal increase was a result of an increase in the value relevance of BV, as the value relevance of earnings had significantly decreased during the period. Francis & Schipper (1999) report findings similar to those of Collins et al. (1997), finding no significant evidence to suggest value relevance of BV and earnings have decreased, but rather the opposite.

However, researchers have also reported findings that contradict those of Collins et al., (1997) and Francis & Schipper (1999) and imply that earnings as well as book values have lost value relevance over time. Lev & Zarowin (1999) document a significant decrease in both earnings and BV over their study period, and thus a decrease in the combined value relevance of the two accounting numbers. Lev & Zarowin (1999) attributes their contrasting findings compared to Collins et al., (1997) partly to the periods examined in the studies. The study of Lew & Zarowin (1999) covers a shorter period, as well as three more recent years, that all see negative value relevance, and thus may have led to an increase in statistical significance of the entire study period.

A common explanation presented when a decrease in value relevance of earnings is found, is that earnings are less relevant in firms that report losses, as found by Collins et al., (1999). The number of loss firms in the United States has increased significantly over the last few decades. During the 1970s only 15% of United States firms reported losses, but by the 1990s these amounted to approximately 35% (Joos & Plesko, 2005). There are no indications to suggest the rate has decreased since.

Another way to interpret BV and its relation to stock price that is common in the literature is linking BV to the liquidation option of firms presented by Hayn (1995). In situations where firms' future operations are at risk, BV acts as a proxy for firms' liquidation option (Collins et al., 1997; Barth et al., 1998). Evidence from the global financial crisis shows that the likelihood of a firm experiencing going concern status significantly increases compared to non-crisis periods (Geiger et al., 2014).

2.2 Value relevance during crises

Although the value relevance literature is vast, the body of research that focuses on the impact of crises on value relevance is smaller. There are however some studies that research different crises, both local and global, and how they impacted value relevance. While value relevance studies can vary in which accounting items are included in the research, the research on crises is mainly focused on BV and earnings and if or how they change.

Using a sample of Mexican firms during the 1994 Mexican currency crisis Davis-Friday & Gordon (2005) finds an increase in the incremental explanatory power of book values, while the incremental explanatory power of earnings decreases. The incremental information content refers to whether one accounting measure provides additional information beyond that provided by another measure (Biddle et al., 1995). The findings of Davis-Friday & Gordon (2005) are consistent with Collins et al. (1997) who propose an inverse relationship between the value relevance of earnings and book values. This suggests that if value relevance of earnings decreases over time, value relevance of book values increases. As Collins et al. (1999) report that earnings are less relevant in loss firms, one would expect an increase in BV in loss firms following the inverse relationship theory presented by Collins et al. (1997).

Because earnings are less value relevant in loss firms and that there is an increase in loss firms during a recession, Kane et al. (2015) explore if these circumstances alone explain the decrease in earnings value relevance. They find that their results are robust even after controlling for the increase in loss firms during the recession. This means that the informational effect of the recession also has an impact on the value relevance of accounting variables, and that the change cannot be explained by the increase in loss firms alone.

Barth et al. (1998) finds that firms experiencing declining financial health have an increase in the explanatory power of BV, while the explanatory power of earnings declines. This effect is referred to as the financial health theory (FHT). The findings of Barth et al. (1998) apply both when researching the years preceding bankruptcy filings for a sample of companies that filed bankruptcy and a sample of firms with varying classifications of financial health. These findings are supported by other researchers showcasing the importance of book values in periods of declining financial health (Subramanyam & Venkatachalam, 1998; Collins et al., 1999). Although the research of Barth et al., (1998) is in a non-crisis situation, the findings regarding financial health are interesting from a crisis perspective.

In contrast to the aforementioned studies, Bepari (2015) finds that the value relevance of book value has decreased, and the value relevance of earnings has increased in Australia during the financial crisis compared to non-crisis periods. Bepari (2015) suggests that his findings contradicting the financial health hypothesis presented by Barth et al. (1998) stems, in part, from the fact that the financial crisis was a global economy-wide crisis. As such, the relevance of book value as a liquidation option may not apply due to general illiquidity in the market (Bepari, 2015). Although Bepari's findings contrast previous research done on other countries and regions, his findings are consistent with previous Australian studies during normal economic conditions (Bepari, 2015). In comparison, Beisland (2013) finds that book values explain a large part of the variation in stock prices in Norway during the financial crisis. This finding is consistent with the theories that indicate an increase in book values during crises. Beisland (2013) does however suggest that earnings include information on the future expected growth that is not captured in book values.

Davis-Friday et al. (2006) examined the value relevance of earnings and book value in a sample of Asian countries in the period surrounding the Asian financial crisis and found mixed results. Their findings do indicate significantly reduced value relevance of earnings, and an increase in value relevance of book values in Indonesia and Thailand. However, in Malaysia, they find that both the BV and earnings decreased, and in Korea they found no significant change during the crisis compared to non-crisis (Davis-Friday et al., 2006). Bilgic et al. (2018) investigated the impact of hyperinflation and the global financial crisis of 2008 in Turkey, and how the respective crises impacted value relevance of accounting information. As noted by Dunham & Grandstaff (2022) the key finding of Bilgic et al. (2018) is the dominance of value relevance of earnings during hyperinflation, and that there are no significant changes in value relevance of the balance sheet during the global financial crisis.

Davis-Friday & Gordon (2005), Davis-Friday et al. (2006) and the part of Bilgic et al. (2018) related to hyperinflation research crises that only had local impact, and is different to the global financial crisis of 2008, and the Covid-19 crisis. Beisland (2013) notes that such local crises affected the researched firms differently, based on whether they produced for foreign or domestic markets. This makes it hard to relate local crises to global crises, where firms who produce for foreign markets are more likely to be affected during global crises than during local crises. Evidence from the Asian financial crisis also shows how the same crisis can have different impacts across country borders. This demonstrates how it is easier to make comparisons between studies that research the same country.

2.3 Hypotheses

While Bepari (2015) discovered that the value relevance of earnings rose during a period of low financial health, and Davis-Friday et al. (2006) noted that this impact varies by country, the majority of research indicates an increase in the value relevance of earnings (Barth et al., 1998; Davis-Friday & Gordon, 2005; Kane et al., 2015). Therefore, this study hypothesizes:

H1. The value relevance of earnings decreases during Covid-19.

Bepari (2015) observed a decrease in the value relevance of BV during a period of low financial health. However, studies by Davis-Friday et al. (2006) and Bilgic et al. (2018) found no change in value relevance in Korea and Turkey, respectively. Despite these variations, most of the research finds an increase in the value relevance (Barth et al., 1998; Subramanyam & Venkatachalam, 1998; Collins et al., 1999; Davis-Friday & Gordon, 2005; Beisland, 2013). Therefore, this study hypothesizes:

H2. The value relevance of book value of equity increases during Covid-19.

3.0 Model and sample

In line with extensive research on value relevance, we employ a price regression model, Model 1, to examine the value relevance of earnings and book value of equity (Beisland, 2009). This model examines the relationship between stock price (P), book value of equity per share (BVPS), and earnings per share (EPS). We opt for a price model over a return model to mitigate potential bias in slope coefficients, though we remain attentive to heteroscedasticity, which tends to be more pronounced in price models (Kothari & Zimmerman, 1995). Model 1A and 1B are utilised to examine the incremental value relevance of BV and earnings. Building upon existing literature, we also employ Model 2, an extension of the price regression, to explore further into the effects of the pandemic (Davis-Friday et al., 2006 Beisland, 2013; Bepari, 2015; Kane et al., 2015).

Model 1
$$P_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 BVPS_{it} + \beta_3 LEV_{it} + \beta_4 SIZE_{it} + \lambda_{1\dots\dots\dots}\lambda_n + \varepsilon_{it}$$

Model 1A
$$P_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 LEV_{it} + \beta_3 SIZE_{it} + \lambda_{1\dots\dots\dots}\lambda_n + \varepsilon_{it}$$

Model 1B
$$P_{it} = \beta_0 + \beta_1 BVPS_{it} + \beta_2 LEV_{it} + \beta_4 SIZE_{it} + \lambda_{1\dots\dots\dots}\lambda_n + \varepsilon_{it}$$

Model 2

$$P_{it} = \beta_0 + \beta_1 Cov + \beta_2 BVPS_{it} + \beta_3 EPS_{it} + \beta_4 BVPS_{it} * Cov + \beta_5 EPS_{it} * Cov + \beta_6 LEV_{it} + \beta_7 SIZE_{it} + \lambda_{1.........}\lambda_n + \varepsilon_{it}$$

Where,

P_{it}	= Closing stock price;
$BVPS_{it}$	= Book value of equity per share;
EPS_{it}	= Earnings per share;
Cov	= Indicator variable with the value of 1 for 2020, and 0 for 2015, 2016, 2017, 2018, 2019, 2021, 2022, 2023;
LEV	= Total liabilities divided by total assets;
SIZE	= Total assets divided by common shares outstanding;
$\lambda_1 .... \lambda_2$	= Indicator variables representing the Fama-French 12 industry dummies.

Stock price is measured as the closing price on the date of the first quarter (Q1) results. EPS and BVPS are based on the Q1 results. Given the market crash prior to the Q1 reports and the concurrent recession, our investigation into value relevance centres on this particular time frame. Extraordinary items are excluded from earnings following Barth et al. (1998). Model 2 includes the interaction terms *BVPS*Cov* and *EPS*Cov*. Although the Covid-19 pandemic did not end in 2020, the *Cov* indicator variable equals 1 only in 2020, based on the analysis in chapter 1.1. If the coefficient β_5 of the interaction term *EPS*Cov* is negative and significant then H1 holds true. Similarly, if the coefficient β_4 of *BVPS*Cov* is positive and significant then H2 holds true. We classified each firm into 12 industry groupings based on the Fama-French industry classifications to control for industry fixed effects. By controlling for industry, we minimize the impact of fluctuations in unrecognized net assets, accounting practices, risk levels and growth in earnings (Barth et al., 1998). As we have previously excluded financial companies, we are left with 11 industries represented by 11 industry indicator variables.

3.1 Control for loss firms

Collins et al. (1999) finds that earnings are less value relevant in firms reporting a loss. To investigate this phenomenon, we deploy Model 2A, where we include an indicator variable for loss firms, following Bepari (2015) and Davis-Friday et al. (2006). This will indicate whether an observed change in earnings value relevance during the pandemic is attributable to an increase in loss firms, or if it signifies a distinct recessionary effect on value relevance.

Model 2A

$$P_{it} = \beta_0 + \beta_1 Cov + \beta_2 BVPS_{it} + \beta_3 EPS_{it} + \beta_4 BVPS_{it} * Cov$$
$$+ \beta_5 EPS_{it} * Cov + \beta_6 LEV_{it} + \beta_7 SIZE_{it} + \beta_8 LOSS$$
$$* EPS_{it} + \beta_9 LOSS * BVPS_{it} + \lambda_{1 \dots \dots \dots} \lambda_n + \varepsilon_{it}$$

Where,

LOSS   = Indicator variable with the value of 1 for firms reporting a loss (EPS<0);

All other variables are as defined in chapter 3.0.

3.2 Measuring value relevance

The first measurement of value relevance is based on R^2. In our models stock price is regressed on earnings and book values. Therefore, the explanatory power of the model, the R^2, is a measure of how much variation in stock price is explained by those accounting variables (Collins et al., 1997). This means that a lower R^2 during the Covid recession period (CRP) compared to the non-recession period (NRP) indicates that less of the variability in stock price is explained by the independent variables, making the accounting variables less value relevant during the CRP.

The second measurement of value relevance is based on the regression coefficient of earnings, which is referred to as the earnings response coefficient (ERC), and the coefficient of book value per share, referred to as the book value response coefficient (BVRC). The accounting variable is seen as value relevant if their coefficient is significantly different from zero. The value of the coefficient tells us how much the expected change in stock price is, based on a change of one unit of the independent variables (Davis-Friday et al., 2006). This means that an increase in the response coefficients indicates an increase in the value investors place on the accounting variables.

3.3 Decomposition technique

We use the decomposition technique introduced by Collins et al. (1997) to examine the incremental explanatory power of earnings and BV. The decomposition technique entails decomposing Model 1 into Model 1A and 1B.

Incremental value relevance of BV = [Adjusted R^2 of Model 1 - Adjusted R^2 of Model 1A].

Incremental value relevance of earnings = [Adjusted R^2 of Model 1 - Adjusted R^2 of Model 1B].

Value relevance common to BV and earnings = [Adjusted R^2 of Model 1 - Incremental value relevance of BV - incremental value relevance of earnings].

In line with our hypotheses, we anticipate a decline (increase) in the incremental value relevance of earnings (book value) during the CRP compared to the NRP.

3.4 Sample

We collected the quarterly data from Compustat Daily Updates - Fundamentals Quarterly. The closing stock prices are supplied by Refinitiv. The sample period consists of all companies listed on US stock exchanges from the years 2015-2023. This is to make sure the effects of the global financial crisis had dissipated. All financial numbers are recorded in US dollars. Using a sample of firms listed on U.S. stock markets is a limitation of our study. This sample cannot be used to generalise results to firms outside the sample.

Table 1. Sample selection of the companies included in the study

Companies listed on U.S. stock exchanges with fiscal year end 31.12, firm-quarter observations	82 724
- Non first quarter observations	61 845
= Observations quarter 1	20 879
- Observations lost due to Compustat missing values	6 040
- Observations lost due to Refinitiv missing values	1 010
- Observations with negative book values	911
- Financial companies	3 111
= Final sample	9 807

By utilising the 4-digit SIC codes and assigning the companies to one of eleven industries in accordance with the Fama-French industry classification we are left with 517 observations in nondurable goods, 328 observations in consumer durables, 1234 observations in manufacturing, 353 observations in energy and gas, 368 observations in the chemical industry, 2070 observations in the business equipment industry, 295 observations in the

telecommunications industry, 403 observations in the utilities industry, 762 observations in wholesale & retail, 1382 observations in healthcare and 1912 in other (construction, transportation, hotels & entertainment).

To limit the effects of extreme values on the results we winsorize the top and bottom 1% of stock price, EPS and BVPS. Companies in the financial sector have been removed because they have unique accounting features, and companies with negative book values have been removed, following Collins et al. (1997).

4.0 Results

Table 2 Panel A presents descriptive statistics for the entire sample used in the empirical analyses. All variables presented in the descriptive statistics tables are on a per share basis. The standard deviations are relatively large, which is common in price regressions (Beisland, 2013). Positive skewness for all variables implies the data is skewed to the right resulting in a mean that is higher than the median. Kurtosis values above three indicate that all three variables are not normally distributed. By running a Breusch-Pagan test we confirm that our data has heteroskedasticity. To deal with heteroskedasticity all the regressions are robust.

Table 2 Panel B shows descriptive statistics for the entire sample by year. The mean stock price fell by 8.6 from 2019 to 2020, but increased by 22.04 the following year, in line with the quick recovery of the S&P 500. Overall, the mean stock price was only 5.38 lower during the CRP compared to the NR. The NRP is represented by a pooled regression of all the years apart from 2020. While the mean of EPS is between 0.29 and 0.36 in the years preceding Covid-19, it falls to just 0.04 during the CRP, indicating an increase in loss firms during the pandemic, which is further confirmed by the first quartile value being -0.32 which is the lowest of all the years. The period following the crisis saw a large increase in EPS with means between 0.40 and 0.44. The mean of BVPS varied between 13.25 and 16.59 throughout the sample years, with no substantial difference between the NRP and CRP.

Table 2 Panel C shows Pearson correlation coefficients below and Spearman correlation coefficients above the diagonal. Pearson correlation coefficients is used when both variables are continuous and follow a linear relationship, therefore the Price, BVPS and EPS variables. On the other hand, Spearman correlation is used when the variables are ordinal or when the relationship between variables is not linear, therefore, it is utilised for the relationship between

Cov and the other variables. As expected, both BVPS and EPS are significantly positively correlated with price. Cov and Price are significantly negatively correlated, indicating the stock price decreased during the pandemic. EPS and Cov are also significantly negatively correlated, however there is no significant correlation between BVPS and Cov. This points towards the pandemic only affecting firms earnings, which we also saw from the descriptive statistics. The independent variables BVPS and EPS have correlation coefficients below 0.7, which is generally considered the point when problems of multicollinearity may arise. Thus, there is no indication of multicollinearity in the data, and the VIF values for the variables further confirmed this.

Table 2 Descriptive statistics and correlation coefficients

Panel A. Descriptive statistics   N = 9 807

Variable	Mean	Median	Q1	Q3	Std. dev	Min	Max	Skewness	Kurtosis
Stock price	55.87	28.15	10.85	64.2	86.56	0.45	576	3.82	20.49
EPS	0.33	0.12	-0.11	0.61	1.03	-2.6	5.5	1.79	10.86
BVPS	15	8.97	3.14	19.95	17.79	0.62	112.16	2.40	10.54

Panel B. Descriptive statistics by year

	P				EPS				BVPS				
Year	Mean	Q1	Median	Q3	Mean	Q1	Median	Q3	Mean	Q1	Median	Q3	N
2015	51.25	14.30	29.51	58.92	0.29	-0.04	0.17	0.53	13.25	3.40	8.92	18.40	845
2016	47.14	11.86	26.23	55.27	0.29	-0.06	0.16	0.55	13.49	3.53	9.12	18.55	868
2017	52.46	14.08	31.70	60.82	0.35	-0.04	0.18	0.56	14.07	3.63	9.58	19.04	907
2018	56.65	15.35	32.38	65.94	0.36	-0.06	0.19	0.66	14.61	3.67	10.05	19.73	1 026
2019	59.69	13.70	32.23	70.45	0.34	-0.07	0.16	0.60	14.94	3.44	9.76	20.17	1 092
2020	*51.09*	*8.60*	*22.91*	*56.50*	*0.04*	*-0.32*	*0.01*	*0.48*	*15.09*	*3.11*	*9.21*	*20.43*	*1 103*
2021	73.13	15.60	37.40	82.07	0.41	-0.12	0.13	0.71	15.78	3.16	8.66	20.90	1 202
2022	55.61	8.56	23.18	65.29	0.44	-0.14	0.07	0.69	15.67	2.64	8.04	20.35	1 381
2023	51.86	5.87	19.36	59.62	0.40	-0.14	0.04	0.67	16.59	2.55	8.36	21.17	1 383
No crisis - pooled	56.47	11.16	28.86	65.10	0.37	-0.09	0.13	0.63	15.00	3.15	8.96	19.84	8 704

Panel C. Correlation coefficients

	Price	BVPS	EPS	Cov
Price	1.000	0.6248***	0.5413***	-0.0425***
BVPS	0.4760***	1.000	0.5554***	0.0018
EPS	0.4588***	0.5506***	1.000	-0.926***
Cov	-0.0196*	0.0017	-0.0196***	1.000

***significant at .01, **significant at .05, *significant at 0.1.

Table 3 shows the results from the regressions run on each year separately, with the crisis year in italics. Again, the "No crisis" is a pooled regression consisting of the NRP. We first take note of the big increase in R^2_{TOT}, from 16.23% in 2015 to 53.44% in 2023. This increase of 37.21% may seem peculiar but a difference of 45.27% between two years is reported by Beisland (2013). The incremental explanatory power of earnings, R^2_{EPS}, and BV, R^2_{BVPS}, is calculated using the decomposition technique explained in chapter 3.2. The incremental explanatory power of earnings decreases by 2.49% from 2019 to 2020, and then increases by 0.9% the following year. The NRP also has a higher incremental explanatory power than the pandemic by 1.04%, and this is despite the years 2015-2017 having a relatively low explanatory power. Overall, the incremental value relevance of earnings indicates a slight decrease during the recession, in line with H1.

If we compare the incremental value relevance of BV between the NRP and CRP a greater difference is noted. The incremental explanatory power of BV increased from 2.55% in 2019 to 8.92% in 2020 and then decreased to 5.67% the following year. According to Barth et al. (1998), an increase in the value relevance of BV happens at the expense of earnings. There is a bigger increase in the incremental value of BV from 2019 to 2020 compared to the decrease in earnings. This can be explained by the decrease in the explanatory power that is common to BV and earnings. The high level of explanatory power common to earnings and BV is consistent with the findings of Collins et al. (1997).

All the coefficients are significant at every level, apart from earnings in 2015 which is not significant at 1%. This indicates that both earnings and BV are value relevant, in line with the vast body of research on value relevance. To examine if there is a significant change in the ERC and the BVRC from the NRP to the CRP we deploy a Chow (1960) structural break test. If the null hypothesis is rejected the two time periods do not share the same slope of the independent variables. The p-value for EPS was 0.014, rejecting the null hypothesis at the 5% level but not 1% level. The p-value for BVPS was 0.5849, not rejecting the null hypothesis. These results indicate that the expected change in the stock price from one unit of earnings has changed from NRP to CRP, but it has not changed for BV. Looking at Table 3 we see that the coefficient for EPS is 17.88 in the CRP which is lower than in the NRP. This means that the expected change in stock price from one unit of earnings is lower in the CRP compared to the NRP, thus making earnings less value relevant during the pandemic.

Table 3 Regression coefficients and explanatory power

Year	β_1EPS	β_2BVPS	R^2_{TOT}	R^2_{EPS}	R^2_{BVPS}	R^2_{COM}	N
2015	11.14**	1.13***	16.23%	0.52%	2.51%	13.29%	845
2016	19.13***	0.71***	23.81%	2.27%	0.9%	20.64%	868
2017	25.98***	1.15***	26.14%	2.97%	4.3%	18.87%	907
2018	27.75***	0.82***	23.41%	4.89%	1.26%	17.26%	1 026
2019	32.89***	1.08***	27.8%	6.87%	2.55%	18.38%	1 092
2020	*17.88***	*1.65***	*27.57%*	*4.38%*	*8.92%*	*14.27%*	*1 103*
2021	24.67***	1.63***	29.99%	5.28%	5.67%	19.04%	1 202
2022	22.39***	1.76***	45.65%	6.31%	9.58%	29.76%	1 381
2023	26.37***	1.68***	53.44%	7.65%	9.91%	35.88%	1 383
No crisis - pooled	24.98***	1.48***	32.49%	5.42%	5.57%	21.5%	8 704

***significant at .01, **significant at .05, *significant at 0.1.

Table 4 shows the results of Model 2, which is a pooled regression of all the years with the interaction terms BVPS*Cov, and EPS*Cov. As for stock price during Covid-19, it is negative, but not significant, signalling that for our data, there was no significant reduction in stock price in 2020 compared to the rest of the sample. The coefficients of BVPS and EPS are both highly significant and positive, in line with the years examined individually. The coefficient of the interaction term BVPS*Cov is positive, but not significant, suggesting there is no significant change in BVRC between the CRP and NRP. The interaction term EPS*Cov has a marginally significant negative coefficient, indicating that the ERC reduces during the CRP. These results are in line with the results from the Chow structural break test, supporting H1 but not H2.

Table 4. Covid and regression coefficients

Variable	β_1Cov	β_2(BVPS)	β_3(EPS)	β_4(BVPS*Cov)	β_5(EPS*Cov)	N	R^2
Stock price	-0.2365	1.48***	25.02***	0.12	-6.59*	9 807	32.01%
t-value	-0.06	18.38	15.45	0.51	-1.84		

***significant at .01, **significant at .05, *significant at 0.1.

Table 5 Panel A presents an overview of the amount of profit and loss firms in our sample. As expected, there are more firms reporting losses in 2020. We therefore deploy Model 2A to examine if our previous results showing a decrease in the ERC might be explained by the increase in loss firms. Table 5 Panel B shows the results from the Model 2A regression where the control variables LOSS*EPS and LOSS*BVPS are included. Now the interaction term EPS*Cov is not significant at any level, pointing towards the circumstance that the increase in loss firms explains the decrease in the value relevance of earnings. We also note the positive (negative) and significant coefficient of LOSS*BVPS (LOSS*EPS). This means the value relevance of BV increases for firms with negative earnings, and the value relevance of earnings decreases for firms reporting negative earnings.

Table 5 Number of profit and loss firms and coefficients

Panel A. Number of profit and loss firms

Year	Profit (Loss)	% Loss firms
2015	596 (249)	29.47%
2016	597 (271)	31.22%
2017	643 (264)	29.11%
2018	679 (329)	32.64%
2019	710 (382)	34.98%
2020	*574 (529)*	*47.96%*
2021	743 (459)	38.19%
2022	808 (573)	41.49%
2023	776 (607)	43.89%
No crisis – pooled	5570 (3134)	36.01%

Panel B. Covid and regression coefficients (Loss firms)

Variable	β_1Cov	β_2(BVPS)	β_3(EPS)	β_4(BVPS*Cov)	β_5(EPS*Cov)	β_8(LOSS*EPS)	β_9(LOSS*BVPS)	N	R^2
Stock price	-2.37	1.1***	37.62***	-0.08	5.3	-42.7***	0.35**	9 807	34.22%
t-value	-0.61	11.53	16.29	-0.36	1.47	-11.67	2.01		

***significant at .01, **significant at .05, *significant at 0.1.

As Covid-19 impacted industries differently, we choose to investigate some industries that were severely affected by the Covid-19 crisis. We apply Model 2 to the industries chosen and discussed in chapter 1.1.

Table 6 Panel A shows descriptive statistics by year for software, while Panel B shows descriptive statistics by year for tourism-related sectors. While the stock price of software firms is higher in 2020 than the NRP, the stock price of tourism-related firms is lower in 2020 than the NRP. For both industries the stock price is lower in 2020 than the preceding year, although the fall is larger in tourism-related firms, with a nearly 30% decrease from 58.18 to 40.79, compared to nearly 16% from 65.91 to 55.55 for software firms. From 2020 to 2021 software firms see an increase in stock price from 55.55 to 82.97, amounting to nearly 50%. Tourism-related firms experienced an increase of just above 54% from 40.79 to 62.93. As changes in stock prices give no indication as to whether there is a change in value relevance, an analysis in order to determine if there has been a change in value relevance is needed.

Table 6 Descriptive statistics for software and tourism related sectors

Panel A. Descriptive statistics by year (Software-related sectors)

Year	P				N
	Mean	Q1	Median	Q3	
2015	51.15	6.96	19.6	49.62	100
2016	39.46	6.62	21.29	38.28	102
2017	54.8	9.23	24.87	46.51	104
2018	52.27	9.75	30.44	55.91	127
2019	65.91	11.48	34.61	73.48	139
2020	*55.55*	*9.11*	*24.64*	*69.79*	*146*
2021	82.97	16.59	40.47	87.5	174
2022	46.35	6.89	16.96	49.2	227
2023	37.95	3.97	12.24	34.6	220
No crisis - pooled	53.81	7.74	22.42	55.22	1339

To analyse the software industry, we include firms with SIC codes between 7370 and 7379.

Panel B. Descriptive statistics by year (Tourism-related sectors)

Year	P Mean	Q1	Median	Q3	N
2015	38.27	13.2	31.37	57.91	22
2016	36.69	13.73	36.68	49.68	20
2017	43	13.9	24.87	46.51	21
2018	45.48	11.9	40.75	64.08	22
2019	58.18	10.23	30.57	61.09	29
2020	*40.79*	*3.42*	*16.87*	*35.82*	*27*
2021	62.93	13.85	42.98	68.8	28
2022	52.52	9.86	26.1	51	32
2023	53.23	9.52	20.84	61.75	33
No crisis - pooled	49	11.18	30.22	57.86	234

To analyse the tourism-related industry we include firms with SIC codes 7011 Hotels and Motels, 4512 Air Transportation, 4581 Airports and 5812 Eating Places.

Most notably, the sample of tourism-related firms has an explanatory power of 66.55%. This is significantly higher than the original sample. The sample used to investigate this industry has a much smaller sample size compared to the original sample. Gu (2007) finds that comparing R^2 across samples could be problematic, because a difference could be observed even if the underlying economic relations are the same. Therefore, comparing the R^2 of the different samples could potentially be misleading, and this finding does not necessarily indicate that there is a higher value relevance in the tourism industry.

As seen in Table 7 Panel A none of the interaction terms are significant at any level when investigating the tourism-related firms. The interactions term BVPS*Cov is positive and not significant, and EPS*Cov is negative and not significant. This indicates that there is no significant change in the value relevance of earnings or BV during the CRP for tourism-related firms.

Similar to the tourism-related firms, none of the interaction terms are significant for software firms. The interaction term BVPS*Cov is negative, compared to the positive coefficient found in tourism-related firms. They are however not significant. EPS*Cov is positive, as opposed to the negative coefficient found in tourism-related firms. Like the interaction term BVPS*Cov, EPS*Cov is not significant at any level. These findings indicate that there are no significant changes in value relevance during the CRP.

Table 7 Covid and response coefficients for software and tourism related sectors

Panel A. Covid and response coefficients (Tourism-related sectors)

Variable	β_1Cov	β_2(BVPS)	β_3(EPS)	β_4(BVPS*Cov)	β_5(EPS*Cov)	N	R^2
Stock price	-18.86	1.6***	31.88***	0.87	-10.76	234	66.55%
t-value	-0.89	2.6	5.88	0.39	-0.71		

***significant at .01, **significant at .05, *significant at 0.1.

Panel B. Covid and response coefficients (Software-related sectors)

Variable	β_1Cov	β_2(BVPS)	β_3(EPS)	β_4(BVPS*Cov)	β_5(EPS*Cov)	N	R^2
Stock price	3.54	1.32***	13.24**	-0.32	5.89	1 339	15.13%
t-value	0.49	3.09	2.27	-0.59	0.65		

***significant at .01, **significant at .05, *significant at 0.1.

5.0 Discussion

Firms' going concern risk increased during the Covid-19 recession, but fundamental models used by investors should be able to discern between transitory effects caused by a pandemic and persistent problems. However, the Covid-19 recession represented a global exogenous shock consisting of lockdowns that was unlike anything the world had ever seen before. Therefore, it would have been very difficult for investors during the release of the first quarterly earnings of 2020 to predict how and when the stock market would recover. This is thought to have impacted how much weight investors place on the accounting variables when making their investment decisions, thus affecting their value relevance. According to the FHT by Barth et al. (1998) the value relevance of earnings (BV) decreases (increases) when companies experience financial distress. Therefore, this study hypothesises that the value relevance of earnings decreases, and the value relevance of BV increases during the pandemic.

Firstly, the ERC is lower during the pandemic compared to the other years, a trend further affirmed by the Chow (1960) structural break test. Additionally, we observe a significant negative coefficient on the interaction term EPS*Cov, indicating a diminished emphasis on earnings by investors amidst the pandemic. While the incremental explanatory power of earnings declined during the recession, the magnitude of this decrease was not substantial. In summary, these results point towards a decrease in the value relevance of earnings during economic downturns, in support of H1.

Indications of a decrease in the value relevance of earnings during the CRP align with prior studies (e.g. Barth et al., 1998; Davis-Friday & Gordon, 2005; Davis-Friday et al., 2006; Kane et al., 2015), yet contradicts Bepari (2015) and Beisland (2013). As discussed in chapter 2.2 the aforementioned studies largely research different crises, and in different countries. The fact that research on the same crisis in different countries can yield vastly differing results signifies the importance of performing such studies on different countries and different crises. The apparent deviations in results between countries and crises make it practically impossible to generalise results.

During the pandemic, there was a notable rise in loss firms, prompting us to examine whether this factor explains the observed decrease in the ERC. Our analysis, upon controlling for this variable, suggests that the decline in the ERC could indeed be attributed to the increase in loss firms. This finding diverges from prior research findings, such as those of Bepari (2015) and

Kane et al. (2015), which reported robust results after controlling for similar factors. Despite indications of decreased earnings value relevance during the pandemic, the overall support for H1 is weak, as further analysis suggests that it stemmed from the increase in loss firms.

Investigating the BVRC an increase in the value is observed during the pandemic compared to the "No crisis - pooled" scenario. However, according to the Chow (1960) structural break test, this disparity lacks statistical significance. This finding is further consistent with the interaction term BVPS*Cov not being significant. Collectively, these findings suggest that investors do not assign greater weight to BV during economic downturns, contradicting H2. Nonetheless, there is a notable increase in the incremental explanatory power of BV from 2019 to 2020, but overall, there is not enough evidence from our results in support of H2.

This finding diverges from the findings of several prior studies, including Davis-Friday & Gordon (2005), Kane et al. (2015), Subramanyam & Venkatachalam (1998), and Beisland (2013), as well as the financial health theory proposed by Barth et al. (1998). According to the inverse relationship theory posited by Collins et al. (1997), a decline in the value relevance of earnings would typically coincide with a rise in the value relevance of BV. However, our findings indicate that the value relevance of BV remain unaffected when the value relevance of earnings decreased during the pandemic, not consistent with the theory. Also, our results deviate from Bepari (2015) who found an increase in the value relevance of BV during the global financial crisis in Australia. Overall, our results are inconsistent with most prior research, both on earnings and BV.

The reason we observe dissimilar results compared to previous research may stem from the fact we are investigating a different crisis. Over a decade separate this pandemic and the other crises investigated. Contemporary shifts in information dissemination channels, notably an increasing reliance on social media platforms for stock-related news by both retail and institutional investors (Haque et al., 2022; Duz Tan & Tas, 2021), potentially diminishes the use of fundamental accounting analysis in investor decision making progress. However, since we do not observe a significant change in value relevance, this could indicate that there was not an increasing reliance on social media explicitly during the pandemic.

Recent studies indicate that amidst uncertainty, investors tend to seek more information. This trend has led analysts to produce more timely reports, but less accurate reports, as suggested by Amiram et al. (2017). This pattern persisted during the Covid-19 pandemic, as noted by Hao et

al. (2022). Surprisingly, despite the increased availability of analyst reports, there was not a significant shift in the importance of these reports in determining firm value. Instead, investors continued to rely on established metrics like EPS and BVPS from quarterly reports, suggesting a preference for more reliable benchmarks over potentially less accurate analyst assessments during the pandemic.

Furthermore, the U.S. government swiftly implemented monetary policies during Covid-19 that were aimed at bolstering market liquidity, which facilitated a rapid recuperation of stock market indices. Although both the pandemic and the global financial crisis were characterized by the non-quantifiable risk in the form of uncertainty, the period during the pandemic potentially experienced lower levels of uncertainty. This circumstance could have inclined investors to continue relying on accounting variables.

Another determinant of our observed discrepancies in value relevance might pertain to alterations in the composition of industries between the other crises and the pandemic. The composition of industries in our sample might be more resistant to changes in value relevance during periods of economic downturn. However, our analysis did not reveal any discernible differences in the value relevance of various industries within our sample.

6.0 Conclusion

The aim of this study was to examine the impact of the Covid-19 crisis on the value relevance of book value of equity and earnings. By analysing the incremental value relevance of book value of equity and earnings we find mixed results.

Based on extensive research we first hypothesise that the value relevance of earnings would decrease during the pandemic. The empirical results documented in Chapter 4 provide partial support of this hypothesis, reflected by a significantly negative coefficient on the interaction term between earnings and Covid. This aligns with several previous studies that show a decrease in the value relevance of earnings during crises. These findings are not robust to controls for loss firms. After robustness tests we find evidence that indicates that the decrease in value relevance of earnings stems from an increase in loss firms in the Covid-19 recession period.

Secondly, we anticipate an increase in the value relevance of book value of equity during the Covid-19 crisis. However, our findings contradict this hypothesis. Although one can initially

observe an increase in explanatory power from 2019 to 2020, further analysis shows that there is no statistically significant change in the value relevance of book value of equity during the CRP compared to the NRP. This indicates that investors may not have assigned greater weight to BV during the Covid-19 recession. These findings suggest that researchers may not need to control for the Covid-19 recession when evaluating the value relevance consequences of new accounting standards.

The inconsistent findings between our hypotheses and empirical results highlight the complexity of determining value relevance in large crises such as Covid-19. Changes in investor behaviour and rapid monetary policies may have influenced the more traditional dynamics observed between stock market prices and fundamental accounting measures, such as book value of equity and earnings.

This study contributes to ongoing discussions on the role financial information plays in the decision making of investors, and especially so in periods characterised by economic and public health uncertainty. The mixed results of our study seen in light with large variations in value relevance between jurisdictions underlines the need for further studies on a variety of economic conditions in order to understand the relationships that define value relevance of book value of equity and earnings in crises.

A limitation of this study is the single-country sample. We investigate a U.S. sample, and this naturally limits the ability to generalise our findings. It can also be problematic to directly compare the results found regarding Covid-19 to other crises. Covid-19 was highly atypical, characterised by massive government intervention and altered consumer behaviour that does not represent normal economic cycles, and may not represent future crises.

Further studies could investigate how the Covid-19 crisis impacted value relevance of book value of equity and earnings in different countries. Value relevance research conducted on different countries could gain insights into how value relevance changes during crises under different economic, regulatory and market responses. Historically, the differences in value relevance across country borders are large, and studies similar to ours could likely yield different results with non-U.S. samples. Researching the role of new media and technology in affecting investor behaviour could improve the literature.

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Appendix

Acronyms and abbreviations

List of acronyms and abbreviations

Abbreviation	Definition
CRP	Covid recession period
GDP	Gross domestic product
NBER	The National Bureau of Economic Research
BV	Book value of equity
FHT	Financial Health Theory
EPS	Earnings per share
BVPS	Book value of equity per share
Cov	Indicates whether year is covid year or not
NRP	Non recession period
ERC	Earnings response coefficient
BVRC	Book value response coefficient
SIC	Standard Industrial Classification

Fama-French 12 Industry Portfolios

Fama-French Industry Portfolios

Industry	SIC Codes	Observations in industry
1 NoDur - Consumer Nondurables -- Food, Tobacco, Textiles, Apparel, Leather, Toy	0100-0999 2000-2399 2700-2749 2770-2799 3100-3199 3940-3989	517
2 Durbl - Consumer Durables -- Cars, TVs, Furniture, Household Appliances	2500-2519 2590-2599 3630-3659 3710-3711 3714-3714 3716-3716 3750-3751 3792-3792 3900-3939 3990-3999	328
3 Manuf - Manufacturing -- Machinery, Trucks, Planes, Off Furn, Paper, Com Printing	2520-2589 2600-2699 2750-2769 3000-3099 3200-3569 3580-3629 3700-3709 3712-3713 3715-3715 3717-3749 3752-3791 3793-3799 3830-3839 3860-3899	1 234
4 Enrgy - Oil, Gas, and Coal Extraction and Products	1200-1399 2900-2999	353
5 Chems - Chemicals and Allied Products	2800-2829 2840-2899	368

6 BusEq - Business Equipment -- Computers, Software, and Electronic Equipment	3570-3579 3660-3692 3694-3699 3810-3829 7370-7379	*2 070*
7 Telcm - Telephone and Television Transmission	4800-4899	295
8 Utils - Utilities	4900-4949	403
9 Shops - Wholesale, Retail, and Some Services (Laundries, Repair Shops)	5000-5999 7200-7299 7600-7699	762
10 Hlth - Healthcare, Medical Equipment, and Drugs	2830-2839 3693-3693 3840-3859 8000-8099	
11 Money – Finance	6000-6999	1 382
12 Other - Mines, Constr, BldMt, Trans, Hotels, Bus Serv, Entertainment		1 912

Firms not classified into any of the first 11 industries are assigned to industry *12 Other*.