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COVID-19, firm performance, and the value relevance of earnings

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ABSTRACT

In the wake of the COVID-19 crisis, there has been a growing interest in investigating how stock markets behave during times of uncertainty and crisis. This is because it has been shown that stock prices seem to disconnect from fundamentals during moments of extreme uncertainty. Using earnings and returns data from publicly traded corporations for the twelve months beginning January 1, 2020, we assessed the performance of major industrial sectors during COVID-19. We also investigated the concurrent earnings/returns relation to discover whether earnings changes convey useful information during times of high uncertainty. Following prior literature along similar lines, we used firm-level earnings and returns data and estimated cross-sectional regressions to examine the earnings/returns relation. We found considerable variation in the earnings and returns data across and within the industrial sectors. Our results mostly showed a positive relationship between accounting income and concurrent stock returns, implying that accounting earnings numbers were value relevant during the pandemic. Positive earnings news (earnings increases) seemed to generate a greater market response than negative earnings news (earnings drops), leading to a shift in the overall stock market's outlook from negative to positive in the second half of 2020. These findings will help the decision-making of investors, creditors, policymakers, financial analysts, and other stakeholder groups.

Contribution/Originality: The primary contribution of the study is the finding that accounting earnings are value relevant even in times of high uncertainty. The positive relationship between earnings and stock returns adds to a better understanding of the relevance of accounting earnings in company valuation during periods of high uncertainty among investors, corporations, and financial analysts.

1. INTRODUCTION

COVID-19 has affected the performance of businesses worldwide. Initially, stock markets plunged almost everywhere in the world. The association between new COVID-19 cases and stock prices was typically negative, although the degree of impact on various sectors differed (Al-Awadhi, Alsaifi, Al-Awadhi, & Alhammadi, 2020). The U.S. stock market witnessed a massive drop in share prices during the first three months of 2020 due to pandemic-induced uncertainty (Baek, Mohanty, & Glambosky, 2020; Cepoi, 2020; Ortmann, Pelster, & Wengerek, 2020). However, despite the economic predictions of significantly low business earnings in 2020, the U.S. stock market rebounded in June 2020. If one accepts that a firm's market capitalization mirrors the present value of expected future cash flows (accounting earnings), this share market rebound is quite illogical (Sunder, 2021). One explanation might be that COVID-19 did not uniformly affect business operations across sectors. Several industrial sectors, such as the

healthcare sector, experienced a rise in demand for their products and services, resulting in positive quarterly earnings change announcements and thus triggering a positive market response in the form of higher stock returns.

Previous empirical research has established a positive correlation between accounting earnings changes and contemporaneous stock returns (see, e.g., (Ball & Brown, 1968; Teets & Wasley, 1996)), suggesting that earnings changes are value relevant and help investors assess firm value. Prior studies on the earnings/returns association have relied mainly on data from stable economic conditions characterized by a low level of uncertainty. Given how volatile and unpredictable markets became during COVID-19, it is critical to assess whether accounting information preserves its value relevance during a crisis. Would this feature have been visible at the industry level during this time period?

We hypothesize that during a period of turmoil, when most firms are expected to perform poorly, good news (e.g., earnings increase) from a firm will attract investors' attention and result in a strongly positive market reaction. Thus, investors' overreaction to good news (earnings increases) compared to bad news (earnings decreases) should have changed the stock market's overall outlook from negative to positive after the second quarter of 2020.

Prior research has relied mainly on the aggregate market or industry-level stock prices (indices) to evaluate the performance of firms during COVID-19. Using firm-level earnings and returns data as a proxy for firms' performance will help obtain more conclusive evidence. In addition, we expect to see results explaining why the stock market rebounded in the second half of 2020. The objectives of this study are, therefore, i) to examine the effects of COVID-19 on the performance of various industrial sectors during the calendar year 2020, and ii) to study the relation between earnings and concurrent stock returns to discover whether accounting earnings were value relevant under these unprecedented conditions. Value relevance research is essential to investors, creditors, policymakers, financial analysts, and other stakeholder groups that use accounting numbers to make decisions (Badu & Appiah, 2018).

The remainder of the paper is structured as follows. The next section provides an overview of the pertinent literature. Section 3 briefly explains the data; Section 4 outlines the methodology; Section 5 briefly explains the results, and the final section concludes.

2. EXTANT LITERATURE

Numerous prior studies on the impact of infectious disease outbreaks may be cited in the context of the analysis of firm performance during the COVID-19 pandemic. According to DeLisle (2003), the 2003 severe acute respiratory syndrome (SARS) outbreak led to economic losses equivalent to those experienced during the Asian financial crisis. Nippani and Washer (2004) investigated the impact of SARS and found that it negatively affected Chinese and Vietnamese stock markets. Macciocchi et al. (2016) evaluated the impact of the Zika virus outbreak on the equity markets of Argentina, Mexico, and Brazil and found a decline in the stock returns of Brazilian stocks only. Lee and McKibbin (2004) assessed the economic implications of SARS using the G-Cubed model and found that the disease had an intense global impact because of the improved economic linkages between nations. Burch, Emery, and Fuerst (2016) analyzed the effect of the 9/11 terror attack on major global stock markets. Bai, Wei, Wei, Li, and Zhang (2021) examined the effects of infectious disease outbreaks on share price fluctuations in the U.S., China, the United Kingdom, and Japan and showed that infectious diseases increase the volatility of international stock markets.

COVID-19 is a novel viral disease, the response to which has affected the performance of businesses worldwide. It shook investors' confidence globally, causing huge stock price fluctuations. Baker, Bloom, Davis, and Kost (2020) noted that no prior viral disease had resulted in daily stock market fluctuations comparable to the reaction to COVID-19. The magnitude of the impact, however, was not uniform. Gupta, Chaudhary, and Gupta (2022) used the t-test and Mann–Whitney U test to examine investors' responses to COVID-19 in the major global equity markets and observed a temporary dip in the stock markets but a rapid rebound; Chaudhary, Bakhshi, and Gupta (2020) and Zeren and Hizarci (2020) supported the conclusions of Gupta et al. (2022) by claiming that the impact of COVID-19 on stock prices varied across countries. Erdem (2020) asserted that the pandemic had a less severe effect on stock prices in more free countries than in less free ones. Additionally, several studies have noted that the effects of COVID-19 on firms'

stock prices differed across industries. For example, Maneenop and Kotcharin (2020) assessed the effects of COVID-19 on the stock prices of firms operating in the airline industry and showed a much sharper decline in the stock returns of airlines than of other firms. Similarly, Haroon and Rizvi (2020) reported that stock volatility was greater in sectors deemed more susceptible to the coronavirus pandemic. Gu, Ying, Zhang, and Tao (2020), He, Sun, Zhang, and Li (2020), and Xiong, Wu, Hou, and Zhang (2020) examined the performance of Chinese firms and concluded that the "corona effect" varied across firms and industries. Finally, Alam, Wei, and Wahid (2021) observed that although COVID-19 adversely affected the overall Australian share market, certain industries continued to perform well.

Earlier studies have shown that share prices tend to disconnect from fundamentals during times of extreme uncertainty, behaving in ways not described by classic valuation models (Barberis, Shleifer, & Wurgler, 2005; Epstein & Schneider, 2008; Williams, 2015). Although several studies have investigated the effect of COVID-19 on stock prices, little is known about firms' and industries accounting earnings and the usefulness of this information for stock valuation in the COVID-19 era.

The discussion of the usefulness of accounting income in firm valuation began with Ball and Brown (1968), who reported that earnings numbers contain value-relevant information. Since then, numerous researchers have investigated the value relevance of earnings by examining the relation between earnings numbers and concurrent stock returns in stable economic conditions (e.g., (Choi, Kalay, & Sadka, 2016; Collins. & Kothari, 1989; Teets & Wasley, 1996)). These studies mostly reported a positive earnings/return relation, suggesting that earnings surprises contain information about firms' future prospects. We hypothesize that during the period of severe economic uncertainty induced by the COVID-19 outbreak, investors used firms' earnings information to make investment decisions, resulting in a stock market rebound in 2020.

3. DATA

The empirical analysis of this study covered twelve months, starting from January 1, 2020. The initial sample included all publicly traded U.S. firms with the required data available on Standard & Poor's Global Market Intelligence. Firms with a stock price under $1 and those with fiscal years ending in months other than December were excluded from the sample. The final sample thus consisted of 2796 individual firms in eight industries. We used the "*1st Level Primary Industry Classification*" of the S&P Market Intelligence database to classify the sample into eight industrial sectors. Appendix A provides additional information on the constituents of each industrial group.

4. METHODOLOGY

Since Ball and Brown (1968), several studies have examined the concurrent earnings/return relationship and its determinants. Using firm-level data, these studies usually estimate the term

$$cov\ (R_{i,t},\ dX_{i,t}) \tag{1}$$

Where $R_{i,t}$ and $dX_{i,t}$ refer to stock returns and earnings surprises, respectively. Earnings changes are generally divided by firms' book or market values. Such studies (e.g., (Beaver, Clarke, & Wright, 1979; Teets & Wasley, 1996)) have mostly reported that $cov(R_{i,t},\ dX_{i,t}) > 0$, supporting the hypothesis that earnings surprises convey information about firms' future prospects.

Previous studies have employed several benchmarks for expected earnings; for instance, Brown and Rozeff (1978) used analyst forecasts, and Ball and Brown (1968) and Collins, Kothari, and Rayburn (1987) preferred market model and lag earnings, respectively. We used lag earnings and estimated earnings surprise as follows:

$$dX_{i,t} = X_{i,t} - X_{i,t-1} \tag{2}$$

Where $X_{i,t}$ refers to the operating income of firm i in year t.

We regressed returns on earnings changes scaled by the lagged stock price. This regression model has been widely used in similar prior literature:

$$R_{i,t} = \alpha_i + \beta_i\ .\ dX_{i,t} / P_{i,t-1} + \varepsilon_{i,t} \tag{3}$$

Where $R_{i,t}$ = Year-to-Date (YTD) total returns as of December 31, 2020, $dX_{i,t}$ = change in annual operating earnings for firm i, and P_i = market capitalization at the beginning of 2020. We used β to infer the sign of the correlation between annual earnings changes ($dX_{i,t}$) and concurrent stock returns ($R_{i,t}$). We estimated cross-sectional regressions for the entire sample and then for each industry. The value weights were calculated using market capitalization at the start of 2020, and the top and bottom 0.5% of dX_i/P_i were winsorized.

Table 1. Summary statistics.

Variable	N	Mean	Std. dev.	Mean	Std. dev.
All firms	2796				
$\Delta X_i/P_i$		-1.29	8.03	-2.60	19.21
Returns		12.29	37.71	18.83	63.84
MTBV		7.32	12.08	4.77	9.91
Size				7459.3	24385.7
Financials	656				
$\Delta X_i/P_i$		-4.57	7.57	-3.93	16.20
Returns		-3.93	25.82	-0.09	39.80
MTBV		6.22	14.61	3.82	11.68
Size				7722.33	26335.3
Healthcare	640				
$\Delta X_i/P_i$		0.49	3.50	0.44	20.63
Returns		17.47	32.86	33.03	77.77
MTBV		9.42	12.62	7.61	11.92
Size				5308.6	22495.9
Technology & telecom	382				
$\Delta X_i/P_i$		0.10	5.84	-1.40	18.58
Returns		23.40	41.11	43.88	68.88
MTBV		6.12	5.49	5.24	7.05
Size				8743.8	30842.2
Materials	119				
$\Delta X_i/P_i$		-0.76	4.90	-0.89	10.68
Returns		19.90	25.80	21.41	45.97
MTBV		4.12	3.24	2.60	2.24
Size				6236.75	10932.1
Consumer	222				
$\Delta X_i/P_i$		0.32	5.76	0.42	17.62
Returns		25.20	38.50	29.74	61.67
MTBV		14.69	18.19	5.52	11.16
Size				9005.4	27330.7
Industrials	324				
$\Delta X_i/P_i$		-3.90	12.52	-1.49	16.47
Returns		6.19	29.00	23.06	56.62
MTBV		7.90	9.24	3.65	6.19
Size				7619.6	21066.7
Real estate	198				
$\Delta X_i/P_i$		-1.56	7.02	-6.16	18.22
Returns		-5.90	22.29	-8.28	41.74
MTBV		4.66	5.12	2.38	2.66
Size		27558.1	27721.8	6485.4	11720.0
Energy & utilities	255				
$\Delta X_i/P_i$		-6.17	11.38	-8.98	29.57
Returns		-19.84	22.71	-13.14	54.99
MTBV		2.41	3.85	3.28	9.70
Size				9619.6	24787.7

Note: MTBV stands for market-to-book ratio, while variables X_i and P_i stand for accounting earnings and stock price for firm i, respectively.

5. RESULTS

Table 1 provides summary statistics, revealing a 1.29% (Std. 8.03) reduction in the average operating income of our sample firms while still showing positive value-weighted YTD returns of 12.29%. Around half of our sample firms showed positive YTD returns, yet earnings and stock return data across industries exhibited considerable variation.

5.1. Industrial Sectors with Negative Earnings Changes

Figure 1 shows that the Energy & Utilities sector experienced the largest decline (-6.17%) in its earnings. The reason for this decline is likely that large oil companies faced a substantial change in aggregate demand for oil along with oil price shocks. Lockdowns were extensively enforced in the second quarter of 2020, which decreased oil consumption and, therefore, oil prices. Additionally, the Energy and Utilities sector experienced the largest negative value-weighted stock returns (-19.84%) during the sample period, supporting the argument that market forces incorporate earnings information into stock prices.

Financials reported the second-largest decline (-4.57%) in their earnings, with stock returns of -3.93%. These findings are consistent with economic theory, which suggests that an economic downturn capable of bringing the economy to a standstill will put the banking sector under pressure. During the pandemic, the slowdown in consumers' demand for goods and services reduced corporate revenue, requiring them to rely heavily on bank loans. Borrowers faced extreme difficulties when their available resources dried out, leaving them unable to make loan repayments. Thus, the high expected non-performing loan losses increased the credit risk exposure of financials. Also, extra costs, such as buying technology to enable people to work from home, could be another reason for the decline in the accounting income of financials.

Other sectors with negative earnings growth were Industrials (-3.90%), Real Estate (-1.56%), and Materials (-0.76%).
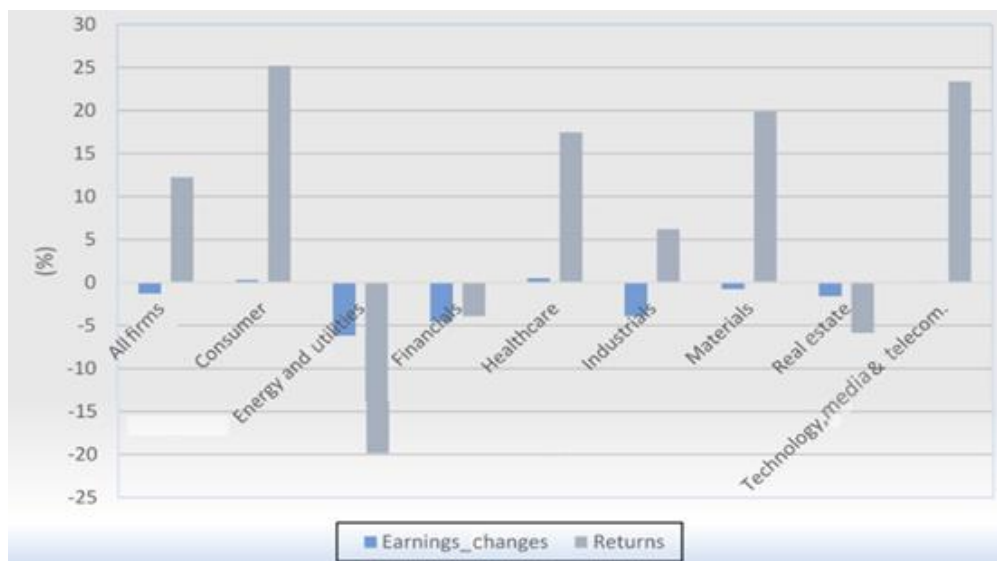

Figure 1. Earnings changes and stock returns.

5.2. Industrial Sectors with Positive Earnings Changes

On average, the sectors reporting a positive change in their accounting earnings experienced a minor rise of less than one percent in their earnings. With 17.47% stock returns, the healthcare industry announced the largest positive earnings changes (0.49%) since healthcare, medical, and pharmaceuticals were less vulnerable to COVID-19. The Healthcare group is made up of five sub-industries, with "Healthcare Supplies" reporting the highest earnings growth (1.70%) and year-to-date returns (57.77%). In addition to a positive change in earnings (0.32%), the Consumer group had the highest positive returns (25.20%). The possible reasons for the better performance of this group during the

crisis period could be (i) the increased consumer spending on grocery items over time (Baek et al., 2020), and (ii) the effective use of technology by firms to develop infrastructure for online or socially distant operations.

The Technology & Telecom group also performed well, showing an increase of 0.10% in accounting earnings, with 23.4% of stock returns. Ramelli and Wagner (2020) reported similar results, noting that the telecommunications industry performed well during the pandemic due to an increase in demand for information technology-related services.

These results show that industries with positive (negative) earnings changes had predominantly positive (negative) returns during the sample period, indicating a positive earnings-returns relationship and supporting the proposition that accounting earnings are value relevant and thus informative, even during unstable periods.

5.3. Regression Analysis of Accounting Earnings' Value Relevance

Value relevance is the extent to which firms' accounting data is mirrored in share prices (Hellström, 2006). Francis, LaFond, Olsson, and Schipper (2004) declared that value relevance was among the most significant features of accounting information. It is the statistical relationship between stock returns and accounting information. Prior studies on the earnings/return relation (e.g., (Collins. & Kothari, 1989; Sadka & Sadka, 2009; Teets & Wasley, 1996)) have reported a positive relationship between accounting income and concurrent stock returns during stable economic periods. We estimated cross-sectional regression coefficients using Equation 1 to determine whether a positive earnings/return relationship existed during the period of disruption caused by COVID-19. Table 2 shows that the slope coefficients (β) for the entire sample and each industry are both positive and statistically significant. Table 1 shows quite similar results. These results corroborate the findings in Table 1 that earnings change announcements carry value-relevant information about firms' future prospects, even in times of crisis, such as COVID-19.

Table 2. Relation between earnings changes and stock returns.

Industry	Slope	T-statistics	Adj.R²
All firms	1.67	18.07	12.80
Financials	1.84	12.73	21.66
Healthcare	0.63	1.39	0.24
Technology & telecom	1.69	4.23	5.50
Materials	1.25	2.41	4.73
Consumer	3.21	6.47	15.61
Industrials	0.711	5.17	9.17
Real estate	0.79	3.45	6.06
Energy & utilities	0.81	6.67	17.71

6. CONCLUSION

Prior research on the performance of firms and industries during COVID-19 has mainly focused on the aggregate stock market (stock indices) fluctuations and concluded that the impact differs across industrial sectors and countries and that the stock market rebounded quickly. Little research has been done to discover the reasons for the quick market recovery or the link between firms' fundamentals, such as earnings and stock prices. Using firm-level earnings and returns data, this study assessed the performance of various industrial sectors in terms of stock returns and changes in accounting earnings during the twelve months commencing January 1, 2020. Additionally, we studied the association between earnings changes and concurrent stock returns to discover whether investors use earnings information to make investment decisions during times of high uncertainty.

We found considerable variation in the earnings and returns data across and within the different industrial sectors. Compared to the other sectors, Energy & Utilities experienced a larger hit, with a 6.17% decline in its accounting earnings, while its stock returns declined by -19.8%. In contrast, the Healthcare, Technology & Telecom, and Consumer sectors performed well in terms of accounting earnings and stock returns. Our regression analysis

revealed a strong positive relationship between changes in accounting income and contemporaneous stock returns, implying that accounting earnings are value relevant, even in times of crisis. It appears that a stronger market reaction to good news (earnings increases) than bad news (earnings decreases), resulted in a shift in the overall stock market outlook from negative to positive in the second half of 2020. Future research may employ the event study approach to examine market reactions across a 3–5 day event frame of quarterly earnings announcements. Similarly, future research may examine why investors react more strongly to positive than negative earnings changes during a crisis.

These findings will help investors, companies, and financial analysts gain a deeper understanding of the importance of accounting earnings in corporate valuation. Government agencies will better understand the vulnerability of various industrial sectors to pandemics like COVID-19 and will be able to take appropriate precautions.

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Appendix A. Classification of industries.

mi_level_1_primary	mi_level_2_primary
Consumer	Education services
	Hotels, restaurants, and leisure
	Producers
	Retail
	Specialized consumer services
Energy & utilities	Independent power producers and energy traders
	Oil, gas, and coal
	Renewable electricity
	Utilities
Financials	Asset management
	Banking
	Financial exchanges
	Financial technology
	Holding companies, patent owners, and trusts or estates
	Insurance
	Investment and business development companies
	Investment banks, brokers, and capital markets
	Mortgage banks and brokers
	Mortgage real estate investment trusts
	Payments
	Specialty finance
Healthcare	Healthcare equipment
	Healthcare providers and services
	Healthcare supplies
	Healthcare technology
	Pharmaceuticals, biotechnology, and life sciences
Industrials	Capital goods
	Commercial services
	Transport
Materials	Chemicals
	Construction related material
	Containers and packaging: Metal, glass, plastic
	Forest products
	Metals and mining
	Paper made items
Real estate	Equity real estate investment trusts
	Real estate management and development
Technology & telecommunications	Information technology
	Media
	Telecommunication services

Note: mi refers to standard & poor's global market intelligence.