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Business as usual after COVID-19?

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Abstract

This thesis investigates the operational, organizational, strategic, and financial adaptations of the 30 largest firms in the United States in response to the COVID-19 pandemic by analysing and comparing their 2019, 2020, and 2022 annual reports as well as publicly available information. The research's primary goal is to identify COVID-induced changes and the long-term implications of the identified changes. A secondary goal is to explore potential industry-specific trends in how firms adapted to the challenges brought on by COVID-19 through a comparative analysis of industry responses. Key findings reveal a negative relationship between the extent of qualitative changes and market capitalization and capital expenditures. The thesis also finds that most companies implemented remote work and corporate social responsibility initiatives and adjusted their risk management practices in response to COVID-19. A notable increase in total debt during Q2 2020 reflects heightened demand for cash, with well-performing companies rapidly de-leveraging after that. In the Tech sector, increased debt levels appear to be a long-term adjustment. Stock-based compensation is indicated to be performance-driven, with poorly performing companies reducing stock-based compensation. This research highlights the varied impacts of the pandemic across different sectors and performance levels and aims to extend the current research body on how to navigate through a global economic crisis.

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List of Abbreviations

Capex	Capital Expenditures
Cf	Confer
CSR	Corporate Social Responsibility
E.g.	Exempli Gratia
FED	Federal Reserve
GDP	Gross Domestic Product
i.e.	Id Est
IMF	International Monetary Fund
LTM	Last Twelve Months
OECD	Organisation for Economic Co-operation and Development
QE	Quantitative Easing
R&D	Research and Development
SBC	Stock-based Compensation
S&P	Standard & Poor's
USD	US Dollar
WHO	World Health Organization

1. Introduction

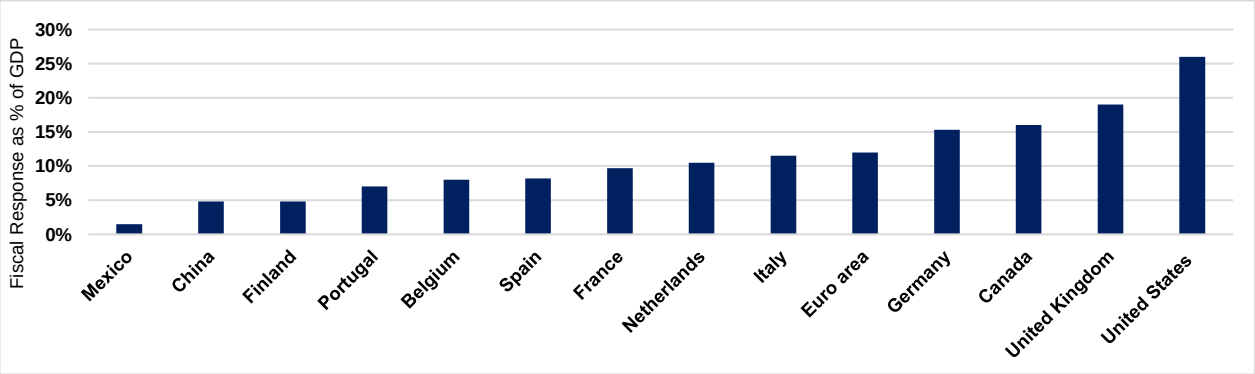
1.1 Background and Rationale

Recognized as a Public Health Emergency of International Concern by the World Health Organization (WHO) on January 30, 2020, and later as a worldwide pandemic on March 11, 2020, the novel SARS-Cov-2 virus (COVID-19) quickly affected over 200 nations. As of February 2024, the global death toll from this pandemic approached the 7 million mark, according to WHO.

COVID has caused the most severe economic crisis since World War II. Global supply chain disruptions and weakened demand for imported goods and services, among other factors, influenced all economic sectors. The U.S. Bureau of Economic Analysis has indicated that in the second half of 2020, corporate earnings fell by 11.8% to USD 1,569.2 billion in the United States. This represents the most significant drop in corporate profits since the final quarter of 2008.

Moreover, the pandemic is distinct from other financial crises because it is an exogenous shock to both supply and demand (OECD, 2021).

FIGURE 1: DISCRETIONARY FISCAL RESPONSE AS A PERCENTAGE OF 2020 GDP, Q1, 2020 – Q3, 2021



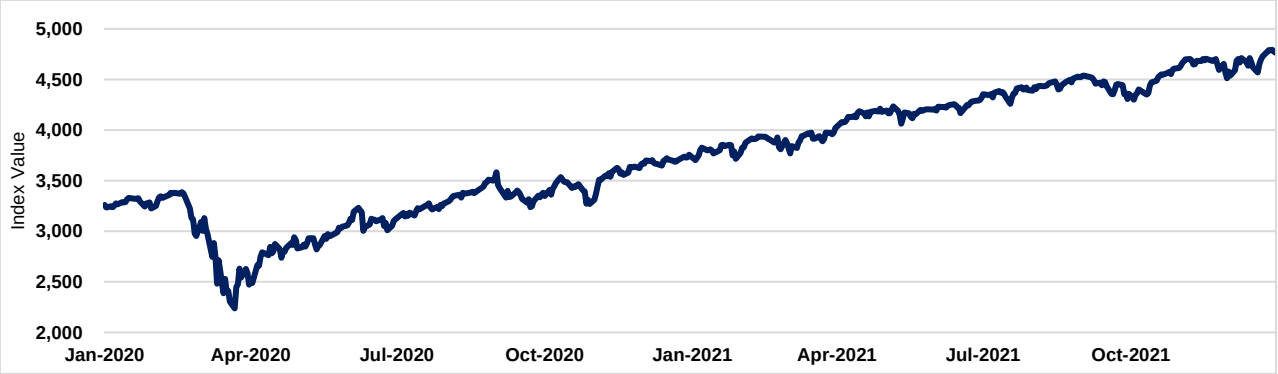
(Source: IMF, 2021)

In reaction to the COVID-19 crisis, governments and central banks across the globe rapidly introduced fiscal and monetary strategies, including quantitative easing (QE) programs of an unparalleled scale, aimed at stabilising financial markets (Demirgüç-Kunt et al., 2021). The U.S. government's fiscal measures to mitigate the effects of the pandemic have been substantial, totalling $4.2 trillion, which is more than 19% of the nation's pre-pandemic GDP in 2019. Also, these measures were mainly distributed over 2020 and 2021 (Gomme, 2022).

The economic repercussions of the pandemic in the U.S. significantly affected labour markets, leading to a steep decline in employment and wage reductions (Cajner et al., 2020; Kurmann et

al., 2021). This caused a substantial decrease in demand and inflation. The scale of the economic downturn was comparable to the Great Depression. Financial markets also reacted negatively, with a more severe drop in equity prices than in past pandemics (Baker et al., 2020). Additionally, the U.S. Treasury market saw a notable sell-off, causing an increase in long-term yields (Schrimpf et al., 2020). In response, the Federal Reserve took several actions, including establishing credit facilities, providing liquidity support to various sectors, and engaging in extensive security purchases while reducing the policy rate to near zero. On the financial market side, during March 2020, the S&P 500 experienced a sharp decline, losing 25% of its value as the pandemic's repercussions rippled through the U.S. economy and markets. Consequently, extraordinary fluctuations in stock prices have been observed in 2020, leading to a phase of heightened volatility in the markets (Curto & Serrasqueiro, 2022).

FIGURE 2: S&P 500 PERFORMANCE, 2020-2021



(Source: Trading Economics and Capital IQ)

With the immediate, almost unprecedented impact of COVID-19 on the business world, companies have to react to function adequately in a new environment. As volatility and uncertainty rise, companies have to decide on how to handle direct changes like prohibitions of gatherings (Jacobsen & Jacobsen, 2020) or indirect effects like the changed demand profile of a customer. The companies will have to potentially decide whether to continue with their investment strategies, whether they need more cash reserves for a period of uncertainty, or whether they want to keep signalling well-being through share buybacks and dividends, albeit their performance might have suffered.

This paper will analyse the responses of various sectors throughout the pandemic, focusing on identifying e.g., the specific changes implemented by high-performing companies compared to those adopted by poorly performing companies.

1.2 Research Question and Objective of the Study

Given the significant impact COVID-19 has had on global business operations, a natural question arises in the aftermath of the crisis: How have large firms adapted to the challenges presented by the pandemic? Specifically, this paper seeks to comprehend the essential changes reported in the annual reports of the 30 largest U.S. companies for fiscal years 2019 and 2020, analysing their operational, financial, and strategic responses to a pandemic-induced business environment. The research aims to explore firmwide responses to the pandemic in areas including, amongst others, workplace organization, risk management practices, capital structure, cash reserves, share repurchases, and investments in the online distribution of products and services. Furthermore, the study also intends to uncover potential industry-specific patterns in how firms have undergone pandemic-induced adaptations, examining whether firms in the same industries responded similarly to the disruptions caused by the pandemic.

Existing literature mainly focuses on large sample sizes of companies, including significantly smaller players and various countries, such as Korea and China (e.g., Chung et al., 2023; He et al., 2022). Furthermore, many studies often concentrate on a single attribute, such as a company's leverage or cash reserves (e.g., Acharya & Steffen, 2020).

Our study aims to bridge the gap between the findings of existing literature and their applicability to the largest U.S. companies. Therefore, we are analysing the annual statements of our sample companies to not only check whether previous academic findings are representative of the largest U.S. companies but also to identify potential new research areas. In particular, we want to identify COVID-induced changes to company policies that, on the one hand, have potentially been retained in the long-term and, on the other hand, show a potential distinction in terms of sector or performance of a company. Lastly, we want to identify whether qualitative changes have impacted the quantitative changes the companies have conducted.

Therefore, this study extends the existing literature by investigating a new peer set of large U.S.-based companies while analysing a multitude of financial and qualitative changes.

1.3 Structure of the Thesis

The "Literature Review" offers a comprehensive analysis of previous studies on business responses to COVID-19, identifying the main findings of scholars who have investigated the topic, key trends, and gaps this research paper aims to fill. Additionally, suggested areas for other research topics are also covered. After covering the existing literature, the paper covers the "Hypotheses" that have been derived from previous papers, as well as potential new research

areas. The hypotheses will be the basis for the analysis and the following discussion and conclusion. The research design, data collecting, and analysing tools used to achieve the study's objectives are described in "Methodology". Afterward, the "Analysis and Results" part of the paper will explain in detail the findings for the qualitative analysis, the quantitative analysis, and the regression.

Furthermore, the results will be put into context of whether a change is considered COVID-induced and whether the change has been retained in the long-term. Lastly, the results will be discussed in the context of the expected outcome versus the actual outcome. Additionally, potential explanations for the observed behaviour will be discussed. At the end of the discussion, the limitations of our study and ideas for further research will be laid out.

2. Literature Review

As this paper will focus on various potential changes that the companies have induced during COVID-19, the following section will look at the existing literature for certain areas of potential change in order to derive hypotheses in the upcoming chapters.

2.1 Organisational Changes

2.1.1 Remote Working

The pandemic has necessitated a change in workplace norms, and organizations adjusted to new ways of working. A notable change has been the widespread adoption of remote working practices (Brynjolfsson et al., 2020). In 2020, the impact of COVID-19 led to a significant increase in employees working remotely, utilising online platforms for virtual collaboration due to the need for physical distancing and the implementation of lockdowns (Franken et al., 2021). As a result, according to GlobalData (2022) the usage of Zoom, a video communications software, increased 30 times in 2020, as remote working policies were implemented and millions of people had to work, learn, and socialise remotely. Moreover, Zoom shares saw an important price rise, and the firm's revenues jumped by 88% between fiscal years 2019 and 2020.

2.1.2 Distribution Channel

COVID-19 also changed the way customers shop. Due to store closures and lockdown measures, many businesses were not able to welcome clients in physical stores. Companies that already had e-commerce platforms prior to the outbreak of the pandemic were able to mitigate the impact of lower sales by encouraging and thereby enabling customers to shop online instead. As customers wanted to minimise the human-to-human contact due to the pandemic, e-commerce became a more popular way of shopping (Woong & Goh, 2020).

According to the IMF (2021), the online share of total spending jumped from 10.3% in 2019 to 14.9% at the peak of the pandemic. Walmart saw its e-commerce sales grow by 74% in the first quarter of 2020 in the U.S., with significant demand for grocery pickup and delivery services (Walmart, 2020). Likewise, Amazon's e-commerce revenue increased 47% year over year in the second quarter of 2020 (S&P Global, 2020). Additionally, Karakaya and Stahl (2009) stated that offline-to-online strategies, which require significant effort since they necessitate regular capital investment and sufficient volumes of online sales to break even or make profits, have a long-term impact on the business as they may be viewed as permanent alternative purchasing methods for customers (Karakaya & Stahl, 2009).

2.1.3 Corporate Social Responsibility (CSR)

"Business responsibility" refers to a company's willingness to use resources driven by its need to address broader social concerns instead of securing financial gain. It dates back to the 1960s as a concept (Frederick, 1960). With the surge of the COVID-19 pandemic, many organisations across the world engaged in CSR activities through donations to coronavirus relief efforts. A website called didtheyhelp.com, which was active until the end of 2020, listed pandemic-related CSR announcements of different firms to show if a given firm took part in any kind of CSR activity. Once an announcement is identified, the website would assign a +1 score if a given firm announced positive pandemic-related news, e.g., making donations, whereas the firm would have a -1 score assigned if the news were negative. The website also contained links to the source of the announcements (Rupp & Limpaphayom, 2024).

2.2 Financial Changes

2.2.1 Leverage

Previous studies on corporate financing indicate that companies tend to raise their debt levels in times of increased uncertainty and crisis, mainly as a precautionary measure. Halling et al. (2020) pointed out that as firms' internally generated sources of funds are less available during abrupt, unexpected recessions, their demand for external capital increases. Their research also provided insights into the equity issuance activities of firms during the early weeks of the pandemic. Contrary to their findings in the corporate bond market, they observed a considerably slower issuance activity in equity markets, which is in line with previous research by e.g., Bernstein (2015).

The research by Chung et al. (2023) revealed that in the first quarter of 2020, as the pandemic shock first hit, companies substantially lowered their cash holdings, net debt, and equity

issuances. Meanwhile, with the implementation of expansionary fiscal and monetary policy measures during the rest of 2020, cash holdings and net debt issuances increased significantly.

Gopalakrishnan et al. (2022) found a roughly two-percentage-point rise in overall debt financing for firms around the globe in the second and third quarters of 2020, compared with pre-pandemic times. The authors underlined that their findings were in line with previous research focusing on bond or loan financing during the pandemic, confirming a general upward trend. Their study also identified that the increase in borrowing activity due to COVID-19 was more significant for bond financing than loan financing. They attributed this difference in the type of borrowing to the differing financial health of firms. For example, firms with access to bond markets usually have better credit ratings. They can secure additional financing for possible investment opportunities. In contrast, companies dependent on bank loans are usually less flexible in terms of financing, and they might look for additional financing as a precautionary measure. Their research demonstrates that when credit conditions are challenging, as was the case for the COVID-19 pandemic, financially stronger firms are more capable of utilizing incremental debt financing to build strategic reserves.

Furthermore, the trade-off theory might be a potential underlying reason for changes in the capital structure (Kraus & Litzenberger, 1973; Miller, 1977; Modigliani & Miller, 1958; Myers, 2001). With almost certain changes in the market capitalization of companies caused by COVID-19, firms might have to react when following a strategy or a goal for its leverage and optimizing the firm's value.

2.2.2 Stock-Based Compensation

The pandemic and its influence on the economy could have an impact on companies' stock-based compensation. Existing literature explains that the underlying reasoning for stock-based compensation is reducing agency problems, therefore aligning the interests of shareholders and managers. The downside is shown to be a short-sighted focus on current performance by managers, for example, by concealing bad news about the future of the company (Benmelech et al., 2010). Matolcsy et al. (2009) have found a positive relationship between stock-based compensation and the company's market value if the SBC is used as an incentive to perform well in the future rather than a reward for past performances. Therefore, SBC has the potential to be used as a tool to further incentivise employees of a company, especially during times of uncertainty. Moreover, with uncertainty, the investment strategy and potentially the criteria for conducting investments may change. Bizjak et al. (1993) found that SBC can be used to induce an investment decision by the management, which could be another reason for a change in the strategy during COVID.

2.2.3 Corporate Liquidity Management and Investments

During the COVID-19 pandemic, firms across different countries adapted their cash management strategies in response to the heightened economic uncertainty and operational disruptions. Studies that examine these actions reveal a varying approach to corporate cash holdings driven by precautionary motives, financial constraints, and corporate governance. Qin et al. (2020) found that the pandemic increased the cash holding level of listed companies. The paper suggested that this type of cash management behaviour during the crisis highlighted the prevention motive of cash, with firms choosing to increase liquidity to prevent systemic risks. The research by Chung et al. (2023) revealed that COVID-19 has a positive impact on the cash reserve level of firms in industries seriously affected by the pandemic. Hence, firms largely impacted by the pandemic may choose to hold larger cash reserves to protect themselves against the related risks, compared to firms that have only been slightly affected. Therefore, their research found, on the one hand, that firms in Korea increased their cash reserves in 2020, but on the other hand that companies reversed this increase in cash in 2021 due to the decline in overall uncertainty, which is, among other factors, influenced by the constraints and accessibility to financing. Similarly, in China, firms adjusted their cash policies based on the pandemic's impact on their stock returns (He et al., 2022). Those experiencing negative impacts were more likely to increase their cash holdings, utilizing it as a precaution to navigate the unpredictable effects on demand, supply, and the cash conversion cycle. This adjustment was more evident among non-state-owned, low-growth, and small firms without overseas operations, highlighting the role of financial frictions and corporate governance in cash management decisions during the pandemic.

Acharya and Steffen (2020) observed that with the beginning of the pandemic, the total cash reserves increased across the entire corporate sector, along with a heightened preference for cash holdings over utilising credit lines. This trend was evident among firms with lower credit ratings (BBB-rated and non-investment grade), illustrating the key role of cash in managing corporate liquidity during periods of increased risk.

These studies collectively highlight the global corporate sector's strategic emphasis on liquidity and financial flexibility amidst the COVID-19 crisis. The increase in cash reserves reflects a broad-based response to the pandemic's challenges, with firms across Korea and China prioritizing financial stability and operational safety. This shared focus on enhancing cash positions, despite the differing regional contexts and firm-specific factors, emphasises the universal importance of preparedness and adaptability in times of uncertainty.

With the potential impact on cash, the influence on investments must also be considered. With various studies showing the importance of cash during uncertainty (e.g. Acharya & Steffen, 2020; Chung et al., 2023; He et al., 2022), research like Han and Qian (2020) shows that for public companies in China, the R&D spending (called "innovation input") increased during the pandemic. Furthermore, He et al. (2022) show that an increase in cash reserves leads to an increase in R&D spending, which is also driven by the lack of other investment opportunities in an uncertain environment. Additionally, firms already possessing sufficient cash reserves are more likely to use these reserves to invest (Chung et al., 2023).

2.2.4 Dividend Policy

The COVID-19 pandemic has also influenced corporate dividend policies, marking a period of considerable financial strategy adjustment across global markets. The existing literature points to diverging policy actions taken by businesses facing challenges posed by the pandemic. For instance, some firms opted to cut or omit dividends as a result of the economic uncertainties and financial strains introduced by COVID-19. However, a substantial number of companies, especially within the G-12 countries, either maintained or raised their dividends, suggesting a strategic move to signal financial stability and confidence to investors in uncertain times (Ali, 2022).

This was also a tendency across the S&P 1500 firms to either uphold or raise dividends (Mazur et al. 2020). This tendency aligns with the broader observation within G-12 countries, indicating a strategic approach toward managing investor expectations, signalling financial stability and confidence and maintaining a firm reputation during uncertain times (Cejnek et al., 2021). Furthermore, Jebran and Chen (2022) showed that an increase in dividends during the pandemic is also connected to a higher quality of managers within Chinese companies. These results, however, are closely related to the findings that a higher managerial ability results in better firm performance (e.g., Bhutta et al., 2021). Also, it has specifically been indicated that improved performance in relation to managerial ability also occurred during the global financial crisis (Andreou et al., 2017).

The variation in responses could be attributed to differences in industry impact, regional economic conditions, firm-specific financial health, and strategic priorities.

FIGURE 3: SUMMARY OF COVID-19 DIVIDEND MEASURES

TABLE 6

Summary of COVID-19 Dividend Measures

Table 6 presents a summary of COVID-19 measures to restrict dividend payments in the European Union, Switzerland, the U.K., and the U.S. Sources: European Banking Authority (EBA), European Central Bank (ECB), European Insurance and Occupational Pensions Authority (EIOPA), European Systemic Risk Board (ESRB), Eidgenössische Finanzmarktaufsicht (FINMA), Bank of England (BoE), and Board of Governors of the Federal Reserve System (Fed).

Country/Region	Summary	Begin	End
European Union	Recommendations to refrain from dividend payment. Most countries adopted these in the financial sector, also for less significant institutions. Dividend ban for firms taking COVID-19 relief.	Mar. 2020	Sept. 30, 2021
Switzerland	Recommendation to postpone dividends and dividend restrictions for firms applying for COVID-19 relief.	Mar. 2020	
U.K.	Communication to refrain from dividend payments until Dec. 10, 2020. An "appropriately prudent framework" has been recommended since then.	Mar. 2020	
U.S.	Large banks had to cap dividend payments. Later dividends allowed through a specific formula. Dividend ban for COVID-19 aid firms.	June 25, 2020	Mar. 31, 2021

(Source: Cejnek et al. 2021, page 15)

Adjustments to dividend policies during the pandemic also varied across sectors or regions, highlighting the significance of specific firm characteristics and external pressures. Firms that demonstrated higher profitability, robust operating cash flows, and positive stock return skewness experienced less severe disruptions in dividend smoothing. In contrast, those with higher leverage, particularly in the financial sector, encountered more significant challenges, partly due to regulatory dividend restrictions (*Figure 3: Summary of COVID-19 Dividend Measures*) aimed at preserving capital and ensuring financial stability during the crisis (Cejnek et al., 2021).

The period also underscored the notable impact of market dynamics and regulatory interventions on dividend policies. The value of near-term dividends showed increased volatility, with dividend futures experiencing a more significant drop than overall market indices in the early stages of the pandemic. This trend was partially reversed by the year's end, highlighting the unique financial market conditions during COVID-19, especially within the financial sector, where regulatory restrictions on dividends compounded the challenges firms faced (Krieger et al., 2021).

2.2.5 Stock Repurchases

With an uncertain environment paired with diverging performances throughout the pandemic, it is interesting to examine stock repurchases. The existing literature shows that share repurchases are a valid alternative to paying dividends, especially for relatively young firms (Grullon & Michaely, 2002). Jagannathan et al. (2000) have found a distinction between dividends and share

repurchases in terms of reasoning. Their research concluded that dividends are closely connected to companies that have stable earnings, whereas share repurchases are not necessarily. Additionally, Grullon and Michaely (2004, p. 651) found that share repurchases are followed by "a significant reduction in systematic risk and cost of capital relative to non-repurchasing firms".

Furthermore, existing literature suggests that stock repurchases also have a signalling effect and intention as the companies want to show that their shares are undervalued, thereby repurchasing them for a relatively low price (Bhattacharya, 1979a & 1979b; Miller & Rock, 1985; Vermaelen, 1984), which could not be proven by Grullon and Michaely (2004). Their research suggests that the repurchases and the market reaction to them are driven by the reduction in free cash flow and systematic risk, as potential overinvestments are less likely to happen due to fewer cash reserves. Therefore, we are provided with multiple possible explanations.

Additionally, Chivaka et al. (2009) analysed the reasons for share repurchases provided in the annual reports by public companies in South Africa. The research shows that share value enhancement is the main reason for share buybacks, indicating a signalling effect. Other reasons include administrative, compensation, or change of control reasons. With an uncertain environment during COVID, part of our analysis will be focused on the changes in share buyback policies and whether we can potentially identify reasons for the changes.

3. Hypotheses

The pandemic has had an economic impact that we have not seen since the Second World War. Given these circumstances, companies had to react to the crisis in the short and long run. Regarding changes that have been retained after the pandemic, we will first set several hypotheses about the topics we previously mentioned. We will then look at whether we find support for our hypotheses or whether we can reject them. Additionally, we are focusing on several qualitative and financial measures that we have identified as potentially significant during COVID along two core dimensions — direct cash impacting decisions and direct decisions impacting the organizations behaviour of conducting business. We limit our research to these measures and dimensions due to their readily identifiable nature. We are aware that the identified measures are not exhaustive to the issue at hand and that there are additional direct and indirect impacts of COVID on organizational decision-making to research and to conduct an analysis on.

Firstly, existing literature has shown that remote work has been implemented into the daily life of companies. We expect the same implementation for most or all of our companies as we have seen governmental regulations prohibiting large gatherings and similar situations. For additional

qualitative changes, we expect the companies, if applicable, to change their distribution channels to a more e-commerce-focused distribution mainly due to the changed consumer preferences and needs driven by the physical restrictions. However, if a company already has an existing website and online shop through which the distribution can be funnelled through, we do not necessarily expect any changes. Lastly, we expect most companies to have some kind of "social" response to the pandemic, e.g., a donation or a social act, since the companies are heavily covered by the media and represent the largest corporations in the world. Therefore, the society expects these companies to act on behalf of the society. Moreover, if a company is not socially responsible while the other companies are, the public backlash could be far more damaging than the cash spent for potential aid. For example, Parmelee and Greer (2023) found that most companies announced their plans in four theme categories regarding COVID. Therefore:

Hypothesis 1: The majority of our data set will implement, if not happened previously, remote work, an e-commerce presence through which the distribution can be carried out, and CSR measures, e.g., donations or other aid

Leverage plays a crucial role in the navigation through the crisis. Studies have already shown that throughout the world, companies have increased their debt levels during uncertain times. Halling et al. (2020) also showed a specific increase in bond issuance during the 12th calendar week in 2020 in the U.S. compared to 2019, 2018, and 2017. It is also suggested that companies that issue new bonds usually have a better credit rating, thereby improving the financing conditions. Since we are taking the upper echelon of companies into our data set, we expect an increase in leverage for our data set. Reasons for that are not only the financing conditions with near 0% interest rates set by the FED but also, for some companies, potentially good performance during the pandemic, thereby allowing the adjustment to an ideal leverage structure. Furthermore, additional cash for mandatory investments might be required. This hypothesis, if proven to be correct, would fall in line with the trade-off theory of capital structure (Miller, 1977; Modigliani & Miller, 1958; Myers, 2001) as companies with increased market capitalisation would need to increase their debt in order to reach the value-maximizing debt level. Therefore:

Hypothesis 2.1: Companies increase or maintain their leverage ratio in the short as well as the long run as the companies either follow a target leverage ratio for which they have to increase their debt or their market capitalization drops, forcing them to take on additional debt as safety

Hypothesis 2.2: Companies increase their total debt during COVID as they want to build a cash reserve against uncertainty or need cash for further investments, while profiting from low interest rates

Stock-based compensation is another potential area of change. Literature has found diverging results regarding the effects of stock-based compensation, with the underlying reasoning being an alignment of interest between shareholders and managers. As COVID was an exogenous shock that changed the way of doing business and caused ominous uncertainty, we assume that, on the one hand, cash reserves were more important than before the pandemic, which could give an incentive to companies to try and pay top-level management as well as regular employees with stock options in order to keep the cash impact at a minimum, and on the other hand, have increased stock-based compensation for managers and employees in order to reward stellar work during such uncertainty and lower the incentive to leave during such times. Ye et al. (2023) have already researched CEO compensation, specifically with the result of an increased compensation and pay ratio, with an additional positive influence on good financial performance. Therefore, we hypothesise:

Hypothesis 3: Companies will increase their absolute stock-based compensation expenses

The following hypothesis examines the role of cash reserves during the uncertainty of a pandemic and its potential long-term effects. Existing literature, specifically studies on Korean companies, has demonstrated that the greater the impact of COVID-19 on a company, the more significantly its cash reserves increased during the crisis. Additionally, this increase gets reverted post-crisis (Chung et al., 2023). Also, Chinese companies reacted negatively to their stock returns by increasing their cash reserves (He et al., 2022). Acharya and Steffen (2020) found a preference for cash reserves compared to utilising credit lines. Furthermore, Han and Qian (2020) and He et al. (2022) both show increased spending in R&D during the pandemic, with Chung et al. (2023) also suggesting higher spending on investments if previous cash reserves were sufficient. When analysing the 30 biggest companies in the U.S., we assume there will be an increase in the cash reserves due to the uncertainty caused by the pandemic. We also hypothesise that companies will have higher cash reserves and more leverage, while investing more in R&D and new projects. This would be financed by higher cash savings through cost cutting as well as through additional debt, which aligns with our previous hypothesis. Therefore:

Hypothesis 4.1: Companies will increase their cash reserves during COVID

Hypothesis 4.2: Companies will increase their spendings on R&D during COVID, potentially for a signalling reason

Hypothesis 4.3: Companies will increase their capex during COVID, potentially for a signalling reason

Hypothesis 4.4: In line with He et al. (2022) findings, cash reserves increase more for companies that perform poorly during COVID

We expect that dividends will maintain or increase in line with the research of Ali (2022) and Cejnek et al. (2021). Additionally, we expect maintenance or an increase in stock repurchases, with similar reasoning as Cejnek et al. (2021) provide, namely the signalling of financial stability that should give the investors confidence in the company. However, there is a scenario in which dividends will remain the same or increase while the share repurchases drop, as the dividends are seen as the primary signalling and return tool during uncertainty. Therefore:

Hypothesis 5.1: Dividends should stay on a similar level as pre-pandemic or increase, while ratio changes should be dependent on the performance of the groups

Hypothesis 5.2: Stock repurchases should stay on a similar level as pre-pandemic or increase, while ratio changes should be dependent on the performance of the groups

We are conducting a regression analysis to connect our qualitative and quantitative results. We are predicting no significant results will come out of the regression as we see two significant problems: the first one is our sample size. With 30 companies, we might lack the necessary depth in order to find significant results. The second reason for our hesitation is the homogeneity of the sample. While the companies are in different sectors and have performed differently throughout COVID, we expect very homogeneous change management for the pandemic. As all companies are based in the U.S. and are the amongst largest companies worldwide, we expect not only government-driven changes that have to be conducted by the entire peer group, but we also expect similar changes for our qualitative changes as the companies might be forced to change similar to the peers due to peer pressure.

An example could be CSR actions being conducted to keep a good media image and to keep up with the competition. Additionally, since we are looking at a data set of multiple industries, not all change categories apply to all sectors (e.g., production to Tech vs production to Industrials, since a Tech company does not have a physical production process). Therefore, we cannot punish a Tech company for not changing its production during COVID. However, we expect a positive

relationship for our ChangeIndex variable for the change in market capitalization since we expect that the market positively values reaction to COVID and that the companies profit from more adjustments to COVID.

Hypothesis 6: The ChangeIndex variable will show a positive relationship with the change in market capitalization. However, we do not expect the regression to yield statistically significant results due to the underlying data set, in particular, due to the potentially very similar characteristics/values of the ChangeIndex variable

4. Methodology

Firstly, for our research, we looked at the largest 30 companies in the S&P 500 index as of 01.01.2024, thereby focusing solely on the U.S. market. We also assign each of the companies to two groups. The first category is their sector (e.g., Apple is a technology company). This is determined by Capital IQ's categorisation and a consolidation of categories to form fewer groups. Secondly, the companies are assigned a performance group. Here, we have five categories (poor, below average, average, above average, good), which are determined by the change in market capitalization of the company from 01/01/2020 to 31/12/2020. In particular, the companies were then put in quintiles, determined by their performance. Therefore, the six companies with the highest percentual increase in market capitalization in that time frame were placed in the good performance group.

The research was split into two methodologies. The first methodology is a qualitative analysis based on companies' annual (10-K) filings with the SEC for the years 2019 (pre-pandemic), 2020, and 2022. Specifically for the fiscal year 2020, we took the annual reports that included the majority of calendar year 2020. This qualitative analysis involves searching these documents for key terms initially identified through the literature review, such as "remote work,", "process management", "work-from-home", and "supply chain disruption" along with other relevant themes that emerged through further research. In addition, terms like "COVID-19" and "pandemic" were also researched in these documents to understand what type of actions companies implemented due to and/or in response to the pandemic. Upon identifying specific changes, such as a company implementing a particular action, the next step is to search for this action on Google. This involves reading through press releases and online information related to the action to gain a deeper understanding of what was implemented and afterward checking if it was maintained in 2022.

In order to understand how each company performed on given themes, a summary table was employed (*Figure 4: Overview Qualitative Analysis Results*). In the table, "Y" was used to indicate

"Yes", meaning the company took action related to this theme; "NR" for "Not Relevant", indicating that the theme is not relevant to the company's industry (e.g., inventory management for a tech company); and "N/A" to indicate that no specific action due to COVID-19 was identified in the annual reports covering the majority of 2020, or in press releases from March 2020 to August 2020 and through the first page of Google search results.

Additionally, it is essential to note that "risk management" in this context refers to business risk rather than health risk to employees. This includes actions like hedging currency risk due to the impact of COVID-19, implementing cybersecurity measures against remote work risks, increasing credit risk loss estimates, and performing write-offs and impairment of asset analyses rather than health-focused actions such as workplace cleaning or COVID-19 testing.

The quantitative analysis was conducted based on data from Capital IQ and combined with the Excel formulas of the Capital IQ add-in. Firstly, the analysis is looking at several periods, which include Q1 to Q4 2019 and 2020, as well as the calendar years 2019, 2020 and a period which can be called Q1 2022 LTM, meaning it includes the second calendar quarter of 2021 (April to June) until the end of Q1 2022. Therefore, the formulas CY2019 and CY2020 have been used for the calendarized years, whereas for our Q1 2022 LTM year, a combination of the formula "IQ_LTM" (Table A) has been used with 31/03/2022 as the date to extract the data. For all of our other formulas, 30/04/2024 was used as the date to extract the data. Furthermore, for our quarterly analyses, we use the CQ12019 to CQ42020 date formulas in order to have a comparable data set. The data will be calendarized to the calendar quarters with the abovementioned formula. Also, we identify Q2 2020 as the first quarter that can show the impact of COVID-19 and its potentially caused managerial and strategic changes on the financials of the researched companies.

Additionally, the analysis looks at two different types of financials. On the one hand, the absolute numbers are analysed (e.g., capex spent or dividends per share paid), and on the other hand, ratios are analysed (e.g., capex as a percentage of sales or the leverage ratio). Additionally, stock-based compensation and share repurchases have been divided by the net income in order to generate a ratio. The reason is our expectation that these two forms of compensation or distribution of means are closely related to the performance of the company, which is often connected either to the market capitalization or the net income. Furthermore, specifically for the stock-based compensation (SBC), we have adjusted the percentage change by the employee growth for the investigated compared quarters. The intention behind this adjustment is a potential relation of stock-based compensation that is naturally granted to new employees or based on the company's growth.

The analysis is looking at the change in the leverage ratio in combination with the change in total debt and change in market capitalization, the change in stock-based compensation (which has been adjusted to the employee growth in the periods) as an absolute number as well as a ratio in relation to net income, R&D expenses in relation to revenue and as an absolute number, share repurchases in relation to net income and as an absolute number, the dividend payout ratio and dividends per share, capex as a percentage of sales and as an absolute number, and cash as a percentage of total assets and as an absolute number. In order to identify whether a COVID-induced change has been kept for the long-term, we compare the change in the ratios from CY2019 to Q1 2022 LTM with several changes in the ratios in the quarters Q2, Q3 and Q4 of 2020. In particular, we look at the change annually, e.g., the capex as a percentage of sales decreases, and see if this has been induced in the quarters mentioned above. In addition, we compare each quarter in 2020 to its respective quarter in 2019 in order to see whether potential changes from, e.g., Q1 2020 to Q2 2020, have been caused by the companies' regular cycles rather than an actual change due to COVID-19. As mentioned, it also analyses how the ratios in Q2, Q3, and Q4 2020 change compared to the figures in Q1 2020, which provides the basis for our analysis.

The results of the analysis will be based on the averages of the changes in percentage for each analysed financial value for each sector or group. Due to the usage of averages rather than medians, the data outputs have been adjusted in order to exclude extreme outliers. We have set the threshold at a change of more or less than +/- 500%. While knowing that values close to the threshold can also be considered outliers that can distort the results, we still want to capture extraordinarily big changes.

Moreover, the results of the analysis have to be interpreted as whether COVID induces these and whether, in case they have been, they have remained in the company. The results above are achieved by comparing pre-COVID levels (Q1 2020 vs Q2 2020) and Q2, Q3, and Q4 2020 to their respective quarters in 2019 and Q1 2020. If an increase in a ratio has occurred in, e.g., Q1 2020 compared to 2019, while there were no significant changes in Q2, Q3, and Q4 2020 compared to 2019, we conclude that there have not been COVID-induced actions. If there is a change in the ratios in comparison to 2019 and ideally a change from Q1 to Q2, Q3, or Q4 2020, then we conclude that there have been COVID-induced changes. Eventually, the comparison to the change between CY2019 and Q1 2022 LTM is made. If the direction of the change (increase or decrease) is the same and the size of the change is similar, we conclude that the COVID-induced change has been kept for the long term in the company.

Lastly, the regression analysis is conducted based on our qualitative and quantitative analysis. We start by assigning each company a value based on the amount of qualitative, COVID-induced changes the company conducts. This variable is called ChangeIndex. ChangeIndex is calculated the following way: we first sum up all the categories in which a company has received a "Yes" for the conduction of such change. Each "Yes" is equal to 1. Afterwards, we divide the sum by the number of categories, which is 7, and subtract the number of categories in which a company has received a "not relevant" (NR) tag

$$ChangeIndex = \frac{Sum\ of\ Index\ Approvals}{7 - Sum\ of\ NR}.$$

For instance, Accenture received an NR tag for production and distribution, inventory, and e-commerce due to either pre-existing fulfilment capabilities (e.g., a website with capabilities to conduct transactions) or the absence of physical products. As a result, the ChangeIndex is a number between 0 and 1. Once the variable is set, we conduct a regression analysis with ChangeIndex as our independent variable and other indicators as dependent variables. The dependent variables we have investigated are "Change in market capitalization", "Change in total debt", "Change in SBC", "Change in R&D", "Change in share repurchases", "Change in dividends", "Change in cash", and "Change in capex". For each dependent variable, two regressions are conducted: one analysing the change from CY2019 to CY2020 and the other analysing the change from Q1 2020 to Q2 2020. The change in market capitalization from 2019 to 2020 is measured based on the market capitalization on January 1, 2020, compared to December 31, 2020. The Q1 to Q2 change is based on the market capitalization as of March 31, 2020, compared to June 30, 2020. Lastly, neither did we evaluate the potential influence of other unknown variables, nor did we control for other known variables.

5. Analysis and Results

5.1 Qualitative Analysis

The qualitative analysis of the annual and quarterly reports of the companies shed light on the corporate decisions made by companies in order to adapt their strategies to disruptions caused by the COVID-19 pandemic.

FIGURE 4: OVERVIEW QUALITATIVE ANALYSIS RESULTS

Companies	Remote Work	Production/ Distribution	Products/ Services	Inventory	E-com merce	Risk Manage ment	CSR
Apple	Y	Y	Y	N/A	Y	Y	Y
Abbvie Inc	Y	Y	Y	Y	NR	N/A	Y
Accenture	Y	NR	Y	NR	NR	Y	Y
Adobe	Y	Y	N/A	NR	Y	Y	Y
Advanced Micro Devices	Y	Y	Y	N/A	N/A	Y	Y
Amazon	Y	Y	Y	Y	Y	Y	Y
Broadcom	Y	Y	Y	N/A	NR	Y	Y
Bank of America	Y	NR	Y	NR	NR	Y	Y
Berkshire Hathaway	Y	Y	Y	Y	NR	Y	N/A
Costco	Y	Y	Y	Y	Y	Y	N/A
Salesforce	Y	NR	Y	NR	NR	Y	Y
Chevron	Y	Y	N/A	N/A	NR	Y	Y
Alphabet	Y	NR	Y	NR	NR	Y	Y
Home Depot	Y	Y	Y	Y	Y	Y	Y
Johnson & Johnson	Y	Y	Y	N/A	N/A	Y	Y
J.P. Morgan	Y	NR	N/A	NR	NR	Y	Y
Coca Cola Company	Y	Y	Y	Y	Y	Y	Y
Eli Lilly & Co	Y	Y	Y	N/A	NR	Y	Y
Mastercard	Y	NR	Y	NR	NR	Y	Y
Meta	Y	NR	Y	NR	Y	Y	Y
Merck & Co	Y	N/A	Y	N/A	NR	N/A	Y
Microsoft	Y	Y	Y	N/A	N/A	Y	Y
Nvidia	Y	N/A	Y	N/A	N/A	Y	Y
Pepsi	Y	N/A	N/A	Y	Y	Y	Y
Procter & Gamble	Y	Y	Y	N/A	Y	Y	Y
Tesla	Y	N/A	N/A	N/A	N/A	Y	Y
United Health Group	Y	NR	Y	NR	NR	N/A	Y
Visa	Y	NR	N/A	NR	Y	Y	Y
Walmart	Y	Y	Y	Y	Y	Y	Y
ExxonMobil	Y	Y	Y	N/A	NR	Y	Y
# of Y	**30**	**17**	**24**	**8**	**11**	**27**	**28**
% of Y, adjusted for NR	**100.0%**	**81.0%**	**80.0%**	**40.0%**	**68.8%**	**90.0%**	**93.3%**

(Source: annual reports, press releases, online articles)

5.1.1 Remote Work and Workplace Flexibility

Our review shows that neither "remote work", nor "work from home", nor "working remotely" were mentioned in the 2019 annual reports of the S&P 500's 30 largest companies. This indicates that prior to the pandemic, remote working was not a common organisational policy or practice. However, once the COVID-19 pandemic hit the United States, especially after the WHO declared it a global pandemic on March 11, 2020, companies started adopting remote work policies.

The 2020 annual reports of the 30 aforementioned companies and the online research indicate that all 30 companies either allowed the majority of their employees to work remotely, enforced a

mandatory work-from-home policy (e.g., NVIDIA), or deferred non-essential work and demobilised non-essential personnel (e.g., Chevron). Interestingly, Tesla managers asked for a strict return-to-office policy in the spring of 2022, whereas the company had allowed office employees to work remotely even before the pandemic. Tesla CEO Elon Musk required employees in an email sent to either spend at least 40 hours a week in the office or leave the firm. Musk, together with other Tesla executives, decided to further monitor employee attendance closely through detailed weekly reports on absenteeism. Moreover, some employees who were previously working remotely were laid off in June 2022 after they stated they would not be able to relocate to meet the return-to-office requirements (Kolodny, 2022).

Nevertheless, several tech companies, including Amazon, recognise that increasingly more employees prioritise remote or hybrid work options in their job search. Hybrid work is a flexible working model in which employees work some days of the week from the office and the remaining remotely. Amazon, in their “Risk Factors” section of 2022 10-K filings with the SEC, mentioned that their policy changes, i.e., asking their employees to return to the office while other firms do not, could be disadvantageous for the company in terms of attracting new talents (Amazon.com Inc., 2023). An observed pattern in 2022 was the switch to a hybrid working model by some of the 30 largest companies in the U.S., especially those within the tech industry, such as Adobe, Apple, Google, Salesforce, Microsoft, and Meta. Thus, signalling the shift from the pre-pandemic in-person working model. For example, Adobe mentioned its plan to introduce a 50/50 hybrid workplace organisation model in its 2021 10-K filings with the SEC (Adobe Inc., 2021). This change in workplace organisation shows a move to balance the benefits of remote work with the advantages of in-office collaboration, aiming to enhance flexibility and productivity and maintain employee engagement and retention.

In addition, a report by McKinsey & Company (2023) indicates that office attendance globally is 30 percent lower compared to pre-pandemic levels. The report suggests that this figure could even further decrease if employees gain more bargaining power, allowing them to negotiate for more remote workdays. Conversely, employees might need to spend more days in the office if employers gain more influence in these negotiations or if they offer incentives to come to the office such as free meals or other benefits. Moreover, with improved hybrid working conditions and improved technology, the need for employees to be physically present might further diminish. Overall, these changes demonstrate the significant impact of the COVID-19 pandemic on workplace organisation. In summary, employees value the hybrid model as it provides more flexibility as well as a better work-life balance, whereas employers are trying to attract potential

candidates with the implementation of hybrid models as the preference for remote work rises (Biron et al., 2022). From an organisational perspective, it helps improve the bottom line through increased productivity and decreased fixed costs (Choudhury et al., n.d.; Raghuram et al., 2019).

5.1.2 Production and Distribution Management

Companies have also made several adjustments to maintain efficient operations and meet customer expectations during the pandemic. One example is Amazon, which faced an unprecedented demand increase during the pandemic. This increase was mainly driven by customers staying at home during the lockdowns and increasingly ordering online, thereby shifting their spending to e-commerce. As a result, the company had to hire 400,000 additional full-time and part-time employees to increase its fulfilment network capacity in 2020 (Amazon.com Inc., 2020). At the end of 2020, the long-term planning science team sent a warning about the fast-growing network's risk of becoming too complicated. Hence, the company started working on a new project that aimed at improving delivery speed and inventory management. Finally, on January 18, 2023, Amazon implemented an organisational change called "regionalisation", through which it was able to restructure its fulfilment network to meet the increase in customer demand through an improvement in efficiency. With the switch to a regionalised fulfilment model, Amazon divided the United States into eight geographic regions to shorten delivery routes and improve delivery speed by fulfiling customer orders from fulfilment centres closer to the customer's respective location. Hence, the company used advanced technologies such as the Adaptive Transportation Optimisation Service (ATROPS), allowing Amazon to assign an optimal delivery route for each order, thereby improving the efficiency of its transportation network and the delivery speed.

Furthermore, Amazon consolidated shipments within regions that allowed it to fill trucks more efficiently. In addition, the consolidation also reduced the number of long-distance shipping routes, and improved the delivery times even further. Overall, this shift significantly increased the percentage of orders fulfilled within regions from 62% to 76%.

Moreover, regionalisation enabled Amazon to manage inventory levels across its fulfilment centres better. The concentration of stocks in fewer strategically located centres improved its ability to meet customer demand quickly and facilitated inventory distribution. These changes show how Amazon adapted its operations to meet the distribution challenges caused by the pandemic, ensuring efficient delivery and high customer satisfaction. The "regionalisation" project was described as Amazon's biggest operational transformation in a decade (O'Neill, 2023).

Likewise, Broadcom is another company that adapted its production management in response to the COVID-19 pandemic. The firm shifted to a build-to-order (BTO) model in reaction to supply chain disruptions and uncertainties in demand (Broadcom Inc., 2020). The BTO model allows companies to manufacture or assemble products following specific customer orders instead of anticipating future demand. As a result, Broadcom was able to navigate supply chain uncertainties better, reduce potential excess inventory, and use its resources more efficiently during the pandemic. For the fiscal year that ended on October 29, 2023, Broadcom continued to operate its BTO model which demonstrated that the company aimed to maintain efficient operations and accurately meet customer demand even after the initial wave of COVID-19 (Broadcom Inc., 2023).

In 2020, Chevron also adjusted its oil production facility management, changing its maintenance turnarounds, which are planned, periodic shutdowns of a plant or facility to perform maintenance, inspections, and upgrades. These maintenance activities are usually needed to guarantee efficiency and safety of facility operations. However, Chevron deferred some of its turnarounds to 2021, while others were extended in duration or reduced in scope to align with pandemic-related constraints. The company also reduced its capital expenditures significantly. As a result, Chevron experienced overall lower production with scaled-back drilling and completion activities, particularly in the Permian Basin, Gulf of Mexico, and Argentina (Chevron, 2020). After 2021, Chevron started to resume more regular maintenance schedules and to increase production activities, but some constraints and cautious adjustments were kept.

Similarly, due to the lower global oil demand in 2020, ExxonMobil reduced its capital expenditure plans by $10 billion, from $33 billion to $23 billion, and decided to cut cash operating expenses by 15% to preserve its dividend (Brower, 2020), with the biggest cuts relating to the Permian Basin. Furthermore, there was a net reduction of approximately 1.5 billion oil-equivalent barrels, according to the company’s 2020 10-K annual filing (Exxon Mobil Corporation, 2021).

Tesla benefitted significantly from its already existing direct-to-consumer (D2C) business model during COVID-19. The direct-to-consumer model is an approach to sales where the car manufacturer sells its vehicles directly to the end user instead of selling through franchised dealerships, a more common model in the U.S. During the pandemic, this model provided several key advantages since Tesla's D2C model mainly relies on online sales platforms, enabling customers to search, customise and purchase their vehicles directly from their homes. The forced closing of many car dealerships provided a significant competitive advantage during lockdowns for Tesla, as it enabled Tesla to control the sales experience and the markups (Moorman et al., 2023).

Moreover, customers did not have to visit stores and interact with salespeople, which is in line with social distancing measures implemented by governments. Therefore, one problem that companies struggled with during the social distancing measures and lockdowns was keeping customers loyal and engaged. Tesla managed to maintain customer relationships and support even during the pandemic through its online sales and service channels. By leveraging its D2C model, Tesla was able to maintain and even grow its sales during the pandemic, demonstrating the strength of its D2C approach in times of a health crisis. In fact, Tesla delivered 139,000 cars, a record number, in the third quarter of 2020. The D2C model not only helped Tesla continue its business operations but also proved Tesla's innovative approach to the automotive market (Fields, 2020).

According to Reuters (2020), the COVID-19 pandemic accelerated the growth of online car sales in the United States, with major automakers increasingly pushing for more online vehicle sales due to the negative impact of COVID-19 on car dealerships. An April 2020 survey by CarGurus, an online marketplace for new and second-hand cars, showed a rise in consumer willingness to buy cars online, from 32% pre-pandemic to 61% during the pandemic (Bernazzani, 2020). Also, in April 2020, Fiat Chrysler launched the "Drive Forward" programme that includes online shopping tools allowing U.S. customers to buy a vehicle online (Carey & Vats, 2020). General Motors stated in mid-2020, after facing a 7% sales decline in the first quarter of 2020 due to lower sales in March, that they would roll out an improved version of their existing D2C programme called "Shop.Click.Drive" which enables customers to browse, buy, and have the vehicle delivered to home (Mceachern, 2020).

5.1.3 Products and Services

Several companies had to adjust their products and services during the pandemic to continue their businesses and to better align with the evolving demands and needs of consumers and clients in the post-COVID environment.

An example can be observed in the healthcare sector, where the pandemic has caused important structural changes since the sector has integrated and improved telehealth services. Telehealth services allow patients to remotely have video or phone appointments with their healthcare practitioners. A survey conducted by Accenture in May 2020 found that 60 percent of 2,700 oncology, cardiology, or immunology patients wanted to leverage technology more to communicate with healthcare providers and manage their conditions in the future. These answers are based on their experiences with telehealth during the pandemic (Accenture, 2020). Furthermore, UnitedHealthcare expanded its telehealth, virtual care, and digital capabilities during

the COVID-19 pandemic. The company introduced a platform that used tools such as Vivify for remote monitoring, Rally for patient engagement, OptumRx for pharmacy services, and AI-powered health records. The personalised digital care platform had features like a symptom checker, the possibility of scheduling telehealth visits with their healthcare provider, home delivery for prescriptions, live video-conferencing, and access to emotional support 24 hours a day (UnitedHealth Group, 2020a). By April 2020, UnitedHealthcare made over 4 million digital care visits, which is around 30 times the number of visits performed in January 2020 (UnitedHealth Group, 2020b). Additionally, Telehealth visits remain available as of today at UnitedHealthcare, and at Eli Lilly through its LillyDirect end-to-end telehealth programme, which was launched in 2024 (Eli Lilly and Company, 2024).

Costco also adapted its operations due to the pandemic. The retailer faced unprecedented supply constraints, including disruptions and delays. As sources of supply became unavailable, the company sought alternative sources and continued to purchase and manufacture private-label merchandise to ensure high quality and value for its members. This flexible approach allowed Costco to maintain its product offerings despite the challenges resulting from the pandemic (Costco Wholesale Corporation, 2020).

Technology companies, such as Salesforce and NVIDIA, had to adjust during the pandemic to the new requirements and needs set by the clients. Therefore, the companies introduced new products that addressed the new client profile. Salesforce developed Work.com, a platform that includes expert advice, content, data, and new products to help companies reopen their businesses and communities. Additionally, Vaccine Cloud was developed as a technology to help institutions efficiently deploy and manage their vaccine programs (Salesforce, 2021). Also, NVIDIA launched the DGX A100 AI system, an advanced AI system to help the world's largest companies, service providers, and government agencies that use NVIDIA's technology to better understand and fight COVID-19 (Alarcon, 2020; NVIDIA, 2020).

The pandemic also changed the way consumers shop. A Mastercard study revealed that nearly 80 percent of consumers globally adopted contactless payments for everyday purchases, driven by the need for touch-free payment experiences due to health concerns. In response, Mastercard increased contactless payment limits in more than 50 countries worldwide, ensuring safer and more convenient transactions during the COVID-19 crisis (Mastercard, 2020).

When it comes to consulting services, Accenture's annual report for the fiscal year 2020 showed a significant shift in the client profile, with reduced demand from clients in the travel, retail, energy,

high-tech, and industrial sectors, particularly affecting consulting services. In contrast, demand increased in the public service, software and platforms, and life sciences sectors. Clients increasingly sought Accenture's expertise for their digital transformations, adoption of cloud technologies, and security-related services, reflecting the urgent need for robust digital infrastructure and security solutions in the evolving business landscape (Accenture plc, 2020). Overall, the pandemic showed how important a strong digital infrastructure and security solutions are for businesses.

5.1.4 Inventory Management

Home Depot is one of a few companies that adjusted their inventory management as a response to the COVID-19 pandemic. During 2020, physical inventory counting was not feasible due to pandemic-related restrictions as well as the general operating conditions. Therefore, Home Depot had to adjust its inventory counting process in order to still estimate inventory losses (i.e., shrink) at the stores that are not able to conduct a physical count. Home Depot eventually used results from a sample of stores where physical inventory counts were still feasible in order to arrive at a reasonable estimate of shrinkage. In the following fiscal year, Home Depot resumed its regularly scheduled physical inventory counts, also in locations where counts had been suspended in the fiscal year 2020. During these procedures, it was found that there was only an insignificant difference between the estimated shrink based on the sample store locations and the actual inventory losses, which indicated that their sample-based estimation method was quite accurate (The Home Depot Inc., 2020). Eventually, Home Depot decided not to continue with the sample-based estimation method after 2020 since, due to a normalisation of the working conditions, physical counting could be resumed at every store. In general, regular physical counts are viewed as more accurate and reliable than the estimation method, which led to the estimation method being a temporary solution.

Amazon is another company that implemented new inventory management measures. In anticipation and preparation for the holiday season during the pandemic, Amazon aimed to ensure that they could handle the increased online shopping activity. As a measure, the company sent a note to sellers on its website, introducing quantity limits on products stored in its warehouses. This measure should ensure that products that are in high demand are prioritised while also ensuring that the storage space is adequate. Additionally, Amazon offered a “free removal fee promotion” to sellers, allowing them to remove non-performing inventory without fees, thereby creating room for more productive inventory. Lastly, sellers were encouraged to adjust their inventory levels and plan carefully for the peak shopping season in order to optimise storage and sales (Palmer, 2020).

5.1.5 E-Commerce

One of the main changes that COVID-19 caused is a change in customer habits and needs. The aforementioned change also impacts the way companies conduct business and, thereby, the adjustments they have to make. With customers ordering online more frequently, companies have to improve or establish an e-commerce presence. As lockdown measures have led to customers favouring the order-from-home process, retailers such as Home Depot or Walmart had to adjust their digital presence and technologies. According to Home Depot's Chief Information Officer during the pandemic, Matt Carey, Home Depot's digital sales grew by nearly 86% in the fiscal year 2020. However, this growth was partly made possible by previous investments of the company. Since 2015, the company has moved its platform to the Google Cloud, which enabled Home Depot to process the large increase in demand without issues.

Additionally, thanks to their cloud infrastructure, Home Depot did not have to order hardware and set it up in their data centres, which would have caused delays and limited their capacity to manage the volume. As a result of all these previously made changes, Home Depot saw its strongest quarterly sales growth in the last 20 years in August 2020. Furthermore, Home Depot managed to quickly roll out their curbside pickup services, a self-delivery method where customers collect their online orders from a specified pickup location. The service was rolled out in order to meet the growing demand for contactless shopping options during the pandemic, showing additional adjustments. Initially, the curbside service was a manual process that included various inefficient processes. For example, customers had to inform the store associates of their order numbers when arriving, and then associates would bring the orders to the customer.

Moreover, associates were making handmade signs to show where customers should exactly park to get their order. However, the retailer was able to introduce enhanced features rapidly. The service was then integrated into Home Depot's mobile application with features like location-based alerts to notify the store when customers arrived. Those changes improved the shopping experience drastically (Loten, 2020). Also, this service, initially implemented during the pandemic, has been maintained post-pandemic due to its convenience and effectiveness.

Walmart is another company that adjusted its operations in order to meet the changed customer needs. The company, which had already introduced its own curbside pickup process in 2013, had noticed an increasing demand for the curbside service. As a reaction, Walmart launched Walmart+ in September 2020, a membership program designed to compete with Amazon Prime and improve the shopping experience for its customers. Walmart+ offers various benefits, including unlimited free delivery from stores including same-day delivery on groceries and other items. Overall,

Walmart+ should not only help Walmart to process the increasing demand due to COVID but should also ensure customer satisfaction through convenient and efficient delivery. Another feature of Walmart+ is the mobile scan-and-go option, allowing members to use their smartphones to scan items as they shop in-store and check out using Walmart Pay. The subscription was priced at $98 per year or $12.95 per month at its launch (Ramirez, 2024). Walmart has continued to expand this service even after the initial phases of COVID-19, as the company recognised that consumer preferences for flexible shopping and delivery options remained post-pandemic. Moreover, in April 2020, Walmart introduced Walmart Express Deliver. This service promises to deliver items within two hours. Firstly, the service was tested in 100 stores in mid-April. Shortly after, Walmart communicated that it would expand it to 1,000 stores in early May and then to a total of 2,000 stores in the following weeks. The Express Delivery service allowed Walmart customers access to 160,000 items, which can be delivered for an extra cost of $10 on top of the existing delivery charge for orders above $30. The company continued to innovate in the following years after the pandemic. As a result, Walmart introduced a new service called Express-On-Demand Early Morning Delivery in March 2024. This service includes 6 a.m. as the start hour for the delivery of online orders (Walmart, 2024).

Also, in May 2020, Meta launched Facebook Shops, allowing businesses to set up a free online store on Facebook. This additional feature was the start of other e-commerce improvements from Meta. In July 2020, they also introduced Instagram Shop, which is a feature in the Instagram application that allows for a smoother and more convenient shopping experience directly in the application. Moreover, another feature on Instagram that was initially launched in 2019 and expanded in 2020 was the Checkout feature, which allows users to complete their purchases without leaving the application to reduce friction for the app users (Meta, 2020). The aforementioned features are all part of Meta's overall strategy to integrate e-commerce into their social media platform and, thereby, leveraging the increased need for online shopping caused by the COVID-19 pandemic. Lastly, these features also help to support small businesses that struggle through the pandemic.

5.1.6 Risk Management

The pandemic also highlighted the importance of risk management practices across various sectors. For instance, implementing remote work has brought new difficulties for the companies such as cybersecurity risks. These risks have been mentioned in the majority of the 30 companies' 10-K reports for 2020. As the shift to a work-from-home model continued throughout COVID, the companies had to rely on new technologies that allowed remote access and more. However, as a

result, the introduction of new tools opened the possibility for new cybersecurity threats. Therefore, ensuring safe remote access while protecting sensitive data was a crucial task for the companies. For example, Adobe has significantly invested in addressing security vulnerabilities. The company worked on engineering more secure products, enhancing security and reliability features, code hardening, and performing a multitude of penetration tests. Furthermore, Adobe reviewed the security controls of their service providers while also improving their support response time in case of an incident. However, the company highlighted in its annual report that some security vulnerabilities could not be eliminated entirely despite all the efforts (Adobe Inc., 2020). Overall, cybersecurity risk was the most frequently mentioned risk in the annual reports of our sample, regardless of the industry.

In addition to cybersecurity risks, companies like J.P. Morgan Chase, Bank of America, Chevron, Google, Pepsi, and Salesforce have mentioned potential credit loss risks due to the deteriorated macroeconomic environment and uncertainty during the pandemic. For example, Pepsi recorded an allowance for expected credit losses of $56 million in 2020 due to COVID-19 (PepsiCo Inc., 2020). Financial institutions like J.P. Morgan Chase and Bank of America were particularly threatened by higher default rates among borrowers. Hence, in order to protect themselves against potential future defaults, these banks have increased their provisions for credit losses as a proactive financial risk management strategy (Bank of America Corporation, 2021; JPMorgan Chase & Co, 2021).

Also, to effectively manage uncertainties like fluctuating commodity prices and reduced demand for oil resulting from COVID-19, Chevron, along with its peers like Exxon, had to adjust its risk management strategies. For example, these companies had to reassess their oil production volumes and cut back on production in certain areas to stabilise market prices against the decreased global demand. Additionally, these companies had to readjust their expenditures and reduce their capital expenditures to preserve cash. These cuts were made by scaling down their projects, such as new explorations and expanding existing facilities.

Currency fluctuations were another area that caused uncertainty and problems for companies. The fluctuations mainly resulted from the global scope of their operations and the economic volatility introduced by the COVID-19 pandemic. Technology companies such as Google, Adobe, and Salesforce addressed currency fluctuation risks through new hedging strategies.

Impairment of assets was another area of concern for companies in 2020. The pandemic's negative impact on industries such as commercial airlines and aircraft manufacturers caused

Berkshire Hathaway to reevaluate the carrying value of its subsidiary Precision Castparts Corporation (PCC), an American aircraft and industrial parts maker. The revaluation was triggered by the expected lower demand for air travel, the lower aircraft production, and potential restructuring actions that could take place during the pandemic. Moreover, Berkshire increased its discount rates and reduced long-term cash flow forecasts, affecting goodwill and indefinite-lived intangible assets related to PCC (Berkshire Hathaway Inc., 2021).

Another example in this context is the impairment assessment from Procter & Gamble. As the COVID-19 pandemic caused a reduction in shave incidents by consumers, coupled with the depreciation of certain currencies against the U.S. dollar, Gilette-branded products saw a reduction in net sales. As a result, an impairment assessment for Gillette's indefinite-lived intangible asset was triggered as of June 30, 2020. The assessment showed that the fair value of Gillette's trade name approached its carrying value, resulting in no impairment charge for the year ending June 30, 2020. Further testing in December 2020 showed that the Shave Care reporting unit's fair value still exceeded its carrying value by more than 20 percent and that Gillette's indefinite-lived intangible asset's fair value continued to exceed its carrying value (The Procter & Gamble Company, 2021). Additionally, Coca-Cola reported an impairment charge of $55 million related to a trademark in North America, driven by the impact of the COVID-19 pandemic (The Coca-Cola Company, 2021).

Lastly, the pandemic caused some companies to suspend their stock repurchase programs as a risk management practice. As an example, Chevron announced the suspension of its stock repurchase program on March 24, 2020, shortly after the WHO declared COVID-19 a global pandemic (Chevron, 2020). This decision was taken as a precaution due to deteriorating market conditions that followed the global outbreak of COVID-19. Also, Home Depot conducted several proactive financial adjustments during Q1 of fiscal year 2020 in order to strengthen its liquidity position. The company suspended its share repurchases from March 2020 to December 2020 due to the pandemic, extended its commercial paper program, and increased its revolving credit facility capacity (The Home Depot Inc., 2021). J.P. Morgan Chase and ExxonMobil similarly decided to suspend stock repurchases to preserve cash and maintain financial stability (Exxon Mobil Corporation, 2021; JPMorgan Chase & Co., 2021).

5.1.7 Corporate Social Responsibility (CSR)

Finally, out of the 30 largest U.S. companies we analysed, almost all (28 out of 30, except Berkshire Hathaway and Costco) took several CSR actions to support the fight against the COVID-19 pandemic. These efforts were in the form of e.g., monetary donations, support programs, and

donations of essential supplies and Personal Protective Equipment (PPE). For example, NVIDIA asked P.C. gamers to donate their computer's GPU power to help with a COVID-19 research project through a project called “Folding@Home, which uses the unused processing power of people's computers, to run simulations that study how proteins, including those in the coronavirus, behave. Gamers could contribute to the project by downloading the Folding@Home software, a software that runs when their computer is not used (Merritt, 2022). In addition to that, NVIDIA partnered with 20 hospitals from 8 countries and developed an AI model that predicts COVID-19 patients' need for supplemental oxygen in the next 24 hours (Flores, 2021).

Microsoft played an active role in responding to COVID-19 by creating and contributing to several initiatives. The company launched the “AI for Health” initiative on January 29, 2020. The initiative had the goal of empowering nonprofits, researchers, and organisations with AI and data science tools in order to further help with research concerning the pandemic. Microsoft immediately dedicated $20 million to this initiative. Moreover, Microsoft expanded Microsoft Azure’s capacity to handle increased demand, with an additional focus on demand from healthcare providers and emergency responders, while also supporting remote work and learning through their technology platforms, such as Teams and Office 365 (Microsoft, 2020). These examples highlight how technology companies leveraged their resources to support scientific research and technological infrastructure during the pandemic.

Additionally, J.P. Morgan Chase took other measures to support small businesses during the pandemic. The bank participated in the Paycheck Protection Program (PPP), which is part of the U.S. government's response to the COVID-19 pandemic. The program aimed at assisting small businesses by offering favourable loans for their payroll and other expenses. The PPP loans were assigned a zero percent risk weight for risk-based capital ratios. J.P. Morgan Chase issued around $27 billion in PPP loans by December 31, 2020 (JPMorgan Chase & Co, 2021).

5.2 Quantitative Analysis

In the following part, the quantitative analysis will be discussed. Firstly, the analysis focuses on two different aspects in terms of financials; one aspect will look at financial values in relation to sales, net income, or total assets in order to determine whether a change in the absolute number is caused by growth or shrinkage of the company rather than an actual change in policy. The second aspect focuses on absolute numbers in order to, on the one hand, verify and further investigate changes in ratios (e.g., is a change in leverage ratio mainly caused by an increase in market capitalization or by adjusted debt) and, on the other hand, to look at the actual changes in

absolute terms. Lastly, when the change from the year 2019 to 2022 is mentioned, 2019 represents the calendar year while 2022 represents the Q1 2022 last twelve months.

Moreover, the analysis defines the following terms:

- Change in the absolute value is the average percentage change of the absolute value for a peer group (e.g., Apple increases its total debt by 10% while Amazon decreases its total debt by 10%. Therefore, the average change in percentage is 0%). Therefore, a peer group can have an increase in the absolute value while having a decrease in the percentage change (e.g., Apple increases its total debt by 1bn USD, which represents an increase of 1%, while Amazon decreases its total debt by 100m USD, which represents a decrease of 11%. Therefore, the average absolute change is +450m USD while the percentage change is -5%).
- Change in the ratio represents the difference in percentage terms between the ratios in the analysis timeframes.
- Long-term change is defined as the change from CY2019 to Q1 2022 LTM.
- A COVID-induced change is defined as a change in strategy due to COVID, e.g., a peer group shows a change in Q1 2020 compared to Q1 2019 (e.g., increases leverage ratio), but reverses this in Q2, Q3, and Q4 2020 compared to 2019 (e.g., decrease the relative leverage ratio in all three quarters). Another possibility is the change in degree, which would qualify as a COVID-induced change. For example, the peer group increased its cash reserves by 2% in Q1 2020 but by 40% in Q2. Therefore, we would consider it a COVID-induced change in the degree of an indicator.

5.2.1 Change in Leverage Ratio and Total Debt

For the poor performance group, we observe a decrease in leverage ratio and an increase in total debt from 2019 to 2022. However, no long-term COVID-induced changes were retained. The increase in leverage ratio can also be attributed to a decrease in market capitalization and a slight increase in total debt. Furthermore, both trends were already present in Q1 2020 compared to Q1 2019, indicating pre-COVID debt level increases (Table 3.1 and Table 3.2).

The below average performance group shows a significant increase in the leverage ratio throughout 2020 and a slight increase in the long-term (5.0%). Additionally, the group shows a large increase in total debt, which was already conducted in Q1 2020 and further increased in Q3. Overall, the increase in total debt was kept in the long-term, indicating a long-term change, but

the change is not COVID-induced. The leverage ratio indicates a similar conclusion, with the addition that the significance of the leverage ratio increase has not been retained.

In the average performance group, the total debt increased from 2019 to 2022 (Table 3.1 and Table 5.1) while the leverage ratio decreased. Both increase and decrease had already been initiated before COVID-19, as shown by the rise from Q1 2019 to Q1 2020 (17.8%) and the decrease from Q1 2019 to Q1 2020 for the leverage ratio (-9.4%). The relatively small decrease in total debt from Q1 2020 to Q2 2020, followed by an increase in total debt from Q3 2020 (Table 3.2) and a decrease in leverage ratio indicate no COVID-induced change.

For the above average performance group, total debt increased in long-term, pre-COVID and during COVID, with a slight de-leverage in Q4 2020. Therefore, there is no indication of a COVID-induced change. The long-term change is in line with the pre-COVID change. The leverage ratio for the peer group decreases in the long-run, Q1 and Q4, but increases in Q2 and Q3, indicating a potential COVID-induced increase in leverage to navigate through the pandemic. However, no long-term change has been induced by COVID.

In the good performance group, companies increased their total debt percentage but decreased their leverage ratio. The increase in total debt in Q2 2020 appears to be a reaction to COVID-19, which has potential long-term effects as the total debt increased by 102.7% from 2019 to 2022 (Table 3.2). Overall, the leverage ratio decreased due to an increase in market capitalization, indicating no lasting COVID-induced changes in terms of leverage ratio.

For the sector analysis, the Financial sector group will be ignored for the analysis of the leverage ratio and the total debt amount as debt has a different function as it is part of the operating activity of financial institutions. Firstly, the Tech sector decreased its leverage ratio and increased its total debt amount in Q1 2020 compared to Q1 2019, indicating a pre-COVID adjustment (Table 2.2). For Q2, Q3, and Q4 2020, the sector group shows increased levels for both values, not only in comparison to the respective levels of 2019 but also in comparison with Q1 2020. The changes are relatively small compared to the long-term change in total debt, while the changes in the leverage ratio are larger than the average long-term change in leverage ratio. This indicates a potential impact of COVID-19 on the long-term strategy as the sector group mainly increased total debt in Q3 2020 (13.3% compared to Q1 2020) while the market capitalization increased throughout 2020 (Table 6.2). For the Biotech/Pharma sector group, an increase in debt pre-COVID can be observed (Table 2.2), which is further increased from Q2 2020 to Q4 2020. Additionally, a constant decrease in the leverage ratio can also be observed, starting pre-COVID with -23.5% Q1

2020 compared to Q1 2019 and ending with -56.0% when comparing Q4 2020 to Q1 2020. The observation above in connection to the increase in debt shows a potential COVID-induced change, namely the decision to change the degree of the decrease of the leverage ratio as well as the decision to keep a higher debt level for COVID, which is reverted later on through a de-leverage in absolute terms in 2022 (Table 4.1). Also, the sector's market capitalization increased in 2020, which magnifies the effect on the leverage ratio (Table 4.2). The Semiconductor sector group de-levers during Q3 and Q4 of 2020 after having significantly levered up pre-COVID (+57.5% total debt Q1 2020 compared to Q1 2019). The long-term reduction in leverage ratio is in line with the trend of Q3 and Q4 2020, but it has also been significantly impacted by the increase in market capitalization. Overall, while there is evidence of a COVID-induced change in long-term strategy regarding the leverage ratio due to the developments in Q4, the conclusion is not entirely definitive. Lastly, the Industrials sector, which only consists of Tesla, shows a large reduction in the leverage ratio, which is mainly driven by the large increase in market capitalization of Tesla between 2019 and 2022. However, Tesla also decreased its total debt in Q3 and Q4 2020.

When investigating the changes in leverage ratios in combination with total debt for the long-term, a significant change from CY2019 to CY2022 can be identified for the average, good, poor, and amazing groups. Additionally, when investigating the results for the sector groups, an overall long-term decrease in the leverage ratio can be observed, with the most significant sectors being Biotech/Pharma with -105.8% and Industrials with -159.9% (Table 2.1). Additionally, the Tech sector, as well as Semiconductors, increased their total debt amount significantly, with 49.2% for the Tech sector and 183.2% for the Semiconductor sector. However, the absolute amount of debt for the Semiconductor sector decreased as the positive change in percentage is mainly driven by AMD quadrupling its debt from 2020 to 2022 (cf. Capital IQ).

With the previously set hypothesis of an increase in the leverage ratio in order to potentially profit from low interest rates, the performance groups reacted with a potentially COVID-induced increase in total debt that was kept in the long-term. However, a COVID-induced increase in the leverage ratio cannot be observed. The decreases in the leverage ratio are due to the drastic increase in market capitalization, for example, for the good peer group. Additionally, all groups except the average performance group increased their total debt in Q2 compared to Q1, indicating a COVID-induced change. Moreover, the performance groups good and above average de-lever after Q2 while the other groups increased their total debt further (which can be seen in the comparisons of Q1 to the other 2020 quarters). Therefore, we reject our hypothesis 2.1 on a

performance basis based on COVID-induced changes in the leverage ratio. At the same time, there is an increase in the absolute amount of total debt, which supports our hypothesis 2.2.

In 2020, compared to 2019, the Semiconductor sector has increased its debt percentage, but compared to Q1 2020, the sector actually de-levered, which would be in line with the long-term trend. Therefore, for this sector, the hypothesis can be rejected as COVID seemingly had a counteractive effect of de-levering rather than increasing the leverage ratio, but in percentage terms of total debt, the sector still levered up, indicating a potentially COVID-induced increase in debt. Additionally, the sector experienced a large increase in market capitalization from 2019 to 2022, which also impacted the leverage ratio for 2022. Lastly, we can reject the hypothesis for the Biotech/Pharma sector and the Industrials sector, as both sectors have largely de-levered during COVID and kept it for the long-term. However, the Biotech/Pharma sector still shows a COVID-induced increase in total debt in Q2 (Table 6.1) , supporting hypothesis 2.2, which results in an inconclusive change in leverage ratio since the market capitalization of the sector grew more than the total debt during that period time.

5.2.2 Change in Stock-based Compensation

Firstly, for the poor performance group, a decrease in terms of SBC ratio can be observed in Q3 and Q4, which indicates potentially a COVID-induced change. Moreover, a strong indication for a COVID-induced change in the absolute SBC can be observed with a decrease in Q2 to Q4 2020, while the SBCs were increased in Q1. This COVID-induced change has not been retained long-term (Table 3.3 and Table 3.4).

In the below average performance group, a decrease in SBC in Q1 and Q2 2020 can be observed, indicating a pre-COVID strategy that was retained for Q2. However, the SBCs increase in Q3 and Q4, indicating a potential change that is also reflected in the long-term. Therefore, a delayed COVID-induced change is indicated, which has been retained long-term. The increase could have an underlying reason for signalling improvement to the market. The ratio does not change significantly.

For the average performance group, changes in the SBC ratio and the absolute SBC were observed, indicating temporary COVID-induced changes. In particular, there was an increase in SBC for Q2 and Q4 2020 (Table 3.3) after the decrease in SBCs pre-COVID. The SBC ratio showed minimal long-term changes, suggesting no significant lasting impact from COVID-19, as the changes during COVID seem to be driven mainly by the increased net income. However, the absolute SBCs indicate a potential COVID-induced long-term adjustment.

For the above average performance group, a significant adjustment in Q2 for absolute SBCs can be observed, potentially indicating a temporary COVID change. The changes during 2020 do not reflect a long-term change. The SBC ratio also indicates COVID-induced changes in Q2 and Q3, which are reverted in Q4, which indicate temporary changes like the observation for the absolute SBC change. The Q2 adjustment, in particular, seems to be impacted by an increase in net income compared to 2019, reducing the ratio while allowing the companies to adjust their SBC to potentially signal the market and their employees' well-being.

Lastly, the good performance group demonstrates a clear increase in SBC when comparing Q1 2020 to subsequent quarters and 2019 (Table 3.3). Although there is evidence of a reaction to COVID-19, as companies increased their SBCs from Q2 onwards, a pre-existing upward trend in SBC is also evident. Consequently, there is no indication of a turnaround in the existing strategy. Furthermore, a significant adjustment in the SBC ratio is noted in Q2, followed by decreases in the subsequent quarters. This pattern suggests a continuation of the pre-COVID strategy, with the notable Q2 adjustment, followed by either a recovery of net income or a strategic reversal in the following quarters. Also, a long-term adjustment in SBC can be observed that does not appear to be primarily induced by COVID-19.

Across all performance groups, there are notable fluctuations in SBC due to the impacts of COVID-19, particularly in Q2 and Q4 of 2020. While some groups show long-term increases in SBC, others indicate temporary adjustments that were not maintained. The good performance group, in particular, demonstrates a strong long-term strategy, with significant increases in both SBC and SBC as a percentage of net income despite the disruptions caused by the pandemic. Lastly, the only two performance groups that decreased their SBCs during COVID are the two worst performing ones, with the poor group even decreasing through all three quarters, indicating that SBC adjustment might be performance-driven.

The Tech sector consistently increased its SBC from Q1 to Q4 2020, while also showing a decrease in SBCs in the long-term. The group reduces the increase in SBC from Q2 2020 onwards compared to 2019 (Table 2.3). However, the sector adjusted its SBC ratio slightly in the long-term (-0.4%) while decreasing the ratio in Q2 and Q3 as a potential reaction to COVID (Table 2.4). This could indicate a slight adjustment in absolute and ratio terms, but the long-term trend shows a decrease in absolute terms. Therefore, there is no absolute long-term, COVID-induced strategy change for the Tech sector, while in ratio terms, a very small long-term, COVID-induced change is indicated. The Semiconductor group has increased its SBC pre-COVID already, which can be seen in the 17.5% increase from Q1 2019 to Q1 2020, and it has kept the increase in SBCs steady

throughout COVID. Therefore, a change due to COVID is not indicated. Additionally, the SBC ratio permanently decreases, therefore there is no COVID-induced change either. The Retail sector shows an initial decrease in SBC starting in Q2 2020 (-8.6% compared to Q2 2019) that gets reverted in Q4 2020, shown by the absolute increase from 0.069bn USD in Q1 to 0.529bn USD in Q4 (which is primarily driven by Walmart as they always expense their SBCs in Q4) and the percentual increase of 76.8% compared to Q1 2020 and 20.6% compared to Q4 2019, indicating a seasonal characteristic of SBCs. Therefore, Q4 still potentially indicates a change in strategy, which would be in line with the long-term strategy of increased SBCs. However, the SBC ratio for the Retail sector decreased in Q4, indicating that there was no change in SBC but rather a recovery in terms of performance. Lastly, the Industrials sector shows a COVID-induced change by drastically increasing the SBCs after Q1 2020, which eventually get reverted in the long-term as Industrials have a negative change in SBC from 2019 to 2022, potentially to survive the steep increase in market capitalization in case SBCs are also linked to performance. However, the SBC ratio numbers are not taken into consideration here since Tesla had a negative net income in 2019.

For the long-term changes for the sector groups, five sectors significantly increased their SBCs (Oil & Gas, Consumer, Semiconductors, Retail, and Biotech/Pharma), whereas Tech, Consulting, and Industrials decreased the SBCs (Table 2.3).

The hypothesis for COVID-induced increases in SBC can be rejected for all performance groups except for the good performance group. While other groups, such as the poor or the above average group, show COVID-induced changes, e.g., a decrease in SBCs in Q2-Q4 2020, these changes have not been continued in the long run but rather inverted. On the other hand, the good performance group shows a continuous increase, which might indicate a pre-COVID strategy that has been continued. Therefore, we find support for our hypothesis for the good performance group.

For the sector analysis, we have several sectors increasing their SBC from 2019 to 2022, but none of the sectors seems to have a COVID-induced change since the only sector that increases its SBC in the long run and during COVID is the Semiconductor sector. However, not only does the Semiconductor group already increase it during Q1 2020 compared to 2019, indicating a pre-COVID change, but the peer group also decreased the SBC ratio, which indicates a non-COVID-induced change to a decreased SBC payout ratio. Lastly, the Retail sector group shows a potential COVID-induced adjustment, which is reverted in Q4 by increasing its SBC, thereby not long-lasting. Additionally, the Retail sector had a significantly lower net income in Q4 compared to the

other quarters (Table 6.3), which explains the significant drop in their SBC ratio, indicating a positive change towards higher SBCs.

5.2.3 Change in R&D as a Percentage of Revenue

Firstly, the poor performance group slightly decreased its R&D expenses as a percentage of sales from CY19 to CY22, indicating a minor reduction in the long-term strategy. However, the companies significantly increased their R&D expenses during 2020, particularly in Q4, suggesting temporary COVID-induced adjustments, which is also reflected in the increases in the R&D ratio (Table 3.5 and Table 3.6). However, the long-term decrease indicates these adjustments were not maintained long-term.

The below average performance group showed a slight increase in the R&D ratio by 0.7% from 2019 to 2022 (Table 3.5). This increase is consistent with the results for Q2, Q3, and Q4 2020 when compared to both Q1 2020 and the respective quarters of 2019. Despite the small magnitude, these changes can be considered potentially COVID-induced. Additionally, the absolute changes in R&D expenses reflect the same pattern, as the COVID adjustments (Q2 to Q4) reflect the long-term strategy. Besides Q2 decreasing its R&D expenses relatively to 2019, it can still be considered a change in the other direction from Q1 2020 (Table 3.6).

For the average performance group, the R&D ratio is not conclusive, but a drastic increase in R&D in the long-term can be observed, which is, to a lesser degree, reflected in the increasing expenses during 2020. Due to the increase in Q1, however, a potential COVID-induced change in the degree/spending levels is indicated.

In the above average performance group, a continuous increase in the R&D expenses can be observed for 2020 as well as in the long-term. However, no COVID-induced changes besides the significance of the investments can be observed, as there have been absolute increases compared to pre-COVID and Q1 in particular, but the companies already increased their R&D spending in Q1.

Lastly, the good performance group indicates a similar trend as the above average peer group. However, the ratio analysis shows a consistent decrease in the R&D ratio, which is mainly driven by the increase in sales.

For the long-term change in R&D expenses per sector, the only significant change seems to be the Semiconductor industry, with a decrease of 5.4% from 2019 to 2022. The data indicates a pre-existing decrease in the R&D ratio (-3.3% Q1 2019 to Q1 2020), which is kept throughout the COVID period. Therefore, no change in the corporate strategy for the ratio caused by COVID is

indicated. However, the Semiconductor group increased its absolute R&D expenses throughout 2020, with a steeper increase from Q2 onward. This change indicates a COVID-induced adjustment that is relatively in line with the long-term trend (Table 2.6). Lastly, although the Biotech/Pharma sector does not necessarily have significant long-term changes in the R&D ratio (-1.0% from 2019 to 2022), the sector still adjusts to COVID by increasing its R&D expenses as percentage of revenue drastically, e.g., +10.5% Q1 2020 to Q4 2020 and +8.5% Q4 2019 to Q4 2020. Additionally, the R&D expenses in absolute terms have also increased in Q2 and Q4 (Table 2.6). The increases in Q2 and Q4 2020 indicate a COVID-induced change in strategy, which has been kept for the long-term.

The Tech sector group exhibits a consistent increase in the absolute R&D expenses with a diminishing trend from Q1 2020 onward. Therefore, COVID has potentially induced a slowdown of the increases. The slowdown has been changed to a steeper increase in the long-term.

We stated in our hypothesis 4.2 that we expect an increase in R&D spending induced by COVID. Our performance analysis shows only one sector that significantly increases its R&D expenses in the long-term, namely the below average group (Table 2.5). This observation seems to be in line with a COVID-induced change, which is carried forward, as the performance group decreases its R&D in Q1 2020 compared to 2019 but afterward increases it over the COVID period. Therefore, we find support for the hypothesis for the aforementioned peer group. An observation to mention is that the poor peer group has increased its R&D spending drastically, especially in Q4 2020, indicating a possible COVID-related change as they had already, albeit marginally, increased their spending in Q1 2020. Therefore, the hypothesis is supported for the absolute R&D expenses, as we observe a consistent increase in R&D spending, which is potentially COVID-induced.

For the sector results, all the researched sectors, except Consulting, have no or a negative change in R&D from 2019 to 2022. However, the Biotech/Pharma sector shows a potentially COVID-induced change in R&D expenses since they increased the expenses in Q2 and Q4 2020, which is only maintained until 2022 in absolute terms. Additionally, the Semiconductor sector has the largest potential change in policy, but since the potential changes already occurred in Q1 2020, it indicates a COVID-induced change in the level of increase. Therefore, our hypothesis cannot be rejected for the Semiconductor, Biotech/Pharma, and Tech sector as all three sectors show a potentially COVID-induced increase, with the notation that the Tech sector results indicate a diminishing impact of COVID on the R&D expenses but not a reversion.

5.2.4 Change in Share Repurchases as an Absolute Number and as Percentage of Net Income

The poor performance group exhibited an absolute increase in share repurchases but a decrease in the ratio from 2019 to 2022. A consistent decrease in the absolute number of share repurchases can be observed from Q2 2020 to Q4 2020 in both comparisons, indicating a drastic COVID-induced change to cut the share buybacks significantly. The COVID-induced change in terms of ratio is retained long-term while the policy for share buybacks in absolute terms is reverted long-term (Table 3.7 and Table 3.8)

The below average performance group is consistently showing a decrease in both the absolute value and the value as a percentage of net income in every observed metric. However, the decrease in ratio as well as absolute share repurchases is significantly larger, especially in Q2, indicating a COVID-induced change in terms of the level of decrease.

The average performance group demonstrates a long-term increase in both the share buyback ratio and the absolute percentage change, although it had already begun reducing share buybacks pre-COVID. This suggests that COVID-19 did not have a long-term impact on their strategy, but COVID has induced a change in the level of decrease, as the Q2 and Q3 decrease in absolute terms is significantly larger than in Q1. Additionally, the reduction in absolute share buybacks is reverted in Q4, potentially with a signalling intent, and maintains long-term.

The above average performance group decreased its share repurchases in Q1 and Q2 but reverted this measure in Q3 and Q4. This indicates a COVID-induced change after Q2, therefore, a potential reaction after the initial change. The reversion is in line with the long-term increase. Additionally, Q3 and Q4 share repurchases are similar to the Q1 repurchases in absolute terms, indicating an absolute value as a target rather than a ratio. The ratio shows a long-term increase but a short-term decrease during Q1 to Q4 (to note: the exception of an outlier changes the Q4 ratio change to the negative number). The ratio adjustments in Q3 and Q4 could indicate a small reversal of the Q2 measures, which would align with the absolute changes. Therefore, we have no long-term, COVID-induced changes as the changes appear to be a reversal of initial measures rather than a change in strategy.

Lastly, the good performance group is the only group that increases its share repurchases in every metric. For this group, a COVID-induced change can be identified as the Q2 and Q4 share repurchases have increased significantly. Additionally, those increases are in line with the long-term trend. However, the ratio analysis shows a decrease throughout 2020, which is driven by the

increase in net income of the performance group. The decrease, as mentioned earlier, is not in line with the long-term trend, therefore indicating a potential focus on the absolute number of shares repurchased rather than the ratio, which would be a similar indication for dividends.

Overall, all performance groups significantly decreased their absolute share repurchases and ratios in Q2 2020 compared to Q1 2020, highlighting the immediate impact of COVID-19 on their repurchase strategies. However, when compared to 2019, the good performance group demonstrates an increase in absolute share repurchases across all quarters, underlining the cyclical nature of buybacks. Similarly, the above average performance group shows increased share repurchases in Q3 and Q4, while the average performance group exhibits an increase in Q4. These observations suggest that although there is an immediate COVID-induced reduction in share repurchases, the timing of the reversal appears to be influenced by the companies' performance, as higher-performing companies tend to revert to previous levels of share repurchases faster.

The sector analysis shows different long-term adjustments for the different sector groups. The Consumer sector reduces both the absolute value and the share buyback ratio, whereas the Semiconductor, Tech, Retail and Consulting increase both values. The Semiconductor sector shows a decrease in Q1 2020 compared to Q1 2019 for both values. The decrease in the share buyback ratio continues to decrease or stay below the levels of 2019, but the absolute value of shares bought back increases in Q2 compared to Q2 2019 as well as in Q4 2020 compared to Q4 2019 and Q1 2020 (Table 2.7). The pre-COVID adjustment seems not to be continued. Furthermore, the sector itself increases the absolute value while decreasing the ratio, which indicates potentially high net income quarters that decrease the ratio. Therefore, the long-term ratio is not COVID-induced, while the share buyback could be driven primarily by the performance of the sector, albeit the increased share buyback value is kept for 2022. The Consumer sector shows a potential change in strategy from pre-COVID that was kept throughout 2020. The aforementioned can be observed in the decrease in share buyback levels compared to 2019. Additionally, all comparisons to 2019 show a negative impact, besides Q2 2020, in which the share buyback ratio was increased, while the comparison to Q1 2020 shows positive values in Q4, indicating a certain cyclicality for the business in terms of share buybacks. As for the Tech sector, it shows a similar picture to the Semiconductor sector, which is driven by a good performance during the COVID quarters. The Tech sector has an increase from 2019 to 2022 for both values, which is supported by the Q1 2020 to Q1 2019 comparison, showing an increase of 67.0% for the absolute value and 8.0% for the share buyback ratio (Table 2.7 and Table 2.8). When analysing

the other data points, the Tech sector constantly decreases the ratio in both comparisons while increasing the absolute share buybacks in comparison to 2019, indicating a performance-driven adjustment to the ratio and a cyclical approach to share buybacks, indicated by the differences in the changes between the 2019 to 2020 comparison and the Q1 2020 to remainder of 2020 comparison. Lastly, the Retail sector shows a constant decrease throughout all comparisons, indicating a pre-COVID effort rather than a COVID-induced change. Additionally, the actions during COVID are the opposite of the development from 2019 to 2022. Overall, the majority of sectors have a decrease in both values in Q2 and Q3 2020 in both comparisons, indicating a potential influence of COVID on the level of share repurchases.

In our hypothesis 5.1 and 5.2, we expect an absolute increase in dividends and share buybacks as an absolute number but a potential decrease as a percentage of net income depending on the performance. Compared to 2019, most of the sectors decreased their absolute number of shares bought back during the COVID period; the only one that increased its share repurchases in Q2 2020 is the top performing good peer group, while other upper quintile groups increased repurchases delayed, indicating a performance-driven decision. Therefore, the hypothesis cannot be rejected for the good peer group, whereas other peer groups initially decrease their repurchases on an absolute level (and, for some, revert this change), indicating that the hypothesis can be rejected on an absolute level. The ratio analysis shows a relatively consistent decrease through all peer groups, therefore rejecting the hypothesis on this basis. Lastly, for our performance groups, we see an increase in the absolute percentual change of share repurchases from 2019 to 2022, except for the below average peer group.

Most of the sector groups increase their absolute share repurchases from 2019 to 2022, with the Semiconductor, Tech, Retail and Consulting increasing both values. The Tech sector increased its shares bought back and ratio pre-COVID while increasing the absolute number in Q2, Q3, and Q4 2020 compared to 2019 and decreasing the ratio. A positive development of net income can impact the ratio. For the Tech sector, we find support for the hypothesis based on a change in ratio, but it seems that the increase in absolute buybacks was set pre-COVID. The Semiconductor sector experienced a decrease in Q1 2020 for both values and a consistent increase in absolute buybacks for Q2 and Q4, indicating a COVID-induced change, which is in line with our hypothesis. Overall, it can be observed that all sectors decreased their absolute share buybacks in Q2 2020 compared to Q1 2020, which is also kept for Q3 2020 except for the financial sector. Lastly, the hypothesis can be rejected for the Retail sector as well since the peer group has consistently decreased both indicators. In the long run, this has been reversed to an increase. Also, since the

decrease already started in Q1 2020, no particular COVID-induced action is indicated, but a potential impact on the severity of the change as a decrease of share buybacks of 75.2% in Q2 compared to 2019 can be observed, which is seemingly reverted in Q4 with only a decrease of 9.4% compared to 2019.

5.2.5 Change in the Dividend Payout Ratio and the Dividend per Shares

The poor performance group shows a decrease in the dividend payout ratio throughout every metric. However, the divided per shares have remained stable, indicating that the strategy is to at least maintain the dividends paid rather than focusing on a dividend payout ratio (Table 3.9 and Table 7.2).

The below average performance group generally increased its payout ratio during the COVID-19 period, with the exception of Q2 2020 compared to 2019, while also increasing its dividends per share each quarter. This aligns with the previously mentioned observation.

The average performance group exhibited a decrease in the dividend payout ratio in Q2 and Q4 while having an increase in the long-term (Table 3.9). However, the dividends per share were also increased in every quarter of 2020.

The above average and the good performance groups show a similar trend with a long-term decrease in the payout ratio and decreases in Q2 and Q4. However, the difference is that the good peer group consistently decreases its payout ratio while also maintaining the same dividends per share for Q2 to Q4. In contrast, the above average group increases the dividends. This indicates a potential difference in strategy, in which the good group, just like the poor performance group, maintains their dividends rather than increasing them potentially in order to preserve cash.

Overall, Table 4.2 and Table 7.2 indicate that the absolute dividends paid by all performance groups have either increased or remained relatively consistent each year, including during the COVID-19 period. This suggests that while the overall policy of maintaining or increasing absolute dividend payments has not changed, the dividend payout ratio likely does not play a significant role as an indicator.

In the long-term, it can be observed that only the average performance group shows an overall increase in the dividend payout ratio, whereas the other groups all decrease their ratios (Table 3.9).

The dividend payout ratio from 2019 to 2022 seems to significantly change for the Oil & Gas, Consumer, and Semiconductor sectors, with smaller changes for Retail and Tech. As previously

mentioned, the changes in the Oil & Gas sector are ignored because the companies had a negative net income for the 2020 quarters. The Consumer sector shows a steady increase in the dividend payout ratio for 2020 with a small pre-COVID increase of 1.4% (Q1 2019 compared to Q1 2020) (Table 2.9). The increases are not in line with the long-term change for the sector. Therefore, it only indicates a potential short-term change in strategy for the sector, but as the absolute dividend policy remains the same, no overall change can be observed. Lastly, the Semiconductor sector had an initial pre-COVID increase in the dividend ratio (Q1 2019 to Q1 2020), which was upheld in Q2 but then decreased in Q3 and Q4 (which is also shown in comparison to Q1 2020). The aforementioned could indicate a COVID-induced change, which was upheld in the long-term. However, regarding dividends, it is noteworthy that the dividends continued to increase in 2022 compared to both 2020 and 2019. This indicates a policy of either maintaining or actively increasing the absolute dividend amount each year. For the Tech and Retail sector, a relatively small change can be observed for Q3 and Q4 2020, which would be in line with the long-term change and a potentially COVID-induced one.

For the Dividends paid during COVID, we can clearly observe that the dividends remain almost the same or increase, depending on, e.g., the sector performance. Additionally, the dividend payout ratio does not necessarily show a true picture. For some sectors, such as Semiconductors, COVID has induced a decrease in the payout ratio, which is mainly due to an increase in net income for the sector. The Consumer sector, on the other hand, has an increase in the payout ratio partly due to a decrease in net income (Table 6.3). The performance groups show a relatively similar picture, with almost all groups decreasing their ratio except the average group in the long-term and the below average group in Q2 and Q4. Therefore, the long-term ratio trend is not in line with our hypothesis.

5.2.6 Change in Cash as a Percentage of Total Assets and as an Absolute

The poor performance group increased its cash ratio by 1.7% (Table 3.10). However, the data does not indicate a COVID-induced change, as cash levels fluctuated from Q2 to Q4, and an increase can already be observed in Q1. The group's absolute cash, however, shows a significant increase in cash holding in the long and short-term (Table 3.11). An increase of 12.9% in Q2 compared to Q1 2020 indicates a COVID-induced increase in cash, partly through additional debt. The relative increase compared to 2019 is retained, while the absolute cash value fluctuates slightly through Q3 and Q4. Therefore, a COVID-induced change can be observed, which is kept in the long-term.

The below average performance group also showed a large increase in cash pre-COVID, which fluctuated when comparing Q1 to the respective remaining quarters. Additionally, the cash ratio has increased throughout the entirety of 2020, indicating no particular COVID-induced change.

For the average performance group, the cash ratio has increased slightly during 2020, while the absolute amount of cash has increased massively during COVID, especially in Q2, indicating a COVID-induced change to increase the cash reserves further (to note: larger Q3 adjustment if the outlier would not be removed).

The above average performance group increases its cash reserves significantly pre-COVID. However, as a COVID-induced reaction, the companies decreased their absolute cash reserves in Q2 and Q3 in comparison to Q1 2020 while still maintaining higher cash reserves compared to 2019. The increased cash reserves have also been retained long-term, albeit to a smaller absolute degree. However, the cash ratio has decreased in Q3, Q4 and in the long-term. Therefore, the results indicate a COVID-induced short-term decrease of the cash reserves.

Lastly, the good performance group increased its cash ratio from Q2 onward, indicating a COVID-induced, long-term change in cash ratio. However, the group has significantly increased its cash reserve prior to COVID. Moreover, in Q3 and Q4, the group increased the cash reserves even further, which can be observed in the comparison to Q1 2020. Therefore, two changes can be identified. One is a potential cash ratio decrease, in case it is the metric in which the strategy is set, or a change in cash reserves triggered by the later stages of COVID, in particular Q4.

Overall, all performance groups increased their absolute cash relative to 2019, with the good, above average, and below average grouping having conducted the increase prior to COVID. The remaining two groups seemingly increased their cash reserves due to COVID. However, a clear absolute adjustment in Q2 and Q3 can be observed for the above average group, indicating a short-term decrease in the cash reserves.

For the sector analysis, the Semiconductor group has a long-term trend of decreasing cash reserves as percentage of total assets (Table 2.10). Also, the absolute cash reserves have increased from 2019 to 2022 (Table 2.11 and Table 6.2). The aforementioned long-term adjustment is also shown in the Q2 2020 comparison since a constant decrease can be observed in both comparisons (Table 2.11). The increase in Q2 does not necessarily indicate a COVID-induced change, as the absolute number compared to 2019 increased in Q1 and Q2. Also, the cash reserves, in fact, decreased in Q2 compared to Q1, which continued through 2020, indicating a potential change on an absolute basis. The change is primarily driven by NVIDIA, as the

company decreases its cash from ~15.49bn USD in Q1 2020 to ~0.85bn USD in Q4 2020. Biotech/Pharma is another sector that shows, albeit to a smaller extent, the same characteristics. Also, the Biotech/Pharma sector has a lower cash amount in 2022 than in 2019, indicating a long-term adjustment. The sector exhibits a cash reserve decrease pre-COVID, which is reverted in Q2 and Q3 2020, thereby indicating a short-term COVID-induced change (to note: removal of outlier changes Q1 to negative change). The most significant, positive ratio changes can be observed for the Industrials and Healthcare sectors, but both sectors consist of one company. Both companies show a constant increase in the cash ratio in comparison with 2019 as well as Q1 2020 for the Industrials sector. However, since there has already been an increase in Q1 2020, a COVID-induced change is not indicated. Both sectors also show a relative cash increase to 2019, while the absolute value decreases from Q1 to Q3 and Q4 for the Healthcare sector, indicating a cyclicality for the cash usage.

Overall, a consistent increase in cash relative to 2019 for every quarter in 2020 can be observed for all sectors except Biotech/Pharma and Semiconductor. Additionally, certain sectors such as Tech or Oil & Gas decreased their absolute amount of cash savings in Q2 compared to Q1. The Oil & Gas sector even decreased the reserves through all quarters compared to Q1, indicating a potential cyclical cash usage for the companies.

We expected an increase in the cash reserves and, thereby, a potential increase in the ratio as well. The sector analysis provides two significant changes, one being the long-term increase of cash ratio for the Industrial and the Healthcare sector and a significant decrease for the Biotech/Pharma and the Semiconductor sector group. The comparison of Q1 2019 to Q1 2020 shows an increase of cash as percentage of total assets for all sectors except for Consulting, indicating a pre-COVID cash increase. Furthermore, for the Semiconductor, Consumer Oil & Gas and Biotech/Pharma sectors, the absolute cash reserves decreased in Q2 2020 relative to Q1 2020, indicating a COVID-induced change. For the Biotech/Pharma sector, a short-term, COVID-induced cash increase during Q2 and Q3 is indicated. The hypothesis can thereby be rejected for the Semiconductor, Oil & Gas and Consumer sector. Both Healthcare and Industrials have similar developments, meaning both sector groups increased their cash in Q1 2020 compared to 2019 and afterward when compared to their respective 2019 quarters. Additionally, both sectors have increased their absolute amount of cash compared to 2019. Since the increase partly happened pre-COVID, the long-term change is not considered a COVID-induced one necessarily, although the degree might have been influenced by COVID since the changes for the Industrials peer group are the largest in Q3 and Q4 2020. The hypothesis is therefore supported in ratio terms for the

sectors Retail, Consulting, Consumer, Biotech/Pharma, Industrials, and Healthcare as they increased their cash ratio for 2020 compared to 2019. However, all sectors, except Biotech/Pharma, kept the absolute increase long-term, even though the degrees vary.

Additionally, if we only consider an absolute increase, the hypothesis is supported for all sectors on an absolute basis compared to 2019 since all sectors increased their cash holdings for Q2 2020, while only Semiconductor (Q3 and Q4) and Biotech/Pharma (Q4) decreased their cash reserves relative to 2019 in one or more subsequent quarters. However, on an absolute basis compared to Q1, which would remove the pre-COVID cash increases, the hypothesis is only supported for Consulting, Financial Sector, Retail, and Industrials, as these sectors increase their cash reserves during COVID. As previously mentioned, with the removal of the pre-pandemic cash increase, the hypothesis is only supported for the aforementioned sectors. The Semiconductor group is split as they increase their cash reserves compared to 2019 in Q2 while decreasing the absolute cash compared to Q1 2020. We argue, however, that the absolute change is more significant as it is consistent through all quarters. Therefore, we reject the hypothesis for the Semiconductor sector.

In terms of performance peer groups, we have the above average peer group that decreases their absolute cash reserves, which is against our hypothesis. The peer group also shows a COVID-induced change as they decreased the amount post-Q1 2020 while still having a relatively higher reserve compared to 2019. The average peer group shows consistently large cash increases during COVID, which also aligns with the long-term change. Therefore, the hypothesis is supported as the change in cash reserve policy has been COVID-induced for the average peer group and potentially the poor peer group, as observed in Q2. For the remaining performance groups, the hypothesis can be rejected. However, an initial reaction of a cash decrease can be identified (Q2), which, for the above average and the good performance group, is reverted in Q4 and Q3, respectively. Additionally, we find mixed support for hypothesis 4.4 since all performance groups increased their absolute amount of cash during COVID compared to 2019, with stronger increases for worse performance groups, while the ratio also decreased for the worse-performing groups. However, on an absolute basis, we cannot find a large difference besides Q2 for the average and the poor group, which would give a partial support to the hypothesis as well as Q3 for the below average peer group, as these are significant increases in absolute cash.

5.2.7 Change in Capex as a Percentage of Revenue and as an Absolute

For the poor performance group, a COVID-induced change can be observed as the absolute capex decreases from Q2 onwards (Table 3.13). Additionally, the COVID-induced change is a

turnaround from the initial increase of capex in Q1. Moreover, the change is in line with the long-term change of the performance group, indicating a long-term, COVID-induced change. A similar result is shown for the capex ratio, with the exception that the ratio has been increased for Q1 and Q2 but then reversed in Q3 (Table 3.12).

The below average performance group exhibits the same results as the poor performance group, with the addition that the capex ratio also decreases in Q2, which further reinforces the argument of a COVID-induced change. Additionally, this indicates a potential relationship between performance and capex adjustments.

For the average performance group, the same ratio trend can be observed. However, the companies increase their absolute capex in the long-term as well as in Q1, Q3, and Q4. With a decrease in Q2, a temporary COVID-induced change can be identified that is reverted in the subsequent quarters. Therefore, the capex ratio is likely driven by the change in sales rather than a change in policy.

The above average performance group exhibits a consistent decrease in the capex ratio while consistently increasing the absolute amount of capex. However, a slight adjustment due to COVID can be identified, as the relative increase from Q1 2020 does not carry on to Q2, therefore indicating a potential COVID-induced adjustment to the amount of capex for the quarter. The increase was significantly amplified in Q4, indicating a reversal of a more cautious strategy. The latter is also in line with the long-term trend.

Lastly, for the good performance group, a continuous increase in both ratio and capex can be observed. As the sales of the good performance group were also increasing, the result shows a COVID-induced change in the amount of capex spent. The increases to 2019 are amplified from Q2 onwards, indicating the aforementioned change and amplification. The latter is also consistent with the long-term trend.

The long-term change in the capex ratio shows a decrease in all sectors except Industrials. Tesla shows a constant increase in their capex as a percentage of revenue, pre- and during COVID, but with a larger increase during COVID (e.g., 5.2% when comparing Q2 2019 to 2020 compared to 1.3% when comparing Q1 2019 to Q1 2020) (Table 2.12).

For capex as an absolute value in the long-term, all sectors except Oil & Gas and Consumer have increased their spending. For several sectors (Financial sectors, Retail, Oil & Gas, and Consumer), it can be observed that the capex spending decreased in Q2 and Q3 compared to 2019, indicating a COVID-induced change. Oil & Gas and Consumer, however, are the only two

sectors that keep this change long-term. Additionally, COVID-induced changes are indicated for the Tech, Biotech/Pharma, and Semiconductor sectors as well. The Semiconductor sector consistently increases its capex from Q1 onwards but amplifies the increase from Q2 onward. Biotech/Pharma and Tech both diminished their increases of capex in Q2 as a reaction to COVID, but later on, reverted the changes (in Q3 and Q4 for Tech and Q4 for Biotech/Pharma). This indicates a temporary COVID-induced change of more cautious capex spending.

We expect the capex ratio and the absolute capex spending to increase or to be stable, while we expect the cash reserves to increase. We find support for our hypothesis for the good and the above average peer group as they increase their capex spending as a percentage of revenue and in absolute terms before and during COVID (Table 3.12, Table 3.13, Table 5.2 and Table 7.2). Also, the level of increase indicates a COVID-induced change. The below average and poor performance groups seem to not be aligned with our hypothesis as they decrease the ratio and the absolute amount of capex compared to 2019 throughout COVID. Overall, a COVID-induced change can be observed, and the decision to reduce or increase capex is determined by the performance of the companies.

In general, for the hypothesis, the changes in absolute capex will be the focus to determine whether the hypothesis is supported or not. Therefore, the hypothesis can be rejected for the Financial, Retail, Oil & Gas, and Consumer sectors as these sectors have, induced by COVID, decreased their capex relative to 2019 levels. Additionally, Tech and Biotech/Pharma can also be taken as an argument against the hypothesis as the sectors were increasing their capex spending compared to 2019 (in Q1) but have drastically diminished the increases in Q2 due to COVID. However, they remain slightly higher than the 2019 levels. The only two sectors that have a significant change in the long-term ratio are Industrials and Oil & Gas, with Industrials having a constant increase in capex, which aligns with the hypothesis. As for other sectors, we have an overall small decrease from 2019 to 2022.

5.3 Regression Results

As the thesis aims to find COVID-induced changes that have been potentially kept for the long-term, identifying actions and changes that might have an impact on other changes inside a company would be an ideal outcome. We have tried to find a potential connection between the qualitative changes our data set had conducted and the quantitative changes we have investigated and observed.

As we conducted the regression, the results show three statistically significant impacts of our ChangeIndex variable for all our tested scenarios, which are the change in market capitalization from CY19 to CY20 and the change in capex in both time frames. For the change in market capitalization, our variable is statistically significant at the 99% confidence level, with a p-value of 0.007 (Table 8.1). Additionally, the coefficient for our ChangeIndex variable is -4.3602, indicating a negative relationship between this independent variable and the change in market capitalization. This finding contradicts our initial hypothesis that a greater number of qualitative changes implemented by a company during COVID-19 would have a positive impact on market capitalization. Furthermore, the ChangeIndex variable shows a statistically significant effect on changes in capital expenditures. Specifically, for the period from CY19 to CY20, the ChangeIndex variable is significant at the 95% confidence level, with a p-value of 0.024 and a coefficient of -1.1691. Similarly, for the period from Q1 2020 to Q2 2020, it is significant at the 90% confidence level, with a p-value of 0.073 and a coefficient of -0.6224.

6. Discussion and Conclusion

The analysis has identified several qualitative and quantitative changes that have been conducted, which will be discussed and interpreted in the following section.

6.1 Qualitative and Quantitative Result Discussion

FIGURE 5: QUALITATIVE OUTPUT BY PERFORMANCE GROUPS

Performance Group	Remote Work	Production/ Distribution	Products/ Services	Inventory	E-commerce	Risk Management	CSR	Total
Good	6/6	4/6	4/6	1/5	3/6	6/6	6/6	**73.2%**
Above Average	6/6	4/4	6/6	2/4	2/3	5/6	5/6	**85.7%**
Average	6/6	3/3	6/6	2/3	2/2	5/6	6/6	**93.8%**
Below Average	6/6	3/4	4/6	2/4	4/5	6/6	6/6	**83.8%**
Poor	6/6	3/4	4/6	1/4	0/0	5/6	5/6	**75.0%**

(Source: own research and representation)

FIGURE 6: QUALITATIVE OUTPUT BY SECTOR GROUPS

Sector Group	Remote Work	Production/ Distribution	Products/ Services	Inventory	E-com merce	Risk Manage ment	CSR	Total
Tech	7/7	4/4	6/7	1/3	4/5	7/7	7/7	**90.0%**
Biotech / Pharma	4/4	3/4	4/4	1/4	0/1	2/4	4/4	**72.0%**
Consulting	1/1	0/0	1/1	0/0	0/0	1/1	1/1	**100.0%**
Semiconductors	3/3	2/3	3/3	0/3	0/2	3/3	3/3	**70.0%**
Financial Sector	5/5	1/1	3/5	1/1	1/1	5/5	4/5	**87.0%**
Retail	3/3	3/3	3/3	3/3	3/3	3/3	2/3	**95.2%**
Oil & Gas	2/2	2/2	1/2	0/2	0/0	2/2	2/2	**75.0%**
Consumer	3/3	2/3	2/3	2/3	3/3	3/3	3/3	**85.7%**
Industrials	1/1	0/1	0/1	0/1	0/1	1/1	1/1	**42.9%**
Healthcare	1/1	0/0	1/1	0/0	0/0	0/1	1/1	**75.0%**

(Source: own research and representation)

6.1.1 Qualitative Results

The qualitative analysis highlighted several key insights about how different sectors responded to the challenges posed by the COVID-19 pandemic. One of the main findings was the adjustment and adoption of remote work policies as a reaction to pandemic-related restrictions. The fast shift to remote work by the 30 largest U.S. companies was an important adjustment in 2020 in order to ensure employee safety and maintain business operations during the government-imposed lockdowns and social distancing measures. It is also notable that remote work was almost non-existent in 2019 and in pre-pandemic times in general. Two of the core drivers for the shift were, the guidance given by the U.S. government as well as the executive orders that recommended remote work wherever feasible. The measures were intended to mitigate the spread of the virus. Additionally, the widespread conduction of CSR initiatives by most of the sample was an important takeaway from the analysis.

Interestingly, this transition to remote work was not just a temporary solution but had a long-lasting impact on the workplace organisation (Liu & Su, 2020). Many companies, especially in the tech sector, have adopted hybrid work models post-pandemic, recognising the benefits of increased flexibility and improved work-life balance. The review of annual reports for 2022 for these companies showed that tech giants such as Adobe, Google, Meta, Microsoft, and NVIDIA switched to operate under a hybrid working model instead of requiring their employees to return to the office fully. With every company in our sample adapting to remote work, we suggest that this might be the most impactful change that the pandemic has induced.

We observed that the majority of companies implement CSR initiatives. A potential reason for the high percentage of companies could be public pressure. As platforms like the COVID-19

Corporate Response Tracker were launched, the public has an easy access point to monitor what companies are doing to support the fight against the pandemic, may it be through donations or other significant actions. This exposure could lead to public pressure because if the company does not conduct any CSR measures, the public could potentially scrutinise the company and its stock, thereby potentially driving down the share price. Thereby, the companies could have been encouraged or potentially compelled to a degree to conduct these measures in order to maintain their reputation and public perception.

The analysis also revealed sector-specific responses to the pandemic. For instance, the tech sector mostly received "NR" (Not Relevant) for inventory management, as managing inventory is not crucial for their operations. Tech companies like Meta or Salesforce did not prioritise inventory management since it is not part of their main business model, although they might have some inventory. On the contrary, the consumer and retail sectors made significant changes in both inventory management and other areas. This is likely due to the fact that these sectors are characterised by their direct interaction with customers, making inventory and e-commerce especially critical to their operations. Efficient inventory management is crucial for ensuring product availability during supply chain disruptions. At the same time, effective e-commerce strategies are necessary for maintaining sales and customer engagement, especially during the pandemic when physical stores were closed due to government-imposed lockdowns.

On the contrary, Amazon was the only tech company to take action in the inventory management area (Amazon.com Inc., 2020). This is in line with our expectations as Amazon's business model covers both technology and retail, which makes inventory management critical for its operations.

It is also important to note that changes in areas such as production, distribution, and products and services likely take more time to implement compared to CSR initiatives, which often involve donating monetary aid or essential products. Additionally, many companies may not have adjusted their inventory levels immediately due to the difficulties and longer timeframes required for such changes. Inventory adjustments can involve reworking supply chains, renegotiating supplier contracts, and investing in new logistics infrastructure, all of which are time-consuming and resource-intensive processes. Therefore, while CSR initiatives and remote work policies could be implemented relatively quickly, adjustments to inventory management and other operational areas may have occurred more gradually as companies adapted to the evolving situation and prepared for future disruptions.

Additionally, we expect the qualitative changes of companies to have an indirect effect on most of the quantitative changes, meaning that while the changes might impact the market capitalization of a company, as seen in the regression results, rather than being a direct driver of, e.g., share buyback reductions or increase of cash reserves, we rather expect the market capitalization and thereby the performance to influence this decision. However, we also expect the qualitative changes to require cash, which then influences, e.g., decisions as to the priority compared to R&D or capex. Since the companies neither provide a specific cash spending value for each qualitative change nor a prioritization for their investments, this question could be interesting for further research.

Lastly, an interesting observation is the percentage of qualitative changes conducted for the performance groups (*Figure 5: Qualitative Output by Performance Groups*). With the best-performing group having the lowest conduction rate, the results would align with our regression results that, in fact, if a company conducts more changes, these might not be well thought run and analyses. Therefore, the companies might end up spending unnecessarily rather than keeping money for the uncertainty. However, as Tesla is part of the good performance group, they are the main driver behind the low conduction rate. Therefore, the suggestive result is to be looked at cautiously.

6.1.2 Leverage Ratio

A point for further research and discussion is about the actual use of the leverage ratio as a target for companies. Our initial thought of an increased leverage ratio due to a potential economic downturn and uncertainty has shown to be true for the below average and poor performance group. For the sector groups, it is a lot more diverse as every sector except Biotech/Pharma, Industrials, and Healthcare shows an increased leverage ratio in Q2 2020 compared to 2019. However, the Tech group is the only group that showed a potentially COVID-induced change that was kept long-term. Also, all performance groups showed an increase in total debt in Q2 2020, both in comparison to 2019 and all except the average group for Q1 2020, which indicates that all sectors, regardless of performance, reacted similarly on an absolute basis. The increase in absolute debt also potentially indicates that companies would rather have more security in terms of cash in the short-term as the pandemic creates an uncertain environment. In hindsight, Harford et al. (2003) have found that even during downturns, the leverage ratio seems to stay stable, indicating more of an adjustment in the absolute amount of debt. Due to low interest rates in 2020, we assumed that companies might be willing to increase their leverage in order to use cheap financing to have more stability in uncertainty. While the counterargument is a burden financially

through interest payments, an argument for additional discipline on the managers can be made to improve the potential capabilities to navigate through the crisis. Overall, it therefore seems that the companies are driven by absolute changes rather than a target leverage ratio, as the ratio might be too volatile with the constant changes in the market capitalization. There is the possibility that companies set a Net Debt/EBITDA ratio as a target rather than a leverage ratio, which has not been analysed in this paper. Additionally, the ability to work remotely was shown to have a positive impact on the firms' need for debt by Gopalakrishnan et al. (2022), as companies with remote work, or the ability to work remotely, took on less additional debt during the pandemic than their on-premise counterparties. Since all companies implemented remote work, we could not find results that would support these findings. Moreover, if Tech companies would be considered to be at the forefront of the change as they were likely the first ones to implement remote work, the results show one of the lowest absolute increases in Q2 but a higher absolute increase in Q3, which is a non-conclusive result. However, if we would only take Q2 as the immediate impact and investment period, the results would support Gopalakrishnan et al. (2022) findings, as sectors such as Biotech/Pharma, Semiconductor, or Retail had the highest absolute increases compared to Tech, Consulting or the Financial sector, which assumingly have an easier process of implementing remote work due to the service nature of the offering.

One potential additional explanation for the absolute increase in debt across all performance groups in Q2 2020 could be the required investments for the qualitative changes. As previously observed, remote work, risk management, and CSR are three changes that almost every company has conducted. Since these changes require cash, additional debt might be necessary and in varying degrees, as we discussed for the remote work changes.

Our results also give rise to another area of discussion, namely the process of de-leveraging. We can observe an increase in total debt for all performance groups except the average group in Q2 2020, which we identify as a COVID-induced reaction. This result is the opposite of what Chung et al. (2023) found for Korean companies. However, in the following two quarters, the best-performing peer groups quickly de-lever while the worse-performing peer groups maintained or even increased their leverage. We interpret this as a performance-driven change as better-performing companies aim to decrease the COVID-induced debt in order to get back to pre-COVID levels, while worse-performing companies might not have the necessary cash to de-lever and are forced to maintain the debt until they recover from the downturn. Additionally, the de-leverage and the ratio change, for example, of the above average performance group in Q4, could be driven by the intent to signal well-being to the market.

Lastly, when analysing the long-term effects, we observe that the Tech sector shows a long-term COVID-induced increase in total debt as well as in leverage ratio. As the Tech companies also have a large increase in market capitalization, which would normally reduce the leverage ratio, the increase and the maintenance of the increase seems intended. Therefore, the companies potentially increased their debt to match a certain goal that was adjusted during COVID. Also, as the sector performs extremely well, the companies could follow a leverage approach that is in line with the trade-off theory since the sector group increases debt in order to stay in line with the ideal capital structure as well as increase the leverage ratio as the potential negative impact of default costs has been pushed to a larger amount of debt due to the improved performance and the improved conditions due to the increase in market capitalization. As for the results based on the performance groups, the increase in total debt can be observed, which was previously discussed, but no particular COVID-induced long-term adjustment of the leverage ratio. Over the long-term, companies try to decrease their leverage ratio while increasing the total debt.

6.1.3 Stock-based Compensation

The results show that through better performance during COVID, companies might be more inclined to increase stock-based compensation. Overall, the below average and poor performing groups, have decreased their SBC in Q2, while the poor performing group has consistently decreased their SBC throughout 2020. This indicates a performance-driven adjustment, meaning that if a company is doing well, they are inclined to increase the SBC. In contrast, the poorly performing ones see SBCs as a potentially fairly easy way of cutting expenses. For the sector groups, increases for sectors such as Tech, Consumer, or Semiconductors can be observed. It is unclear whether increases are more driven through performance or the sector, as Tech and Semiconductors are primarily in the good and above average performance groups, while Consumer ranks their companies in the below average group.

Our thought process for an increase in stock-based compensation was the need to retain high-quality workers in the company during a time of uncertainty, even in well-performing companies. With uncertainty, potential risk-taking might decrease, which would make a non-cash payment more attractive while fulfiling the aforementioned target. However, the compensation itself might be more related to senior personnel and the performance of the company. Additionally, certain sectors are also more prone to pay non-executives with shares, thereby increasing the volatility of changes. Lastly, an explanation for the increasing SBCs could be that companies want to reward the employees for their good performance throughout the pandemic, whereas worse-performing

companies are hesitant to dilute the existing shareholders further as these are potentially already dissatisfied with the performance of the company and the current stock performance.

6.1.4 R&D and Capex

As R&D expenses can also be used for signalling (He & Tian, 2014), with a potentially positive impact on the long-term performance of the company, given the right investment (Anagnostopoulou, 2008; Eberhart et al., 2004; Lev & Sougiannis, 1996), the thesis of an R&D increase potentially due to uncertainty can be rejected for the poorly and below average performing companies, as they decreased their absolute R&D spendings in Q2. However, the hypothesis cannot be rejected for the remaining peer groups, as these consistently increase their absolute R&D spending from Q1 2020 onward. As previously mentioned, it indicates a COVID-induced change in the level of R&D spending, which potentially is driven by the available cash and, therefore, adequate investment opportunities or through a signalling process, as the companies want to further signal well-being during uncertain times. The R&D ratio shows a decrease, which might indicate the opposite in terms of strategic change. Additionally, the Biotech/Pharma sector also increased their spending in Q2 and Q4, but this could be related to specific COVID measurements, as the change was not long-term. For the Biotech/Pharma sector in particular, the development of a vaccine was potentially the main driver behind the increased expenses. Moreover, the other sectors consistently increasing their R&D spending are Tech and Semiconductors. Both sectors can be considered as R&D intensive, which could explain the increase in R&D; however, since both sectors represent the majority of the top performance groups, it raises the question of whether the increase is sector or performance-driven. Mikkelson and Partch (2003) found that if a company has higher cash reserves, it usually has higher R&D expenses as well. Therefore, we also looked at potentially higher changes in R&D expenses if a company has higher cash reserves. However, this does not necessarily align with our findings as peer groups like the poor or the above average peer group show an absolute increase in cash reserves in Q2 2020, while the R&D expenses decrease. Overall, the changes indicate a performance-driven adjustment to the spending, namely, the better the performance, the higher the R&D spending, potentially allowing the companies to gain an edge against their worse performing competitors. It could be argued that well performing peer groups had higher reserves pre-pandemic, however, the highest increases in absolute cash in Q1 2020 compared to Q1 2019 can be observed for the good, below average and the average peer groups. The results also suggest an absolute target for R&D spending rather than a target ratio, which would align with the reasoning that there needs to be valid investment opportunities rather than constant, increasing spending.

The same thought process is applicable to capex spending. With the drastic decrease in capex for the below average and poor group, as well as the average performance group for Q2, the results indicate a performance-driven change in strategy. Subpar performance could force a company to decrease capex in order to stabilise its cash until it can revert the changes. The aforementioned could be the reason for the average performance group to increase capex in Q3 and Q4. The good performance group showed a clear increase during COVID, which aligns with the previous statement. Overall, a COVID-induced change can be observed for the low-performing groups, which is also kept for the long-term in the case of the poor performance group. Our hypothesis of signalling well-being, at least for the worse performing groups, can be rejected as capex seems to be among the first spendings to be cut. This could also tie back to the results of our R&D analysis, as the R&D expenses were cut significantly less and only for a short period for the worse performing groups, indicating that R&D in uncertainty and poor performance is prioritized to capital expenditures. Moreover, it could indicate the aforementioned signalling reason for the R&D spending rather than capex. However, we cannot rule out that there simply were no adequate investment opportunities for the performance groups, causing the decrease in capex rather than a cognitive decision in favour of equally adequate R&D investments.

Besides our findings, it is unclear what type of policy the companies run for their R&D. Is it a project-based calculation with a budget based on their sales or is it a fixed amount of money that is set at the beginning of a period. We see a cyclicality in the R&D expenses, which might be explained by the budgeting process of a company as well as the uncertainty of the future, meaning that it is easier and less risky to set a budget in Q4 than in Q1 since the year has passed. Therefore, a company is potentially using its surpluses while also having data from the three quarters to base its decision on. The aforementioned added information would reduce the uncertainty and risk of such a decision.

6.1.5 Share Buybacks

We found that in Q2, absolute share buybacks are cut due to COVID for all groups except the good performance group. The varying degrees of the decrease, as well as the reversal of the changes, indicate a performance-driven reasoning for the cuts. The worse the company performs, the fewer resources are available to buy back shares. Additionally, the share buyback ratio decreased for all groups, potentially indicating an absolute target rather than a ratio, but it is not conclusive.

The initial thought process of a signalling effect through the pandemic, showing the market that, in fact, the company is undervalued (Otchere & Ross, 2002) during uncertain times, can be

rejected for poorly performing companies. The underlying assumption was that the market might judge the performance too harshly in combination with the uncertainty of the pandemic, and thereby, the poorly performing companies would be considered undervalued. Overall, the hypothesis can still be true if we would consider the well-performing companies to be undervalued due to the pandemic, e.g., the market does not see the performance as something long-term, therefore undervaluing the company.

As there is a COVID-induced change for all companies when investigating the long-term adjustments, the absolute share buybacks for all groups except the below average performance group increase, which could indicate two things. One is that, indeed, companies have been undervalued, which will be used to create value for the company and the shareholders. The other driver could be the growth of the companies. However, the three top-performing groups increase their long-term share repurchase ratio, which further enforces the hypothesis of buying back undervalued shares. The poor group, on the other hand, decreases its ratio by roughly the same degree as during COVID, which could indicate that the adjusted policy has been kept and identified as better.

The sector analysis also indicates a difference between sectors. Worse-performing sectors, such as Consumer or Oil & Gas, reduce their absolute share buybacks. However, better-performing sectors, such as Retail, also decreased their buybacks. Overall, with other well-performing sectors (e.g., Tech) increasing their share buybacks, the results indicate a mixture of performance and sector-driven changes. The Tech sector, with decreasing ratios but increasing absolute values, shows the connection between good performance and share buybacks, while the Retail sector decreases ratios and absolute share buybacks drastically, indicating more of a sector-specific driver. Therefore, in terms of sectors, we cannot observe sector-specific changes besides potentially the Retail sector and a potential undervaluation of the Tech and Semiconductor sector as they increase their absolute share buybacks. However, as previously mentioned, this could also be purely performance-driven.

For worse-performing companies, it seems that the additional cash outflow through share buybacks is rather considered an easy way to cut without any major repercussions from the market on the share price. For example, ExxonMobil mentioned the preservation of cash as a reason for the share buyback cut. Therefore, we suggest that the share buyback programs have a lower impact than dividend payments as an information transmitter for the company's valuation since we clearly see a maintenance or increase in the dividends paid rather than the share buybacks. Additionally, share buybacks are also conducted when the company has excess cash, and the

company lacks proper investment opportunities, which would tie up to the hypothesis of maintenance or increase in cash reserves, as there is no excess cash, as well as maintenance in capex and R&D expenses having a priority if there is an adequate opportunity, which for R&D seems to be the case. Also, as cash reserves have been increasing for some peer groups, they seem to value the safety of cash more than returning profits through share buybacks. Additionally, higher-performing companies tend to revert to previous levels of share repurchases faster, indicating their potential intention to signal financial stability and confidence to the market sooner.

Lastly, we have not found a potential relationship between our qualitative changes and the share buybacks of our peer groups, as we are assuming that the changes will have a broader impact on, e.g., the market capitalization, which then has an impact on the share buybacks.

6.1.6 Dividend Payments

We found potential adjustments in the payout ratio but a clear policy in terms of absolute dividends, namely a constant maintenance or increase of the absolute annual dividends. These findings indicate that the companies, albeit having potentially poor performance, keep or increase the dividends in order to have a positive signalling effect and to prevent a negative impact on the stock price. The aforementioned would be in line with Cejnek et al. (2021). Additionally, we find that, although the underlying driver of returning profits to the shareholder is the same, in times of uncertainty, share buybacks get cut rather than dividends. Also, while the sector adjustments vary and are not conclusive, the performance group analysis indicates that the poor performance group is the only one that keeps the dividends per share flat over the entire period, which indicates that the decision to maintain rather than increase could be driven by poor performance. As previously mentioned and written in the annual of one poor-performing company, Chevron (Chevron, 2020), the protection of the dividends has a high priority and, therefore, also potentially causes cutbacks in capex and share repurchases for the poorly performing group. Lastly, if the sample companies are considered to have relatively stable earnings, the maintenance in dividends in favour of share repurchases would align with the findings of Jagannathan et al. (2000).

6.1.7 Cash Reserves

Overall, we find mixed results in terms of cash reserves. We are focusing on the absolute changes compared to Q1 2020 since even though compared to 2019, every peer group increases their cash reserves, it would give a false impression otherwise as the increases compared to 2019 are often caused by potential pre-pandemic cash increases.

In line with our hypothesis, sectors like Retail, Consulting, or Industrials increase their cash reserves in an economic downturn, as hypothesised by Harford et al. (2003). A large set of sectors, however, decreases their absolute cash reserves and Q2 and often throughout the entirety of 2020. One outlier is the Biotech/Pharma sector groups, which revert their absolute cash decrease in Q2 afterward. This might be largely caused by the improved performance as R&D expenses in Q4 most likely increase due to the vaccine. For the Semiconductor group, the R&D expenses, as well as the share repurchases, increase, thereby decreasing the cash reserves.

Also, on an absolute basis, the average and the poor performance group increased their cash reserves in Q2 2020 compared to Q1, which would, to a degree, fall in line with Chung et al.'s (2023) findings in Korea and He et al. 2022 for China, as both found that companies that have been negatively impacted by COVID increased their cash reserves. Additionally, it would fall in line with Acharya and Steffen (2020). A potential reason for the increased cash reserves can be the uncertainty and, therefore, the need for additional safety, which is provided through the cash buffer, rather than investing the generated cash to counteract the downturn. Lastly, the argument for additional safety is partly enforced by the stronger increases in cash reserves for the bottom three performance groups compared to the top two performance groups, as we assume that poorly performing companies are exposed to even higher uncertainty and, therefore, need more safety. Also, as seen with the good performance group increasing their absolute cash reserves while decreasing their cash ratio, for both changes, the performance might be the driver as the good performance allows the companies to retain additional cash while increasing their total assets.

As for the multiple sector and performance groups that decreased their cash reserves during the pandemic, a potential explanation could be the need for investments while the previously existing cash reserves are already considered sufficient. Therefore, the pandemic could be seen as less of a problem but rather an opportunity to invest in an uncertain environment.

Lastly, as we found a consistent increase in cash reserves throughout almost all peer groups, sectors, and performance when comparing the reserves to 2019, we arrived at a potential limitation that will be further explained in the limitations part. However, we cannot reject the potential of a COVID-induced overall cash increase for all companies, as the increases in Q1 2020 could be COVID-induced since the pandemic has been a known factor before Q2.

6.2 Regression

As previously mentioned in the results section of the thesis, we observe three significant relationships between the qualitative changes and the quantitative section.

Firstly, the effect of the ChangeIndex variable on the change in market capitalization is negative in our analysis. This seems to be counterintuitive at first in our thought process since we expected a positive relationship due to the expectation of effective and rational changes having a positive impact on either the performance of the business or the view of the market on the business. However, as we find a negative relationship, a potential explanation could be the effectiveness and the reasoning for those changes. If a company is forced to adjust purely due to peer pressure or public pressure, changes might, in fact, not be effective or favourable for the company. Additionally, with COVID having such a large impact on the world of business, companies were forced to make decisions quickly, which potentially did not leave enough time to review and analyse the proposed changes.

However, the significance of the variable is mainly driven by Tesla's change in market capitalization. With Tesla having a +787.1% increase in their market capitalization from CY19 to CY20 while having the lowest ChangeIndex of 0.429, Tesla is the main driver of the significant regression results. For comparison, when the regression is conducted without Tesla, the ChangeIndex variable has a negative coefficient of -0.1687 but a p-value of 0.7407, which is not significant. Therefore, we are having doubts about the previously mentioned results since we did not control for more variables in our regression. Also, Tesla's performance is an extreme outlier during COVID, which is a combination of multiple factors. Therefore, we want to emphasise this potential limitation on the results of our regression.

The second and third significant findings are the negative impacts of the ChangeIndex variable on the change in capex. A potential reason for the aforementioned could be the required cash in order to conduct the qualitative changes. With the uncertainty of the crisis and the implied need for more cash in order to counteract the uncertainty, investments for qualitative changes require a significant amount of cash. Since companies are forced to cut spending, capital expenditures are the first cash spending cut. This also aligns with our findings about the mixed changes in R&D, as we argued that R&D spending might have a higher priority to capex, which results in a cut of capex in order to save cash. Moreover, the potential for the relationship for both time frames is probably the same. We would expect that in Q2, the company will want to cut their cash spending, either to protect themselves against the uncertainty or to invest in the mentioned changes. Therefore, in Q2, capex decreased, which remains due to the duration of the investments as well as the uncertainty throughout 2020.

However, we cannot be sure that this is the reason for the capex spending cut. Therefore, it opens up an area for future research, namely, cash savings and how certain cash expenses are

prioritized. Additionally, we cannot be sure whether there is simply a lack of good investment opportunities, which leads to the low prioritization of capex.

For us, a potential reasoning for the large set of insignificant values lies within the peer group and our definition of the qualitative themes. Since we define, e.g., changes in the product very broadly, by which the addition of producing masks falls under product changes as well as an actual change in the main product of a company, multiple companies have a checkmark/"Yes" for most of the changes, if these are relevant to their business model. However, we also think that a large part of the insignificance comes from the peer group characteristics itself, namely the largest U.S. corporations and thereby amongst the largest worldwide. Not only do all these public companies follow the regulations set by the U.S. government, but they will also react to other public companies conducting changes and potentially feel the need to do the same. Therefore, if all peers start donating to COVID relief funds, we assume that this remaining company might be "peer pressured" to do the same since there would be potential negative repercussions from the market if they do not.

6.3 Limitations and Further Research

The first limitation that has occurred is the set of data used to determine the COVID changes in our qualitative analysis. While we analysed a set of multiple sources, including the annual reports, press releases and the first page of google results for a multitude of keywords and key phrases, this does not reflect all possible sources in which companies could publish news. Therefore, we cannot be 100% sure whether a company has conducted a change due to COVID as they do not necessarily have to mention such change.

Secondly, in our quantitative analysis, we cannot be sure whether a company is adjusting a policy based on ratios or absolute values due to the lack of communication and the ambiguity of data. Therefore, we are using our judgment to indicate a potential change.

Thirdly, we assume that the first COVID-induced change can be observed in Q2 2020. However, with the companies being global players as well as very adaptable, potential changes might be observable in Q1 already, as the first COVID cases have been detected before Q2 2020 and COVID has already been declared a pandemic in Q1. Therefore, it would allow companies to potentially react before Q2 2020.

A fourth limitation is the breadth of factors that we are analysing. There are more potential areas in which companies have adjusted their strategies (e.g., prices or leases), but we did not analyse those areas from a quantitative standpoint.

As our last limitation, due to our data being pulled from Capital IQ, we acknowledge a potentially minor influence of differences in the calculation of certain values. As companies might classify certain e.g. expenses in different categories in their annual reports than Capital IQ, small variances might be created that could influence our results.

There are multiple areas in which future research can continue to research. Firstly, future research can look at an updated sample in more recent years to see if the long-term COVID-induced changes to ratios or absolute value are retained. With our data set, we have the Ukraine-Russia conflict, which started in early 2022. The conflict restricted us from taking a later point in time to analyse the long-term effect as the conflict has a significant impact on the strategies and financials of the companies. Additionally, rising interest rates are expected to have a large impact on companies' structures.

Lastly, as the basis for our regression is limited to 30 companies as well as fairly broad categorisations for the qualitative analysis, future research could focus on creating more detailed "change themes" in order to have a more granular ChangeIndex variable. Additionally, future research can increase the sample size in order to investigate the connection between our qualitative and quantitative analyses, while also adding control variables to the analysis.

6.4 Conclusion

This study aimed to investigate the COVID-induced changes focusing on the largest 30 U.S. companies. We primarily set out the goal to find COVID-induced changes that were in connection with sector characteristics or performance characteristics while also, as a secondary goal however, looking at potentially long-term COVID-induced changes. For our analysis, we focused on qualitative changes based on the annual reports and press releases of our sample and on quantitative changes that we investigated through Capital IQ data.

We have found several potentially COVID-induced changes and potential relationships between qualitative changes and quantitative changes across the peer groups. Our main findings include a negative relationship between the number of qualitative changes and the change in market capitalization as well as capital expenditures, hinting at a potential poor investment into the qualitative changes. Additionally, we found that the vast majority of companies implement remote work and CSR and that the majority of companies adjust their risk management due to COVID. Furthermore, we could observe a total debt increase in Q2 2020 for the entire peer set, hinting at the increased demand for cash, while well-performing companies tend to de-leverage quickly after in order to achieve the previous capital structure. Additionally, the data set indicates that for the

Tech sector, these increases in debt and leverage ratio are long-term, which shows that companies could have potentially learned from the COVID pandemic and the adjusted views of the market in order to increase their corporate efficiency. Moreover, we found that stock-based compensation is driven by performance even during uncertainty, as poorly performing companies cut rather than increase their SBC, even though it is a form of non-cash expenses. Also, we found mixed signals about increasing or decreasing cash reserves during COVID. We also investigated dividends and share buybacks and found that the companies prioritize dividends as a form of payoff as all firms either maintain or increase their dividends, no matter the performance. For share buybacks, however, companies are swift to cut these in order to retain cash for investment and to protect against uncertainty. In the long term, the share buybacks increase, indicating the recovery post-COVID as well as potentially profiting from an undervaluation through the COVID pandemic. Lastly, we found that companies in our sample prioritize R&D over capex when it comes to cash spending, with a potential implication that R&D expenses have a stronger signalling effect than capex.

Our study contributes an additional aspect of COVID and its implied changes on the basis of the world's largest companies. Not only do we contribute with an analysis that includes an investigation of existing financial changes and whether these have also been conducted in the U.S., but we also provide qualitative research showing what changes the largest companies have conducted and communicated. Additionally, we bridge the gap between qualitative and quantitative changes and provide potential new areas for research when it comes to the influence of the pandemic on business.

However, our study had clear limitations as we have only looked at a small sample size of companies in combination with a fairly homogenous peer set. Also, due to the Ukraine-Russia conflict, we were not able to analyse long-term effects as we had to keep the long-term changes to the beginning of 2022, which is relatively close to COVID.

Therefore, future research should consider analysing an updated sample in more recent years to determine if long-term COVID-induced changes in ratios or absolute values are retained, especially considering the impact of subsequent events like the Ukraine-Russia conflict and rising interest rates. Additionally, increasing the sample size and creating more detailed "change themes" for a more granular ChangeIndex variable could enhance the investigation of the connection between qualitative and quantitative analyses.

Lastly, we hope that this study can provide a well-founded base for future research on how to navigate a sudden global economic crisis.

7. Appendix

TABLE A

Excel Formula Glossary - Capital IQ Data

Item	Definition of item and used formula
Calendar year	Formula: e.g. CY2019 Formula provides the calendarized data for the calendar year 2019 (01.01.2019 to 31.12.2019)
Capital expenditures	Formula: IQ_CAPEX Capital Expenditure is a line item in the Standard template that represents cash outflows towards purchase of plant, property and equipment by the company and has the following components: Capital Expenditure - (Template Specific) [2114], Nuclear Fuel Expenditures [2109], Sale Proceeds from Rental Assets {42411}, This item excludes: Purchase/ sale of real estate properties, Purchase/ sale of intangible assets like licenses, patents, trademarks etc., Purchase/ sale of investments, Sale of property, plant and equipment, Additions to deferred charges Cash restricted for capital expenditure
Cash & Cash equivalents	Formula: IQ_CASH_EQUIV Cash and Cash Equivalents is a line item across all templates that represents funds in the form of cash, readily convertible deposits, securities and other instruments having maturities of less than 3 months at the time of purchase. It includes short term, highly liquid investments that are readily convertible into known amounts of cash and are near their maturity as well as cash on hand consisting of coins, currency, undeposited checks, money orders and drafts, and deposits in banks.
Dividend payout ratio	Formula: IQ_PAYOUT_RATIO Payout Ratio is a supplemental line item across all templates calculated using the following formula: Common & Preferred Stock Dividends Paid [2022] / Net Income - (IS) [15]

Dividend per share	Formula: IQ_DIV_SHARE Dividend Per Share represents gross dividend per common share declared in the form of cash. For companies that exist in countries with imputation systems, the cash dividend is net of tax credits and hence Dividend per share represents net dividend per share. This item Includes: Any cash dividends declared on various classes of common stock (i.e., Class A, Class B) that is being listed This item excludes: Special dividend, Liquidation distributions, Preferred stock dividends, Stock dividends, Spin off dividends, Extraordinary return of capital, Extraordinary capital gains distributions, Cash dividends paid in lieu of fractional shares, Minority shareholders distributions Note: 1. This item is fully adjusted for all subsequent stock splits and stock dividends. 2. We consider the declaration date to determine the reporting period in which the dividend is included. In cases where dividends are normally declared quarterly but the two declarations fall within the same quarter, then only one dividend declaration is considered, which is related to the reporting quarter
Last twelve months	Formula: IQ_LTM Formula provides data for the last twelve months from the given extraction date
Leverage ratio	Formula: IQ_TOTAL_DEBT_EQUITY Total Debt [4173] / Total Equity [1275] Notes: (1) If the denominator is less than or equal to zero then the ratio will be shown as NM
Market capitalization	Formula: IQ_MARKETCAP Last close Market capitalization is the aggregate valuation of the company based on its last close share price and the last close number of outstanding stocks. It is calculated by multiplying the last close market price of the company's share with the last close outstanding shares of the company. For companies with multiple class, the calculation is done at the security/class level and then aggregated for a company level market cap Last Close Market Capitalization is calculated using the following formula: Last Close BS Shares out [100053] * Last Close Price [100052]
Net income	Formula: IQ_NI Net Income - (IS) is a subtotal line item across all templates with the following components for the standard template: Earnings From Continuing Operations [7], Earnings Of Discontinued Operations [40], Extraordinary Item & Accounting Change [42], Minority Interest in Earnings [83]

Research and development expenses	Formula: IQ_RD_EXP_FN Research And Development Expense From Footnotes is a supplemental line item that represents the costs incurred by a company on development of a new product, innovation relating to technology formulation, process development, engineering expenses or on the process undertaken in upgrading the existing product or service line. Research and development process may be in-house or undertaken at leading universities and outside research facilities. This item Includes: Company-sponsored research and development, Research and development expenses incurred for its own product or that, spent for customers., Both the Research & Development expenses sponsored by the 'customer' and by the 'Company', Acquired or In-Process Research and Development Expenses, Amortization /Write-off of Research, development or software development costs This item excludes: Inventor royalties, Market research and testing, Support Expense, Amount Spent on Discontinued Business, Website development Costs (other than industries where the business is related to Internet software or internet information providers)
Share repurchases	Formula: IQ_COMMON_REP Repurchase of Common Stock is a line item in the Standard template that represents cash used for the repurchase of common stock This item includes: Purchase of treasury stock, Repurchase/redemption of common stock, Purchase of common stock for treasury and retirement, Share buyback, Purchase of ESOP shares, Purchase of treasury stock for dividend reinvestment plan, Stock repurchase program, Purchase of own shares, Payments for share buy-back, Cash payment in lieu of fractional shares on stock split, Taxes paid related to net settlement of stock-based compensation awards, Tax withholding related to exercise of stock options, Payment of payroll taxes in lieu of issuing shares for stock-based compensation, Payment for Tax Withholding for Vesting of Restricted Stock, Employee taxes paid related to the net share settlement of stock-based awards, Withholding Taxes Paid on Vesting of Restricted Stock Units, Cancellation of Restricted Stock Awards for Payroll Tax Withholdings on Vested Shares This item excludes: Repurchase or redemption of preferred stock, Repurchase of common shares by subsidiaries, Issuance of common or preferred stock by the company
Stock based compensation	Formula: IQ_STOCK_BASED_COMP_PRETAX Stock-Based Compensation Before Tax represents total stock based compensation expenses before tax effect. This item includes: All stock based compensation expenses related to employees (incl. options, restricted, etc.), All stock based compensation expenses related to non-employees (consultants, directors, etc.), Amortization of stock based compensation charges, Amortization of non-cash stock expense, Stock based compensation given for all the plans including options and restricted, This item excludes: Capitalized stock based compensation

Total assets	Formula: IQ_TOTAL_ASSETS Total Assets is subtotal line item across all templates with the following components for the standard template: Total Current Assets [1008], Net Property, Plant & Equipment [1004], Long-term Investments [1054], Goodwill [1171], Other Intangibles, Total [1040], Finance Div. Loans and Leases, LT [1033], Finance Division Other Long-Term Assets, Total [1034], Other Assets, Total [1272]
Total debt	Formula: IQ_TOTAL_DEBT Total Debt is a supplemental line item across all templates with the following components for the standard template: Short-term Borrowings [1046], Current Portion of Long-Term Debt [1297], Current Portion of Leases [1090], Long-Term Debt [1049], Long Term Leases [1183], Finance Div. Debt Current [1030], Finance Div. Debt Non-Curr. [1035]
Total revenue	Formula: IQ_TOTAL_REV Total Revenues is subtotal line item in the Standard template with the following components: Revenues [112] and Other Revenues, (Summary Subtotal) [357]

Source: Capital IQ

Note: The content of Table A has been copied and pasted from Capital IQ and has not been altered

TABLE 1.1

Performance Group	#	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
Good	6	3	-	-	2	-	-	-	-	1	-
Above Average	6	3	1	-	1	-	1	-	-	-	-
Average	6	1	1	1	-	-	2	-	-	-	1
Below Average	6	-	1	-	-	2	-	-	3	-	-
Poor	6	-	1	-	-	3	-	2	-	-	-
Sum:	**30**	**7**	**4**	**1**	**3**	**5**	**3**	**2**	**3**	**1**	**1**

(Source: own research and representation)

TABLE 1.2

Sector Groups #	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
Apple	1	-	-	-	-	-	-	-	-	-
Abbvie Inc	-	1	-	-	-	-	-	-	-	-
Accenture	-	-	1	-	-	-	-	-	-	-
Adobe	1	-	-	-	-	-	-	-	-	-
Advanced Micro Devices	-	-	-	1	-	-	-	-	-	-
Amazon	1	-	-	-	-	-	-	-	-	-
Broadcom	-	-	-	1	-	-	-	-	-	-
Bank of America	-	-	-	-	1	-	-	-	-	-
Berkshire Hathaway	-	-	-	-	1	-	-	-	-	-
Costco	-	-	-	-	-	1	-	-	-	-
Salesforce	1	-	-	-	-	-	-	-	-	-
Chevron	-	-	-	-	-	-	1	-	-	-
Alphabet	1	-	-	-	-	-	-	-	-	-
Home Depot	-	-	-	-	-	1	-	-	-	-
Johnson & Johnson	-	1	-	-	-	-	-	-	-	-
J.P. Morgan	-	-	-	-	1	-	-	-	-	-
Coca Cola Company	-	-	-	-	-	-	-	1	-	-
Eli Lilly & Co	-	1	-	-	-	-	-	-	-	-
Mastercard	-	-	-	-	1	-	-	-	-	-
Meta	1	-	-	-	-	-	-	-	-	-
Merck & Co	-	1	-	-	-	-	-	-	-	-
Microsoft	1	-	-	-	-	-	-	-	-	-
Nvidia	-	-	-	1	-	-	-	-	-	-
Pepsi	-	-	-	-	-	-	-	1	-	-
Procter & Gamble	-	-	-	-	-	-	-	1	-	-
Tesla	-	-	-	-	-	-	-	-	1	-
United Health Group	-	-	-	-	-	-	-	-	-	1
Visa	-	-	-	-	1	-	-	-	-	-
Walmart	-	-	-	-	-	1	-	-	-	-
ExxonMobil	-	-	-	-	-	-	1	-	-	-
	7	**4**	**1**	**3**	**5**	**3**	**2**	**3**	**1**	**1**

(Source: own research and representation)

TABLE 2.1

Average change in Leverage Ratio for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	(20.3)%	1.0%	(105.8)%	(4.9)%	(3.9)%	11.5%	(13.4)%	(0.5)%	(9.6)%	(159.9)%	(4.3)%
Q1 19 to Q1 20	3.6%	(1.9)%	(23.5)%	21.2%	1.3%	20.9%	2.6%	3.8%	40.6%	(68.7)%	15.9%
Q2 19 to Q2 20	1.7%	1.8%	(43.6)%	21.1%	1.7%	8.4%	5.9%	7.5%	60.4%	(63.8)%	(5.4)%
Q3 19 to Q3 20	2.5%	5.7%	(27.7)%	19.8%	11.4%	13.9%	(2.0)%	6.6%	45.8%	(109.0)%	(12.5)%
Q4 19 to Q4 20	(5.2)%	3.7%	(60.9)%	(3.1)%	(1.0)%	12.2%	(3.6)%	16.5%	37.4%	(123.4)%	(3.8)%
Q1 20 to Q2 20	(3.8)%	2.0%	(38.2)%	(0.1)%	(1.1)%	(6.0)%	1.4%	4.3%	22.5%	(5.9)%	(16.4)%
Q1 20 to Q3 20	(9.5)%	3.4%	(50.4)%	(1.5)%	(11.8)%	(0.1)%	(5.5)%	4.9%	4.9%	(55.8)%	(21.2)%
Q1 20 to Q4 20	(13.5)%	1.5%	(56.0)%	(2.8)%	(15.4)%	(3.5)%	(5.2)%	13.4%	(9.2)%	(86.1)%	(22.2)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.2

Average change in Total Debt for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	35.2%	49.2%	13.7%	5.1%	183.2%	23.6%	(0.7)%	(7.4)%	11.7%	(51.8)%	16.8%
Q1 19 to Q1 20	21.9%	12.9%	19.5%	n.a.	57.5%	21.1%	19.4%	10.5%	18.9%	19.2%	34.6%
Q2 19 to Q2 20	25.8%	14.4%	36.2%	n.a.	63.3%	17.9%	34.5%	17.7%	22.9%	8.1%	9.0%
Q3 19 to Q3 20	25.2%	21.7%	40.9%	n.a.	60.2%	18.6%	20.2%	12.2%	18.6%	3.6%	(2.5)%
Q4 19 to Q4 20	20.5%	18.6%	22.1%	1.4%	52.5%	18.9%	2.4%	47.2%	14.6%	(8.5)%	6.9%
Q1 20 to Q2 20	5.6%	3.1%	11.4%	3.0%	8.5%	3.8%	10.5%	10.9%	3.1%	1.8%	(10.8)%
Q1 20 to Q3 20	6.3%	13.3%	16.8%	2.2%	(8.8)%	6.5%	5.0%	11.5%	(0.4)%	(0.2)%	(15.1)%
Q1 20 to Q4 20	7.1%	15.1%	19.2%	0.5%	(11.2)%	6.7%	1.1%	35.7%	(5.5)%	(12.3)%	(15.8)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.3

Average change in Stock Based Compensation (adjusted for Employee growth) for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	7.1%	(5.3)%	8.1%	(11.1)%	21.4%	0.2%	11.9%	51.0%	26.5%	(51.9)%	(2.1)%
Q1 19 to Q1 20	4.1%	9.7%	34.2%	n.a.	17.5%	(6.5)%	(1.0)%	n.a.	(32.8)%	(22.2)%	(5.7)%
Q2 19 to Q2 20	8.6%	7.3%	6.4%	n.a.	20.5%	40.0%	(8.6)%	n.a.	(14.6)%	41.6%	n.a.
Q3 19 to Q3 20	11.4%	3.6%	(21.2)%	7.1%	22.5%	(1.1)%	(8.2)%	n.a.	10.5%	149.2%	n.a.
Q4 19 to Q4 20	8.5%	1.4%	3.7%	11.5%	18.5%	(1.5)%	20.6%	(28.1)%	30.2%	77.9%	(13.2)%
Q1 20 to Q2 20	(19.9)%	12.3%	(87.2)%	n.a.	19.5%	(41.9)%	(62.7)%	n.a.	27.3%	64.5%	(100.0)%
Q1 20 to Q3 20	(20.9)%	9.1%	(95.7)%	n.a.	27.2%	(55.3)%	(54.5)%	n.a.	3.9%	157.3%	(100.0)%
Q1 20 to Q4 20	11.7%	6.3%	(40.9)%	n.a.	20.1%	(2.1)%	76.8%	n.a.	24.9%	180.9%	(35.0)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.4

Average change in SBC as % of Net Income for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	(0.4)%	(0.4)%	0.2%	0.7%	(40.2)%	0.6%	(0.3)%	(6.3)%	(2.1)%	127.1%	(0.2)%
Q1 19 to Q1 20	8.0%	62.5%	1.0%	0.0%	(75.8)%	4.3%	(0.1)%	0.0%	(0.6)%	n.a.	(0.2)%
Q2 19 to Q2 20	(6.1)%	(65.0)%	(12.0)%	0.0%	(30.5)%	3.1%	0.1%	0.0%	4.1%	385.1%	0.0%
Q3 19 to Q3 20	(2.9)%	(7.5)%	(0.6)%	(0.7)%	(20.3)%	0.2%	(0.8)%	0.0%	0.3%	24.9%	0.0%
Q4 19 to Q4 20	15.3%	53.0%	92.2%	0.5%	(44.3)%	0.0%	(27.5)%	(19.5)%	1.1%	(33.2)%	2.0%
Q1 20 to Q2 20	(19.8)%	(72.0)%	(13.8)%	0.0%	4.4%	(4.1)%	(2.0)%	0.0%	1.4%	n.a.	(6.8)%
Q1 20 to Q3 20	(21.1)%	(71.0)%	(4.1)%	20.2%	(23.5)%	(6.4)%	(2.9)%	0.0%	0.0%	n.a.	(6.8)%
Q1 20 to Q4 20	(5.8)%	(53.4)%	90.6%	20.8%	(29.2)%	(4.4)%	(13.5)%	(16.0)%	1.1%	n.a.	0.0%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.5

Average change in R&D expenses as % of Sales for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	(0.8)%	(0.4)%	(1.0)%	0.2%	(5.4)%	0.0%	0.0%	(0.2)%	(0.1)%	(1.2)%	0.0%
Q1 19 to Q1 20	(0.5)%	0.8%	(1.9)%	0.0%	(3.3)%	0.0%	0.0%	0.0%	0.0%	(2.1)%	0.0%
Q2 19 to Q2 20	0.6%	0.9%	4.1%	0.0%	(1.1)%	0.0%	0.0%	0.0%	(0.2)%	(1.2)%	0.0%
Q3 19 to Q3 20	(0.6)%	(0.1)%	(2.0)%	0.8%	(2.7)%	0.0%	0.0%	0.0%	0.0%	(1.1)%	0.0%
Q4 19 to Q4 20	0.7%	(1.1)%	8.5%	0.0%	(1.9)%	0.0%	0.0%	0.1%	(0.1)%	0.2%	0.0%
Q1 20 to Q2 20	0.9%	0.2%	4.0%	0.0%	(0.0)%	0.0%	0.0%	0.0%	3.4%	(0.8)%	0.0%
Q1 20 to Q3 20	(0.0)%	(0.7)%	2.4%	8.0%	(4.0)%	0.0%	0.0%	0.0%	0.0%	(1.2)%	0.0%
Q1 20 to Q4 20	0.8%	(2.0)%	10.5%	0.0%	(4.0)%	0.0%	0.0%	2.0%	1.1%	(0.6)%	0.0%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.6

Average change in R&D for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	36.4%	51.3%	24.7%	39.8%	66.4%	n.a.	n.a.	(38.5)%	3.9%	100.9%	n.a.
Q1 19 to Q1 20	9.2%	24.1%	(4.3)%	0.0%	12.6%	n.a.	n.a.	0.0%	0.0%	(4.7)%	n.a.
Q2 19 to Q2 20	13.5%	20.8%	21.9%	0.0%	21.5%	n.a.	n.a.	0.0%	(1.6)%	(24.8)%	n.a.
Q3 19 to Q3 20	10.2%	16.6%	(0.9)%	8.9%	24.2%	n.a.	n.a.	0.0%	0.0%	9.6%	n.a.
Q4 19 to Q4 20	22.2%	14.8%	55.7%	0.0%	31.4%	n.a.	n.a.	(14.7)%	0.6%	51.3%	n.a.
Q1 20 to Q2 20	7.6%	5.6%	22.6%	0.0%	12.2%	n.a.	n.a.	0.0%	0.0%	(13.9)%	n.a.
Q1 20 to Q3 20	10.9%	8.2%	24.5%	0.0%	16.8%	n.a.	n.a.	0.0%	0.0%	13.0%	n.a.
Q1 20 to Q4 20	32.2%	23.7%	83.8%	0.0%	27.0%	n.a.	n.a.	0.0%	0.0%	61.1%	n.a.

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.7

Average change in Share Repurchases for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	52.4%	86.0%	(2.9)%	62.9%	140.9%	77.8%	73.6%	87.0%	(52.2)%	n.a.	6.4%
Q1 19 to Q1 20	(5.4)%	67.0%	(21.7)%	(3.7)%	(39.2)%	15.9%	(55.8)%	(27.6)%	(47.1)%	n.a.	(43.7)%
Q2 19 to Q2 20	(35.4)%	30.2%	(85.8)%	28.3%	105.8%	(86.3)%	(75.2)%	(100.0)%	(76.2)%	n.a.	(100.0)%
Q3 19 to Q3 20	(10.9)%	21.2%	32.4%	45.1%	(10.5)%	(52.9)%	(31.5)%	(100.0)%	(52.4)%	n.a.	41.7%
Q4 19 to Q4 20	10.7%	31.7%	(74.9)%	5.4%	95.0%	24.9%	(9.4)%	(71.1)%	(48.5)%	n.a.	328.3%
Q1 20 to Q2 20	(55.3)%	(13.1)%	(88.9)%	(35.4)%	(41.3)%	(34.7)%	(75.7)%	(100.0)%	(70.9)%	n.a.	(100.0)%
Q1 20 to Q3 20	(20.7)%	(6.7)%	(92.2)%	(39.2)%	9.4%	40.5%	(18.2)%	(100.0)%	(4.8)%	n.a.	(49.7)%
Q1 20 to Q4 20	8.7%	12.2%	(83.8)%	(20.7)%	134.8%	30.1%	(0.5)%	(83.6)%	44.1%	n.a.	1.1%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.8

Average change in Share Repurchases as % of Net Income for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	(4.4)%	15.1%	(18.4)%	13.0%	17.1%	(3.6)%	20.1%	(48.0)%	(55.9)%	0.0%	(6.2)%
Q1 19 to Q1 20	(4.9)%	8.0%	(19.7)%	(11.1)%	(60.8)%	51.2%	(21.6)%	(12.4)%	(19.8)%	0.0%	(36.6)%
Q2 19 to Q2 20	(17.5)%	(1.7)%	(18.5)%	11.9%	(28.8)%	(47.3)%	(26.8)%	(9.6)%	5.9%	0.0%	(45.5)%
Q3 19 to Q3 20	(17.8)%	(4.3)%	(50.1)%	9.8%	(14.0)%	(25.6)%	(23.4)%	(19.5)%	(14.9)%	0.0%	9.8%
Q4 19 to Q4 20	(17.5)%	(8.6)%	(18.9)%	(2.5)%	(7.0)%	(34.3)%	(74.0)%	6.5%	(17.2)%	0.0%	66.0%
Q1 20 to Q2 20	(29.7)%	(15.0)%	(27.0)%	(27.5)%	(1.4)%	(100.2)%	(18.1)%	3.1%	(16.1)%	0.0%	(50.0)%
Q1 20 to Q3 20	(24.8)%	(25.9)%	(27.6)%	(32.8)%	(3.0)%	(66.6)%	(14.4)%	3.1%	(6.0)%	0.0%	(23.2)%
Q1 20 to Q4 20	(30.4)%	(39.3)%	(28.4)%	(27.3)%	(10.5)%	(84.9)%	(31.3)%	2.9%	7.4%	0.0%	27.3%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.9

Average change in Dividend Payout Ratio for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	(17.8)%	(2.6)%	(1.3)%	7.1%	(33.3)%	1.3%	(3.7)%	(149.8)%	(38.8)%	0.0%	2.9%
Q1 19 to Q1 20	2.8%	(0.5)%	0.9%	41.4%	26.1%	22.4%	3.6%	(83.6)%	1.4%	0.0%	5.5%
Q2 19 to Q2 20	(5.2)%	0.6%	(46.6)%	(33.1)%	17.3%	17.2%	(5.8)%	(85.5)%	40.8%	0.0%	(13.2)%
Q3 19 to Q3 20	(7.6)%	(0.4)%	(31.4)%	39.5%	(7.5)%	11.4%	(1.5)%	(102.0)%	9.1%	0.0%	8.5%
Q4 19 to Q4 20	(9.5)%	(1.3)%	7.8%	(0.3)%	(82.6)%	0.6%	(26.9)%	(32.7)%	25.4%	0.0%	24.6%
Q1 20 to Q2 20	(3.4)%	0.1%	(5.6)%	0.0%	(12.9)%	(6.7)%	(5.0)%	(33.4)%	28.6%	0.0%	(12.4)%
Q1 20 to Q3 20	(7.0)%	(1.5)%	6.3%	(1.9)%	(47.7)%	(15.3)%	3.7%	(33.4)%	14.8%	0.0%	7.2%
Q1 20 to Q4 20	(3.1)%	(3.7)%	15.7%	(4.2)%	(45.7)%	(20.9)%	(9.0)%	(33.4)%	68.4%	0.0%	23.2%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.10

Average change in Cash as % of Total Assets for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	(3.7)%	(2.9)%	(11.9)%	(5.2)%	(23.2)%	1.4%	0.8%	2.3%	1.4%	8.2%	5.2%
Q1 19 to Q1 20	5.8%	1.3%	8.6%	(0.1)%	17.8%	3.5%	5.1%	1.1%	8.4%	14.1%	3.7%
Q2 19 to Q2 20	2.0%	0.2%	(0.8)%	1.4%	(7.9)%	5.5%	8.5%	1.0%	6.1%	7.0%	3.4%
Q3 19 to Q3 20	0.4%	(0.4)%	(2.3)%	2.1%	(18.1)%	5.5%	7.8%	(0.3)%	3.0%	15.5%	2.1%
Q4 19 to Q4 20	(1.0)%	0.4%	(10.7)%	4.9%	(20.7)%	5.0%	5.0%	0.2%	2.1%	18.9%	2.3%
Q1 20 to Q2 20	(2.5)%	(0.7)%	(9.8)%	2.1%	(16.5)%	1.9%	4.4%	(0.1)%	(2.2)%	0.9%	0.2%
Q1 20 to Q3 20	(2.8)%	(1.5)%	(8.8)%	6.5%	(21.2)%	1.6%	4.2%	(0.6)%	(2.6)%	10.1%	(2.2)%
Q1 20 to Q4 20	(3.0)%	(0.2)%	(9.4)%	6.2%	(22.5)%	2.0%	1.2%	(1.6)%	(4.6)%	15.5%	(2.8)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.11

Average change in Cash for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	44.3%	5.5%	(26.8)%	(5.9)%	66.7%	65.6%	32.2%	181.9%	34.8%	179.3%	132.0%
Q1 19 to Q1 20	94.1%	34.1%	(6.4)%	21.8%	189.2%	51.7%	150.5%	73.2%	240.4%	267.6%	73.8%
Q2 19 to Q2 20	70.9%	24.5%	16.0%	35.1%	30.9%	71.2%	197.2%	89.5%	167.3%	73.9%	62.4%
Q3 19 to Q3 20	39.0%	14.7%	28.6%	37.4%	(4.7)%	76.1%	56.4%	11.9%	53.5%	172.2%	42.0%
Q4 19 to Q4 20	47.6%	32.0%	(14.6)%	47.9%	(11.7)%	79.0%	136.0%	19.8%	47.9%	209.3%	54.0%
Q1 20 to Q2 20	3.6%	(0.1)%	(6.2)%	18.5%	(16.4)%	17.8%	38.3%	(4.5)%	(13.5)%	6.6%	3.5%
Q1 20 to Q3 20	6.3%	1.1%	13.0%	54.8%	(35.1)%	17.2%	40.7%	(20.9)%	(15.7)%	79.8%	(18.6)%
Q1 20 to Q4 20	11.5%	21.5%	8.6%	58.1%	(23.6)%	33.2%	28.1%	(47.9)%	(32.8)%	139.9%	(21.5)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.12

Average change in Capex as % of Sales for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	(0.5)%	(0.3)%	(0.1)%	(0.1)%	(1.0)%	(0.3)%	(0.2)%	(5.2)%	(1.1)%	5.3%	(0.0)%
Q1 19 to Q1 20	0.4%	0.6%	1.1%	0.1%	(0.7)%	0.3%	(0.4)%	2.1%	(0.3)%	1.3%	(0.2)%
Q2 19 to Q2 20	0.1%	(1.2)%	(0.0)%	0.1%	0.6%	(0.0)%	(0.5)%	3.9%	(0.6)%	5.2%	0.0%
Q3 19 to Q3 20	(0.4)%	(0.3)%	(1.5)%	(0.4)%	2.0%	(0.6)%	(0.5)%	(2.8)%	(1.1)%	5.1%	0.1%
Q4 19 to Q4 20	(0.3)%	(0.0)%	1.1%	(0.0)%	0.4%	(0.7)%	0.2%	(5.1)%	(2.1)%	4.8%	(0.2)%
Q1 20 to Q2 20	(0.1)%	(1.0)%	(0.5)%	(0.1)%	0.5%	(0.1)%	(0.1)%	2.7%	(0.2)%	1.3%	(0.0)%
Q1 20 to Q3 20	(0.4)%	(0.7)%	(1.6)%	0.3%	1.2%	(0.2)%	0.1%	(3.6)%	0.1%	3.6%	0.1%
Q1 20 to Q4 20	0.0%	(1.6)%	2.2%	(0.7)%	(0.3)%	(0.4)%	0.9%	(2.5)%	1.9%	2.8%	0.1%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 2.13

Average change in Capex for Sector Peer Group

	Full Sample	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=30	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
CY19 to CY22[1]	37.1%	61.4%	26.1%	20.2%	46.0%	2.3%	16.3%	(42.8)%	(8.4)%	383.7%	17.9%
Q1 19 to Q1 20	19.8%	43.1%	26.2%	18.3%	9.4%	30.2%	(13.9)%	10.2%	(3.0)%	57.7%	(16.5)%
Q2 19 to Q2 20	1.9%	1.7%	1.8%	6.9%	47.6%	(16.9)%	(16.3)%	(35.0)%	(22.3)%	111.2%	8.7%
Q3 19 to Q3 20	13.8%	20.6%	(2.7)%	(21.8)%	133.3%	(32.3)%	(14.5)%	(49.6)%	(19.5)%	149.0%	25.5%
Q4 19 to Q4 20	20.5%	40.6%	35.3%	(2.0)%	59.0%	(31.0)%	25.7%	(48.4)%	(20.6)%	159.2%	(11.7)%
Q1 20 to Q2 20	(2.9)%	(8.7)%	3.5%	(9.3)%	25.5%	(21.2)%	2.6%	(29.5)%	(0.2)%	17.7%	(3.8)%
Q1 20 to Q3 20	17.1%	7.9%	10.9%	14.1%	69.5%	(16.6)%	33.5%	(46.3)%	22.5%	112.3%	18.8%
Q1 20 to Q4 20	43.9%	27.8%	89.0%	(43.7)%	31.4%	(21.0)%	82.0%	(36.5)%	117.6%	142.0%	22.4%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.1

Average change in Leverage Ratio for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	(20.3)%	(21.7)%	(8.6)%	(71.0)%	5.0%	(5.1)%
Q1 19 to Q1 20	3.6%	(10.7)%	(1.5)%	(9.4)%	36.6%	2.8%
Q2 19 to Q2 20	1.7%	(4.4)%	1.3%	(29.8)%	37.0%	4.4%
Q3 19 to Q3 20	2.5%	(10.8)%	6.3%	(20.2)%	35.8%	1.6%
Q4 19 to Q4 20	(5.2)%	(12.2)%	(4.3)%	(49.8)%	30.1%	10.2%
Q1 20 to Q2 20	(3.8)%	2.6%	1.7%	(32.4)%	7.0%	2.1%
Q1 20 to Q3 20	(9.5)%	(7.2)%	(3.5)%	(41.5)%	5.0%	(0.1)%
Q1 20 to Q4 20	(13.5)%	(15.4)%	(3.1)%	(52.2)%	(5.3)%	8.5%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.2

Average change in Total Debt for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	35.2%	102.7%	25.3%	18.5%	22.6%	6.6%
Q1 19 to Q1 20	21.9%	33.4%	28.1%	17.8%	24.2%	5.5%
Q2 19 to Q2 20	25.8%	38.8%	44.7%	8.6%	24.9%	9.4%
Q3 19 to Q3 20	25.2%	35.7%	35.7%	19.7%	30.2%	3.8%
Q4 19 to Q4 20	20.5%	35.4%	4.4%	15.8%	23.0%	24.0%
Q1 20 to Q2 20	5.6%	8.5%	11.3%	(3.6)%	6.0%	5.8%
Q1 20 to Q3 20	6.3%	1.8%	8.0%	6.2%	11.6%	4.0%
Q1 20 to Q4 20	7.1%	0.5%	6.1%	5.6%	6.3%	16.9%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.3

Average change in SBC (adjusted for Employee growth) for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	7.1%	14.0%	(20.4)%	6.3%	5.8%	29.7%
Q1 19 to Q1 20	4.1%	12.2%	6.7%	(3.7)%	(21.2)%	43.8%
Q2 19 to Q2 20	8.6%	26.1%	16.8%	2.2%	(14.6)%	(30.9)%
Q3 19 to Q3 20	11.4%	46.4%	2.1%	4.6%	8.9%	(54.1)%
Q4 19 to Q4 20	8.5%	27.3%	2.0%	7.7%	16.6%	(15.1)%
Q1 20 to Q2 20	(19.9)%	31.0%	(9.5)%	(73.5)%	(27.2)%	(59.1)%
Q1 20 to Q3 20	(20.9)%	48.7%	(12.9)%	(76.0)%	(38.7)%	(73.3)%
Q1 20 to Q4 20	11.7%	50.6%	13.7%	(14.2)%	7.0%	(27.6)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.4

Average change in SBC as % of Net Income for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	(0.4)%	12.2%	(14.5)%	0.9%	(1.1)%	(1.8)%
Q1 19 to Q1 20	8.0%	(42.0)%	69.7%	0.6%	(0.8)%	4.2%
Q2 19 to Q2 20	(6.1)%	46.2%	(80.4)%	0.0%	2.8%	1.2%
Q3 19 to Q3 20	(2.9)%	(7.0)%	(7.7)%	(0.1)%	0.4%	(1.0)%
Q4 19 to Q4 20	15.3%	(15.3)%	110.9%	(12.5)%	1.6%	(8.3)%
Q1 20 to Q2 20	(19.8)%	3.1%	(91.3)%	(2.6)%	(0.3)%	(4.3)%
Q1 20 to Q3 20	(21.1)%	(9.2)%	(87.8)%	0.7%	(1.0)%	(6.2)%
Q1 20 to Q4 20	(5.8)%	(16.4)%	1.3%	(6.2)%	1.4%	(11.1)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.5

Average change in R&D expenses as % of Sales for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	(0.8)%	(2.5)%	(1.4)%	(0.6)%	0.7%	(0.4)%
Q1 19 to Q1 20	(0.5)%	(2.3)%	0.9%	(0.4)%	(1.0)%	0.5%
Q2 19 to Q2 20	0.6%	(1.0)%	2.0%	1.1%	0.2%	0.6%
Q3 19 to Q3 20	(0.6)%	(1.2)%	(2.4)%	(0.3)%	0.3%	0.8%
Q4 19 to Q4 20	0.7%	(0.7)%	(1.5)%	0.1%	0.4%	5.3%
Q1 20 to Q2 20	0.9%	(0.1)%	1.2%	1.1%	2.1%	0.2%
Q1 20 to Q3 20	(0.0)%	(1.7)%	(1.4)%	1.2%	0.3%	1.6%
Q1 20 to Q4 20	0.8%	(1.7)%	(2.0)%	0.1%	1.5%	6.0%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.6

Average change in R&D for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	36.4%	73.5%	41.2%	33.1%	10.6%	(16.4)%
Q1 19 to Q1 20	9.2%	11.6%	22.9%	6.3%	(10.4)%	4.2%
Q2 19 to Q2 20	13.5%	12.8%	34.7%	8.3%	(0.5)%	(1.6)%
Q3 19 to Q3 20	10.2%	22.5%	7.1%	4.6%	4.9%	1.5%
Q4 19 to Q4 20	22.2%	34.1%	15.6%	12.2%	9.0%	32.6%
Q1 20 to Q2 20	7.6%	7.0%	19.1%	4.6%	1.7%	(1.4)%
Q1 20 to Q3 20	10.9%	17.1%	8.9%	0.7%	5.1%	18.0%
Q1 20 to Q4 20	32.2%	45.1%	18.7%	18.5%	19.2%	55.4%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.7

Average change in Share Repurchases for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	52.4%	115.5%	72.5%	66.5%	(26.3)%	72.1%
Q1 19 to Q1 20	(5.4)%	12.8%	(3.6)%	(10.1)%	(20.7)%	5.9%
Q2 19 to Q2 20	(35.4)%	101.8%	(14.9)%	(36.0)%	(75.0)%	(98.9)%
Q3 19 to Q3 20	(10.9)%	7.0%	97.9%	(22.2)%	(40.1)%	(99.6)%
Q4 19 to Q4 20	10.7%	67.2%	31.8%	37.6%	(31.6)%	(16.4)%
Q1 20 to Q2 20	(55.3)%	(37.4)%	(29.0)%	(75.8)%	(72.8)%	(51.4)%
Q1 20 to Q3 20	(20.7)%	(9.4)%	1.0%	(55.3)%	(16.8)%	(13.8)%
Q1 20 to Q4 20	8.7%	105.0%	(0.4)%	(21.3)%	(3.2)%	(7.7)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.8

Average change in Share Repurchases as % of Net Income for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	(4.4)%	15.2%	8.9%	12.7%	(30.7)%	(28.1)%
Q1 19 to Q1 20	(4.9)%	(9.4)%	(26.8)%	(12.3)%	(11.2)%	35.3%
Q2 19 to Q2 20	(17.5)%	(7.1)%	(20.4)%	(8.4)%	(20.8)%	(30.8)%
Q3 19 to Q3 20	(17.8)%	(2.5)%	(7.4)%	(18.4)%	(11.9)%	(48.9)%
Q4 19 to Q4 20	(17.5)%	(7.8)%	(7.5)%	(29.2)%	(8.1)%	(33.1)%
Q1 20 to Q2 20	(29.7)%	(10.0)%	(8.1)%	(31.8)%	(34.0)%	(64.8)%
Q1 20 to Q3 20	(24.8)%	(14.9)%	(11.0)%	(31.5)%	(2.8)%	(64.0)%
Q1 20 to Q4 20	(30.4)%	(29.4)%	(6.0)%	(38.2)%	(10.1)%	(64.5)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.9

Average change in Dividend Payout Ratio for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	(17.8)%	(3.3)%	(18.0)%	4.5%	(20.7)%	(51.4)%
Q1 19 to Q1 20	2.8%	(2.3)%	13.7%	14.8%	(1.4)%	(10.7)%
Q2 19 to Q2 20	(5.2)%	(0.9)%	(24.5)%	(11.3)%	28.7%	(18.1)%
Q3 19 to Q3 20	(7.6)%	(0.2)%	0.1%	5.6%	(2.9)%	(40.6)%
Q4 19 to Q4 20	(9.5)%	(1.1)%	(58.3)%	(3.8)%	29.2%	(21.8)%
Q1 20 to Q2 20	(3.4)%	1.3%	(11.6)%	(10.0)%	21.1%	(17.7)%
Q1 20 to Q3 20	(7.0)%	(0.9)%	(11.9)%	(3.1)%	14.7%	(33.9)%
Q1 20 to Q4 20	(3.1)%	(3.6)%	(23.1)%	(8.2)%	52.4%	(36.5)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.10

Average change in Cash as % of Total Assets for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	(3.7)%	(13.4)%	(6.6)%	(0.1)%	(0.1)%	1.7%
Q1 19 to Q1 20	5.8%	11.4%	7.9%	2.6%	6.0%	1.3%
Q2 19 to Q2 20	2.0%	(3.2)%	0.6%	4.2%	5.7%	2.6%
Q3 19 to Q3 20	0.4%	(6.6)%	(2.0)%	4.8%	5.3%	0.6%
Q4 19 to Q4 20	(1.0)%	(7.7)%	(4.9)%	3.5%	2.8%	1.6%
Q1 20 to Q2 20	(2.5)%	(7.8)%	(6.9)%	1.9%	(0.6)%	1.1%
Q1 20 to Q3 20	(2.8)%	(8.5)%	(7.8)%	2.4%	(0.1)%	0.1%
Q1 20 to Q4 20	(3.0)%	(8.1)%	(6.4)%	0.9%	(2.3)%	0.8%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.11

Average change in Cash for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	44.3%	49.3%	9.3%	35.0%	21.1%	106.9%
Q1 19 to Q1 20	94.1%	140.1%	51.8%	84.2%	138.0%	49.3%
Q2 19 to Q2 20	70.9%	30.4%	36.6%	107.5%	108.5%	71.7%
Q3 19 to Q3 20	39.0%	30.7%	11.9%	60.2%	64.3%	31.6%
Q4 19 to Q4 20	47.6%	33.7%	20.7%	93.2%	40.1%	50.3%
Q1 20 to Q2 20	3.6%	(0.8)%	(12.5)%	21.2%	(2.8)%	12.9%
Q1 20 to Q3 20	6.3%	6.1%	(13.3)%	35.8%	7.1%	(4.0)%
Q1 20 to Q4 20	11.5%	29.4%	0.6%	32.7%	(9.2)%	4.2%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.12

Average change in Capex as % of Sales for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	(0.5)%	1.4%	(0.8)%	(0.8)%	(0.5)%	(2.1)%
Q1 19 to Q1 20	0.4%	0.3%	(0.1)%	0.2%	0.1%	1.3%
Q2 19 to Q2 20	0.1%	1.1%	(1.0)%	(0.3)%	(0.4)%	1.2%
Q3 19 to Q3 20	(0.4)%	2.5%	(0.3)%	(0.7)%	(0.9)%	(2.5)%
Q4 19 to Q4 20	(0.3)%	2.1%	(0.5)%	(0.4)%	(1.3)%	(1.4)%
Q1 20 to Q2 20	(0.1)%	0.4%	(0.9)%	(0.1)%	(0.2)%	0.5%
Q1 20 to Q3 20	(0.4)%	1.8%	(0.9)%	0.0%	(0.1)%	(2.7)%
Q1 20 to Q4 20	0.0%	0.9%	(1.4)%	(0.3)%	1.0%	(0.2)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 3.13

Average change in Capex for Performance Group

	Full Sample	Good	Above Average	Average	Below Average	Poor
	N=30	N=6	N=6	N=6	N=6	N=6
CY19 to CY22[1]	37.1%	136.1%	30.4%	18.4%	(0.1)%	(17.5)%
Q1 19 to Q1 20	19.8%	32.8%	28.5%	3.9%	13.8%	20.1%
Q2 19 to Q2 20	1.9%	52.3%	1.1%	(5.3)%	(21.3)%	(27.0)%
Q3 19 to Q3 20	13.8%	114.0%	9.0%	0.9%	(22.1)%	(55.9)%
Q4 19 to Q4 20	20.5%	97.4%	23.6%	11.4%	(20.3)%	(24.7)%
Q1 20 to Q2 20	(2.9)%	19.9%	(1.1)%	(5.7)%	(11.1)%	(23.2)%
Q1 20 to Q3 20	17.1%	74.2%	11.9%	19.9%	3.9%	(45.1)%
Q1 20 to Q4 20	43.9%	79.3%	25.1%	38.0%	64.0%	(2.5)%

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 4.1

in bn$

	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
Total Assets										
CY2019	190.5	92.6	33.2	34.8	1,208.6	113.1	300.0	92.2	34.3	173.9
CY2020	221.3	115.9	38.3	38.2	1,438.4	127.8	286.3	100.1	52.1	197.3
CY2022[1]	249.8	119.7	44.3	61.4	1,656.3	126.6	301.9	102.5	66.0	221.2
Total Sales										
CY2019	134.8	44.2	44.0	13.4	98.1	263.0	199.4	58.0	24.6	242.2
CY2020	162.3	48.6	44.7	17.0	91.8	288.1	136.9	59.1	31.5	257.1
CY2022[1]	212.7	54.7	56.7	24.8	109.0	311.4	242.5	66.4	62.2	297.6
Total Debt										
CY2019	45.5	34.6	3.4	16.2	243.9	40.1	41.8	35.6	14.6	40.7
CY2020	51.7	43.4	3.4	16.7	264.8	39.1	60.6	40.5	13.3	43.5
CY2022[1]	58.2	39.2	3.6	17.8	278.3	38.0	38.4	39.3	7.0	47.5
Total SBC										
CY2019	5.31	0.53	1.12	1.13	1.01	0.58	0.57	0.33	0.90	0.70
CY2020	6.44	0.63	1.23	1.18	1.05	0.71	0.43	0.34	1.73	0.68
CY2022[1]	8.49	0.68	1.52	1.38	1.32	0.76	0.69	0.40	1.93	0.84
Total R&D										
CY2019	16.43	8.65	0.80	3.08	-	-	0.86	0.86	1.39	-
CY2020	19.13	10.06	0.87	3.60	-	-	0.73	0.84	1.49	-
CY2022[1]	24.67	10.78	1.12	4.47	-	-	0.56	0.88	2.79	-

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 4.2

in bn$

	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
Total Share Buybacks										
CY2019	18.47	4.14	2.63	1.21	14.48	4.42	1.76	4.57	-	5.50
CY2020	21.77	1.50	2.96	0.61	10.11	1.33	0.97	2.71	-	4.25
CY2022[1]	34.26	2.17	4.29	3.34	16.69	8.46	1.11	4.05	-	5.85
Total Dividends per Share (in $)										
CY2019	0.370	3.230	2.260	3.738	1.300	2.528	4.095	2.763	-	4.140
CY2020	0.421	3.555	3.360	4.572	1.440	3.207	4.320	2.927	-	4.830
CY2022[1]	0.471	3.945	3.790	5.139	1.603	3.581	4.470	3.153	-	5.800
Total Cash										
CY2019	18.44	17.31	5.81	6.27	86.85	6.88	4.39	6.09	6.27	10.99
CY2020	21.04	8.54	8.59	4.00	189.96	13.08	4.98	8.97	19.38	16.92
CY2022[1]	17.28	7.90	5.47	5.65	209.95	9.64	11.37	8.26	17.51	25.48
Total Capex										
CY2019	11.33	2.11	0.62	0.38	3.44	5.46	19.24	3.18	1.43	2.07
CY2020	15.00	2.49	0.60	0.63	2.81	5.24	13.10	2.74	3.23	2.05
CY2022[1]	21.06	2.53	0.74	0.57	3.03	6.52	10.93	3.07	6.93	2.44
Market Capitalization										
CY2019	747.9	218.1	133.7	107.3	402.4	235.1	261.6	246.4	75.4	278.5
CY2020	1,139.8	240.9	165.7	203.9	402.9	286.9	168.4	261.9	668.9	332.7
CY2022[1]	1,411.1	307.8	214.4	381.9	474.8	328.9	338.5	290.7	1,130.6	490.0

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 4.3

in bn$

	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
Total Net Income										
CY2019	23.28	10.29	4.78	2.40	33.10	7.15	8.63	6.71	(0.86)	13.84
CY2020	30.76	8.15	5.25	3.59	21.34	10.23	(13.99)	9.57	0.72	15.40
CY2022[1]	44.85	13.42	6.39	6.99	36.05	11.87	23.15	11.51	8.40	17.45

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 5.1

in bn$

	Good	Above Average	Average	Below Average	Poor
	N=6	N=6	N=6	N=6	N=6
Total Assets					
CY2019	107.4	115.5	135.0	89.7	1,103.9
CY2020	131.6	136.3	154.1	98.2	1,290.4
CY2022[1]	160.8	147.3	164.4	101.4	1,478.8
Total Sales					
CY2019	100.3	72.1	184.1	49.4	148.1
CY2020	125.2	84.0	200.0	49.5	122.9
CY2022[1]	164.6	105.7	229.6	54.1	172.9
Total Debt					
CY2019	36.1	37.7	31.0	27.0	217.3
CY2020	42.7	39.8	33.1	32.1	240.7
CY2022[1]	48.8	38.2	33.5	31.4	244.1
Total SBC					
CY2019	2.64	2.50	2.49	0.44	0.98
CY2020	3.44	2.95	2.85	0.45	0.98
CY2022[1]	4.61	3.80	3.46	0.53	1.26
Total R&D					
CY2019	10.07	7.67	5.44	2.47	1.91
CY2020	11.97	9.10	5.86	2.48	2.47
CY2022[1]	15.98	11.28	7.00	2.97	2.25

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 5.2

in bn$

	Good	Above Average	Average	Below Average	Poor
	N=6	N=6	N=6	N=6	N=6
Total Share Buybacks					
CY2019	14.239	5.051	7.268	5.978	10.884
CY2020	14.382	6.387	7.045	3.942	6.911
CY2022[1]	17.812	15.526	14.944	5.843	11.181
Total Dividends per Share (in $)					
CY2019	0.128	3.312	2.354	2.413	2.408
CY2020	0.137	3.905	3.003	2.607	2.567
CY2022[1]	0.149	4.400	3.451	2.826	2.715
Total Cash					
CY2019	16.19	14.58	8.20	8.55	72.82
CY2020	17.41	11.63	13.55	11.01	157.11
CY2022[1]	15.24	10.16	11.90	9.74	176.98
Total Capex					
CY2019	4.77	5.54	6.78	2.37	9.64
CY2020	8.99	6.29	6.51	2.10	7.27
CY2022[1]	13.86	8.18	8.12	2.36	6.68
Market Capitalization					
CY2019	441.9	386.5	339.5	304.6	343.7
CY2020	872.1	532.9	421.8	336.9	289.5
CY2022[1]	1,138.2	664.7	596.3	361.1	406.2

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 5.3

in bn$

	Good	Above Average	Average	Below Average	Poor
	N=6	N=6	N=6	N=6	N=6
Net Income					
CY2019	12.2	12.2	13.2	9.2	28.7
CY2020	16.3	16.2	15.6	10.1	11.4
CY2022[1]	25.0	22.8	22.4	13.1	36.2

[1] CY2022 consists of the last twelve months ending calendar Q1 2022

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 6.1

in bn$

	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
Total Assets										
CQ1 2020	187.7	93.1	33.5	36.9	1,324.7	113.5	296.2	99.2	37.3	189.1
CQ2 2020	196.4	110.1	35.1	37.0	1,370.6	117.5	292.4	101.6	38.1	192.5
CQ3 2020	204.9	113.5	37.1	36.6	1,385.4	124.4	290.6	103.0	45.7	191.0
CQ4 2020	221.3	115.9	38.3	38.2	1,438.4	127.8	286.3	100.1	52.1	197.3
Total Sales										
CQ1 2020	33.7	11.4	11.1	3.5	21.8	67.3	42.5	13.2	6.0	64.4
CQ2 2020	36.0	10.9	11.0	3.9	21.0	71.0	24.2	13.6	6.0	62.1
CQ3 2020	39.2	12.7	10.8	4.7	23.9	73.9	34.8	15.4	8.8	65.1
CQ4 2020	53.5	13.7	11.8	5.0	25.1	75.8	35.3	16.9	10.7	65.5
Total Debt										
CQ1 2020	45.6	35.1	3.4	18.3	269.1	42.4	46.0	42.9	15.2	51.6
CQ2 2020	47.8	41.4	3.5	17.8	270.7	41.1	51.8	44.3	15.5	46.1
CQ3 2020	50.3	42.7	3.5	16.6	264.0	40.4	51.8	43.0	15.2	43.8
CQ4 2020	51.7	43.4	3.4	16.7	264.8	39.1	60.6	40.5	13.3	43.5
Total SBC										
CQ1 2020	1.434	0.192	-	0.267	0.266	0.069	-	0.061	0.211	0.231
CQ2 2020	1.664	0.059	-	0.300	0.181	0.029	-	0.106	0.347	-
CQ3 2020	1.613	0.041	0.260	0.303	0.123	0.037	-	0.076	0.543	-
CQ4 2020	1.715	0.124	0.311	0.313	0.232	0.529	0.431	0.099	0.633	0.152
Total R&D										
CQ1 2020	4.239	1.895	-	0.815	-	-	-	-	0.324	-
CQ2 2020	4.526	2.216	-	0.895	-	-	-	0.600	0.279	-
CQ3 2020	4.618	2.386	0.871	0.912	-	-	-	-	0.366	-
CQ4 2020	5.751	3.563	-	0.977	-	-	0.726	0.240	0.522	-

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 6.2

in bn$

	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
Total Share Buybacks										
CQ1 2020	5.368	1.034	0.970	0.147	3.855	0.521	0.939	0.548	-	1.691
CQ2 2020	4.747	0.181	0.627	0.129	1.273	0.012	-	0.189	-	-
CQ3 2020	5.076	0.126	0.590	0.185	2.539	0.183	-	0.804	-	0.850
CQ4 2020	6.579	0.154	0.769	0.152	2.444	0.610	0.050	1.167	-	1.709
Total Dividends per Share (in $)										
CQ1 2020	0.100	0.870	0.800	1.085	0.356	0.777	1.080	0.704	-	1.080
CQ2 2020	0.102	0.885	0.800	1.085	0.356	0.793	1.080	0.741	-	1.250
CQ3 2020	0.109	0.885	0.880	1.201	0.360	0.793	1.080	0.741	-	1.250
CQ4 2020	0.109	0.915	0.880	1.201	0.368	0.843	1.080	0.741	-	1.250
Total Cash										
CQ1 2020	18.7	16.4	5.4	8.7	129.9	10.5	10.0	13.3	8.1	21.6
CQ2 2020	18.6	7.7	6.4	4.6	162.4	14.0	9.7	11.7	8.6	22.3
CQ3 2020	17.8	9.5	8.4	3.7	162.1	13.8	7.8	11.3	14.5	17.6
CQ4 2020	21.0	8.5	8.6	4.0	190.0	13.1	5.0	9.0	19.4	16.9
Total Capex										
CQ1 2020	3.199	0.499	0.165	0.119	0.663	0.961	4.539	0.514	0.481	0.469
CQ2 2020	3.232	0.422	0.150	0.138	0.690	0.987	3.255	0.524	0.566	0.451
CQ3 2020	3.871	0.337	0.189	0.216	0.715	1.397	2.461	0.653	1.021	0.557
CQ4 2020	4.692	0.872	0.093	0.157	0.743	1.893	2.848	1.050	1.164	0.574
Market Capitalization										
CQ1 2020	691.3	194.8	104.0	103.2	298.5	216.1	148.4	209.5	96.4	236.6
CQ2 2020	927.4	221.9	136.6	140.7	326.5	247.5	177.8	223.8	200.2	279.7
CQ3 2020	1,051.1	222.6	143.8	192.6	354.7	284.0	139.8	250.0	399.8	296.3
CQ4 2020	1,139.8	240.9	165.7	203.9	402.9	286.9	168.4	261.9	668.9	332.7

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 6.3

in bn$

	Tech	Biotech / Pharma	Consulting	Semiconductors	Financial Sector	Retail	Oil & Gas	Consumer	Industrials	Healthcare
	N=7	N=4	N=1	N=3	N=5	N=3	N=2	N=3	N=1	N=1
Total Net Income										
CQ1 2020	5.333	3.370	1.235	0.547	(7.619)	2.389	1.495	2.343	0.016	3.382
CQ2 2020	6.223	1.826	1.228	0.489	7.662	3.882	(4.675)	2.075	0.104	6.637
CQ3 2020	7.718	2.503	1.288	1.017	9.622	3.319	(0.444)	2.768	0.331	3.172
CQ4 2020	11.486	0.449	1.500	1.539	11.670	0.644	(10.368)	2.385	0.270	2.212

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 7.1

in bn$

	Good	Above Average	Average	Below Average	Poor
	N=6	N=6	N=6	N=6	N=6
Total Assets					
CQ1 2020	104.9	116.5	138.1	92.7	1,199.5
CQ2 2020	111.2	129.9	141.5	95.6	1,236.4
CQ3 2020	118.0	131.3	148.2	98.7	1,247.6
CQ4 2020	131.6	136.3	154.1	98.2	1,290.4
Total Sales					
CQ1 2020	24.6	18.5	47.6	11.7	32.4
CQ2 2020	27.3	19.2	48.8	11.2	25.7
CQ3 2020	30.1	22.8	49.4	12.7	31.9
CQ4 2020	43.2	23.4	54.3	13.8	32.9
Total Debt					
CQ1 2020	37.5	37.2	34.6	31.2	239.1
CQ2 2020	40.4	40.7	32.4	32.9	242.3
CQ3 2020	41.2	40.1	33.7	34.0	235.9
CQ4 2020	42.7	39.8	33.1	32.1	240.7
Total SBC					
CQ1 2020	0.694	0.672	0.597	0.099	0.233
CQ2 2020	0.885	0.735	0.583	0.070	0.134
CQ3 2020	0.874	0.744	0.593	0.054	0.087
CQ4 2020	0.991	0.802	0.849	0.105	0.327
Total R&D					
CQ1 2020	2.432	2.068	1.377	0.430	0.363
CQ2 2020	2.662	2.373	1.418	0.752	0.348
CQ3 2020	2.800	2.254	1.532	0.496	0.558
CQ4 2020	4.071	2.408	1.538	0.798	1.207

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 7.2

in bn$

	Good	Above Average	Average	Below Average	Poor
	N=6	N=6	N=6	N=6	N=6
Total Share Buybacks					
CQ1 2020	3.384	1.652	2.195	1.335	2.963
CQ2 2020	3.110	1.360	1.246	0.393	0.881
CQ3 2020	3.089	1.627	1.633	1.084	1.515
CQ4 2020	4.800	1.749	1.970	1.131	1.560
Total Dividends per Share (in $)					
CQ1 2020	0.033	0.932	0.717	0.627	0.642
CQ2 2020	0.035	0.940	0.745	0.656	0.642
CQ3 2020	0.035	1.007	0.758	0.659	0.642
CQ4 2020	0.035	1.027	0.783	0.666	0.642
Total Cash					
CQ1 2020	15.8	16.5	12.0	12.6	109.5
CQ2 2020	14.6	10.7	13.3	11.9	136.3
CQ3 2020	15.0	10.1	13.1	13.2	134.5
CQ4 2020	17.4	11.6	13.5	11.0	157.1
Total Capex					
CQ1 2020	1.572	1.411	1.539	0.419	2.172
CQ2 2020	1.666	1.516	1.423	0.411	1.716
CQ3 2020	2.424	1.649	1.647	0.491	1.375
CQ4 2020	3.325	1.704	1.898	0.782	1.771
Market Capitalization					
CQ1 2020	424.6	356.2	298.0	260.3	232.8
CQ2 2020	610.2	465.6	356.7	291.4	246.2
CQ3 2020	770.6	504.2	378.0	317.4	250.1
CQ4 2020	872.1	532.9	421.8	336.9	289.5

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 7.3

in bn$

	Good	Above Average	Average	Below Average	Poor
	N=6	N=6	N=6	N=6	N=6
Total Net Income					
CQ1 2020	2.639	3.376	3.191	2.934	(6.111)
CQ2 2020	3.080	3.299	4.507	2.274	4.695
CQ3 2020	3.669	4.640	4.247	2.585	7.753
CQ4 2020	6.956	4.922	3.637	2.301	5.102

Source: Own calculations based on Capital IQ as of 24.06.2024

TABLE 8.1

Regression Table for the ChangeIndex Variable		
Independent Variable: ChangeIndex		
	Coefficient	
Dependent Variables	'19-20	'Q1-Q2
Change in Market Capitalization	-4.3602***	-0.355
	(1.511)	(0.25)
Change in Total Debt	-0.5208	-0.0872
	(0.442)	(0.14)
Change in SBC	-0.4669	-2.4726
	(0.34)	(2.034)
Change in R&D	-0.1467	0.0157
	(0.166)	(0.188)
Change in Share Repurchases	-2.0252	-0.0549
	(2.829)	(0.741)
Change in Dividends per Share	0.1387	-0.0312
	(0.127)	(0.044)
Change in Cash	0.6231	0.1976
	(0.897)	(0.406)
Change in Capital Expenditures	-1.1691**	-0.6224*
	(0.491)	(0.335)
Observations	30	30

Standard errors in parentheses

* p < 0.1, ** p < 0.05, *** p < 0.01

Source: Own calculations based on Capital IQ as of 24.06.2024 and own research

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