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**THE VALUE OF CORPORATE CASH HOLDINGS DURING THE COVID-19
PANDEMIC**

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THE VALUE OF CORPORATE CASH HOLDINGS DURING THE COVID-19 PANDEMIC

Abstract:

This paper investigates the value of corporate cash holdings during the recent COVID-19 pandemic. Based on a sample of 147,512 firm-quarter observations of 51 countries, I find that the value of cash holdings strongly increased at the start of the pandemic in 2021, but diminished again in the later part of the pandemic. Using country-level measures of the impact of the pandemic, I further document that the value of cash is higher for firms that are located in countries with higher infection rates of COVID-19. Finally, I find that the positive effect of COVID-19 on the value of cash holdings is stronger in weak corporate governance countries with high infection rates in the first year of the pandemic, which is consistent with the argument that the likelihood of cash abuse is reduced in countries with weak corporate governance where COVID-19 hits hard.

Keywords: COVID-19; Cash holdings; Firm value; Corporate governance

JEL codes: G01, G31, G32

1. Introduction

Holding cash benefits a company by reducing the transaction costs of external financing and supporting investment possibilities (Kim et al., 1998). Prior research has shown that financially constrained firms have higher valued cash holdings (Denis & Sibilkov, 2010; Faulkender & Wang, 2006; Pinkowitz, Stulz, & Williamson, 2006; Tong, 2011). However, cash holdings also enhance agency problems that lead to misuse of cash in the form of overinvestment (Jensen, 1986). This is because poorly governed entrenched directors may use the cash for their benefit (Dittmar & Mahrt-Smith, 2007; Lee & Lee, 2009; Denis & Sibilkov, 2010; Hsu & Liu, 2018).

The COVID-19 pandemic presents a unique opportunity to investigate the dynamics of corporate cash holdings during a crisis. This exogenous shock has had a profound negative impact on the revenues of numerous firms, disrupting their operational capabilities and impeding the production and sale of goods and services (Mazur et al., 2020; Albuquerque et al., 2020; Carletti et al., 2020; Fahlenbrach et al., 2020; Goodell, 2020). As the pandemic-induced recession unfolded unexpectedly and sharply, firms faced a severe scarcity of internally available funds (De Vito and Gómez, 2020; Halling et al., 2020). Consequently, a "dash for cash" ensued, with companies actively seeking to draw down credit lines, reduce dividend payments, and bolster their cash reserves (Acharya & Steffen, 2020; Krieger et al., 2021; Li et al., 2020).

Recent studies have shed further light on the role of cash holdings during the pandemic. For instance, Luo and Tian (2022) found that firms exhibit a preference for holding cash in times of high ambiguity aversion, such as the COVID-19 crisis, as a precautionary measure to avoid potential litigation or expensive external refinancing. Tawiah and Keefe (2022) examined the impact of cash holdings on corporate investments in the United States during the pandemic, revealing that higher levels of cash holdings mitigated the adverse effects of the crisis on firms'

investment activities. Similarly, Xu et al. (2022) observed a negative effect of the pandemic in China on corporate cash dividend policies. Zheng's (2022) study aligns closely with the notion of the precautionary motive for holding cash during the pandemic.

While there exists a substantial body of literature investigating the impact of the pandemic on cash holdings, it is worth noting that none of the previous studies have specifically examined the value of cash holdings during a pandemic while simultaneously evaluating the potential agency costs associated with these holdings. Moreover, prior studies have predominantly focused on specific countries or limited sample sizes. Thus, this study aims to address this research gap by examining the value of cash holdings in the context of a pandemic using a large dataset encompassing numerous countries. By considering both the precautionary motive and the agency motive, this research seeks to provide a comprehensive understanding of the factors influencing the value of corporate cash holdings during the COVID-19 crisis.

By analyzing a sample of 147,512 firm-quarter observations from 2015-quarter 1 to 2021-quarter 4 in 51 countries, I assess the changes in the value of cash holdings during the pandemic. I expect that the value of corporate cash holdings significantly increased at the beginning of the COVID-19 shock, as cash on the balance sheet serves as a protective measure against cash flow shortfalls caused by the pandemic. While there was a substantial decline in stock returns at the start of the COVID-19 pandemic (Didier et al., 2021; Ding et al., 2021), corporate cash holdings played a dampening role in mitigating the decline in stock returns (Ramelli & Wagner, 2020; Fahlenbrach et al., 2020; Ding et al., 2021).

Additionally, I investigate whether the effect of COVID-19 on cash value is stronger in countries severely affected by the pandemic, and the influence of corporate governance on the value of cash holdings during the COVID-19 crisis. Corporate governance, measured by the H. Index from the World Bank at the country level, serves as an indicator of the quality of governance mechanisms within firms. During a crisis, the incentives for controlling

shareholders to expropriate other shareholders may increase as the expected return on investment falls (Johnson et al., 2000). Since cash holdings are more valuable in the presence of better corporate governance (Dittmar & Mahrt-Smith, 2007; Pinkowitz, Stulz & Williamson, 2006), it is reasonable to expect that the value of cash increased more in countries with stronger corporate governance during the COVID-19 crisis. Alternatively, the value of cash may have increased more in weak corporate governance environments due to the higher risk of cash mispending before the crisis. Figure 1 provides a visualization of the conceptual model of this study.

*** Figure 1 about here ***

The results of this study indicate that the value of cash experienced a decrease in the first quarter of 2020, likely reflecting the initial shock and uncertainty caused by the COVID-19 pandemic. However, in the subsequent three quarters of 2020, the value of cash significantly increased. This increase suggests that firms recognized the importance of holding cash as a precautionary measure to navigate the uncertain and volatile business environment.

The value increase in cash holdings during the later part of 2020 is particularly noteworthy because it implies that companies recognized the need to have sufficient liquidity to manage potential disruptions and mitigate financial risks associated with the pandemic. This finding aligns with the precautionary motive of holding cash, which suggests that firms keep cash reserves as a safety net to handle unexpected events or downturns.

Interestingly, the study reveals that the value increase in cash holdings during 2020 was weaker for firms that were more positively exposed to the COVID-19 pandemic, as measured by the country's infection rate. This finding suggests that companies in countries heavily impacted by the pandemic may have faced greater financial challenges or uncertainties, which could have limited their ability to accumulate cash reserves. Therefore, the impact of the

pandemic on the value of cash holdings was not uniform across all firms, with those in more adversely affected regions experiencing a relatively smaller increase in cash value.

Moving on to the second year of the pandemic (2021), the study finds that the value of cash is decreasing once again. This decrease could be attributed to several factors, such as the gradual recovery of the economy, increased business activity, and a reduction in perceived risks and uncertainties compared to the early stages of the pandemic. As the situation stabilizes and firms regain confidence, they may feel more comfortable deploying their cash reserves for investments or other productive uses, thereby reducing their overall cash holdings.

Additionally, the study explores the impact of corporate governance on the value of cash holdings in the context of COVID-19 exposure. It reveals that COVID-19 exposure had a significant effect on increasing the value of cash in both weak and strong corporate governance countries. However, the effect was stronger in weak corporate governance countries that were severely affected by the pandemic. This finding implies that firms operating in countries with weaker corporate governance frameworks may have faced greater challenges in accessing external financing or managing their financial resources effectively during the pandemic. Consequently, these firms may have relied more heavily on their cash reserves to ensure their financial stability and survival, leading to a higher appreciation of the value of cash.

Overall, these findings shed light on the complex dynamics of cash holdings during the COVID-19 pandemic. They emphasize the precautionary motive of holding cash as firms recognized the importance of maintaining liquidity in the face of uncertainty. The results also highlight the influence of COVID-19 exposure and corporate governance on the value of cash, showcasing how the severity of the pandemic and the effectiveness of governance systems can impact firms' cash management strategies.

The findings of this study contribute to our understanding of the effects of the COVID-19 shock but also provide insights into the value of cash and financial flexibility during a crisis.

While there is existing literature on financing constraints during the Global Financial Crisis, the COVID-19 pandemic differs significantly from that crisis (Shehzad et al., 2020), making it crucial to study its unique impact on firm cash holdings. Furthermore, this research contributes to the literature on corporate cash holdings by examining their effects on firm performance and value. By addressing these research gaps, this study aims to provide valuable insights for policymakers, investors, and managers navigating crises and making informed decisions regarding financial management, risk mitigation, and corporate governance practices.

The remainder of the paper is organized as follows. Section 2 describes the hypotheses development. Section 3 discusses the research design and the results are presented in Section 4. Section 5 concludes the paper.

2. Hypotheses development

Corporate finance theory provides insights into the various motivations behind firms' cash holdings. In this study, I specifically examine two widely discussed motives: the precautionary motive and the agency motive. The precautionary motive refers to the need for firms to hold cash as a safeguard against unexpected events or future uncertainties, whereas the agency motive arises from the agency problems inherent in corporate governance structures. For the precautionary motive, Kim et al. (1998) showed that corporate cash holdings can be beneficial in case of dependence on external finance. But also in case of information asymmetries, it is reasonable to assume that the benefits of holding cash outweigh the uncertainties (Faulkender & Wang, 2006; Pinkowitz, Stulz & Williamson, 2006). Duchin (2010) showed that firms that hold more cash outperformed rivals during the Global Financial Crisis (GFC). However, it is not valid to compare the origin of the GFC with the COVID-19 pandemic. While the GFC was caused by a negative shock to the supply of credit, the COVID-19 pandemic strongly reduced the revenues of many firms. This revenue shock limited the ability of firms to cope with the demand (Albuquerque et al., 2020; Carletti et al., 2020;

Fahlenbrach et al., 2020; Goodell, 2020). Recent work on the COVID-19 pandemic (Acharya & Steffen, 2020; Krieger et al., 2021; Li et al., 2020) showed there was a “dash for cash”, whereby firms tried to draw down bank credit lines, cut their dividends, and raise their cash levels. Further evidence showed a major decrease in stock returns at the start of the COVID-19 pandemic (Didier et al., 2021; Ding et al., 2021), while the corporate cash holdings have dampened the decline in stock returns (Ramelli & Wagner, 2020; Fahlenbrach et al., 2020; Ding et al., 2021). This effect was stronger in industries that were more strongly affected by the shock. Thus I expect that the value of corporate cash holdings significantly increased during the COVID-19 shock since cash on the balance sheet protects firms against a cash flow shortfall such as the one created by the COVID-19 shock. Hence, I propose the following hypothesis.

H1: *The value of corporate cash holdings significantly increased at the start of the COVID-19 crisis.*

Furthermore, I also expect that this increased value of cash holdings is more pronounced in countries which are more severely affected by COVID-19. This leads to the second hypothesis:

H2: *The value of cash holdings at the beginning of the COVID-19 crisis is significantly higher in countries which are more severely affected by COVID-19.*

The next theoretical motive for holding cash is the agency conflict. Agency theory suggests that conflicts of interest can occur between managers and shareholders, with managers potentially seeking personal benefits at the expense of shareholder value. Cash holdings can be seen as a valuable resource that managers may exploit for their private gains, leading to a reduction in firm value (Myers & Rajan, 1998). For instance, Harford (1999) found that firms with higher cash holdings are more likely to overinvest into non-value added projects and that if investors expect that managers use this resource for their benefit, the market value decreases. Previous research has shown that corporate governance quality negatively affects self-interest

behavior and positively affects the value of corporate cash holding (Pinkowitz, Stulz & Williamson, 2006; Kalcheva & Lins, 2007). For this paper, it is important to consider the literature on this relationship during a crisis. Johnson et al. (2000) found that when the effectiveness of protection of minority shareholders is higher, the firm value decreased less during the East Asian Financial Crisis in 1997-1998. Mitton (2002), Lemmon & Lins, (2003) and Baek et al. (2004) confirmed these results at firm-level. This would suggest that during the COVID-19 crisis the cash value of companies with high quality corporate governance may have increased. Chang et al. (2017) document a value increase of cash during the 2008 financial crisis for financially constrained firms which was stronger when corporate governance was better.

Therefore, I propose the following hypothesis:

H3a: *Strong corporate governance increases the value of cash at the start of the COVID-19 crisis.*

At the same time, the value of cash may have increased during the COVID-19 crisis in environments with weaker corporate governance. This is because cash holdings reduce bankruptcy risk and in weak corporate governance environments, cash is more likely to be mispent. Thus, during the crisis, the usefulness of cash may have increased more in these environments. Therefore, I propose the following alternative hypothesis:

H3b: *Weak corporate governance increases the value of cash at the start of the COVID-19 crisis.*

3. Research design

3.1. Sample

The sample covers the period from the first quarter of 2015 to the fourth quarter of 2021, where the pandemic period is from 2020 to 2021. It includes listed firms in 51 countries for which I was able to collect information necessary to construct the variables from the Compustat

Database. I start with a total number of 10,798 firms. In line with previous work (e.g., Faulkender & Wang, 2006), I exclude financial firms (SIC code 6000-6999) and utilities (SIC codes 4900-4999) from the sample. Financial firms are excluded as they can be subject to specific rules and regulations. Utilities are also excluded from the sample because they can be subject to specific supervision, for instance, their level of cash holdings can be regulated by the government (Opler et. al, 1999). This reduces the sample to 6,643 firms, resulting in an unbalanced set of 147,512 firm-quarter observations. In table 1, I report the number of observations per quarter-year combination. While I have a diverse sample of countries, the United States is dominantly present. The number of observations per industry based on the Standard Industrial Classification (SIC) code (two digits level) is reported in Appendix Table A.1.

*** Table 1 about here ***

3.2. Empirical models

To test hypothesis 1, I estimate the following baseline model using OLS regression:

$$\begin{aligned}
 \text{Tobin's } Q = & \alpha + \beta_1 \text{Cash}_{it} * 2020 \text{ q1} + \beta_1 \text{Cash}_{it} * 2020 \text{ q2} + \beta_1 \text{Cash}_{it} * \\
 & 2020 \text{ q3} + \beta_1 \text{Cash}_{it} * 2020 \text{ q4} + \beta_1 \text{Cash}_{it} * 2021 \text{ q1} + \beta_1 \text{Cash}_{it} * 2021 \text{ q2} + \\
 & \beta_1 \text{Cash}_{it} * 2021 \text{ q3} + \beta_1 \text{Cash}_{it} * 2021 \text{ q4} + \beta_2 \text{Cash}_{it} + \beta_3 \text{CONTROLS}_{it} + \mu_i + \gamma_t + \\
 & \varepsilon_{it} \quad (1)
 \end{aligned}$$

Where 2020 q1 , 2020 q2 , 2020 q3 , 2020 q4 , 2021 q1 , 2021 q2 , 2021 q3 , and 2021 q4 are dummies equal to one for the individual quarters of the pandemic year 2020; CONTROLS_{it} represent my control variables (Intangibles, Leverage, Firm size, Cashflow, Dividend, Acquisitions, Capex, Profit); μ_i denotes firm effects; γ_t denotes the quarter fixed effects and ε_{it} represents the error term. The standard errors are clustered on cross-section(firm) level. Since the model includes firm fixed effects, all the effects I find should be interpreted as *within*

firm effects. The Hausman test is performed to define whether the sample is sufficient to be tested with a fixed- or random effect method, the result confirmed the choice for a fixed effects method.

Following previous work (e.g., Brush et al., 2000; Bates et al., 2009; O'Brien and Folta, 2009; Martinez-Sola, 2013; Kim and Bettis, 2014; Nason & Patel, 2016) I use *Tobin's Q* as the dependent variable. Using Compustat North America – Fundamentals Annual, *Tobin's Q* is calculated as: [Market value of equity - book value of equity + book value of assets] / Book value of assets at the end of each quarter. For the firms which are not part of Compustat North America, I use the Compustat Global – Fundamentals Annual to calculate *Tobin's Q* as: [Quarter end closing stock price * shares outstanding + book value total_assets – book_value equity] / Book value total assets at the end of each quarter.

Cash holdings are measured by *Ln.cash*, which is the logarithm value of the sum of cash and short-term investments scaled by total assets (e.g., Opler et al., 1999; Haushalter et al., 2007; Kim & Bettis, 2014).¹ In line with previous research (e.g., Opler et al., 1999) I use the following control variables: *Intangibles*, *Leverage*; *Firm size*; *Cashflow*; *Dividend (Div)*; *Acquisition (Acq)*; *Capital Expenditure (Capex)* and *Profit*. In Appendix Table A.2 all variables used in this study are defined. All variables are measured at the end of each quarter. To minimize the impact of outliers, I winsorize my dependent, independent and control variables at 0.5% at each tail. *Ln.cash* and *Firm size* are not winsorized since it is already expressed in logarithm form.

To investigate hypothesis 2 I use the following model:

$$Tobin's Q = \alpha + \beta_1 Cash_{it} * 2020 q1 * Infectionrate + \beta_1 Cash_{it} * 2020 q2 * Infectionrate + \beta_1 Cash_{it} * 2020 q3 * Infectionrate + \beta_1 Cash_{it} *$$

¹ Note that I don't use a measure of excessive cash as in previous literature (e.g., Fresard & Salve, 2010; Lee & Powell, 2011) because the pandemic creates a disequilibrium which makes an "optimal" cash level calculated with pre-pandemic data useless.

$$\begin{aligned}
& 2020 \text{ q4} * Infectionrate + \beta_1 Cash_{it} * 2021 \text{ q1} * Infectionrate + \beta_1 Cash_{it} * \\
& 2021 \text{ q2} * Infectionrate + \beta_1 Cash_{it} * 2021 \text{ q3} * Infectionrate + \beta_1 Cash_{it} * \\
& 2021 \text{ q4} * Infectionrate + \beta_2 Cash_{it} + \beta_3 CONTROLS_{it} + Infectionrate + \mu_i + \gamma_t + \\
& \varepsilon_{it} \quad (2)
\end{aligned}$$

The additional variable in this model compared with the base model is *Infectionrate*. The infection rate is calculated as the number of infections per quarter per country divided by the population in the country, based on the data from John Hopkins University & Medicine – Coronavirus resource center. I use two country-level measures based on the infection rate in the country where the firm is headquartered. I classify countries based on whether the infection rate in the country is above the median (mean) of the pandemic full year of 2020 and zero otherwise.

In order to test hypothesis 3a and 3b I reuse model 2, but split my sample based on the quality of governance per country. To measure the quality of corporate governance, I use the Corporate Governance, H. Index from the World Bank (<https://govdata360.worldbank.org>) of the year 2019. This measure at the country level consists of three parts: (1) Strength of auditing and accounting standards; (2) Conflict of interest regulation, and (3) Shareholder governance. I use the headquarters country of the firm as the location. I use the median for all observations, where I classify corporate governance quality below the median as weak corporate governance and corporate governance quality above the median as strong corporate governance.

Table 2 reports for each country the number of observations, whether the country has an infection rate above the median (mean) or not, and the strength of corporate governance.

*** Table 2 about here ***

4. Regression results

Figure 1 shows the evolution of cash holdings for the firms in the sample. Consistent with the “dash for cash” there is a sharp increase in cash holdings in 2020. The increase in cash holdings during the COVID-19 pandemic, as observed in Figure 1 in 2020 and supported by the “dash for cash” phenomenon observed by Acharya and Steffen (2020) and Li et al. (2020), aligns with the precautionary motive theory. Firms tend to hold larger cash reserves during periods of uncertainty and economic downturns to mitigate potential cash flow shortfalls and to provide a cushion against unforeseen events, such as the pandemic. This increase in cash holdings reflects the precautionary motive of firms to ensure financial stability and flexibility during times of crisis. In 2021, however, I observe a downward trend again of the cash levels.

*** Figure 2 about here ***

Table 3 reports the descriptive statistics of the firm-level variables used in this study. I split my sample into two panels, one panel is for 2015-2019 and the other panel shows the pandemic years 2020 and 2021. The mean (median) cash holding before the pandemic is 14.2% (8.8%) and 16.5% (11.5%) during the pandemic, reflecting the increase in cash holdings in the pandemic. Table 4 shows the correlation between the main variables of this paper. Overall, they indicate that multicollinearity is not a problem in this paper.

*** Table 3 about here ***

*** Table 4 about here ***

Results of my regressions of the baseline model are reported in Table 5. Model 1, where cash is measured by *Ln.cash*, shows a significant ($p < 0.01$) increase in the value of cash in q2, q3, and q4 of 2020. Remarkably, I find a significant *reduction* in the value of cash holdings in q1 2020. A possible explanation is that cash holdings at the start of the crisis reflect a lack of

investment opportunities and firms with fewer investment opportunities faced a stronger reduction in value at the start of the pandemic. $\ln.cash$ is positively and significantly ($p < 0.01$) related to Tobin's Q, but less than one-on-one. This is consistent with the cash literature which generally finds that large cash holdings are associated with a lower firm value (cf. Faulkender & Wang, 2006; Pinkowitz, Stulz & Williamson, 2006; Dittmar & Mahrt-Smith 2007). The positive but less-than-one-to-one relationship between cash holdings and Tobin's Q suggests that large cash holdings can potentially create agency costs. These costs arise when managers with discretion over cash use it for their own interests rather than maximizing shareholder value. The findings indicate that excessive cash holdings may not be fully valued by shareholders, which implies agency costs associated with misallocation or suboptimal use of cash resources. In the second year of the pandemic, 2021, there is a decrease again in the value of cash suggesting that the value of cash is decreasing over time during the pandemic. These results are fully confirmed in model 2 of Table 5 when I use the non-logarithm value of cash holdings. Considering that half of my sample consists of US firms, it is important to consider this effect. I do this in two ways: first, I use in model 3 a weighted least square approach. This is in line with previous studies (e.g. Fernandes & Gonenc, 2016; Pinkowitz et al., 2016 and Dittmar et al., 2003). For the weight, I use the inverse of the square root of the total number of firm-quarter observations for each country. The results of model 3 confirm the prior found results. In model 4, I exclude all firm observations not headquartered in the US. The results continue to hold in this subsample. Although I find in the first quarter of 2020 a negative value effect on cash holdings, all other quarters in 2020 show a significant positive coefficient ($p < 0.05$ or $p < 0.01$). These findings partly support hypothesis H1, which states that the value of corporate cash holdings significantly increased at the start of the COVID-19 crisis.

Acharya and Steffen (2020) show that firms took bank credit lines and used capital markets to raise cash during the COVID-19 pandemic. This raises the question to what extent

the results are driven by the cash held by firms at the start of the pandemic, or rather by the ability to raise cash during the pandemic. In model 5 of Table 5, I measure cash by cash holdings at the end of 2019 (i.e. at the start of the pandemic), which provides very similar results as in model 1. This suggests that the increasing value of cash during the pandemic is not purely driven by a greater ability to raise cash during the crisis. These results lose statistical significance in the second pandemic year and show even negative coefficients in the last two quarters of 2021.

*** Table 5 about here ***

Next, I investigate whether the value effect of cash during the pandemic depends on the exposure of firms to the COVID-19 pandemic. First, I estimate separate regressions depending on whether the infection rate in the country where the firm is located is above or below the median infection rate. In Table 6, I mainly find that the value increase of cash tends to be higher for firms located in a country where the infection rate is above the median (model 7), than when it is located in a country with an infection rate below the median (model 8). However, when I include the interaction between a dummy equal to one if the infection rate is above the median, cash and the pandemic quarter effects in model 9, which is estimated for the full sample, I find only for the first year of the pandemic period a statistically significant difference between above and below median infection rate. When I distinguish countries based on the *mean* infection rate (which is higher than the median infection rate) in models 10 and 11, I again find a stronger increase in the value of cash during the first year of the pandemic in countries with a higher infection rate. Similarly, I find that the increase in the value effect of cash during 2020 is significantly higher when the COVID-19 infection rate in the country where the firm is located is above the mean, as measured by *DummyINF2* (model 11). These results suggest that the diminishing effect of the value of cash holdings is strongly affected by exposure to COVID-19. These results are also economically significant, for example, moving from zero COVID-19

exposure to the mean CovidEXP (*DummyINF2*) of 0.1677 in model 11 reduces the increase in the value of contemporaneous cash on firm value from -0.361 the pre-pandemic period to 0.129 in the third quarter of 2020, i.e. a reduction of 36% ($= 0.1677 * (0.767) / -0.361$). All results are confirmed when I measure cash at the start of the pandemic (quarter 4 of 2019), which is shown in Appendix Table A.2. These results provide evidence that there was a substantial and statistically significant rise in corporate cash holdings during the initial period of the COVID-19 crisis in countries more exposed to the pandemic, consistent with the second hypothesis of this study.

*** Table 6 about here ***

Next, I examine whether the effect of COVID-19 on the value of cash holdings is moderated by the quality of corporate governance. As explained, the COVID-19 crisis may have increased the value of cash more in an environment where the quality of corporate governance is better because there is less risk of expropriation in a strong corporate governance environment. On the other hand, the value of cash may have increased more during the COVID-19 crisis when corporate governance is *weaker* because the pandemic has decreased the likelihood that cash will be misspent more when corporate governance is weak. When I distinguish countries based on the median of the corporate governance measure, in models 12 and 13, I find for strong corporate governance countries a more positive increase in the value of cash from quarter 2 of 2020 until the first quarter of 2021 compared with weak corporate governance countries. However, during the rest of the pandemic period, the findings are reversed.

However, these results do not take into account the exposure of countries to COVID-19. In models 14 and 15, I add the COVID-19 exposure measure, *DummyINF*, as an interaction term in the models. I find that the 2020 value increase of cash occurred in both strong (model 14) and weak (model 15) corporate governance countries, suggesting that the COVID-19 effect

on cash is not driven by differences in corporate governance between countries. More importantly, the positive effect of COVID-19 is stronger in weak corporate governance countries, which is consistent with the argument that the likelihood of cash abuse is reduced in countries with weak corporate governance where COVID-19 hits hard. This finding implies that weak corporate governance, which typically allows for less effective monitoring and control, may mitigate the agency costs associated with cash holdings during a crisis like the COVID-19 pandemic. However, in the second pandemic year (2021), I no longer find significant results for the weak corporate governance countries. These results are confirmed when I use the alternative cash variable, *Ln.cash 2019Q4* (see appendix). This implies that I can accept hypothesis 3b, which states that weak corporate governance increases the value of cash at the start of the COVID-19 crisis. Conversely, the findings also lead to the rejection of hypothesis H3a, which suggests that strong corporate governance increases the value of cash at the onset of the crisis.

*** Table 7 about here ***

It is important to acknowledge the limitations of this study. One limitation is the use of a country-level corporate governance measure, which does not account for variations at the individual firm level. Additionally, the study does not take into account the potential beneficial impact or variations in aid packages for firms across different countries during the pandemic period. Furthermore, the study relies on country-level measures of COVID-19 impact, rather than firm-level data. It is recommended that future research addresses these limitations.

5. Conclusion

In this paper, I analyze the effect of the COVID-19 pandemic on the value of corporate cash holdings. I do this for a sample of 6,643 listed firms located in 51 countries. The pre-pandemic period is 2015-2019, while the pandemic period is defined as 2020-2021. Generally,

I find that the value of cash holdings significantly increased at the start of the pandemic, except in the first quarter when it surprisingly decreased. A possible explanation for this decrease is that cash holdings at the start of the crisis reflected a lack of investment opportunities. As the pandemic progresses, the value of cash decreases again in 2021, implying that shareholders value cash less the further the COVID-19 pandemic continued. This is in line with my expectations that the cash value would be valued higher when the ‘dash for cash’ was at its highest level. I also find that the value of cash of firms that are located in countries with higher infection rates of COVID-19 is higher, suggesting that the value of the cushion of cash on the balance sheet of the firms protected them against a cash flow shortfall such as the one created by the COVID-19 shock. This result is robust when using different measures of exposure to COVID-19. However, also for these more severely hit countries, the value of cash is diminishing after the end of 2020. Finally, I find that the positive effect of COVID-19 is stronger in weak corporate governance countries with high infection rates in the first year of the pandemic, which is consistent with the argument that the likelihood of cash abuse is reduced in countries with weak corporate governance where COVID-19 hits hard. Further, this suggests that the value of cash at the start of the pandemic for firms may have reduced the risk of bankruptcy and that the pandemic has decreased the possibility of cash being misused. All of these results are confirmed when I use an alternative cash variable as a robustness test and control for time and firm fixed effects and different weights.

Managers and decision-makers should recognize the importance of strategic cash management during crisis periods. The increase in cash holdings at the start of the pandemic suggests that firms prioritized building a financial cushion. However, the subsequent decrease in cash value indicates that cash has diminishing returns over time. This implies that companies should carefully balance the need for cash reserves with investment opportunities and long-term growth prospects. The finding that firms located in countries with higher COVID-19

infection rates had higher cash values suggests that maintaining a cash buffer can protect against cash flow shortfalls caused by unexpected shocks. Policymakers, investors, and managers should consider the importance of building resilience and implementing risk mitigation strategies that include sufficient cash reserves to withstand future crises or disruptions.

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Figures and Tables

Figure 1

Visualization of the research framework

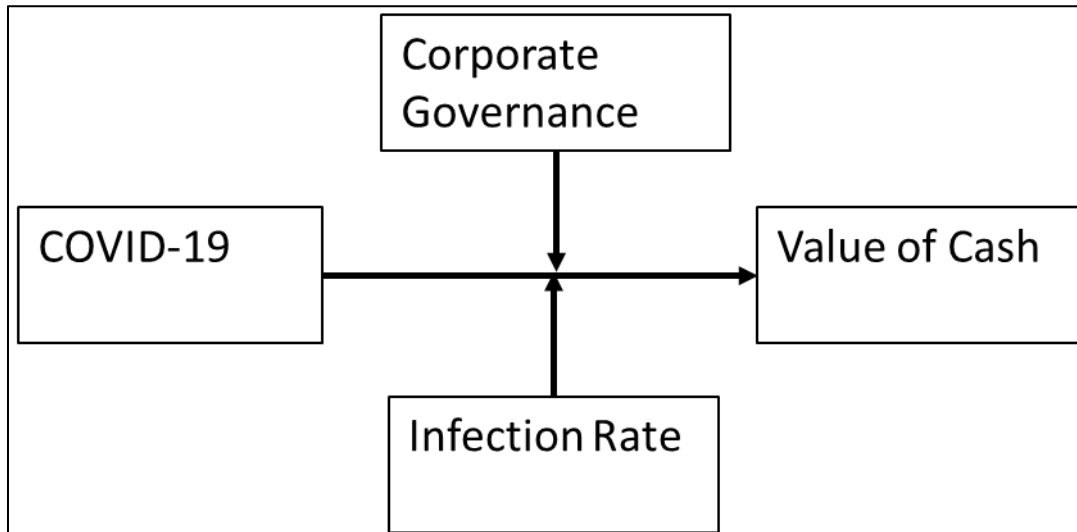


Figure 2

Median of Cash plus quartiles (0.75 & 0.25 quartiles)

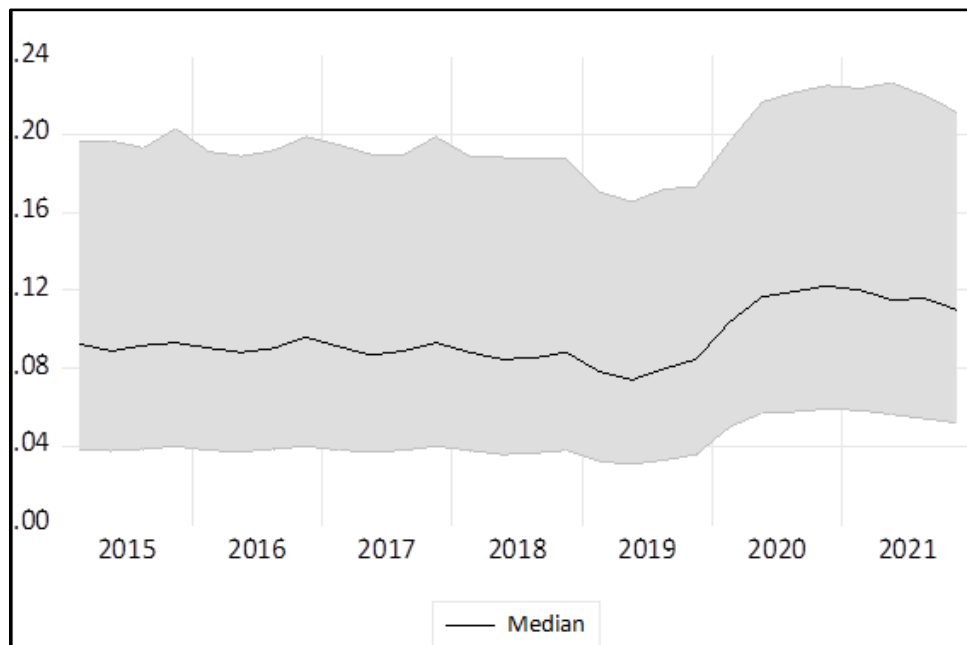


Table 1.

Number of observations per year/quarter

Year/quarter	No. of obs.
2015Q1	5,895
2015Q2	5,592
2015Q3	5,761
2015Q4	5,695
2016Q1	5,761
2016Q2	5,453
2016Q3	5,636
2016Q4	5,584
2017Q1	5,673
2017Q2	5,368
2017Q3	5,565
2017Q4	5,453
2018Q1	5,588
2018Q2	5,279
2018Q3	5,477
2018Q4	5,262
2019Q1	5,421
2019Q2	5,116
2019Q3	5,340
2019Q4	5,006
2020Q1	5,224
2020Q2	4,887
2020Q3	5,099
2020Q4	4,568
2021Q1	4,650
2021Q2	4,365
2021Q3	4,539
2021Q4	4,255
TOTAL	147,512

Table 2

Number of observations per country

ISO code	Country name	No. of obs.	% of total observations	Infection rate > median	Infection rate > mean	Corp Gov Strength
USA	United States	73,949	50.1%	1	1	Medium
CAN	Canada	11,047	7.5%	0	0	Strong
GBR	United Kingdom	8,405	5.7%	0	1	Strong
AUS	Australia	6,648	4.5%	0	0	Weak
SWE	Sweden	3,808	2.6%	0	0	Strong
DEU	Germany	3,724	2.5%	0	0	Weak
JPN	Japan	3,392	2.3%	0	0	Weak
IND	India	3,196	2.2%	0	0	Strong
FRA	France	3,083	2.1%	1	1	Weak
BRA	Brazil	2,737	1.9%	1	0	Weak
CHE	Switzerland	2,096	1.4%	1	1	Weak
NOR	Norway	1,910	1.3%	0	0	Strong
ISR	Israel	1,833	1.2%	1	1	Strong
NLD	Netherlands	1,822	1.2%	1	1	Weak
ZAF	South Africa	1,770	1.2%	0	0	Strong
HKG	Hong Kong	1,499	1.0%	0	0	Weak
MEX	Mexico	1,628	1.1%	0	0	Weak
IRL	Ireland	1,350	0.9%	0	1	Strong
ITA	Italy	1,250	0.8%	0	0	Weak
DNK	Denmark	1,236	0.8%	1	1	Strong
FIN	Finland	1,214	0.8%	0	0	Weak
ESP	Spain	1,065	0.7%	1	1	Strong
NZL	New Zealand	993	0.7%	0	0	Strong
KOR	Korea, Republic of	745	0.5%	0	0	Strong
BEL	Belgium	736	0.5%	1	1	Weak
SGP	Singapore	647	0.4%	0	0	Strong
AUT	Austria	606	0.4%	1	1	Strong
THA	Thailand	559	0.4%	0	0	Strong
TUR	Turkey	518	0.4%	1	0	Weak
LUX	Luxembourg	489	0.3%	1	1	Weak
CHL	Chile	451	0.3%	0	0	Weak
MYS	Malaysia	380	0.3%	0	0	Strong
IDN	Indonesia	332	0.2%	0	0	Weak
PHL	Philippines	306	0.2%	0	0	Weak
GRC	Greece	257	0.2%	1	0	Weak
CHN	China - Mainland	232	0.2%	0	0	Weak
PER	Peru	220	0.1%	0	0	Weak
PRT	Portugal	220	0.1%	0	0	Weak
COL	Colombia	193	0.1%	1	0	Strong
TWN	China - Taiwan	196	0.1%	0	0	Strong
RUS	Russia Federation	143	0.1%	0	0	Weak
ARG	Argentina	132	0.1%	1	0	Weak
EGY	Egypt	124	0.1%	0	0	Weak
PAN	Panama	107	0.1%	1	0	Weak

NGA	Nigeria	83	0.1%	0	0	Weak
PAK	Pakistan	56	0.0%	0	0	Weak
CYP	Cyprus	40	0.0%	1	1	Weak
BHS	Bahamas	29	0.0%	0	0	Weak
HUN	Hungary	28	0.0%	0	1	Weak
KEN	Kenia	27	0.0%	0	0	Strong
UKR	Ukraine	1	0.0%	0	0	Weak
TOTAL		147,512	100.0%	17	14	

Table 3.
Descriptive statistics

	TobinsQ _{it}	Cash _{it}	Ln.cash _{it}	Intangibles _{it}	Leverage _{it}	Firm size _{it}	Cashflow _{it}	Div _{it}	Acq _{it}	Capex _{it}	Profit _{it}
2015-2019											
Mean	2.145	0.142	-1.103	0.210	0.260	3.158	-0.020	0.325	0.013	0.026	-0.010
Median	1.574	0.088	-1.057	0.137	0.240	3.148	0.023	0.000	0.000	0.014	0.008
Maximum	6.669	0.562	-0.250	0.660	0.708	8.554	0.235	1.000	0.263	0.178	0.110
Minimum	0.722	0.007	-2.165	0.000	0.000	-3.000	-1.072	0.000	-0.001	0.000	-0.439
Std. Dev.	1.533	0.149	0.517	0.213	0.206	1.137	0.184	0.469	0.042	0.033	0.077
N	109,925	109,925	109,925	109,925	109,925	109,925	109,925	109,925	109,925	109,925	109,925
2020-2021											
Mean	1.964	0.165	-0.990	0.202	0.299	3.342	-0.015	0.336	0.010	0.019	-0.006
Median	1.335	0.115	-0.939	0.131	0.283	3.318	0.020	0.000	0.000	0.011	0.007
Maximum	6.669	0.567	-0.246	0.661	0.713	8.630	0.235	1.000	0.263	0.178	0.110
Minimum	0.602	0.007	-2.165	0.000	0.000	-3.000	-1.072	0.000	-0.001	0.000	-0.439
Std. Dev.	1.618	0.153	0.472	0.206	0.202	1.137	0.162	0.472	0.036	0.026	0.067
N	37,587	37,587	37,587	37,587	37,587	37,587	37,587	37,587	37,587	37,587	37,587

Notes: I refer to the appendix for a full description of the variables used in this table.

Table 4.
Pearson correlation coefficients.

	TobinsQ _{it}	Cash _{it}	Ln.cash _{it}	Intangibles _{it}	Leverage _{it}	Firm size _{it}	Cashflow _{it}	Div _{it}	Acq _{it}	Capex _{it}	Profit _{it}
TobinsQ _{it}	1.000										
Cash _{it}	0.364***	1.000									
Ln.cash _{it}	0.320***	0.849***	1.000								
Intangibles _{it}	-0.065***	-0.285***	-0.225***	1.000							
Leverage _{it}	-0.115***	-0.324***	-0.336***	0.148***	1.000						
Firm size _{it}	-0.254***	-0.356***	-0.234***	0.088***	0.167***	1.000					
Cashflow _{it}	-0.179***	-0.340***	-0.218***	0.135***	-0.040***	0.421***	1.000				
Div _{it}	-0.078***	-0.219***	-0.182***	0.092***	0.024***	0.286***	0.268***	1.000			
Acq _{it}	0.007**	-0.095***	-0.081***	0.265***	0.053***	0.002	0.065***	0.059***	1.000		
Capex _{it}	-0.038***	-0.141***	-0.139***	-0.231***	0.056***	0.093***	0.067***	0.071***	-0.029***	1.000	
Profit _{it}	-0.164***	-0.318***	-0.196***	0.135***	-0.035***	0.412***	0.809***	0.244***	0.058***	0.054***	1.000

Notes: : I refer to the appendix for a full description of the variables used in this table. ***, ** and * denote significance at 1, 5 and 10 % levels, respectively.

Table 5.
Cash holdings and Tobin's Q during the COVID-19 pandemic

Model:	(1)	(2)	(3)	(4)	(5)
Sample:	All	All	All	Non-US	All
Cash measure:	Ln.cash _{it}	Cash _{it}	Ln.cash _{it}	Ln.cash _{it}	Ln.cash _{i,2019q4}
Cash * 2020 q1	-0.161*** (0.027)	-0.624*** (0.120)	-0.142*** (0.024)	-0.147*** (0.041)	-0.063** (0.027)
Cash * 2020 q2	0.149*** (0.031)	0.493*** (0.129)	0.142*** (0.027)	0.108** (0.046)	0.201*** (0.029)
Cash * 2020 q3	0.146*** (0.031)	0.393*** (0.126)	0.148*** (0.028)	0.140*** (0.045)	0.183*** (0.03)
Cash * 2020 q4	0.239*** (0.034)	0.694*** (0.140)	0.243*** (0.031)	0.178*** (0.052)	0.278*** (0.032)
Cash * 2021 q1	-0.062 (0.048)	-0.027 (0.180)	-0.06 (0.047)	-0.596*** (0.082)	-0.016 (0.047)
Cash * 2021 q2	-0.016 (0.049)	0.014 (0.182)	-0.032 (0.048)	-0.453*** (0.089)	-0.056 (0.047)
Cash * 2021 q3	-0.161*** (0.048)	-0.445** (0.181)	-0.144** (0.047)	-0.583*** (0.082)	-0.098** (0.047)
Cash * 2021 q4	-0.325*** (0.048)	-1.105*** (0.181)	-0.303*** (0.047)	-0.541*** (0.088)	-0.227*** (0.047)
Cash _{it}	0.255*** (0.022)	0.900*** (0.102)	0.211*** (0.019)	0.277*** (0.033)	-0.720*** (0.238)
Intangibles _{it}	-0.749*** (0.107)	-0.666*** (0.111)	-0.692*** (0.096)	-0.535*** (0.171)	-0.931*** (0.108)
Firm size _{it}	-0.594*** (0.057)	-0.600*** (0.056)	-0.502*** (0.052)	-0.722*** (0.085)	-0.600*** (0.06)
Leverage _{it}	-0.146* (0.079)	-0.140* (0.079)	-0.241*** (0.073)	-0.408*** (0.123)	-0.218*** (0.081)
Cashflow _{it}	0.009 (0.054)	0.013 (0.054)	0.209*** (0.051)	0.014 (0.106)	-0.054 (0.054)
Div _{it}	-0.052*** (0.012)	-0.054*** (0.012)	-0.042*** (0.012)	-0.024* (0.013)	-0.041*** (0.013)
Acq _{it}	0.556*** (0.099)	0.546*** (0.099)	0.477*** (0.091)	0.447*** (0.169)	0.525*** (0.100)
Capex _{it}	1.535*** (0.189)	1.582*** (0.189)	1.398*** (0.167)	1.385*** (0.233)	1.388*** (0.203)
Profit _{it}	-0.155 (0.118)	-0.146 (0.119)	0.42*** (0.106)	0.738*** (0.264)	-0.202* (0.118)
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	147,512	147,512	147,512	73,653	147,512
R-squared	0.74	0.74	0.76	0.74	0.74

*Notes: This table shows regression results. The dependent variable in all regressions is Tobin's Q. All variables are defined as before. Robust standard errors allowing for cross-sectional clustering in brackets. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.*

Table 6.

The effect of COVID-19 exposure on the relation between cash holdings and Tobin's Q

Model:	(6)	(7)	(8)	(9)	(10)	(11)
Sample:	Infection rate > median	Infection rate < median	All	Infection rate > mean	Infection rate < mean	All
COVID-19 exposure measure:			Infection rate > median			Infection rate > mean
Cash measure:	Ln.cash _{it}	Ln.cash _{it}	Ln.cash _{it}	Ln.cash _{it}	Ln.cash _{it}	Ln.cash _{it}
Cash * 2020 q1 * COVID-19 exp			0.763*** (0.057)			0.723*** (0.059)
Cash * 2020 q2 * COVID-19 exp			0.753*** (0.06)			0.709*** (0.061)
Cash * 2020 q3 * COVID-19 exp			0.804*** (0.06)			0.767*** (0.062)
Cash * 2020 q4 * COVID-19 exp			0.718*** (0.06)			0.680*** (0.062)
Cash * 2021 q1 * COVID-19 exp			-0.095 (0.063)			-0.084 (0.065)
Cash * 2021 q2 * COVID-19 exp			-0.032 (0.063)			-0.031 (0.065)
Cash * 2021 q3 * COVID-19 exp			-0.021 (0.062)			-0.022 (0.064)
Cash * 2021 q4 * COVID-19 exp			0.040 (0.063)			0.032 (0.065)
Cash * 2020 q1	-0.146*** (0.034)	-0.189*** (0.046)	-0.641*** (0.046)	-0.155*** (0.034)	-0.161*** (0.047)	-0.631*** (0.048)
Cash * 2020 q2	0.177*** (0.038)	0.104* (0.054)	-0.356*** (0.049)	0.172*** (0.038)	0.121** (0.055)	-0.340*** (0.05)
Cash * 2020 q3	0.147*** (0.038)	0.142*** (0.051)	-0.370*** (0.048)	0.146*** (0.037)	0.156*** (0.053)	-0.361*** (0.05)
Cash * 2020 q4	0.266***	0.172***	-0.262***	0.261***	0.194***	-0.244***

	(0.041)	(0.061)	(0.051)	(0.04)	(0.063)	(0.053)
Cash * 2021 q1	0.190***	-0.846***	-0.036	0.181***	-0.861***	-0.021
	(0.047)	(0.089)	(0.064)	(0.047)	(0.094)	(0.067)
Cash * 2021 q2	0.194***	-0.743***	-0.020	0.173***	-0.759***	-0.007
	(0.047)	(0.102)	(0.067)	(0.048)	(0.104)	(0.068)
Cash * 2021 q3	0.085*	-0.871***	-0.176***	0.064	-0.863***	-0.162**
	(0.047)	(0.091)	(0.065)	(0.048)	(0.091)	(0.066)
Cash * 2021 q4	-0.162***	-0.825***	-0.360***	-0.187***	-0.789***	-0.345***
	(0.049)	(0.1)	(0.067)	(0.048)	(0.104)	(0.068)
COVID-19 exp	0.024	0.099**	1.002***	0.110	0.415**	0.907***
	(0.075)	(0.041)	(0.074)	(0.167)	(0.121)	(0.076)
Cash _{it}	0.219***	0.297***	0.251***	0.217***	0.290***	0.246***
	(0.026)	(0.037)	(0.021)	(0.02)	(0.04)	(0.021)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	90,900	56,612	147,512	96,738	50,774	147,512
R-squared	0.76	0.74	0.75	0.76	0.74	0.75

*Notes: This table shows regression results. The dependent variable in all regressions is Tobin's Q. All regressions include control variables as defined as before. Robust standard errors allowing for cross-sectional clustering in brackets *p < 0.10; **p < 0.05; ***p < 0.01.*

Table 7.

The effect of corporate governance quality on the effect of COVID-19 exposure on the relation between cash holdings and Tobin's Q

Model:	(12)	(13)	(14)	(15)
Sample:	Strong Corporate Governance	Weak Corporate Governance	Strong Corporate Governance	Weak Corporate Governance
COVID-19 exposure measured by:			DummyINF _{it}	DummyINF _{it}
Cash measured by:	Ln.cash _{it}	Ln.cash _{it}	Ln.cash _{it}	Ln.cash _{it}
Cash * 2020 q1 * COVID-19 Exp			0.319*** (0.107)	0.976*** (0.35)
Cash * 2020 q2 * COVID-19 Exp			0.326*** (0.109)	0.934*** (0.352)
Cash * 2020 q3 * COVID-19 Exp			0.406*** (0.112)	0.989*** (0.35)
Cash * 2020 q4 * COVID-19 Exp			0.359*** (0.111)	0.910** (0.364)
Cash * 2021 q1 * COVID-19 Exp			0.365*** (0.117)	0.264 (0.438)
Cash * 2021 q2 * COVID-19 Exp			0.287** (0.114)	0.456 (0.445)
Cash * 2021 q3 * COVID-19 Exp			0.372*** (0.116)	0.351 (0.458)
Cash * 2021 q4 * COVID-19 Exp			0.257** (0.115)	0.573 (0.428)
Cash * 2020 q1	-0.138*** (0.05)	-0.205*** (0.072)	-0.222*** (0.057)	-0.273*** (0.082)
Cash * 2020 q2	0.128** (0.053)	-0.062 (0.089)	0.039 (0.061)	-0.174* (0.102)
Cash * 2020 q3	0.158*** (0.054)	0.047 (0.086)	0.055 (0.062)	-0.042 (0.094)
Cash * 2020 q4	0.198*** (0.059)	0.042 (0.114)	0.101 (0.067)	-0.074 (0.122)
Cash * 2021 q1	-0.600*** (0.097)	-0.661*** (0.153)	-0.726*** (0.102)	-0.738*** (0.145)
Cash * 2021 q2	-0.527*** (0.099)	-0.330* (0.197)	-0.632*** (0.1)	-0.451** (0.177)
Cash * 2021 q3	-0.617*** (0.094)	-0.588*** (0.158)	-0.740*** (0.095)	-0.672*** (0.149)
Cash * 2021 q4	-0.611*** (0.096)	-0.427** (0.198)	-0.706*** (0.098)	-0.564*** (0.174)
COVID-19 exposure	0.092** (0.044)	0.353*** (0.119)	0.378*** (0.13)	0.959*** (0.357)
Cash _{it}	0.290*** (0.038)	0.204*** (0.06)	0.289*** (0.033)	0.207*** (0.06)
Control variables	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes

Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	52,092	15,654	52,092	15,654
R-squared	0.74	0.74	0.74	0.74

*Notes: This table shows regression results. The dependent variable in all regressions is Tobin's Q. All regressions include control variables as defined as before. To measure the quality of corporate governance, I use the GCI 4.0: 1.G Corporate Governance, H. Index. Where I classify corporate governance quality below the mean as weak corporate governance and corporate governance quality above the mean as strong corporate governance. Robust standard errors allowing for cross-sectional clustering in brackets *p < 0.10; **p < 0.05; ***p < 0.01.*

Appendix The Value of Corporate Cash Holdings during the COVID-19 Pandemic

Table A.1

Number of observations for each industry - two digits SIC code

SIC	SIC description	No. of observations
73	Business Services	19,804
28	Chemicals and Allied Products	19,769
36	Electronic & Other Electrical Equipment & Components	9,408
38	Measuring, Photographic, Medical, & Optical Goods, & Clocks	8,213
35	Industrial and Commercial Machinery and Computer Equipment	7,366
48	Communications	6,548
13	Oil and Gas Extraction	6,539
20	Food and Kindred Products	5,305
37	Transportation Equipment	4,579
10	Metal Mining	4,382
50	Wholesale Trade - Durable Goods	3,005
87	Engineering, Accounting, Research, and Management Services	2,924
80	Health Services	2,883
59	Miscellaneous Retail	2,865
51	Wholesale Trade - Nondurable Goods	2,202
33	Primary Metal Industries	2,184
58	Eating and Drinking Places	2,085
45	Transportation by Air	1,985
34	Fabricated Metal Products	1,886
79	Amusement and Recreation Services	1,789
32	Stone, Clay, Glass, and Concrete Products	1,751
53	General Merchandise Stores	1,625
29	Petroleum Refining and Related Industries	1,558
26	Paper and Allied Products	1,546
15	Construction - General Contractors & Operative Builders	1,493
27	Printing, Publishing and Allied Industries	1,489
56	Apparel and Accessory Stores	1,341
30	Rubber and Miscellaneous Plastic Products	1,290
16	Heavy Construction, Except Building Construction, Contractor	1,269
47	Transportation Services	1,208
44	Water Transportation	1,183
23	Apparel, Finished Products from Fabrics & Similar Materials	1,114
55	Automotive Dealers and Gasoline Service Stations	1,081
54	Food Stores	977
39	Miscellaneous Manufacturing Industries	953
99	Nonclassifiable Establishments	940
42	Motor Freight Transportation	927
24	Lumber and Wood Products, Except Furniture	881
70	Hotels, Rooming Houses, Camps, and Other Lodging Places	845
82	Educational Services	820
57	Home Furniture, Furnishings and Equipment Stores	785

25	Furniture and Fixtures	670
78	Motion Pictures	599
12	Coal Mining	584
14	Mining and Quarrying of Nonmetallic Minerals, Except Fuels	542
46	Pipelines, Except Natural Gas	499
31	Leather and Leather Products	429
22	Textile Mill Products	414
75	Automotive Repair, Services and Parking	400
52	Building Materials, Hardware, Garden Supplies & Mobile Homes	379
17	Construction - Special Trade Contractors	369
40	Railroad Transportation	353
72	Personal Services	321
21	Tobacco Products	239
41	Local & Suburban Transit & Interurban Highway Transportation	232
1	Agricultural Production - Crops	205
83	Social Services	138
7	Agricultural Services	126
81	Legal Services	106
9	Fishing, Hunting and Trapping	68
89	Services, Not Elsewhere Classified	42
TOTAL		147,512

Table A.2

Definition of variables:

Variable	Variable definition	Source
Cash _{it}	Cash and short-term and investments scaled by total assets	Compustat
LnCash _{it}	Logarithm value of Cash	Compustat
LnCash _{i,2019q4}	logarithm value of Cash at the end of 2019 quarter 4.	Compustat
Intangibles _{it}	Intangible assets scaled by total assets	Compustat
Tobin's Q _{it}	(Market value of equity - book value of equity + book value of total assets) scaled by total assets (book value) at the end of each quarter.	Compustat
Firm size _{it}	Logarithm value of the total assets	Compustat
Cashflow _{it}	Earnings after interest, dividends, and taxes but before depreciation scaled by total assets	Compustat
Acq _{it}	Acquisition costs scaled by total assets	Compustat
Div _{it}	Dummy variable that takes the value of 1 if a firm pays a dividend and zero otherwise	Compustat
Capex _{it}	Capital expenditure scaled by total assets	Compustat
Profit _{it}	Net income scaled by total assets	Compustat
Leverage _{it}	Total debt scaled by total assets	Compustat
Corporate Governance	GCI 4.0: 1.G Corporate Governance, H. Index	World Bank
Infectionrate	Number of infections per quarter per country divided by the population in the country	John Hopkins University & Medicine – Coronavirus resource center

Table A.3.

The effect of COVID-19 exposure on the relation between cash holdings and Tobin's Q with cash holdings measured at the end of 2019.

Model:	(A.1)	(A.2)	(A.3)	(A.4)	(A.5)	(A.6)
Sample:	Infection rate > median	Infection rate < median	All	Infection rate > mean	Infection rate < mean	All
COVID-19 exposure measure:			Infection rate > median			Infection rate > mean
Cash measure:	Ln.cash _{i,2019q4}	Ln.cash _{i,2019q4}	Ln.cash _{i,2019q4}	Ln.cash _{i,2019q4}	Ln.cash _{i,2019q4}	Ln.cash _{i,2019q4}
Cash * 2020 q1 * COVID-19 exp			0.714*** (0.064)			0.675*** (0.064)
Cash * 2020 q2 * COVID-19 exp			0.672*** (0.064)			0.630*** (0.064)
Cash * 2020 q3 * COVID-19 exp			0.706*** (0.064)			0.668*** (0.064)
Cash * 2020 q4 * COVID-19 exp			0.631*** (0.064)			0.589*** (0.064)
Cash * 2021 q1 * COVID-19 exp			-0.075 (0.066)			-0.067 (0.067)
Cash * 2021 q2 * COVID-19 exp			-0.052 (0.066)			-0.058 (0.067)
Cash * 2021 q3 * COVID-19 exp			-0.017 (0.066)			-0.015 (0.067)
Cash * 2021 q4 * COVID-19 exp			0.030 (0.066)			0.019 (0.067)
Cash * 2020 q1	-0.043 (0.032)	-0.129** (0.05)	-0.558*** (0.052)	-0.062* (0.032)	-0.085* (0.051)	-0.551*** (0.052)
Cash * 2020 q2	0.242*** (0.036)	0.107** (0.05)	-0.254*** (0.05)	0.235*** (0.036)	0.114** (0.051)	-0.244*** (0.051)
Cash * 2020 q3	0.199*** (0.036)	0.153*** (0.055)	-0.296*** (0.051)	0.189*** (0.036)	0.171*** (0.055)	-0.289*** (0.052)

Cash * 2020 q4	0.308*** (0.039)	0.201*** (0.055)	-0.159*** (0.052)	0.297*** (0.039)	0.221*** (0.056)	-0.142*** (0.052)
Cash * 2021 q1	0.204*** (0.046)	-0.715*** (0.1)	0.043 (0.068)	0.184*** (0.047)	-0.711*** (0.103)	0.051 (0.069)
Cash * 2021 q2	0.168*** (0.046)	-0.716*** (0.099)	-0.012 (0.069)	0.152*** (0.047)	-0.716*** (0.101)	0.008 (0.069)
Cash * 2021 q3	0.106** (0.046)	-0.730*** (0.102)	-0.079 (0.069)	0.091* (0.047)	-0.715*** (0.103)	-0.067 (0.069)
Cash * 2021 q4	-0.045 (0.049)	-0.780*** (0.098)	-0.247*** (0.069)	-0.066 (0.049)	-0.741*** (0.1)	-0.226*** (0.069)
COVID-19 exp	0.194 (0.141)	0.134*** (0.021)	0.972*** (0.086)	0.561*** (0.172)	0.441** (0.112)	0.867*** (0.086)
Cash _{it}	0.245*** (0.025)	0.216*** (0.04)	0.244*** (0.021)	0.240*** (0.02)	0.209*** (0.040)	0.241*** (0.021)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	90,900	56,612	147,512	96,738	50,774	147,512
R-squared	0.76	0.74	0.75	0.76	0.74	0.75

*Notes: This table shows regression results. The dependent variable in all regressions is Tobin's Q. All regressions include control variables as defined as before. Robust standard errors allowing for cross-sectional clustering in brackets *p < 0.10; **p < 0.05; ***p < 0.01.*

Table A.4.

The effect of corporate governance quality on the effect of COVID-19 exposure on the relation between cash holdings and Tobin's Q

Model:	(A.9)	(A.10)	(A.11)	(A.12)
Sample:	Strong Corporate Governance	Weak Corporate Governance	Strong Corporate Governance	Weak Corporate Governance
COVID-19 exposure measured by:			DummyINF _{it}	DummyINF _{it}
Cash measured by:	Ln.cash _{i,2019q4}	Ln.cash _{i,2019q4}	Ln.cash _{i,2019q4}	Ln.cash _{i,2019q4}
Cash * 2020 q1 * COVID-19 Exp			0.339*** (0.117)	0.645** (0.311)
Cash * 2020 q2 * COVID-19 Exp			0.368*** (0.116)	0.533* (0.312)
Cash * 2020 q3 * COVID-19 Exp			0.422*** (0.117)	0.574* (0.312)
Cash * 2020 q4 * COVID-19 Exp			0.380*** (0.116)	0.494 (0.315)
Cash * 2021 q1 * COVID-19 Exp			0.331*** (0.12)	0.082 (0.364)
Cash * 2021 q2 * COVID-19 Exp			0.289** (0.119)	0.050 (0.361)
Cash * 2021 q3 * COVID-19 Exp			0.332*** (0.12)	0.080 (0.369)
Cash * 2021 q4 * COVID-19 Exp			0.277** (0.12)	0.179 (0.362)
Cash * 2020 q1	-0.070 (0.052)	-0.252*** (0.075)	-0.174*** (0.062)	-0.328*** (0.1)
Cash * 2020 q2	0.156*** (0.051)	-0.045 (0.083)	0.047 (0.06)	-0.118 (0.101)
Cash * 2020 q3	0.174*** (0.054)	-0.003 (0.097)	0.058 (0.064)	-0.073 (0.109)
Cash * 2020 q4	0.215*** (0.055)	0.092 (0.105)	0.107* (0.064)	0.017 (0.12)
Cash * 2021 q1	-0.493*** (0.101)	-0.383** (0.173)	-0.611*** (0.105)	-0.425*** (0.16)
Cash * 2021 q2	-0.504*** (0.099)	-0.362** (0.175)	-0.608*** (0.102)	-0.403** (0.162)
Cash * 2021 q3	-0.525*** (0.101)	-0.364** (0.175)	-0.639*** (0.104)	-0.408** (0.161)
Cash * 2021 q4	-0.581*** (0.098)	-0.336** (0.17)	-0.679*** (0.1)	-0.389** (0.157)
COVID-19 exposure	0.065 (0.045)	0.248** (0.12)	0.439*** (0.147)	0.523* (0.309)
Cash _{it}	0.236*** (0.036)	0.118** (0.062)	0.236*** (0.036)	0.120* (0.061)
Control variables	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes

Observations	52,092	15,654	52,092	15,654
R-squared	0.74	0.74	0.74	0.74

*Notes: This table shows regression results. The dependent variable in all regressions is Tobin's Q. All regressions include control variables as defined as before. To measure the quality of corporate governance, I use the GCI 4.0: 1.G Corporate Governance, H. Index. Where I classify corporate governance quality below the mean as weak corporate governance and corporate governance quality above the mean as strong corporate governance. Robust standard errors allowing for cross-sectional clustering in brackets *p < 0.10; **p < 0.05; ***p < 0.01.*
