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Defensive Liquidity Accumulation vs. Offensive Investing : Corporate Strategies During Economic Crises

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1. Introduction

Economic crises bring extreme uncertainty that forces companies to make difficult and critical financial decisions. During each crisis we saw similar dynamics: sharp decline in demand, disruption of supply chains, and worse financial and economic conditions. This could cause serious challenges for any firm because access to financing becomes limited, revenues and sales become more volatile, and assessing prospects and growth become more difficult. As a result, firms are forced to reevaluate their financial strategies and make decisions in a riskier and more uncertain environment.

In response to these challenging conditions, companies can choose different financial strategies. Considering the risk and the uncertainty, a company could logically choose a defensive approach by accumulating liquidity and limit investments in order to maintain financial flexibility. Liquidity can provide a buffer against financial distress and risk, by absorbing negative shocks when revenues decline and financing becomes more limited. But on the other hand, it could constrain future growth. For this reason, companies could adopt a more aggressive strategy by maintaining or even increasing investment in order to exploit strategic opportunities and continue to spend cash to sustain operations despite the adverse conditions. This could strengthen market position and support long-term performance.

However, using resources in such environment could bring worse performance in future if the crises persist or intensify. For this reason, it is an interesting subject to study why firms could adopt a strategy or another when facing similar crisis conditions.

Academic literature has examined broadly corporate financial behavior and strategies during economic crisis, especially liquidity management and investment decisions. Previous studies have demonstrated that holding cash is a precautionary move that can help firms to cope with uncertainty, financial constraints, and economic shocks. In addition, many researchers have demonstrated that investments tend to decline, because of the increase of uncertainty and access to external finance become more complicated. At the same time, a large body of studies suggest that not all firms respond to crisis conditions in the same way. That is because it is important to account for structural differences such as financial strength, access to internal and external funds, and operational characteristics. These differences lead to different approaches regarding liquidity management and investment.

Despite the large amount of literature about corporate liquidity management and investment behavior during economic crises still it is important to say that these studies focus more on firm's responses to uncertain economic conditions and often do not analyze the consequences of different financial strategies. Especially, it remains unclear whether defensive or offensive strategies regarding liquidity and investment could improve or undermine future performance.

In addition, usually literature analyzes crises in isolation, by not providing insights into the effects of different economic shocks. Finally, researchers acknowledge differences between companies and their heterogeneity regarding approaches to crises, but few studies analyze how pre-crisis characteristics influence the outcomes of liquidity and investment decisions.

In order to achieve a better understanding of how crises affect corporate financial strategies, in this paper, I will examine two crises: The Covid-19 pandemic and the war in Ukraine. Covid-19 pandemic was a sudden economic shock that had an effect in every country in the world, characterized by declines in demand for goods, interruption of supply chains, and an unprecedent level of uncertainty considering the duration and the severity of the event.

During that period, future was really difficult to predict, for this reason companies were prioritizing short-term survival, rather than future growth. In contrast, the war in Ukraine was a geopolitical and energy shock with uneven effect across countries and companies. The economic impact depended on country's exposure to the energy market, trade relationships, and sanctions. Companies that operate in countries where there are stronger links with Russia were affected more, while others had a limited effect.

Importantly, the war happened only 2 years after the COVID-19 crisis, this exposed firms to consecutive shocks within a relatively short period. Considering the proximity of these 2 events, the effect on firms was higher and their ability to recover was undermined even further. This fact makes the research even more interesting, considering that 2 immediate crises do not happen often.

Given the discussion above, this thesis will try to answer the following questions. First, how do firms adjust their liquidity holdings and investment behavior during periods of economic crisis? Second, how are defensive liquidity accumulation and offensive investment strategies related to firm performance in the years following a crisis? Third, do the performance implications of these strategies depend on firm characteristics and on the nature of the crisis faced?

To answer these questions, in this thesis I will use panel data of publicly listed companies across different countries and continents. The analysis will first concentrate on liquidity management and investment behavior during both crisis periods and after that the thesis will show how alternative strategies affect performance in the following years. In the paper, I will use a regression analysis that has as their main goal to capture differences in firm behavior across crises and to account for firm different characteristics.

Overall, this thesis aims to understand how firms navigate the trade-off between liquidity preservation and investment during periods of economic crisis, and how these strategic choices affect performances after the shock.

The remainder of the thesis is structured as follows. The next chapter reviews the relevant literature on corporate liquidity management and investment behavior during economic

crises. The following chapter describes the data and empirical methodology. The empirical results are then presented and discussed, and the thesis concludes with a summary of the main findings.

2. Literature Review

This chapter reviews literature about corporate financial strategies during economic crises. Especially, it focuses on liquidity management and investment behavior during uncertain periods. The objective of this chapter is to analyze the paper's main findings and insights, in order to develop hypothesis regarding liquidity and investment strategies.

2.1. Liquidity Management and Cash Holdings

In modern corporate finance, liquidity management is fundamental because it allows companies to maintain their investments such as capex and manage their costs related to their operational activities, such as wages, inventories, advertising. The need to hold cash rise because external financing could not be always available or too costly, this force companies to rely on their internal resources.

This is a normal practice even in stable times, because companies could have some internal risk due to the nature of their business, in simple words, each business has a different level of risk and its related level of cash holdings. But when we have some external economic shock that could influence the entire economy or a big portion of it, liquidity management becomes even more strategically relevant. This is because firms should adapt their daily liquidity strategy to the new environment, where risks and uncertainty become even higher. In these circumstances, liquidity management can potentially become a tool for survival.

In order to understand what are the factors that influence the corporate cash holdings in different companies, it is useful to use as reference the research provided by Opler, Pinkowitz, Stulz, Williamson (1999). The authors sustain that firms tend to accumulate liquidity in order to reduce the risk of unanticipated shocks and of the constraints in external funding that could cause the missing of potentially good investments. So, the authors suggest that the level of cash holdings is not randomly chosen but firms appear to follow target level of cash holdings. The choice of the level of liquidity is influenced by mainly the risk and the company's characteristics. In fact, companies tend to accumulate more cash if they have high cash flow volatility, growth opportunities, lower leverage, less access to capital markets and companies with more intangible assets and R&D expenses. By contrast larger companies, companies with better access to credit and firms with more tangible assets tend to have lower liquidity levels. Given that, companies are always facing a trade-off between holding more liquidity to avoid unexpected risks and the cost of keeping it instead of investing it in more productive activities.

To further investigate the notion about corporate cash holdings, we can refer to the work done by Bates, Kahle, and Stulz (2009). In their research, they documented that in a time period of 20 years on average the cash-ratio doubled, and net debt becomes negative for many US companies. According to them, this phenomenon can be explained by the fact that firms have changed their business models and their characteristics. In fact, companies have started to rely more on intangible assets and spend more in research and development, this change has caused companies to face additional difficulties in accessing outside financing and potentially higher distress costs. Therefore, their results suggest that due to the increase of the perceived operational risk and due to the tighter financial constraints, companies are encouraged to accumulate liquidity in order to defend themselves from these uncertainties. Overall, the study makes us understand that the accumulation of cash is not a temporary event or an inefficient use of resources, but it is a rational defensive decision against risk and an important part of corporate financial strategy.

In order to gain new insights into liquidity management, this thesis investigates how companies adapt their liquidity strategies when there are market imperfections. In this regard,

Almeida, Campello, Cunha, and Weisbach (2014) try to answer to the question. According to them, the debt market is not always in a favorable condition. In fact, when the economy is facing a crisis, even banks face uncertainties that could be even worse than for corporations, for this reason the lending could become more inaccessible, and companies do not have the necessary liquidity to continue decently their operations. As a result, firms started to accumulate liquidity in good times in order to have it during periods when the credit market is not favorable or when the cash flows decline. This allows companies to continue investing even when they cannot rely on borrowing as in normal conditions. These findings are even more relevant for firms with financial constraints that naturally expect high financing uncertainties in the future. Overall, internal liquidity could represent a reliable source of funding during crisis periods, for this reason cash accumulation should be considered as a rational and defensive financial strategy when there is a need for precautionary moves.

After discussing the theory about liquidity management, it is time to analyze studies on how cash holdings are affected during crisis times. To analyze how internal liquidity is affected by economic downturns and the associated credit market deterioration, we can look to the study conducted by Campello, Graham, and Harvey (2010). By conducting a survey to CFOs, they first defined which firms are financially constrained or unconstrained according to how easily they can access external financing. They provide strong evidence that internal liquidity has a crucial role during crises. This is because constrained companies have a limited access to the debt market, for this reason, especially when operating cash flows decline, these companies are forced to heavily rely on their internal funds and in some cases, they need to sell their assets, cut employees, and reduce investments. These findings further increase previous knowledge that cash holdings can be used as a survival tool during credit supply crises.

The notion that cash holdings can be used as a precautionary tool during severe market conditions is sustained also by Duchin, Ozbas, and Sensoy (2010). According to the authors, during the subprime mortgage crisis, the contraction of debt supply had a stronger effect on firms with low cash reserves and high short-term debt, this was because they were forced to rely on their limited internal resources and, as a consequence, to cut investment and other

expenditures in order to survive. These findings point to the fact that firms with a higher level of liquidity were able to handle the shock in an easier way because they were less exposed to reduction in real activity. Overall, this highlights once again the key role of liquidity in reducing the impact of crises.

After discussing liquidity management during crises, it is time to approach the specific crises of this analysis. Of course, it is important to say that because these are recent shocks, there is not a big amount of literature as for the 2008 crisis. First, we are going to start by analyzing literature about the effects of COVID-19 pandemic. Chung, Jhang & Ryu (2023), in their paper about cash holdings in Korean companies during covid, they analyzed how companies adjusted their cash holdings to the global crisis. Liquidity during COVID is an interesting case to analyze because there was a high degree of cashflow risk and economic uncertainty, but there was also a relatively favorable credit markets, due to the cut of interest rates and quantitative easing. This economic environment gave to the author the opportunity to analyze in isolation the effect of uncertainty on liquidity accumulation. This is because the pandemic could potentially increase the need for defensive measures such as accumulating liquidity but at the same time accommodative monetary policy reduce the need for cash holdings. At first, Korean companies started to reduce their cash holdings in order to cover their operational expenses but in the following quarters, there was an increase of cash holdings especially for firms affected the most by the pandemic and for financially constrained companies, but this effect is also present for unconstrained firms. When policy support was gradually withdrawn and economic instability reduced, there was also a decrease of cash holdings. The findings suggest that liquidity accumulation was used mainly as a precautionary measure against the pandemic crisis, and not because of tightening conditions in the debt market.

The second crisis in our analysis is the Russian-Ukrainian war, for this reason it is important to review literature about geopolitical risk. Such study was conducted by Jahan and Ryu (2026) by using a sample of Korean firms. They analyzed how geopolitical tensions affect cash holdings. They found that firms act in a precautional way by accumulating liquidity when there is a high geopolitical risk, especially if the risk comes from a country near geographically or economically. This effect is interpreted as a defensive measure against

potential disruptions in supply chains, trade and external financing caused by diplomatic conflicts and security tensions. It is important to note that the effect is even stronger for companies working in sectors that are more vulnerable to external shocks. This confirms that liquidity accumulation is used as a defensive strategy against political instability.

This literature review discussed so far that liquidity is fundamental part of the corporate financial strategy to cope with adverse conditions for this reason companies actively change their liquidity levels as a response to economic crises, pandemics, and geopolitical risk. But, only understanding how firm's cash ratio changes during crises is not sufficient. It is also important to understand how it affects different companies in different economic environments and to analyze the valuation effects on corporate cash holdings. Faulkender and Wang (2006) analyzed that an increase in cash holdings does not have the same effect and value in different firms, but it depends on their characteristic and the economic environment. According to their results, additional cash is less valuable if the firm does not have strong financial constraints. On the contrary, for companies with low leverage, marginal value of cash is higher. This effect is even stronger if there are some constraints in accessing the debt market. These findings suggest that cash holdings have a defensive nature against uncertainties and the effect varies among different firms.

Building on the previous framework, Chakraborty, Baum, and Liu (2017) studied the marginal value of corporate cash holdings and how the value of this liquidity is affected by different sources of uncertainty, distinguishing between macroeconomic and firm-specific uncertainty. According to them, when uncertainty regarding future economic conditions is increasing, the marginal value of cash changes depending on the source of uncertainty. In addition, they discovered that liquidity valuation rises when firm-specific uncertainty is high, with stronger effects for financially constrained firms. Their research points to the fact that cash holdings could be considered as a financial strategy against operational risk and macroeconomic instability.

2.2 Investment

After we have discussed what are the determinants of liquidity levels and how crises affect them, we can adopt a similar approach regarding corporate investment. According to Bloom, Bond, and Van Reenen (2007), uncertainty influences the investment behavior of companies. In fact, when uncertainty is increasing companies tend to slow down decisions about investment and disinvestment. This happens because when there are periods of uncertainty there is also a subsequent increase in the value of waiting before taking a decision, that happens because usually capital expenditures are difficult and costly to reverse. As a consequence, when there is uncertainty, firms wait before committing to new projects. It is also important to add that during these times of instability, investment becomes less sensitive to changes in demand, this means that even if there is a positive dynamic in demand such as a sales increase, companies will not necessarily spend more on investment expenditures. Overall, their research shows us that uncertainty alone is an important factor for corporate investment, even if there are no financial constraints.

To further expand our knowledge on how uncertainties influence corporate investments, it is advisable to refer to the research done by Gulen and Ion (2016). Their main focus is related to future government policies, and they found out an association between policy uncertainty and reduction in corporate investments, especially for companies more exposed to fiscal and regulatory decisions. Their findings are relevant for this thesis because it demonstrates that different crises could potentially influence corporate investments. This supports the idea that crises, which are often accompanied by institutional and regulatory uncertainty, may lead firms to postpone or reduce their investment expenditures.

Another research regarding uncertainties influencing corporate investments was provided by Julio and Yook (2012) that examine the role of political uncertainty in corporate investments by employing a model in which elections serve as a measure of political uncertainty with respect to future policy decisions by governments. Using a large sample of international firms, Julio and Yook find that corporate investments are lower in election years compared to non-election years. These findings by Julio and Yook imply that firms tend to delay investments in projects that are irreversible in nature due to a less predictable future policy

environment. The role of political uncertainty in influencing corporate investments further reinforces the idea that external shocks can impact corporate decisions in a significant manner, thus encouraging a wait-and-see approach by firms during times of high instability.

In order to understand deeply how investments can change in different conditions, it is a good idea to analyze what are the effects on these investments during periods of financial distress. As already discussed in the liquidity section, Campello, Graham, and Harvey (2010) analyze firms' behavior during the global financial crisis. According to their results, when credit conditions deteriorate, there is a bigger reduction in investment activity for constrained companies than for unconstrained companies. In addition, these firms with limited access to the debt market were the ones that engaged in assets sales. These results indicate to the fact that deterioration of credit market conditions is a significant factor of the investment activities in corporations, especially for financially distressed companies that are forced to adopt a defensive strategy in order to survive.

As discussed in the section on liquidity, the study by Duchin, Ozbas, and Sensoy (2010) focuses on the behavior of firms during the global financial crisis. In addition to the findings on cash holdings, the authors present evidence on the investment decisions of firms, which indicates that firms with low cash and high levels of short-term debt experienced greater investment declines following the credit crunch. This indicates that internal liquidity not only helps firms to survive financial shocks but is also significant for investment decisions.

Because one of the crises discussed in the thesis is the COVID pandemic, it could be useful to review a paper regarding this specific crisis. The study by Hassan, Hollander, Lent, Schwedeler and Tahoun (2023) aims to investigate the effects of the COVID-19 pandemic on corporate decision-making by developing measures of firm-specific shocks related to the epidemic. This allows for an evaluation of the extent to which individual firms were affected by the pandemic in terms of demand shocks, supply shocks, and overall uncertainty. The study reveals that firms that were exposed to greater negative demand shocks during the pandemic responded by significantly reducing their investment activities. The demand shock that results from the lockdowns and mobility restrictions is revealed to be the major factor that contributes to the decline in investment activities by these firms.

To approach the second crisis, we need to understand how geopolitics influence investment. Fortunately, such research was done by Caldara and Iacoviello (2022) that examine the impact of geopolitical risk on economic activity by creating an index based on news related to wars, terrorism, and geopolitical tensions. The study indicates that higher geopolitical risk is associated with lower investment for firms that are more exposed to geopolitical risks. The study indicates that geopolitical risks and war have a negative impact on investment decisions because they deter firms from making irreversible investment decisions. This is because, when the geopolitical environment deteriorates, firms delay their investment decisions in order to avoid potential negative outcomes. This indicates that geopolitical risks are a source of uncertainty that affects investment decisions in the economy, and this supports the idea that external political shocks can lead to investment decisions that can be regarded as defensive.

2.3 Performance

In the previous part of the literature review, it was built the base of the thesis by understanding how firms adjust their liquidity and investment activities in general and in response to crises, but this is only a part of the analysis, now it is time to understand how these strategies translate into performance.

When we discuss how liquidity management affects future performance, we can refer to the research written by Dittmar and Mahrt-Smith (2007) that analyzes whether bad or good governance affects cash holding and how cash holdings, in turn, affect performance. According to their results, companies with a bad governance tend to dissipate cash quickly and for this reason, they experience worse future profits. On the contrary, companies' stronger corporate governance allows firms preserve cash holdings without impairing performance. These findings suggest that if liquidity is managed more efficiently by

allocating these resources correctly, can lead to improved firm performance. Overall, this research is useful for this thesis, because it demonstrates that liquidity management plays key role in enhancing future firm performance.

To investigate the relationship between corporate investment and firm performance, we can refer to the research done by Richardson (2006) that analyzes the use of internal resources for corporate investment purposes and whether these investments are creating or destroying value. The author shows us that companies with high free cash flows tend to overinvest in not high returns projects. This dynamic could potentially cause worse future performance, highlighting that not all investments yield positive returns, particularly if investments are driven by agency problem rather than genuine growth opportunities. Overall, the paper is suggesting that wrong investment strategy can lead to worse performance. Although this analysis is performed outside of crisis periods, it is pertinent to this thesis because it is showing that investment efficiency is a major factor in predicting future operating performance, suggesting that changes in investment policies due to crises could have important implications.

After analyzing how investments and liquidity management influence future performance, we should study how crises affect performance. Although the focus of the following study is not on the financial policies such as cash holdings or investment decisions, the study by Lins, Servaes, and Tamayo (2017) is important in the context of the performance of companies during the crisis periods. During the global financial crisis, companies with higher levels of trust and with better relationships with stakeholders outperformed their counterparts and exhibited greater resilience during the recession. This shows that external shocks do not affect all firms in the same way and companies' attributes are key determinants of performance during crisis times. Overall, the results are important for our thesis because it demonstrates that crises have a significant effect on performance and encourages a further analysis on how financial strategies could contribute in handling crises.

To further study what are the determinants of future performance during crises, we can refer to the study by Opler and Titman (1994) their main focus is how crises influence firm performance by analyzing financially fragile firms. According to their results, high leveraged

firms had experienced large decline in sales and operating income during the economic downturn, compared with firms that rely less on debt financing. It is important to say that the effects were particularly pronounced for companies operating in concentrated markets and for those with high R&D expenses. Overall, from their studies we can understand that better financial position is fundamental in managing crisis times and for this thesis we can highlight the importance of financial strategies in shaping performance during crisis periods.

Regarding performance in crisis periods specific to this thesis, specifically the COVID-19 pandemic, we can refer to the research done by Shen, Fu, Pao, Yu and Chen(2020). In their study, they demonstrate that there was a significant effect of Covid on corporate performance in Chinese companies in different spheres of the economy. Overall, the study shows that global crisis have a serios effect on corporate performance underling the importance of considering cash ratio and investment activity when evaluating the firm's performance, as these financial practices may be important to firms to cope with extreme uncertainty.

2.4 Research Gap and Hypothesis Development

Significant knowledge of how firms manage their liquidity and investment decisions in response to uncertainty and crises has been documented in the existing literature. A substantial number of studies have investigated the factors affecting corporate cash holdings and have found that firms build up their cash reserves for precautionary purposes, especially in risky and constrained conditions. Other studies have attempted to investigate corporate investment decisions and have found that uncertainty and crises induce firms to postpone their capital expenditures. In parallel, a separate body of literature has attempted to investigate how firm performance is affected by various crises, such as financial crises and pandemics.

However, these strands of literature have evolved rather independently. Most of the studies have investigated liquidity management, investment decisions, and performance in an

isolated manner without explicitly connecting these dimensions in an integrated framework. As such, relatively less is known about how firms' liquidity management and investment decisions jointly impact performance. In particular, relatively less is known about how corporate cash holdings and investment decisions jointly impact performance as measured by return on assets, compared to studies employing market-based performance indicators.

Moreover, most of the existing literature focuses on particular types of shocks. The most common one is financial crises. However, relatively less emphasis has been placed on investigating other types of shocks. Recently experienced crises like COVID-19 and the Russian-Ukrainian war are examples of other types of external shocks. These shocks have particular economic characteristics. Moreover, relatively less is known about how changes in financial strategies by corporations have similar or dissimilar effects on their performance during such crises. Specifically, relatively less is known about whether changes in liquidity accumulation and investment behavior contribute to mitigating performance losses during crises like COVID-19 and the Russian-Ukrainian war.

The purpose of this thesis is to contribute to the existing literature by investigating corporate cash holdings and investment behavior. Moreover, it aims to investigate their effects on corporate performance during crises like COVID-19 and the Russian-Ukrainian war. Specifically, by investigating corporate performance during these crises, this thesis aims to contribute to the existing literature by providing new insights about how changes in financial strategies by corporations contribute to their ability to cope with extreme uncertainty.

Taking all the theories discussed before, this thesis will try to test the following hypotheses.

1) ***Firms increase their liquidity holdings during the COVID-19 pandemic and the Russian-Ukrainian war.***

   Crises are marked by high levels of uncertainty and disruption of cash flows. According to the precautionary motive, firms may react to these situations by increasing their liquidity in order to maintain flexibility and avoid being affected negatively.

2) ***Firms reduce investment expenditures during the COVID-19 pandemic and the Russian-Ukrainian war.***

   Investment decisions are often not reversible and are affected by factors of uncertainty. When the future economic situation becomes hard to predict and financing becomes harder, firms may want to hold back on investment.

3) ***Higher liquidity holdings during the crisis period are positively associated with firm performance in the post-crisis period.***

   Liquidity can help a firm to better withstand adverse shocks and continue operations during stressful periods. Thus, it is likely that firms with higher cash reserves will be better able to cope with a crisis and recover when the situation improves.

4) ***Firms that maintain higher investment levels during the crisis period exhibit superior post-crisis performance compared to firms that strongly reduce investment.***

   Reduced or curtailed investments may be a way to ensure liquidity in the short term, yet it may have negative effects in the long term. Firms that continue to support investments even in a crisis situation have a higher likelihood of maintaining growth opportunities in the recovery period.

3. Methodology

3.1 Data Source and Sample Selection

The financial data for the empirical analysis was extracted from the Orbis database provided by Bureau van Dijk. The choice of this database was made in order to achieve comparability between companies in different countries, as this platform provides standardized balance sheet and income statement information, this ensures uniform accounting classifications.

In order to achieve geographic diversity and to guarantee the availability of reliable information, the initial sample consists of 7 countries:

The countries chosen for the analysis are: France, Germany, Italy, Japan, the Republic of Korea, the United Kingdom, and the United States. Before extracting the financial information, several filters were applied. Firstly, only those firms that have an active legal status were retained. Secondly, firms were chosen on the basis of their country of incorporation. Thirdly, only those companies that have a standardized legal form classified as a public limited company were retained. Lastly, only those companies that are publicly listed were retained. This limited the data to only those countries included in this study and focuses on companies with stricter market disclosure obligations and comparable reporting standards.

In order to achieve correct cross-industry comparison, the sample includes companies operating in agriculture, mining and extraction, utilities, construction, manufacturing industries, wholesale and retail trade, transport and storage, travel and leisure, software, media and broadcasting, property services, business services, biotechnology and life sciences, and information services. The only sector that was excluded is the banking and financial services because of the substantial difference in the regulatory framework and in the balance sheet composition from those of non-financial corporations.

Additionally, to reduce the reporting noise and data with unreliable accounting information, the sample is formed only by mid and large size firms. In order to achieve so, small companies were excluded by filtering for companies with at least 100 employees

Companies for which no recent financial statements were available and public authorities, states, and government-related entities were excluded from the sample, as their objectives, financing models, and investment behavior are determined by public policy rather than profit maximization objectives and thus cannot be compared to those of corporations in the private sector.

Finally, in order to avoid issues regarding exchange rate fluctuations, all the variables are expressed in local currency (LCU).

Overall, the sample provides a multi-country panel of publicly listed firms over the sample period from 2018 to 2024, allowing for an analysis of corporate liquidity and investment behavior before, during, and after the COVID-19 pandemic and the Russian-Ukrainian war.

3.2 Data Cleaning and Sample Refinement

Once the initial selection is complete, in order to improve data quality there is a need to apply additional adjustments to the dataset. First, all the companies located in overseas territories were excluded because of the substantial differences in accounting standards and laws with their main countries. Secondly, in order to avoid inconsistent financial ratios, all the companies with missing key information in their financial statements were excluded from the dataset.

In order to reduce the impact of small firms and possible noise in reporting, the bottom 10 percent firms in total asset values for each country were dropped from the analysis. This minimizes the impact of extreme values and firms with abnormal or unstable financial reporting patterns.

Considering the fact that variables are in local currency, they were expressed as ratios to total assets in order to guarantee correct company comparability by removing biases linked to size and currency denomination. In addition, to handle the issue of currency denomination for the size variable, that is defined as the natural logarithm of total assets, it was re-expressed as country-based percentile rankings ranks. The disadvantage of this change is that relatively large firms in a particular country can become smaller when compared with firms in another country, even though in absolute terms they are large, as this is determined by their relative size position in the size distribution of firms in a country.

The final adjustment is the winsorization at the 1st and 99th percentiles of the financial variables. This method mitigates the impact of outliers with the advantage that it maintains the sample size because it does not remove the observations, this could potentially improve the estimations.

After cleaning the dataset, the sample size has 28727 observations and 4899 companies, distributed by country as in the following table:

Number of Companies by Country	
Country	Number of Companies
Japan	2,278
United States of America	1,239
United Kingdom	409
France	266
Republic of Korea	261
Germany	260
Italy	186

Table 1: Companies by Country

The country distribution is not uniform, with more companies from Japan and USA. In order to ensure that this uneven distribution will not influence the estimated coefficients, the regression analysis is going to use country fixed effects.

3.3 Variables

This section explains the dependent variables, main independent variables, and control variables that will be used in the empirical study. In this thesis, the variables will be discussed separately according to the liquidity, investment, and performance regressions due to the thesis's structure.

3.3.1 Liquidity Variables

To capture corporate liquidity, the empirical part will use cash ratio, calculated as cash and cash equivalents over total assets. This ratio variable is the most suitable because it indicates the portion of assets held in liquidity reserves and reflects precautionary behavior.

The thesis is studying the effect of crises, for this reason, the main independent variables are the two dummy variables, one for Covid and one for the war in Ukraine. Covid-19 is equal to 1 when the year is 2020 and otherwise is 0. It is important to say that the first cases of covid were identified at the end of 2019, but the lockdowns started to widespread only in the beginning of 2020 with their subsequent economic effects. For this reason, it is appropriate to use 2020 as the dummy variable. While the war variable is equal to one for the year 2022. That is because the geopolitical crisis started at the beginning of the year, in February 2022, with an immediate effect on the energy markets, on production costs, and on inflation. It is important to note that these strong uncertainties persisted also in the following year, but the most pronounced effect was on the year chosen in the analysis. Taken together, these variables are adequate to analyze changes in liquidity relative to previous years.

A series of control variables at the firm level are used to represent the factors that, according to prior literature, affect cash holdings. Firm size is represented by the natural logarithm of total assets and is expected to be negatively related to cash holdings, as larger firms are expected to have easier access to external finance. Leverage is represented by total debt over total assets and reflects the trade-off between relying on internal finance and debt finance. Tangibility is represented by property, plant, and equipment over total assets and reflects the amount of collateral available, which can reduce the need to hold cash. Net working capital, represented by (current assets minus current liabilities minus cash) over total assets, is used to represent substitutes to cash that a company can use.

For the full specifications, there are additional control variables. Receivables and inventory ratios were added to account for how many resources are absorbed by operational needs. Higher levels of inventories and receivables can increase the cash holdings in order to meet short-term obligations. The following control variable is the intangible assets, that usually are more difficult to use it as a collateral. For this reason, companies with high level of intangible assets are usually facing tight conditions in the debt market, which encourages the management of these firms to increase cash holdings as a safe measure.

The short-term debt ratio, which equals short-term debt divided by total assets, represents the firm's dependence on short-maturity obligations. Firms that rely on short-term debt will tend to hold larger cash positions to pay off these debts in the near future.

Additionally, the regressions include control variables regarding operating performance.

Operating cash flow is a control variable that indicates the ability to generate liquidity. But the effect is not clear, because on the one hand companies with higher cash flows, need less cash holdings as a financial buffer because they expect to generate cash flows in the following years. On the other hand, companies with high cash flows may accumulate more liquidity because they can generate it internally.

The interest coverage ratio, which equals EBIT divided by financial expenses, represents the firms' ability to pay financial expenses using operating profits. Firms that can pay their financial expenses are less likely to default on their debt and therefore may not hold as much cash, whereas firms that are not able to pay their financial expenses may hold larger cash positions to act as a buffer against default risk.

The final control variables are capturing the operational efficiency. Asset turnover defined as sales over total assets and operating return defined as EBIT over total assets indicate how efficiently the company is able to generate earnings, which it may reduce the need for defensive cash holdings.

The table below reports the descriptive statistics for the cash ratio. Meanwhile for the control variables, the table can be found on the appendix.

Summary Statistics of Cash Ratio	
Statistic	Value
Min.	0.0017
1st Qu.	0.0595
Median	0.1226
Mean	0.1552
3rd Qu.	0.2161
Max.	0.5968

Table 2 Summary Statistics of Cash Ratio

3.3.2 Investment Variables

In this thesis, to capture corporate investment behavior, the empirical analysis uses net cash flow from investing activities scaled by total assets. Negative values indicate net investment, while positive values indicate net disinvestment. This ratio-based measure is suitable because it reflects changes in firms' real investment activity relative to their size and allows for the identification of contractions and expansions in capital expenditures. Negative values signal net investment, while positive reflect net disinvestment. This scale variable is appropriate because it captures variation in capital expenditures, identifying both expansions and contractions in investment. This part of the analysis is going to use the same dummy crisis variables as in the liquidity part. Overall, in the same way for liquidity, these variables are appropriate in capturing the change of the dependent variables, but this time for investment.

The regressions include the same set of controls as the liquidity analysis. These controls proxy for how a firm is financed, what its asset structure is, and how it operates. Firm size is

included to look for scale advantages and easier access to external capital, in fact larger firms have less issues with financing constraints and can continue to invest even in bad times. Leverage is included because highly leveraged firms are more prone to reducing investment during financial distress in order to save liquidity to meet their debt obligations. Tangibility is included in order to capture both differences in production capital intensity and asset collateralization. Companies with higher tangibility may reduce or delay investment more during crises because usually their capital expenditures can be postponed without immediately disrupting production. Net working capital excluding cash was included because it captures how many resources are used for short-term operations, rather than long-term investment. The inventory ratio reflects the percentage of assets in unsold goods that could potentially limit investments.

Intangible asset variable is included because during crisis, companies with high intangible assets ratio may face tighter borrowing conditions and for this reason they could potentially not find resources for investments. Short-term debt is also included because it measures the refinancing risk. A firm with more short-term debt may reduce investments more significantly in order to meet the debt obligation and minimize refinancing risk. Operating cash flow is also added to measure the ability of the firm to generate internal funds.

To account for the company's ability to service their debt, the regression will include also interest coverage ratio. This is because if the interest coverage ratio is high, there could be higher level of investments due to less tight financial constraints and less risk of default. Operational efficiency is proxied by asset turnover and operating return. More efficient companies tend to invest more as a result of their performance and steadier cash flows.

The table below reports the descriptive statistics for the investment variable.

Summary Statistics of Cash Flow from Investing Activities	
Statistic	Value
Min.	−0.3224
1st Qu.	−0.0676
Median	−0.0361
Mean	−0.0476
3rd Qu.	−0.0148
Max.	0.1513

Table 3 Investment Cash Flow

3.3.3 Performance Variables

In order to understand which strategies are the better choice for handling crisis periods, the variable chosen was ROA, defined as net profit divided by total assets. The dependent variable captures the post-crisis performance, so the thesis uses the value in time t+1 in respect to the crisis year. So, the Covid regression has as a dependent variable ROA measured in year 2021, while for the Russian-Ukrainian war, the empirical analysis uses ROA for the year 2023. This approach allows to understand the different effects of the two crises. The main independent variables are the strategy chosen by the firms regarding liquidity management and investing. For the liquidity, the strategy is defined as offensive if the value of cash and cash equivalents at the time of the crisis, so at time t, is lower than the pre-crisis period, so at time t-1. It means that if the strategy is offensive, the company decreased their cash holdings, on the contrary if there was an accumulation of liquidity, the strategy will be considered defensive. For the investment performance part, the strategy is considered offensive if the value of cash flow from investing becomes more negative in the crisis year, at time t, in comparison to the year before the crisis, at time t-1. This means that if a company chose an offensive strategy, there was an increase of spending in investing activities, meanwhile the firm is considered defensive if the company decides for precautionary motives

to decrease spending on investment activities, so by having less negative or even positive values in the account of cash flow from investing activities.

The performance regressions include the same set of firm-level control variables included in the liquidity and investment analyses. The rationale for this is that differences in firm fundamentals may affect profitability. Firm size is included in the analysis because larger firms may benefit from diversification and may have greater access to finance, which may result in higher profitability. The leverage ratio is included because highly leveraged firms may have lower profitability due to the interest and financial distress costs associated with their leverage. The tangibility ratio is included because the asset structure and collateral of the firm may affect the efficiency of the business and the access to finance, which may impact profitability. Net working capital and inventory include the proportion of resources devoted to short-term activities. Higher working capital and inventory can affect profitability because resources may be devoted to short-term activities instead of more long-term activities. Receivables include the proportion of resources devoted to customer credit, which may impact profitability. Intangible assets include the proportion of resources devoted to intangible activities, which may impact profitability. Short-term debt includes the proportion of resources devoted to short-term debt repayment, which may negatively impact profitability. The operating cash flow includes the proportion of resources devoted to generating cash flows, which is expected to have a positive impact on profitability. However, the cash flow may not be representative of the long-run performance of the business. The interest coverage ratio includes the proportion of resources devoted to servicing interest expenses. Firms that have a higher interest coverage ratio may not have financial distress and may have higher profitability. For the operational efficiency like for the previous parts, the performance analysis will use asset turnover and operating return, and it is expected that they have a positive effect for ROA. As for robustness check, the analysis will also use the ROA at time t, in order to account for base levels of profitability.

Another methodological problem to consider is that the characteristics of firms in the crisis year may already include the effects of the crisis shock, given that accounting data are generally recorded at the end of each fiscal year. Therefore, it would also be important to

consider an additional set of robustness checks in which firm characteristics in the pre-crisis year t-1 are used to better capture firms' underlying conditions at the start of the crisis. This would enable us to disentangle the impact of firms' initial strength from firms' crisis-time strategic decisions.

Below the following tables represent the descriptive statistics for future ROA in the year 2021 and 2023. In the appendix are located the tables of the control variables for both crises.

Summary Statistics of ROA 2021	
Statistic	Value
Min.	−0.2219
1st Qu.	0.0166
Median	0.0397
Mean	0.0402
3rd Qu.	0.0687
Max.	0.2444

Table 4 Summary Statistics of ROA 2021- COVID part

Summary Statistics of ROA 2023	
Statistic	Value
Min.	−0.4001
1st Qu.	0.0130
Median	0.0364
Mean	0.0288
3rd Qu.	0.0635
Max.	0.2189

Table 5 Summary Statistics of ROA 2023- WAR part

3.4 Empirical Model

This thesis has an empirical model by using mainly 3 sets of regression for estimating changes in liquidity during crises, changes in investment activity during crises and the performance outcome based on the corporate strategy regarding investment and liquidity management.

3.4.1 Liquidity Regressions

To analyze how the two crises affected the cash holdings, the baseline regression has only the two crisis variables.

$$CashRatio_{\{i,t\}} = \alpha + \beta_1 Covid_t + \beta_2 War_t + \varepsilon_{\{i,t\}}$$

Subsequently, to the regression are added the non-crisis year dummies ($D_{\{i,t\}}$) with 2019 omitted, since it is considered the reference year because it precedes the two crisis periods. In addition, in the regression there are country (μ_c) and sector (λ_s)fixed effects.

$$+ D_{\{2018,t\}} + D_{\{2021,t\}} + D_{\{2023,t\}} + D_{\{2024,t\}} + \mu_c + \lambda_s$$

After that size and leverage are included

$$+ Size_{\{i,t\}} + Leverage_{\{i,t\}}$$

Following by balance sheet variables, working-capital and asset-composition control.

$$+ Tangibility_{\{i,t\}} + NWC_{\{i,t\}} + ShortTermDebt_{\{i,t\}}$$

$$+ Inventory_{\{i,t\}} + Receivables_{\{i,t\}} + Intangibles_{\{i,t\}}$$

Finally, the operating performance variables are added as the last controls.

$$+ OpCashFlow_{\{i,t\}} + InterestCoverage_{\{i,t\}} + OpReturn_{\{i,t\}} + AssetTurnover_{\{i,t\}}$$

3.4.2 Investment Regressions

For the investment regressions, the analysis uses the same explanatory and control variables as in the liquidity part. With $X_{\{i,t\}}$ indicating all the control variables.

$$InvCF_{\{i,t\}} = \alpha + \beta_1 Covid_t + \beta_2 War_t + \varepsilon_{\{i,t\}}$$

$$InvCF_{\{i,t\}} = \alpha + \beta_1 Covid_t + \beta_2 War_t + X_{\{i,t\}} + \varepsilon_{\{i,t\}}$$

3.4.3 Performance Regressions

For the performance part, the dependent variable is the ROA in the year following the crisis, so, for war the regression will have $ROA_{\{i,2023\}}$, while for COVID $ROA_{\{i,2021\}}$. The explanatory variables $OffCash_{\{i,t\}} + OffInv_{\{i,t\}}$ indicate if the company chooses an offensive strategy regarding cash holdings and investment.

$$ROA_{\{i,t+1\}} = \alpha + OffCash_{\{i,t\}} + OffInv_{\{i,t\}} + \varepsilon_i$$

After that with the same logic as the previous parts, there were added the same control variables and the fixed effects at time t.

$$ROA_{\{i,t+1\}} = \alpha + OffCash_{\{i,t\}} + OffInv_{\{i,t\}} + X_{\{i,t\}} + \mu_c + \lambda_s + \varepsilon_i$$

As a robustness check, $ROA_{\{i,t\}}$ was added to account for the baseline profitability and for persistence in firm performance.

$$ROA_{\{i,t+1\}} = \alpha + OffCash_{\{i,t\}} + OffInv_{\{i,t\}} + X_{\{i,t\}} + ROA_{\{i,t\}} + \mu_c + \lambda_s + \varepsilon_i$$

Finally, to check for firm's characteristics before the crises, the was an additional check by running the same regressions with controls at time t-1.

$$ROA_{\{i,t+1\}} = \alpha + OffCash_{\{i,t\}} + OffInv_{\{i,t\}} + X_{\{i,t-1\}} + ROA_{\{i,t-1\}} + \mu_c + \lambda_s + \varepsilon_i$$

4. Results

4.1 Liquidity Results

Liquidity regressions are presented in table 6 with year 2019 as the reference year. The baseline regression, located in column 1, is showing that when only the crisis indicators are included, only the covid year has a positive and significant effect. Conversely, the war dummy is not statistically significant in this specification. The simplest regression could be interpreted as only in the covid year there was a defensive increase in cash holdings.

In specification 2 there are also the non-crisis year dummies and country and sector fixed effects. It is important to notice that in this regression both crisis explanatory variables are positive and significant. In addition, the effect of COVID-19 increased in magnitude. These results indicate the fact that, after controlling for country and sector differences, the two crises are responsible for the elevation of corporate cash holdings.

From regression 3 to 6, to the regressions progressively are added additional control variables.

Before talking about the more complex regression, it could be useful to discuss about the significance of the controls. Firm size and leverage are negatively correlated with cash holdings in all the equations. This suggests that bigger and more leveraged firms tend to hold relatively lower cash. Tangibility, net working capital, and short-term debt are also negatively correlated with the cash ratio. Inventories, receivables, and intangible assets also exhibit

negative correlation with cash holdings. With respect to the performance variables, operating cash flow and operating return exhibit positive correlation with cash holdings, whereas asset turnover exhibits negative correlation.

Regarding Covid 19, the effect remains positive and statistically significant for all the regressions, even though its magnitude declines when additional controls are included. In general, the results suggest that the effect of COVID-19 remains statistically significant, supporting the conclusion that indeed companies during the pandemic increased their cash holdings relatively to the pre-crisis reference period. In addition, the level of cash holding in the following year, 2021, was still higher than the pre-crisis reference, indicating that the pandemic may have an effect not only in 2020, but it had a prolonged effect spread also to the following year.

On the other hand, the war dummy is statistically significant for the majority of regression, only in specification 5 the effect is not significant, but after adding performance controls, the significance returned. In the full model, the estimated rise in cash holdings in 2022 remains positive relative to 2019 but is substantially lower than the increase recorded for the covid year and year 2021.

This pattern shows the key difference with the pandemic effect is that although the war variable is significant, the magnitude of liquidity accumulation is less compared to COVID.

Cash ratio regressions (base year: 2019)

	(1) Baseline	(2) FE + Years	(3) + Controls	(4) + Balance sheet	(5) + Asset comp.	(6) + Performance
COVID (2020)	0.017***	0.025***	0.026***	0.022***	0.013***	0.013***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
War (2022)	0.001	0.010***	0.009***	0.008***	0.002	0.003**
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Year 2018		−0.003*	−0.004***	−0.006***	−0.004***	−0.005***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Year 2021		0.024***	0.022***	0.018***	0.009***	0.009***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Year 2023		0.008***	0.007***	0.006***	−0.001	−0.001
		(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Year 2024		0.008***	0.008***	0.006***	0.000	0.000
		(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Firm size			−0.027***	−0.034***	−0.030***	−0.032***
			(0.001)	(0.001)	(0.001)	(0.001)
Leverage (Total debt / Assets)			−0.178***	−0.088***	−0.024**	−0.007
			(0.009)	(0.009)	(0.008)	(0.008)
Short-term debt / Assets				−0.372***	−0.342***	−0.302***
				(0.020)	(0.018)	(0.019)
Tangibility (PPE / Assets)				−0.227***	−0.433***	−0.435***
				(0.008)	(0.011)	(0.011)
NWC excl. cash / Assets				−0.244***	−0.239***	−0.246***
				(0.010)	(0.010)	(0.011)
Receivables / Assets					−0.357***	−0.311***
					(0.014)	(0.014)
Intangibles / Assets					−0.423***	−0.427***
					(0.011)	(0.012)
Inventory / Assets					−0.249***	−0.219***
					(0.014)	(0.014)
Operating Profit						0.061***
						(0.014)
Asset Turnover						−0.018***
						(0.003)
Operating CF / Assets						0.126***
						(0.014)
Interest coverage						0.000***
						(0.000)
Num.Obs.	28727	28727	28727	28727	28727	27876
R2	0.002	0.211	0.313	0.432	0.611	0.611
R2 Adj.	0.002	0.210	0.312	0.432	0.610	0.610
R2 Within		0.007	0.136	0.286	0.511	0.520
R2 Within Adj.		0.007	0.135	0.286	0.510	0.519
AIC	−36765.8	−43433.4	−47407.7	−52895.4	−63740.0	−63778.8
BIC	−36741.0	−43127.6	−47085.4	−52548.3	−63368.0	−63375.3
RMSE	0.13	0.11	0.11	0.10	0.08	0.08
Std.Errors	by: company	by: company	by: company	by: company	by: company	by: company
FE: country		X	X	X	X	X
FE: sector		X	X	X	X	X

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001
Standard errors clustered at the firm (company) level.
Country and sector fixed effects included.
Year dummies included; 2019 is the omitted base year.
* p < 0.10, ** p < 0.05, *** p < 0.01.

Table 6 Cash Ratio Regressions

4.2 Investment Results

The results of the regressions about corporate investments are reported in table 7, as for the liquidity regressions, 2019 is considered the base year. Before approaching the result, it is again important to understand that positive coefficient values signify a decline in investment or disinvestment, while negative values denote an increase in investment.

By looking to column 1, where the baseline regression is presented, it is clear that without adding control variables, the effect of the pandemic is positive and significant, indicating a reduction of investments. While, in this initial model, the war dummy is not statistically significant.

After adding all the non-crisis year dummies and the fixed effects, the pandemic effect on corporate investment activity remains statistically significant, confirming that there was a reduction in investment activity during the pandemic. The war variable becomes slightly positive and marginally significant; this could indicate that there was a small reduction in corporate investment during that year.

After adding all the control variables progressively through columns 3 to 6, the pandemic effect remains statistically significant in all the regressions with a slight increase in magnitude after considering all the control variables. On the other hand, the war period has no significant effect in all the regressions, except for the full specification, in fact in the final model, the war year has a surprisingly different effect than covid. Here, the war year has a negative sign, indicating that in 2022 the investment activity did not reduce and maybe there was actually a partial recovery.

As for the control variables, it should be noted that the positive relationship between firm size and cash flow from investing activities implies that larger firms will reduce their investments more severely. The negative relationship between leverage and cash flow from investing activities implies that firms with higher debt will have higher investment activities. The negative relationship between tangibility and intangible assets with the dependent variable implies that firms with larger asset bases will have higher investment expenditure. The significant negative relationship between net working capital and operating cash flow

with the dependent variable should also be noted. Inventory ratio has a positive sign effect, indicating that firms with high inventory levels tend to have less investment activity. Surprisingly, firms with high operating profit tend to invest less.

The inclusion of balance sheet and performance controls significantly enhances the model, while the estimated crisis effects remain robust.

Overall, the findings suggest a strong and significant contraction of corporate investment during the COVID-19 crisis, whereas the evidence for the war period is weaker and less stable across specifications. This implies a more pronounced reaction of corporations to the pandemic crisis through a reduction in investment activities, whereas investment behavior during the war period is more heterogeneous and closer to pre-crisis levels.

. Cash Flow From Investing Activities regressions (base year: 2019)

	(1) Baseline	(2) FE + Years	(3) + Controls	(4) + Balance sheet	(5) + Asset comp.	(6) + Performance
COVID (2020)	0.006***	0.008***	0.008***	0.008***	0.008***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
War (2022)	−0.000	0.002+	0.002	0.001	0.001	−0.003*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Year 2018		−0.004**	−0.004**	−0.005***	−0.005***	−0.006***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Year 2021		0.004**	0.003*	0.003*	0.002+	0.001
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Year 2023		0.005***	0.005***	0.004***	0.004***	0.004**
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Year 2024		0.004**	0.004**	0.004**	0.004**	0.004**
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Firm size			0.002**	0.002***	0.004***	0.005***
			(0.001)	(0.001)	(0.001)	(0.001)
Leverage (Total debt / Assets)			−0.034***	−0.039***	−0.018***	−0.025***
			(0.004)	(0.005)	(0.005)	(0.005)
Short-term debt / Assets				0.055***	−0.004	−0.026*
				(0.010)	(0.010)	(0.010)
Tangibility (PPE / Assets)				−0.048***	−0.071***	−0.063***
				(0.004)	(0.004)	(0.004)
NWC excl. cash / Assets				−0.001	−0.040***	−0.054***
				(0.004)	(0.005)	(0.005)
Receivables / Assets					0.038***	0.045***
					(0.005)	(0.006)
Intangibles / Assets					−0.068***	−0.063***
					(0.005)	(0.005)
Inventory / Assets					0.045***	0.050***
					(0.007)	(0.007)
Operating Profit						0.041***
						(0.010)
Asset Turnover						−0.002+
						(0.001)
Operating CF / Assets						−0.173***
						(0.011)
Interest coverage						−0.000
						(0.000)
Num.Obs.	28727	28727	28727	28727	28727	27876
R2	0.001	0.039	0.047	0.063	0.087	0.111
R2 Adj.	0.001	0.038	0.045	0.061	0.085	0.110
R2 Within		0.003	0.010	0.027	0.052	0.079
R2 Within Adj.		0.003	0.010	0.027	0.051	0.078
AIC	−75433.9	−76487.1	−76701.9	−77182.1	−77920.3	−76180.5
BIC	−75409.1	−76181.2	−76379.5	−76834.9	−77548.4	−75777.0
RMSE	0.07	0.06	0.06	0.06	0.06	0.06
Std.Errors	by: company	by: company	by: company	by: company	by: company	by: company
FE: country		X	X	X	X	X
FE: sector		X	X	X	X	X

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001
Standard errors clustered at the firm (company) level.
Country and sector fixed effects included.
Year dummies included; 2019 is the omitted base year.
* p < 0.10, ** p < 0.05, *** p < 0.01.

Table 7 Cash Flow from Investing Activities Regressions

4.3 Performance Results

4.3.1 COVID Strategy

Table 8 shows the result of the performance for the pandemic period with ROA in 2021 as the dependent variable. The baselines regression has negative and significant coefficient on the offensive cash holding strategy indicating that companies that adopted offensive approaches regarding liquidity, by reducing their liquidity ratios, experienced lower profitability in comparison to more defensive companies. While the offensive strategy regarding investment has a positive and significant outcome, meaning that firms that had actually increased their investments subsequently experienced higher performance. By looking at the second regression, even after adding the fixed effects, the results remained unchanged.

From regression 3 to 5, after adding firm- level controls related to financial structure and asset composition, the results remain mostly identical. This means that even after accounting for different sets of corporate characteristics, offensive liquidity strategy remains a negative strategy regarding future post-crisis performance, while offensive investment remains a positive strategy for better post-crisis performance according to the model.

The results completely change after adding the performance controls in specification 6. In fact, the offensive liquidity strategy becomes positive with lower significance, while the significance of the investment strategy became statistically not significant. This evidence suggests that subsequent performance can be partly explained by the current operating conditions.

In addition, in this empirical analysis there was also added a new regression for robustness. Here after adding the ROA, measured in the year of the crisis, as a measure for baseline profitability and persistence in the firm performance, the results remain similar to the previous regression. Overall, regression 7 shows that after taking into account all the difference in firm's profitability among companies, reducing cash holdings during the pandemic led to better post-crisis ROA, while there is no significant effect regarding investment.

Future Performance ROA t+1 COVID Strategy

	(1) Baseline	(2) FE + Years	(3) + Controls	(4) + Balance sheet	(5) + Asset comp.	(6) + Performance	(7) + ROA t
Offensive liquidity strategy	−0.015***	−0.013***	−0.012***	−0.013***	−0.012***	0.005*	0.005*
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Offensive investment strategy	0.008***	0.007**	0.007**	0.007**	0.007**	−0.001	−0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Firm size			0.010***	0.010***	0.010***	0.006***	0.005***
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage (Total debt / Assets)			−0.062***	−0.053***	−0.052***	−0.017+	−0.009
			(0.008)	(0.011)	(0.011)	(0.009)	(0.009)
Short-term debt / Assets				−0.001	−0.028	0.025	0.018
				(0.022)	(0.025)	(0.022)	(0.022)
Tangibility (PPE / Assets)				−0.004	−0.002	−0.022*	−0.024**
				(0.008)	(0.010)	(0.009)	(0.009)
NWC excl. cash / Assets				0.031**	0.011	0.006	0.001
				(0.010)	(0.013)	(0.011)	(0.011)
Receivables / Assets					0.015	−0.025*	−0.024+
					(0.013)	(0.013)	(0.013)
Intangibles / Assets					0.002	−0.032**	−0.032***
					(0.012)	(0.010)	(0.010)
Inventory / Assets					0.056**	0.022	0.025+
					(0.018)	(0.015)	(0.015)
Operating Profit						0.332***	0.193***
						(0.023)	(0.050)
Asset Turnover						0.003	0.003
						(0.003)	(0.003)
Operating CF / Assets						0.225***	0.228***
						(0.024)	(0.024)
Interest coverage						0.000+	0.000*
						(0.000)	(0.000)
ROA t							0.153**
							(0.051)
Num.Obs.	4018	4018	4018	4018	4018	3904	3904
R2	0.012	0.042	0.075	0.078	0.082	0.408	0.414
R2 Adj.	0.011	0.034	0.067	0.070	0.073	0.401	0.407
R2 Within		0.009	0.043	0.047	0.051	0.388	0.394
R2 Within Adj.		0.009	0.042	0.045	0.048	0.386	0.392
AIC	−10404.6	−10469.0	−10605.0	−10616.1	−10626.3	−11989.3	−12026.5
BIC	−10385.7	−10261.2	−10384.6	−10376.8	−10368.0	−11707.1	−11738.1
RMSE	0.07	0.07	0.06	0.06	0.06	0.05	0.05
Std.Errors	by: company	by: company	by: company	by: company	by: company	by: company	by: company
FE: country		X	X	X	X	X	X
FE: sector		X	X	X	X	X	X

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001
Standard errors clustered at the firm (company) level.
Country and sector fixed effects included.
Year dummies included; 2019 is the omitted base year.
* p < 0.10, ** p < 0.05, *** p < 0.01.

Table 8 Regressions ROA (2021)

4.3.2 COVID Strategy with lagged controls

Table 9 displays the performance regression results for the COVID-19 period, but this time using firm characteristics at time t-1 (2019). The dependent variable is still post-crisis profitability, calculated as ROA in 2021. Using lagged controls allows the analysis to condition on firms' financial strength and operating conditions prior to the onset of the crisis.

As can be seen, across all of the regressions, the coefficient for the offensive liquidity strategy is negative and statistically significant for all the regression, although smaller in magnitude for the final specification compared to the baseline results. This provides further evidence that, after controlling for firm characteristics before the onset of the crisis, those firms that implemented an offensive liquidity strategy during the COVID-19 crisis experienced lower levels of post-crisis profitability.

The coefficient for the offensive investment strategy is positive and statistically significant across the baseline and intermediate results but loses statistical significance once performance-related controls and lag ROA are included in the regression equation. This suggests that a positive relationship between investment levels during the COVID-19 crisis and post-crisis profitability are not robust once controlling operating conditions at the onset of the crisis.

As can be seen, the results from the lag controls, when using contemporaneous and lagged controls, the findings for the investment strategy appear similar. The sign and significance of the coefficient for the offensive investment strategy are similar across the two approaches, suggesting that the relationship between crisis-time investment behavior and post-crisis performance does not depend on whether or not firm characteristics are measured during the crisis or in the pre-crisis year.

In contrast, the findings for the liquidity strategy appear different across the two approaches. The baseline findings using contemporaneous controls show a positive relationship between

an offensive liquidity strategy and post-crisis performance, whereas the findings using lagged controls show a negative coefficient in the last two models. This suggests that, once firm characteristics are measured during the pre-crisis year, an offensive liquidity strategy during the COVID-19 crisis is associated with lower post-crisis profitability.

Future Performance ROA t+1 COVID Strategy with lagged controls

	(1) Baseline	(2) FE + Years	(3) + Controls	(4) + Balance sheet	(5) + Asset comp.	(6) + Performance	(7) + ROA t
Offensive liquidity strategy	−0.016***	−0.014***	−0.014***	−0.013***	−0.013***	−0.008***	−0.008***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Offensive investment strategy	0.007***	0.007**	0.007**	0.006**	0.006**	0.002	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Firm size			0.009***	0.009***	0.010***	0.005***	0.005***
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage (Total debt / Assets)			−0.035***	−0.030**	−0.025*	−0.010	−0.003
			(0.008)	(0.011)	(0.012)	(0.010)	(0.010)
Short-term debt / Assets				0.005	−0.022	0.040+	0.033
				(0.022)	(0.026)	(0.022)	(0.022)
Tangibility (PPE / Assets)				−0.005	−0.010	−0.020+	−0.020*
				(0.008)	(0.011)	(0.010)	(0.010)
NWC excl. cash / Assets				0.026*	0.009	0.011	0.009
				(0.010)	(0.013)	(0.012)	(0.012)
Receivables / Assets					0.003	−0.031*	−0.030*
					(0.013)	(0.013)	(0.013)
Intangibles / Assets					−0.012	−0.018+	−0.018+
					(0.013)	(0.011)	(0.011)
Inventory / Assets					0.040*	0.026+	0.028+
					(0.018)	(0.016)	(0.016)
Operating Profit						0.370***	0.258***
						(0.028)	(0.056)
Asset Turnover						0.005+	0.006*
						(0.003)	(0.003)
Operating CF / Assets						0.162***	0.157***
						(0.025)	(0.025)
Interest coverage						0.000	0.000
						(0.000)	(0.000)
ROA t-1							0.137*
							(0.062)
Num.Obs.	3936	3936	3936	3936	3936	3817	3817
R2	0.013	0.045	0.062	0.065	0.068	0.304	0.307
R2 Adj.	0.012	0.038	0.054	0.056	0.058	0.296	0.299
R2 Within		0.010	0.028	0.030	0.033	0.278	0.281
R2 Within Adj.		0.009	0.027	0.029	0.031	0.276	0.278
AIC	−10082.8	−10155.2	−10221.8	−10227.3	−10232.6	−11027.2	−11038.9
BIC	−10063.9	−9948.0	−10002.0	−9988.8	−9975.2	−10746.1	−10751.5
RMSE	0.07	0.07	0.07	0.07	0.07	0.06	0.06
Std.Errors	by: company	by: company	by: company	by: company	by: company	by: company	by: company
FE: country		X	X	X	X	X	X
FE: sector		X	X	X	X	X	X

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001
Standard errors clustered at the firm (company) level.
Country and sector fixed effects included.
Year dummies included; 2019 is the omitted base year.
* p < 0.10, ** p < 0.05, *** p < 0.01.

Table 9 Regressions ROA (2021) with lagged controls

4.3.3 War Strategy

Table 10 shows the regressions regarding performance for the war period, here the dependent variable for the post crisis performance is measured as ROA in 2023.

In the baseline regression with only the strategy variables, there is a negative and significant effect on future post-crisis performance when a company opts for an offensive strategy regarding liquidity management. While for investment, the effect is significant but positive.

Looking to regression 2, despite adding the fixed effects, the explanatory variables hold the same significance and sign as the baseline regression.

Even after introducing control variables related to financial structure and asset composition, the effect remains negative and significant for offensive liquidity strategies, while the variable offensive investment still remains significant and positive. This indicates that without controlling for performance characteristics of the firm, spending liquidity has a negative outcome for post-crisis performance, while increasing investment increases post-crisis ROA.

But after adding the performance control variables in regression 6 and after adding ROA as baseline profitability in regression 7, liquidity offensive strategy becomes positive and less significant while investment strategy variable also lost its significance and became negative, similarly to the covid crisis.

This means that when difference in profitability during the crisis are taken into account, spending and reducing cash has a positive effect on post-crisis ROA, while no strong significant performance effect is found for investment strategy.

Future Performance ROA t+1 War strategy

	(1) Baseline	(2) FE + Years	(3) + Controls	(4) + Balance sheet	(5) + Asset comp.	(6) + Performance	(7) + ROA t
Offensive liquidity strategy	−0.018***	−0.016***	−0.015***	−0.016***	−0.017***	0.004+	0.004*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Offensive investment strategy	0.007**	0.006*	0.007**	0.007**	0.007**	−0.003+	−0.003+
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Firm size			0.016***	0.016***	0.017***	0.005***	0.005***
			(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Leverage (Total debt / Assets)			−0.068***	−0.051***	−0.043**	−0.016	−0.006
			(0.010)	(0.014)	(0.015)	(0.010)	(0.010)
Short-term debt / Assets				−0.027	−0.090**	0.016	0.003
				(0.029)	(0.032)	(0.024)	(0.024)
Tangibility (PPE / Assets)				0.004	0.023+	−0.001	−0.001
				(0.009)	(0.012)	(0.008)	(0.008)
NWC excl. cash / Assets				0.050***	0.014	−0.001	−0.008
				(0.012)	(0.015)	(0.011)	(0.011)
Receivables / Assets					0.116***	0.080***	0.083***
					(0.016)	(0.012)	(0.012)
Intangibles / Assets					0.022	0.008	0.007
					(0.016)	(0.011)	(0.011)
Inventory / Assets					0.078***	0.042**	0.043**
					(0.019)	(0.015)	(0.015)
Operating Profit						0.522***	0.314***
						(0.027)	(0.053)
Asset Turnover						−0.001	−0.001
						(0.002)	(0.002)
Operating CF / Assets						0.213***	0.199***
						(0.028)	(0.028)
Interest coverage						−0.000	0.000
						(0.000)	(0.000)
ROA t							0.259***
							(0.057)
Num.Obs.	4192	4192	4192	4192	4192	4062	4062
R2	0.011	0.050	0.089	0.096	0.113	0.534	0.543
R2 Adj.	0.011	0.043	0.081	0.088	0.104	0.529	0.538
R2 Within		0.009	0.049	0.056	0.074	0.515	0.524
R2 Within Adj.		0.009	0.048	0.055	0.072	0.513	0.522
AIC	8863.8	8971.2	9139.9	9166.6	9240.7	11526.8	11602.9
BIC	8844.8	8761.9	8918.0	8925.6	8980.7	11242.9	11312.6
RMSE	0.08	0.08	0.08	0.08	0.08	0.06	0.06
Std.Errors	by: company	by: company	by: company	by: company	by: company	by: company	by: company
FE: country		X	X	X	X	X	X
FE: sector		X	X	X	X	X	X

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001
Standard errors clustered at the firm (company) level.
Country and sector fixed effects included.
Year dummies included; 2019 is the omitted base year.
* p < 0.10, ** p < 0.05, *** p < 0.01.

Table 10 Regressions ROA (2023)

4.3.4 War Strategy with lagged controls

Compared to the war specifications with contemporaneous controls, the regressions with lagged firm characteristics reveal a different pattern for the liquidity strategy.

While the war regressions with contemporaneous controls reveal a positive relationship between an offensive liquidity strategy and performance during the crisis in the final specifications, the corresponding regressions with lagged controls reveal a consistently negative and statistically significant coefficient for this strategy. This implies that, once firm characteristics are measured before the crisis, a reduction in cash holdings during the war period is associated with lower profitability after the crisis.

The findings for the investment strategy are more similar across the two approaches. The coefficient on the offensive investment strategy is positive in the baseline and intermediate specifications and loses statistical significance once performance controls and lagged ROA are added, as is the case for the contemporaneous regressions. This implies that the relationship between crisis time investment behavior and performance during the war period is not sensitive to whether firm characteristics are measured before or during the crisis.

Future Performance ROA t+1 War Strategy with lagged controls

	(1) Baseline	(2) FE + Years	(3) + Controls	(4) + Balance sheet	(5) + Asset comp.	(6) + Performance	(7) + ROA t
Offensive liquidity strategy	−0.019***	−0.017***	−0.017***	−0.016***	−0.016***	−0.013***	−0.013***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Offensive investment strategy	0.009***	0.008**	0.008**	0.008**	0.007**	0.004+	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Leverage (Total debt / Assets)			−0.043***	−0.037**	−0.031*	−0.006	0.002
			(0.010)	(0.014)	(0.015)	(0.012)	(0.012)
Short-term debt / Assets				−0.003	−0.059*	0.034	0.023
				(0.025)	(0.029)	(0.024)	(0.024)
Tangibility (PPE / Assets)				0.007	0.023*	0.007	0.012
				(0.009)	(0.011)	(0.009)	(0.009)
NWC excl. cash / Assets				0.029**	−0.004	0.007	0.005
				(0.011)	(0.014)	(0.013)	(0.013)
Receivables / Assets					0.096***	0.065***	0.069***
					(0.016)	(0.013)	(0.014)
Intangibles / Assets					0.020	0.010	0.013
					(0.015)	(0.012)	(0.012)
Inventory / Assets					0.075***	0.040*	0.043**
					(0.019)	(0.017)	(0.017)
Operating Profit						0.364***	0.208***
						(0.029)	(0.050)
Asset Turnover						0.004	0.004
						(0.003)	(0.003)
Operating CF / Assets						0.227***	0.216***
						(0.027)	(0.027)
Interest coverage						0.000*	0.000**
						(0.000)	(0.000)
ROA t-1							0.200***
							(0.054)
Num.Obs.	4109	4109	4109	4109	4109	3999	3999
R2	0.015	0.049	0.074	0.076	0.090	0.342	0.347
R2 Adj.	0.015	0.042	0.066	0.067	0.081	0.335	0.340
R2 Within		0.012	0.038	0.040	0.054	0.318	0.323
R2 Within Adj.		0.012	0.037	0.038	0.052	0.315	0.320
AIC	−9141.1	−9225.9	−9328.4	−9331.7	−9388.2	−10377.6	−10407.7
BIC	−9122.1	−9017.3	−9107.2	−9091.6	−9129.1	−10094.3	−10118.2
RMSE	0.08	0.08	0.08	0.08	0.08	0.07	0.07
Std.Errors	by: company	by: company	by: company	by: company	by: company	by: company	by: company
FE: country		X	X	X	X	X	X
FE: sector		X	X	X	X	X	X

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001
Standard errors clustered at the firm (company) level.
Country and sector fixed effects included.
Year dummies included; 2019 is the omitted base year.
* p < 0.10, ** p < 0.05, *** p < 0.01.

Table 11Regressions ROA (2023) with lagged controls

5. Discussion

This section addresses the hypothesis formulated earlier by using the results in the empirical analysis.

5.1 Hypothesis 1: Firms increase their liquidity holdings during the COVID-19 pandemic and the Russian–Ukrainian war.

Based on liquidity regressions, hypothesis 1 is accepted. In fact, the results are showing that during both crises, there was a significant increase of cash holdings. The increase was more pronounced during the pandemic, while the magnitude was lower during the war but still there was a significant increase.

Accumulated liquidity was an important defensive instrument for companies during both crises, used in order to protect themselves against declines in revenues, declines in demand, unstable cash flows and in general against a difficult macroeconomic environment. The magnitude of the effect was more pronounced for the covid year because the disruption of the economic activity, caused by lockdowns and health restrictions, was more pronounced due to the severity of the crisis and the global expansion of it. By contrast, the war in Ukraine, although it was a huge shock, the effect of it was uneven across countries and sectors. The uneven effect could be explained by the fact that there are companies and countries that suffered more than others the energy price increase and the disruption in trade relationships with the Russian Federation.

Overall, the findings state that there was a defensive approach to both crises, by using liquidity accumulation and increasing cash holdings.

5.2 Hypothesis 2: Firms reduce investment expenditures during the COVID-19 pandemic and the Russian–Ukrainian war.

Based on investment regressions, hypothesis 2 is only partially accepted. This is due to the evidence provided by the empirical analysis. According to the regressions only the covid pandemic had a significant reduction of investment activity, while the reduction of investments during the war year is not robust enough. The decline in investment activity during the covid period was due to the unprecedent level of uncertainty. In fact, the health emergency made future conditions highly unpredictable due to lockdowns, mobility restrictions, drop in demand, issues with supply chains, and workforce health concern. In this unpredictable economic environment, it is not a surprise that many companies decided to postpone and cancel investments or even disinvest, this is because preserving liquidity and reducing additional debt was important for achieving short term survival, even at the cost of missing some investment opportunities for the long term. On the other hand, investment behavior in the war period appears more heterogeneous and similar to pre-crisis levels. In fact, while uncertainty and production costs increased due to the war, especially due to high energy costs, there was not a similar demand contraction as the one experienced in the pandemic. Moreover, economic impacts of the war differ significantly between countries and sectors depending on their exposure to energy markets and their economic ties with the Russian Federation. Therefore, while some firms reduce their investment as a precautionary response, others continue or even increase their investment efforts, reducing the overall average effect.

In general, these findings suggest that when crisis is more widespread, like for the covid pandemic, it can generate a more pronounced negative effect on the investment behavior of companies, whereas more specific shocks with uneven impact across countries and companies, lead to differentiated reactions.

5.3 Hypothesis 3: Higher liquidity holdings during the crisis period are positively associated with firm performance in the post-crisis period.

Based on the performance regressions, the hypothesis is accepted but with some nuances. This is because the empirical analysis has used both contemporaneous and lagged controls, producing two opposite results. By seeing the regression that used controls of the year of the crisis, it is deducible that offensive liquidity strategy provides higher post-crisis performance, but when the analysis uses the lagged controls, meaning firm's characteristics before the start of the crisis, the result is the opposite, with defensive cash accumulation considered as the better strategy.

In general, using before crisis controls could be considered a better choice because contemporaneous firm's characteristics are influenced by the crisis itself and could be biased. But this thesis develops its interpretation of both results, stating that in general the optimal strategy is using defensive approach during crises, but if firms can predict good performance during the crisis with sufficient accuracy despite the economic uncertainty, deploying cash through an offensive strategy may also constitute a viable approach.

5.4 Hypothesis 4: Firms that maintain higher investment levels during the crisis period exhibit superior post-crisis performance.

According to performance regressions, before adding the performance controls, all the regressions have a positive and significant effect for offensive investing strategy for both crises, even when the regressions use lagged controls that account for firm's characteristics before the start of the crisis. But as soon as the performance controls are added to the specifications, the significance drops for all the models. These results suggest that the underlying firm's operating conditions are the main factor influencing future performance

post crisis. The interpretation of these findings is that companies with already good profitability and more stable cashflows are likely to be those that invested more during the crisis. For this reason, the hypothesis cannot be fully accepted because the results are showing that increase of investment do not systematically improve post-crisis performance for the average company.

6. Conclusion

This thesis examined how firms manage their liquidity and investment behavior during the economic crises caused by the COVID-19 pandemic and the Russian-Ukrainian war and how these strategies affected the future performance after the crises. The results showed that during the pandemic and the war in Ukraine there was a significant increase of cash holdings while only during the pandemic there was an evident reduction of investment activity.

But the interpretation of the war-related results regarding liquidity requires caution. Since the conflict happened shortly after the pandemic, companies were already operating in an uncertain economic environment. Therefore, the effect of war on corporate cash holdings could be just a prolonged effect of the pandemic, rather than a defensive measure against the geopolitical crisis.

In general, these findings suggest that widespread crises, like the pandemic, lead to more substantially defensive reactions, than shocks that affect countries and industries unevenly, like the war in Ukraine.

The performance analysis suggests that the effect of financial strategies during crises on post-crisis profitability depends on chosen model specification and on the firm's starting conditions prior to the crisis itself. After accounting for pre-crisis firm fundamentals, defensive cash accumulation appears to be linked to better post-crisis profitability, indicating that defensive liquidity management could reinforce corporate resilience during difficult economic periods.

By contrast, investment strategies during crises are not significant enough regarding post-crisis performance once operating conditions and baseline profitability are included. This suggests that companies with strong financial conditions before the crisis are more able to sustain investments, whereas investment per se is not the fundamental driver of improved post-crisis outcomes.

By jointly investigating liquidity, investment, and performance within a unified framework and by comparing two crisis episodes, this thesis extends the existing literature on corporate financial strategies during periods of economic stress. Nevertheless, there are several aspects that could be investigated deeply. In fact, although the empirical analysis includes fixed effects regarding the sector where the companies are working in, the analysis does not explicitly examine whether the impact of the crises differs across industries. For this reason, future studies may investigate how different companies in energy-intensive, technology-oriented, or supply-chain-dependent industries adapt their financial strategies when economic shocks happen, and which strategies are more effective for future post-crisis performance.

To conclude, the findings of this thesis highlight the importance of liquidity in corporate resilience during economic crises, whereas the advantage of sustaining investments during crises appears to be dependent on the firm's pre-crisis financial strength.

Appendix

Summary Statistics of Control Variables						
Variable	N	Mean	Std. Dev.	Min	Median	Max
Asset Turnover	28,727.0000	0.9411	0.5488	0.1079	0.8254	3.0890
EBIT / Assets	28,727.0000	0.0499	0.0823	−0.3155	0.0509	0.2795
Interest Coverage Ratio	27,876.0000	144.6160	559.6509	−144.8506	10.5697	4,462.4562
Intangible Assets / Assets	28,727.0000	0.1293	0.1765	0.0004	0.0374	0.7128
Inventory / Assets	28,727.0000	0.1198	0.1031	0.0002	0.1010	0.4728
Leverage	28,727.0000	0.2175	0.1746	0.0000	0.1937	0.7358
Net Working Capital (excl. Cash)	28,727.0000	0.0616	0.1535	−0.3347	0.0574	0.4859
Operating Cash Flow Ratio	28,727.0000	0.0668	0.0734	−0.2042	0.0673	0.2757
Receivables / Assets	28,727.0000	0.1541	0.1118	0.0031	0.1341	0.5369
Firm Size (Percentile)	28,727.0000	0.5500	0.2599	0.1000	0.5500	1.0000
Short-Term Debt Ratio	28,727.0000	0.0569	0.0768	0.0000	0.0252	0.3713
Asset Tangibility	28,727.0000	0.2701	0.1898	0.0072	0.2330	0.8310

Table 12 Summary Statistics of Control Variables

Summary Statistics of Performance Lagged Control Variables 2019						
Variable	N	Mean	Std. Dev.	Min	Median	Max
Asset Turnover	3,936.0000	0.9820	0.5580	0.1337	0.8601	3.0627
EBIT / Assets	3,936.0000	0.0507	0.0713	−0.2602	0.0502	0.2590
Interest Coverage Ratio	3,817.0000	132.5727	498.1793	−115.5895	10.4277	3,950.6008
Intangible Assets / Assets	3,936.0000	0.1303	0.1795	0.0005	0.0368	0.7246
Inventory / Assets	3,936.0000	0.1166	0.1003	0.0002	0.0976	0.4712
Leverage	3,936.0000	0.2195	0.1742	0.0000	0.1991	0.7368
Net Working Capital (excl. Cash)	3,936.0000	0.0618	0.1496	−0.2994	0.0574	0.4827
Operating Cash Flow Ratio	3,936.0000	0.0705	0.0668	−0.1757	0.0705	0.2625
Receivables / Assets	3,936.0000	0.1630	0.1176	0.0033	0.1421	0.5561
ROA at time t-1	3,936.0000	0.0292	0.0659	−0.2641	0.0320	0.2040
Firm Size (Percentile)	3,936.0000	0.5503	0.2602	0.1000	0.5502	1.0000
Short-Term Debt Ratio	3,936.0000	0.0583	0.0776	0.0000	0.0281	0.3739
tangibility_lag_w	3,936.0000	0.2810	0.1915	0.0080	0.2456	0.8366

Table 13 Summary Statistics of Control variables 2019

Summary Statistics of Performance Control Variables 2020						
Variable	N	Mean	Std. Dev.	Min	Median	Max
Asset Turnover	4,018.0000	0.8818	0.5296	0.0920	0.7743	2.8980
EBIT / Assets	4,018.0000	0.0320	0.0853	−0.3052	0.0393	0.2492
Interest Coverage Ratio	3,904.0000	116.4034	451.3654	−245.3538	7.7849	3,336.9728
Intangible Assets / Assets	4,018.0000	0.1270	0.1750	0.0004	0.0354	0.7135
Inventory / Assets	4,018.0000	0.1097	0.0947	0.0001	0.0930	0.4531
Leverage	4,018.0000	0.2283	0.1780	0.0000	0.2071	0.7260
Net Working Capital (excl. Cash)	4,018.0000	0.0473	0.1510	−0.3520	0.0441	0.4620
Operating Cash Flow Ratio	4,018.0000	0.0721	0.0754	−0.2011	0.0738	0.2853
Receivables / Assets	4,018.0000	0.1515	0.1129	0.0027	0.1295	0.5329
ROA at time t	4,018.0000	0.0137	0.0849	−0.3867	0.0266	0.2163
Firm Size (Percentile)	4,018.0000	0.5503	0.2601	0.1000	0.5504	1.0000
Short-Term Debt Ratio	4,018.0000	0.0590	0.0789	0.0000	0.0259	0.3736
Asset Tangibility	4,018.0000	0.2773	0.1912	0.0077	0.2406	0.8479

Table 14 Summary Statistics of Control variables 2020

Summary Statistics of Performance Lagged Control Variables 2021						
Variable	N	Mean	Std. Dev.	Min	Median	Max
Asset Turnover	4,109.0000	0.9014	0.5372	0.0852	0.7903	2.9940
EBIT / Assets	4,109.0000	0.0564	0.0776	−0.2216	0.0528	0.3008
Interest Coverage Ratio	3,999.0000	158.1786	586.6084	−149.9284	13.8547	4,600.3159
Intangible Assets / Assets	4,109.0000	0.1277	0.1753	0.0004	0.0362	0.7112
Inventory / Assets	4,109.0000	0.1168	0.1011	0.0003	0.0988	0.4622
Leverage	4,109.0000	0.2136	0.1722	0.0000	0.1885	0.7137
Net Working Capital (excl. Cash)	4,109.0000	0.0568	0.1476	−0.3241	0.0520	0.4695
Operating Cash Flow Ratio	4,109.0000	0.0649	0.0754	−0.1836	0.0644	0.2835
Receivables / Assets	4,109.0000	0.1496	0.1090	0.0031	0.1300	0.5382
ROA at time t-1	4,109.0000	0.0394	0.0694	−0.2310	0.0394	0.2607
Firm Size (Percentile)	4,109.0000	0.5502	0.2602	0.1000	0.5502	1.0000
Short-Term Debt Ratio	4,109.0000	0.0540	0.0743	0.0000	0.0229	0.3602
Asset Tangibility	4,109.0000	0.2665	0.1876	0.0078	0.2279	0.8252

Table 15 Summary Statistics of Control variables 2021

Summary Statistics of Performance Control Variables 2022						
Variable	N	Mean	Std. Dev.	Min	Median	Max
Asset Turnover	4,192.0000	0.9420	0.5495	0.1060	0.8296	3.1176
EBIT / Assets	4,192.0000	0.0550	0.0885	−0.3276	0.0531	0.3205
Interest Coverage Ratio	4,062.0000	159.9718	596.9993	−172.2657	12.1601	4,593.5120
Intangible Assets / Assets	4,192.0000	0.1292	0.1757	0.0003	0.0382	0.7033
Inventory / Assets	4,192.0000	0.1279	0.1088	0.0003	0.1088	0.4841
Leverage	4,192.0000	0.2155	0.1738	0.0000	0.1912	0.7416
Net Working Capital (excl. Cash)	4,192.0000	0.0685	0.1557	−0.3300	0.0656	0.4912
Operating Cash Flow Ratio	4,192.0000	0.0543	0.0780	−0.2303	0.0531	0.2881
Receivables / Assets	4,192.0000	0.1508	0.1075	0.0031	0.1326	0.5262
ROA at time t	4,192.0000	0.0344	0.0808	−0.3507	0.0375	0.2515
Firm Size (Percentile)	4,192.0000	0.5501	0.2602	0.1000	0.5500	1.0000
Short-Term Debt Ratio	4,192.0000	0.0564	0.0769	0.0000	0.0237	0.3745
Asset Tangibility	4,192.0000	0.2647	0.1866	0.0078	0.2270	0.8250

Table 16 Summary Statistics of Control variables 2022

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