MASTERS IN MANAGEMENT (MIM)

MASTERS FINAL WORK

DISSERTATION

CORPORATE GOVERNANCE AND FINANCIAL PERFORMANCE IN TIMES OF THE PANDEMIC

EMILIA FLORENTINE KLINGSÖHR

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ABSTRACT

This thesis aims to prove whether specific corporate governance mechanisms help listed companies to support their performance when responding to COVID-19. Company data from the French SBF120, UK FTSE100 and German DAX100 index firms for 2010 to 2020 and 2020 exclusively was studied, capturing different economic states.

Based on agency theory and several corporate governance studies, we hypothesize that firms that conform with corporate governance best practices show better corporate performance during the crisis. Therefore, the explanatory variables of the research are board size, CEO/Chairman duality, board independence, board ownership and the largest five shareholders, which operate as corporate governance proxies. The financial, operational, and market-based firm performance is measured by LogROE, LogROIC and LogTobin´s Q, respectively. OLS and Panel Regression within a quantitative research framework are applied to verify our hypotheses. Hereby, the statistical analysis follows a comparative approach: first, the regression outcomes for all years from 2010 to 2020 are reviewed. After that, it examined if these results as well sustain for the crisis year 2020.

The results provide evidence for the second and third research hypotheses: It is found that the separation of CEO and chairman roles and a higher level of board ownership help firms better overcome the unexpected financial shock created by COVID-19. However, we need to limit the research findings since they refer to observations of a small crisis period, solely including the first two pandemic waves. Therefore, the results must be re-examined when additional data become available.

KEYWORDS: corporate governance; COVID-19; firm performance; OLS; panel regression; listed companies

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GLOSSARY

ASIC – Australian Securities and Investments Commission.

BAFIN – Bundesanstalt für Finanzdienstleistungsaufsicht

CEO – Chief Executive Officer.

COO – Chief Operating Officer.

COVID-19 – Coronavirus Disease 2019.

DAX – Deutscher Aktienindex.

FTSE – Financial Times Stock Exchange.

GFC – Global Financial Crisis.

GLS – General Least Squares.

G7 – Group of Seven.

Log – Logarithm.

OLS – Ordinary Least Squares.

PDR – Panel Data Regression.

ROA – Return on Assets.

ROE – Return on Equity.

ROIC – Return on Invested Capital.

SBF – Société des Bourses Françaises.

STATA – Software for Statistic and Data Science.

UK – United Kingdom.

US – United States.

WHO – World Health Organization.

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1. INTRODUCTION

Financial markets reflect significant events that have occurred in the past and can be classified as either endogenous or exogenous shocks. Two of the most recent examples are the 2008 Global Financial Crisis and the COVID-19 epidemic. The GFC was an endogenous shock which resulted from in a loan-financed housing boom. As financial markets reacted to the economic decline, fiscal changes were made for averting recession. Recently, the exogenous shock of an unanticipated coronavirus created a worldwide health crisis (Izzeldin et al. 2021). By the end of 2020, more than 1.8 million individuals dyed, and about 81 million were getting infected by the virus (World Health Organization 2022). After that, several lockdown measures were taken, impeding the economy, and having significant consequences for financial markets. Even though the epidemic is global, many countries have been affected by the virus with varying intensity (Brauner et al. 2021; Izzeldin et al. 2021). Therefore, governments have taken differing measures (König and Winkler 2021). It is expected that the long-term consequences for the financial market will lead to an economic downturn of 3% to 6% (IMF 2020). Investors, practitioners, and regulators fear that companies fail to establish adequate restrictions to protect their capital from management fraud in such an uncertain crisis.

This mistrust is founded in several cases of managerial misconduct, which led to global financial scandals in the past. Most recently, the accounting fraud of the former Dax company Wirecard attracted public attention. In 2020 the audit of the German financial service provider discovered that 1.9 billion euros of the balance sheet total were missing. Accordingly, the 2019 financial statement could not be certified, which had severe consequences: The company's share price fell by more than 60 per cent in just a few days, and it had to file for insolvency shortly after. Finally, Wirecard was excluded from the German stock exchange. Both former COO and CEO were expelled and convicted for fraud while rejecting the accusations themselves (Bartz and Hesse 2020; McCrum 2020). The collapse of Wirecard sparked a national political controversy. Many criticized the incompetence of the German Federal Financial Supervisory Authority (BAFIN) and inappropriate closeness to Wirecard management (Bender et al. 2021). This case exemplifies what a lack of ethical behaviour and poor corporate governance across all business units can lead to.

Corporate governance defines as “a set of mechanisms—both institutional and market-based—that induce the self-interested controllers of a company to make decisions that maximize the value of the company to its owners" (Denis and McConnell 2003, p.2). It sets the guidelines for the relationship of the firm’s management and its board members, share- and stakeholders. The most essential characteristics of good corporate governance are transparency, accountability, and appropriate publication of trustworthy information to its stakeholders. This frequently entails addressing conflicts of interest and efficiently managing the firm. Such regulations aim to minimize inappropriate managerial behaviour and allow businesses to function more effectively. By limiting risks and gaining access to capital decisions, shareholders' interests are protected. An underlying principle of good corporate governance is that implemented policies and managerial behaviour must follow the company's ethical principles (Bhagat and Bolton 2019; Shirwa and Onuk 2020). Consequently, corporate governance is a fundamental component in providing investors with a sense of security during times of crisis.

Nowadays, most managers are aware of the possible negative long-term effects that inadequate corporate governance structures can have (Claessens and Yurtoglu 2013). Many researchers found evidence that better-governed companies outperform such with weak governance standards. Even though some mechanisms do not have a significant impact on firm profitability, they are perceived positively by the market (Allam 2018). Hence, a connection between good corporate governance and firm performance is suggested (Haniffa and Hudaib 2006; Lehn, Patro, and Zhao 2009; McConnell and Servaes 1990). This rationale especially applies to crises. It is proven that a firm's risk management and financing policies direct how hard a company is hit by a financial crisis (Kashyap, Rajan, and Stein 2008). Therefore, weak corporate governance can be the leading cause of financial losses during a crisis period. Conversely, when a company remains good corporate governance in times of uncertainty, it is more likely to maintain higher profitability (Kowalewski 2016).

These results are based on times when there was no crisis or refer to the 2008 Global Financial Crisis. With this, the following work tries to analyze whether the assumptions remain consistent for business during the corona crisis. So far, only a few authors have touched on this topic in a way. Izzeldin and others (2021) made a research on how the corona epidemic has impacted G7 stock markets and their business sectors.

They found that the UK and the US had the most variety in their business sectors' responses, which might be attributed to uncertainty in the initial response and implementation of lockdown measures. Also, the financial markets' reaction to COVID-19 is similar to a prior financial crisis and less to a previous pandemic. This is in line with a paper by Dias et al. (2020). It aims to analyze the capital market efficiency through stock market indices of Belgium, France, Germany, US, Greece, Spain, Ireland, Portugal, and China during 2020. They argue that the corona crisis is a situation that creates opportunities for arbitrage and abnormal returns, putting investors at risk. Accordingly, Stan (2020) debates that the management is in an exceptional situation during the corona pandemic, wherefore special behavioural strategies are necessary. The given study emphazises a comparative approach: it reviews the similarity between managerial behaviour patterns during the GFC in 2010 and the managerial choices made to avert the effects of COVID-19. Finally, Steele (2021) wrote a paper on directors' duties to avert insolvent trading in a crisis. The author studied the managerial responses to the pandemic in the Australian and German markets and provided lessons to be learned.

It becomes clear that there is not much literature about corporate governance and financial firm performance against the background of COVID-19. Since the pandemic has not ended yet and data is still to be collected, research finds itself just at the beginning. The findings of our study contribute to the emerging debate on whether, in advanced economies, firms with particular board and ownership structures are better able to withstand the unexpected financial shock created by COVID-19. Hereby, leading to the main research questions of the thesis:

What corporate governance mechanisms assist organizations in mitigating the adverse consequences of the corona crisis on their financial, operational, and market performance?

To answer this question, business data from the French SBF120, UK FTSE100 and German DAX100 index firms for 2010 to 2020 and 2020 exclusively was analyzed. Herewith, the study compares two different economic states and examines whether the results of all years also apply to the crisis period.

Since working with panel data, a quantitative research model was chosen to study the issue. As a starting point for our research, three hypotheses relating to a company's operational, financial, and market performance were developed. After reviewing the descriptive statistics, the hypotheses were tested by performing Ordinary Least Squares and Panel Data Regression in STATA.

Therefore, the work is structured as follows: Chapter two covers the theoretical foundation for the subsequent analysis. It describes essential facts concerning COVID-19 and argues why the pandemic should also be considered a financial crisis. Additionally, the main theories of managerial research, namely agency theory, stakeholder theory and stewardship theory, are presented. To assess the governance structures of the German, French and UK market, the essential parts of the respective corporate governance codes were summarized. Based on the analyzed literature, the different corporate governance mechanisms and their impact on firm performance are discussed in the third chapter. With this the different hypotheses are developed. Chapter four informs what and where the research data was gathered, what research methodology was applied, how the dependent and independent variables were measured, and what generated statistical models were used. Afterwards, the study results are presented by explaining the descriptive statistics and then discussing the OLS and Panel Regression outcomes. In this course, the regression results based on the different time periods are compared with each other. Finally, the thesis ends with a conclusion. Here, the research strategy and findings are summarized while stating limitations and implications for future research.

2. LITERATURE REVIEW

The most prominent governance systems are defined as either being internally or externally to the organization. An organization's equity ownership structure and its board of directors are crucial internal components. On the other side, important external instruments are the judicial systems and the market for corporate management (Denis and McConnell 2003). Essentially, Bhagat and Bolton (2008) argue that corporate governance depends on a firm's environment. A financial crisis caused by the pandemic corresponds to specific circumstances that a company must manage while doing business. Theoretical foundations relevant for answering the research question are clarified in the current chapter. Therefore, the corona pandemic and its financial effects are described below, and other vital terminologies of management research are defined. As already indicated, countries differ in their state regulations on corporate governance. Since these built the essential framework for firm corporate governance decisions, they will be considered at the end of this chapter.

2.1.Covid pandemic

In December 2019, COVID-19 emerged in China, which led the World Health Organization (WHO) to declare a worldwide pandemic only a few months later (Dias et al. 2020). From there on, an unprecedented health crisis was triggered. By February 2022, about 387 million people were infected with COVID-19, and over 5.5 million people died due to their infection (World Health Organization 2022). Since the virus has hit nations with different extent, governments have implemented numerous policies (Brauner et al. 2021). In this course, policymakers were trying to balance the trade-off between health and economic risks (König and Winkler 2021). However, many of the anti-pandemic regulations introduced by governments were hindering companies from operating as usual, causing harm to economies (Steele 2021). By February 2020, COVID-19 had made a significant impact across financial markets worldwide. The Dow Jones and the S&P 500 decreased by about 35% in about a month.

Meanwhile, the stock exchange's fluctuation was similar to the one observed during the Wall Street Crash in 1929 and the GFC of 2007-2008 (Baker et al. 2020; Izzeldin et al. 2021). Followingly, many authors view the pandemic not only as a health but also an economic crisis (E.g. Izzeldin et al. 2021; König and Winkler 2021; Stan 2020; Steele

2021). Taking up this literature, we expect the pandemic to show characteristics in line with the former crises. For this reason, we treat the COVID-19 pandemic as a monetary emergency rather than an epidemic event. Furthermore, even though the long-term economic impacts are unclear, a current study on major historical pandemics found that the economic disadvantages of pandemics last for over 40 years and indeed exceed those of wars (Jordà, Sing, and Taylor 2020).

Looking at the issue in more detail, company managers are ultimately confronted with how to handle such a crisis best. Pointing out that concern, ASIC commissioner John Price stated that "the economic circumstances surrounding COVID-19 present many challenges to companies, boards and management" in April 2020. Therefore, it is interesting to analyze which corporate governance factors support firms and their management to overcome better the difficulties triggered by the crisis.

2.2. Agency Theory

Agency theory is founded on the separation of ownership and control of a firm and the divergent interests of the respective parties. Agents – also known as managers- are expected to not always act in the company's best interest and somewhat be self-orientated and self-serving. Meanwhile, the shareholders' goal is to increase firm value to maximize their profits. This puts them at a disadvantage since managerial decisions do not always enhance firm performance (Berle and Means 1932; Jensen and Meckling 1976). Jensen and Meckling (1976) suggest two essential ways in aligning managers and shareholders' interests: First, to monitor the agent's behaviour preventing him/her from behaving opportunistically. Second, to entice the agent with rewards that help make him/her act in the principal's interest. In both cases, a precise contract is necessary. However, it can be hard or eventually impossible to specify each parties' rights in detail. Moreover, the manager who has superior knowledge about a company is better positioned to assert one's interests when writing the contract (Fama 1980; Fama and Jensen 1983). Agency costs arise from these differences. These may contain the costs for lawyers structuring the contract, monitoring, and controlling agents, and losses due to unfavorable decisions made by agents (Duppati, Scrimgeour, and Sune 2019).

2.3 Stakeholder Theory

According to the stakeholder theory, corporate management must consider the interests of the shareholders and all stakeholders without whose support the company would not be able to survive. The group of stakeholders is consequently very heterogeneous and includes, for example, employees, customers and suppliers, the state and the public. Following from this, the enterprise is seen as an organization in which various interest groups (stakeholders) are united. The task of the company management is to mediate between the different groups to align their interests (Freeman et al. 2010). Freeman (1984) says that , different corporate governance mechanisms must be applied to solve disputes between a company's management and its stakeholders.

A central premise of the stakeholder literature is that when stakeholders' interests are managed well, corporate value is created and therefore, firm performance increases (T. Donaldson and Preston 1995; Freeman 1984; Freeman et al. 2010). Consequently, it is assumed that stakeholder management is positively affecting firm performance (i.e. Berman et al. 2006; Choi and Wang 2009).This assumption also builds a guiding principle for the following work.

2.4. Stewardship Theory

The stewardship theory is based on the research of Donaldson (1990), Donaldson and Davis (1991) and Davis et al. (1997). It offers a sociologically and psychologically shaped explanation for organizing corporate management in firms and represents the counterpart of the agency theory by Berle and Means (1932). Similarly, the stewardship theory is based on the exchange relationship between a headmaster and a steward. However, the critical difference between the agency and stewardship approach lies in the behavioural principles of the steward. The steward's self-serving behaviour at the expense of owners and thus the construct of the "homo oeconomicus" is neglected within the framework of the stewardship theory (Dutzi 2005). This is due to psychological, behavioural patterns in which financial motives become less important as need satisfaction increases. Non-financial motivational factors, which determine the relationship between members and stakeholders, are thus at the heart of company managers' actions. Motivational factors include taking on responsibility and engaging in challenging activities, developing, or improving corporate reputation, and developing

flexibility to increase one's commitment. Therefore, a steward is expected to behave in a community-orientated manner, valuing the companies' goals more highly than his/her ones. Thus, the steward's interests are more intrinsic than extrinsic (Davis, Schoorman, and Donaldson 1997; L. Donaldson and Davis 1991).

Since executive actions align with owners' interests, there are no conflicts of objectives between the contract partners. Thereby, information asymmetries as in principal-agent theory are rejected. Unlike the agency approach, it is unnecessary to implement specific control measures or financial incentive schemes because the collective goal is more significant than the stewards individual economic advantage (Davis, Schoorman, and Donaldson 1997). This behaviour benefits principals as a good steward maximizes shareholder wealth through firm performance (L. Donaldson and Davis 1994).

2.5 Corporate Governance Codes

The increasing complexity of corporate-society relationships and current corporate governance incidents have increased global pressure for corporate governance standards that manage relationships with stakeholders (Okhmatovskiy and David 2012). Rather than mandatory laws, these regulations have frequently taken the form of voluntary standards. Many governments have reduced legislative responsibilities to a few fundamental norms and supported the establishment of non-binding corporate governance standards (Pierce and Waring 2004). These norms are often expressed as guidelines, and their implementation is frequently dependent on reputational processes (Wymeersch 2005). As the United Kingdom published the Cadbury Report in 1992 numerous nations enacted national corporate governance laws. Most of these codes are based on the "compliance or explain" principle. Therefore, compliance isn’t legally required, however companies must reason their detraction. These nonmandatory guidelines can effectively promote good corporate governance because they draw investors' interest (Okhmatovskiy and David 2012; Wymeersch 2005). In line with that, multiple corporate governance authors see a link between a firm's compliance with a national code to its market value (Fernández-Rodríguez, Gómez-Ansón, and Cuervo-García 2004; Goncharov, Werner, and Zimmermann 2006). Further, corporate governance laws can be supportive in times of crisis like the corona pandemic. Companies that comply with the code are mainly in a

good initial position since its regulations address board balance, supporting the board to make efficient decisions even in challenging situations. (Duppati, Scrimgeour, and Sune 2019).

2.5.1 UK Corporate Governance Code

The UK corporate governance code was last updated in July 2018. According to the code, the chair must be independent continuously. It is stated that the chair may not serve for more than nine years. Any executive board member is entitled for the position. This creates incentives for employees who want to develop within the corporation. Further, the requirements for the independence of non-executive directors are underlined. Also, it should be reported on how a board is structured and how its performance is assessed. The code requires that the allocation of positions should be performance-based to promote diversity throughout the company. In line with that, organizations are obligated to reveal guidelines for firm diversity and inclusion. Meanwhile, the board must recognize the opinions and ideas of the company's workforce. Executives should explain the ways in which stakeholder interests were considered when setting company goals. Firms need to properly examine upcoming risks and credible threats. Based on this, strategies should be developed on how best govern them. In case a company is not equipped with an internal audit department or committee, the absence must be explained in the annual report. Consequently, firms must develop rules that define how internal assurance is maintained and how this affects external audit work. It is critical to make the CEO compensation ratio public. This necessitates the creation of a compensation ratio table for executives in the first, second, and third quartile (Financial Reporting Council 2018).

2.5.2 French Corporate Governance Code

The executive board is a collaborative unit elected by firm owners. It should operate in the firm's best interests. All public limited corporations in France are allowed to select between a board of directors, a supervisory board, and a management board. Governmental rules are not favoring any method, wherefore companies are free in choosing its preferred management type. A firm's financial transparency strategy is determined by the board of directors. Corporations are required to implement rules concerning the communicating with the public market. Any communication activity must ensure that everyone has access to the same information simultaneously. Boards must

address the intended member proposition and that of its committees, particularly regarding diversity. The corporate governance report should include the implemented diversity guidelines, and also an explanation of the guideline's goals. In connection with this, application measures and results accomplished during the past business year should be mentioned. In stock companies with no controlling owners, independent directors should account for fifty percent of the board (Afep and Medef 2018; Djehane 2021).

2.5.3 German Corporate Governance Code

The most recent version of the German Corporate Governance Code was adopted on 16 December 2019 and came into force in March 2020. The code specifies the functions and composition of the executive and supervisory boards and their behavioural norms. On the one hand, the executive board is obliged to manage the corporation in the interest of its shareholders. Therefore, executives define a firm's strategic direction, coordinate their decision-making with the supervisory board, and implement strategic decisions. On the other hand, the supervisory board selects and discharges members of the executive board, supervises, and advises it. As a result, it plays a crucial role in decision-making. Shareholders exercise membership rights in the general meeting and thus influence the appropriation of profits and the discharge of the executive and supervisory board. In more detail, the supervisory panel decides, within the framework of statutory provisions, on the number executives, the qualifications required and the appointment of suitable persons to certain executive positions. Further, it is advised that the supervisory board determines the proportion of women and pays attention to diversity when structuring the board. The first appointment for an executive board member shall not exceed three years, and the government recommends establishing an age restriction for board representatives. Meanwhile, the supervisory panel should be composed of shareholder representatives and, if applicable, employee representatives. With this, all members must have professional knowledge and skills for conscientiously performing their duties. To reduce conflict potential, it is recommended that more than half of the shareholder representatives on the supervisory board are independent, which means that there is no personal or business relationship to an executive board member or controlling shareholder. This is also advocated by maximum two previous board executives being members of the supervisory panel. Both boards should cooperate in the company's interest

and maintain a trusting relationship. For transparency reasons, the board of directors must inform the supervisory board on a frequent about their goal setting, strategy and risk planning (Deutsche Regierungskomission 2019).

3. RESEARCH HYPOTHESES

Based on current corporate governance literature, this chapter discusses how different corporate governance mechanisms affect operational, financial and market performance during a crisis. When firms are negatively affected by a crisis, financial research implies that most shareholders are concerned about the quality and structure of the board of directors (Leung and Horwitz 2010). The corporate board has the authority to make, or at least confirm, all major decisions, such as investment policy, management compensation policy, and board governance (Bhagat and Bolton 2019). It is one of a firm's most essential resources since its members offer skills, knowledge, and networks, which drive company value and success (J. L. Johnson, Daily, and Ellstrand 1996; Pfeffer and Salancik 1978). According to a review of existing literature on board effectiveness and corporate crisis, most empirical evidence demonstrates that specific board qualities may boost the survival odds of enterprises suffering a corporate crisis (Abatecola, Farina, and Gordini 2014). Board quality is improved by adjusting certain board attributes. E.g., the board's size, the number of directors, the proportion of independent directors and splitting the roles of the CEO and chairperson of the board between two individuals (Bhagat and Bolton 2019; Denis and McConnell 2003; Leung and Horwitz 2010). Additionally, the number of company shares held by the board members should not be disregarded (Bhagat and Bolton 2008). As a result, the current study posits that firms with effective boards are more likely to implement turnaround plans during a financial crisis. Accordingly, three different hypotheses are developed that need to be confirmed or refuted in the thesis:

The first hypothesis is aimed at one of the most extensively studied board characteristics: board independence. On one side, authors argue that firms with a high independence ratio do not experience any performance advantages. For example, Erkens, Hung and Matos (2012) raised data of nearly 300 international firms between 2007 and 2008. They found that such companies even experienced worse stock returns during the financial crisis. However, the reviewed companies were of financial kind, which

characteristics must be separated from non-financial firms. Further, high board independence may explain the 'risky' behaviour of institutional shareholders and independent boards before a crisis emerges. Since independent directors are not directly affected by the losses of a firm, they may encourage managers to increase the return of shareholders by taking a greater risk before the crisis emerges (Laeven and Levine 2009). Such behaviour can lead to descending financial and operational firm performance during and after the crisis. On the other side, many authors find a positive relationship between board independence and firm value, which is founded in agency theory. Board independence is assumed to be an effective corporate governance mechanism, as it accelerates decision making and lowers agency costs of the board (Denis and McConnell 2003; Lei and Song 2012). Thereby leading to superior firm performance and higher firm valuation (Hossain, Prevost, and Rao 2001). According to Kaplan and Minton (1994) such appointments, on average, stabilize and marginally increase business performance as measured by stock returns, operating performance, and sales growth, especially after poor stock performance and losses caused by a crisis. Hence, the following hypothesis was built:

Hypothesis 1: Board independence is likely to positively impact the financial, operational, and market-based performance when responding to the pandemic.

It is widely discussed in literature whether CEO/Chairman duality can be used as an effective corporate governance mechanism or not (Brickley, Coles, and Jarrell 1997; Dahya and Travlos 2000; Schmid and Zimmermann 2008). Duality exists when the CEO also holds a chairman position. On one side, stewardship theory emphasizes managers are motivated intrinsic, and there is no need in monitoring them. For that reason, it is harmless to stakeholders for an individual to hold both positions at the same time. Further, CEO/Chairman unity reduces the information asymmetries between CEO and chairman, so that he/she has a clear understanding of the respective responsibilities (Davis, Schoorman, and Donaldson 1997; Garas and ElMassah 2018; N. A. Sheikh and Karim 2015). On the other side, supporters of the agency theory argue that agency concerns increase when both tasks are fulfilled by different directors. They believe that the separation of the CEO and the chairman position is essential for improved contemporaneous and subsequent operating performance (Fama and Jensen 1983; Karim,

Abdul Manab, and Ismail 2020). Nuanpradit (2019) even found evidence that duality may lead to poorer monitoring, reliance, decreased board monitoring efficacy, and rising CEO entrenchment. Therefore, firm performance suffers with CEO/Chairman duality (Bhagat and Bolton 2013) and we assume that:

Hypothesis 2: CEO/Chairman duality is likely to negatively impact the financial, operational, and market-based performance when responding to the pandemic.

Board ownership is another factor that influences board dynamics and efficiency. The term refers to the percentage of outstanding company shares owned by the board of directors (E.g. Bhagat and Bolton 2008). On one side, high board ownership bares managers' risk of entrenching themselves. When the interests of outside shareholders and managers are not entirely matched, incentives for managers to exploit their ownership to act opportunistically. Simultaneously, entrenched managers do not fear reprisal if their decisions solely benefit themselves (Denis and McConnell 2003). Further, they can control the board's composition, by appointing the chairman and board directors and increasing the number of board members. This creates the risk that managers on the board are less likely to perform their monitoring roles and of communication problems among the board (Lasfer 2006). Consequently, board ownership is becoming an ineffective corporate governance mechanism. Supporters of agency theory, however, argue that in case ownership and control are not fully coincident, the potential for conflicts of interests between owners and controllers increases. Magnifying managerial ownership, therefore, is a tenable approach for aligning both perspectives (Fama and Jensen 1983; Jensen and Meckling 1976). Bhagat and Bolton (2008, 2019) point out that board members with suitable stock ownership may be incentivized to conduct adequate monitoring and oversight of crucial company choices. They emphasize that board members' stock ownership is an appropriate scale for overall good governance. It is tied to both future operating success and the likelihood of disciplinary management turnover in underperforming organizations. Additionally, it preserves stock value for minority investors by decreasing the impact of the free-rider problem of monitoring managers (Ali, Chen, and Radhakrishnan 2007; Jensen 1993). Given the effect of managerial ownership on company performance, it may be assumed that the key lies in the trade-off between the alignment of interest and the previously discussed entrenchment effects (Brickley and

Zimmerman 2010). The present research responds to utilizing board ownership as a metric of good corporate governance and improving business performance, with the extension of being a helpful mechanism in times of crisis. Hereby, leading to our last research hypothesis:

Hypothesis 3: Board Ownership is likely to positively impact the financial, operational, and market-based performance when responding to the pandemic.

As further hypotheses would go beyond the qualitative scope of the work, the variables board size and ownership of the largest five shareholders were not examined.
The Table I below gives an overview of the expected hypotheses results:

Table I - Summary of Hypotheses

Hypothesis	Variable	Financial performance (LogROE)	Operational performance (LogROIC)	Market based performance (LogTobin‘sQ)
1	Board Independence	+	+	+
2	CEO/Chairman duality	-	-	-
3	Board Ownership	+	+	+

4. METHODOLOGY AND DATA

The following chapter first gives an overview of the applied research methodology. Afterwards, the source and content of the research database are described. This section also explains how the database was adjusted for outliers and missing values to grant robustness. It is crucial to explain why specific proxies were used to measure corporate governance and firm performance. Therefore, we substantiate our approach in 4.3. with different literature. In the last section of this chapter, the statistical models developed to test the hypotheses are stated.

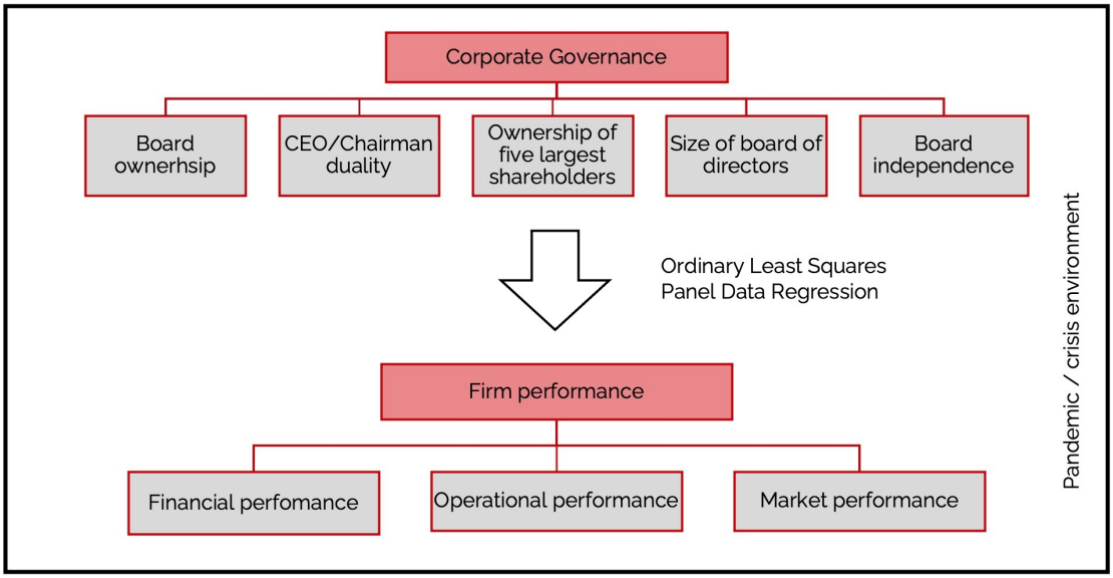
4.1 Research Methodology

The purpose of this research is to determine whether particular corporate governance mechanisms aided French, German, and UK stock companies in mitigating the financial crisis caused by the corona pandemic. Since analyzing company data at specific time periods is necessary, a quantitative approach was chosen to assess the issue. In more detail, quantitative research collects and interprets numerical data. Its main kinds are descriptive and experimental research. While descriptive research simply seeks an overall summary of the study variable, the experimental research investigates causality between variables (Bryman 2012). Therefore, the experimental kind was used to verify causal linkages between companies' corporate governance and performance variables. As a companies' corporate governance is a 'soft' factor which itself is difficult to measure, it would have been an option to assess it based on the Bloomberg Governance Scores. These evaluate the dynamics of governance metrics for about 4350 companies by considering board composition and board compensation. In order to achieve even more detailed results five quantifiable variables were chosen for estimating it: board independence, CEO/Chairman duality, board ownership, board size and ownership of the five largest shareholders. Those variables represent the independent variables of the analysis.

Financial firm performance, operational firm performance, and market-based performance are the dependent variables, which can be quantified by using known key figures: Return on Equity, Return on Invested Capital and Tobin's Q ratio. In order to achieve more valid results, the log of each dependent variable was applied. Ordinary Least Squares and Panel Data Regression were applied as statistical methods to test the

hypotheses. In section 4.4. it is discussed why this seems to be most appropriate for the research analysis. The just described research methodology is summarized in the figure below.

Figure 1 - Research Model



4.2 Sample and data source

The initial data sample of this research includes all non-financial companies within the French SBF100, UK FTSE100 and German DAX100 index for the years 2010 to 2020. It also would have been possible to do the research using a cross European index as e.g. the MSCI Europe, Euronext100 or Eurostoxx 50. By considering the individual indices, we have the advantage that the results can be analyzed not only on a global level, but also for each country separately. Companies in the financial field, such as investment firms and banks, were not considered due to their unique characteristics. For example, financial firms have their own set of rules and standards for corporate governance, and they underlie external regulatory audits (E.g. Schultz, Tan, and Walsh 2010). Companies that have been delisted and merged during the research period were also excluded from the data set. The data set contains listed companies which operate in eight different sectors: 18.26% of the analyzed firms are in the Consumer, Cyclical sector, 9.62% in the Basic Material sector, 11.1% in the Communications sector, 43.27% in the Consumer, Non-cyclical sector, 2.49% in the Energy sector, 19.71% in the Industrial sector, 9.62% in the Technology sector and 5.77% in the Utilities sector. An overview of the sample section can be reviewed in Table IIIII.

Table II - Sample Section according to Business Sectors

Sector	Study population	Germany	France	UK
Consumer, Cyclical	38	10	15	13
Basic Materials	20	8	5	7
Communications	23	7	11	5
Consumer, Non-cyclical	49	12	18	19
Energy	5	-	3	2
Industrial	41	21	15	5
Technology	20	9	10	1
Utilities	12	2	5	5
Total	208	69	82	57

It was necessary to treat outliers and missing values correctly to grant robustness (Acock 2005; Goktan, Kieschnick, and Moussawi 2018; M. F. Sheikh et al. 2018). Most commonly, outliers are evened out by either cutting the tails of the population, substituting the values with the median or by dropping all of them (Aldamen and Duncan 2012; Beekes et al. 2016; Fairhurst and Nam 2020). Based on the findings of the reviewed authors, it was decided to cut the tails at the one percent level since. By doing so, solely the population above 1% and below 99% will be considered for further analysis (E.g. Beekes et al. 2016; Fairhurst and Nam 2020; Jaiswall and Raman 2021; M. F. Sheikh et al. 2018). A traditional way of handling missing values is to, e.g., do a mean substation. However, many researchers criticize the traditional methods, as they can result in significant biases (Acock 2005; Enders 2010). Therefore, one of the more prominent approaches is to drop all of the missing values for having a robust data set (Aldamen et al. 2020; Chapple and Truong 2015; Fairhurst and Nam 2020; Francis, Hasan, and Wu 2015; Misangyi and Acharya 2014). Since the database features only a few missing values, it seemed reasonable to apply this method and not substitute it with any other value. Editing on outliers and missing values was done by coding in Python. A summary of the research on outliers and missing values can be found in the two tables below.

Table III - Research on Outliers

Method Paper	cut tails at 1% level	subsitute by median	drop all
Aldamen, Duncan, Kelly & McNamara (2020)			x
Sheikha, Shahb & Akbarc (2021)	x		
Fairhurst & Nam (2020)	x		
Jaiswall & Raman (2021)	x		
Goktan, Kieschnick & Moussawi (2018)		x	
Beekes, Brown, Zhan & Zhang (2016)	x		
Liao, Mukherjee, Wang (2015)	x		
Aldamen & Duncan (2012)			x
Jiraporn & Gleason (2007)	x		

Table IV- Research on Missing Values

Method Paper	substitute by average	subsitute by median	drop all
Aldamen, Duncan, Kelly & McNamara (2020)			x
Francis, Hasan & Wu (2015)			x
Fairhurst & Nam (2020)			x
Chapple & Truong (2015)			x
Misangyi & Acharya (2014			x
Acock (2005)	x		x
Allison (2001)	x		
Enders (2010)	x		
Little & Rubin (2002)	x		

This research aims to determine whether some companies outperformed others by applying specific corporate governance mechanisms when responding to the pandemic. Therefore, the studied data set included company data for the entire period between 2010 to 2020. However, the data from 2010 to 2020 and 2020 itself was evaluated individually, allowing us to conclude regarding the time of interest. The described screening process results in 2372 non-financial firm-year observations. Almost all financial data (e.g. ROE, ROIC, Tobin's Q) and board data (e.g. board independence, board size) was collected via Bloomberg. However, for the UK and German stock companies, board ownership, major shareholders, and the five largest shareholders had to be obtained via the annual report, corporate website, or MarketScreener.

4.3 Measurement of variables

It has been studied what and how specific corporate governance mechanisms can mitigate the adverse effects of crisis events on corporate performance. For example, Bhagat and Bolton (2019) suggest single corporate characteristics as corporate governance determinants: board independence, stock ownership of board members and whether the Chairman and CEO positions are held by the same or two different individuals (Brickley, Coles, and Jarrell 1997; Hermalin and Weisbach 1998; Jordà, Sing, and Taylor 2020). Additionally, stock ownership of the largest shareholders (E.g. Denis and McConnell 2003) and board size (E.g. Erkens, Hung, and Matos 2012; Jensen 1993; S. Johnson et al. 2000; La Porta et al. 1999; Shleifer and Robert 1997) are used as corporate governance proxies by several authors.

The variable board independence relates to the number of independent directors on the board divided by the total number of board members. An independent board member is defined as one who does not have any relation to the company except the board seat. Therefore, this study classifies directors with former executive functions, a family relationship with an executive officer, or other business ties, such as lawyers or consultants, as non-independent directors (Aebi, Sabato, and Schmid 2012). As mentioned earlier, many authors find a high board independence ratio to be an effective corporate governance tool that stabilizes and modestly improves corporate performance (Duchin, Matsusaka, and Ozbas 2010; Duppati, Scrimgeour, and Sune 2019; Hossain, Prevost, and Rao 2001; Lei and Song 2012). Eventually, high board independence is a

risk related corporate governance mechanism associated with superior firm performance during crises (Aebi, Sabato, and Schmid 2012; Kaplan and Minton 1994; Leung and Horwitz 2010).

Often board members own equity shares of the firm, which is why ownership and control are not always wholly separated (Denis and McConnell 2003). Hence, board ownership is the ratio of all shares held by board directors to the total company shares outstanding. As in agency and stakeholder theory, the overlap between ownership and control aligns managers and shareholders' interests and enhances firm performance (Bhagat and Bolton 2019; James 2008; Laeven and Levine 2009; Leung and Horwitz 2010). The study contributes to the ongoing debate on whether firms with strong managerial ownership are better able to withstand unexpected financial shocks than with lower levels of board ownership. As a result, the research follows Bhagat's and Bolton's (2008) approach to use the board's dollar ownership as a corporate governance measure.

A central assumption of organization theory is that chairman and CEO duality enhances firm corporate governance and performance (Garas and ElMassah 2018; Karim, Abdul Manab, and Ismail 2020; N. A. Sheikh and Karim 2015). Agency costs can be reduced by separating decision management from decision control, and the board of directors is only an effective mechanism for decision control if it limits senior managers' choice discretion (Bhagat and Bolton 2008; Fama and Jensen 1983; Jensen 1993). For this reason, the binary variable CEO/chairman duality was included in the analysis, taking the value of one if the chairman is the same person as CEO and zero otherwise.

Prior studies suggest that major shareholders affect firm corporate governance since they serve important disciplining and monitoring roles (Erkens, Hung, and Matos 2012). Blockholders can intervene in managerial decisions that will either increase overall shareholder value or privately benefit major shareholders. Accordingly, concentrated ownership empowers the conflict of interest between minority and major shareholders, potentially at the expense of smaller shareholders (Anderson and Reeb 2003; Fan and Wong 2002; S. Johnson et al. 2000; Shleifer and Robert 1997). As a result, the eventual impact of blockholder ownership on company value is determined by the trade-off between the shared benefits of blockholder governance and any private extraction of firm value by major shareholders (Denis and McConnell 2003). For this reason, it was considered profound to draw a link between the ownership of major shareholders and

corporate governance. The ownership percentage of major shareholders was calculated by adding up the shares of the five largest shareholders and dividing them by the total number of firm-shares outstanding.

Lastly, board size is an important corporate governance variable to observe since it is associated with board independence and operating complexity (Erkens, Hung, and Matos 2012). There is much research on how board size can affect board efficiency and performance (Duppati, Scrimgeour, and Sune 2019; Mak and Yuanto 2002). E.g., a larger board requires much more coordination and communication, and there is more space for problems to arise (Jensen 1993). Thus, it seems reasonable to incorporate this variable as a proxy for corporate governance. In this study, board size is measured by summing up the number of executive and non-executive directors.

Return on Equity, Return on Invested Capital and Tobin's Q Ratio are used as performance proxies. These measures capture the firm's financial, operational and market performance. The research follows many authors, which applied these variables as performance indicators (E.g. Arora and Sharma 2016; Bhagat and Bolton 2008; Malik and Makhdoom 2016; Renders, Gaeremynck, and Sercu 2010; Vithessonthi and Tongurai 2015). The Return on Equity is calculated by dividing the company's net earnings by its shareholders' equity. ROE is defined as the return on net assets since shareholders' equity equals a company's assets less its debt. ROE is regarded as a measure of a company's profitability and efficiency in generating profits and therefore gives insights into a firm's financial performance (Kumalasari and Pratikto 2018). The Return on Invested Capital can be computed in several ways. The current study corresponds to the ratio of a firm's operating earnings to its invested capital, where the invested capital equals the total assets minus liabilities. The metric is used to evaluate a company's efficiency in allocating the capital under its control to successful ventures. ROIC measures how effectively a company uses its capital to generate profits. In fact, this measure gives insights to a company's operational performance (Vuran and Adiloglu 2017). Lastly, the Tobin's Q Ratio is calculated by adding up a firm's market capitalization with its liabilities, preferred equity, and minority interest and dividing that sum by its total assets. It expresses the relationship between market valuation and intrinsic company worth at its most basic. In other words, it is a method of determining if a particular firm or market is overpriced or underpriced (Gompers, Ishii, and Metrick 2003).

As mentioned previously, it was made a logarithmic transformation of the performance variables. This improves the data set and statistical analysis in several ways: reducing skewness and producing a more normally distributed data set. Additionally, it is beneficial for eliminating heteroscedasticity and improving the linearity between the dependent and independent variables (Studenmund 2017). Hence, the actual performance variables used were: LogROE, LogROIC and LogTobinsQ. Throughout the study, the firm's size, as assessed by revenues and debt-to-asset leverage, were employed as control variables. These coefficients were chosen since small businesses are more likely to be closely held, implying a distinct governance structure than large businesses. Organizations with more chances for growth are likely to have different ownership and governance structures than firms with fewer opportunities for growth (Demsetz 1983; Duppati, Scrimgeour, and Sune 2019).

4.4 Statistical models

The following is the core empirical model used to explore the impact of corporate governance procedures on company performance:

$$(1)\ Firm\ Perfomance = \beta_0 + \beta_1 \sum_{G=1}^{n} (Governance) + \beta_2 \sum_{C=1}^{n} (Control) + \varepsilon$$

Firm performance is measured by LogROE, LogTobinsQ and Log ROIC. Governance proxies are the board independency ratio, board ownership, CEO/Chairman duality, board size and major shareholders. Control variables include firm size and leverage. Therefore, the baseline models are as follows:

$$\begin{aligned}(2)\ LogROE = \beta_0 + \beta_1 Board\ independence + \beta_2 Board\ ownership \\ + \beta_3 CEO\ Chairman\ duality \\ + \beta_4 Ownership\ of\ the\ largest\ five\ shareholders \\ + \beta_5 Board\ size + \beta_6 Firm\ size + \beta_7 Leverage + \varepsilon\end{aligned}$$

$$\begin{aligned}(3)\ LogROIC = \beta_0 + \beta_1 Board\ independence + \beta_2 Board\ ownership \\ + \beta_3 CEO\ Chairman\ duality \\ + \beta_4 Ownership\ of\ the\ largest\ five\ shareholders \\ + \beta_5 Board\ size + \beta_6 Firm\ size + \beta_7 Leverage + \varepsilon\end{aligned}$$

$$(4)\ LogTobinsQ = \beta_0 + \beta_1 Board\ independence + \beta_2 Board\ ownership + \beta_3 CEO\ Chairman\ duality + \beta_4 Ownership\ of\ the\ largest\ five\ shareholders + \beta_5 Board\ size + \beta_6 Firm\ size + \beta_7 Leverage + \varepsilon$$

The most common shortcoming of previous corporate governance and business performance research is that many of them suffer from econometric concerns such as a lack of statistical power (Renders, Gaeremynck, and Sercu 2010). In response to that, we examined our regression model for significant statistical issues: multicollinearity, endogeneity, heteroskedasticity and autocorrelation. Multicollinearity is referred to as the presence of substantial intercorrelations between two or more explanatory variables in a multiple regression model. When interpreting the effects of an independent on the dependent variable, it can lead to skewed or misleading results. For this reason, the database does not consider dependent variables that measure similar factors. Endogeneity arises if any of the explanatory variables is correlated with the error term. OLS estimates will be inconsistent except if the exogenous and endogenous are independent from each other (Cameron and Trivedi 2005). This can happen under various circumstances, but two are particularly common in research: (1) when essential variables are omitted from the model and (2) when the outcome variable is a predictor of x rather than simply a response to x (Lynch and Brown 2011). In terms of the current investigation, the relationship between corporate governance and firm performance could be correlated with other latent variables we cannot account for. The Hausman Test was applied to treat this issue. It allows us to choose between fixed or random effects as an endogeneity estimator, which is then used in regression analysis (Hausman 1978). As shown in Appendix 8 we do not reject the null hypothesis for the variable ROE, which means that the difference in coefficients is not systematic and random effects is appropriate. In the case of ROIC and Tobin's Q, we must reject the null hypothesis, leading us to apply fixed effects. In regression analysis, heteroscedasticity is discussed in terms of residuals or the error term. Heteroscedasticity is defined as a systematic variation in the spread of residuals over the range of measured values (White 1980). Because OLS regression assumes that all residuals are obtained from a population with a fixed i.e., homoscedastic variance, heteroscedasticity is a concern (Frost 2020). Therefore, the variance consistency was

tested through the Breusch-Pagan/Cook-Weisberg test, where the alternate hypothesis predicts the constant variance of the regression model (Breusch and Pagan 1979). In fact, the null hypothesis was rejected for all explanatory variables, leading to the existence of heteroscedasticity. Additionally, it is necessary to take care of autocorrelation, which describes the correlation of a function with itself at an earlier point in time (Dunn 2005). For this purpose, it is made use of the Wooldridge test, where the null hypothesis is that there is no first-order autocorrelation (Drukker 2003). Considering the explanatory variable ROE, we do not reject the null hypothesis, meaning that there is no autocorrelation. However, the null hypothesis for ROIC and Tobin's Q cannot be rejected, indicating the existence of autocorrelation.

Finally, we need to specify the statistical methods that are used to analyze the data in STATA. Many corporate governance studies simply apply OLS for finding results. However, Brown et al. (2011) points out that studies doing so, suffer from unobserved heterogeneity, heteroscedasticity, and autocorrelation. Likewise, the previous results of the Hausman, Breusch-Pagan and Wooldridge test call for more statistical strength. The current study uses Panel Data Regression models in addition to OLS to overcome this limitation. According to the performed Hausman test, the general least squares (GLS) estimator is used to fit the random-effects model of LogROE to Panel Regression (Hausman 1978). Meanwhile, the within regression estimator is applied to fit the fixed-effects models of LogROIC and LogTobin's Q to Panel Regression. The analysis is performed in two different economic states, allowing us to draw a conclusion on the impact of corporate governance on firm performance against the background of the pandemic.

5. RESULTS

In this chapter, the descriptive statistics are reviewed. This offers a first impression of how the explanatory and dependent variable values have developed in the different periods. , the OLS and Panel Regression results are discussed regarding the three hypotheses.

Tables IV and VI report the descriptive statistics, particularly mean, standard deviation, minimum and maximum of the independent, dependent and control variables used throughout this research. However, Table VI presents the statistics of all years, while the crisis statistics are presented in Table VIII. The reported descriptive statistics summarize the characteristics of the study samples and highlight the changes that happened to the research sample at the beginning of the corona pandemic in 2020. The average ROE decreased from 13.19% for the total sample to 10.14% for the crisis period. Likewise, the average ROIC decreased from 8.57% to 7.22% percent. However, the mean Tobin's Q ratio remained the same with a value of 1.71%. Still, a downturn in the companies' financial and operational performance during the pandemic can be inferred. Moving on to the explanatory variables, the average board ownership decreased from 15.48% to 15.05% when comparing the total data period to solely 2020 data.

Meanwhile, the average ownership of the largest five shareholders and board independence even increased from 39.15% to 41.53% and 58.25% to 62.12%, respectively. The mean of the variables board size and CEO/chairman duality nearly stayed the same when comparing the values of 2010-2020 to 2020. These statistics reveal that firms are more inclined to decrease their board ownership during the pandemic and increase the percentage of independent directors on the board; moreover, major owners tend to obtain an even more significant stake in the company during the pandemic period. However, the crisis affects board size and CEO/chairman duality negligibly. The control variables can detect an increase in the mean leverage and a decrease in revenues.

The OLS and Panel Data Regression results are sectioned into the studied periods and dependent variables observed. Appendices 1, 2 and 3 refer to the years 2010-2020 and report on the OLS and Panel Data Regression for LogROE, LogTobin's Q and LogROIC, respectively. Appendices 4, 5 and 6 are structured similarly, with the results referring exclusively to 2020. Herewith it is possible to compare the impact of the corporate governance measures on the financial, market-based and operational firm

performance from 2010 to 2020 to the crisis period in 2020.

Table V- Descriptive Statistics Total Sample (n=208; 2010-2020)

Dependent Variables	**Mean**	**SD**	**Min.**	**Max.**
ROE (%)	13.19	24.57	-197.14	265.57
ROIC (%)	8.57	10.06	-101.57	53.16
Tobin´s Q	1.71	0.98	0.06	11.45
Explanatory Variables				
Board ownership (%)	15.48	22.40	0.00	94.36
Ownership of the largest shareholders (%)	39.15	22.22	0.00	100.00
Board size	12.01	3.80	3.00	23.00
Independence of board of directors (%)	58.25	19.36	0.00	100.00
CEO/Chairman duality	0.22	0.41	0.00	1.12
Control Variables				
Leverage	0.25	0.15	0.00	1.33
Revenues	20736.76	47032.41	0.20	47017.1

Table VI - Descriptive Statistics Pandemic Period (n=208; 2020)

Dependent Variables	**Mean**	**SD**	**Min.**	**Max.**
ROE (%)	10.13	30.77	-197.14	165.82
ROIC (%)	7.23	12.24	-48.73	42.8
Tobin´s Q	1.71	1.01	0.81	8.74
Explanatory Variables				
Board ownership (%)	15.05	22.76	0.00	94.36
Ownership of the largest shareholders (%)	41.53	22.70	5.44	100.00
Board size	12.16	3.70	5.00	21.00
Independence of board of directors (%)	62.12	20.18	5.88	100.00
CEO/Chairman duality	0.20	0.40	0.00	1.00
Control Variables				
Leverage	0.31	0.15	0.00	0.93
Revenues	17032.38	30402.84	7.76	222884

6. CONCLUSION

6.1 Discussion

The *first research hypothesis* aims at board independence's impact on the financial, market and operational firm performance during the pandemic. Appendix 1 includes the regression outcomes between the explanatory variables and the financial performance, as measured by LogROE for 2010 to 2020. Here, the OLS for French index companies shows that board independence is cohering significantly to LogROE at a five percent level. However, this observation does not remain constant for 2020, which can be reviewed in Appendix 4. In terms of market performance, Appendix 2 reports on the relationship between the explanatory variables and LogTobin's Q for 2010 to 2020. According to OLS, board independence is significant for LogTobin'sQ at a one percent level on a global scale. Additionally, OLS proves that the market value of French and German index companies is significantly influenced by board independence. Even though the Panel Data Regression does not hold these results, a significant general relationship between board independence and market value can be inferred. Looking at the market performance regression outcomes for the crisis year 2020 in Appendix 5, no significant results emerge for LogTobin'sQ. Finally, neither appendices 3 or 6 show a significant relationship between board independence and the operational performance variable LogROIC. Therefore, the analyzed data is insufficient to conclude on the influence of corporate governance mechanisms on firm market performance at the beginning of the pandemic. Consequently, it is necessary to *neglect the first research hypothesis.*

The *second research hypothesis* discusses the possible effect CEO/Chairman duality can have on financial, market and operational firm performance during the pandemic. The OLS outcomes in Appendix 1 show that CEO/Chairman duality is correlated significantly at a one percent level to LogROE or financial firm performance on a global scale for the years 2010 to 2020. Panel Regression does not support the significance globally but on a UK and on a German level. When reviewing the regression results on financial performance for 2020 only, OLS shows that CEO/Chairman duality remains significant at a 10 percent level in 2020 from a global perspective. Therefore, there is evidence that organizations show a superior financial performance during the pandemic when different individuals hold the CEO and Chairman position. Moving on to the analysis on firm market performance for 2010 to 2020, Appendix 2 proves that

According to OLS, CEO/Chairman duality has a significant impact on LogTobin'sQ at a one percent level on a global scale. Additionally, Panel Regression shows that the correlation between CEO/chairman duality and LogTobin's Q lies below the one percent mark for UK stock companies. However, looking at the market performance regression outcomes for the year 2020 in Appendix 5, no significant results emerge for LogTobin'sQ. Therefore, the analyzed data is insufficient to conclude on the influence of corporate governance mechanisms on firm market performance at the beginning of the pandemic. Appendix 3 explores the correlation results for the operational performance as measured by LogROIC for the years from 2010 to 2020. The Panel Regression proves a significant relationship between CEO/Chairman duality and LogROIC for all regions and the OLS confirms this on the UK and global level. With this, the Panel Regression shows a five percent significance globally, one percent for UK stock companies and ten percent for French and German stock companies. Significances of OLS are on a one percent level globally and a ten percent level for UK index firms. Meanwhile, the LogROIC outcomes for 2020 in Appendix 6 do not align with these observations. There is no significant relationship between the variable CEO/chairman duality and LogROIC for any of the indexes in 2020. For this reason, it is not possible to say to what extent the variable affects the operational performance during the crisis.

According to the OLS results of CEO/Chairman duality and LogROE for 2020, a positive relationship between the CEO/Chairman duality and financial firm performance can be inferred. Therefore, *we can partly prove the second hypothesis.*

Finally, the *third hypothesis* must be examined. It argues that a higher level of board ownership supports a firm's financial, operational and market performance during the pandemic. Considering the data for all years OLS in Appendix 1 shows that board ownership is significantly correlated with LogROE globally, for UK and the French stock companies. In contrast, these results are neither supported by Panel Regression or the regression outcomes for 2020 only. Followingly, there was not found a positive relationship between board ownership and LogROE for the crisis period. By reviewing Appendix 2 the relationship between board ownership and market performance - as measured by LogTobin'sQ – for 2010 to 2020 can be observed. Both OLS and Panel Regression emphasize a significant relationship between board ownership and LogTobin'sQ for UK index firms, at a one and ten percent significance level, respectively.

Also, OLS suggests a significant correlation for German stock companies at a five percent level. Admittedly, the Panel Data Regression does not support this result. Again, when looking at the market performance outcomes for 2020 only, no significant results for LogTobin'sQ can be observed. For this reason, a general positive relationship between board ownership and market performance for UK and German stock companies is proven, which, however, does not apply to the crisis period. As a last step, the impact of board ownership on operational firm performance must be appraised. OLS for all years finds a ten percent significance level of board ownership and LogROIC, which, however, is not confirmed by the Panel Regression (Appendix 3). This is somehow supported by the 2020 regression outcomes in Appendix 6, as board ownership and LogROIC are significantly correlated globally at a ten percent significance level. Hence, there is evidence that a higher level of board ownership supports a company's operational performance in times of crisis. For this reason, *the third hypothesis can be partly supported.*

Moreover, Appendix 6 provides relevant content that goes beyond the research hypotheses. OLS for 2020 proves that the variable largest five shareholders is correlated to LogROIC on a global level and for UK stock firms, at a five and ten significance level, respectively. For this reason, it is helpful for companies if an increased proportion of shares belong to major shareholders in times of the pandemic. As our hypotheses have not investigated the variable largest five shareholders it seems reasonable to explore it in future research.

6.2 Academic contributions

To contain the outbreak of COVID-19, governments worldwide implemented severe restrictions within the paradigm of social distance. These finally resulted in fundamental changes in ordinary practices and had a significant economic impact. The magnitude of the pandemic's social and economic consequences cannot be conclusively clarified at the current state of knowledge.

Therefore, the underlying study seeks to contribute to the unprecedented body of literature and data research about corporate performance during the outbreak of COVID-19. The aim of this research was to specify whether certain corporate governance practices support a firm's financial, operational, and market-based performance when responding to the crisis. Indeed, it is of interest if there are corporate measures that help a firm to overcome the pandemic constraints better.

To get closer to this question, necessary theoretical foundations were laid, and three hypotheses were developed. Company data from the French SBF100, UK FTSE100 and German DAX100 index were analyzed, to test the research hypotheses. The original database was adjusted for e.g., outliers and several statistical tests were performed to eliminate significant statistical errors. In response to criticism from several authors, not only Ordinary Least Squares but also Panel Data Regression was used as a statistical model. A two-period framework was applied by first considering company data from 2010 to 2020 and then solely examining 2020 data, which allowed to focus on the period of interest.

6.3 Managerial contributions

Even though the first research hypothesis could not be justified, it was possible to partly prove the second and third hypotheses: We found significant correlations for the variable CEO/chairman duality and LogROE for 2010 to 2020 and 2020 exclusively. Indicating that the separation of CEO and chairman role positively impacts the financial firm performance during pandemic. Additionally, a significant relationship between board ownership and LogROIC was observed for 2010 to 2020 and 2020 exclusively; meaning a higher level of board ownership supports a company's operational performance in times of crisis.

6.3 Limitations

Still, the results must be critically questioned: The observed significances for 2020 were not particularly strong and exclusively applied at the global level and/or for UK index firms. This can be explained by the fact that there was no data beyond 2020 available at the research's beginning. Therefore, the findings refer to a small period, including the first two pandemic waves. Having said that, our results must be re-examined when new annual financial statements become available. Also, the research must be limited because it does not consider the different measures enforced by French, German and UK governments during the pandemic. Here we allude to, e.g., the stringency in social distancing, subventions by the government, fatality rate and other factors.

6.4 Further research

This work contributes to the emerging corporate governance and firm performance research in the context of the corona pandemic. We found evidence that specific corporate governance measures support the financial and operational firm

performance when responding to the pandemic. However, it is suggested that further analysis builds upon data that contains observations beyond 2020. Thereby, leading to even more substantial evidence. We believe that the research issue may be of interest to people worldwide, as a large part of humanity was either directly or indirectly affected by the pandemic. Precisely because it is not clear yet when or in what order the interventions in economic and social life will be ceased, it is critical to address how to best deal with them at an early stage.

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APPENDICES

A list of substantial studies sustaining the research hypotheses, the Python and STATA code developed can be accessed under the following link: *https://collect.wetransfer.com/board/s5fldb1i8rbpucijg20220314084137/latest.*

Appendix 1 - LogROE outcomes for years from 2010 to 2020

LogROE (2010-2020)	Global		UK		France		Germany	
	OLS	PDR	OLS	PDR	OLS	PDR	OLS	PDR
Board size	-0.0132	-0.0078	0.0008	0.0060	-0.0064	-0.0071	-0.0090	0.0063
	(0.013)**	(0.458)	(0.969)	(0.871)	(0.513)	(0.608)	(0.215)	(0.726)
CEO/Chairman duality	-0.2507	-0.0747	0.2756	0.7838	-0.0726	0.0164	-0.0725	-0.1780
	(0.000)***	(0.309)	(0.506)	(0.000)***	(0.225)	(0.845)	(0.926)	(0.002)***
Board Independence	-0.0014	-0.0012	0.0010	-0.0053	-0.0040	-0.0024	0.0007	0.0011
	(0.199)	(0.573)	(0.781)	(0.269)	(0.048)**	(0.406)	(0.612)	(0.745)
Board ownership	0.0025	0.0019	0.0083	0.0015	0.0048	0.0002	0.0022	0.0046
	(0.039)**	(0.702)	(0.090)*	(0.843)	(0.012)**	(0.951)	(0.191)	(0.305)
Largest five shareholders	-0.0051	-0.0052	0.0000	-0.0064	-0.0048	-0.0019	-0.0017	-0.0053
	(0.024)**	(0.110)	(0.996)	(0.415)	(0.175)	(0.567)	(0.643)	(0.408)
Revenue	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.102)	(0.061)*	(0.024)**	(0.006)***	(0.253)	(0.886)	(0.041)**	(0.961)
Leverage	0.3114	0.0472	1.3504	0.2987	-0.5237	-0.0531	0.0719	0.0226
	(0.014)**	(0.137)	(0.000)***	(0.565)	(0.014)**	(0.897)	(0.697)	(0.655)
R-squared	0.0313	0.0109	0.0729	0.0025	0.0299	0.0052	0.4242	0.0033

Prob > F	0.0000	0.0000	0.0025	0.0115

***,**,*, are significant at levels 1%, 5% and 10%, respectively.

Appendix 2 - LogTOBINSQ outcomes for years from 2010 to 2020

LogTOBINSQ (2010-2020)	Global		UK		France		Germany	
	OLS	PDR	OLS	PDR	OLS	PDR	OLS	PDR
Board size	-0.0272	0.00641	-0.0101	0.0056	-0.0249	0.0138	-0.0174	0.0122
	(0.000)***	(0.022)**	(0.220)	(0.510)	(0.000)***	(0.122)	(0.000)***	(0.512)
CEO/Chairman duality	-0.0940	0.0428	0.2175	0.4056	-0.0265	-0.0368	-0.0782	0.0285
	(0.000)***	(0.850)	(0.199)	(0.000)***	(0.331)	(0.372)	(0.727)	(0.828)
Board Independence	0.0018	0.0010	0.0020	0.0004	-0.0017	-0.0003	0.0041	0.0015
	(0.000)***	(0.402)	(0.160)	(0.839)	(0.055)*	(0.839)	(0.000)***	(0.457)
Board ownership	0.0008	0.0018	0.0071	-0.0077	0.0003	-0.0008	0.0019	-0.0023
	(0.146)	(0.154)	(0.000)***	(0.077)*	(0.699)	(0.764)	(0.016)**	(0.367)
Largest five shareholders	-0.0021	0.0016	-0.0035	-0.0073	-0.0050	-0.0010	0.0035	0.0024
	(0.033)**	(0.283)	(0.089)*	(0.004)*	(0.001)*	(0.702)	(0.051)**	(0.341)
Revenue	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.000)***	(0.575)	(0.000)***	(0.644)	(0.000)***	(0.382)	(0.000)***	(0.051)*
Leverage	-0.2999	0.1625	0.2365	-0.6332	-0.6223	-0.2446	-0.2700	0.0164
	(0.000)***	(0.137)	(0.035)**	(0.025)**	(0.000)***	(0.417)	(0.002)***	(0.942)
R-squared	0.1675	0.0178	0.0977	0.0152	0.1947	0.0597	0.2625	0.0412
Prob > F	0.0000	0.0816	0.0000	0.0000	0.0000	0.0607	0.0000	0.3050

***,**,*, are significant at levels 1%, 5% and 10%, respectively.

Appendix 3 - LogROIC outcomes for years from 2010 to 2020

LogROIC (2010-2020)	Global		UK		France		Germany	
	OLS	PDR	OLS	PDR	OLS	PDR	OLS	PDR
Board size	-0.0218	0.0054	-0.0218	-0.0039	-0.0130	-0.0076	-0.0141	0.0441
	(0.000)***	(0.723)	(0.169)	(0.881)	(0.140)	(0.712)	(0.032)**	(0.088)*
CEO/Chairman duality	-0.1899	0.2779	0.6209	1.1371	0.0047	0.2399	0.0902	0.1837
	(0.000)***	(0.034)**	(0.051)*	(0.000)***	(0.930)	(0.070)*	(0.899)	(0.055)*
Board Independence	-0.0010	-0.0026	0.0017	-0.0038	-0.0028	-0.0032	0.0004	-0.0024
	(0.277)	(0.222)	(0.530)	(0.354)	(0.118)	(0.228)	(0.738)	(0.584)
Board ownership	0.0011	-0.0019	0.0068	-0.0062	0.0015	-0.0058	0.0023	0.0031
	(0.283)	(0.612)	(0.067)*	(0.250)	(0.365)	(0.219)	(0.123)	(0.584)
Largest five shareholders	-0.0058	-0.0028	0.0026	-0.0066	-0.0070	0.0029	-0.0057	-0.0053
	(0.003)***	(0.359)	(0.513)	(0.247)	(0.027)**	(0.587)	(0.096)*	(0.291)
Revenue	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.000)***	(0.000)***	(0.000)***	(0.001)***	(0.000)***	(0.049)**	(0.267)	(0.879)
Leverage	-1.1741	-1.2519	-0.6782	-2.1609	-2.1435	-0.7333	-0.8459	-1.1517
	(0.000)***	(0.001)***	(0.002)***	(0.000)***	(0.000)***	(0.192)	(0.000)***	(0.117)
R-squared	0.1068	0.0009	0.0693	0.0126	0.1790	0.0006	0.0822	0.0032
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0144	0.0000	0.0000

***,**,*, are significant at levels 1%, 5% and 10%, respectively.

Appendix 4 - LogROE outcomes for year 2020

LogROE (2020)	Global	UK	France	Germany
	OLS	OLS	OLS	OLS
Board size	0.0044	0.0581	-0.0210	0.0261
	(0.866)	(0.585)	(0.671)	(0.493)
CEO/Chairman duality	-0.371	0.1552	-0.2005	0.2674
	(0.077)*	(0.922)	(0.447)	(0.808)
Board Independence	-0.001	-0.0169	0.0042	0.0017
	(0.879)	(0.438)	(0.670)	(0.799)
Board ownership	0.000	0.0191	-0.0067	-0.0024
	(0.947)	(0.444)	(0.449)	(0.746)
Largest five shareholders	0.006	0.0074	0.0059	0.0163
	(0.591)	(0.802)	(0.741)	(0.333)
Revenue	0.000	0.0000	0.0000	0.0000
	(0.763)	(0.287)	(0.981)	(0.491)
Leverage	0.231	0.7598	-0.7432	-0.1043
	(0.693)	(0.571)	(0.449)	(0.921)
R-squared	0.0277	0.1623	0.0527	0.0673
Prob>F	0.7926	0.5296	0.9144	0.8843

***,**,*, are significant at levels 1%, 5% and 10%, respectively.

Appendix 5 - LogTOBINSQ outcomes for year 2020

LogTOBINSQ (2020)	Global	UK	France	Germany
	OLS	OLS	OLS	OLS
Board size	-0.0076	0.0053	0.0187	-0.0211
	(0.444)	(0.879)	(0.344)	(0.143)
CEO/Chairman duality	0.0344	0.2244	0.1525	-0.1271
	(0.671)	(0.689)	(0.163)	(0.662)
Board Independence	0.0027	-0.0037	0.0033	0.0024
	(1.590)	(0.618)	(0.398)	(0.345)
Board ownership	0.0023	0.0044	-0.0001	0.0034
	(0.219)	(0.576)	(0.983)	(0.240)

Largest five shareholders	0.0025	-0.0096	0.0006	0.0090
	(0.511)	(0.331)	(0.925)	(0.168)
Revenue	0.000	0.0000	0.0000	0.0000
	(0.002)***	(0.317)	(0.012)**	(0.085)*
Leverage	-0.2314	0.3195	-0.5620	0.0034
	(0.246)	(0.477)	(0.077)*	(0.993)
R-squared	0.1001	0.1167	0.1303	0.2234
Prob>F	0.0064	0.6117	0.2256	0.0438

***,**,*, are significant at levels 1%, 5% and 10%, respectively.

Appendix 6 - LogROIC outcomes for year 2020

LogROIC (2020)	Global	UK	France	Germany
	OLS	OLS	OLS	OLS
Board size	-0.0265	0.0813	-0.0328	-0.0382
	(0.186)	(0.253)	(0.393)	(0.181)
CEO/Chairman duality	-0.0383	0.3936	0.2254	-0.0382
	(0.800)	(0.711)	(0.248)	(0.817)
Board Independence	0.0030	-0.0157	0.2254	0.0011
	(0.418)	(0.285)	(0.315)	(0.813)
Board ownership	0.0069	0.0166	0.0012	0.0071
	(0.058)*	(0.323)	(0.856)	(0.180)
Largest five shareholders	-0.0203	-0.0309	-0.0176	-0.0122
	(0.022)**	(0.097)*	(0.171)	(0.318)
Revenue	0.0000	0.0000	0.0000	0.0000
	(0.887)	(0.188)	(0.617)	(0.486)
Leverage	-1.4281	-1.9475	-2.5571	-0.2511
	(0.001)***	(0.033)**	(0.000)***	(0.745)
R-squared	0.1611	0.3422	0.2960	0.1155
Prob>F	0.0002	0.0217	0.0037	0.6054

Appendix 7 – Variable Overview

Performance variables	**Formula**
ROE (Return on Equity)	$ROE = \frac{\text{Net Earnings}}{\text{Shareholders´Equity}}$
ROIC (Return on Invested Capital)	$ROIC = \frac{\text{Operating Earnings or EBIT}}{\text{Invested Capital}}$ IC= Assets - operational liabilities
Tobin´s Q	$Tobin´s\ Q = \frac{\text{Mkt cap.} + \text{L} + \text{PE} + \text{MI}}{\text{Total Assets}}$ Mkt cap = Market capitalization L= Liabilities PE= Preferred equity MI= Minority interest
Corporate Governance Measures	
Board size	Executive and non-executive directors
Board ownership	$DO = \frac{\text{N of shares held by directors}}{\text{Total shares}}$ DO= Director ownership
Board independence	$BI = \frac{\text{N of independent board members}}{\text{Total number of board members}}$ BI=Board independence
CEO/Chairman duality	CEO/Chairman: taking the value of 0 if the chairman is the same of CEO and 1 otherwise
Ownership of the largest shareholders	$\text{OMS} = \frac{\text{N of shares held by five largest shareholders}}{\text{Total shares}}$ OMS = Major shareholder ownership
Control Variables	
Revenue	Sale of goods or services
Leverage	$Leverage = \frac{\text{Book value of total debt}}{\text{Book value of assets}}$

Appendix 8 – Statistical Tests

Explanatory variables		Ownership of the largest shareholders; Size of board of directors; Independency of board of directors; Posts of chairman and CEO; Board ownership						
Dependent variables		ROE		ROIC		Tobin´s Q		Conclusions
Test	Null hypothesis	Dist.	Prob.	Dist.	Prob.	Dist.	Prob.	
Test for choosing endogeneity estimator: Hausman Test.	Ho: difference in coefficients not systematic.	chi2(6)= 5.47	Prob>chi2= 0.4853	Chi2(6)= 24.62	Prob>chi2=0 .0004	chi2(6)= 59.35	Prob>chi2=0.0 000	Since Prob>chi2(6) of ROE: > 0.05 we do not reject the null hypothesis. This means that Random effects model is appropriate. As Prob>chi2(7) of ROIC & Tobin's Q: < 0.05 we reject the null hypothesis. This means that Fixed effects model is appropriate.
Test for the existence of heteroscedasticity: Breusch-Pagan Test	Ho: homoscedasticity Ha: heteroscedasticit y	F(7, 2364)= 24918.49	Prob>F=0.0 000	F(7, 2364)= 50094.41	Prob>F=0.0 000	F(7, 2364) >99999.00	Prob>F=0.000 0	Since Prob>F < 0.01 we reject the null hypothesis, which means that there is heteroscedasticity.
Test for the existence of first order autocorrelation: Wooldridge test	Ho: No first order autocorrelation	F(1, 217) = 1.496	Prob > F = 0.2227	F(1, 217) = 14.587	Prob > F = 0.0002	F(1, 217) = 13.827	Prob > F = 0.0003	As Prob>F for ROE: > 0.05, we do not reject Ho, so there is no autocorrelation. Since Prob>F for ROIC & Tobin's Q: < 0.05, we reject Ho, therefore autocorrelation exists.