



Female CEOs facing challenges during Covid-19 pandemic: Differences in family and non-family firms

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Abstract

The COVID-19 pandemic has been a disruptive unexpected event that hit firms worldwide. It is necessary starting to investigate on the features of the firms which better allowed companies to face and react to this critical situation. The present study aims at investigating as first whether firm performance is affected by the presence of a female CEO during unexpected critical events, and then by exploring the effects of being a family firm during a crisis period. Moreover, the study aims at exploring also the impact of having a female CEO in case the firm is a family one. In fact, given the rising importance of gender in top managerial levels, more research has been focusing on female leadership. However, still little research exists on female leadership in family firms. An empirical analysis was conducted on a sample of Italian listed firms over a three-year period (2018–2020), which means data were collected and analyzed through the COVID-19 pandemic. The results show that female leadership during the pandemic has a positive effect on firm performance. Likewise, family firms are able to outperform non-family firms during the occurrence of an unexpected critical event.

Keywords: COVID-19, family firms, female leadership, resilience

1. Introduction

On March 11th, 2020, the World Health Organization declared a pandemic due to the COVID-19 virus. Social distancing, lockdowns, and strict governmental restrictions were imposed worldwide to prevent the diffusion of the virus. Public events were prohibited, and any non-essential businesses were closed for almost all of 2020. The stock market strongly reacted to this contingent situation, leading to a sudden crash (Baker et al., 2020). The Dow Jones index went down by almost 6,400 points, with a 26% loss in four days (Mazur et al., 2021). The sectors strongly affected by the pandemic were certainly, but not only, the ones linked to tourism, entertainment, petroleum, real estate, and hospitality (Ramelli and Wagner, 2020). The situation created by the pandemic has resulted in business literature providing useful explanations and suggestions to firms dealing with the most difficult health, social, and economic challenges of the modern era as a result of the COVID-19 virus and its aftermath, including its dramatic consequences for the firms, investors, and customers. Given this premise, this paper aims to investigate how firms with a female leader have performed during the pandemic compared to firms led by a male leader while also distinguishing between family and non-family firms. There is, in fact, a still scarce literature on female leadership during crises, as highlighted by Bavik et al. (2021), and more investigation is needed especially on the role of female leaders during the pandemic period.

The ascent of women at the top levels of firms has brought growing attention to the effects of female leadership on firms. Beyond the ethical and social implications connected to women in top managerial positions, the presence of female leaders can impact the firm's competitiveness, performance, and value. The main aim of a firm is to generate value for its shareholders and stakeholders. Provided that CEOs are the principal decision-makers of a firm, it is understandable why academics and practitioners have started to investigate the effects of female top management figures on firm outcomes more thoroughly. According to Farrell and Hersch (2005), there is an increasing demand for female leaders for three reasons: the positive impact that gender diversity in boardrooms generates, internal predilections for gender diversity, and the market pressure about having more female directors and managers.

There is still a lack of studies focusing on the impact of female leadership on firm performance, and no unique and aligned results have been reached. Moreno-Gomez et al. (2018) found a positive relationship between firm performance and female leadership in Colombian public firms. Similarly, Liu et al. (2014) and Dwyer et al. (2013) found a positive effect of female presence in top managerial positions on firm performance, and Liu et al. found that the effect is moderated by the organizational culture and the strategic view. On the contrary, Jادیappa et al. (2019) focused on a sample of Indian firms and highlighted a negative relationship between the presence of a female CEO and firm performance. On the same path, Yang et al. (2019), studying a sample of Norwegian firms, find a negative effect of female leaders on firm performance and firm risk.

The differences between the male and the female gender are undoubtedly leading the individuals to behave and act differently, as suggested by upper echelon theory (Hambrick and Mason, 1984). Literature about female leadership highlights the differences between males and females when it comes to decisions; women tend to be more risk-averse, less overconfident, and more detailed and accurate while researching before deciding (Charness and Gneezy, 2012; Watson and Newby, 2005). These different behavioral approaches will have implications on firm outcomes, especially in contingent situations, such as the current

pandemic. There is an urgent need to investigate how these characteristics influence the performance of a firm during a crisis or a very difficult and unexpected event such as a pandemic. Additionally, it is important to understand the effects of a female CEO on firm performance and the effects in different contexts, which can imply and lead to dissimilar outcomes.

When it comes to family firms (FFs), the implications deriving from female leadership can be different due to the particular features typical of FFs. FFs are characterized by elements that derive from family involvement and linkages in the firm (D'Allura, 2019). In these contexts, the logic behind the governance of the firm sometimes goes beyond the purely managerial one. Thus, investigating how being a family firm impacts firm performance, specifically in contingent situations such as a pandemic outbreak, is important. To our knowledge, in the literature there is no evidence about how FFs react to a pandemic. However, the main features of FFs such as their longer duration (Lins et al., 2013; Miller and Le Breton Miller, 2005; Minichilli et al., 2016), strong ties between the family and the business which results in what Picone et al., 2021 call "ownership identity", and their personal relationships with the financial and political world (Arregle et al., 2007), help them foster the dialogue with stakeholders, which are undoubtedly more valuable during a pandemic (Carney, 2005; Chrisman et al., 2005; Dyer Jr and Whetten, 2006). Moreover, their ability to react to external negative events, due to shorter chains of command (Carney, 2005; Tagiuri and Davis, 1996; Ward, 1997), their sense of community with internal stakeholders (Berrone et al., 2010; Le Breton Miller et al., 2011), and the presence of "patient capital" (Dobrzynski, 1993; Sirmon and Hitt, 2003) invested in the business by the family without the constraint of liquidation in the short term, work in favor of an improved capability to face a critical event like a pandemic.

The lack of research about female leadership in FFs is still evident, and more investigations are needed on this topic. A little literature, in fact, has started to focus on this subject. Bjuggren et al. (2018), in their empirical analysis conducted on a sample of Swedish private firms, found that female leadership is more positively related to performance in FFs compared to non-FFs. Similarly, Amore et al. (2014) support the idea that a female CEO positively impacts business performance in FFs. However, there are also some studies providing the opposite results (Danes et al., 2007; Olson et al., 2003). The diverse findings achieved by the extant literature led the authors to address this in their research to fill the gap in this area. Indeed, there is a need to investigate the effect of female leadership in different contexts.

Using a sample of Italian listed firms over three years, from 2018 to 2020, the authors want to add to the existing literature about the effects of the presence of female leaders in firms, also highlighting the differences between FFs and non-FFs during the pandemic outbreak, which remains an unexplored area of research. Italy represents the ideal landscape for the present study because it was the first European country to face COVID-19 and because more than 70% of its listed companies are FFs, according to the definition of FF provided by La Porta et al. 1999, who states that a firm is considered a FF if at least the 20% of the capital is controlled by a family.

The results show that female leadership during the pandemic outbreak has a positive effect on firm performance. Similarly, being a FF is positively related to performance; thus, FFs can

better face the effects of the pandemic. Finally, no evidence is found in terms of the effects on firm performance during the pandemic when the FF is led by a female CEO.

These results support the theory that women holding a leadership position due to their attitude is characterized by risk aversion and less propensity to issue new leverage to help the firm better face hard times. In addition, FFs with a propensity to protect the family business are able to manage crisis situations because of the less risky decisions that are usually taken.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature and develops the hypotheses. Section 3 deals with the model used and provides a description of the sample and data. Section 4 presents the results. Section 5 provides conclusions, limitations, and suggestions for future research.

2. Literature Review and Hypotheses Development

2.1 Female CEO and firm performance

Female leadership is a topic that received rising attention over the last decade, and it began to be analyzed under several theoretical frameworks, starting with agency theory, moving toward stakeholder theory, and behavioral theories. One of the main issues concerning female leadership relies on its impact on firm performance.

A large part of the literature reports positive effects of female leadership on firm performance in developed countries (Francoeur et al., 2008; Khan and Vieito, 2013). Krishnan and Parsons (2008) discovered a positive relationship between female presence in senior management positions and earnings quality. Likewise, Erhardt et al. (2003) found that firms with a consistent number of women covering executive, managerial positions are more profitable. Moreover, according to feminist theory (Fischer et al., 1993), female CEOs have a greater social capital because they have to overcome bias to be nominated for a leadership position, and thus, they have to be more qualified than their male counterparts (Adams et al., 2007). The outcome of this fact is that the company will benefit from better performance according to social capital theory (Burke, 1997). However, negative effects have also been highlighted. Jadiyappa et al. (2018) found that the firm performance, measured with accounting ratios, decreases when a female CEO is appointed, and it also persists at lower levels, generating a higher amount of agency costs. The authors highlight that these negative effects could be more frequent in developing countries since women face dissimilar socioeconomic and cultural statuses compared to women in developed countries.

A small number of studies have also focused on the impact of the presence of females with top managerial positions on the firm value. Some research shows that the value of a firm can be affected by the presence of female leaders such as the CEO and the CFO. For example, Peni (2014) and Zulvinaa and Adharianib (2019) found that stock prices are positively influenced by the presence of a female CFO. The explanation for this can be found in the market appreciation about females who are considered more conservative than men. Other authors, instead, do not find a significant influence on the firm's value. Sitthipongpanich and Polsiri (2013) and Faccio et al. (2016) found that female CEOs do not affect firm value. Martin et al. (2008) evaluated the impact of appointments of female CEOs on the valuation and the risk of the firm, finding that three-day cumulative abnormal returns do not present significant differences between male and female CEO appointments, while the risk becomes

lower in the case of a female CEO appointment, consistent with the literature suggesting that females are more risk-averse. On the same path, Brinkhuis and Scholtens (2018) observe no impact for investors in case of female CEO or CFO appointment.

The upper echelon theory framework (Hambrick, 2007; Hambrick and Mason, 1984) emphasizes how the cognitive features of individuals in leadership positions are fundamental determinants for firm results. According to studies developed on the behavioral differences in the most recent years, men tend to be more competitive, less risk-averse, more overconfident, and less ethical than women (Charness and Gneezy, 2012; Ford and Richardson, 1994; Nierdele and Vesterlund, 2007). Barber and Odean (2001) and Bliss and Potter (2002) posit that besides being more risk-averse, they also worry more about how the company spends money and, in addition, they usually extract fewer personal benefits from the company compared to their male counterparts. Ravasi and Schultz (2006) state that women, within organizational contexts, tend to be more collaborative and less hierarchical than men. Reguera-Alvarado et al. (2017) underline that females are more long-term oriented than males when it comes to strategy and strategic decisions.

Moreover, previous literature on the attributes of female leaders indicates that they have better communication and listening capabilities than males (Dallas 2002; Schubert, 2006). Faccio et al. (2016) demonstrate that females are more reluctant to increase the debt leverage. Aligned with this idea, Rosa et al. (1996) also posit that females give less preference to financial performance, and they are more people-oriented. These characteristics impact firm performance because they imply a different attitude when making decisions (Huang and Kisgen, 2013; Terjesen et al., 2016). Huang and Kisgen (2013) showed that male leaders undertake more acquisitions and issue more debt than female leaders. The behavioral differences in how women make decisions might have a significant impact on the firm outcomes, especially in the case of contingent situations, such as the COVID-19 pandemic.

The effect of the presence of a female CEO on firm performance during the pandemic is still an unexplored area of research. Considering the female approaches in the decision-making process highlighted by the previous literature, they typically demonstrate greater risk aversion, a lower propensity to issue new leverage, and a more long-term perspective. These characteristics can generate benefits in a market crisis since the firm will benefit from a lower risk level (Khan and Vieito, 2013; Ezzine, 2018) and might prevent devastating business results (Stavaren, 2014). Moreover, in contingent situations, there is no possibility or need to grow; thus, the attitude to avoid risky projects and investments reduces growing possibilities, while during critical situations can be beneficial. Thus, these considerations lead the authors to posit the following hypothesis:

H1: The presence of a female CEO during the pandemic positively impacts firm performance.

2.2 FFs and firm performance during a crisis

There is large evidence in the literature about the capability of FFs to respond to adversities and crises as a result of their resilience (Chrisman et al., 2011; Danes et al., 2009; Memili et al., 2013; Minichilli et al., 2016; Williams and Shepherd, 2018). Salvato et al. (2020) define resilience as a “firm’s ability to effectively absorb, develop situation-specific responses to, and ultimately engage in transformative activities to capitalize on disruptive surprises that potentially threaten organization survival” (p. 608). According to the authors, the notion of

resilience can be traced back to two main perspectives. The first considers resilience as a firm's response to external and unexpected negative events (Meyer, 1982; Weick and Roberts, 1993; Wildavsky, 1988), and the second goes beyond the response and looks at the firm's capability to react under pressure and develop new capabilities (Coutu, 2002).

Applying the definition of resilience to FFs means underlying several basilar and fundamental features of this kind of firm to differentiate them from firms with dispersed ownership. Specifically, these characteristics refer to the notion of socioemotional wealth (Gómez-Mejía et al., 2007; Gómez-Mejía et al., 2011; Izzo and Ciaburri, 2018), the strong ties between the family and its external and internal stakeholders (Zellweger et al., 2012), the family social capital (Herrero, 2018; Sanchez-Ruiz et al., 2019), the desire to transfer the business control to future family generations (Mahto et al., 2019), and the presence of family management and governance sharing the same goals (Lim et al., 2010). All these elements can be summarized in the family, identification, binding, emotional, renewal components of the socioemotional wealth theory, proposed by Berrone et al. (2012). According to this theory, the resilience of a FF in facing hardship is demonstrated through their willingness to inject private monetary resources of the controlling family into the business to preserve the long-term survival of the company (van Essen et al., 2015; Villalonga and Amit, 2010).

Some recent evidence of the capability of FFs to better react to a crisis can be found in several studies provided by scholars after the financial crisis of 2008 (Aldamen et al., 2020; Lins et al., 2013; Ramalho et al., 2018; Saleh et al., 2017). This large body of research asserts that ownership concentration has a positive and significant impact on FFs during the crisis period in terms of financial performance. The better capability of FFs to face hard times is also confirmed by the analysis provided by Osservatorio AUB, which shows that in 2020, which has been largely impacted by the crisis due to the COVID-19 pandemic, the increase in stock price for Italian FFs has been more than 22.3% compared to non-FFs. These results confirm that Italian FFs' performance has been above that of their non-familiar counterparts and that investors appreciated the reaction of Italian FFs to the pandemic.

On the other hand, an opposing view (Baek et al., 2004; Mitton, 2002) suggests that when facing hard times, FFs tend to transfer assets and profits out of the company for the benefit of the controlling family. These studies are grounded on the financial crisis that hit, in the years 1997–1998, the Asian countries where the presence of FFs is enormous. This kind of behavior was originally defined as “tunneling” by Johnson et al. (2000). Further studies have shown that corporate governance factors become crucial during a financial crisis when the controlling family has more incentives to expropriate minority shareholder wealth (Boubakri et al., 2009; Jiang and Peng, 2011; Yang and Schwarz, 2016).

Since the relationship between family control and firm performance during a crisis is still unclear, the authors try to shed new light on this topic by analyzing whether family control affects firm performance during the COVID-19 pandemic. Aligned with Aldamen et al. (2020) and Ramalho et al. (2018), the authors posit the following hypothesis:

H2: FFs have better performance than non-FFs during the pandemic.

2.3 Female CEO in FFs and firm performance

The impact of the presence of a female CEO can be different in FFs and non-FFs due to the firm's specific characteristics and particular governance aspects that they present. For instance, the two types of firms differ when it comes to recruiting policies and strategic attitudes. One of the most recent studies focusing on firm performance and executive gender in FFs conducted by Amore et al. (2014), showed that a positive and significant effect on profitability occurs when there is an interaction between a female CEO and female directors in FFs. For the other female gender variables, there is a negative relationship. Chadwick and Dawson (2018) found that firms led by a female CEO outperform those led by a male CEO in terms of nonfinancial performance for both FFs and non-FFs.

Bjuggren et al. (2018) examined a sample of private Swedish firms and found that female leadership more positively impacts performance in FFs compared to non-FFs, which they highlight as an ambiguous effect. The effects of the presence of a female CEO on FF performance during the COVID-19 outbreak remains unknown. Given the aforementioned literature about female leadership in FFs, the authors posit the following hypothesis:

H3: Performance with a female CEO will be better in FFs than in non-FFs during a pandemic.

3. Research Design

First, the authors describe the sample selection procedure and the specificity of the panel data. Second, the authors explain the regression model and its features. Third, the authors illustrate the measures used for the analysis.

3.1 Sample Selection Procedure

The study was conducted on Italian firms. The sample comprises all the firms listed in the FTSE MIB (Milano Indice di Borsa) from 2018 to 2020. Financial and accounting data were collected from AIDA (Italian Digital Database of Companies), a database of Bureau van Dijk. Ownership and management data was hand-collected with the information available in AIDA and the CONSOB (Commissione Nazionale per le Società e la Borsa) databases. The choice of the Italian financial market in the indicated period is interesting for several reasons. First, this allows to follow the same companies during the study period and observe the evolution of their performance before and after the COVID-19 pandemic. Second, it allows for the identification of changes in the governance of the companies during this period. Third, the Italian setting is of particular interest for FFs since a big portion of the national GDP is produced by private family businesses¹. Owning families are particularly committed to maintaining control of the firm (Franks et al., 2012), and according to AIdAF – Italian Family Business, about 60% of the Italian Stock Exchange is made up of family companies². Fourth, Italy was the first country in Europe to deal with COVID-19 and implement measures based on national quarantine and social distancing to contain the spread of coronavirus³.

¹ Global Data Points. Available online: <http://www.ffi.org/?page=GlobalDataPoints>

² Family Businesses in Italy. Available online: <http://www.aidaf.it/aidaf/le-aziende-familiari-in-italia>

³ The Lessons from Italy's COVID-19 Mistakes. Available online: <https://www.bloomberg.com/opinion/articles/2020-03-23/italy-s-covid-19-trial-and-error-and-lessons-for-france-and-u-k>

Aligned with the existing literature (La Porta et al., 1999), the authors consider FFs to be those with an ultimate owner (i.e., a single individual or a family) that holds a minimum of 20 percent of the firms' share. After dismissing the financial companies, the final sample consists of 323 companies (969 observations).

Table 1. Selection procedure of the final sample

Initial sample	381
Financial companies ^a	-58
Final sample	323
Period: 2018-2020	3 years
Number of observations	969

^a Banks, Insurance, Life Insurance, firms with other financial activities

3.2 Regression Model

Given the nature of the dataset, a panel data estimation model was used to test the hypotheses. The advantages of using panel data are described by Hsiao (1985) and Klevmarken (1989). Panel datasets allow researchers to control for individual heterogeneity, meaning that variables that cannot be observed and measured, such as differences in business procedures across firms or variables that change over time but not across entities (i.e., national policies, federal regulations, international agreements), can be assessed. Moreover, the cross-section dimension of panel datasets increases variability; thus, the amount of collinearity is decreased, and as a result, more informative and detailed data are obtained. This allows for more efficient and reliable estimation of the parameters. Panel data can also examine the speed and the dynamics of adjustments (e.g., of an external shock). For the purposes of this paper, these elements are fundamental since the study focuses on the effects of the COVID-19 pandemic.

The regression model is used to define firm performance as the dependent variable. It is explained by both control variables and the following independent variables: The presence of a female CEO during the COVID-19 pandemic outbreak, the presence of a FF structure during the COVID-19 pandemic outbreak, and the presence of a female CEO in a FF during the COVID-19 pandemic outbreak.

Compared to regular time-series or cross-section regressions, a panel data regression presents a double subscript on its variables where subscript i indicates the entities in the panel data and therefore denotes the spatial (or cross-sectional) dimension. Moreover, t indicates the temporal (or time-series) dimension and represents time; X_{it} represents the independent variable in the regression for entity i at time t , and β indicates the marginal effect of the independent variable on Y .

$$Y_{it} = \alpha + X_{it}\beta + u_{it} \quad i = 1, \dots, n; \quad t=1, \dots, t \quad (1)$$

In the dataset ($n = 323$) of Italian-listed firms, there are three time periods ($t = 3$) from 2018 to 2020. Three regressions are run to test the hypotheses.

- (1) $Firm\ Performance_{it} = \delta Female\ CEO\ during\ COVID - 19 + \beta Firm\ Characteristics_{it} + Industries\ Dummies + Year\ Dummies + \varepsilon_{it}$
- (2) $Firm\ Performance_{it} = \delta Family\ firm\ during\ COVID - 19 + \beta Firm\ Characteristics_{it} + Industries\ Dummies + Year\ Dummies + \varepsilon_{it}$
- (3) $Firm\ Performance_{it} = \delta Female\ CEO\ in\ family\ firm\ during\ COVID - 19 + \beta Firm\ Characteristics_{it} + Industries\ Dummies + Year\ Dummies + \varepsilon_{it}$

To address the problem of omitted variable bias, the random effect model, as suggested by the Hausman test, is used. The random-effect model for panel dataset regression analysis assumes that the entity's error term is not correlated with the predictors, allowing the time-invariant variables to play a role as explanatory variables. In this case, year and industry are included as dummies since they might have an influence on the dependent variable. The Hausman test verifies if the unique errors ε_{it} are correlated with regressors, and the null hypothesis states that they are not. Indeed, the result obtained through Stata shows a coefficient greater than 0.05. Thus, the null hypothesis cannot be rejected, and the random-effects model can be used.

3.3 Measures

3.3.1 Dependent Variable

Previous studies on FFs, female CEOs, and corporate governance use different measures to address firm performance. Some of them focus on stock market indicators such as stock profitability or market value of assets (Brickley et al., 1994; Magnanelli et al., 2020; Thomsen et al., 2006). Others use accounting and financial indicators, such as economic profitability (e.g., return on assets, ROA) or return on equity (ROE; Hutchison and Gul, 2004; Magnanelli and Pirolo, 2021; Park and Shin, 2004). In this research, firm performance is determined by examining economic profitability (ROA). Hutchison and Gul (2004) argue that the use of accounting and financial ratios is preferable to stock market ratios to investigate the relationship between performance and characteristics of corporate governance.

3.3.2 Independent Variables

Various independent variables are used to test the hypotheses.

The first variable is whether the firm had a *female CEO during COVID-19*, which is a dummy variable that is equal to 1 when the firm is managed by a female CEO during the COVID-19 pandemic, and 0 otherwise. In this case, the dummy variable might be equal to 0 for two reasons. The first is that the company is not managed by a female CEO, and the second is that the pandemic was not occurring between 2018 and 2019. The variable is calculated as a two-way interaction as follows: *Female CEO * COVID-19*.

The second variable is whether the firm was a *FF during COVID-19*, which is also a dummy variable that is equal to 1 when the firm is an FF during the COVID-19 pandemic, and 0 otherwise. In this case, the dummy variable might be equal to 0 for two reasons; either the firm is not a FF or because the COVID-19 was not occurring between 2018 and 2019. The variable is calculated as a two-way interaction as follows: *Family firm * COVID-19*.

The third variable is whether there was a *female CEO in the FF during COVID-19*, which measured the effect of a female CEO in FFs during the pandemic through a three-way interaction variable constructed as follows: *Female CEO * COVID-19 * Family firm*. The result is a dummy variable that is equal to 1 if a family firm is managed by a female during the COVID-19 pandemic and 0 otherwise. In this case, the dummy variable might be equal to 0 for several reasons: (1) COVID-19 is occurring, the company is managed by a female CEO, but the firm is not an FF; (2) COVID-19 is occurring, the firm is a FF, but the company is not managed by a female CEO; (3) COVID-19 is occurring, the firm is not an FF, and the company is not managed by a female CEO; (4) the company is managed by a female CEO,

the firm is an FF, but COVID-19 is not occurring; (5) the company is managed by a female CEO, but the firm is not an FF, and the COVID-19 is not occurring; (6) the firm is an FF, but the company is not managed by a female CEO, and COVID-19 is not occurring.

3.3.3 Control Variables

Prior literature recommends controlling for firm-specific characteristics that may affect performance (Campbell and Minguez-Vera 2008). Specifically, the following variables are included as controls in this study: financial leverage, board size, firm size.

4. Results and Discussion

The results are presented in two stages. The descriptive statistics are described first, followed by a discussion of the regression model.

4.1 Descriptive Analysis

The descriptive analysis (Table 2) shows that the ROA has a lower mean value after the pandemic started in 2020. The value is 0.39, but before the pandemic, it was 3.24. This shows that, on average, firm performance decreases after COVID-19. The percentage of FFs is about 71%, which demonstrates that Italy is one of the most appropriate settings to conduct the analysis. Among the firms in the database, 4% of CEOs are women. According to the European Institute for Gender Equality⁴, this is not far from what has recently been identified in the European Union. Among the largest publicly listed companies in EU-28, only 19.3% of executives and 7.9% of CEOs are women. Among the control variables, the average board size is 9.52 members, the financial leverage, calculated as the debt-to-equity ratio (D/E), is constant during the two periods along with the firm size, calculated as the logarithm of total assets.

Table 2. Descriptive statistics

Variable	Mean	Std.Dev	Min	Max
COVID-19 is not occurring (2018)				
Return on assets (ROA)	3.24	15.41	-63.15	156.34
Female CEO	0.04	0.20	0.00	1.00
Family firm	0.71	0.45	0.00	1.00
Financial leverage	0.65	1.35	-7.90	14.88
Board size	9.53	4.37	0.00	25.00
Firm size	4.99	2.02	0.00	11.72
COVID-19 is occurring (2019-2020)				
Return on assets (ROA)	0.40	20.30	-243.19	139.54
Female CEO	0.04	0.20	0.00	1.00
Family firm	0.71	0.45	0.00	1.00
Financial leverage	0.65	1.46	-4.10	14.88
Board size	9.53	4.37	0.00	25.00
Firm size	4.53	2.12	0.00	11.68

⁴ European Institute for Gender Equality, "Largest Listed Companies: CEOs, Executives and Non-Executives," Gender Statistics Database (2019).

The correlation matrix (Table 3) shows that ROA is negatively related to the presence of a female CEO in the firm. Among the control variables, firm size is positively related to the financial leverage and to the ROA, while it is negatively related to the presence of a female CEO and to the COVID-19 pandemic. Board size is negatively related to the presence of a female CEO and to family ownership, while it is positively related to firm size. Financial leverage is negatively related to the ROA.

Table 3. Correlation matrix

	Return on assets (ROA)	Female CEO	Family firm	COVID-19	Financial leverage	Board size	Firm size
Return on assets (ROA)	1						
Female CEO	-0.0920**	1					
Family firm	0.0454	0.00923	1				
COVID-19	-0.0501	-0.00152	0.0144	1			
Financial leverage	-0.0890**	-0.0313	-0.00698	0.00590	1		
Board size	0.00729	-0.184***	-0.124***	0.0506	0.000107	1	
Firm size	0.153***	-0.162***	-0.00681	-0.0637+	0.130***	0.389***	1

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

4.2 Panel Regression Analysis

Since random-effects can be assumed, the error term could be decomposed into individual random effects and residual random effects. The Hausman test result validates the assumption of random effects. For the dependent variable (ROA), four models are considered, as shown in Table 4. Model 1 is a simple model using the control variables and the others used to construct the interaction variables. Model 2 adds the independent variables to test Hypothesis 1. Model 3 adds the independent variables to test Hypothesis 2. Finally, Model 4 adds the independent variables to test Hypothesis 3.

Table 4. Panel Data Estimation (ROA as dependent variable)

	Model 1		Model 2		Model 3		Model 4	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Female CEO	-0.199	1.370	-1.545	1.530	-0.650	3.529		
COVID-19	-0.568+	0.321	-0.668*	0.325	-1.912**	0.622	-2.067***	0.627
Family firm	0.550	0.608	-0.142	0.667	0.004	0.679		
Financial leverage	-0.177**	0.180	-0.213**	0.162	-0.175**	0.162	-0.175**	0.162
Board size	-0.017	0.067	-0.028	0.067	-0.011	0.067	-0.016	0.068
Firm size	0.02**	0.166	0.037**	0.136	0.037**	0.136	0.057**	0.137
Industry	Dummies included		Dummies included		Dummies included		Dummies included	
Year	Dummies included		Dummies included		Dummies included		Dummies included	
Female CEO during COVID-19			3.522*	1.791			6.497	4.232
Family firm during COVID-19					1.810*	0.720	1.887**	0.727
Female CEO in a family firm during COVID-19							-4.068	4.679
Female CEO in a family firm							-1.353	3.881
Constant	1.227	1.387	1.513	1.346	1.672	1.393	1.598	1.405

	Model 1		Model 2		Model 3		Model 4	
Number of obs	793		793		793		793	
Number of groups	315		315		315		315	
Wald chi²	797.14		803.34		810.08		817.83	
Prob > chi²	0.000		0.000		0.000		0.000	
R² Within	0.531		0.534		0.539		0.541	
R² Between	0.425		0.425		0.420		0.426	
R² Overall	0.519		0.520		0.520		0.524	

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Model 1 shows that the COVID-19 pandemic has a significant and negative impact on ROA, which affects the long-term profitability of the firms. This is quite intuitive given that the COVID-19 pandemic produced the worst worldwide recession since 1930 (Shen et al., 2020), affecting the stock market (Iyke, 2020a; Narayan and Phan 2020) and firm performance (Cui et al., 2020; Hagerty and Williams, 2020; Papadopoulos et al., 2020). The evidence confirms that most of the firms in every industry and in every world region (Liu et al., 2020; Wang et al., 2020), apart from very few exceptions represented by firms providing medical services and devices and food delivery services, suffered from COVID-19 outbreak in terms of performance.

The model does not show a significant association between family ownership and firm performance or between the presence of female CEO and ROA. Among the other control variables, financial leverage is significantly and negatively associated with ROA, while firm size shows a significant and positive effect on firm performance.

Model 2 tests what occurs when the firm is managed by a female CEO during the COVID-19 pandemic. A positive association between the presence of a female CEO during COVID-19 and firm performance is found. The association confirms Hypothesis 1. The result is aligned with previous studies conducted during normal periods of time (Francoeur et al., 2008; Khan and Vieito, 2013). This outcome confirms that the less propensity toward risk, the more monitoring, and the less overconfidence of women can bring benefits in contingent situations when the firm's risk of surviving is higher due to the uncertainty of the external environment. Among the control variables, the significant and negative association with ROA is confirmed for the financial leverage as well as firm size that shows a significant and positive coefficient as in Model 1.

Model 3 tests what occurs when the firm is a FF during the COVID-19 pandemic. A positive association between the presence of a FF during COVID-19 and the firm's performance is found. The association confirms Hypothesis 2. The explanation of this evidence may be given by the resilience shown by FFs during crisis events (i.e., FF's features like long-term outlooks and the possibility to face a crisis with family resources help the company to overcome difficult periods and sustain firm performance). This evidence is also confirmed by XII Osservatorio AUB about the performance of Italian FFs during the first six months of 2020, which shows that Italian FFs performed better (+4,3%) when compared to their non-FF counterparts⁵. Moreover, the result is also aligned with the previous literature about the outperformance of FF during crisis periods (Vieira, 2014; Minichilli et al., 2015; Arrondo-

⁵ 12° Osservatorio AUB – 2020. Accessible at <https://www.aidaf.it/wp-content/uploads/2021/01/26>

Garcia et al., 2016). Among the control variables, the significant and negative association with ROA is confirmed for the financial leverage, while firm size shows a significant and positive coefficient as in Model 1.

Model 4 tests what occurs when the FF is managed by a female CEO during the COVID-19 pandemic. No significant association between the presence of a female CEO during COVID-19 in a FF and a firm's performance is found. Thus, the model does not confirm Hypothesis 3. Among the control variables, the significant and negative association with ROA is confirmed for financial leverage, while firm size shows a significant and positive coefficient as in Model 1.

In sum, the panel estimation model supports Hypothesis 1 and Hypothesis 2, while Hypothesis 3 is not supported. This means that in case of an unexpected, disruptive event, having a female CEO can bring benefits to the company in terms of firm performance, as well as being a FF.

5. Conclusions

The recent COVID-19 pandemic has raised important questions about how firms cope with critical events. Several studies have already been proposed, but the main point in this article is to focus on FFs and on the presence of female figures in leadership positions. This article is particularly timely, considering that no studies about female leadership in FFs during the pandemic are yet available. This study contributes to this line of inquiry using a panel of Italian-listed firms between 2018 and 2020. The authors examined how and if the presence of female leaders in FFs has an influence on performance during the pandemic. Specifically, the authors analyze if female leadership positively affects firm performance during a pandemic, if being a FF has a positive effect on firm performance during a pandemic, and if performance in FFs is better when there is also a female CEO.

The data confirm the first two hypotheses. Thus, having a female CEO and being a FF during a pandemic positively impacts firm performance. These outcomes support the theory that female leadership, due to the female attitude mainly characterized by higher risk aversion and less propensity to issue leverage, positively contributes to face and to overcome contingent situations, which generates better performance. However, as pointed out by Smith et al. (2006), it has to be considered that any effect of female leadership on performance is closely tied to the attributes of the individual female leaders. Likewise, FFs are characterized by a higher propensity to protect the family business and can better manage crisis situations because of their resilience that can be mainly explained by the strong ties between the family and the business, family social capital, the desire to pass the business to the future generations, and the possibility to face the unexpected critical events through family resources.

The third hypothesis was not confirmed. The relation is not significant. This result is aligned with Chadwick and Dawson (2018), who found a positive relationship between the presence of a female leader and firm performance is verified only for non-FFs.

This study about the performance of FFs with female CEOs during the pandemic outbreak opens up new areas for future research. For instance, it would be interesting to extend the analysis to other countries with different levels of female presence in leadership positions

since the phenomenon of the pandemic affects firms worldwide. Moreover, when the analysis included in the present paper was performed, just one year has passed since the onset of the outbreak. In this light, future research should analyze the long-term consequences of the pandemic on FF's performance, focusing on the years following the pandemic.

The findings of the paper extend the current literature on female leadership and FFs in the case of an unexpected disruptive event, and they are also relevant to practitioners. For instance, the findings point to important aspects concerning the gender of the leadership and the ownership structure of the firm that might influence firm performance in these critical moments. The behavioral differences between male and female leaders undoubtedly mean that these two types of individuals act differently and, consequently, approach decision-making differently. As pointed out by Christine Lagarde, President of the European Central Bank, "If it had been Lehman Sisters rather than Lehman Brothers, the world might well look a lot different today."

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