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Gender Interactions Within the Family Firm

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We analyze whether gender interactions at the top of the corporate hierarchy affect corporate performance. Using a comprehensive data set of family-controlled firms in Italy, we find that female directors significantly improve the operating profitability of female-led companies. To mitigate endogeneity concerns, we assess executive transitions using a triple-difference approach complemented by propensity score matching and instrumental variables. Finally, we show that the positive effect of female interactions on profitability is reduced when the firm is located in geographic areas characterized by gender prejudices and when the firm is large.

Keywords: female CEOs; female directors; firm performance
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1. Introduction

Motivated by the observation that women are dramatically underrepresented in leadership positions (see, e.g., Bertrand and Hallock 2001), policy makers around the world are devoting considerable attention to the participation of women in the labor market. This attention has led to such major policy interventions as the introduction of political quotas in India and of board quotas in Norway.

Although experimental works have suggested that women generally exhibit less willingness than men to engage in competitive activities (Niederle and Vesterlund 2007) and worse performance when subject to competitive pressures (Gneezy et al. 2003, Gneezy and Rustichini 2004), the effect of female leaders on corporate performance remains unclear. For instance, Adams and Ferreira (2009) report an ambiguous effect of female directorship on firm profitability, whereas Dezso and Ross (2012) find that female management can benefit performance in some contexts. We contribute to this literature by analyzing whether gender interactions in the top layers of a firm's hierarchy affect corporate profitability. Using a comprehensive data set of family-controlled firms in Italy over the period 2000–2010, we show that companies led by female chief executive officers (CEOs) perform significantly better with increasing numbers of women on the board of directors.

Taking advantage of the longitudinal dimension of our data, we establish our main result controlling for company fixed effects (which absorb the constant unobserved heterogeneity) and for a wide array of governance and financial factors. We mitigate endogeneity problems by employing a triple-difference approach to assess the effect of executive transitions. In particular, we compare family firm profitability before and after transitions from male to female CEOs with a control sample of transitions from male to male CEOs (Huang and Kisgen 2013); we then analyze how the resulting difference in profitability is shaped by the presence of female directors. Transition analyses can be problematic if past profitability or omitted factors affect the choice of the incoming CEO. We address this problem in two ways. First, we use a matching procedure that enables better isolation of the change in profitability after CEO succession by comparing male-male and male-female transitions in firms that are most alike in terms of presuccession characteristics. Second, we employ instrumental variables based on (a) the gender composition of the pool of potential family heirs and (b) geographic variations in gender stereotypes. Our results confirm that the profitability effect of female CEO transitions is increasing in the proportion of female directors on the board.

It is well established that CEOs exert a significant influence on corporate policies and performance (Bennedsen et al. 2009, 2012; Bertrand and Schoar 2003).

Moreover, the board of directors provides important services to companies. As summarized by Adams et al. (2010), directors hire, evaluate, and fire executives as well as contribute to corporate strategy—for example, by providing expert advice. Executive and governance officers clearly do not work in isolation, and the literature has underscored the importance of interactions between CEO and organizational characteristics. For instance, Adams and Ferreira (2007) argue that the flow of firm-specific information from CEOs to directors affects the quality of advice and monitoring that boards provide to CEOs. Drawing on social psychology studies, Westphal and Zajac (1995) suggest that the effectiveness of interactions between directors and CEOs can be shaped by similarities in demographic characteristics such as age and education. But why, in particular, should interactions between female CEOs and directors affect corporate outcomes?

On one hand, women are often considered to be their own worst enemies—a dynamic that may be exacerbated in ruthless corporate environments. On the other hand, female interactions have been shown to benefit women in a variety of contexts. A field study conducted by Greig and Bonhet (2009) in a developing country shows that women cooperate more with female groups than with mixed-gender groups. Eckel and Grossman (2001, p. 171) find that "women paired with women almost never fail to reach an agreement" in an ultimatum game. Dasgupta and Asgari (2004) document that the frequency of classroom encounters with female faculty reduces the activation of gender stereotypes among female students. In a business context, the findings of Matsa and Miller (2011) suggest that female directors help other women reach management positions.

Drawing on these insights, we posit that the presence of female directors improves the profitability of companies led by female CEOs. First, female directors may enhance the self-esteem of a female CEO in an environment, such as corporate leadership, that is typically viewed as male oriented (Koenig et al. 2011) and thus capable of inducing psychic costs (Blau and Ferber 1986) that could lead to female underperformance (Iriberri and Rey-Biel 2012). Second, a female-friendly corporate culture arising from the presence of female directors can encourage cooperation and information exchange at the top and thereby improve the quality of board advice, which in turn improves the task performance of female CEOs. In line with this view, our fixed-effects estimates indicate that—although lone female CEOs tend to depress profitability—a large presence of female directors significantly improves the profitability of family firms that are led by a woman: the profitability effect of female CEOs working with a female-dominated board of directors is 0.9 percentage points. That being said, there is wide variation in this effect; in particular, such female interactions are less effective in geographic areas that are characterized by a relatively conservative view of women's role in society and also in large firms, where it may be more difficult for women to affect corporate policies.

Our study is closely related to recent research on female leadership. Several works analyze the characteristics of female directorship and its influence on a variety of firm outcomes (Adams et al. 2012, Adams and Ferreira 2009, Adams and Funk 2012, Bianco et al. 2011, Matsa and Miller 2013). Other research investigates the corporate policies undertaken by female CEOs (Faccio et al. 2011), chief financial officers (Huang and Kisgen 2013), and owners (Matsa and Miller 2012), as well as the effect of female managers on the gender pay gap (Tate and Yang 2011) and firm performance (Dezso and Ross 2012). Yet another strand of the literature analyzes how the gender composition of teams affects group performance (Apesteguia et al. 2012, Hoogendoorn et al. 2013). We differ from these studies in that, whereas they focus solely on the leader's gender and/or the gender composition of teams, we focus on the importance of female *interactions* involving governance and CEO positions.

Our paper also contributes to the emerging stream of studies that examine gender interactions in the field. Gagliarducci and Paserman (2012) find that female-headed municipalities in Italy are more likely to experience early termination of the legislature when the council consists only of men. Our main finding—that female CEOs perform significantly better when there are more women on the board of directors—extends to the business sector the result of Gagliarducci and Paserman (2012), that gender interactions play a critical role in the functioning of organizations.

Delfgaauw et al. (2013) study the effect of tournament incentives on the sales growth of Dutch stores. These authors find that tournament incentives increase growth only for those stores in which the manager and a majority of workers are of the same gender. Our work here differs from these previous papers in that we shed light on the profitability effect of gender interactions *at the top* of the corporate hierarchy. This focus is of particular importance because these top-level gender interactions can have a significant effect not only on corporate profitability but also on such corporate behavior as risk taking in financial and investment policies.

Finally, by assessing the corporate consequences of women in CEO and governance positions, we complement extant research on the "glass ceiling" (Matsa and Miller 2011) and gender stereotypes (Price 2012), which has focused mostly on policies regarding the appointment and compensation of women in leadership positions.

2. Data

2.1. Sources

Our empirical analysis is based on the population of medium and large family-controlled firms (hereafter, family firms) in Italy (see also Amore et al. 2011, Miller et al. 2013). Family firms represent the most common ownership form worldwide (Faccio and Lang 2002, La Porta et al. 1999). Even among large publicly traded U.S. companies, which are typically thought to have dispersed ownership, families hold large equity stakes in about a third of S&P 500 firms and half of the largest 2000 industrial firms (Anderson and Reeb 2003, Anderson et al. 2009, Villalonga and Amit 2006).

We follow the literature in considering as family firms private companies in which one family owns an absolute majority (i.e., at least 50%) of the shares. That level of ownership is generally needed to achieve control, given that private firms are usually owned by few shareholders (Bennedsen and Wolfenzon 2000). However, as in other studies on European companies (e.g., Andres 2008), we reduce this threshold to 25% for firms listed on the Milan stock exchange, while assuming de facto control due to collective action problems and/or the family's use of control-enhancing mechanisms.[1]

Each firm covered in our data set had sales exceeding €50 million in 2009, a threshold that corresponds to a typical large or medium-sized family firm in Italy. Such companies make for a more appropriate setting in which to investigate leadership and governance structures than do smaller firms, which are often characterized by simple and mainly informal governance structures. Large and medium-sized family firms constitute a major segment of the Italian economy. In our data, they account for 57.1% of all similar-sized firms—followed by local subsidiaries of multinational companies (21.3%), coalitions of owners (8.7%), cooperatives and consortia (5.8%), state-owned firms (5.1%), and companies controlled by a bank or private equity firm (2.0%). Moreover, descriptive evidence suggests that medium-sized and large Italian family firms account for approximately 20% of the country's gross domestic product and employ a similar portion of the workforce.

Our data set is assembled from two main sources. Ownership and governance data are hand collected from official public filings obtained from the Italian Chamber of Commerce. These filings track changes over time in ownership, governance, and leadership structures. Starting with the population of companies with sales greater than the aforementioned threshold, we reconstruct the ownership structure of all firms for the period 2000–2010. Overall, we identify about 2,400 family-controlled firms per year.[2] The gender of each CEO and board member is coded via a fiscal identifier that allows us to identify some demographic characteristics. Family membership of CEOs and directors is identified by surname affinity with that of the controlling family.[3]

Accounting data come from AIDA, which is the Italian provider of the Bureau van Dijk European Databases. We merge our data sources for the period under study and then drop observations with missing values in the key explanatory variables, with negative or zero book value of assets and revenues, or in cases where there is no formal CEO.

Although our final data set is limited to one organizational form, it has a number of important advantages. First, it covers not only listed firms but also a vast majority (some 93%) of privately held companies, which are widespread in the Italian economy. Second, its longitudinal dimension and large set of firm characteristics allows us to adopt a fixed-effects methodology and control for potentially confounding factors. Third, and similar to previous research (e.g., Bennedsen et al. 2007), it allows the use of family characteristics to generate exogenous variations (in organizational structure) that are useful for mitigating endogeneity concerns.

2.2. Summary Statistics

Panel A of Table 1 presents summary statistics for the main firm characteristics. We adopt the return on assets (ROA) as our measure of operating profitability. Computed as the earnings before interest and taxes (EBIT) divided by the book value of total assets, ROA is widely used to assess firm performance (see, e.g., Bennedsen et al. 2007, Perez-Gonzales 2006). In our sample, the average ROA is 0.054.

Leadership and governance characteristics are tabulated next. First, in line with existing evidence, we find that ownership is highly concentrated (an average of 91% of shares are held by family members). Firms in our sample have, on average, two CEOs; this reflects the possibility in Italian firms that there may be more than one CEO with the same duties and

[1] Because of differences in the average equity share and stock market characteristics, the ownership thresholds used by scholars to define a U.S. "family firm" are typically lower than those used in European countries (Andres 2008, Miller et al. 2013).

[2] Specifically, we started with a population of about 6,800 firms with sales of more than €50 million in 2009. After a first screening, we identified 4,221 family firms. Among those, we sampled the parent company for firms in business groups operating in the same two-digit industry (because the boards and leadership structures of controlled companies are almost always identical to those of the parent firm); in such cases, we used consolidated financial information for the whole group. For business groups (usually holding companies) that operate in more than one two-digit industry, we analyzed the controlled companies separately.

[3] Since this approach fails to capture some family ties—e.g., marriages in which the wife does not assume her husband's surname—it should be viewed merely as a proxy for blood ties.

Table 1 Summary Statistics

	Number of observations	Mean	Median	SD
Panel A: Firm characteristics				
ROA	10,154	0.054	0.045	0.069
Ln *firm age*	10,154	3.108	3.219	0.694
Ln *assets*	10,154	11.420	11.296	1.175
Family ownership	10,123	0.915	1	0.151
Number of CEOs	10,154	1.979	2	1.224
Family CEOs	10,154	0.742	1	0.376
Number of directors	10,154	4.996	4	2.422
Directors' age	10,120	53.780	54	7.253
Family directors	10,153	0.650	0.667	0.300
Panel B: Women in CEO and board positions				
Female CEO presence	10,154	0.204	0	0.403
Female CEOs	10,154	0.107	0	0.242
Female directors	10,154	0.174	0.143	0.199

Notes. *ROA* is the ratio of earnings before interest and taxes divided by the book value of total assets. Ln *firm age* and Ln *assets* are, respectively, the natural logarithm of a firm's age measured in years and the book value of total assets. *Family ownership* is the fraction of equity held by the family. *Number of CEOs* is the number of a firm's CEOs. *Family CEOs* is the ratio of family CEOs to the total number of CEOs. *Number of directors* is the number of a firm's board members. *Directors' age* is the average age of board members. *Family directors* is the ratio of family directors to the total number of board members. *Female CEO presence* is a dummy equal to 1 if at least one of the firm CEOs is a woman. *Female CEOs* is the ratio of female CEOs to the total number of a firm's CEOs.*Female directors* is the ratio of female directors to the total number of board members.

legal responsibilities—a special leadership structure that renders our results not directly comparable to studies of firms in countries (e.g., the United States and the United Kingdom) where the single-CEO model is more typical. To reduce the number of dropped observations, we conduct our main analysis on the full sample formed by both firm types; however, we establish that our results also hold on the subsample of firms with a single CEO. In our data, CEOs are members of the controlling family in 74% of the cases. The typical firm in our sample has 5 board members, although this number ranges from 2 to 23. Directors are 54 years old on average, and 65% of them are part of the controlling family.

Panel B of Table 1 shows that about 20% of the 10,000 + observations report at least one female CEO. Overall, nearly 11% of CEOs are female; this portion is 9% in the subsample of firms with only one CEO (approximately 45% of the observations). On average, the portion of female directors is 17% (11% if female CEOs are excluded from the count).[4] About 45% of observations see no female directors, 32% have one female director, 15% have two female directors, and the remaining 8% have three or more female directors. There are 4,140 observations involving female directors in addition to female CEOs (if any), of which 53% involve one female director; 32% involve two female directors; and 16% involve three or more female directors. As expected, the average percentage of female directors is higher in the subsample of firms with at least one female CEO (38%, versus 12% in companies without a female CEO), and in 32% of those cases the board consists of at least 50% female members.

3. Empirical Analysis

3.1. Preliminary Evidence

Our goal is to estimate how the interaction of women in CEO and governance positions affects firm profitability. Toward this end, we estimate the following model separately for firms with at least one female CEO and firms without a female CEO:

$$ROA_{it} = \beta_0 + \beta_1(\textit{Female directors}_{it}) + \delta_t + \alpha_j + \mathrm{X}_{it-1}\eta + \varepsilon_{it}. \quad (1)$$

Here ROA_{it} is our measure of firm profitability for firm i at time t. The main explanatory variable, $\textit{Female directors}_{it}$, is the ratio of female directors to all directors. The model includes year dummies δ_t to control for common shocks as well as two-digit industry dummies α_j to control for sectoral differences in profitability. The vector X_{it-1} captures firm characteristics. These include the (log of) firm age and total assets, which control for a firm's different stages of development; the ratio of cash holdings to total assets, which controls for differences in liquidity; and the ratio of capital expenditures to total assets, which controls for differences in investment. Finally, we control for the presence of the family in governance, executive, and ownership positions; this is motivated by previous studies showing that family involvement at different levels has strong implications for firm performance (see e.g., Anderson and Reeb 2003, Bennedsen et al. 2007, Perez-Gonzales 2006, Villalonga and Amit 2006). To avoid simultaneity problems, all firm-level controls are lagged by one year.

Results reported in Table 2 show that, in the absence of female CEOs, the percentage of female directors has no effect on firm profitability (column (1)). When there is at least one female CEO, however, the effect is positive and significant at the 5% level (column (2)).[5]

[4] In the United States, women held 14.8% of the Fortune 500 board seats in 2007 (see Adams and Ferreira 2009 and the references therein). Among listed Italian companies, Bianco et al. (2011) find that women accounted for 6.8% of all board seats at the end of 2010. This is a lower percentage than that reported here, which is likely a consequence of their data set including only listed firms; such firms are typically among the largest, and (as documented by Bianco et al. 2011) female directors are more common in smaller companies.

[5] Taken together, these results suggest that the profitability improvement is not simply driven by a reduction in overall diversity and instead is specific to female interactions.

Table 2 Preliminary Evidence

	No female CEOs	At least one female CEO	Full sample
Dependent variable: *ROA*	(1)	(2)	(3)
Female CEO presence			0.000
			(0.004)
Female CEO presence × *Female directors*			0.018**
			(0.009)
Female directors	−0.006	0.020**	−0.008
	(0.005)	(0.010)	(0.005)
Ln *firm age*	0.003***	0.003	0.003***
	(0.001)	(0.002)	(0.001)
Ln *assets*	−0.005***	−0.005***	−0.005***
	(0.001)	(0.002)	(0.001)
Cash holdings	0.159***	0.271***	0.191***
	(0.013)	(0.029)	(0.012)
Capex	−0.019***	−0.028***	−0.019***
	(0.005)	(0.010)	(0.005)
Family CEOs	−0.001	−0.007	−0.002
	(0.003)	(0.010)	(0.003)
Family directors	−0.004	0.010	−0.004
	(0.004)	(0.007)	(0.003)
Family owners	0.011***	−0.009	0.009**
	(0.004)	(0.010)	(0.004)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Number of observations	5,764	1,637	7,401

Note. Robust standard errors are reported in parentheses below the coefficients.
** and *** denote significance at 5% and 1%, respectively.

Next, we estimate the following interaction model on the full sample:

$$ROA_{it} = \beta_0 + \beta_1(\textit{Female CEO presence}_{it}) + \beta_2(\textit{Female directors}_{it}) + \beta_3(\textit{Female CEO presence}_{it} \times \textit{Female directors}_{it}) + \delta_t + \alpha_j + X_{it-1}\eta + \varepsilon_{it}. \quad (2)$$

Here $\textit{Female CEO presence}_{it}$ measures the presence of women in CEO positions. To ensure enough variation, we operationalize that presence using an indicator variable set equal to 1 (respectively, to 0) if at time t any (respectively, none) of the CEOs of firm i is female. The coefficient β_1 measures the effect (on profitability) of female CEOs as the fraction of female directors tends to zero; β_2 measures the effect of female directors on the profitability of companies without female CEOs; and β_3 measures how the profitability of companies with at least one female CEO varies with the fraction of female directors. Thus, for any given value of $\textit{Female directors}_{it}$, the effect on firm profitability of female CEOs is given by $\beta_1 + \beta_3(\textit{Female directors}_{it})$.

Results reported in column (3) of Table 2 indicate that, whereas the coefficient for the female CEO dummy is not statistically different from zero, the interaction term is positive and significant at the 5% level. We can interpret the economic magnitude of female CEOs evaluated when at least half of the board members are women: in this case, the effect is $0.000 + 0.018(0.501) = 0.009$, or 0.9 percentage points (statistically significant at the 1% level).

3.2. Fixed-Effects Estimates

In §3.1, we offered descriptive evidence that the interaction between women in CEO and board positions improves firm profitability. We now provide more accurate estimates by augmenting Equation (2) with firm fixed effects α_i to reduce unobservable time-invariant heterogeneity at the firm level. And because many of the controls adopted in Table 2 could be endogenous, here we adopt a more parsimonious vector X_{it-1} that only includes the one-year lagged logarithms of firm age and total assets in addition to industry trends.[6]

Columns (1) and (2) of Table 3 report that the profitability effect of female CEOs and female directors is negative, although only the coefficient for female directors is statistically significant at the 10% level. In column (3), we include the interaction between female CEOs and female directors. The results indicate that female directors have a significantly negative effect on the profitability of companies without a female CEO. Moreover, the results indicate that as the fraction of female directors tends to zero, female CEOs have a significantly negative effect on profitability; the coefficient is −0.016—i.e., 1.6 percentage points. Thus, when women are present only as CEO(s), the result is reduced firm profitability. Yet the coefficient for the interaction term is positive and statistically significant at the 1% level; in other words, the underperformance of companies led by female CEOs is less when the fraction of female directors increases. The economic magnitude of female CEOs when at least half the board members are women is $-0.016 + 0.050(0.501) = 0.009$—i.e., 0.9 percentage points (significant at the 5% level).[7]

[6] In our main specification, we control for industry trends by interacting year and one-digit industry dummies; however, the results are robust to excluding this control. Our results hold also if we control for industry trends in different ways—e.g., by interacting year and two-digit industry dummies or by subtracting from firm ROA the annual median or mean industry ROA (computed at the one- or two-digit level).

[7] In unreported regressions, we replace the continuous fraction of female directors with dummies indicating whether that fraction is low, medium, or high (corresponding to the lowest, medium, or highest tercile of the empirical distribution in female-led firms). Our findings indicate that female CEOs have a significantly negative profitability effect when there is a low fraction of female directors. This effect, which is close to zero for a medium fraction of female directors, becomes positive and significant for a high fraction of female directors. These results suggest that, in order for female interactions to induce a significant effect on profitability, the fraction of female directors has to be large.

Table 3 Fixed-Effects Regressions

	Main effects		Interactions	
Dependent variable: *ROA*	(1)	(2)	(3)	(4)
Female CEO presence	−0.002	−0.002	−0.016***	−0.011
	(0.003)	(0.003)	(0.006)	(0.008)
Female CEO presence × *Female directors*			0.050***	0.047***
			(0.015)	(0.018)
Female directors	−0.021*	−0.023*	−0.033**	−0.031**
	(0.012)	(0.012)	(0.014)	(0.013)
Ln *firm age*		0.009**	0.009**	0.009**
		(0.004)	(0.004)	(0.004)
Ln *assets*		−0.001	−0.001	−0.001
		(0.002)	(0.002)	(0.002)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry trends	No	Yes	Yes	Yes
Number of observations	10,154	10,154	10,154	10,154

Note. Robust standard errors are reported in parentheses below the coefficients.

*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

In the regressions described so far, *Female CEO presence*$_{it}$ is operationalized as an indicator variable set equal to 1 if any of the family firm's CEOs is female (and set to 0 otherwise); however, in column (4) of Table 3 we show that our results are robust to replacing this dummy with a continuous measure corresponding to the fraction of female CEOs. These results, which are similar to those reported in column (3), reveal that female CEOs have a negative effect on profitability when the fraction of female directors tends to zero (although the *p*-value is only 0.19). Likewise, female directors have a significantly negative effect on profitability as the fraction of female CEOs tends to zero. However, the interaction term is positive and statistically significant at the 1% level.

Overall, our results indicate that, although lone female leadership is detrimental to family firm performance, this negative effect is significantly mitigated by the interaction between women in CEO and board positions.[8]

3.2.1. Confounding Factors. One concern with our estimates is that of bias stemming from omitted factors. Given that female interactions do not occur randomly, they may be correlated with unobserved characteristics that affect firm profitability and thus bias our estimates. An advantage of our specification is that, by exploiting the data's longitudinal dimension, we can effectively control for firm-level unobserved heterogeneity that is invariant over time. We further mitigate omitted factor concerns in two ways. First, we augment our fixed-effects specification with controls for a number of governance and financial characteristics. Second, we show that our estimates do not mirror the interaction of other demographic characteristics.

In panel A of Table 4, we sequentially control for the family involvement variables used in Table 2. Specifically, in column (1) we include the lagged fraction of family CEOs; in column (2) we include the fraction of family directors; and in column (3) we include the fraction of family owners. In column (4) we control for the presence of female owners to mitigate concerns that—since female leadership may be correlated with female ownership—the effect on profitability may arise from female owners and not from the interaction between female CEOs and female directors. Finally, in column (5) we control for the fraction of nonexecutive directors as a proxy for the quality of board oversight. This panel confirms that none of these additional controls affects the statistical and economic significance of the interaction term. In unreported analyses, we establish that our findings remain unchanged when these controls are all included in a single regression and also when we include additional controls such the number of board members.

Although our results indicate that female interactions affect firm profitability, it could be that we are capturing not a gender-specific effect but rather a generic effect stemming from demographic similarities. However, we can show that no profitability effect arises from interactions of another demographic characteristic such as age. This is done, in panel B of Table 4, by replacing our gender variables with the average age of CEOs and directors and with the interaction between these variables.

3.2.2. Robustness. First, we confirm our main result by excluding CEO seats on the board of directors from the calculation of *Female directors*$_{it}$.[9] As shown in column (1) of Table 5, using this alternative measure of female directors results in an interaction term that is significant both statistically and economically.

In §2, we mentioned that it is common for Italian firms to have multiple CEOs with similar duties. Column (2) restricts the analysis to firms that have a single CEO. The values reported in this column indicate that our results are not driven by the number of a firm's CEOs.

Next we establish that our findings hold, irrespective of how firm profitability is measured. In column (3),

[8] It should be stressed here that we do not refer to the *total* effect of female interactions on profitability (i.e., the sum of all coefficients), but rather to how the effect of female CEOs varies with the presence of female directors.

[9] For example, a firm with one female CEO and a board consisting of one female and one male director has a fraction of female directors equal to 50%. But if the CEO sits on the board, then there is no true female interaction because the same woman is serving both as CEO and director. We accommodate that possibility by excluding the number of female CEO board positions when calculating the fraction of female directors. In the example given here, that fraction would then be 0% rather than 50%.

Table 4 Confounding Factors

	Panel A: Additional controls					Panel B: Age interactions	
Dependent variable: *ROA*	(1)	(2)	(3)	(4)	(5)	Dependent variable: *ROA*	
Female CEO presence	−0.017***	−0.015***	−0.023***	−0.025***	−0.016***	*CEOs' age*	0.001
	(0.005)	(0.005)	(0.006)	(0.007)	(0.006)		(0.001)
Female CEO presence ×	0.049***	0.047***	0.054***	0.057***	0.052***	*CEOs' age* ×	−0.000
Female directors	(0.015)	(0.015)	(0.017)	(0.018)	(0.015)	*Directors' age*	(0.000)
Female directors	−0.035**	−0.039***	−0.039**	−0.043**	−0.034**	*Directors' age*	0.001
	(0.014)	(0.015)	(0.018)	(0.018)	(0.014)		(0.001)
Family CEOs	0.014**					Firm controls	Yes
	(0.006)					Firm fixed effects	Yes
Family directors		0.014				Year fixed effects	Yes
		(0.009)				Industry trends	Yes
Family owners			0.013*			Number of observations	10,120
			(0.007)				
Female owners				0.010*			
				(0.006)			
Nonexecutive directors					0.004		
					(0.005)		
Firm controls	Yes	Yes	Yes	Yes	Yes		
Firm fixed effects	Yes	Yes	Yes	Yes	Yes		
Year fixed effects	Yes	Yes	Yes	Yes	Yes		
Industry trends	Yes	Yes	Yes	Yes	Yes		
Number of observations	10,154	10,153	7,613	7,531	10,154		

Note. Robust standard errors are reported in parentheses below the coefficients.
** and *** denote significance at 5% and 1%, respectively.

we change the dependent variable from EBIT divided by total assets to EBITDA (earnings before interest, taxes, depreciation, and amortization) divided by total assets; in column (4), we use the ratio of net income to total assets. In untabulated regressions we adopt still other profitability measures: return on sales and (log of) sales to assets; the latter measure captures the efficiency with which the company uses its assets to generate revenues. Finally, our results hold when the dependent variable is a measure of total factor productivity, computed as the residuals obtained from estimating, via ordinary least squares (OLS), a log-linear Cobb–Douglas production function in which the dependent variable is the logarithm of sales and the explanatory variables are the logs of employment and capital together with industry and year dummies.

One criticism of using firm fixed effects in this context is that the identification exploits only within-company changes in the presence of women among executives and directors, and such changes may well be limited

Table 5 Robustness

	No CEO–board overlaps	Single-CEO firms	EBITDA to assets	Net income to assets	Random effects	Regional trends	Trimmed ROA	Firm-clustered residuals	Nonlinear effects	Lagged ROA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Female CEO presence	−0.012***	−0.028**	−0.015***	−0.010**	−0.004	−0.016***	−0.016***	−0.016**	−0.014**	−0.016*
	(0.004)	(0.012)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.008)	(0.007)	(0.009)
Female CEO presence ×	0.039**	0.067**	0.042***	0.048***	0.027**	0.048***	0.040***	0.050**	0.044**	0.036*
Female directors	(0.016)	(0.033)	(0.015)	(0.015)	(0.013)	(0.015)	(0.012)	(0.022)	(0.018)	(0.021)
Female directors	−0.035**	−0.058*	−0.028**	−0.031**	−0.010	−0.030**	−0.018***	−0.033	−0.042*	−0.016
	(0.014)	(0.034)	(0.012)	(0.015)	(0.008)	(0.013)	(0.007)	(0.022)	(0.022)	(0.017)
Firm controls	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	10,154	4,550	10,154	10,154	10,154	10,154	9,952	10,154	10,154	6,527

Note. Robust standard errors (clustered by firm in column (8)) are reported in parentheses below the coefficients.
*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

in number. In column (5), we show that, even for a specification based on random effects, female interactions have a positive effect on profitability (with a significance level that approaches 5%). Column (6) controls for the interaction between regional and year dummies and so accommodates any effect of time-varying geographic factors. We next mitigate concerns that our results are driven by particularly influential observations. In column (7), we trim 1% of the observations on both the left and right tails of the ROA distribution (in unreported regressions, we alternatively trim 2.5% and 5% of these observations). Our results are robust as well to taking transformations of the dependent variable—e.g., the natural logarithm of 1+ROA. Column (8) details the results when an alternative computation of the standard errors, one based on firm clustering, is used; this procedure is valuable when we seek to account for the potential correlation of residuals by firms (in unreported tests we also cluster residuals by firm and by year). Next, we augment our specification with the *squared* fraction of female directors in case the profitability effect of female interactions is a nonlinear one; column (9) shows that, although the quadratic term is itself weakly significant (unreported), the main interaction term remains positive and significant at the 5% level.

Another concern with our analysis is that successful firms may be more likely to conform to gender diversity norms (Dezso and Ross 2012) and thus appoint female executives. To address the likelihood of such reverse causality, we follow Dezso and Ross (2012) in augmenting the specification with firm profitability lagged by one year. We can thus establish the effect of gender interactions after controlling for differences in past profitability across firms. It is well known that fixed-effects estimates are inconsistent when lags of the dependent variable are included as explanatory variables—a problem that arises by construction because lags are correlated with the residuals. We therefore adopt the dynamic generalized method of moments developed by Arellano and Bond (1991). This method first differentiates the model (to eliminate fixed effects) and then performs an instrumental variables regression of the resulting model using lags of the explanatory variables as instruments. As shown in column (10), which reports one-step heteroskedasticity robust estimates, the interaction term remains statistically significant at the 10% level as well as economically close to our baseline estimates.[10] We further assess the causal direction of our results by estimating a noncontemporaneous specification. Specifically, we re-estimate our baseline regression model using one-year lags of the main explanatory variables and interaction term. The results (untabulated) of this estimation indicate that *past* female interactions have a positive and significant effect on *current* firm profitability ($\beta_3 = 0.045$, $p = 0.005$).

[10] When employing many instruments, the Arellano–Bond method can suffer from poor performance of asymptotic results. Therefore, in unreported regressions we check that our results are robust to restricting the instruments to the first available lag.

4. Evidence from Executive Transitions

Although our findings are robust to several checks, the concern of endogeneity remains. In this section, we estimate a triple-difference model of executive transitions. An important advantage of this approach is that, by absorbing trends and other factors that are unobserved but common to all firms, it better isolates the profitability effect of female interactions. First, we present estimates obtained on the full sample of CEO transitions. Second, we present a number of robustness checks. Third, we report results based on propensity score matching and instrumental variables.

4.1. Main Results

We start by identifying the subsample of approximately 3,300 observations involving family firms that experienced CEO successions during the period under study. Our treatment group is formed by CEO transitions in which the departing CEO is male and the incoming CEO is female (i.e., male-female transitions); the control group consists of male-male transitions.[11] The treatment group accounts for 13% of our observations of CEO succession. Comparing the profitability effect of these male-female transitions with that of the control group is a difference-in-differences approach similar to that employed by Huang and Kisgen (2013). One condition for this approach to be valid is that firms in the treatment and control group exhibit similar pretransition trends relative to the outcome of interest. We establish the satisfaction of this condition by comparing the mean profitability of treatment and control groups prior to transition. Two-sample t-tests confirm that both our treatment and control groups are similar in terms of pretransition ROA (difference $= -0.0001$, $p = 0.985$). This lack of a significant difference should mitigate concerns about reverse causality, a topic that is addressed more thoroughly in §§4.2 and 4.3.

Next we adopt the fraction of female directors as an additional (continuous) treatment. The resulting interaction constitutes a triple-difference estimator, which assesses how the profitability effect of male-female versus male-male CEO transitions varies depending

[11] We exclude the few cases of female-male transitions.

on the presence of female directors. We estimate the following model:

$$\begin{aligned} ROA_{it} = {} & \beta_0 + \alpha_i + \delta_t + X_{it-1}\eta + \beta_1(Post_{it} \times Female_i) \\ & + \beta_2(Post_{it} \times Female_i \times Female\ directors_{it}) \\ & + \beta_3(Post_{it} \times Female\ directors_{it}) \\ & + \beta_4(Female_i \times Female\ directors_{it}) \\ & + \beta_5(Female\ directors_{it}) + \varepsilon_{it}. \end{aligned} \quad (3)$$

Here $Post_{it}$ is an indicator variable set equal to 1 only for the years *after* transition, and $Female_i$ is an indicator set equal to 1 if the company experiences a male-female transition. The coefficient β_1 for the $Post_{it} \times Female_i$ interactions estimates the profitability effect of male-female transitions as compared with male-male transitions. Our estimate of interest is given by β_2—i.e., the coefficient for the triple interaction $Post_{it} \times Female_i \times Female\ directors_{it}$—which measures how the profitability effect of male-female versus male-male transitions varies depending on the fraction of female directors. The dependent variable and controls are similar to those in the regressions reported in Table 3.

The results are reported in Table 6. First, we find that male-female CEO transitions have a positive effect on firm profitability that is significant at the 10% level (columns (1) and (2)). Second, male-female transitions have an economically and statistically significant effect on profitability as the fraction of female directors increases (columns (3) and (4)). These results support our previous finding that female interactions improve the profitability of family firms.

4.2. Robustness

With regard to sample composition, we show that our results are robust to excluding the few firms that undertake more than one succession during the period considered (column (5) of Table 6) and to including only single-CEO firms (column (6)). In the latter case, the triple-interaction term is positive and close to our main estimate in column (4), although the statistical significance is not achieved at conventional levels (owing, perhaps, to the small sample size). In column (7), we check that our results hold when female CEOs are excluded from the count of female directors.

As already mentioned, firms undergoing male-male versus male-female leadership transitions do not differ in terms of profitability *prior* to the transition. This sameness is crucial because it indicates that reverse causality is highly improbable in our setting. However, we further mitigate that concern by using "placebo" successions two years prior to the actual succession year. If the coefficient for such placebo succession turned out to be statistically significant, then our previous estimates might merely reflect diverging pretransition trends in the treatment and control groups rather than a treatment effect. In column (8), we show that the triple-interaction term is neither statistically nor economically significant. This result further validates our approach and confirms that our findings are indeed driven by executive transitions and not by diverging trends.

In unreported regressions, we also check that the triple-interaction term remains statistically and economically significant when residuals are clustered by firms, and also when we trim 1% of the observations in both tails of the ROA distribution to reduce the

Table 6 Triple-Difference Estimates

	Difference-in-differences estimates		Interaction: Triple-difference estimates		Unique transitions	Single-CEO firms	No CEO–board overlaps	Placebo transitions
Dependent variable: *ROA*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × *Female incoming CEO*	0.010*	0.010*	−0.014	−0.012	−0.011	−0.022	0.001	0.007
	(0.006)	(0.006)	(0.009)	(0.008)	(0.014)	(0.017)	(0.006)	(0.008)
Post × *Female incoming CEO* × *Female directors*			0.087***	0.076**	0.076*	0.091	0.073**	−0.007
			(0.033)	(0.032)	(0.041)	(0.067)	(0.034)	(0.008)
Female directors	−0.036	−0.038	−0.037	−0.043	−0.079*	−0.132	−0.029	−0.060*
	(0.029)	(0.029)	(0.027)	(0.027)	(0.044)	(0.097)	(0.031)	(0.031)
Post × *Female directors*			−0.018	−0.012	−0.017	−0.039	−0.022	0.013
			(0.020)	(0.021)	(0.024)	(0.052)	(0.025)	(0.016)
Female incoming CEO × *Female directors*			0.001	0.005	0.065	0.183	0.012	0.048
			(0.033)	(0.033)	(0.059)	(0.134)	(0.043)	(0.033)
Firm controls	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry trends	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Number of observations	3,343	3,343	3,343	3,343	2,832	1,566	3,343	3,343

Note. Robust standard errors are reported in parentheses below the coefficients.
*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

effect of outliers. Finally, we check that our main finding remains significant when either the variable *Female directors*$_{it}$ or the interaction term *Post*$_{it}$ × *Female Directors*$_{it}$ is excluded. In fact, the result holds even when we include only the terms *Post*$_{it}$ × *Female*$_i$ × *Female directors*$_{it}$ and *Post*$_{it}$ × *Female*$_i$.

4.3. Propensity Score Matching and 2SLS Estimates

Propensity score matching ensures that firms experiencing male-male successions and those experiencing male-female successions are as similar as possible with respect to an array of observable characteristics. Specifically, we match each treatment firm, i.e., a firm in which a male-female transition occurs, with a firm in which a male-male transition occurs. The matching is performed—without replacement—on the basis of a propensity score estimated using a probit regression in which the dependent variable is the succession treatment dummy and the controls are the following variables: presuccession averages of firm age, firm size, ROA, and fraction of female directors; and dummies for year, region, and industry. Note that employing presuccession ROA ensures that the compared firms exhibited similar profitability prior to the CEO succession.

Results are reported in columns (1) and (2) of Table 7. The sample size for these regressions is much smaller because (i) for each firm that undergoes a male-female transition, we consider the most similar firm undergoing a male-male transition while discarding observations for all other firms, and (ii) male-male transitions are much more frequent than male-female transitions. The coefficient reported in column (2) for the triple-interaction term is economically relevant and statistically significant at the 5% level.

Propensity score matching addresses problems of reverse causality, but it may still be that unobservable variables are correlated with the incoming CEO's gender. We deal with this concern using instrumental variables. Recent works suggest that family firms offer a unique setting in which to address endogeneity: family characteristics have a strong influence on the organization of the family firm, yet they are unlikely to affect corporate outcomes directly.[12] In exploiting family-specific characteristics, our first instrument is an indicator variable set equal to 1 if the CEO has a female child (and set to 0 otherwise).[13] This variable is potentially a good instrument because—though it is (nearly) randomly determined and unlikely to be affected by firm profitability at the time of succession—it can be a significant predictor of the incoming CEO's gender: when there is a female child within the controlling owner's family, it is (expected to be) more likely that a female CEO will be appointed. Indeed, results from a probit regression indicate that the likelihood of appointing a female successor in this case is 9% higher ($p < 0.01$) after we control for firm size, firm age, and year and industry dummies. As a second instrument, we exploit a unique feature of the Italian context. Namely, there are marked differences across regions in terms of gender roles. Southern regions of the country are characterized by a traditional view of the family in which the woman is the homemaker and the man is the breadwinner. This belief, which is exhibited less often in central Italy, is even less prevalent in northern regions of the country. We therefore employ an indicator variable set equal to 1 if the firm is located in northern Italy (and to 0 otherwise). Although geographic variations in gender roles are likely to affect an incoming CEO's gender (in fact, firms located in northern regions are approximately 9% more likely to appoint a female CEO), it is unlikely that such variations have a direct effect on *changes* in profitability subsequent to a CEO succession.

The main endogenous variable in our framework is the indicator variable for incoming female CEO.

Table 7 Triple-Difference Estimates: Alternative Estimation Methods

	Matched sample		2SLS	
Dependent variable: *ROA*	(1)	(2)	(3)	(4)
Post × *Female incoming CEO*	−0.013	−0.017	−0.082	−0.054
	(0.015)	(0.015)	(0.108)	(0.091)
Post × *Female incoming CEO* × *Female directors*	0.076*	0.093**	0.386*	0.345*
	(0.044)	(0.043)	(0.217)	(0.197)
Female directors	−0.014	−0.017	−0.128**	−0.123**
	(0.027)	(0.032)	(0.064)	(0.060)
Post × *Female directors*	−0.024	−0.034	−0.110**	−0.122**
	(0.027)	(0.027)	(0.056)	(0.059)
Female incoming CEO × *Female directors*	−0.013	−0.014	0.238	0.282
	(0.044)	(0.049)	(0.181)	(0.187)
Firm controls	No	Yes	No	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry trends	No	Yes	No	Yes
Number of observations	851	851	1,973	1,973

Note. Robust standard errors are reported in parentheses below the coefficients.

* and ** denote significance at 10% and 5%, respectively.

[12] Bennedsen et al. (2008) use family size as an instrument when estimating the effect of board size on performance; Bennedsen et al. (2007) use the gender of a CEO's firstborn child to establish the performance effect of family CEO successions.

[13] Data on potential heirs were hand collected while considering the family nucleus of the main physical shareholder at the year of succession. In the presence of controlling legal entities, we identified the main shareholder among the physical shareholders of the controlling holding. We collected information on the gender of the main owner's children from a variety of sources, including company websites, press releases, family blogs, administrative documents, newspapers, and obituaries. Unfortunately, this information is available for only about 60% of the observations used in columns (1)–(4) of Table 6.

Thus, Equation (3) contains three endogenous variables: $Post_{it} \times Female_i$, $Post_{it} \times Female_i \times Female\ directors_{it}$, and $Female_i \times Female\ directors_{it}$. We estimate a two-stage least-squares (2SLS) model in which OLS are first used to regress each endogenous variable on the (similarly operationalized) instruments and the other controls, after which firm ROA is regressed on the predicted values of the endogenous variables together with the same first-stage controls. The results of this procedure, which are reported in columns (3) and (4) of Table 7, indicate that the triple-interaction term is statistically significant (at 8%) and economically larger than the OLS estimates.[14]

5. Variations

5.1. Gender Stereotypes

So far we have established that, on average, family firms led by female CEOs perform significantly better as the fraction of female directors increases. We now explore how gender stereotypes shape this result. On one hand, female interactions could be particularly valuable in the presence of stereotypes against women by helping alleviate the negative effect of such stereotypes on CEO task performance. On the other hand, female productivity may be lower in workplaces characterized by stereotypes against women. In Table 8 we adopt two empirical tests to disentangle these hypotheses.

First, we present results separately for firms located in the southern, central, and northern regions of Italy; as discussed in §4.3, these regions traditionally differ in terms of gender roles. Our results indicate that lone female CEOs have a large negative impact on profitability in southern regions (column (1)) and a negative but relatively smaller effect in central and northern regions (columns (2) and (3), respectively). The interaction term is positive and significant for companies operating in southern regions and positive but relatively smaller in northern regions. Assessing the effect of female CEOs evaluated for firms whose boards are predominantly female, we find a negative effect in southern regions (-0.023, $p=0.073$), an insignificant effect in central regions (0.009, $p=0.294$), and positive and significant effect in northern regions (0.012, $p=0.025$).[15]

Second, we follow the approach in Guiso and Rustichini (2011) that is based on data from the World Value Survey (WVS). The WVS is a collection of comprehensive individual-level surveys carried out in several countries around the world,[16] and it contains many questions on human values related to religion, political participation, attitudes toward women and minorities, and family values; the survey also reports standard demographic characteristics of the respondents. For the purpose of our analysis, we extract data from the 2005 wave and use responses to four questions concerning the role of women in society. Respondents were asked to indicate the extent of their agreement—on a four-point scale ranging from "strongly agree" to "strongly disagree"—to the following statements: (i) "Being a housewife is just as fulfilling as working for a pay." (ii) "On the whole, men make better political leaders than women do." (iii) "A university education is more important for a boy than for a girl." (iv) "On the whole, men make better business executives than women do." We used the survey to devise two indexes of female emancipation: one based on the first principal component of the responses to statements (i)–(iv) and another based solely on responses to question (iv). Finally, we compute the regional averages of these two indexes based on the respondents' geographic location and then assign the relevant value to each firm in our data set as a function of where its headquarters is located.

Columns (4)–(6) report the results when observations are sorted by terciles of the first index.[17] Although the negative coefficient for lone female CEOs is slightly more negative when female emancipation is high, in this case the interaction coefficient is both positive and much larger. A similar result is obtained when we use the second index of female emancipation; see columns (7)–(9).

5.2. Firm Size, Director Identity, and Economic Conditions

In this section, we show how our main finding varies in terms of firm characteristics and business cycles. We start by focusing on firm size, which may shape our results in two opposing ways. On one hand, it

[14] To assess the change in economic magnitude, we estimate an OLS regression on the subsample of firms used for the 2SLS regression. We find that the interaction term is nearly three times larger when estimated with 2SLS.

[15] We use the baseline specification, but our results are robust to excluding overlaps between female directors and CEOs and also to restricting the analysis to single-CEO firms.

[16] The countries covered by the WVS increased from 20 in the first wave (1981–1984, 25,000 respondents) to 54 in the last wave (2005–2008, 77,000 respondents). For Italy, the 2005 wave was addressed to about 1,000 statistical units selected from the population of age 18–74. Overall, 80 municipalities were selected from all 20 Italian regions while accounting for the distribution of population by region and the degree of urbanization (small, medium, medium-large, and large municipalities). The WVS then created a proportional sample stratified by region, age, and gender. The WVS website (http://www.worldvaluessurvey.org) documents that there are no significant differences between the real and theoretical sample in terms of age, gender, demographic size of municipalities, and geographic areas. In terms of geographic areas, for instance, 45.65% of WVS statistical units are in northern regions of Italy (versus 45.80% in the theoretical sample), 19.17% (versus 19.35%) are in central regions, and 35.18% (versus 34.79%) are in southern regions.

[17] Our findings are substantially unchanged if the sample is split at the median instead of into terciles.

Table 8 Gender Stereotypes

	Geographic areas			Overall emancipation			Emancipation of women in business		
	South	Central	North	Low	Medium	High	Low	Medium	High
Dependent variable: *ROA*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Female CEO presence	−0.064***	−0.014	−0.014**	−0.019**	0.008	−0.028***	−0.027***	0.005	−0.038***
	(0.020)	(0.015)	(0.006)	(0.008)	(0.013)	(0.009)	(0.008)	(0.010)	(0.012)
Female CEO presence × *Female directors*	0.082*	0.047	0.053***	0.048**	−0.023	0.083***	0.058***	0.013	0.097***
	(0.047)	(0.038)	(0.018)	(0.022)	(0.031)	(0.027)	(0.022)	(0.023)	(0.033)
Female directors	−0.029	0.004	−0.045***	−0.000	0.006	−0.076***	−0.002	−0.008	−0.087***
	(0.038)	(0.020)	(0.017)	(0.016)	(0.017)	(0.027)	(0.017)	(0.013)	(0.033)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	587	1,551	8,016	3,386	2,089	4,679	3,139	3,458	3,557

Note. Robust standard errors are reported in parentheses below the coefficients.
*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

may be easier for women to leave a personal imprint on corporate policies when the firm is small. On the other hand, large companies might be less subject to gender stereotypes and so may enact policies that favor the careers of women. Columns (1) and (2) in Table 9 present estimates separately for small and large firms—i.e., for firms below and above (respectively) the median with respect to size of assets. The reported values reveal that the negative effect (on profitability) of lone female CEOs is slightly more pronounced for large firms; also, the interaction term is positive and significant (albeit relatively smaller) for large firms. Thus, the effect of female CEOs heading firms with female-dominated boards is 10% significant and greater in small firms than in large ones.

Next we test how the family affiliation of female directors affects our result. Toward this end, we measure the fractions of family-affiliated and family-unaffiliated female directors,[18] and then interact the two resulting variables with our indicator variable for female CEO. The results, which are reported in columns (3) and (4) of Table 9, indicate that lone female CEOs in each case have a significantly negative effect on firm profitability.[19] The interaction term is positive and significant for both related and unrelated female directors, but the effect is much larger in the latter case. When interpreting this result, one should bear in mind that female CEOs are almost always appointed from within the controlling family; the implication is that column (3) is de facto analyzing female interactions between family members while column (4) is analyzing female interactions between family-affiliated CEOs and outside directors. In other words, the female interactions that generate the most improvement in profitability are those between a related female CEO and unrelated female directors. A possible explanation for this finding is that, because family members typically know each other and share the same values and objectives, gender is less likely to influence CEO–board interactions. This result could also be interpreted from a governance perspective: the value of a woman in a governance position (as documented by Adams and Ferreira 2009) may well be amplified when she is unrelated to the controlling family, given that outside directors mitigate expropriation by minority stakeholders (Anderson and Reeb 2004). Moreover, the companies we analyze are in particular need of effective directors because family ties are often associated with worse management practices (Bloom and Van Reenen 2007). So improvements in firm profitability that are a result of better governance should be greater when female interactions are between CEOs and family-unaffiliated directors—and, indeed, this is what we find. Overall, these special circumstances argue for caution when seeking to extend our results to nonfamily firms.

Finally, we explore the effect of variations resulting from business cycles. In particular, we estimate our main specification for the period ending in 2007 (i.e., for "normal" economic times) and also for the "financial crisis" period 2008–2010. One reason the profitability effect of female interactions could differ in crisis versus normal economic circumstances is risk aversion. If women are more risk averse than men, then companies with women in CEO and board positions may be better positioned financially in the aftermath of an economic crisis and thus better able to respond and adapt to that circumstance. In contrast, if women are less risk averse than men (or if there are no gender differences in risk taking), then the profitability effect

[18] Approximately 80% of all female directors are family affiliated.

[19] Results also show that only nonfamily female directors have a negative and significant effect on profitability—perhaps because they allocate too many resources to governance issues when the CEO is male.

Table 9 Firm and Business-Cycle Characteristics

	Firm size		Directors' affiliation		Business cycle	
	Small	Large	Family	Nonfamily	Normal times	Financial crisis
Dependent variable: *ROA*	(1)	(2)	(3)	(4)	(5)	(6)
Female CEO presence	−0.014	−0.018**	−0.010**	−0.006**	−0.014*	0.007
	(0.009)	(0.007)	(0.005)	(0.003)	(0.007)	(0.013)
Female CEO presence × *Female directors*	0.050**	0.041**	0.027**	0.095**	0.046**	−0.009
	(0.025)	(0.018)	(0.013)	(0.042)	(0.022)	(0.036)
Female directors	−0.044*	−0.009	−0.005	−0.099***	−0.054***	0.027
	(0.027)	(0.011)	(0.010)	(0.037)	(0.021)	(0.032)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry trends	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	5,077	5,077	10,141	10,141	6,187	3,967

Note. Robust standard errors are reported in parentheses below the coefficients.
*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

of female interactions during the 2008–2010 period should be negative (or, respectively, merely negligible). Unfortunately, the evidence on gender differences in risk aversion is ambiguous. There is some research indicating that women are the more risk-averse gender (for a recent contribution, see Charness and Gneezy 2012); yet Adams and Funk (2012) find that female directors take more risk than their male counterparts do. According to our results, the female-related standalone and interaction terms are significant in normal times (column (5)) but *not* in times of financial crisis (column (6)).

6. Discussion and Conclusion

Motivated by the introduction of policies that aim to increase the presence of women in political and corporate positions, a growing literature has explored gender differences in economic behavior and their implications for organizations.

Experimental research in the field of economics has stressed the role of environmental factors in explaining female competitiveness. For instance, Gneezy et al. (2009) find that women compete more than men in a matrilineal society but that the opposite is true in a patriarchal society. Booth and Nolen (2012) show that girls from single-gender schools are more competitive than girls from coeducational schools, and other researchers (Iriberri and Rey-Biel 2012, Shurchkov 2012) argue that women tend to underperform on tasks that are perceived to be male oriented. A number of authors in the field of finance have investigated the effect of female involvement in various corporate positions (e.g., Adams and Ferreira 2009, Dezso and Ross 2012, Faccio et al. 2011, Huang and Kisgen 2013).

Bridging these two strands of research, in this paper we explore how the interactions between women in governance and CEO positions affect corporate profitability. Our working hypothesis is that, although lone female CEOs may underperform because of the psychic costs (Blau and Ferber 1986) induced by a company's pervasive male-oriented context (Koenig et al. 2011), their performance may improve in response to interaction with women in the board of directors. In particular, female CEOs may feel less inhibited when operating with female peers in governance positions. Such interactions between female CEOs and female directors may also serve to reduce the risk of communication breakdowns, improve cooperation, and facilitate information exchange—effects that should result in higher-quality board performance and thus in more efficient managerial decision making.

Using a panel of family firms from Italy, we find that an increasing fraction of women on the board of directors significantly improves the profitability of firms led by female CEOs. One challenge to a causal interpretation of our findings is the nonrandom occurrence of female interactions. We exploit the longitudinal nature of our data to control for unobserved firm heterogeneity and several other possible sources of bias, including reverse causality. We further mitigate endogeneity concerns by taking a triple-differences approach to the analysis of executive transitions. Finally, we identify several factors that reduce the positive effect (on profits) of interactions between female CEOs and female directors; in particular, such reduction is evident when the firm is located in geographic areas characterized by a conservative view of women's role in society, when the firm is large, and in times of financial crisis.

Our results have several implications. Existing evidence suggests that women are more sensitive than men to context (Croson and Gneezy 2009). By showing

that the interactions with a board in which women are largely represented mitigate the observed underperformance of lone female CEOs, our results augment recent discussions (e.g., Dezso and Ross 2012) of the contexts under which female leadership can be more effective. Our findings also suggest that the criteria by which women gain seats on the board may shape the performance effect. That is, the female interactions that are most beneficial to firm profitability are those involving nonfamily female directors, who are more likely to have been selected via a meritocratic process. This notion is reinforced by our finding that female interactions are less effective in areas with strong traditional family values, where companies more likely appoint executives on the basis of family ties. Our results thus complement those of Ahern and Dittmar (2012), who document a decline in the market value of firms subsequent to the passage in Norway of gender quotas for boards (a finding that may reflect the tendency of those companies to appoint relatively inexperienced female directors).

Our results are relevant also to the ongoing debate over the governance of private unlisted firms. Although traditionally ignored by policy makers, unlisted companies are now increasingly affected by the adoption of "codes of good governance" (see European Confederation of Directors' Associations 2010, Van den Berghe 2010). A recent example is the Buysse Code in Belgium, which offers detailed suggestions on how private firms should be governed to secure their survival and long-term success. We believe that similar codes could be used to promote female representation on boards of directors; even in the absence of specific gender quotas, such representation can yield female complementarities that could improve firm performance.

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