

FEMALE DIRECTORS AND CASH HOLDINGS: EVIDENCE FROM PAKISTAN

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Abstract

This paper examines the impact of female directors i.e., female independent directors and number of female directors on corporate cash holdings using the data of non-financial firms listed on the Pakistan Stock Exchange for the period 2009-2018. The results indicate a significant negative impact of female independent directors on firm cash holdings. Further, we also find a negative effect of number of female directors(voice) on cash holdings. The findings are in line with both resource dependency and critical mass perspectives. Further, our results are robust to alternative econometric specifications, various measures of cash holdings and corporate governance, generalized method of moment (GMM), lagged explanatory variables, and two-stage least squares. This study offers valuable insights into the current global debate on female representation in the workplace and its implications for a firm's strategic outcomes.

Keywords: Female directors, resource dependency theory, critical mass theory, cash holdings.

INTRODUCTION

The changing social trends and recent corporate failures, e.g., Enron and WorldCom, lead to changes in corporate board composition and management (Van der Walt and Ingley, 2003). Extant literature shows several factors such as board directorship, experience, multiple management tasks, and various compensation and incentive programs impact the board's efficiency. Consistent with this, an increasing strand of literature has documented female

directors' role in the board's effective decision-making (Chen et al., 2017; Mustafa et al., 2020; Ullah et al., 2019). This is because the female representation enables firms to access the large intellectual talent and bring different perspectives to the team collective wisdom, increasing the firm's ability to respond to dynamic changes in the environment, improving firm performance. This view is further supported by resource dependency theory, which suggests that procurement of external resources has essential consequences for organizational outcomes (Pfeffer and Gerald, 1978). However, female independent directors (FID hereafter) and cash holding nexus are not investigated in the conservative but developing economy of Pakistan. This study seeks to fill this gap.

Bradshaw, Murray, & Wolpin (1992) define gender diversity as "the contribution of women in the firm's management and introduce a power-sharing policy." Extant literature documented that women board members are more spoken and less conservative than their male counterparts (Carter et al., 2003). Moreover, female directors adhere to assorted views, opinions, and experiences required to contain complex situations through quality decisions (Huang and Kisgen, 2013). Prior studies show that female presence at the top cadre significantly influences decision-making (Shaukat et al., 2016). For instance, they are the efficient negotiator of acquisitions deals (Levi et al., 2014), enhance investment efficiency (Faccio et al., 2016), keep more budget for research and development (Miller and del Carmen Triana, 2009), and improve firm value (Liu et al., 2014a). In addition, women presence at the board level are positively associated with better governance and higher payout ratio (Chen et al., 2017), improve the stock price-related information (Gul et al., 2011), strive more to guarantee transparency through audit efforts (Gul et al., 2008), and they are more diligent in playing monitoring role (Adams and Ferreira, 2009; Ullah, Fang, and Jebran, 2019). However, women's involvement in board operations depends upon their population (Tanford and Penrod, 1984) and when they have specific numbers on board, their influence on board decision making becomes even more pronounced (Bear et al., 2010; Torchia et al., 2011). The presence of one, two, and three female directors are considered token, presence, and voice, respectively (Atif et al., 2019). Two women are considered better than one woman, and three women are better than two (Kanter, 1977). In short, not only women but their number also matter in a firm's strategic decisions.

Corporate cash holding decision is one of the important decisions of top management that ensure a firm's short-term solvency and fulfill operational needs. On the other hand, keeping higher cash ratio is considered detrimental to shareholders' wealth and firm's value because of dual taxation and inferior return (Jensen, 1986; Tong, 2010). Excessive cash holding exacerbate the agency problem (Jensen, 1986) because it encourages entrenched managers to spend more on their empire building (Harford et al., 2008; Ozkan and Ozkan, 2004). For instance, prior studies show that entrenched managers use excess cash to protect themselves from capital market monitoring mechanisms (Harford et al., 2008; Jensen, 1986). Various board and firm-related factors have been dealt with in the extant literature for agency problems mitigation due to excess cash holding (Myers and Majluf, 1984; Harford, Mansi, and Maxwell, 2008a; Tong, 2010). However, FD effect on firm's cash holding literature is not only limited but also inconclusive

(Atif et al., 2019; Cambrea et al., 2019; La Rocca et al., 2019). Moreover, these studies are conducted in developed countries, whereas empirical evidence from a conservative society such as Pakistanis still overlooked.

To find the relationship between female director, i.e., FID and number of female directors, and corporate cash holdings, we studied non-financial firms listed on the Pakistan Stock Exchange (PSX) for 2009-18. Our results demonstrate a strong negative relationship between FID and firms' cash holdings. We also find that firms having more than one female director on the board have a more significant negative impact on cash holding decisions, supporting the resource dependency and critical mass theories. Our findings are in line with alternative measures of cash holdings and econometric techniques. In addition, we find that the existence of controlling shareholders mitigates the monitoring role of women directors.

This study adds to the existing cash holding literature in the following ways. We documented substantial evidence on the FID and firm's cash holdings nexus from a conservative emerging economy, i.e., Pakistan. Contrary to the advanced countries, where women's participation in economic activities is widespread, Pakistan's economic landscape is dominated by men, and women have limited opportunities. Interestingly, FID disciplines the firm's cash holdings in Pakistan settings, and provides valuable resources for better utilization of cash. These findings support the resource dependency theory. We further contribute to the growing literature related to the women's presence on board to strengthen the monitoring mechanism (Adams and Ferreira, 2009; Atif et al., 2019; Chen et al., 2017; Gul et al., 2011), and make their presence obvious in the firm. The results reveal that as the female presence increase from one to two and three, the firm's cash holdings decrease significantly. This means that more female existence at the firm's upper echelon strengthens the boardroom's monitoring function, alleviating agency costs. These findings are consistent with the critical mass theory. Finally, our study provides empirical evidence on the recent global call for workplace diversity and accolades existing literature supporting women's presence on corporate boards.

The scheme of this study is as follows. Section 2 is about hypotheses development. Section 3 shows data and empirical methodology; Section 4 depicts the study results, while Section 5 highlights the robustness of the results. Finally, section 6 concludes the study and shows its limitation.

HYPOTHESIS DEVELOPMENT

Extant literature highlights numerous benefits of female existence in corporate boardrooms. For instance, a woman's presence at the board level improves stock price information (Gul et al., 2011), significantly decreases earning management (Luo et al., 2017), and strengthens board's monitoring function (Atif et al., 2019; Cox and Blake, 1991). Theories like agency, resource dependency, and critical mass proposed by Jensen and Meckling (1976), Salancik and Pfeffer (1978), and Kanter (1977), respectively, provide framework for investigating the impact of female on corporate outcomes.

FEMALE INDEPENDENT DIRECTORS AND CORPORATE CASH HOLDING: RESOURCE DEPENDENCY THEORY

There are two primary motives behind cash holdings: first, to fulfill business needs, and second, entrenchment (related to agency theory). The business needs motive claims that firms hold cash to meet the firm's operational, investment, and precautionary requirements when no other financial source is available (Bates, Kahle, and Stulz, 2009). Conversely, excessive cash holding increases agency problems liquid asset cash, gives managers unnecessary control to spend maliciously on personal perquisite or waste in unprofitable investments (Jensen, 1986; Masulis et al., 2009). Therefore, agency theory claims that holding funds for ingrained purposes is harmful to the firm (La Porta et al., 2000).

Corporate board is an internal governance mechanism to protect the shareholders' interest from entrenched managers in contemporary firms (Fama, 1980). An effective corporate board would control the agency problems (related to cash holding) through intensive monitoring mechanisms (Fama and Jensen, 1983), collective wisdom, and impartial advice (Dittmar and Mahrt-Smith, 2007; Harford et al., 2008). Consequently, the board's effectiveness is important for protecting the shareholders' interests and mitigating agency problems (Derouiche and Nguyen, 2015; Atif, Liu and Huang, 2019; Ullah et al., 2020). However, extant literature shows that boardroom combination affects its effectiveness. A homogeneous board may have a quick decision advantage, while a diverse board can bring more collective wisdom and access to the critical resources, which are the pre-requisites of quality decision making. Diversity at the upper echelon view is supported by resource dependency theory (Salancik and Pfeffer, 1978). Extant literature suggests that one's gender affects decisions. For instance, compared to their male aggressive and overconfident peers (Huang and Kisgen, 2013), women are more risk-averse and conservative in their decisions (Hurley and Choudhary, 2020; La Rocca et al., 2019). Female directors also have a lesser inclination towards earnings manipulation and fraudulent behavior (Triki Damak, 2018; Wahid, 2019). Likewise, the presence of a female director at the board level is negatively associated with information opacity (Abad et al., 2017; Dobija et al., 2021; Upadhyay & Zeng, 2014; Ullah et al., 2020) and is positively related to firm's performance (Liu et al., 2014b). However, existing literature is inconclusive on the female directors and firm's cash holdings nexus (Atif et al., 2019; Cambrea et al., 2019; Nasr et al., 2020; La Rocca et al., 2019; Ullah et al., 2020). This may be due to their conservative and honest personality attributes. In a country like Pakistan, which is dominated by men and has 124th number on corruption perception index (Transparency International, 2021), managers will keep more cash reserve for their ingrained purposes. However, the appointment of female members to the corporate will strengthen the board monitoring function and alleviate agency costs. This impact will be more pronounced if they are independent in their decisions, i.e., independent female directors. Thus, our first hypothesis is as follow:

H1: *Firms with female independent directors on board have relatively less cash holdings.*

NUMBER OF FEMALE DIRECTORS AND CORPORATE CASH HOLDING: CRITICAL MASS PERSPECTIVE

An individual representative of any social class in a group is considered a token, and the dominant class controls the group and its culture (Kanter, 1977). Therefore, one female on corporate board is negatively observed by others. Instead of encouraging female to participate and provide their valuable input, the dominant group (males) mold women into gender role stereotypes and distort their image (Sherrick et al., 2014). Consequently, female' voice remains unheard in firm's strategic decisions (Terjesen et al., 2009). Thus, tokenism creates difficulties for women to serve in a top position, which might be why most men hold higher ranks (Lee and James, 2007). Extending the work of Kanter (1977), Konrad, Kramer, & Erkut (2008) explain the numerical representation of females(i.e., as one, two, and three) on the corporate board. Their findings show that two females are better than one, and three are defiantly better than two. Therefore, women's participation in board proceedings depends upon the number of female directors on board. As their number increases, they feel powerful enough to influence the board decisions (Bear et al., 2010; Torchia et al., 2011). This increase from at least three female directors at the firm's boardroom is considered critical mass (Torchia et al., 2011). Researchers linked critical mass theory with different corporate factors and documented empirical evidence. Similarly, Bear et al. (2010) documented a positive nexus between critical mass and firm reputation. Therefore, extending the same line of research, we argue that if FID affects the firm's cash holdings, then the critical mass would have a more pronounced impact on cash holdings. Thus, we propose our second hypothesis;

H2: The more the number of female directors the more it will negatively affect the corporate cash holdings.

DATA AND EMPIRICAL METHODOLOGY

SAMPLE

For this study, a sample of 224 non-financial firms listed on (PSX) was taken for the years 2009-2018. Consistent with existing literature, we excluded financial firms due to their unique regulatory mechanism and financial structure (Atif et al., 2019; Liu et al., 2015; Nikolov and Whited, 2014). Only those firms are considered whose data for the sample period was available. The selected firms' financial and governance data were collected from the Wharton Database (Compustat) and State Bank of Pakistan (SBP) websites, respectively.

VARIABLES MEASUREMENT

Table 1 shows the measurement of the dependent, independent, and control variables of the study.

Table 1. Variables measurement

Variable	Name	Measurement
Panel A: Cash Holdings (Dependent Variables)		
Cash holdings	CH1	$\ln(1 + \text{cash and cash equivalent} / \text{total assets})$
Cash holdings	CH2	Ratio of cash and marketable securities to net assets
Panel B: Female Directors (Independent Variables)		
Female Independent directors	FID	Number of female independent directors divided by board size
Female Dummy 1	F1	Indicator variable equals 1 if the firm has one female directors, and 0 otherwise
Female Dummy 2	F2	Indicator variable equals 1 if the firm has two female directors, and 0 otherwise
Female Dummy 3	F3	Indicator variable equals 1 if the firm has three female directors, and 0 otherwise
Panel C: Firm's Specific Variables (Control Variables)		
Tangibility	TNG	Property, plant and equipment scaled by total assets
Leverage	LV	Total debt divided by total assets
ROA	ROA	Net income divided by total assets
Tobin's Q	TQ	Market value divided by book value of equity
Capital expenditure	CEX	Total capital expenditure scaled by total assets
Sales Growth	SG	Percentage change in sales scaled by total assets
Panel D: Governance (Control Variables)		
Board Independence	BIND	Number of independent directors on the board
Board size	BS	Number of directors on the board
CEO Duality	Dual	Indicator variable: equals one if CEO is also the chairman of the board and zero otherwise

(Wintoki et al., 2012). And finally, the instrumental variable (IV) and 2SLS methods were employed (Harford, Li, and Zhao, 2008). Section 5.2 further explains these methods.

RESULTS

DESCRIPTIVE STATISTICS

Table 2 depicts the summary statistics of the study. Two separate measures are used for firm's cash holdings purposes: CH1 and CH2. In terms of CH1 and CH2, Column 2 of Table 2 shows that on the average sample firms have 4.6% and 4.2% for cash holdings relative to assets, respectively. The mean (Std.Dev) of FID in full sample is 0.674 (1.033). Similarly, the average number of female directors on the board is 0.196 (F1), 0.129 (F2), and 0.095 (F3).

Control variables are categorized as governance and firm-specific variables. Governance variables consist of board independence (BIND), board size (BS), and CEO duality (Dual). The existence of independent directors in the corporate board room is important, as it counters the manager's opportunistic behavior and thus reduces the agency conflict (Fama and Jensen, 1983). CEO Duality (Dual) may also influence the decision-making process, as a manager he has discretionary power on excessive cash. Table 2 depicts BIND, BS, and Dual as 0.557, 8.010, and 0.232, respectively. Firm-specific group includes tangibility (TNG), Leverage (LV), Return on assets (ROA), growth opportunity (TQ), capital expenditure (CEX) and sales growth (SG). Tangibility has an average value of 0.992, Lev 0.608, ROA 0.045, TQ 0.131, CEX 0.054 and SG 0.147.

Table 2. Descriptive Statistics

Variables	Full Sample		With women		Without women		Mean Diff	t-stat
	N=1997		N= 845		N= 1152			
	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev		
CH1	0.046	0.079	0.041	0.078	0.050	0.080	-0.009***	2.422
CH2	0.042	0.069	0.038	.067	0.046	0.070	-0.008***	2.599
FID	0.674	1.033	1.549	1.067	0.000	0.190	1.358***	-47.257
F1	0.196	0.397	0.463	0.498	0.000	0.000	0.463***	-31.509
F2	0.129	0.420	0.536	0.498	0.000	0.058	0.532***	-35.893
F3	0.095	0.293	0.220	0.421	0.000	0.058	0.216***	-17.499
TNG	0.992	0.031	0.994	0.022	0.991	0.036	0.002**	-1.941
LV	0.6080	0.356	0.612	0.357	0.605	0.356	0.007	-0.434
ROA	0.0455	0.113	0.046	0.110	0.044	0.115	0.041	-0.326
TQ	0.1314	0.164	0.134	0.157	0.129	0.169	0.004	-0.619
CEX	0.0542	0.069	0.050	0.055	0.056	0.078	-0.006	1.856
SG	0.1472	1.353	0.210	2.008	0.099	0.406	0.110	-1.684
BIND	0.5579	0.195	0.545	0.196	0.567	0.195	-0.021***	2.459
BS	8.0150	1.5670	7.8982	1.3513	8.1006	1.7036	-0.202***	2.857
Dual	0.2320	0.4222	0.2970	0.4572	0.1843	0.3879	-0.090***	-5.940

CORRELATION MATRIX

Table 3 shows Pearson correlation among all the variables. Results highlight the high correlation between FID and dummy variables (F1, F2 and F3). Furthermore, Cash holding measures, i.e., CH1 and CH2 are also highly correlated. These highly correlated variables were tested in separate regression models to avoid multicollinearity. Besides the test for the potential effect of multicollinearity, we also calculated variance inflation factor (VIF). This, VIF score, is less than 3.50 for all the variables, and the overall average is 3.55, confirming no multicollinearity issues exist in our models.

Table 3: Pearson Correlation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1) CH1	1							
2) CH2	0.999***	1						
3) FID	-0.089***	-0.092***	1					
4) F1	-0.060**	-0.062**	0.832***	1				
5) F2	-0.094***	-0.096***	0.882***	0.636***	1			
6) F3	-0.118***	-0.123***	0.729***	0.377***	0.592***	1		
7)TNG	-0.016	-0.019	0.0526**	0.0244	0.0399	0.073***	1	
8)LV	-0.211***	-0.215***	0.0917***	0.038	0.0633**	0.179***	0.023	1
9)ROA	0.332***	0.339***	-0.084***	-0.017	-0.056**	-0.154***	-0.047*	-0.393***
10)TQ	-0.230***	-0.235***	-0.009	0.0202	-0.052**	0.0505*	0.047*	0.521***
11)CEX	-0.001	0.003	-0.035	-0.015	-0.035	-0.031	0.032	-0.104***
12)SG	0.001	0.000	0.00768	0.0430*	-0.020	-0.013	-0.005	-0.010
13)BIND	-0.012	-0.011	-0.025	-0.027	-0.018	-0.002	0.019	-0.038
14)BS	0.021	0.021	-0.022	-0.071***	-0.012	0.001	-0.114***	-0.051**
15) Dual	-0.039	-0.038	0.112***	0.155***	0.066**	0.034	0.060**	0.097***
	(9)	(10)	(11)	(13)	(13)	(14)	(15)	
9)ROA	1							
10)TQ	-0.266***	1						
11)CEX	0.155***	0.049*	1					
12)SG	0.048*	0.046*	-0.002	1				
13)BIND	0.039	-0.091***	-0.037	-0.018	1			
14)BS	0.096***	-0.085***	0.0178	0.024	0.0425	1		
15) Dual	-0.069***	0.067***	-0.053**	0.0138	-0.130***	-0.152***	1	

Robust standard errors in parenthesis *** p<0.01, ** p<0.05, * p<0.1

FID AND FIRM'S CASH HOLDINGS: RESOURCE DEPENDENCY THEORY

Resource dependency theory argues that firms accumulate benefits through their boards in three ways: advisory, legitimacy and access to resources (Salancik and Pfeffer, 1978). For

instance, some firms keep diverse boards to maintain a good relationship with customers and employees, while others desire a women perspective in the firm's important decisions. Table 4 highlights the impact of FID on the firm's cash holdings. It is evident from the table that FID has a strong negative impact on corporate cash balances, using both the models of cash holding, i.e., CH1 and CH2. For instance, column 4.1 and 4.3 show CH1, CH2 -0.007 and - 0.006, respectively. This means FID affects the firm's cash holdings is significant at a 1% level. Likewise, when investigated along with control variables, firm-specific and board-specific, it has still a negative impact on the dependent variable at a 5% level. For example, column 4.2 and 4.4 of Table 4 depicts CH1 -0.004 and CH2 -0.003, respectively.

In control variables, TQ, CEX and BIND are negative while ROA is positively associated with cash holdings. Inverse nexus between the firm's growth opportunities with cash holdings is consistent with the pecking order theory. This means that corporations primarily finance their investment projects with their own generated resources (Myers and Majluf, 1984). Consequently, firms having relatively better expansion prospects on hand have small cash balances on their statement of financial position. Similarly, BIND negatively affects cash holdings. However, CEX and Cash holding negative relationship are in contradiction with the trade-off theory and with the findings of Opler et al. (1999), Wang and Kabiraj, (2016), Rehman et al., (2016), and Siddiqua, Rahman and Hussain (2018). Our results also reveal a positive link between a firm's profitability (ROA) and cash holdings. This means firms with high profitability ratios maintain a large reserve of cash holdings. Finally, no significant relationship of TNG, LV, SG, BS and CEOs duality were observed with cash holdings.

Table 4 Female independent directors on the board and corporate cash holdings

	(4.1)	(4.2)	(4.3)	(4.4)
Variables	CH1	CH2	CH1	CH2
FID	-0.007*** (0.002)	-0.004** (0.001)	-0.006*** (0.001)	-0.003** (0.001)
TNG		0.0141 (0.0448)		0.00535 (0.0409)
LV		-0.0042 (0.0082)		-0.0036 (0.0073)
ROA		0.223*** (0.0310)		0.198*** (0.0266)
TQ		-0.074*** (0.0178)		-0.067*** (0.0160)
CEX		-0.0536* (0.0289)		-0.0422 (0.0258)
SG		-0.0002 (0.0004)		-0.0002 (0.0003)
BIND		-0.017** (0.0078)		-0.015** (0.0068)
BS		-0.0010 (0.0012)		-0.0009 (0.0011)
Dual		-0.0014 (0.0016)		-0.0009 (0.0014)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Intercept	0.0522*** (0.0128)	0.0601 (0.0445)	0.0479*** (0.0113)	0.0618 (0.0407)

N	1,875	1,472	1,875	1,472
R ²	0.012	0.146	0.014	0.152

*Note: This table reports the result of board gender diversity and corporate cash holdings. *** $p < 0.01$, ** < 0.05 , * < 0.1 .*

CRITICAL MASS THEORY AND CASH HOLDINGS

Following critical mass theorem, a regression model having three dummy variables for female presence at board level, F1, F2, and F3, and two measures for cash holding, CH1 and CH2, were tested to know the impact of number of female directors on corporate cash holdings. Table 5 reports the results. It is worth mentioning that as the number of female board members increases from one to three, their statistical significance improves from 10% level to 1% on the firm's cash holdings. For example, column 5.3 and 5.4 of Table 5 indicate that having one female director at the board level diversity impact is -0.0083 and -0.0076 for CH1 and CH2, respectively. As women existences on board jump from 1 to 3, their statistical significance improves from 10% to 1% level. These findings are consistent with earlier studies (e.g., Torchia et al., 2011; Liu, Luo and Tian, 2015; Atif, Liu and Huang, 2019). Following the Critical Mass paradigm analogy, "one is token, two is the presence, and three is a voice." Our results illustrate that the presence of two or more female directors at the firm's board have pronounced negative impact on cash holdings.

We found a negative association between TQ, CEX, and BIND with CH1 and CH2. However, a positive relationship is observed between ROA and cash holdings in Table 5. Finally, no statistically significant relationship is found between the rest of the control variables, i.e., TNG, LV, SG, BS, and Dual, with cash holdings.

ROBUSTNESS

ROBUSTNESS RESULTS

As a robustness estimation, we re-defined our dependent variable proxies, i.e., CH1 and CH2, as cash and cash equivalent over total assets (CH3). We then re-estimated our model and reported our findings in Table 6. Results show that FID has a significant negative effect on CH3. FID is statistically negatively related to cash holdings at a 10 percent level, and set of dummy variables F2 and F3 at a 1% level. These findings are congruent to those documented in Table 4 and 5 and are consistent to the prior studies (Tong, 2010; Chen et al., 2015; Atif et al., 2019).

ENDOGENEITY ISSUES

To overcome the endogeneity problem, this study use GMM results, lag of test variables and 2SLS. The results of these methods are discussed in the following sections.

GMM RESULTS

According to this approach, lagged-values of cash holdings are taken and estimated in advanced regression via Arellano-Bond. This method circumvents endogeneity problem arising from unobserved, simultaneity and vibrant relationship of board composition and the firm's past performance (Wintoki et al., 2012). Explanatory variables are concocted to be endogenous. The second and third lags of the explained variables, together with the lags of the exogenous variables, are used as instrumental variables (IVs). Table 7 reports GMM results, which depict that the female director has a significant effect on cash holdings. For instance, 1% rise FID results in decrease in CH1 and CH2 -0.0068 and -0.0061 respectively. Likewise, F1, F2 and F3 impact is -0.0394, -0.0293; -0.0278, -0.0213 and -0.0053, -0.0239 in term of CH1 and CH2.

Table 5. Number of female directors and corporate cash holdings: Critical mass perspective

	(5.1)	(5.2)	(5.3)	(5.4)	(5.5)	(5.6)	(5.7)	(5.8)
Variables	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2
FID	-0.0047** (0.0019)	-0.0043** (0.0017)						
F1			-0.0083* (0.0042)	-0.0076** (0.0037)				
F2					-0.0163*** (0.0049)	-0.0146*** (0.0043)		
F3							-0.0175*** (0.0040)	-0.0161*** (0.0036)
TNG	0.0160 (0.0450)	0.0069 (0.0410)	0.0098 (0.0439)	0.0014 (0.0401)	0.0165 (0.0450)	0.0072 (0.0410)	0.0196 (0.0524)	0.0103 (0.0476)
LV	-0.0038 (0.0082)	-0.0033 (0.0073)	-0.0052 (0.0084)	-0.0045 (0.0075)	-0.0032 (0.0082)	-0.0028 (0.0073)	-0.0027 (0.0072)	-0.0023 (0.0064)
ROA	0.224*** (0.0310)	0.200*** (0.0266)	0.227*** (0.0315)	0.202*** (0.0271)	0.225*** (0.0312)	0.200*** (0.0268)	0.222*** (0.0239)	0.197*** (0.0208)
TQ	-0.0754*** (0.0179)	-0.0679*** (0.0161)	-0.0726*** (0.0176)	-0.0654*** (0.0158)	-0.0780*** (0.0181)	-0.0701*** (0.0162)	-0.0747*** (0.0152)	-0.0673*** (0.0137)

CEX	-0.0559*	-0.0443*	-0.0555*	-0.0440*	-0.0564*	-0.0448*	-0.0547**	-0.0433*
	(0.0289)	(0.0257)	(0.0289)	(0.0258)	(0.0288)	(0.0257)	(0.0261)	(0.0233)
SG	-0.0002	-0.0002	-0.0001	-0.0001	-0.0003	-0.0003	-0.0003	-0.0003
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0003)	(0.0003)
BIND	-0.0185**	-0.0160**	-0.0182**	-0.0157**	-0.0187**	-0.0162**	-0.0180**	-0.0155**
	(0.0078)	(0.006)	(0.0078)	(0.0068)	(0.0079)	(0.0069)	(0.0088)	(0.0077)
BS	-0.0009	-0.0008	-0.0010	-0.0009	-0.0009	-0.0008	-0.0008	-0.0007
	(0.0012)	(0.0011)	(0.0012)	(0.0010)	(0.0012)	(0.0011)	(0.0010)	(0.0009)
Dual	-0.0011	-0.0007	-0.0009	-0.0006	-0.0012	-0.0009	-0.0017	-0.0013
	(0.0016)	(0.0014)	(0.0017)	(0.0015)	(0.0016)	(0.0014)	(0.0018)	(0.0016)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.0586	0.0604	0.0657	0.0670*	0.0582	0.0602	0.0518	0.0542
	(0.0446)	(0.0407)	(0.0430)	(0.0394)	(0.0445)	(0.0406)	(0.0524)	(0.0476)
N	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472
R	0.148	0.153	0.146	0.152	0.151	0.157	0.148	0.153

*Note: FID represents female independent director at the firm's boardroom. F1 illustrate firms with at least one female on the board. F2 illustrates firms with at least two female directors on the board. F3 illustrate firms with 3 or more than three female directors on the board. TNG illustrate tangibility. LV reports leverage. ROA illustrates return on assets. TQ illustrates Tobin's Q. CEX illustrates capital expenditure. SG reports sales growth. BIND illustrates board independence. BS illustrates board size. Dual represents duality. *** $p < 0.01$, ** < 0.05 , * < 0.1 .*

LAGGED OF TEST VARIABLES

The second alternative uses a one-year lagged female director measures in the estimation model to substitute the contemporary ones since women directors to influence cash holdings. The results reported in Table 8 suggest that, FID and set of women directors (dummy variables) have a negative impact on firms' cash holdings. The findings are quite alike to the ones reported in Tables 4, and 5.

Table 6 Robustness test using alternative proxy for corporate cash holdings (CH3)

	(6.1)	(6.2)	(6.3)	(6.4)
	H1	H2	H2	H2
FID	-0.00502* (0.00286)			
F1		-0.00971 (0.00652)		
F2			-0.0233*** (0.00747)	
F3				-0.0226*** (0.00560)
TNG	0.0520 (0.0602)	0.0468 (0.0588)	0.0566 (0.0608)	0.0594 (0.0695)
LV	-0.00520 (0.0114)	-0.00644 (0.0116)	-0.00352 (0.0113)	-0.00324 (0.0102)
ROA	0.318*** (0.0494)	0.323*** (0.0502)	0.319*** (0.0495)	0.316*** (0.0368)
TQ	-0.102*** (0.0242)	-0.0994*** (0.0239)	-0.107*** (0.0247)	-0.102*** (0.0210)
CEX	-0.106** (0.0425)	-0.108** (0.0427)	-0.110** (0.0425)	-0.107*** (0.0372)
SG	-0.000213 (0.000700)	-0.000149 (0.000708)	-0.000379 (0.000693)	-0.000311 (0.000661)
BIND	-0.0273** (0.0122)	-0.0278** (0.0122)	-0.0287** (0.0123)	-0.0276** (0.0130)
BS	-0.00165 (0.00178)	-0.00168 (0.00175)	-0.00153 (0.00178)	-0.00144 (0.00158)

Dual	-0.00290 (0.00242)	-0.00245 (0.00260)	-0.00263 (0.00244)	-0.00337 (0.00257)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Intercept	0.0515 (0.0584)	0.0582 (0.0561)	0.0481 (0.0586)	0.0406 (0.0691)
N	1,471	1,471	1,471	1,471
R ²	0.126	0.125	0.131	0.127

Table 7. Using Two-step Generalized Method of Moment (GMM)

	(7.1)	(7.2)	(7.3)	(7.4)	(7.5)	(7.6)	(7.7)	(7.8)
	Hypothesis One				Hypothesis Two			
Variables	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2
FID	-0.0068*	-0.0061*						
	(0.0036)	(0.0031)						
F1			-0.0394***	-0.0293***				
			(0.0066)	(0.0058)				
F2					-0.0278**	-0.0213*		
					(0.0128)	(0.0109)		
F3							-0.0053	-0.0239***
							(0.0042)	(0.0081)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.0268	0.0273	-0.0107	-0.0119	-0.0167	-0.0114	0.0141	-0.00746
	(0.0704)	(0.0604)	(0.0553)	(0.0429)	(0.0667)	(0.0539)	(0.0609)	(0.0683)
AR(1)	-4.20***	-4.72***	-4.44***	-5.02***	-4.9***	-5.18***	-4.60***	-5.20***
AR(2)	0.55	0.60	0.93	1.04	1.01	1.08	1.11	-0.18

J-Stat	42.38	42.68	33.96	33.84	22.47	21.94	40.77	34.97
N	1,412	1,412	1,412	1,412	1,412	1,412	1,412	1,412
Firms	214	214	214	214	214	214	214	214

Table 8: Female Directors and corporate cash holdings: Using lag of test variables

	(8.1)	(8.2)	(8.3)	(8.4)	(8.5)	(8.6)	(8.7)	(8.8)
	H1		H2					
VARIABLES	CH_One	CH_Two	CH_One	CH_Two	CH_One	CH_Two	CH_One	CH_Two
L.FID	-0.030** (0.014)	-0.0281** (0.0124)						
L.F1			-0.0062* (0.0036)	-0.0057* (0.00339)				
L.F2					-0.015*** (0.0047)	-0.013*** (0.0041)		
L.F3							-0.015*** (0.0042)	-0.0140*** (0.00376)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.0635 (0.0451)	0.0651 (0.0412)	0.0675 (0.0536)	0.0669 (0.0407)	0.0622 (0.0453)	0.064 (0.0413)	0.0568 (0.0451)	0.059 (0.0411)
N	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470
R ²	0.146	0.151	0.147	0.15	0.15	0.155	0.146	0.151

5.2.3 Using Two-stage least square:

The third alternative method used for specification purposes is the use of instrumental variables (IVs) and two-stage least squares (2SLS). The appropriate exogenous IV is that which meet the instrument exogeneity and relevance conditions. Considering that percentage of female members of a firm board level may be affected by the percentage of woman directors in its industry, we choose the lag of the percent of women directors in the firm as IV. Table 9 reports the results of 2SLS. All the proxies used for female directors in 2SLS estimation have the same results reported in Table 4 and 5.

Table 9. Female Directors and corporate cash holdings: using two-stage least square estimation

	(9.1)	(9.2)	(9.3)	(9.4)	(9.5)	(9.6)	(9.7)	(9.8)
Variables	H1		H2					
	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2
FID_IV	-0.0037** (0.0019)	-0.0035** (0.0016)						
F1_IV			-0.00645 (0.00403)	-0.00603* (0.00351)				
F2_IV					-0.0171*** (0.00525)	-0.0151*** (0.00459)		
F3_IV							-0.0177*** (0.00488)	-0.0162*** (0.00437)
CV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.0633 (0.0452)	0.0648 (0.0413)	0.0681 (0.0539)	0.0693 (0.0490)	0.0608 (0.0455)	0.0627 (0.0415)	0.0544 (0.0453)	0.0567 (0.0413)
N	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470
R ²	0.145	0.150	0.144	0.150	0.150	0.155	0.146	0.151

CONCLUSION

Female directors at the firm's upper echelon attracted scholars' attention in the last decade. However, there is a little empirical consensus that whether FD has positive, negative or no significant effect on the firm's cash holdings. This study broadens FD and firm's cash holdings literature by providing empirical evidence from an emerging economy, i.e. Pakistan. Using a sample of 224 firms listed on PSX for the years 2009-2018, we found a negative relationship of FID and the firm's cash holdings. Consistent with critical mass theory, board having two or more female members has a pronounced impact on cash holdings. Furthermore, the results highlight that female presence at top cadre improve governance and thus mitigate agency problems at cash holdings level. These findings are robust under different estimation models, i.e., GMM, Lag of test variables and 2SLS. Finally, our results have important implications for policymakers and investors.

Like other emerging economies, Pakistan is also facing pressure from inside and outside forces, calling for gender diversity at the board level. However, due to the shortage of a sufficient number of qualified female directors and conservative nature-society, it is a challenging task for policymakers to formulate policies for gender-diverse board structures. We also acknowledge the limitation and generalization of these results to a broader perspective due to various elements such as culture, social backgrounds and institutional settings. This study does not take into consideration the specific attributes of female directors, such as qualification, age, expertise, ethnicity and experiences.

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