**CEO personal characteristics and firms’ risk-taking behaviour: The moderating role of family ownership**

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**Abstract**

**Purpose:** We examine the impact of Chief Executive Officers’ (CEO) personal characteristics on firms’ risk taking, and the moderating role of family ownership on this relationship.

**Design/methodology/approach:** We employed 2,647 firm-year observations of non-financial firms listed on Pakistan Stock Exchange over the period 2013-2021. To test the hypotheses, we used ordinary least squares regression and, to resolve the possible endogeneity problem, we employed system generalised method of moments (GMM) technique.

**Findings:** Drawing insights first from upper echelons theory, we report that CEOs with business, economics, finance and/or management educational background and female CEOs reduce firms’ risk-taking behaviour. Further and utilising insights from social and organisational identity theoretical perspectives, our results indicate that due to strong family affiliation and organisational identity, family owners exhibit risk aversion behaviour and moderate this relationship.

**Originality:** Our study provides novel evidence of risk averse behaviour of CEOs with business, economics, finance and/or management educational background and female CEOs along with moderating impact of family ownership on this relationship in an emerging economy. Overall, our results extend empirical support for upper echelons, organisational and social identity theories in an emerging market context.

**Keywords:** CEO personal characteristics, firm risk, family ownership, Upper Echelon theory, organizational theory, social identity theory

1. **Introduction**

The influence of Chief Executive Officer (CEO) on a firm’s strategic and operational decisions has been widely debated in the literature. The extant literature highlights that the decision-making capabilities of CEOs depends on their personality and attributes (Jaggia & Thosar, 2022; Elmagrhi and Ntim, 2022). According to upper echelons theory (UET), a firm’s strategic decisions are affected by the managerial capabilities and shaped by personal characteristics and educational background of the CEO (Hambrick and Mason, 1984; Shahab *et al*., 2020). While the positive influence of CEO’s participation in decision making has been highlighted in the literature, nevertheless, the excessive power in the hands of CEOs has been considered as one of the important factors behind the notorious corporate collapses, such as Enron and the Maxwell Corporation (Solomon, 2020; Stiles & Taylor, 1993). Being a powerful organisational actor and having a major role in decision making of the organization, multiple studies have highlighted that CEO attributes and personality traits affect strategic decisions that influence organisational outcomes. For instance, Jaggia and Thosar (2021) highlight that firm performance is positively related to educational level of CEOs. Similarly, Faccio et al. (2016) suggest that due to risk aversion behaviour, the female managers take less risky decisions. The corporate governance literature, therefore, considers CEO personal characteristics, such as educational background and gender as an important aspect of governance mechanisms that may affect the firm outcomes, such as firm risk taking.

According to Federo et al. (2020), the corporate boards of the listed firms are composed of multiple type of owners, such as lone founders, family owners, institutional owners and state owners. Each owner influences a firm’s strategic behaviour according to his social value and distinct social context. Relatedly, Boubaker et al. (2016) indicate that the presence of concentrated owners, such as family firms affect the risk-taking behaviour of the firm. Contextually, family businesses due to their unique setting provides an interesting ground for researchers, while examining a firm’s risk-taking behaviour. Since the non-financial firms listed on the Pakistan Stock Exchange (PSX) are mainly family firms, we find it important to examine the relationship between CEOs’ educational background and gender, and firm risk in the presence of family owners in context of Pakistan. Family owners mainly differ from non-family firms due to family and organisational identity attached to family firms by family owners (Kabbach de Castro et al., 2017). Unlike non-family firms that mainly focus on financial profit-oriented goals, for family businesses, reputation and non-financial goals are more relevant, while making investment decisions. Since the risk of bankruptcy and firm’s reputation risk is critical for family owners, risky decisions are generally avoided. Further, due to concentration of family owners’ wealth, their portfolio is mainly undiversified, which makes it difficult for family owners to take higher risk (Boubaker et al., 2016). Furthermore, family owners consider their business as a legacy to be transferred to next generation of their families. Consequently, the potential risk of business failure or bankruptcy can encourage the avoidance of taking risky investment decisions (Poletti-Hughes & Williams, 2019). Under these scenarios, we may expect risk averse behaviour of family owners and expect moderating impact of family owners on firm risk taking. Empirically, mixed results are found within the literature regarding this. For instance, Boubaker *et al.* (2016) reported lower risk taking in case of French family firms. Similarly, Gentry *et al.* (2016) noted that family firms seek long term orientation of their firm and sacrifice short term gains in order to achieve long term wealth maximization. Thus, less risk taking and lower risk of bankruptcy is found in family firms. On the contrary, some authors (e.g., Lee *et al.,* 2018) reported that family firms with higher ownership take more risk than other firms. Overall, the contradictory arguments inherent in existing empirical findings are unable to offer sufficient understanding of the family firm’s owners effect on firm risk-taking, which motivates us to investigate the influence of family owners on firm risk taking.

Linking together, the influence of CEOs with educational background and female CEOs on firm’s risk taking in family firms is an important aspect of governance structure that can influence organisational outcomes. Despite of its importance, surprisingly, very few studies have examined CEO educational background and CEO gender on firm’s risk taking in context of family firms. Recently, Martino *et al.* (2020) examined the impact of family CEO’s personal characteristics on family firms risk taking in the case of Italian listed firms, nevertheless, we depart from the author’s study on at least two grounds. First, Martino *et al.* (2020) examined the influence of CEO’s belonging to the owner’s family on strategic risk-taking behaviour of the firm. We differ from Martino in this respect, as we considered the educational background and gender of CEO, irrespective of their belongingness to the owner’s family. Second, emerging markets differ from developed markets due to weak governance regulations and low protection of shareholders in emerging economies. The weak regulations serve as a motivation for concentrated owners, such as family owners to involve in dubious related party transactions and exploit minority shareholders, resulting in principal-principal conflict. The results obtained in the context of developed economy (Italy) by Martino *et al.* (2020), therefore, cannot be generalised to emerging markets. Overall, we are of the view that there exists a significant gap in the literature as to how CEO educational background and gender affect firms risk taking, and how family owners shape this relationship. We, therefore, attempt to fill this important gap by answering two research questions: first, whether CEO characteristics, such as educational background and gender influence firms risk taking and, second, whether family ownership moderates the relationship between CEOs with business, economics, finance and/or management educational background and female CEOs, and firms risk taking.

To answer our research questions, we used the sample of non-financial firms listed on PSX over the period 2013-2021. We consider Pakistan an important research ground for the examination of this nexus for several reasons. Pakistan is an emerging country with weak regulatory framework and like other emerging markets, is subject to weaker formal and informal institutions (Khan *et al.,* 2021). In this scenario, the presence of effective leadership is important for the safeguard of the wealth of minority shareholders is important. We, therefore, consider it necessary to examine the behavior of CEOs with educational background and female CEOs on firm risk taking behaviour in Pakistani listed firms. Second, the corporate culture in Pakistan is mainly male dominated and females face barriers that inhibit their progress to top management positions and restrict their participation in firms’ decision making (Amin *et al.,* 2021). In this situation, the efforts of female directors to climb the corporate ladder against the preferences of the male members of society displays their better planning and networking talents. The effectiveness of the females on corporate boards, in this scenario, is an important area of research which this study attempts to address. Finally, firms listed on PSX are mainly concentrated often with the presence of single family as a large shareholder. Armitage *et al.* (2017) noted that principal-agent conflict is mainly visible in developed countries due to small shareholding, whereas, the principal-principal conflict is mostly evident in emerging economies with concentrated ownership and pyramidal ownership structures. Since, the social values and behaviour of family owners differs from other ownership types, therefore, the examination of relationship between CEO educational and gender characteristics, and firm risk taking behaviour in the presence of family owners in an emerging market context is arguably likely to provide interesting results for prospective investors and policy makers.

In summary, relying on a UET framework, we report that CEOs educational background and female CEOs reduce firm risk taking behaviour. In addition, using the lens of social and organizational identity theoretical perspectives, we show that due to the consideration of family business as a social enterprises with stronger need to maintain family reputation by avoiding bankrutcy, family owners moderate this relationship. Our results contribute to the extant literature in the following manners. First, we provide novel evidence of the impact of CEO business, economics, finance and/or management educational background and gender on firm risk taking, and the moderating role of family ownership, in the context of an emerging economy. In this way, we also respond to the research call made by Martino *et al.* (2020) while examining the relationship between CEO characteristics and strategic risk taking in family firms in a developed economy, Italy. The author urged future researchers to extend the findings of his study to other countries. Second, we add to the gender diversity literature by examining the influence of female CEOs on firm risk taking behaviour and their participation in strategic decision making. In this context, our study highlights the risk aversion behaviour of female CEOs and their effective contribution in firm decision making in a male dominated society. Third, we add to the family business literature by investigating the moderating role of family owners and their behaviour on firm risk taking in the presence of CEOs’ with educational background and gender. As such, we enrich the literature by providing empirical support for social and organiational identity theoretical perspectives by explaining family owner’s behaviour on risk taking. Finally, our results provide empirical support to the application of UET in the presence of ownership concentration in an emerging market. In this scenario, our results offer support for the prevalence of the theory in family firms that are mainly dominant on the Pakistan Stock Exchange.

The rest of the study will proceed in the following manner. Section two will present the literature review and hypotheses development. Research methodology will be discussed in section three. Results will be presented and discussed in section four. Section five will conclude the study.

1. **Literature review and hypotheses development**

**2.1 Upper Echelons theory**

The upper echelons theory posits that the firm outcomes, strategic choices and performance levels are affected by the managerial traits and characteristics (Abdul Wahab *et al.*, 2018; Hambrick and Mason, 1984). According to the theory, the personality characteristics of decision maker is more relevant in case of complex decision making. Ting *et al.* (2015) mentioned that personal characteristics such as age, tenure, education, gender and experience of the top executives affects his or her strategic decision making, that ultimately shapes the firm’s behavior and affects the firm outcomes. In a similar vein, Shen (2021) mentioned that CEOs exert significant influence on firm outcomes. Relatedly, Jaggia and Thosar (2021) noted that educational background of CEO is reflected in their organization. Barker III and Mueller (2002) highlighted that education level of CEO influence the risk taking behavior of CEO and investment opportunities. In a similar context, Kubo and Nguyen (2021) reported that CEO gender influence the firm performance. Using the same framework, Martino *et al.* (2020) mentioned that being a powerful actor of the organization, the personal characteristics such as education level of the CEO affects the strategic risk taking of the firm and firm outcomes. The presence of family owners, however, affects the risk-taking behavior of the firm. For instance, Gómez-Mejía *et al.* (2007) mentioned that to preserve socio-emotional wealth, the family owners take less risks. On the contrary, Zahra (2005) argued that intense involvement of family owners in the firm’s decision making increases the firms risk taking behavior. The contradictory behaviors of family owners on firms’ risk taking in the presence of CEO with educational background is an important research question which this study attempts to address. We, therefore, consider upper echelons theory an important framework to examine the relationship between CEO educational background, CEO gender, and firms risk taking in presence of family owners.

2.2 Family identity and organizational identity

The family firm is defined as “one controlled by a family through involvement in management and ownership, coupled with a transgenerational vision for the firm” (Chua *et al.,* 1999). The family firms offer a unique set of ownership pattern due to prominence of non-financial goals by such firms. To achieve family-centered goals (Carney, 2005) and to preserve the socio-emotional wealth, the controlling family owners pursue the non-financial goals (Berrone *et al.,* 2010). Contextually, Gómez-Mejía *et al.* (2007) related the socio-emotional wealth and family identity with the non-financial goals by highlighting the socio-emotional wealth as an important perspective of decision making like risk taking (Zellweger *et al.,* 2013).

The family business literature highlights various types of non-financial goals pursued by the family owners such as autonomy and control, family name recognition, respect, status and goodwill in the community (Miroshnychenko *et al.,* 2021). The desire to achieve non-financial family centered goals, motivate the family owners for a strong firm’s reputation. Berrone *et al.* (2010) noted that these family centered non-financial goals shape the identity claims of the family. Weigert and Hastings (1977) defined family identity as “the meaning that family members attach to the family for internal processes of self-verification”. From social psychology’s perspective, the family identity is associated with interpersonal relationships and internalized set of behavioral expectations that exist in the relationships. These interrelationships may include the mutual support and positive affection and feeling among the family members. Moreover, as indicated by Smith *et al.* (2021) these relational connections among families shifts across various social settings and cultures.

The organizational identity consists of the core values and beliefs of an organization which its members consider more central and enduring. The identity of organization is revealed to the external stakeholders through behavior, symbolism and communication. According to Nag *et al.* (2007) the organizational identity reflects the member’s collective view of “who we are as an organization” and “what we do as a collective”. The organizational identity is therefore a clear reflection of the social behavior of the organizational members. Relatedly, the presence of family members in a family firm offers a unique organizational identity to the firm that differs widely from the non-family firms.

Overall, the family business literature considers the family identity and organizational identity as a unique characteristics of family firms. The presence of same family members in ownership and control, collective family agenda and emotional attachment of members with the firm leads to congruence of identities which ultimately leads to strong identity fit between family and organization and affect the risk propensity of owners.

**2.3 CEO educational background and firm risk taking**

The influence of CEO’s characteristics on strategic decision making and firm outcomes has been widely debated in literature (Dittmar and Duchin, 2016; Elmagrhi *et al.*, 2021). Accordingly, Gupta (2022) mentioned that CEO is mainly responsible for the firm’s decision making, and firm outcomes extensively depends upon the CEO characteristics. Among other characteristics, educational background of CEO is considered an important factor that shapes his or her behavior while taking business decisions and risks (Shen *et al.,* 2021). In a similar context, Sarto and Saggese (2022) reported that CEO educational background plays a major role towards the firm’s strategic outcomes. From Upper Echelons theory’s perspective, the managers make their strategic choices according to their cognitive, social and psychological characteristics that ultimately affects the firm’s risk. Eventually, their educational background influences their decision-making capabilities (Mun *et al.,* 2020). In a similar context, Jaggia and Thosar (2022) mentioned that educational level of CEO has implications for firms strategic risk taking behavior. Thus, we are of the view that CEO having business education such as management, economics and finance affects the firms risk taking.

Empirically, the influence of CEO educational level on firms’ risk taking has been examined and found mixed results. For instance, Farag and Mallin (2018) examined the CEO’s demographic characteristics on firms’ risk taking in context of Chinese listed firms and found higher risk taking by CEOs with educational background. The higher educational level motivates them to take innovative decisions and more risk taking activities. Similarly, Custódio and Metzger (2014) highlighted higher debt and less cash holding in case of CEOs with financial education pointing towards higher risk taking. In a similar vein, Ali *et al.* (2021) reported positive linkage between CEO education level and firm performance. On the opposite, Martino *et al.* (2020) found negative relationship between firms’ risk taking and CEOs professional education in case of Italian listed firms. Similar results were reported by Cho *et al.* (2021) in context of Chinese listed manufacturing firms. The authors argue that the higher qualifications train the executives to involve in less risky decisions and avoid major losses. Finally, some studies (e.g., Wang and Poutziouris, 2010) could not found any significant relationship between CEO’s educational background and firms risk taking in case of UK listed firms.

Overall, we base our conjecture on the notion that CEO with professional education background such as MBA and PhD are risk averse because such executives are primarily trained to avoid big losses and mistakes. Moreover, they are able to make calculated decisions using financial models and techniques such as capital asset pricing model and net present value to assess the cost of capital and calculation of risk involved in the project (Graham *et al.,* 2005). Similarly, consistent with Martino *et al.* (2020), we are of the view that professionally educated executives prefer long term growth of the firm and avoid investing in high variant projects. Thus, we hypothesize that:

H1: CEO educational level is negatively associated with firms’ risk taking behavior.

**2.4 CEO gender and firm risk taking**

CEO gender is an important demographic characteristic that may have implications for the strategic behavior of firm. Contextually, the extant literature considers women different from men due to different social values, norms and beliefs. From liberal feminist theory’s (Fischer *et al.,* 1993) point of view, the same situation is perceived differently by men and women, that results in different decision making by opposite genders (Jadiyappa *et al.,* 2019). Similarly, Pullen and Vachhani (2021) mentioned that the women differ from men in terms of morality and compassion. Women leaders are associated with collaborative atmosphere and their presence leads to open discussions and mitigation of agency conflicts (Rigolini *et al.,* 2021). As compared to male, the women are considered more independent, diligent and responsible (Li and Li, 2020) and their inclusion in the top management team reduces systematic biases and extend social networks (Bass, 2019). Further, the presence of women at key management position provides alternate solutions to complex problems and increase the legitimacy of corporate practices (Hillman *et al.,* 2007). Furthermore, they produce higher quality decisions and improves self-efficacy in context of global leadership (Amin *et al.,* 2022). The values, norms and beliefs of women CEOs, therefore, may influence the firm’s strategic behavior such as risk taking differently from men.

Relatedly, the prior literature on gender based behavioral differences considered women more risk averse as compared to men. Multiple studies (e.g., Borghans *et al.,* 2009; Cho *et al.,* 2021) examined the behavior of gender differences on financial decision making and concluded that women are more averse to loss and less likely to take risks. Faccio *et al.* (2016) mentioned that due to risk aversion behavior of women, their presence at the top position in firm is associated with less risky investment and lower leverage ratio. Similarly, Poletti-Hughes and Briano-Turrent (2019) noted that presence of women affects the strategic decisions of the firm for the identification of investment opportunities. This implies that the risk propensity of the gender differences also affects the firm’s investment decisions in different ways. In a similar vein, Menicucci and Paolucci (2021) found that female CEOs negatively affects the level of bank risk taking. On the opposite side, some studies highlighted the positive relationship between gender diversity and firm risk. For instance, Berger *et al.* (2014) reported that presence of women on the board is associated with the higher risk propensity and low liquidity in German firms. Finally, some studies (e.g., Sila *et al.,* 2016; Loukil and Yousfi, 2016) did not find significant relation between female’s presence at the top position and firm risk taking.

Following this, we frame our next hypothesis on the notion that female CEOs show risk aversion behavior and negatively influence firm risk taking behavior for at least two reasons: first, female CEOs are more open to discussion and more willing to seek expert opinions and recommendations, that help them in better identification and assessment of the firm risk, thus, leading to lower firm risk; and second, consistent with the prior studies (e.g., He et al., 2008), from sociology and psychology’s perspective, women are more risk sensitive to losses than gains, and therefore, estimate probability of losses more, as compared to men, leading to lower risk taking behavior. We, therefore, hypothesize that:

H2: Female CEOs reduces firms’ risk taking behavior more than male CEOs.

**2.5 Moderating role of family ownership**

Family firms differs from other ownership types due to unique overlapping of family owners, managers and family groups (Berrone *et al.,* 2010). Due to non-financial characteristics and socio-emotional wealth perspective, the governance mechanism in family firms differs considerably from other ownership types (Abdul Wahab *et al*., 2022; Federo *et al.,* 2020). Unlike other owners, the family owners while taking decisions focus on family identity and organizational identity and, therefore, avoid such decisions that may adversely affect the firm’s reputation or risk the firm’s survival. In this scenario, the family firms are considered more risk averse than non-family firms due to undiversified portfolio. Since major portion of their wealth is locked into the family business, therefore, the family firms are found to be less risk taking (Poletti-Hughes and Williams, 2019). On the other hand, non-family investors can make the risky decisions due to diversified portfolio across various firms. Thus, the potential fear of bankruptcy is more harmful for the family businesses in contrast to non-family businesses (Kempers *et al.,* 2019). In a similar vein, Gómez-Mejía *et al.* (2007) argued that the family owners are more concerned about their family wealth and therefore avoid risky business decisions.

According to Gomez-Mejia *et al.* (2010), the CEO of an organization is considered as a most powerful actor of the organization that shapes the strategic behavior of the firm and, therefore, influence of family owners on their decisions is important for the firm outcomes and firms risk taking. We are of the view, that since the CEOs with educational background reduces the firm’s risk taking, and family owners are also inclined towards low risk projects to avoid any risk of bankruptcy, therefore, family ownership will moderate the relationship between CEOs with educational background, and firm risk taking. Similarly, due to risk aversion nature of females, the presence of family owners will also moderate the relationship between female CEOs and firm risk taking. Thus, we hypothesize that:

H3a: Family ownership moderate the relationship between CEO educational background and firm risk taking.

H3b: Family ownership moderate the relationship between female CEOs and firm risk taking.

1. **Methodology**

**3.1 Sample selection**

The data for the study was gathered from the annual reports of the firms available on website of Pakistan Stock exchange and on the website of the respective firm. The sample was based on the non-financial listed firms over the period 2013-2021. We start our sample period from 2013, as most of the governance data was not available before the introduction of Listed companies (Code of Corporate Governance) Rules, 2012. Moreover, the financial firms were excluded because these firms operate under separate regulatory frameworks and have different financial characteristics. After exclusion of financial firms and firms with missing observations, our final sample comprises of unbalanced panel data with 2647 firm-year observations. The sample selection procedure is depicted in table I.

**{Insert table I around here}**

**3.2 Variable measurement**

Consistent with Sila *et al.* (2016) the dependent variable, firm risk was measured using three proxies: total risk, systematic risk and idiosyncratic risk. Total risk is measured as the standard deviation of daily stock returns. The total risk was further categorized into systematic risk and idiosyncratic risk by applying a simple market model as reflected in equation 1. Systematic risk is the regression coefficient whereas, the Idiosyncratic risk is the standard deviation of residuals obtained from the market model regression. According to Yang *et al.* (2019) the systematic risk is more relevant to equity investors of the firm, while the idiosyncratic risk is of more concern for other stakeholders such as lenders, employees and customers, who are directly affected by the firm’s default.

Following Ali *et al.* (2021), the data for our independent variable, CEO educational background, was obtained from the annual report of the respective companies and from other open access sources such as website of the company and LinkedIn profiles of CEOs. Purposely, we created dummy variable where ‘1’ represents if the CEO has a degree in finance, economics, management or related field and ‘0’ otherwise. Similarly, consistent with Jadiyappa *et al.* (2019), we measure CEO gender using a dummy variable where ‘1’represents if the CEO is female and ‘0’ otherwise. According to Villalonga and Amit (2006), minimum of ownership of 20% of equity capital is sufficient to consider the firm as family owned and controlled. However, following Purkayastha *et al.* (2019), we further strengthen the ownership criteria and considered the family owned firm as a firm where at least any two out of the following three conditions are met: “1) the family had a minimum stake of 20%; 2) at least one member of the family was on the board; 3) a member of the family was also the chairperson of the board”.

To control for the endogeneity, we further introduced governance and financial controls in our model. Following Nekhili *et al.* (2020), we introduced board size, board independence, CEO duality, gender diversity, audit committee size, and audit committee independence that may affect our variable of interest firm risk. Similarly, we employed Return on assets, market to book ratio, leverage, firm size and firm age as a control variable to control for the financial characteristics. Board size is assumed to be negatively associated with firm risk because large group discussions are less risky and therefore results in moderate decision making (Haider and Fang, 2016); Board independence is likely to be positively associated with firm risk because presence of independent directors may result in more shareholder focused board leading to higher risk taking (Sila *et al.,* 2016): CEO duality may increase the firm risk taking as the concentration of powers of both chairman and CEO in a same person may lead to risky decisions (Zaid *et al.,* 2020; Shahab *et al*., 2020); presence of gender diversity on the board may reduce risk taking as women are assumed to be risk averse (Lenard *et al.,* 2014); and, finally, audit committee size and audit committee independence may reduce risk propensity of firm’s risk taking due to independent decision (Amin *et al.,* 2021). Regarding financial control variables, return on assets is likely to have positive relationship with firm risk as risky investments leads to higher return on assets in short run; market to book ratio is the reflection of market based view of firm and higher firm risk will likely to increase market to book ratio due to higher profits; leverage is assumed to be positively related with firm risk as higher leverage will lead to higher risk as the higher debt in the capital structure increases the chances of bankruptcy; we expect positive relationship between firm size and firm risk as larger firms are capable of taking higher risk and take risky decisions due to larger availability of resources; and finally, firm age is also assumed to be positively related to firm risk as with the passage of time the firms are ready to take higher risks. Table II depicts the nature, symbol and measurement of all the variables used in the study.

**{Insert table II around here}**

3.3 Econometric model

In order to test the hypotheses, the following two regression models were developed. The model 1-2 were used to determine the direct effects of CEO educational background and CEO gender on firm risk, whereas, the model 3-4 were used to analyze the moderation effects of family ownership:

Where firm risk is our dependent variable measured using three proxies: total risk (TR), systematic risk (SR) and idiosyncratic risk (IR); is the intercept of the model; CEO educational background (CEO\_EDU) and female CEO (CEO\_FEM) are our independent variables; control variables are included as explained in table II; CEO\_EDU\*F\_OWN and CEO\_FEM\*F\_OWN are the interaction terms included to determine the moderating effects; represents industry dummy; represents year dummy; β1 – β16 represents regression coefficients of independent variable, control variables, moderator, interaction term, industry dummy and year dummy; is the error term; and i represents firm at time t.

1. **Results**

**4.1 Descriptive statistics**

The table III reports the descriptive statistics of all the variables used in the study. The mean value of total risk (TR) is 0.57 and ranges from -0.51 to 1.86. Similarly, idiosyncratic risk (IR) has a mean of 0.24 with a minimum value of 0.14 and maximum of 1.59. The mean value of systematic risk (SR) is 0.18 and ranges between -0.02 and 0.41. Regarding CEO education (CEO\_EDU), the table shows 0.39 which shows that 39% of CEOs of our sample firms have educational background. The mean value of female CEO is 0.08, which shows that very few firms have female CEOs. These stats support the notion of Wang *et al.* (2019) that presence of female in the top management team is not common in Pakistan. The Family ownership (F\_OWN) has a mean of 62% which shows that around 62% of our firms are family owned which is expected, as emerging markets are mainly characterized by the owner concentrated firms such as family firms. The mean board size (BD\_SIZE) is 8 which is in agreement with the legal framework of the country. The mean of board independence (BD\_IND) is 12% which reflects the independence of the board. CEO duality (CEO\_DUAL) has a mean of 23%. Mean of female’s presence on board (PFD\_BD) is 18%. Noticeably, some firms do not have any female on board. This is not surprising as our sample comprises of period before the mandatory placement of at least one female director on board through Listed companies (code of corporate governance) Rules, 2017. Audit committee (AUD\_COMM) has a mean of 4.16 which is in accordance with the mandatory requirement of at least four members in the audit committee. Audit committee independence (AC\_IND) is 2.93 which shows that on average three persons in the audit committee are independent directors. Similarly, mean of return on assets (ROA) is 6.55%; mean market to book ratio (MTB) is 2.34; mean leverage (LEV) is 13%; mean firm size (F\_SIZE) measured as log of assets is 22.76; and mean firm age (F\_AGE) is 26 years.

**{Insert table III around here}**

**4.2 Pearson correlation**

The Pearson correlation of all the variables is reported in the table IV. The results show partial support for our hypotheses. We expect negative relationship between firm risks and CEO educational background. As reflected in results, negative correlation was found between CEO\_EDU and TR (-0.004\*); CEO\_EDU and IR (-0.002\*), and CEO\_EDU and SR (-0.015\*), significant at 10% level of significance. Similarly, in case of female CEO, we found negative correlation, significant at 10% level of significance, between CEO\_FEM and all measures of firm risks: CEO\_FEM and TR (-0.039\*); CEO\_FEM and IR (-0.031\*), and CEO\_FEM and SR (-0.021\*). Our results implies that CEOs with educational background and female CEOs are less likely to take the risky decision and our results are in agreement with our argument and extends partial support for our hypothesis.

Similarly, we also found significant negative correlation between family ownership and all proxies of firm risks: F\_OWN and TR (-0.062\*\*); F\_OWN and IR (-0.063\*\*); and F\_OWN and SR (-0.030\*). These results also extend partial support to our argument that due to socio-emotional wealth, the family firms are less involved in higher risk taking. All other results are in line with our expectations and not discussed separately for the sake of brevity.

**{Insert table IV around here}**

**4.3 Regression analysis**

**4.3.1 Ordinary Least squares regression**

In order to test our hypotheses, ordinary least squares regression (OLS) method was applied, and the results obtained are depicted in table V. The column 1-3 examine the direct effects of CEO educational background and firm risk using model 1. Under hypothesis H1, we hypothesize that the CEO’s education level reduces to firm’s risk taking. We argue that the CEOs with educational background such as management, finance and economics are risk averse, as they are professionally trained to take calculated decisions. The results show that our hypothesis H1 was supported as we found significant negative association between CEO\_EDU and all proxies of firm risk. In case of TR (-0.119\*\*\*) the coefficient was significant at 1% level of significance, whereas, in case of IR (-0.113\*\*) and SR (-0.118\*\*) the coefficients were negative at 5% level of significance. Our results were consistent with Martino *et al.* (2020), who reported that CEOs with educational background prefer smooth operations of business, and Cho *et al.* (2021) who highlighted inverse relationship between executive’s education level and firm risk. Our results also support view of Ali *et al.* (2021) who argued that CEOs with professional qualification influence firm outcomes through calculated decisions.

Similarly, under hypothesis H2, we hypothesized that presence of female CEO reduces the firm risk taking more than men. We argue that due to risk aversion nature of female, the presence of female CEO will reduce the firm risk taking behavior. To test the hypothesis, we run the regression using model 2, and the results obtained are reported in column 4-6 of table V. The results show support of our hypothesis H2, as we obtained significant negative association between CEO\_FEM and all measures of firm risk: CEO\_FEM and TR (-0.085\*\*): CEO\_FEM and IR (-0.015\*\*): and, CEO\_FEM and SR (-0.019\*\*). In all cases our results were significant at 5% level of significance. Our results are consistent with prior studies (e.g., Faccio *et al.* (2016) which highlighted that female executive are less likely to take risky decisions. From gender diversity’s perspective, our results have important implications for the body of literature. The corporate environment in Pakistan is mainly male dominated and females are normally restricted to climb up the corporate ladder. Moreover, due to the cultural barriers female are usually deprived of formal education that hinder their participation in the corporate sector and also limit their contribution in the overall progress of the country. Consistently, our stats represent very lower mean value (8%) of female CEOs in our sample. However, despite of their limited presence at the CEO level, their influence on firm risk taking was significant. Thus, our findings represent the effectiveness of females at the top management level and their economic benefits for the family owners and shareholders.

In order to test the hypotheses H3a and H3b, we run the regression using model 3 and model 4, respectively. The results obtained are reported in table VI. Under hypothesis H3a, we hypothesized that family ownership moderates the relationship between CEO educational background and firm risk taking. From the social identity theory’s perspective, we argued that the family owners consider the firm as a socio-emotional wealth and a legacy, to be transferred to next generation. For the sake of firm’s reputation and avoid the risk of bankruptcy, the family owners do avoid the risky investments and risky decisions. Our hypothesis H3a was supported as we found negative coefficient of interaction term in all cases of firm risk measures. As reported in column 1-3 of table VI, in all cases (TR: -0.028\*\*; -IR: 0.002\*\*; -SR: 0.057\*\*) our results were significant at 5% level of significance. The results extend support to our arguments and are consistent with earlier studies.

Finally, under hypothesis H3b we hypothesized that family ownership moderates the relationship between female CEO and firm risk. We argue that female CEOs exhibit risk averse behavior towards risky decision and, since the family owners also avoid risky investments, therefore, the family ownership will moderate this relationship in the same direction. Results reported in column 4-6 of table VI show that our hypothesis H3b and our argument was supported, as we found negative coefficient of interaction term significant at 5% level of significance (TR: -0.013\*\*; IR: -0.017\*\*; SR: -0.023\*\*).

Based on the framework of social identity theory, Gómez-Mejía *et al.* (2007) argued that the family owners are more concerned about their family wealth and therefore avoid risky business decisions. Our findings are consistent with Gómez-Mejía *et al.* (2007) that family firms are family oriented and avoid risky decisions. Our results also provide empirical support to social identity and organizational identity’s perspective by highlighting that non-financial goals are more preferred by family owners, and socio-emotional wealth is considered as an important perspective of decision making like risk taking (Zellweger *et al.,* 2013). Overall, the presence of CEOs with financial background and female CEOs in a firm is associated with less risk taking behavior and, moreover, risk averse attitude of family owners further strengthen this relationship.

**{Insert table V around here}**

**{Insert table VI around here}**

**4.3.2 Generalized method of moments**

Although OLS regression results show support for our hypotheses, however, the results may be endogenous due to unobserved heterogeneity and simultaneity. According to Ullah *et al.* (2018), OLS regression is unable to capture complex and dynamic relationship and unable to solve the problem of unobserved heterogeneity and simultaneity, which may lead to biased results. In this scenario, the Generalized method of moments (GMM) model can control for the three major sources of endogeneity: unobserved heterogeneity; simultaneity; and, dynamic endogeneity. Therefore, we used GMM estimation for the robustness check as it is commonly used for endogeneity problems.

The GMM estimation of CEO educational background, female CEO, family ownership and firm risk are shown in table VII-VIII. As expected, the signs of coefficients were in conformity with our earlier obtained results which shows the conformance of results obtained from OLS regression method. It is notable, that p-value of Hansen j test and Arellano bond (AR) 2 test are insignificant which shows the validity of our model. Hansen j test ensure the validity of instruments whereas the Arellano bond test indicate that model does not suffer from second order autocorrelation.

**{Insert table VII-VIII around here}**

1. **Summary and conclusion**

We examine the impact of CEOs’ personal characteristics on firm’s risk taking and, the moderating effect of family ownership on this relationship. Our study extends the extant literature in several manners. First, we provide a novel evidence regarding CEOs’ educational background and gender on firm risk taking in an emerging economy. As such, we provide empirical evidence of risk aversion attitude of CEOs with business, economics, finance and/or management educational background and female CEOs among PSX listed firms. Moreover, we extend the extant research work of Martino *et al.* (2020) by examining this nexus in an emerging economy. Second, we add to the gender diversity literature by highlighting the risk averse attitude of female CEOs and their significant influence on decision making in a male dominated society. Third, we add to the family business literature by providing evidence of low risk-taking behaviour of family firms in an emerging market. More specifically, we report that the presence of family owners further strengthens the low risk attitude of CEOs with business, economics, finance and/or management educational background and female CEOs in family firms. Finally, we provide empirical support to social and organizational identity theoretical perspectives by highlighting that family owners while making strategic decisions, consider the firm as socio emotional wealth and avoid risky decision as they maintain strong affiliation with their firms. Further, they consider the firm as a legacy to be transferred to the next generation and therefore often seek to avoid higher risk taking that may increase the chance of bankruptcy or damage the firms’ reputation.

Our sample of study consists of non-financial firms listed on the PSX over the period 2013-2021. We employed OLS regression method to test the hypotheses, and further used GMM estimation for the robustness check of our results. Under hypothesis H1, we hypothesized that the CEO’s education background reduces firms’ risk taking. We argue that the CEO with degrees in management, finance, economics, business and/or related fields exhibit lower risk taking, as they prefer smooth operation of business due to their professional education. Our hypothesis H1 and our argument was supported as we found negative relationship between CEO education background and firm risk taking. Empirically, our results were consistent with Martino *et al.* (2020) and Cho *et al.* (2021), who reported that CEOs with business, economics, finance management and/or related educational background avoid risky business decisions, and our results also support the findings of Ali *et al.* (2021) who argued that CEOs with professional qualification influence firm outcomes through calculated decisions. Similarly, under hypothesis H2, we hypothesized and argued that due to risk aversion attitude of women, the presence of female CEOs reduce the firm’s risk taking behaviour. Our hypothesis H2 was supported as we found negative relationship between the female CEOs and all proxies of firm risk taking. Empirically our results were consistent with those of prior literature (e.g., Faccio *et al.,* 2016).

Under hypotheses H3a and H3b, we hypothesized that family ownership moderates the relationship between CEOs’ educational background and firm risk, and female CEOs and firm risk, respectively. Based on social and organizational identity theoretical perspectives, we highlight that family owners strongly affiliate themselves with their business and family, and therefore, tend to avoid risky business decisions that may increase the chances of bankruptcy and potential failure. Further, they appear to consider the firm as a legacy to be transferred to the next generation which encourage them to pursue long term objectives rather than short term risky projects. Our hypotheses H3a and H3b were supported as we found negative coefficient of the interaction terms which shows that presence of family owners further strengthens both relationships. Empirically, our results support the findings of past studies (e.g., Gómez-Mejía *et al.,* 2007), which suggest that family firms are family oriented and therefore, tend to avoid taking risky decisions.

Pakistan is an emerging economy and is facing balance of payment deficits due to low GDP growth and dearth of domestic and foreign investment. In order to boost volume of investment and improve investor’s confidence, understanding CEO’s behavior and demographic characteristics relating to strategic decision making is very important for current and prospective investors. In this scenario, our results indicate that business qualification and gender is an important attribute of CEOs that affect risk taking in firms listed on the PSX. According to Ali et al., (2021) the most important role of CEO’s is to develop and implement the strategic plans for the growth of business and firm value maximization. Our findings have implications for firm owners in terms of hiring CEO’s with business educational background and female CEOs in order to ensure smooth operations of business with long term orientations and risk averse decisions. Moreover, the firms listed on the PSX are mainly family owned firms that offers a unique setting over other firms due to their different social values and social behaviour that shapes the firm’s strategic directions. Since the family owners are strongly affiliated with their firms, as they attach socio-emotional wealth to their firm, therefore, the investigation of strategic behaviour of family owners in decision making is important for shareholders and prospective investors. Our findings indicate the risk aversion behaviour of CEOs with business educational background, female CEOs, and family owners, which provides insights to shareholders, while diversifying their portfolios. Our results also enrich the regulators regarding the risk averse nature of professionally qualified CEOs and female CEOs, and urge them to focus more on their professional education and training programmes to gain maximum benefits of their professional skills.

Like other studies, this study also suffers from some limitations which can serve as directions for future research. First, we have limited our study to only two aspects of CEO’s attribute: ‘education’ and ‘gender’, and their impact on firm’s risk taking. Future studies could investigate the impact of other attributes, such as ‘age’ and ‘tenure’ on firm risk. Second, according to Federo *et al.* (2020), corporate boards of listed firms are represented by multiple owners, such as lone founders, institutional owners and state owners, with each owner having distinct set of social values and social behaviour that shapes the firm’s strategic direction. While we examine only the moderating impact of family ownership, future studies could also consider the impact of other ownership types, such as institutional ownership, on this relationship. Finally, future studies could also examine CEO’s strategic behaviour through survey and other primary data sources, such as questionnaires and interviews. The primary data collection techniques could capture the personality traits of CEOs that affect their decision-making capabilities.

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