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Impact of Tax Aggressivenss, Earnings Quality, and Pyramidal Structure on Firm Risk-Taking: The Moderating Role of Family Ownership

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The study investigates the impact of tax aggressiveness, earnings quality, and pyramidal structure on firms risk-taking. Further, it also ascertains the moderating influence of family ownership on the association between tax aggressiveness and firm risk-taking, earnings quality and firm risk-taking, and pyramidal structure and firm risk-taking. The data is based on top 50 non-financial firms according to market capitalization listed on the Pakistan Stocks Exchange (PSX) for the period 2015 to 2023. Based on Hausman test result, the panel data was statistically analyzed using the random effect model. Regression results were further checked for robustness using panel-corrected standard errors (PCSE) and Maximum likelihood Estimation (MLE) methods. Identifying factors that affects firms risk-taking is important to forecast growth and innovation. The study adds value to the existing literature by ascertaining the positive effect of tax aggressiveness and earnings quality on firms risk-taking. It also highlighted a negative effect of pyramidal structure on firm risk-taking. The study also reveals that there is a positive moderation by family ownership on the association between tax aggressiveness and firm risk-taking, and on the relationship between earnings quality and firm risk-taking. Additionally, the family ownership negatively moderates the association between pyramidal structure and firm risk-taking. The study is beneficial for corporate valuation and corporate governance professionals.

1. Introduction

Identifying factors that affect risk-taking by firms is important for financial valuation and corporate governance requirements. With rapidly changing business environment, this awareness has become more crucial as corporate managers in almost every industry have to deal with fluctuating demands, changing preferences by customers, and curtailed financial resources (Ali et al., 2024; Babar & Habib, 2021). Under these circumstances managers need to take measured risks to meet the performance expectations from different stakeholders (Choi & Cho, 2024; McCormick & Somaya, 2020). Risk-taking by firms essentially leads to more capital expenditure and innovation (Liu et al., 2023).

Due to poor governance, high cost of debt, weak regulatory environment, etc., firms resort to tax aggressive behavior to generate cash tax savings leading to higher net cash flows after taxes and lower effective tax rates (Hutchens et al., 2024). Further, a substantial percentage of firms are owned and controlled by families especially in the developing world (Abdullah et al., 2022; Anderson & Reeb, 2003). There are studies that suggest family monitoring results in better firm performance (Minichilli et al., 2010), while, there are studies that negate it (Memili et al. 2015).

Internal and external factors that lead to increased risk-taking by firms are being investigated continuously (Gopalan et al., 2021). In the past, researches have been conducted to study the effect of tax aggressiveness, family ownership, political connections, etc. on firm performance (Flamini et al., 2021) but not on firm risk-taking. The present study endeavors to reveal, how firm characteristics like tax aggressiveness, earnings quality, and pyramidal structure coupled with family ownership impacts the firms risk-taking ability. Further, it aims to explore any moderating effect of the family ownership on these relationships.

The data for this study has been manually extracted from the annual reports of top 50 non-financial firms listed on PSX for the period from 2015 to 2023. Pakistan being a developing country has relatively weaker law enforcement with topsy-turvy economic conditions. Under such conditions therefore, importance of studies on firm risk-taking cannot be overlooked. Previous studies in the developed economies have highlighted the contribution of research and development expenditure to achieve sustainable firm growth (Coad & Rao, 2010; Flamini et al., 2021). Though studies conducted in developed could be applied to developing world (Lee, 2020). However, mixed results have been reported in the literature about the impact of R&D expenditure on firm performance, (Vithessonthi & Racela, 2016; Abdullah et al., 2022), very few have been conducted for developing economies.

This empirical study fills several gaps by identifying the factors that promote firm risk-taking especially in developing world. First, it examines the association between tax aggressiveness and firm risk-taking. Second, it studies the association between earnings quality and firm risk-taking. Third, it uncovers the association between pyramidal structure and firm risk-taking. Fourth, the study explores the moderating effect of family ownership on the associations between tax aggressiveness and firm risk-taking. Fifth, it examines the moderating effect of family ownership on the relationship between earnings quality and firm risk-taking. Sixth, it explores the effect of family ownership between pyramidal structure and

firm risk-taking. The remainder of the paper is structured as follows. Section 2 deals with related theory and brief review of literature. Section 3 deals with methodology, thereafter, Section 4, deals with results and discussions. Section 5, presents and conclusion and recommendations for future course of action.

2. Literature Review And Hypothesis Development

2.1agency Theory

The agency theory deals with the concerns when an individual, the agent, works for another individual, the principal (Aksoy & Yilmaz, 2023; Panda & Leepsa, 2017). For firms in which shareholding is widely dispersed, managers may divert the firm's valuable resources to extract benefits thereby inducing the Type I agency problem (Jensen & Meckling, 1976). In most economies shareholding is typically closely held (Aguilera & Crespi-Cladera, 2016) which cause Type II agency conflict between outside minority shareholders (principal) and owners having majority shareholders (agent) (Abdullah et al., 2022).

As large commercial organizations are geographically dispersed, therefore there are several layers of management, due to which there is a natural likelihood of agency conflicts at various levels. This necessitate aligning the monitoring and compensation system to obtain the desired financial results (Tosi & Gomez-Mejia, 1989). The consequences of agency relationships on various aspects of business management in different industries is an important ongoing research area.

Identifying the factors that encourages firms to take risks is essential for better understanding of growth and innovation dynamics. Factors such as inclination towards tax aggressiveness, earnings quality, pyramidal structure etc. are open for empirical studies and further discussions. These factors depend upon the thinking and position taken by the dominant group in the firm. The present investigation tries to explore how firm risk-taking behavior would be affected by presence of tax aggressiveness, earnings quality issues, and pyramidal structure especially for firms that are dominated by family shareholding.

2.2 Tax Aggressiveness and Firm Risk-Taking

Firms in emerging economies suffer greatly due to the tendency of tax avoidance and tax aggressiveness (Abdullah et al., 2022). The deliberate attempts to reduce tax liability by using some accounting strategies by firms is referred to as tax aggressiveness (De Waegenaere et al, 2015). Tax avoidance/evasion is a serious problem faced by emerging economies (Khuon et al., 2020). Tax aggressiveness also affects the firm reputation which in turn hampers the firm's ability to take risks.

Coupled with poor governance, political influence, and the high cost of debt, tax aggressiveness has a profound negative impact on overall firm performance and risk-taking in the face of a changing economic environment (Al-Ahdal et al., 2020; Faccio, 2010; Álvarez-Botas & González-Méndez, 2019). Past studies reveal that managers' tax aggressiveness amplifies agency conflict and creates information asymmetry and reporting transparency (Dyreng et al., 2016). Moreover, firms are faced with reputational, litigation, and higher scrutiny risks due to engaging in tax aggressiveness/ avoidance activities (Cook et al., 2017; Graham et al., 2014). Other costs could be imposed due to changes in operations, investing,

or financing decisions thereby increasing the firm complexity and uncertainty about future cash flows (Balakrishnan et al, 2019). Nevertheless, certain benefits encourage firms to indulge in tax-aggressive behavior. It generates cash tax savings which lead to higher net cash flows after taxes and also lowers the effective tax rates (Hutchens et al., 2024).

Based on the above discussion following hypothesis has been formulated:

H1: Tax aggressiveness significantly affects the firm risk-taking.

2.3 Earnings Quality and Firm Risk-Taking

Earnings quality is a vital idea in accounting and finance, which measures how closely reported earnings correspond to a company's real economic performance which in turn affects firm valuation (Fassas et al., 2023). Earnings quality refers to the degree to which reported financial performance of a firm is indicative of its true, sustainable earnings potential that could be used to predict future earnings (Duarte et al., 2024; Nissim, 2021). Extensive research has established that the strategy adopted by the firms largely depends upon the personal traits of their CEOs (Cragun et al., 2020; Harrison et al., 2020). The CEO is responsible for corporate decisions including but not limited to issuance of financial reports, firm performance, and influencing the board. So, there could be the possibility of indulging in earnings management thereby affecting the earnings quality (Musa et al., 2023).

Sometimes CEOs have to meet specific benchmarks and to achieve those they may indulge in earnings manipulation through various accounting treatments (Habib et al., 2022). The CEO may exercise discretion regarding reported earnings as there are several incentives available to him (Ali & Zhang, 2015). These include capital market incentives to meet analysts' forecasts (Gunny, 2010), regulatory and tax incentives to avoid costs owing to government regulations (Chen & Zhang, 2014), and contractual incentives to maximize compensation (Ali & Zhang, 2015).

Substantial research and professional discourse have delved the numerous facets of earnings quality, identified the factors that shape it, its implications, and the methodologies employed to assess it (Dechow et al. 2010). Researchers have explored the relationship between earnings quality and firm reputation (Harymawan & Nurillah, 2017). As firm risk-taking depends upon earnings quality we hypothesize as under:

H2: Earnings quality significantly affects the firm risk-taking.

2.4 Pyramidal Structure and Firm Risk-Taking

Pyramidal ownership structure refers to a complex web of shareholding patterns that makes it difficult to identify the actual owner and controllers of a firm. The practice can be found frequently in Asian and European economies. The traditional argument is that pyramids separate control rights from cash flow rights by a series of ownership relations (Wang et al., 2022; Levy, 2009). Outside the US and the UK, it is prevalent for wealthy families controlling large corporations to use cross-shareholding, super-voting rights, and pyramidal structures etc., to control their empire without making a proportionate capital investment (Gama & Bandeira-de-Mello, 2021)

Pyramidal structures are quite prevalent in China and have been studied for various business aspects. They have been found to have a very high agency cost (Shah & Xiao, 2023; Fan et al., 2005). When starting a new firm, the control mechanism is decided by the dominant shareholder which may result in a complex web of ownership. This control mechanism sometimes affects the firm risk-taking impacting the overall business performance (Jara et al., 2021; Chrisman et al., 2018; Panda & Leepsa, 2017). According to researchers (Faccio & Lang, 2002; Claessens et al., 2000; La Porta et al., 1999), ownership concentration is mostly prevalent in developing economies. With ownership concentration in a few hands and the ultimate owner exercising control over the firm through indirect shareholding may affect the decision-making process, operations, and firm performance (Bany-Ariffin et al., 2010; Claessens et al., 2000).

Gama and Bandeira-de-Mello (2021), have studied the impact of pyramidal structure on firm performance for 127 Brazilian groups for the period 2001 - 2015. Their finding is that the number of layers in the pyramid has a positive moderation effect on group-level performance despite a negative moderation at the first layer level. At the firm level, this creates agency and entrenchment issues since families having dominant control have little real capital invested.

Based on the above discussion, the following hypothesis was developed.

H3: Pyramidal structure significantly affects the firm risk-taking.

2.5 Moderating Effect of Family Ownership

Family firms have a pivotal role in socio-economic development, job creation and contribution to the GDP. Over 50 percent of the firms in Europe and around one-third of S&P 500 firms in the US are family-owned (Maury, 2006; Anderson & Reeb, 2003). Due to their profound impact, it is vital to study the unique characteristics and influences of family-owned firms on the different scopes of the business. Though there is no universal definition of family-owned firms, nevertheless the central idea in nearly all definitions is the control exercised by the family in directing the business by ownership concentration and the way they carry out day-to-day managing and decision-making activities (Abdullah et al., 2022; Rodríguez-Ariza et al., 2017).

Family firms exhibit different characteristics (Sharma et al., 1997; Chua et al., 2012). Heterogeneity may be found due to the presence of diverse objectives (Chrisman et al., 2012), the nature of resources available (Habbershon et al., 2003), and the governance structure (Carney, 2005). Researchers (Chua et al., 2018; Holt et al., 2017) have found that family-owned firms follow both non-financial and financial objectives. An important feature that distinguishes a family firm from other firms is the trade-off made by them in selecting the objectives to pursue and the results that are considered as important (Chua et al., 2018; Holt et al., 2017).

Prior researches have indicated that family-owned firms have a higher agency cost because of the presence of family members with controlling interests or directly involved in managing the affairs of the business (Dyer, 2018; Savitri, 2018). To advance their personal benefits majority shareholder assign targets to managers while ignoring the interest of

minority shareholders, thereby affecting the firm reputation and firm's ability to take risks. Board decision-making under such circumstances is also influenced because of their presence either directly or through their nominee directors. Yet, some studies support assistance of family ownership in policymaking by mitigating the conflict of interests among shareholders and managers (Wang, 2006; Cascino et al., 2010).

Based on the above discussions, the following hypotheses are framed:

H4: ***Family ownership moderates the association between tax aggressiveness and firm risk-taking.***

H5: ***The family ownership moderates the association between earnings quality and firm risk-taking***

H6: ***Family ownership moderates the association between pyramidal structure and firm risk-taking.***

3. Methodology

3.1 Data & Sample Selection

To empirically validate the above hypotheses, the study uses data set comprising of 450 firm-year observations based on the financial results of top 50 firms according to their market capitalization. Data from the financial reports of active, non-financial firms listed on the Pakistan Stock Exchange (PSX) for the period 2015 to 2023 were extracted manually. Consistent with past research, financial companies have been excluded as they are governed by different laws and rules (Abdullah et al., 2025; Eliwa et al. 2021).

3.2 Measurement of Variables

The dependent variable of the study is firm risk-taking (FRT), which has been measured using different proxies such as the capital expenditure intensity, defined as the ratio of capital expenditures to total assets (CAPEX_INT), R&D expenditure intensity, defined as the ratio of R&D expenditures to total assets (R&D_INT), etc., (Yung & Chen, 2018). The most commonly used proxy for firm risk-taking in the literature is CAPEX_INT (Bhagat & Welch 1995). Therefore, this study uses the capital expenditure intensity (CAPEX_INT) as the proxy for firm risk-taking (FRT).

To measure tax aggressiveness (TAG) previous researches have cited different proxies (Landry et al., 2013; Lanis & Richardson, 2012). One of them being the effective tax rate (ETR) which is obtained by dividing the current income tax expense by the pre-tax earnings (PBT), (Chen et al., 2010; Lanis & Richardson, 2012). A firm may use several strategies to reduce its tax liabilities, some of them are perfectly legal whereas some borders tax avoidance. According to Landry et al. (2013), ETR captures this entire range of tax strategies. A lower ETR indicates a higher TAG, therefore to obtain an increasing measure of TAG it is multiplied by -1 (Lanis & Richardson, 2012).

In literature there are several proxies for measuring earnings quality. In financial accounts revenues are recorded when they are realized and expenses are recorded when the resources are used up. However, this does not necessarily mean that cash has been received

or paid (Ronen & Yaari, 2008). Consequently, earnings could be divided into two parts: accruals and cash flows (Mohammady, 2010). According to researchers and practitioners accounting earnings that pair closely with the cash flows are more appropriate (Penman 2001; Francis et al., 2004). A higher ratio of cash flow from operations (CFO) to earnings implies a higher earnings quality (EQ) (Penman 2001).

The number of layers present between the firm and the ultimate shareholders is generally referred as the pyramidal structure (LAY) (Fan et al., 2005; Bradford et al., 2013). It is measured as a dummy variable having a value equal to 1 if layers are present and 0 otherwise. While, the proxy for family ownership (FO) is the percentage of shareholding controlled by the family (Abdullah et al., 2022).

Table No 1: Variable name, symbols, category and description

Variable name	Symbol	Category	Description
Firm risk-taking	FRT	Dependent variable	Capital expenditure / Total assets
Family ownership	FO	Moderating variable	Percentage of shareholding controlled by family.
Tax aggressiveness	TAG	Independent variable	-1*(Current income tax expense / Pre-tax earnings)
Earnings quality	EQ	Independent variable	Cash flow from operations / Net income
Pyramidal structure	LAY	Independent variable	Dummy variable, 1 if layers are present otherwise, 0
Firm age	LNAGE	Control variable	The LN of total number of years since the date of incorporation.
Firm listing age	LNListAge	Control variable	The LN of total number of years since the firm has been listed on the stock exchange.
Firm size	SIZE	Control variable	LN of total assets
Sales growth	Sgrowth	Control variable	A proportion of the current year's sales to previous year's sales minus 1
Profitability	PROF	Control variable	Net profit after tax/total sales
Return on assets	ROA	Control variable	Net profit / total assets

3.3 Statistical Analysis and Model Specifications

3.3.1 Baseline Model

To following Baseline model has been used to test the hypotheses 1 to 3 (H1 to H3).

$$FRT = \beta_0 + \beta_1 TAG + \beta_2 EQ + \beta_3 LAY + \beta_4 \Sigma Controls + u \ldots\ldots\ldots\ldots \quad (1)$$

If the coefficients of the independent variables in the model are statistically significant then it will support the hypothesis. The sign of the coefficients will indicate whether the influence is positive or negative.

Consistent with past researches Firm Age (LNAGE), Firm listing age (LNListAge), Firm size (SIZE), Sales growth (Sgrowth), Profitability (PROF), and return on assets (ROA) have been used as the control variables (Abdullah et al., 2025). Also included are the industry and year dummies which are consistent with previous researches (Abdullah et al., 2022).

3.3.2 Interaction Model

To ascertain the validity of moderating effect (H4 to H6), the following interaction model has been used. The model checks whether or not the family ownership (FO) moderates the relationship between tax aggressiveness (TAG) and firm risk-taking (FRT); earnings quality (EQ) and firm risk-taking (FRT); and pyramidal structure (LAY) and firm risk-taking (FRT).

$$FRT = \beta_0 + \beta_1 TAG + \beta_2 EQ + \beta_3 LAY + \beta_4 FO + \beta_5 TAG*FO + \beta_6 EQ*FO +$$

$$\beta_7 LAY*FO + \beta_8 \Sigma Controls + u \ldots\ldots\ldots\ldots \quad (2)$$

Consistent with literature, if the coefficients of interaction terms *TAG*FO*, *EQ*FO*, *and LAY*FO,* are statistically significant, then it will confirm our hypotheses. The sign of the coefficients will determine the nature of the moderation, i.e., positive or negative.

4. Results and Discussion

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics of the variables. The FRT has a mean of 0.125 (standard deviation 1.078) indicating that on an average firm in the sample have spent equivalent of 12.5% of their total assets on capital expenditure. The large range of FRT suggests that firms have different preferences for capital expenditures. TAG (tax aggressiveness) having a mean value of -0.235 (standard deviation 0.178) indicates that firms do pursue tax aggressive policies though there is wide variation indicated by maximum and minimum values of 0.161 and -0.543 respectively. The mean for EQ is 0.885 (standard deviation 1.769) with values ranging from 4.797 to -3.371, indicating large variation in earnings quality of sample firms. The pyramidal structure, LAY has a mean value of 0.933 (standard deviation 0.25). The maximum and minimum values are 1 and 0. These values indicate that nearly 93.3% of the firms have pyramidal structure. The mean value of FO is 0.098 (standard deviation 0.156), indicating on average 9.8% of the shareholding is held by family owners in sample firms.

As the firms in the sample are of different sizes and belong to different industries resulting in large variation in these statistics. Shapiro-Wilk test was performed to test the normality of the data which has been appended in the table as well. All the variables are statistically significant at 1%, we conclude that the data is non-normal.

Table No 2: Descriptive statistics

	N	Mean	SD	Max	Min	Swilk test
FRT	450	.125	1.078	19.949	-.105	13.543***
TAG	450	-.235	0.178	.161	-.543	5.635***
EQ	450	.885	1.769	4.797	-3.771	6.549***
LAY	450	.933	0.250	1	0	6.779***
FO	450	.098	0.156	.503	0	10.588***
LNAGE	450	3.665	0.546	4.7	1.792	6.752***
LNListAge	450	3.287	0.677	4.304	0	7.223***
SIZE	450	17.655	1.442	21.245	13.385	4.021***
Sgrowth	450	.17	0.387	3.405	-.997	10.035***
PROF	450	-3.943	72.039	167.391	-1403.41	13.588***
ROA	450	.092	0.136	1.626	-.466	10.811***

4.2 Pearson Correlations

Table 3 presents the Pearson correlation coefficients. The results indicate that the correlation between FRT and TAG (r = 0.091) is positive and statistically significant at 10% meaning that capital expenditure and tax aggressiveness have weak association. While the correlation between FRT and EQ (r = 0.127) is positive and statistically significant at 1%, implying that earnings quality is positively associated with capital expenditure intensity. The correlation between FRT and LAY (r= -0.246) is negative and statistically significant at 1% indicating a negative association pyramidal structure and capital expenditure intensity. The results also indicate a positive and statistically significant correlation at 1% between FRT and FO (r= 0.160). As all correlation coefficients (except between listing age and firm age - which is understandable) are below 0.8, so there is no issue of multicollinearity.

Table No 3: Correlation Matrix

*Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) CAPEX_INT	1										
(2) TAG	0.091*	1									
(3) EQ	0.127***	-0.187***	1								
(4) LAY	-0.246***	-0.045	-0.015	1							
(5) FO	0.160***	0.056	0.033	-0.257***	1						
(6) LNAGE	-0.011	-0.121***	-0.085*	0.127***	0.054	1					
(7) LNListAge	0.018	-0.142***	-0.067	0.093**	0.06	0.812***	1				
(8) SIZE	-0.170***	-0.120**	0.022	0.333***	-0.384***	0.059	0.018	1			
(9) Sgrowth	-0.03	-0.076	0.073	-0.003	0.063	0.053	0.015	0.034	1		
(10) PROF	0.006	-0.075	0.027	-0.015	0.04	0.064	0.025	-0.017	0.164***	1	
(11) ROA	-0.017	-0.202***	0.052	0.099**	-0.018	0.086	0.097**	-0.092*	0.042	0.08	1

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

4.3 Panel Regression Results

4.3.1 Baseline Model

Table 4 presents the panel data regression results for the baseline model. The choice between fixed effects model and random effects model was made based on the outcome of Hausman test. As suggested by the test result, panel data regression with random effects was used. The opinion about the hypotheses H1, H2, and H3 are based on the coefficient of the independent variables (TAG, EQ, and LAY).

Table No 4: Baseline Model Results

Panel data regression, random effect	
VARIABLES	**Model 1**
TAG	0.782**
	(0.307)
EQ	0.092***
	(0.029)
LAY	-1.010***
	(0.267)
LNAGE	-0.062
	(0.185)
LNListAge	0.174
	(0.156)
SIZE	-0.039
	(0.058)
Sgrowth	-0.029
	(0.138)
PROF	0.000
	(0.001)
ROA	0.032
	(0.394)
Year dummies	included
Industry dummies	included
Constant	1.549
	(1.180)
R-squared - overall	0.130
Chi-squared	52.814***
N	450

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The results indicate that tax aggressiveness (TAG) has a positive and statistically significant coefficient (β= 0.782, p <0.05) meaning that tax aggressive firms are incline to more risk-taking. The results also indicates that EQ (earnings quality) has a positive and statistically significant coefficient (β= 0.0924, p< 0.1). Firms with better earnings quality have propensity for greater capital expenditure which in turn indicates higher risk-taking. For pyramidal structure, LAY, the model shows a negative and statistically significant coefficient (β= -1.010, p< 0.01), indicating a negative influence of pyramidal structure on firm risk-taking.

4.3.3 Interaction Model

Table 5 provides details regarding the moderating effect of family ownership, FO, on the association between dependent variable, FRT and independent variables TAG, EQ, and LAY. The coefficient of moderating term TAG*FO (β = 7.434, p< 0.01) in the Model 2 is positive and statistically significant at 1%, indicating that FO positively moderates the association between firm risk-taking and tax aggressiveness.

Table No 5: Interaction model results

Panel data regression, random effect	
VARIABLES	Model 2
TAG	-0.023
	(0.327)
EQ	-0.011
	(0.032)
LAY	0.041
	(0.296)
FO	4.182***
	(0.825)
TAG*FO	7.434***
	(1.694)
EQ*FO	0.784***
	(0.147)
LAY*FO	-3.334***
	(0.895)
LNAGE	-0.0984
	(0.152)
LNListAge	0.193
	(0.129)
SIZE	-0.0270
	(0.0485)
Sgrowth	-0.00618
	(0.131)
PROF	-0.00007
	(0.000661)
ROA	0.213
	(0.362)
Year dummies	Included
Industry dummies	Included
Constant	0.118
	(1.017)
R-squared- overall	0.247
Chi-squared	138.385***
N	450

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Moreover, the coefficient of the moderating term EQ*FO (β = 0.784, p< 0.01) being positive and statistically significant indicates that family ownership, FO, positively influences

the association between earnings quality, EQ, and firm risk-taking. While, the interaction term LAY*FO has a negative statistically significant coefficient (β = -3.334, p<0.01) showing that the FO, negatively moderates the relationship between pyramidal structure, LAY, and firm-risk taking.

4.4 Further Analysis

The baseline model was further analyzed using panel corrected standard error (PCSE) and maximum likelihood (MLE) regression methods to check robustness. The results are presented in Table 6. PCSE method gives TAG coefficient as (β= 0.763, p <0.1) while MLE method gives TAG coefficient as (β= 0.768, p <0.01). Both the results support the initial analysis that TAG has a positive and significant influence on firm risk-taking.

Table No 6: Baseline model results – PCSE and MLE

	PCSE	**MLE**
VARIABLES	Model 1	Model 1
TAG	0.763*	0.768***
	(0.438)	(0.295)
EQ	0.090**	0.091***
	(0.038)	(0.028)
LAY	-1.034*	-1.029***
	(0.599)	(0.239)
LNAGE	-0.057	-0.058
	(0.056)	(0.162)
LNListAge	0.170**	0.171
	(0.080)	(0.137)
SIZE	-0.050	-0.047
	(0.067)	(0.052)
Sgrowth	-0.032	-0.031
	(0.110)	(0.136)
PROF	0.000	0.000
	(0.000)	(0.000)
ROA	-0.051	-0.030
	(0.432)	(0.381)
Year dummies	included	Included
Industry dummies	included	Included
Constant	2.036	1.737
	(1.853)	(1.057)
R-squared	0.130	
Wald Chi-squared	4947.58***	
LR Chi-squared		50.17***
N	450	450

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

In case of EQ, the PCSE method gives coefficient as (β= 0.0900, p <0.05) while MLE gives a coefficient of (β= 0.0906, p <0.01). These results confirm that earnings quality has positive and significant impact of firms risk-taking.

For pyramidal structure LAY, panel corrected standard error (PCSE) technique produced coefficient of (β= -1.034, p <0.1) while MLE produced coefficient of (β= -1.029, p <0.01). These results are in conformity with initial findings that the pyramidal structure has significant negative impact on firms risk-taking

Table No 7: Interaction model results – PCSE and MLE

	PCSE	**MLE**
VARIABLES	Model 2	Model 2
TAG	-0.0230	-0.001
	(0.309)	(0.325)
EQ	-0.011	-0.011
	(0.022)	(0.031)
LAY	0.041	0.259
	(0.745)	(0.360)
FO	4.182	5.058***
	(2.752)	(1.072)
TAG*FO	7.434*	6.774***
	(4.121)	(1.686)
EQ*FO	0.784***	0.760***
	(0.280)	(0.141)
LAY*FO	-3.334	-4.282***
	(2.618)	(1.166)
LNAGE	-0.098	-0.127
	(0.085)	(0.176)
LNListAge	0.193**	0.217
	(0.097)	(0.148)
SIZE	-0.027	-0.003
	(0.078)	(0.058)
Sgrowth	-0.006	-0.007
	(0.110)	(0.126)
PROF	-0.000	-0.000
	(0.000)	(0.001)
ROA	0.213	0.329
	(0.496)	(0.369)
Year dummies	included	included
Industry dummies	included	included
Constant	0.608	-0.557
	(2.146)	(1.251)
R-squared	0.247	
Wald Chi-squared	11631.39***	
LR Chi-squared		116.78***
N	450	450

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 7 present results of further analysis of the moderating effect of family ownership, FO. The methods employed are panel corrected standard error (PCSE) and maximum likelihood (MLE). The results indicate that FO has significant positive moderating effect on the association between tax aggressiveness (TAG) and firm risk-taking (FRT). It also moderates the relationship between earnings quality (EQ) and firm risk-taking (FRT). In the case of pyramidal structure, the moderating effect of family ownership, FO, on the relationship between LAY and FRT is negative and significant (β= -4.282, p <0.01) for MLE method whereas, PCSE produces an insignificant result.

These results suggests that firm's risk-taking is positively associated with tax aggressiveness as well as earnings quality. On the other hand, firms with pyramidal structure have lower inclination towards risk-taking. The results are in accordance with agency theory which suggest that major shareholders might extract private benefits at the expense of minority shareholders.

5. Conclusion and Recomendations

The study examined the impact of tax aggressiveness, earnings quality, and pyramidal structure on firms risk-taking. Further, what is the moderating effect of family ownership on the association between the tax aggressiveness and firm risk-taking, between earnings quality and firm risk-taking, and between pyramidal structure and firm risk-taking were also explored. The empirical findings indicate that ability of firms to take risks is positively associated with firm tax aggressiveness and earnings quality, whereas, firms with pyramidal structure are less inclined to take risks. The study also reveals that family ownership positively moderates the association between tax aggressiveness and firms risk-taking as well as, the association between earnings quality and firms risk-taking. While the family ownership negatively moderates the association between pyramidal structure and firms risk-taking. These results are in accordance with agency theory.

The paper has quite a few recommendations for government officials, investors, and creditors who are interested in longer term performance of the firms. For government officials charged with taxation, they need to devise appropriate taxation policies that will help firms to pursue growth. For investors, firms with higher risk-taking abilities and willingness are sought for higher growth leading to wealth creation. For creditors, firms taking more risks will require more development fundings.

There are some limitations of the study as the dataset is based on firms listed on PSX. The sample had been selected on the basis of market capitalization hence wide variations in firms' operating and capital bases. The study period was restricted to nine years from 2015 to 2023. Still, the study opens the vistas for further investigations in the areas of corporate governance and corporate risk-taking.

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