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# Corporate Governance Practices and Firms' Financing Decisions: The Role of Managerial Heuristics-and-Biases<sup>☆</sup>

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## Abstract

Corporate governance in relation to firm capital structure choices is well documented in corporate finance literature. Less known is that managerial heuristics-and-biases, such as availability and illusion of control, also relates to financing structures. Research show that business managers that are overconfident/optimistic of their company's future are likely to choose more levered financing structures, which may result in higher prospects of financial distress and higher costs of capital. Thus, the aims of this study are: 1) to investigate the influence of firm-level corporate governance practices on firms' financing structure pattern, 2) to examine the effects of a large number of well-known heuristics-and-biases on the executive's choice of financing (debt or equity), and 3) to test the relationship between firm-level corporate governance mechanisms and corporate financial structure in the presence of well-known managerial heuristics-and-biases. This research contributes to behavioural corporate finance literature: 1) by illuminating the effects of a large number of well-known heuristics-and-biases on managers' financing choices from an emerging market perspective, Pakistan, and 2) by illuminating the (significant) links between firm-level corporate governance attributes and debt/equity choices of firms in the presence of managerial heuristics-and-biases in Pakistan.

*Keywords:* Corporate governance, Heuristics-and-biases, Capital structure, Leverage, Managers, Behavioural corporate finance.

*JEL Classifications:* G30, G32, G34, G41.

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*“People are often unaware of their own unawareness”*

— Thomas Gilovich, *Heuristics and Biases: The Psychology of Intuitive Judgment*

## **1. Introduction**

One of the key questions in corporate finance is “what determines firms’ financing decisions.” The degree of financial leverage varies greatly among firms in the real world, and the determinants of the financial structure still largely remained unexplained. Although the standard finance theories (such as the Agency Theory and the Pecking Order Theory) largely contribute to explain how corporations make capital structure choices, the empirical evidence has been to some extent contradictory. Thus, more robust evidence is required to explain “why corporations make different financing decisions.”

It is only recently that psychological and behavioural characteristics have been considered as a vital element in the firm financial decision-making processes. It has been argued that overconfident/optimistic CEOs/CFOs will display the preferences for debt over equity financing because they believe issuing new equity will destruct the value of existing shareholders. In this study, therefore, the researcher contends that a large set of well-known managerial heuristics-and-biases (such as overconfidence and optimism) could help us better understand one of the fundamental questions in corporate finance: why corporations choose different financial structures. Therefore, the findings of this research fill a critical gap in the corporate finance literature on the corporate debt policy and provide meaningful explanations for the use of different financing means when considering psychological aspects of management.

With this backdrop, in this study, the researcher seek to expand on the past research by seeking to resolve the conflict over the relationship between firm-level corporate governance practices and firm financing pattern, by testing for the effect of a large number of well-known managerial heuristics-and-biases on the amount of leverage in the firm’s financing structure, and by exploring whether there is a relationship between firm-level corporate governance and corporate debt policy in the presence of well-established heuristics-and-biases.

The researcher proposes that heuristics-and-biases of corporate executives are the sources of distortions in corporate financing decisions and these also affect the CG practices. Consequently, the relationship between CG attributes and corporate debt policy, as well as corporate performance become insignificant. This study would help organizations to understand the managerial heuristics-and-biases and how these can be reduced while making

financial decisions, which sometimes lead towards better decisions and sometimes towards bad outcomes. This research would also help the firms to understand the extent of damage in the form of heuristics-and-biases in financing decisions distortions, which ultimately affect the financial performance of a firm.

Besides, in addition to the secondary data, the study will use a survey-based approach to provide new insights into the people and processes behind corporate financing decisions. This approach allows the researcher to address issues that traditional empirical work based on large archival data sources cannot. To the best of the author's knowledge, no other researcher has attempted to measure a large number of well-established heuristics-and-biases of key financial decision makers directly through a survey approach, particularly in Pakistan. This research, therefore, might be one of the first empirical studies to explicitly seek the roles of managerial cognitive characteristics in explaining firm financing decisions, and in seeking the relationship between CG characteristics and corporate financing decisions using both the primary and secondary data.

Keeping the contextual perspective in view, the study contributes to the research stream by investigating the moderating role of managerial heuristics-and-biases in the relationship between CG provisions and financial structure, which was previously unexplored. The current research further enhances the theoretical contribution as no such study has been conducted formerly in Pakistan.

This study is organized into six main sections. Section 1 is devoted to motivations of the study, research objectives, summary of the key findings and contributions of the study. Review of the empirical studies and research hypotheses are presented in section 2. Section 3 describes the sample selection procedure and criteria, data collection, ethical considerations, variables of the study, empirical models, and statistical tests.

## **2. Literature Review and Hypothesis Development**

The current section provides a review of the literature and hypotheses on various specific CG mechanisms and heuristics-and-biases.

### ***The Effects of Corporate Governance Mechanisms on Capital Structure<sup>1</sup>***

The relationship between corporate governance and financial structure has attracted considerable research attention over the last couple of decades. A number of researchers have

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<sup>1</sup> Summary of the studies on corporate governance and capital structure is given in Table 1.

shown that the main CG mechanisms that have a significant impact on capital structure decisions of firms include board size, board independence, audit committee size, female directorship, CEO duality, managerial ownership, institutional ownership, ownership concentration and audit reputation. The following subsections provide a brief discussion on these mechanisms and their effects on CS choices of the firm.

### ***Board Size and Capital Structure***

The empirical studies on the size of the board of directors and financial structure so far, though ample, document varied results and appear largely inconclusive. For instance, empirical results in Kenya by Kyereboah-coleman and Biekpe (2006) indicate a statistically significant positive relationship between board size and the total as well as short-term leverage ratios, which suggest that corporations with larger board membership employ more leverage irrespective of the maturity period. Abor (2007) find a positive and statistically significant relationship between board size and capital structure, suggesting that firms with larger board size tend to pursue high debt policy. A related paper by Bokpin and Arko (2009) observe a positive and statistically significant relationship between the size of the board of directors and the choice of long-term debt over equity, implying that the directors substitute equity for long-term debt in their capital structure decisions. In another study, Sheikh and Wang (2012) suggest that board size is positively and significantly related to the total debt ratio and the long-term debt ratio.

However, a recent study by Dimitropoulos (2014) documents that firms with a higher board size are associated with lower levels of leverage.

Besides, Wen, Rwegasira, and Bilderbeek (2002) observe no relationship between the number of directors in the board and financial leverage. In their paper, Bokpin and Arko (2009) document that board size has a negative but statistically insignificant impact on the total debt ratio, while they observe that the effect of board size on the choice of short-term debt over equity is positive but again statistically insignificant. In a more recent study, Detthamrong, Chancharat, and Vithessonthi (2017) using a sample of 493 Thai listed (non-financial) firms investigate the relationship between board size and financial leverage. They find that board size does not affect financial leverage. However, when the researchers split the sample into two subsamples (small and large firms), their results indicate that, for the subsample of large firms, the effect of board size on financial leverage is positive and statistically significant, but at the 10% level only. Siromi and Chandrapala (2017) also do not find any association between the number of directors in the board and firms' capital structure decision in Sri Lanka.

Collectively, the above-cited studies imply that board size and the degree of financial leverage are connected with each other. Thus, it is expected that, as in most of past studies, firms with larger board membership have low financial leverage. Consequently, based on the literature review we conjecture the following first research hypothesis:

**Hypothesis 1:** *Board size is positively associated with the level of financial leverage.*

### ***Board Independence (Composition) and Capital Structure***

Though findings are mixed, a number of empirical studies are available in the literature that focuses the link between the presence of external directors on the board and corporate capital structure. For instance, by analysing the data from a sample of 22 Ghanaian listed firms, Abor (2007) reports a positive and statistically significant association between board composition (i.e., the ratio of non-executive directors to total directors) and the debt ratio, suggesting that firms pursue high debt policy with higher proportion of non-executive directors on the board. In their study, Sheikh and Wang (2012) have shown that the ratio of outside directors to the total board members is positively and significantly associated with the total debt ratio and the long-term debt ratio. Employing the data from a sample of 138 manufacturing listed firms in Sri Lanka, Siromi and Chandrapala (2017) also observe that board composition (having more independent non-executive directors in the board) significantly affects the total debt ratio. In a recent paper, Boateng, Cai, Borgia, Gang Bi, and Ngwu (2017) report a positive and statistically significant relationship between the independent directors and long-term leverage in China, which implies that the proportion of outside directors increases with long-term debt usage.

On the contrary, for a sample of 60 Chinese non-financial listed firms, Wen et al. (2002) indicate that board composition (measured by the percentage of outside directors in the board) is negatively and significantly associated with financial leverage. In their study, Kyereboah-coleman and Biekpe (2006) show that board independence and short-term leverage are inversely related, implying that corporations with higher (short-term) debt tend to have more external directors on the board. Recently, Dimitropoulos (2014) also suggests that an increased number of independent and non-executive directors on the board is linked to a lower level of leverage.

Besides, in a related work, Bokpin and Arko (2009) have identified that board independence has a negative (though statistically insignificant) impact on the long-term as well as short-term debt ratios, while the authors observe a positive but again statistically insignificant effect on the total debt ratio. Detthamrong et al. (2017) observe no relationship

between board independence and firms' financial leverage. However, when they partition their sample into two groups (small and large firms); they find that, for the subsample of large firms, the effect of board independence on the degree of financial leverage is positive and statistically significant.

Thus, in line with most of the studies in the literature, we expect the effect of the proportion of independent and non-executive directors on the board to be positive. As a result, the second research hypothesis is proposed as follows:

**Hypothesis 2:** *Board independence is positively associated with the level of financial leverage.*

### ***Female Directorship and Capital Structure***

To the researcher's best knowledge, just one study (again by Detthamrong et al. (2017)) is available in the literature that seeks the effect of female directorship on the degree of financial leverage. More precisely, in a more recent study, Detthamrong et al. (2017) observe no relationship between female directorship and firms' financial leverage. However, when they split the sample into two subsamples, small and large size firms, they find that, for the subsample of small size firms, female directorship has a positive and statistically significant effect on the degree of financial leverage. Thus, in line with Detthamrong et al., we expect that firms with a larger number of female directors on the board of directors will be related to higher levels of financial leverage. Therefore, we propose the third research hypothesis in the following form:

**Hypothesis 3:** *Female directorship is positively associated with the level of financial leverage.*

### ***CEO Duality and Capital Structure***

In relation to a dual leadership structure and the level of leverage, a considerable amount of research has been conducted, which yields mixed results. Abor (2007), for example, shows a positive and statistically significant association between CEO duality and the debt ratio, suggesting that firms with a unitary leadership structure tend to employ more debt in their capital structure. Recently, by analysing a sample from 67 European football clubs, Dimitropoulos (2014) finds that non-existence of CEO dual role results in a reduction in the level of leverage.

Conversely, Kyereboah-coleman and Biekpe (2006) demonstrate that corporations in which the CEO is also the board chair employ more (short-term) debt.

But, in his study, Fosberg (2004) postulates that firms with a two-tier leadership structure experience higher leverage; however, this relationship is statistically insignificant. In

their study, Bokpin and Arko (2009) conclude that CEO duality is positively (though statistically insignificantly) associated with the financial leverage ratio and the choice of short-term debt over equity but negatively (though again statistically insignificantly) with the debt ratio. In a related research, Sheikh and Wang (2012) have found a negative but statistically insignificant relationship between CEO duality and both the total debt ratio and the long-term debt ratio in Pakistan. More recently, Detthamrong et al. (2017) do not find any relation between CEO duality and firms' financial leverage. However, when the researchers partition the sample into two groups (small size and large size firms), their results show that, for the group of small size firms, the effect of CEO duality on the degree of financial leverage is positive and statistically significant. In another recent study, Siromi and Chandrapala (2017) have also found no relation between duality leadership and the leverage ratio. In the context of China, Boateng et al. (2017) conclude no relationship between CEO duality and debt structure.

Communally, the above-cited research indicate that firm leadership structure and CS choices are related to each other in some way. Hence, it is expected that, as in much of earlier work, financial leverage tends to be higher for the corporations with the CEO and the board chair as the same person. Accordingly, based on the literature review we postulate the following fourth hypothesis:

**Hypothesis 4:** *CEO duality is positively associated with the level of financial leverage.*

#### ***Audit Committee Size and Capital Structure***

Concerning the audit committee size mechanism, almost no empirical research is available in the literature that focuses on the role of this mechanism in explaining firm financing decisions. Until now, we are aware of only one paper that has attempted to address this issue. In particular, quite recently, Detthamrong et al. (2017) find a negative and statistically significant (but at the 10% level) relationship between audit committee size and firms' financial leverage. Moreover, when they divide their sample into a small firms and a large firms group, they reveal that, for the group of large firms, the effect of audit committee size on the degree of financial leverage is negative and statistically significant. Therefore, based on Detthamrong et al.'s results, it is predicted that firms with a higher audit committee size will be associated with lower levels of debt capital. Hence, the fifth research hypothesis is stated in the following form:

**Hypothesis 5:** *Audit committee size is positively associated with the level of financial leverage.*



### ***Audit Reputation and Capital Structure***

There is a scarcity of research on the relationship between audit reputation and financial structure. To the author's best knowledge, to date, only Detthamrong et al. (2017) seek to test whether audit reputation is linked to the amount of debt financing a company uses. And in their study, Detthamrong et al. (2017) do not find any relation between audit reputation (proxied by the Big Four Auditors) and firms' financial leverage. In sum, based on the review mentioned above, the sixth research hypothesis is proposed as follows:

**Hypothesis 6:** *Audit reputation is positively associated with the level of financial leverage.*

### ***Managerial Ownership and Capital Structure***

Although evidence is mixed, a number of empirical studies have been conducted to test the relationship between managerial ownership and CS. For instance, for a sample of US firms, Fosberg (2004) concludes that managerial insiders (CEO, officers and directors) ownership and the debt/equity ratio are inversely related, implying that the amount of debt finance in firms' capital structures increases as the percentage of the firm's common stock held by the CEO and other officers and directors declines. Additionally, a study by Bokpin and Arko (2009) documents that inside (managerial) shareholding positively and statistically significantly influences the choice of long-term debt over equity and the total debt ratio, among Ghanaian listed firms. In his study, Dimitropoulos (2014) concludes that higher managerial share ownership results in an increase in the level of leverage.

On the contrary, using a sample of 155 Pakistani non-financial firms, Sheikh and Wang (2012) have found that managerial ownership is negatively linked to both the total debt ratio and the long-term debt ratio; though, the relationship is statistically significant for the long-term debt ratio only.

Whereas, in their paper, Bokpin and Arko (2009) do not find any relation between managerial ownership and the choice of short-term debt over equity. In a more recent paper, Siromi and Chandrapala (2017) do not observe any significant relationship between managerial ownership and the total debt ratio for a sample of Sri Lankan firms.

Collectively, the studies discussed above point out that managerial share ownership and the degree of financial leverage are somehow correlated with each other. Therefore, it is proposed that, as in most of the previous studies, higher managerial shareholding will result in an increase in the degree of financial leverage. As a result, the seventh research hypothesis is offered in the following form:

**Hypothesis 7:** *Managerial ownership is positively associated with the level of financial leverage.*

### ***Institutional Ownership and Capital Structure***

Similar to the female directorship and audit reputation mechanisms, there is a dearth of research on the relationship between institutional ownership and the amount of debt in a firm's financial structure. As far as the author knows, until now, only one research by Dimitropoulos (2014) explores this relation. In particular, in a recent research, Dimitropoulos (2014) shows that higher institutional share ownership results in an increase in the level of debt. Consequently, it is anticipated that higher institutional share ownership will have a significant positive effect on the degree of financial leverage. Hence, we establish our eighth research hypothesis as follows:

**Hypothesis 8:** *Institutional ownership is positively associated with the level of financial leverage.*

### ***Ownership Concentration (Blockholder Ownership) and Capital Structure***

Although results are mixed and largely inconclusive, a considerable amount of empirical research has been conducted on ownership concentration influence on CS decisions. For instance, a related paper by Fosberg (2004) indicates a positive relationship between blockholders share ownership (5 percent or more) and debt financing, suggesting that the greater proportion of the firm's common stock owned by the firm's blockholder results in higher debt usage. Further, the researcher documents that for any given level of share ownership of blockholder, the higher the number of blockholders a company has the less effective blockholders are in increasing the amount of debt capital in the firm's financial structure. Employing the data from 98 non-financial listed firms in Bangladesh, Haque, Arun, and Kirkpatrick (2011) investigate the relationship between ownership concentration (measured as the percentage of ownership by the top 10 shareholders) and debt finance and find the evidence that ownership concentration is positively related to the debt ratio. A related research, by Sheikh and Wang (2012), suggests that ownership concentration (measured as the ratio of shares held by 5 largest shareholders to total outstanding shares) is positively and significantly associated with the total debt ratio and the long-term debt ratio in Pakistan.

However, in their work, Boateng et al. (2017) suggest that the ownership concentration (proxied by the percentage of shares held by the top 5 shareholders) exerts a statistically significant negative influence on the level of debt utilized by Chinese listed companies, which indicates that concentrated ownership leads to efficient monitoring. Moreover, their further

analysis after splitting the sample into two groups (state-owned enterprises and privately owned enterprises) shows that, only for the sub-sample of state-controlled firms, the effect of ownership concentration on the long-term leverage ratio is negative and statistically significant, which suggests that ownership concentration in the hands of the state has a better capacity to perform effective monitoring role.

While, a more recent study, by Detthamrong et al. (2017), shows that ownership concentration does not have any effect on firms' financial leverage. However, when the authors categorize the sample into two subsamples, small and large size firms, they find that, for the subsample of small size firms, ownership concentration has a positive and statistically significant (at the 10% level) effect on the degree of financial leverage.

In sum, consistent with the findings of most of the studies cited above, we expect that higher concentrated ownership of a firm will have a significant positive effect on financial leverage. Accordingly, the ninth research hypothesis is stated in the following form:

**Hypothesis 9:** *Ownership concentration is positively associated with the level of financial leverage.*

Table 1: Summary of the Studies on Corporate Governance and Capital Structure

<b>Author/s (year)</b>	<b>Country(ies)</b>	<b>Study period</b>	<b>Sample</b>	<b>Data source(s)</b>	<b>Methodology</b>	<b>Main finding(s)</b>
Wen et al. (2002)	China	1996-98	60 non-financial listed firms	Questionnaire, Shengying Wangui Security Company	Descriptive statistics, Correlation, OLS regression	Managers seek lower leverage when they face stronger CG.
Fosberg (2004)	US	1990-96	142 firms (excluding banks)	Business Week, Forbes, Disclosure	Summary statistics, Univariate analysis, Regression analysis	Managerial ownership and number of blockholders are inversely, while blockholder ownership is positively, related to the debt/equity ratio.
Du and Dai (2005)	9 East Asian economies	1994-96	1473 (1484) firms for the market (book) leverage analysis	DataStream, PACAP	OLS regressions	Controlling shareholders with relatively small ownership share tend to increase leverage with the aim of raising external finance without diluting their shareholding dominance.
Kyereboah-coleman and Biekpe (2006)	Kenya	1999-2003	47 listed firms	Not specified	Summary statistics, Random-effects GLS regression	Board independence and CEO duality negatively, while board size positively, affect corporate leverage.
Abor (2007)	Ghana	1998-2003	22 listed firms	Annual reports, GSE Fact Books, Interviews	Descriptive statistics, OLS regression	Board size, CEO duality and board composition positively affect capital structure.
Bokpin and Arko (2009)	Ghana	2002-07	23 listed firms	Annual reports	Descriptive statistics, Seemingly unrelated regression	Board size and managerial ownership have a positive effect on the leverage ratio.
Haque et al. (2011)	Bangladesh	2004-05	98 non-financial listed firms	Questionnaire, Annual reports	Summary statistics, Correlation, OLS regressions	Poorly governed firms have a higher level of debt finance.
Sheikh and Wang (2012)	Pakistan	2004-08	155 non-financial listed firms	Annual reports	Summary statistics, Correlation, OLS regressions	Board size, outside directors and ownership concentration are positively related with the total and long-term debt ratios. While managerial ownership is negatively

						related to the long-term debt ratio.
Dimitropoulos (2014)	10 EU countries	2005-09	67 (7 listed and 60 unlisted) soccer clubs	Annual reports	Descriptive statistics, Correlation, GMM panel regression	Strong CG mechanisms and more dispersed ownership result in a reduction in the level of leverage.
Boateng et al. (2017)	China	1998-2012	2,386 non-financial listed firms	Chinese Stock Market Research	Descriptive statistics; Correlation; OLS, Fixed-effects and System-GMM regressions	Independent directors positively, while ownership concentration negatively, influence the long-term debt ratio.
Detthamrong et al. (2017)	Thailand	2001-14	493 non-financial firms	Datastream, SETSMART	Descriptive statistics, Correlation, OLS regressions with firm and year fixed-effects	CG has no effect on financial leverage.
Siromi and Chandrapala (2017)	Sri Lanka	2009-13	138 non-financial firms	Annual reports	Descriptive statistics, Paired samples <i>t</i> -test, OLS regression	Board composition positively, while board committees inversely, related to total debt ratio.

*Notes:* OLS = Ordinary Least Squares; EU = European Union; GMM = Generalized Method of Moments; GSE = Ghana Stock Exchange; GLS = Generalized Least Squares

### ***The Effects of Heuristics-and-Biases on Capital Structure<sup>2</sup>***

Concerning the effects of heuristics-and-biases on the manager's choice of financing, i.e., debt or equity, a considerable amount of research, both empirical and theoretical, has been conducted. However, past research have only focused one bias, managerial overconfidence/optimism, and the results, thus far, are also mixed. For instance, in his theoretical study, Fairchild (2005) considers the effect of managerial overconfidence on capital structure decisions in the presence of asymmetric information and moral hazard problems. In his asymmetric information model, he argues that managerial overconfidence is unambiguously bad, since it results in greater use of (welfare-reducing) debt financing, thus increasing the probability of financial distress. For the moral hazard model, the effect of managerial overconfidence is ambiguous, i.e., Fairchild demonstrates that increasing managerial overconfidence induces higher managerial effort, but it may also result in greater use of debt financing and higher expected costs of bankruptcy.

In an empirical study, Barros and Silveira (2008) examine the influence of managerial overconfidence/optimism on a firm's capital structure choices in Brazil. The authors proposed various proxies for managerial overconfidence, primarily based on the manager's status as an entrepreneur or non-entrepreneur. In particular, they measured managerial overconfidence through different dummy variables; for example, they assigned one to the overconfidence variable if the manager was the founder of the firm and zero otherwise. Employing a sample of 153 non-financial listed firms in the years 1998 to 2003, the authors show strong empirical evidence that the proxies of managerial overconfidence have strong positive associations with the (book and market) leverage ratios.

In another empirical work, Oliver and Mefteh (2010) evaluate the impact of market sentiment/confidence on the market value of leverage in a sample of 303 French (non-financial) listed firms. They measured manager confidence through the results of sentiment surveys of industry representatives in four industry classifications and observe that industry confidence and investor confidence are highly inversely significant in explaining firm capital structure decisions. However, when Oliver and Mefteh (2010) decomposed their measure of industry sentiment into two components (a common investor part and a unique manager part), they note a positive and statistically significant relation between the manager component and the market leverage ratio, providing some support to the behavioural finance theory that overconfident management prefer debt to equity.

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<sup>2</sup> Summary of the studies on heuristics-and-biases and capital structure is given in Table 2.

In a recent paper, Graham, Harvey, and Puri (2013) study the relationship between managerial optimism and capital structure choices among public and private firms from the US, Europe and Asia. They gauged managerial optimism using the Life Orientation Test-Revised (LOT-R), as developed by Scheier, Carver, and Bridges (1994). By using a large sample of US and non-US CEOs ( $N = 1,017$ ) and CFOs ( $N = 1,276$ ), Graham et al. (2013) display that: 1) US-based CEOs are much more optimistic than the general population and their CFO colleagues, 2) US-based CEOs and CFOs are more optimistic than their non-US correspondents, and 3) firms led by very optimistic CEOs use more debt, in particular, more short-term debt, than the firms led by less optimistic CEOs.

However, in his paper, Oliver (2010) studies the association between management confidence and financing behaviours of the 229 US industrial companies. He gauged management confidence as the average of the past 12 months Consumer Sentiment Index (CSI) from the University of Michigan. The author reveals that management confidence is pervasive and highly significant in explaining firms' capital structure decisions. In particular, he documents that when management confidence is higher, corporations have higher debt levels.

Collectively, the above-cited literature implies that various measures of overconfidence/optimism and the amount of debt capital in firms' capital structures are associated with each other. Thus, based on the above-mentioned discussion, it is proposed that the firms led by "biased" managers will use higher levels of debt than the firms led by "rational" (or not biased) managers. Consequently, we can assert the final research hypothesis in the following form:

**Hypothesis 10:** *Managerial heuristics-and-biases are positively associated with the level of financial leverage.*

Table 2: Summary of the Studies on Managerial Heuristics-and-Biases and Capital Structure

Author/s (year)	Study type	Country(ies)	Study period	Sample	Data source(s)	Methodology	Main finding(s)
Fairchild (2005)	Theoretical	N/A	N/A	N/A	N/A	N/A	Overconfidence results in greater use of debt financing.
Barros and Silveira (2008)	Empirical	Brazil	1998-2003	153 non-financial listed firms	ECONOMATICA, Brazilian Securities Commission' Annual Information forms	Descriptive statistics, System-GMM estimator	Overconfidence/optimism has a strong positive association with the leverage ratios.
Oliver (2010)	Empirical	US	1978-2004	229 industrial companies	Osiris, Compustat	Descriptive statistics, Correlation, OLS regression	Higher management confidence leads to higher levels of debt.
Oliver and Mefteh (2010)	Empirical	France	1995-2004	303 non-financial listed firms	Compustat Global, Datastream, European Commission	Summary statistics, Correlation, Seemingly unrelated regression	Industry confidence and investor confidence are inversely, while the unique component of manager industry confidence is positively, related to the leverage ratio.
Graham et al. (2013)	Empirical	US, Europe, Asia	2006	2,293 senior managers (1,017 CEOs + 1,276 CFOs)	Survey instrument	Summary statistics; Correlation; OLS, Logit and Ordered Logit regressions	Firms led by (highly) optimistic CEOs use more debt, in particular, more short-term debt.

Notes: OLS = Ordinary Least Squares; EU = European Union; GMM = Generalized Method of Moments; GSE = Ghana Stock Exchange; GLS = Generalized Least Squares; N/A = Not Applicable.



### 3. Data and Methodology

The current section presents a detailed description of the research design and methods used to achieve the research objectives.

#### *The Data*

As can be seen in Table 3, the sample consists of Pakistani non-financial firms listed at the PSE with three years of data over the years 2015-2018. Financial firms are excluded because they are subjected to legal regulations regarding financial structure. This approach resulted in 600 firm/year observations. All the accounting and financial statement data are sourced from Datastream. CG data are sourced from annual reports. The biases data is sourced from the survey.

Table 3: Sample Selection

<b><i>Panel A: Selection procedure</i></b>	
All firms listed on the PSE (on July 10, 2017)	582
Less: financial firms	(150)
Remaining (non-financial) firms	432
Less: newly added firms, non-operating firms, and firms with missing (financial and governance) data	(60)
Firms with full financial and governance data	372
<b><i>Panel B: Sample distribution by sector</i></b>	
<b>Sector</b>	<b>No. of firms</b>
Automobile Assembler	4
Automobile Parts & Accessories	1
Cable & Electrical Goods	3
Cement	9
Chemical	16
Engineering	3
Fertilizer	4
Food & Personal Care Products	7
Glass & Ceramics	6
Jute	2
Leather & Tanneries	2
Miscellaneous	9
Oil & Gas Exploration Companies	4
Oil & Gas Marketing Companies	5
Paper & Board	3
Pharmaceuticals	6
Power Generation & Distribution	6
Refinery	2
Sugar & Allied Industries	9
Synthetic & Rayon	3
Technology & Communication	6
Textile Composite	25
Textile Spinning	29
Textile Weaving	4
Tobacco	3
Transport	3
Vanaspati & Allied Industries	2
Woollen	1

## ***Variables of the Study***

### *Dependent Variable: Financial Leverage*

Capital structure theories do not offer immediate guidance about what precise leverage measures one should use in empirical studies. In particular, it could be more appropriate to use “book” leverage measures in some cases and “market” measures in others, although this choice is often unclear (Barros & Silveira, 2008). Therefore, for a deeper understanding of the relationships, we use both types of financial leverage, that is, book leverage and market leverage. See Table 4 for the operational definitions of both types of leverage.

### *Independent Variable: Corporate Governance Practices*

In order to test the effect of firm-specific governance quality on financial leverage, we use nine attributes of corporate governance, board size, board independence, female directorship, CEO duality, audit committee size, audit reputation, managerial ownership, institutional ownership, and ownership concentration, which are commonly used in the research of capital structure as explanatory variables (e.g., Du and Dai (2005), Boateng et al. (2017)). Operational definitions for the CG attributes are described in Table 4.

### *Independent Variable: Managerial Heuristics-and-Biases*

Many behavioural researchers (e.g., Oliver (2010), Oliver and Mefteh (2010)) argue that it is difficult to measure cognitive biases, such as overconfidence because these biases are not directly observable (Barros & Silveira, 2008). Although some behavioural researchers have proposed a number of (secondary) proxies of managerial overconfidence/optimism, the data on these measures is not available in most of the emerging countries, such as Pakistan. Therefore, following Graham et al. (2013), we gauged a large number of well-known heuristics-and-biases directly from survey approach. In addition, following the research of Toplak et al. (2011), each of the ten problems in the heuristics-and-biases battery is scored 0 or 1, and the scores are summed to form a composite score.

### *Control Variables: Firm-level*

To control for firm-specific factors that might affect corporate financing choices as well as to address the concerns arising from omitted variables that may influence firm’s financial leverage, we include firm profitability, firm size, asset tangibility, firm age, market-to-book ratio, growth opportunities, non-debt tax shields, industry dummies, firm risk and dividend

yield, which have been commonly used in past research as the determinants of corporate CS. See Table 4 for the measurements of these variables.

*Control Variables: Individual-level*

Existing research (e.g., Graham et al. (2013), among others) have suggested that individual-specific characteristics (e.g., gender and age) also influence firms' financial leverage. Accordingly, in the present study, we include a large set of demographic factors to control for individual-level characteristics that might influence corporate CS decisions. Specifically, the characteristics that we control are gender, age, designation, tenure, past experience, highest qualification, business degree and academic major. Operational definitions for these variables are given in Table 4.

Table 4: Summary of the Study Variables

Acronym	Description	Measurement	Expected sign	Theoretical justification	Data source
<i>Dependent variable: Capital structure</i>					
BLEV	Book leverage	Book value of total debt / (book value of total equity + book value of total debt)			Datastream
MLEV	Market leverage	Book value of total debt / (market value of total equity + book value of total debt)			Datastream
<i>Independent variable: Corporate governance</i>					
BS	Board size	Natural logarithm of the total no. of board directors	+	–	Annual reports
BI	Board independence	No. of independent board directors / total no. of board directors	+	Agency theory	Annual reports
FD	Female directorship	No. of female board directors / total no. of board directors	+	–	Annual reports
CEOD	CEO duality	A dummy variable, 1 if the CEO of a firm is the Chairman, 0 otherwise	-	Agency theory	Annual reports
ACS	Audit committee size	No. of the audit committee on the board	+	–	Annual reports
AQ	Audit reputation	A dummy variable, 1 if a firm's auditor is one of the big 4 auditing firms (KPMG, Deloitte, PwC and EY), 0 otherwise	+	–	Annual reports
MO	Managerial ownership	No. of shares held by management (e.g., CEOs, directors) / total outstanding shares	-	–	Annual reports
IO	Institutional ownership	No. of shares held by institutional investors / total outstanding shares	+	–	Annual reports
OC	Ownership concentration	No. of shares held by 5 largest shareholders / total outstanding shares	+	Agency theory	Annual reports
<i>Independent variable: Managerial heuristics-and-biases</i>					
HBS	Heuristics-and-biases	Heuristics-and-biases composite score	+	–	Survey
<i>Controls variables: Firm-level</i>					
FP	Firm profitability	Earnings before interest and taxes / the book value of total assets	+/-	Pecking order theory	Datastream
FS	Firm size	Natural logarithm of the book value of total assets	+/-	Pecking order/Trade-off theory	Datastream
AT	Asset tangibility	Total fixed assets / the book value of total assets	+/-	Pecking order/Trade-off theory	Datastream
FA	Firm age	Natural logarithm of the number of years since the firm was listed at the PSE	+	–	Datastream
MTB	Market-to-book ratio	Market value of equity / book value of equity	-	–	Datastream
GO	Growth opportunities	Net revenues / the book value of total assets	+	Trade-off/Signaling theory	Datastream

NDTS	Non-debt tax shields	Depreciation and amortization / the book value of total assets	+	Trade-off theory	Datastream
IND	Industry dummies	Twenty-seven dummy variables, 1 if a firm belongs to a specific industry, 0 otherwise			Datastream
RISK	Firm risk	Volatility of earnings before interest and taxes	+/-	Trade-off theory	Datastream
DIV	Dividend yield	Dividend payout ratio: Dividends per share / net income per share	+	–	Datastream
<hr/> <i>Controls variables: Individual-level</i> <hr/>					
GD	Gender	A dummy variable, 1 if gender is female, 0 otherwise	-	–	Survey
AGE	Age	Age in years		–	Survey
DESIG	Designation	Seven dummy variables, 1 if a manager belongs to a specific group, 0 otherwise		–	Survey
TEN	Tenure	No. of years in the current position	+	–	Survey
PEXP	Past experience	Past experience in years	+	–	Survey
QUAL	Highest qualification	Qualification level measured on a scale from 1 to 4		–	Survey
BDEG	Business degree	A dummy variable, 1 if a manager holds a business degree (e.g., MBA), 0 otherwise	+	–	Survey
MAJOR	Academic major	Three dummy variables, 1 if a manager belongs to a specific group, 0 otherwise		–	Survey

### ***Empirical Models***

Following Haque et al. (2011), amongst others, we develop the following three research models that relate financial leverage—a proxy of the corporate financial structure—to the CG attributes, managerial heuristics-and-biases and our control variables.

$$\text{Leverage} = \alpha_0 + \alpha_1 (\text{Corporate governance practices}) + \alpha_2 (\text{Firm-level controls}) + \varepsilon \dots \quad (1)$$

$$\text{Leverage} = \beta_0 + \beta_1 (\text{Managerial heuristics-and-biases composite score}) + \beta_2 (\text{Individual-level controls}) + \varepsilon \dots \quad (2)$$

$$\text{Leverage} = \gamma_0 + \gamma_1 (\text{Corporate governance practices} * \text{Managerial heuristics-and-biases composite score}) + \gamma_2 (\text{Firm-level controls}) + \gamma_3 (\text{Individual-level controls}) + \varepsilon \dots \quad (3)$$

### ***Statistical Tests***

In order to test the research hypotheses as well as the above three empirical models, we use three statistical tests. First, summary statistics are run to describe the characteristics of sample firms and respondents. Second, Pearson correlation technique is used to test the correlations among the study variables. Finally, a cross-sectional regression analysis is run to analyse the effects of the explanatory variables on the response variable.

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