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Corporate Debt Choice and Board Size: The Case of Oil Exporting Economy

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Abstract

This paper investigates the role of firms' board size on capital structure decisions in an oil-based economy. Using a sample of 121 listed firms in Saudi capital Market, over the 2009-2016 period, we find a strong negative linkage between board size and debt choice. Our findings suggest that strong corporate governance practice enforce the usage of lower debt financing to promote firms' performance. This finding provides important implications for investors and policymakers. Our conclusion still unchanged before and after the global oil prices drop and after applying alternative methodology.

JEL classification numbers: G3, G32, G34
Keywords: Capital Structure; Corporate Governance; Board Size; Oil-Based Economy.

1 Introduction

Since the classical work of Modigliani and Miller (1958,1963), Investigations into the optimal financial structure mix have been a cornerstone of academic research in corporate finance. Following this, theories have been developed to explain corporate capital structure decisions (e.g., the trade-off theory, the pecking order theory, and the agency theory).

Research on corporate capital structure has been performed in international markets outside the United States. For example, prior studies cover the capital structure of firms operating in the G7 economies (e.g., Rajan and Zingles,1995) and some research focuses on testing the capital structure determinants in

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developing markets since they have heterogeneous institutional structures (see Booth et al., 2001). Following these studies, capital structure research expands to emerging markets, such as MINA[2] region and GCC[3] economies (e.g., ElBannan, 2017; Belkhir et al., 2016).

Corporate governance entails the rules and practices that facilitate corporations' management and control. Corporate governance practices aim to balance the firms' stakeholders mainly managers and shareholders. The corporate governance principles largely build trust among firms' investors and managers. Thus, good corporate governance practices substantially improve firms' major strategic decisions, such as the choice of external financing (Berger et al., 1997). Therefore, corporate governance characteristics like board size may explain some of the variations on firms' capital structure decisions (Butt and Hasan, 2009).

Prior empirical evidence reports that board size is one of the factors representing firms' corporate governance quality (e.g., Jaradat, 2015; Butt and Hasan,2009; Wen,2002). More specifically, a large board size represents a strong governance practice. Efficient management of the firms requires a board of directors who plan and make optimal financing decisions that increase the firms' value and hence maximize shareholders' wealth (Shleifer and Vishny, 1997).

Agency problem can exist due to the conflicted relationship between firms' managers and shareholders (Jensen and Meckling, 1976). In this vein, corporate governance research considers the mentioned conflict of interest importantly. Nevertheless, although agency theory is one of the influential theories that explain capital structure decisions, most empirical works concentrate on studying the linkage between corporate governance practice and firms' value (e.g., Claessens and Fan, 2002).

In addition to the trade-off theory and the pecking order theory, agency theory is an influential theory that predicts agency cost as one of the key elements related to corporate capital structure decisions. However, there are little empirical studies that investigate the importance of corporate governance on firms' leverage decisions. More importantly, most prior empirical research related to corporate governance and leverage choice does not reached conclusive outcomes on the nature of the relationship among corporate governance and firms' capital structure decisions (e.g. Butt and Hasan, 2009; Abor, 2007; Wen, 2002; Berger et al., 1997; Friend and Lang, 1988).

Saudi Arabia is a substantial economy worldwide, being one of the G20 economies as well as the first exporter and producer of crude oil around the globe. Further, the Saudi capital market is the largest financial market (known as the Tadawul) in the MENA region and ranked among the 26 largest capital markets in the globe based on market capitalization (Alkhareif, 2016). It is rapidly growing and expected to double in size to equal approximately US$ 1 trillion by 2022 (Khan &

[2] Middle East and North Africa.

[3] Gulf Cooperation Countries. Countries belong to the GCC including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirate.

Derhally,2017). Recently, the country has made several ambitious reforms in the capital markets including the liberalization of the capital market. Following this, in 2018, the Saudi capital market has been upgraded to emerging market status by index provider FTSE. Therefore, it is extremely beneficial for local and foreign investors and policymakers to conduct further empirical studies.

Although the linkage between board size and capital structure choice have been examined in developed and developing markets, there are few in-depth empirical work in the oil-based economy, such as Saudi Arabi. Thus, the main purpose of this study is to re-examine the impact of one of the main corporate governance-related factors (i.e. board size) on firms' capital structure decision in the context of the oil exporting economy (i.e. Saudi Arabia). The focus on such context enables the present study to provide further empirical investigation to understand how corporate governance quality is relevant to corporate financing decision. In such a country, as Twairesh (2014) and Eldomiaty (2007) argued, the financial market suffers from low efficiency and higher information asymmetry in comparison to developed markets. These may cause the financial decisions for Saudi listed firms to be less efficient. Therefore, it is important to investigate the role of corporate board, which is one of key factors related to corporate governance quality, on shaping corporate capital structure in Saudi Arabia.

Since prior studies report mixed evidence on the linkage between board size and debt choice, the present study provides further understanding on the effect of board size and firms' capital structure choice for firms operating in an oil-based economy. Therefore, the current study will contribute to the theoretical perspective by providing an insight into the nexus between firms' board size and debt choice. Likewise, it provides empirical support for the validity of financial theories in explaining the linkage between firms' size and capital structure decisions. Finally, since little work has been performed on studying capital structure determinants for listed non-financial firms' in Saudi Arabia, the current study will show how finance theory can explain firm-specific capital structure determinants for Saudi listed corporations.

We find that board size displays a significant effect of firms' capital structure choice listed in the Saudi capital market. More narrowing, after controlling for industry and applying both market and book-based measures for capital structure, board size is negatively related to firms' debt financing. Such results adhere to the view that larger boards enforce the usage of lower debt to improve corporates' performance. Further, our findings show that classical capital structure theories (i.e., the trade-off, the pecking order, and the agency theory) can predict firms' capital structure decisions for listed in Saudi's capital market.

This remainder of this study is organized as follows: section 2 presents the relevant literature and the development of the hypothesis; section 3 shows the data and methods applied; Section 4 includes our empirical results; and finally, we conclude the paper.

2 Literature Review

The board of directors is regarded as the highest level in the firm that is responsible for controlling and managing the firms' operations. The board of directors also plays a substantial role in making the firm's strategic decisions including the composition of the capital structure. A classical study performed by Pfeffer and Salancick (1978) explored a significant association between capital structure choice (i.e., debt and equity) and board size. However, subsequent studies report mixed evidence regarding the direction of the mentioned linkage between firms' board size and the leverage ratio (e.g., Berger et al., 1997; Wen, 2002; Abor and Biekpe, 2007; Butt and Hasan, 2009).

Using a sample represents US firms, Berger et al. (1997) show that companies with a larger number of board of directors generally have lower debt in their capital structure. Berger et al. (1997) point out that larger board size makes more pressure on the firm's managers to use lower levels of debt financing to improve firms' financial performance due to the lower interest payment. Another study that examines the relationship between board size and capital structure choice is performed by Abor and Biekpe (2007). They investigate a sample of Ghanian Medium and Small firms via applying multiple regression analysis and find results that are in line with Berger et al. (1997). More specifically, Abor and Biekpe (2007) find a negative relationship between board size and leverage ratios.

Furthermore, Butt and Hasan (2009) investigate the impact of board size and leverage choice for 58 listed non-financial companies in Pakistan during the period from 2002 to 2005. They also find a significant negative link between board size and debt choice. Further studies also confirm the negative association between board size and capital structure choice (e.g., Hamid et al., 2011; Wiwattanakantang, 1999; Brennan, 2006).

In contrast to the mentioned above studies which report a negative linkage between board size and leverage decisions, Wen (2002) finds that board size is positively related to leverage choice for listed non-financial firms in China. Wen (2002) argues that large board size forces higher usage of debt financing to increase firm value especially when firms are entrenched because of higher monitoring. Further, firms' larger board size may encounter some difficulties in making unanimous decisions, and this may impact the quality of the firm's corporate governance and results in higher leverage usage. Also, using a sample for 129 firms in Jordon during the years 2009-2013, Jardat (2015) find that board size is positively related to firms' leverage choice. Jensen (1986) reports that firms with high levels of debt in their capital structure rather have more board members. Anderson et al. (2004) find that lenders believe that firms with the large board are monitored more efficiently and therefore the cost of debt financing should be less for such firms.

After reviewing relevant studies, it has been found that board size is significantly related to firms' capital structure choice. The direction of the significant linkage between board size and leverage choice show conflicting evidence. However, the

mentioned relationship has not been explored for corporates that are functioning in an oil-based economy (e.g., Saudi Arabia).

3 Data sample and empirical method

3.1 Data

The study applies data over the period 2009-2016 for a sample includes listed non-financial firms in the Saudi Stock Market (TASI). The reason we start the sample period from 2009 is that of the availability of data related to the number of the firms' board of directors. All capital structure and firms' characteristics related data are obtained from Osiris database, while the data related to firms' board size are manually collected from Tadawul website. All financial firms are excluded from our sample (i.e., banks and insurance companies) since these firms' capital structure is influenced by legal requirements and regulations and hence not driven by the market (McMillan and Camara, 2012). All leverage related measures with missing values and negative total assets values are dropped.

In line with prior capital structure studies, all leverage measures (i.e., market leverage and book leverage) and firms' characteristics variable are winsorized at the 1st and 99th percentiles (e.g., Park et al., 2013; Lemmon et al., 2008). After performing the mentioned required data management, the final sample contains 121 companies.

3.2 Empirical Method

3.2.1 Defining Capital Structure

Most prior relevant studies, such as Butt and Hasan (2009) and Wen (2002) apply only book debt ratio when studying the assassinations among board size and debt financing. Flannery and Rangan (2006) reports that finance theory tends to downplay the importance of book leverage, and hence most capital structure studies apply market debt ratio as a measure for firms' capital structure (e.g., Fama and French, 2002; Graham et al., 2015; Leary and Roberts, 2005 and Welch, 2004). Nevertheless, survey evidence performed by Graham and Harvey (2001) finds that firms' managers set their capital structure mix based on book number. Therefore, the superiority of the market or book debt ratio to better measure firms' debt ratios is still an unsolved question (Park et al., 2013).

We apply both market and book leverage measures to ensure the consistency of our conclusions regarding the linkage between firms' board size and capital structure decision. The following equations present market and book debt ratios calculation:

$$\text{Market Leverage} = \text{M-Leverage} = \frac{SD_{it} + LD_{it}}{SD_{it} + LD_{it} + S_{it}\,P_{it}} \quad (1)$$

Where $SD_{it} + LD_{it}$ is the firms' short-term debt plus long-term debt at time t and S_{it} P_{it} is the product of firms' outstanding common shares and the price per share at time t.

$$\text{Book Leverage} = \frac{SD_{it} + LD_{it}}{TA_{it}} \quad (2)$$

where $SD_{it} + LD_{it}$ is the sum of firms' short-term debt plus long-term debt at time t and TA_{it} is total assets at time t.

3.2.2 Variable Selection and Regression Analysis

The current study controls for firms' characteristics variables that are importantly related capital structure decisions including profitability, size, growth opportunities, the tangibility of assets, earnings volatility and non-debt tax shield.[4] According to Park et al., (2013), prior research on corporate capital structure generally consider firms' size, growth, profitability and assets tangibility as main capital structure determinants (Lemmon et al., 2008; Ragan and Zingales, 1995). [5]

Board Size: The natural logarithm of the number of the firm's board of directors. As mentioned, prior studies report a mixed relationship between board size and debt choice.

Profitability: Earnings before interest, tax and depreciation divided by total assets (Frank & Goyal, 2009)[6]. The pecking order theory, presented by Myers (1984) and Myers and Majluf (1984), predicts a negative relation between firms' debt and profitability since higher retained earnings decrease the firms' usage for external debt financing. However, the trade-off theory predicts a positive relation between firms' profitability and capital structure because lower expected bankruptcy is expected for high-profitability corporates.

Market to book ratios (MB): The firm market value of equity divided by total book value of assets. This variable is used to proxy firms' growth opportunities. Myers (1977) predicted that firms with higher potential investment would have lower leverage ratios in that they face higher agency cost (i.e., the underinvestment problem). Further, the trade-off theory also predicts a negative linkage between firms' growth opportunities and their leverage since growth firms are expected to lose more of their value when they become financially distressed (Frank & Goyal, 2009).

Size: The natural logarithm of a firm's total assets. Frank and Goyal (2009) point out that the trade-off theory explains that larger firms have more leverage because they have lower cash volatility, have more reputation in the capital markets and therefore lower expected bankruptcy cost. In contrast, the pecking order theory predicts that larger firms should have lower debt because they have fewer informational asymmetry problem.

Tangibility (TANG): The ratio of a firm's gross property, plant, and equipment divided by total assets. Firms that own more tangible assets can use such assets as collateral and hence are more likely to have a lower expected cost of bankruptcy.

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[4] We also control for research and development investment and still have the same results but due to large missing observations related to this variable, we exclude this variable from our regression.

[5] The calculations for all applied variables are shown in table 1.

[6] We apply alternative measures for firms' profitability, including return on assets (ROA), return on equity (ROE) and the ratio of EBIT to total assets and still have the same results.

Thus, a positive relationship is expected between assets tangibility and debt ratio. Further, the agency cost theory predicts that assets tangibility is positively related to firms' leverage since tangible assets make asset substitution difficult. In contrast, the pecking order theory predicts a negative relationship between tangibility and leverage since tangible assets are associated with less information asymmetry (Harris & Raviv, 1991).

Earnings volatility: The standard deviation of earnings before interest, tax, and depreciation (i.e., EBITD) to total assets over the most recent three years[7] (Frank & Goyal, 2009). The trade-off theory predicts a negative association between firms' earnings volatility and leverage ratios due to the higher probability of expected bankruptcy resulting from the volatility of the firm's earnings.

Nondebt Tax Shield (Dep): The ratio of depreciation expense to total assets. Following DeAngelo and Masulis (1980), high depreciation expense decreases the firm's leverage since deprecation can substitute debt. However, Harris and Raviv (1991) reported that nondebt tax shield is positively correlated with debt.

Table 1: Definitions and description of applied Variables.

This table describes all applied variables in our regression analysis. Market leverage and book leverage are the dependent variables. Board size is the main independent variable. The data required for all variables are obtained from Osiris.

Variable	Definition
M-leverage	Short-term debt + long-term debt/short-term debt + long-term debt + market capitalization
B-leverage	Short-term debt + long-term debt/total assets
Board Size	Log of board members number.
Profitability	Operating income before depreciation/total assets
MB	Market value of equity/total assets
Size	Natural log of total assets
Tang	Net property plant and equipment/total assets
Earnings V	The standard deviation of EBIT/total assets over the most recent three years
Dep	Depreciation expenses/total assets

3.2.3 Methodology

To test the relationship between firms' board size and capital structure decision, we apply pooled OLS regression analysis in a panel data framework[8]. Applying panel data enables the study to investigate cross-sectional and time series data which provide more statistical power and cross-sectional variations. The following

[7] Following Park et al. (2013) we also use the standard deviation of EBITDA to total assets over the past four years and obtain the same results.

[8] Fixed effect estimator is not applicable in our study due the sample size. However, we apply random effect estimator and find similar outcomes.

equations present our model based on market and book leverage measures of firms' capital structure:

$$MLeverage = \beta_0 + \beta_1 Board\ Size + \beta_2 Profitablity + \beta_3 MB + \beta_4 Size + \beta_5 Tang + \beta_6 EarningVol + \beta_7 Dep + \beta_8 Industry + \beta_9 time + \varepsilon_{it} \quad (3)$$

$$B\ Leverage = \beta_0 + \beta_1 Board\ Size + \beta_2 Profitablity + \beta_3 MB + \beta_4 Size + \beta_5 Tang + \beta_6 EarningVol + \beta_7 Dep + \beta_8 Industry + \beta_9 time + \varepsilon_{it} \quad (4)$$

Where:
M-leverage: is the firm's market leverage, which is a market-based measure for capital structure.
B-Leverage: is the firm's book leverage, which another measure for firms' capital structure.
Board Size: is the number of board of directors.
Profitability: is the firm's profitability.
MB: is growth opportunities.
Size: is the natural logarithm of total assets.
Tang: is asset tangibility.
Earnings Vol: is the firm's volatility of earnings.
Dep: is the nondebt tax shield.
Industry: is the industry dummy variable.
Time: is the time dummy variable.
$\varepsilon_{it:}$ the error terms.

4 Empirical Results

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics for the applied variables in this study. The mean values for market leverage and book leverage for Saudi listed firms are .21 and .24. These outcomes explain that debt financing is used to finance almost 24% of Saudi listed firms' assets. Unlike US firms, market leverage is slightly lower than book leverage due to the less developed debt market in Saudi Arabia.

The descriptive statistics show that the average board size of the Saudi listed non-financial firms in our sample is 8.3 with the largest board of 11, while the minimum board size is 5. The Saudi firms' average board size is lower than the average board size for Pakistani firms, which is 8.5, and also lower than the board size for Chinese firms, which is 9.8, (Butt et al., 2009; Wen et al., 2002).

The mean and standard deviation values for profitability are .109 and .095. However, the median value of profitability reveals that Saudi listed firms have low ratios of profitability. In addition, Growth opportunities mean and standard deviation values are 1.39 and 1.15. Further, the firms' size mean and standard deviation are 6.58 and 1.56 while the mean and standard deviation values for assets tangibility (TANG) are .477 and .230.

Table 2: Descriptive Statistics

This table presents the summary statistics of the applied variables in our sample for the period 2009-2016. The detailed definition of each variable is reported in Table 1.

	N	Mean	Median	Std. dev	Min	Max
M-Leverage	774	.212	.149	.196	0	.676
B-Leverage	774	.242	.226	.181	0	.662
Board Size (No. of Directors)	774	8.29	9	1.37	5	11
Profitability	774	.109	.095	.086	-.068	.379
Growth	774	1.39	1.06	1.15	.231	8.48
Size	774	6.58	6.40	1.56	3.13	10.8
TANG	774	.477	.477	.230	0	.891
Earnings Vol	757	.028	.023	.022	.002	.177
Dep	774	.033	.031	.022	0	.138

4.2 Regression Analysis Results

The regression results are summarized in table 3. The main coefficient of interest in the regression is Board Size. The sign of this variable is negative and statistically significant at the 1% significance level. This significant negative effect of board size on capital structure decision is consistent in the two applied capital structure measures (i.e. market leverage and book leverage ratios) and remain unchanged in all regressions applied in this study (with and without industry fixed effect). Therefore, the results confirm that board size is an essential element of capital structure choice for Saudi non-financial firms. More precisely, the larger the number of directors the less debt financing is used in the composition of firms' capital structure. The negative effect of board size on firm leverage ratios found in this study is consistent with prior studies which argue that larger boards enforce lower external debt financing to improve corporates' performance (e.g., Butt and Hasan, 2009; Abor and Biekpe, 2007; Berger et al., 1997). However, the negative linkage between firms' board size and debt usage is in inconsistent with a prior study performed by Wen (2002) who find a positive linkage between board size and debt ratios in China.

On examining the control variables, profitability is negatively linked to firms' debt financing decision. This negative relationship is in line with the pecking order theory that firms' use internal financing as the main financing choice and consistent with the majority of prior empirical studies (e.g., Frank and Goyal; Lemmon et al., 2008; Titman and Wessels,1988).

Firms' growth opportunities (MB) show a statistically significant and negative effect on firms' market and book leverage, which is consistent with Myers's (1977) underinvestment hypothesis and in line with prior studies performed by Park et al. (2013) and Frank and Goyal (2009).

Consistent with the trade-off theory, firms' size is positively and significantly related to Saudi firms' debt choice since larger firms have more reputation in the capital market and have lower expected bankruptcy cost and therefore their capital

structure should include more debt (Frank and Goyal, 2009). Further, our results indicate that assets tangibly (Tang) is positively related to firms' capital structure decisions. This positive linkage between assets tangibility and debt choice is in line with the view that firms with more tangible assets can use more debt since higher tangibility of assets means more debt collateral. The results shown in Table 3 reveal that earnings volatility and non-debt tax shield (Dep) have no significant impact on firms' debt. This insignificant relationship among firms' earnings volatility and debt is consistent with Park et al., 2013. Finally, the insignificant outcomes between non-debt tax shield and leverage are in contrast with DeAngelo and Masulis (1980) who report that depreciation should be a substitute for firms' debt.

Table 3

This table presents regression results showing the effect of board size on Saudi firms' capital structure decisions over the period 2009-2016. Column 1 (2) shows the pooled OLS regression results showing the effect of board size on market (book) leverage ratios without industry fixed effect. Column 3 (4) presents the results of the effect of board size on market (book) leverage including industry fixed effect. The main independent variable is Board Size. The control variables are (profitability, MB, Size, Tang, Earnings Volatility and Dep). The definitions of all applied variables are reported in Table 1. The numbers in the parentheses are the robust standard error[9]. *.**. and,*** present the two-tailed significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
VARIABLES	M-Leverage	B-Leverage	M-Leverage	B-Leverage
Board Size	**-0.196*** **	**-0.171*** **	**-0.127*** **	**-0.103*** **
	(0.03)	**(0.03)**	**(0.03)**	**(0.03)**
Profitability	-0.526***	-0.342***	-0.596***	-0.540***
	(0.07)	(0.08)	(0.07)	(0.07)
MB	-0.063***	-0.043***	-0.043***	-0.022***
	(0.01)	(0.01)	(0.01)	(0.01)
Size	0.056***	0.045***	0.057***	0.059***
	(0.00)	(0.00)	(0.00)	(0.01)
Tang	0.073***	0.147***	0.131***	0.212***
	(0.03)	(0.03)	(0.03)	(0.03)
Earning Volatility	0.109	0.063	-0.112	0.286
	(0.22)	(0.24)	(0.23)	(0.22)
Dep	-0.097	-0.100	0.020	0.113
	(0.22)	(0.25)	(0.24)	(0.26)
Constant	0.302***	0.292***	0.163**	-0.007
	(0.06)	(0.07)	(0.07)	(0.07)
Time Dummies	Yes	Yes	Yes	Yes
Industry Dummies	No	No	Yes	Yes
Observations	756	756	756	756
R-squared	0.55	0.40	0.65	0.52

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

[9] We also apply cluster standard errors by the firm and find similar results.

5 Robustness Checks

To ensure the robustness of our conclusion, we attempt two further specifications. First, since oil revenues largely drive the Saudi economy, we split the sample period into equal halves to ensure that our conclusions are still robust before and after the recent decline of the oil prices in 2014. To show this, tables 4 and 5 confirm that the results remain unchanged in the two subperiods.
Second, we apply an alternative econometric method (i.e. Random Effects) since this method can account for firms' unobservable factors that might be related to corporate capital structure decision. The results reported in Table 6 show that board size is negatively related to firms' debt financing after applying the mentioned alternative method.

5.1.1 Alternative Time Horizon: 2009-2012

Table 4

This table presents regression results showing the effect of board size on Saudi firms' capital structure decisions over the period 2009-2012. Column 1 (2) shows the pooled OLS regression results showing the effect of board size on the market (book) leverage ratios without industry fixed effect. Column 3 (4) presents the results of the effect of board size on market (book) leverage including industry fixed effect. The main independent variable is Board Size. The control variables are (profitability, MB, Size, Tang, Earnings Volatility and Dep). The definitions of all applied variables are reported in Table 1. The numbers in the parentheses are the robust standard error. *.**. and *** present the two-tailed significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)
VARIABLES	M-Leverage	B-Leverage	M-Leverage	B-Leverage
Board size	**-0.189*** **	**-0.206*** **	**-0.091** **	**-0.070***
	(0.04)	(0.05)	(0.04)	(0.04)
Profitability	-0.505***	-0.283**	-0.528***	-0.349***
	(0.10)	(0.12)	(0.09)	(0.09)
MB	-0.058***	-0.048***	-0.037***	-0.022***
	(0.01)	(0.01)	(0.01)	(0.01)
Size	0.057***	0.048***	0.058***	0.052***
	(0.01)	(0.01)	(0.01)	(0.01)
Tang	0.105***	0.177***	0.176***	0.296***
	(0.04)	(0.04)	(0.04)	(0.05)
Earnings Volatility	0.062	0.085	-0.372	-0.313
	(0.31)	(0.35)	(0.29)	(0.29)
Dep	0.105	0.205	0.328	0.707**
	(0.32)	(0.38)	(0.34)	(0.34)
Constant	0.259***	0.324***	0.020	-0.032
	(0.09)	(0.11)	(0.08)	(0.09)
Time Dummies	Yes	Yes	Yes	Yes
Industry Dummies	No	No	Yes	Yes
Observations	349	349	349	349
R-squared	0.54	0.41	0.68	0.65

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

5.1.2Alternative Time Horizon: 2013-2016

Table 5

This table presents regression results showing the effect of board size on Saudi firms' capital structure decisions over the period 2013-2016. Column 1 (2) shows the pooled OLS regression results showing the effect of board size on market (book) leverage ratios without industry fixed effect. Column 3 (4) presents the results of the effect of board size on market (book) leverage including industry fixed effect. The main independent variable is Board Size. The control variables are (profitability, MB, Size, Tang, Earnings Volatility and Dep). The definitions of all applied variables are reported in Table 1. The numbers in the parentheses are the robust standard error. *.**. and *** present the two-tailed significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)
VARIABLES	M-Leverage	B-Leverage	M-Leverage	B-Leverage
Board Size	-0.204***	-0.145***	-0.160***	-0.095**
	(0.04)	(0.04)	(0.04)	(0.04)
Profitability	-0.540***	-0.393***	-0.583***	-0.454***
	(0.11)	(0.10)	(0.11)	(0.09)
MB	-0.066***	-0.040***	-0.050***	-0.025***
	(0.01)	(0.01)	(0.01)	(0.01)
size	0.056***	0.042***	0.055***	0.058***
	(0.01)	(0.01)	(0.01)	(0.01)
Tang	0.045	0.121***	0.105**	0.216***
	(0.04)	(0.04)	(0.04)	(0.04)
Earnings volatility	0.157	0.007	0.104	0.249
	(0.31)	(0.34)	(0.33)	(0.28)
Dep	-0.325	-0.334	-0.369	0.101
	(0.31)	(0.34)	(0.34)	(0.35)
Constant	0.381***	0.316***	0.329***	0.158
	(0.09)	(0.09)	(0.10)	(0.10)
Time Dummy	Yes	Yes	Yes	Yes
Industry Dummy	No	No	Yes	Yes
Observations	407	407	407	407
R-squared	0.55	0.38	0.64	0.57

Robust standard errors in parentheses

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

5.2 Alternative Econometrics Method (Random Effect)

Table 6

This table presents regression results showing the effect of board size on Saudi firms' capital structure decisions over the period 2009-2016 after applying random effect panel data method. Column 1 (2) shows regression results showing the effect of board size on market (book) leverage ratios without industry fixed effect. Column 3 (4) presents the results of the effect of board size on market (book) leverage including industry fixed effect. The main independent variable is Board Size. The control variables are (profitability, MB, Size, Tang, Earnings Volatility and Dep). The definitions of all applied variables are reported in Table 1. The numbers in the parentheses are the robust standard error. *.**. and *** present the two-tailed significance at the 10%, 5% and 1% levels, respectively.

VARIABLES	(1) M-Leverage	(2) B-Leverage	(3) M-Leverage	(4) B-Leverage
Board Size	**-0.254*** **	**-0.322*** **	**-0.195*** **	**-0.226*** **
	(0.07)	**(0.08)**	**(0.06)**	**(0.07)**
Profitability	-0.668***	-0.599***	-0.666***	-0.584***
	(0.09)	(0.10)	(0.09)	(0.10)
MB	-0.033***	-0.010*	-0.030***	-0.008
	(0.01)	(0.01)	(0.01)	(0.01)
Size	0.080***	0.098***	0.082***	0.112***
	(0.01)	(0.01)	(0.01)	(0.01)
Tang	0.092**	0.213***	0.111**	0.245***
	(0.04)	(0.05)	(0.05)	(0.05)
Earnings volatility	0.077	0.039	0.016	-0.110
	(0.18)	(0.26)	(0.19)	(0.18)
Dep	-0.077	-0.548*	-0.078	-0.488*
	(0.25)	(0.30)	(0.25)	(0.28)
Constant	0.271**	0.230	0.230*	0.108
	(0.13)	(0.14)	(0.14)	(0.16)
Time Dummy	Yes	Yes	Yes	Yes
Industry Dummy	No	No	Yes	Yes
Observations	756	756	756	756
Number of Firms	121	121	121	121

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

6 Conclusion

Empirical evidence on the linkage between board size and debt choice is inconclusive. This study empirically investigates the relationship between corporate governance and capital structure by examining the nexus between board size and debt choice for non-financial firms in oil exporting economy during the period 2009-2016 via applying multivariate regression analysis. The results reveal that board size is significantly and negatively related to debt ratios. This relationship is explained by the fact that a larger board size prefers lower debt levels to enhance firms' performance. Therefore, it can be concluded that corporate

governance practice is important factors that can explain some of the variations in the firms' capital structure.

Firms' specific determinants of capital structure including profitability, growth opportunities, size, and tangibility have a significant effect on firms' capital structure. Consistent with the pecking order theory, profitability is negatively related to Saudi firms' market and book debt ratios. Consistent with the trade-off theory, both firms' size and tangibility of assets are positively related to firms' capital structure decisions. In sum, the pecking order and the trade-off theories are successful in predicting the relationship between firm-specific factors and leverage choice in the context of oil-rich economy.

Several recommendations can be derived from the outcomes of this study, which can provide investors and policymakers with important implications. While corporates with a larger number of directors use less external debt financing to increase firms' financial performance and lowering the risk of bankruptcy, policymakers should consider in detail the substantial role of corporate governance practice for Saudi firms. Since the Saudi Capital market becomes accessible for foreign investors, policymakers should notice that the enhancement of strong corporate governance mechanism attracts more investors and hence supply more fund into the economy which leads to economic growth.

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Appendix

Correlation Matrix and Variance Inflation Factor (VIF)

Tables A.1 and A.2 present the correlation matrices and the variance inflation factors (VIFs). Overall, the mentioned tables confirm the lack of high correlation among the factors applied in our regression analyses performed in this study. Further, the VIFs confirm that multicollinearity is not a major issue.

Table A.1: Market Leverage is the Dependent Variable

	M-Leverage	Board Size	Duality	Profit	MB	Size	Tang	Earnings Vol	Dep	
M-Leverage	1									VIF
Board Size	0.07	1								1.32
Profit	-0.36	0.17	0.19	1						1.37
MB	-0.59	-0.18	0.15	0.40	1					1.57
Size	0.53	0.45	-0.08	0.03	-0.40	1				1.62
Tang	0.14	0.09	-0.05	0.05	0.01	0.22	1			1.24
Earnings Vol	-0.13	-0.11	-0.01	-0.001	0.16	-0.20	-0.02	1		1.07
Dep	-0.03	-0.04	-0.03	0.08	0.06	-0.06	0.34	0.10	1	1.19

Table A.2: Book Leverage is the Dependent Variable

	B-Leverage	Board Size	Duality	Profit	MB	Size	Tang	Earning.V	Dep	
B-Leverage	1									VIF
Board Size	0.06	1								1.32
Profit	-0.26	0.17	0.19	1						1.37
MB	-0.45	-0.18	0.15	0.40	1					1.57
Size	0.47	0.45	-0.08	0.03	-0.40	1				1.62
Tang	0.24	0.09	-0.05	0.05	0.01	0.22	1			1.24
Earning. V	-0.11	-0.11	-0.01	-0.001	0.16	-0.20	-0.02	1		1.07
Dep	0.01	-0.04	-0.03	0.08	0.06	-0.06	0.34	0.10	1	1.06