

Impact of CEO Duality, Board Independence, Board Size and Financial Performance on Capital Structure using Corporate Tax Aggressiveness as a Moderator

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Abstract

This research aims to examine how the Board of Director's characteristics (Board Duality, Board Independence and Board Size) and financial performance of the firm affect its capital structure using tax aggressiveness as a moderating variable. To the firm and the shareholders, taxes normally considered as an additional cost as it reduces the available cash flow, that's why firm's tends to apply different tax aggressiveness techniques in strategic tax planning to decrease tax liability and legitimate saving of taxes. The sample used is 58 Egyptian listed companies during the period 2015-2019. This research runs five multiple regression models to examine the relationships between research variables. The statistical results indicate that CEOD and board independence have a positive significant impact on company' capital structure, while board size have a significant negative relationship with capital structure. Moreover, results shows that ROA, current ratio and asset turn over have a negative significant impact on company' capital structure, while ROE have a significant positive relationship with capital structure. In addition, findings show that CEOD and firm size have a positive significant impact on company' tax aggressiveness, while board independence has a significant negative relationship with tax aggressiveness.

Keywords: CEO Duality – Board Independence – Board Size – Financial Performance - Capital Structure – Tax Aggressiveness – Egypt

Introduction

Debt is a tool that firms usually use to improve its capital structure in order to increase its overall performance and finance its activities (Detthamrong et al., 2017; Rembeth, 2015). Therefore, the higher debt level would consequently have a negative impact on the firm's financial performance. That because it reduced profits and thus in turn affected the capital structure of the firm, which consequently will affect the firm tax policies. To overcome this shortage and eliminate the decline in the firm performance, many non-financial and banking innovate by increasing their debt to improve their performance through the purchasing a new-fixed assets or expanding their current business. However, without good governance tools, adding debt will increase the probability of a crisis if not regulated in a proper way (Yusuf, 2018).

Various previous scholars argued that taxes are substantial for the investment, and the growth of the firm at the long run (Minnick et.al. 2010). Hence, in order to reduce the level of taxes, top executive directors choose to use many policies. Among these policies, tax aggressiveness. Tax aggressiveness considered as a good tool for reducing tax liability and enhancing the stakeholder's wealth (Lanis et.al. 2011; Hanlon et.al. 2010). The tax aggressiveness become more prominent, and concentrates on the focus of attention for a variety of parties such as top managers, shareholders and government regulators (Goh et al., 2016).

According to the echelon theory, the managerial traits of top executive managers could influence the firm strategic and performance (Hambrick and Mason, 1984). The CEO play a leading role in implementing strategic firm decisions with related to tax policies and determine the firm's tax aggressiveness level (Dyrenge et al., 2010). CEOs considered as the chief who is responsible for financial performance, capital structure and tax statements. Previous studies have examined the effect of CEO characteristics on the tax aggressiveness level beside the capital structure choice and consequently on the shareholder's wealth beside stock crash risk (Neifar et.al. 2019; Chee et al., 2017; Chen et al., 2019; Huang, 2019; James, 2019).

Furthermore, according to (Chancharat et al., 2012), the CEO characteristics have an essential role to mitigate firm risky failure. As firms with larger board size directors have more leverage to reduce agency costs which in turn enhance the directors' network and external financing access. Therefore, there is a positive relationship between the number of directors and firm leverage (Bokpin, 2009). Meanwhile, (Berger et al., 1997) argued that the increase in the number of top

executives number have a negative impact on the capital structure. This previous findings was supported by (Anderson et al., 2004), who indicated that there is a significant negative association between the number of directors and the firm capital structure.

Research Aim and Questions

The main aim of this research is to examine the impact of the board characteristics (CEO Duality, board independence and board size) and firm's financial performance on capital structure using corporate tax aggressiveness as a moderator variable. The research addresses the following three main questions:

1. What is the impact of board characteristics (CEO Duality, board independence and board size) on capital structure using corporate tax aggressiveness as a moderating variable?
2. What is the impact of financial Performance (profitability and liquidity) on capital structure using corporate tax aggressiveness as a moderating variable?
3. What is the relationship between capital structure and corporate tax aggressiveness?

Literature Review and Hypotheses Development

Board Characteristics and Capital Structure

CEO Duality and Capital Structure

CEO duality defined to the situation when the CEO occupies the position of chairman of the board of directors, which in result may lead to a concentration in the managerial power (Surroca et.al, 2008). This concentration of power in one executive person may increases the risk of taking self-interest such as develop strategies that favor his or her personal interests to the detriment of the firm they lead. Hence, this may result in raising the opportunistic actions and consequently deplete the executive board efficiency, and in turn would have a negative impact on firm's overall performance.

Regarding to the agency theory, firms should divide the roles of CEO and Chairperson in order to avoid this power concentration in a single executive person

(Goyal and Park, 2002). Considering this theory, (Hashim et.al. 2009) argued that the separation of the roles of both chairman and CEO is preferable in order to provide a balanced system of controls regarding the performance of executive directors. In addition, the separation of the functions of firm control reduces agency costs and enhance firm performance (Christensen et al., 2010; Singh et al. (2018) conclude that CEO duality is negatively impact on firm's financial performance.

Above that, previous scholars state that CEO duality facilitate the rising of low-quality financial information, manipulating of profits, generating opportunistic actions, and undermining the efficiency of the executive board (Gupta et al., 2018), moreover, (Jensen, 1993) stated that CEO duality creates opportunities for the one's self-interests justifying that CEO taking major of his decisions in order to maximize their wealth instead of the firm's stakeholders. Therefore, CEO duality is an indication of poor governance in both agency theory and managerial power.

Meanwhile, other theorists argued that CEO duality has a significant positive impact on firm performance and capital structure. Such as, Stewardship theory argued that concentrating power by duality could protect their interests in a firm in contrast to agency theory's assumptions. Stewardship theory also indicated intrinsic value motivates CEO to enhance the firm value (Donaldson and Davis, 1991). In addition, some scholars reported that CEO duality could effectively increase firm debt, and there is a positive and significant association between CEO duality and leverage (Abor, 2007; Bokpin, 2007; Arko, 2009)

Board Independence and Capital Structure

Independent directors are professionals who are not have a relationship with the firm management, so they do not interfere in firm's decision-making process with their personal opinions (Agrawal et.al., 1996). Moreover, independent directors are more likely in guaranteeing the integrity ethically and appropriate behavior of firms in order to fulfillment the established goals. Therefore, it is more likely that independent directors are more objective when assessing the firms' management than executive ones (Sonnenfeld, 1981; Jizi et al. 2014; Fernández et al. 2016).

Concerning this regard, agency theory indicated that boards with a high proportion of independent directors are more effective in governing and controlling firm's management, consequently, this lead to high firm performance especially, the financial one. In the same line, (Volonte, 2015) indicated that independent directors reduce agency conflicts as they consider as an effective oversight controlling

mechanism for the executive board and thus protect the interests of shareholders from the firm's self-interest.

Furthermore, according to resource dependence theory, independent directors have a significant positive impact on the value creation of firm activities and, consequently, on its performance through affecting its strategic decision-making (Gabrielsson 2007; Masulis et al. 2012). Hence, based on both agency theory and resource dependence theory, the higher presence of independent or external directors on executive board may lead to a greater increase in the firm internal control, beside a greater information disclosure, as well as a more effective protection for the shareholders and high financial performance.

As same important (Abdulrahman, 2021) argued in his study that independent directors play a vital role as they enhance the relationship between the capital structure and profitability. However, when introducing board independence as moderator variable, the result shows negative and significant impact which mean that the higher the debt to equity ratio, the lower the profitability. Therefore, they recommended that regulators one should improve their monitoring effort, by increasing the mixture between the dependent and independent executives' directors in the board in order to help attaining the firm's goals.

Board size and Capital Structure

The board of directors considered as the main structural elements of corporate governance in order to oversee how the main firm's operations goes appropriately in the firm. This element plays an important role in reducing firm's failures and enhances the financial performance and strategic decisions (Chancharat et al., 2012). Some scholars argued that larger boards could influence the efficiency of firm's monitoring and controlling. Moreover, they found that firms with larger number of board sizes have higher level of leverage, than their peers with smaller board. This result has an indication that more top executive numbers has the ability to give them better access of external financing (Yusuf et.al. 2018).

Furthermore, board size is an important element in the board structure because it can be used as a proxy for the efficiency of the executive board of directors (Noor et.al. 2013; Jia, 2013). From one hand, it may thought that larger boards may be more inefficient because the increase of agreements that are more difficult to reach, beside owing to multiple interests (Brown et al. 2006). Meanwhile, from other hand, it can also consider that the increase in the board size will consequently bring different

personal characteristics, which in turn may help, in linking the firm with its external environment beside ensuing critical resources, such prestige and legitimacy.

In addition, with large board size, there will be a greater wealth and variety of both opinions and experiences beside an increase in the board supervisory, monitoring and controlling capacity. In this regard, the agency and resource dependence approaches argued that the larger the board, the more efficient board of directors. As according to agency theory (Jensen and Meckling 1976), boards with a large number of directors are more effective in handling and controlling firm management. Hence, in terms of the agency problems and cost, a greater number of executive one involved in firm activities will make the board more vigilant (Hutchinson and Gul 2004; Jermias, 2007).

As the same important, resource dependence theory suggests that large boards are more likely to contribute the knowledge capital of the business sector deeply, which can later influence the quality of strategic decision-making and affect the capital structure , and in the end, have a positive impact on firm overall performance (Arosa et al. 2010).

Considering the above, board size is an essential link between the firm and its external resources that it needs to maximize its performance. Moreover, there positive relation seems to derive from the fact that when the size board of directors has more members, there will be a greater wealth and variety of opinions beside the experiences, which increase the supervisory capacity of the board. At the same time that facilitating the obtaining of resources that have a favorable impact on both capital structure, financial performance and creation of value for the firm (Guest 2009; Singh et al., 2018; Lehn et al., 2009). Hence, the firm should have a board with suitable size in order to facilitate decision-making, reduce the operations costs, and guarantee the diversity criteria to adapted firm's needs (Martínez 2015).

Based on the previous illustrated literature, the researchers formed the following three hypotheses:

H₁: CEO duality has significant impact on capital structure.

H₂: Board independence has significant impact on capital structure.

H₃: Board size has significant impact on capital structure.

Financial Performance and Capital Structure

In the previous literature, the concept of capital structure has many various point of views. From (Stephen et.al, 2003) point of view, the firm's capital structure considered as the combination of using the debt and equity with a certain proportion in order to finance production process and firm's activities. In other words, the capital structure is a correlation with a certain proportion between long-term debt and equity.

Moreover, High (debt/equity) ratio contributes in enhancing the firm's financial performance in the terms of both liquidity and profitability (Adesina et al., 2015). In the same line, (Kpwe, 2017) argued that capital structure have a positive significant impact on the financial performance. Meanwhile, other scholars argue the relevance of capital structure in affecting both firm's profitability and financial performance (Mutenheri et.al. 2015; Ikapel et.al, 2017).

Nevertheless, (Pratheepkanth, 2011; Khan 2012) found showed a negative relationship between capital structure and firm performance. Their study uses the ROA as a proxy for financial performance, beside gross margin and Tobin's Q. In addition, the independent variables were both ratios of short-term debt to total assets and total debt to total assets. On the same context (Doan, 2014) studied empirically the impact of capital structure on the firm financial performance in case of privatization. He found that there is a negative association between financial performance and capital structure.

Furthermore, (Qayyum et. al., 2019) make an empirical study on a sample of banks by using ROA as a proxy. Moreover, they found that the ROA has a negative association with capital structure but these results differ according to the bank size. In addition, they argued that there is a negative correlation between financial performance (when using ROA as a proxy) and capital structure of both conventional and Islamic banks. In contrast, there is a positive correlation between financial performance (when using ROE as a proxy) and capital structure for both conventional and Islamic banks.

However, (Gul and Cho, 2019) suggest that the rise in the capital structure subsequently, leads to increase the firm risk in default whereas this risk can decreased in default way by the increase in long-term debt to assets. They also argued that there is an additional determinant for this risk such as firm size, beside both tangibility and interest coverage. Beside (Dinh, 2020) he used the least square regression to examine the association between capital structure and firm financial performance. His analysis showed that the financial leverage ratio, long-term asset ratio and debt-to-assets ratio

have positive significant association with firm financial performance. Meanwhile the self-financing affects negatively to the return on equity

Based on the previous illustrated literature, the researchers formed the following two hypotheses:

H4: Profitability has significant impact on capital structure.

H5: Liquidity has significant impact on capital structure.

Board Characteristics and Tax Aggressiveness

Taxes considered as an additional cost to the firm and its shareholders. Because these taxes reduce, the available cash flow. According to the previous reason, firms are highly tended to use different tax aggressiveness techniques. Aggressive tax or strategic tax behaviors in general are activities designed in order to help in reducing tax liability, which includes tax evasion, beside both tax evasion and legitimate saving of taxes (Deslandes, 2013; Salihu, 2014; Aburajab et.al, 2019).

Moreover, (Maali et.al, 2019) empirically tests the relationship between board of director's characteristics such as board duality, board composition, and board independence on tax aggressiveness. Their results showed that there is a negative association between board composition and board independence from one hand and the tax aggressiveness from the other hand. Furthermore, their results indicated that there is a positive association between both board duality and tax aggressiveness.

In addition, the independence of the board from management usually provides protection for shareholders from abusive management behaviors (Tam, 2010). The presence of independent directors considered as a power of balance force in the board, and the ratio of presence of independent directors reinforces in default way the elements of firm governance (Yeung, 2010) argued that the highly increase in the independence of board directors leads to a the reduction in the actual tax rate beside the good governance elements will in turn lead to a strict tax policy strategy.

Furthermore, considering the role of board directors as supervisors of the firm's strategic decisions, previous studies indicate that the association between independent directors and their influence in the tax administration process from the accumulated experience point of view is negative, as the independence directors has a negative association with the potential for tax aggressiveness (Salihu, 2014; Jaradat, 2015; Fakunle, 2019). Above that, several previous scholars have indicated that also, the quality of board members beside their independence subsequently reduces the likelihood of tax aggressiveness (Gomes, 2016).

As the same important, the firm rate expected by the stakeholders to comply with tax rules and this awareness by especially by regulators is now increasing. This can have negative effects of tax aggressiveness on their returns. Therefore (Fakunle, 2021), examined the association between board characteristics and tax aggressiveness. He found that there is no significant association between board size and tax aggressiveness. In addition, he recommends that firms should focus on policies that lead to maximizing shareholders wealth instead of than strategies that reduce tax liability

Based on the previous illustrated literature, the researchers formed the following three hypotheses:

H₆: CEO duality has significant impact on corporate tax aggressiveness.

H₇: Board independence has significant impact on corporate tax aggressiveness.

H₈: Board size has significant impact on corporate tax aggressiveness.

Financial Performance and Tax Aggressiveness

Previous scholars raise a question of does the need for working capital and liquidity ratio would in turn influence tax aggressiveness? (Chiachio, 2018), he found in his study by using Fleuriet model including both healthier and non-healthy firm, that there is no significant difference of the tax aggressiveness level between firms classified according to the structures of this model. Meanwhile, the additional analyses for the liquidity ratio showed that the higher the liquidity, the lower is the tax aggressiveness. His results can indicate that greater tax aggressiveness would explained partly by liquidity difficulties.

Furthermore, (Prasista and Setiawan, 2016) empirically analyzed the impact of profitability on tax aggressiveness. Their resulted showed that profitability has negative impact on tax aggressiveness. Because firms with low profitability consequently have a high probability of taxes, this is because firms with low profitability will choose to keep their financial and internal assets instead of paying taxes, so the firm becomes more aggressive with taxes.

Moreover, (Gemilang, 2017) argued that profitability is a determinant of tax aggressiveness. Because firms with high profits will in turn pay greater taxes as well, nevertheless, firms with low profit rates will in turn pay lower taxes or may not pay taxes if they suffer losses. Other scholars supporting these results such as (Nugraha, 2015) which argued that there is significant association between profitability and tax aggressiveness. As the high level of profits received by the firm will consequently

increase the level of tax. Therefore, the firm will have to minimize its profits in an appropriate way to obtain a low aggressiveness rate.

At the same context, (Yanti, 2019) found that leverage does not have a significant impact on tax aggressiveness, while profitability has significant effect on the aggressiveness of tax. He justified his results by indicating that firms with the higher leverage ratio that means higher funding from third party debt used by the firm which in turn raises the interest debt cost. This cost will affect the level of firm net income and reduce the tax.

Regarding this context, (Agusti 2014), support the previous results by stated that if the firm leverage is higher or lower, that will not have a significant impact on the aggressiveness of taxes carried out by the firm, because the leverage level affected only with funding cost and has no related with firm profit.

However, (Fitri, 2018; Yanti, 2019) there is a significant association between profitability and tax aggressiveness. They justified the results by indicating that profitability mean that firm is able to generate profits using its total internal assets, which subsequently will be associated with the amount of tax burden. Therefore, the amount of tax burden will be small; this will become a consideration for tax aggressiveness. The results of their study are also supported by research (Gemilang, 2017), which indicate that profitability as measured has a significant impact on the tax aggressiveness of the firm.

Based on the previous illustrated literature, the researchers formed the following two hypotheses:

H₉: Profitability has significant impact on corporate tax aggressiveness.

H₁₀: Liquidity has significant impact on corporate tax aggressiveness.

Capital Structure and Tax Aggressiveness

Previous scholars argued that tax aggressiveness might influence firm's financing decisions. Because tax avoidance results in risky incremental cash flows (Goh et.al. 2016, and Cook et.al. 2017). There are empirical studies analyzing the impact of the firm tax system on the firm capital structure. Such as (Faccio, 2015) who used changes in the firm income tax rate and found that leverage rate increases when the firm income tax rate increases. In addition (Barclay et.al. 2013) who argued that, leverage ratios of taxable real estate are higher than their nontaxable peers, which mean that the firm tax system has a significant impact on the firm capital structure.

Moreover, (Heider,2015) use the variation in state-level of firm income tax rates in and he found that 1% increase in the state-level of firm income tax rate is significantly associated with 0.38% percentage increase in the firm leverage. On the same context, (Doidge et.al. 2015) examined the impact of firm strategies policies on Canadian firms and he found that there is increase in the level of leverage following the policy change. Meanwhile, (Graham et.al. 2014) found no statistical association between the firm tax policies and aggregate level of leverage.

Furthermore, tax aggressiveness affects capital structure through convert the costs of equity and debt. Especially, tax avoidance reduces tax, which transferred to the government and generates higher after the process of tax cash flows (Goh et al. 2016; Hasan et.al, 2014; Shevlin et.al. 2019). Above that (Devereux, 2017) investigated how firm's capital structure affected by income taxes using the confidential firm-level tax returns for a sample from UK firms. He found that there is a positive and significant long-run tax impact on firm leverage.

As Leverage responds more to decreases in the marginal tax rate, and it responds to changes in the marginal rather than the average tax rate. In addition, his results showed that the marginal tax rate, which based on tax returns considered as greater explanatory power for firms leverage than the marginal tax rate based on its financial statements. And he indicate that errors which could happen in the measurement for tax incentives using financial statements as a source would subsequently lead to underestimation of the tax aggressiveness impact on capital structure.

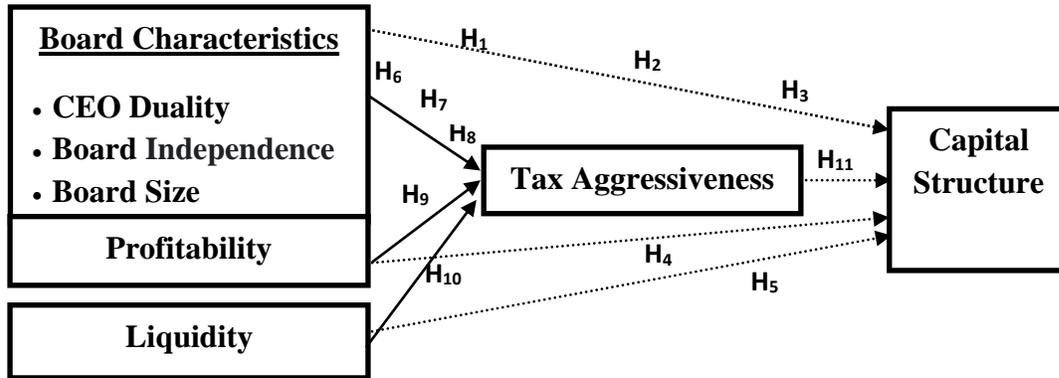
Based on the previous illustrated literature, the researchers formed the following hypothesis:

H₁₁: Tax aggressiveness has significant impact on capital structure.

Research Conceptual Framework

In figure (1), we present the research conceptual framework to show the relationships between the research variables and hypotheses. The left side shows the board of director's characteristics (independent variables), which indicated in the code corporate governance in Egypt and the related literature. These variables are: CEO duality, board independence and board size. The right side shows the capital structure of the firm (dependent variable) and corporate tax aggressiveness as a mediating variable.

Figure (1): Research Conceptual Framework



Research Methodology

This research conducted using data from 58 publically listed non-financial companies listed in the Egyptian stock exchange (EGX) from the year 2015 till 2019. We exclude those financial firms as they are regulated by different set of corporate governance instructions due to their distinct nature. Financial and secondary data were obtained from the financial statements and the published annuals reports.

Research Variables and Regression Model

The statistical relationship between CEO duality, board independence and board size and financial performance on capital structure using corporate tax aggressiveness as a moderator variable was tested using the following five multiple regression models:

First regression model, used to examine the relationship between board characteristics and capital structure.

H₁: CEO duality has significant impact on capital structure.

H₂: Board independence has significant impact on capital structure.

H₃: Board size has significant impact on capital structure.

$$CS_{it} = \beta_0 + \beta_1 CEOD_{it} + \beta_2 BI_{it} + \beta_3 BS_{it} + \beta_4 TQ_{it} + \beta_5 FS_{it} + \varepsilon_{it}$$

Where,

Dependent variable = Capital Structure (CS) measured by Debt to Equity (D/E).

β_0 = denotes a constant of the regression equation.

β_1 = CEO duality denotes regression coefficient of CEO duality.

β_2 = BI denotes regression coefficient of board independence.

β_3 = BS denotes regression coefficient of board size.

β_4 and β_5 = denotes control variables, regression coefficient of Tobin's Q (TQ) and firm size (FS).

I_{it} = Firm i in period t.

T_i = Year fixed effect.

ε_{it} = Standard error term.

Second: regression model, used to examine the relationship between financial performance and capital structure.

H4: Profitability has significant impact on capital structure.

H5: Liquidity has significant impact on capital structure.

$$CS_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 ROE_{it} + \beta_3 GPM_{it} + \beta_4 CR_{it} + \beta_5 AT_{it} + \beta_6 IT_{it} \\ + \beta_7 TQ_{it} + \beta_8 FS_{it} + \varepsilon_{it}$$

Where,

Dependent variable = Capital Structure (CS) measured by Debt to Equity (D/E).

β_0 = denotes a constant of the regression equation.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ = denotes regression coefficient of ROA, ROE, GPM, CR, AT, IT denotes regression coefficient of return on assets, return on equity, gross profit margin, current ratio, asset turnover, inventory turnover as measures for financial performance (profitability and liquidity).

β_7 and β_8 = denotes control variables, regression coefficient of Tobin's Q (TQ) and firm size (FS).

I_{it} = Firm i in period t.

T_i = Year fixed effect.

ε_{it} = Standard error term.

Third: regression model used to examine the relationship between board characteristics and tax aggressiveness.

H6: CEO duality has significant impact on tax aggressiveness.

H7: Board independence has significant impact on tax aggressiveness.

H₈: Board size has significant impact on tax aggressiveness.

$$TA_{it} = \beta_0 + \beta_1 CEOD_{it} + \beta_2 BI_{it} + \beta_3 BS_{it} + \beta_4 TQ_{it} + \beta_5 FS_{it} + \varepsilon_{it}$$

Where,

Dependent variable = Tax Aggressiveness (TA).

β_0 = denotes a constant of the regression equation.

β_1 = CEOD denotes regression coefficient of CEO duality.

β_2 = BI denotes regression coefficient of board independence.

β_3 = BS denotes regression coefficient of board size.

β_4 and β_5 = denotes control variables, regression coefficient of Tobin's Q (TQ) and firm size (FS).

I_{it} = Firm i in period t.

T_i = Year fixed effect.

ε_{it} = Standard error term.

Fourth: regression model used to examine the relationship between financial performance and tax aggressiveness.

H₉: Profitability has significant impact on tax aggressiveness.

H₁₀: Liquidity has significant impact on tax aggressiveness.

$$TA_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 ROE_{it} + \beta_3 GPM_{it} + \beta_4 CR_{it} + \beta_5 AT_{it} + \beta_6 IT_{it} \\ + \beta_7 TQ_{it} + \beta_8 FS_{it} + \varepsilon_{it}$$

Where,

Dependent variable = Tax Aggressiveness (TA).

β_0 = denotes a constant of the regression equation.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ = denotes regression coefficient of ROA, ROE, GPM, CR, AT, IT denotes regression coefficient of return on assets, return on equity, gross profit margin, current ratio, asset turnover, inventory turnover as measures for financial performance (profitability and liquidity).

β_7 and β_8 = denotes control variables, regression coefficient of Tobin's Q (TQ) and firm size (FS).

I_{it} = Firm i in period t.

T_i = Year fixed effect.

ε_{it} = Standard error term.

Fifth: regression model used to examine the relationship between tax aggressiveness and capital structure.

H₁₁: Tax aggressiveness has significant impact on capital structure.

$$CS_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 TQ_{it} + \beta_3 FS_{it} + \varepsilon_{it}$$

Where,

Dependent variable = Capital Structure (CS) measured by Debt to Equity (D/E).

β_0 = denotes a constant of the regression equation.

β_1 = denotes regression coefficient of tax aggressiveness (TA).

β_2 and β_3 = denotes control variables, regression coefficient of Tobin's Q (TQ) and firm size (FS).

I_{it} = Firm i in period t.

T_i = Year fixed effect.

ε_{it} = Standard error term.

The definition and measurement of the variables used in this research are listed in Table (1).

Table (1): Research Variables, Definitions and Measures

Variables / Type		Definition	Measure
Independent Variables: Board Characteristics and Financial Performance (Profitability and Liquidity)	CEO Duality	CEOD	CEO duality occurs when the same CEO is the chairman of the board of directors
	Board Independence	BI	A member of the board of directors is considered independent if he is not an investor in the company and is not involved in its daily operation in an executive way.
			To measure the CEO duality (CD) as an independent variable, we give value one (1) when the CEO also occupies the position of the chairman and give zero (0) when the CEO is not the same person who occupies the chairman post.
			Board independence ratio is measured by dividing the number of independent directors (outside / non-executive) by the total number directors on the board.

	Board Size	BS	Board size is the total number of inside executive and outside non-executive directors on the board.	Board size (BS) measured as a small or large based on the number of directors on the board.
	Return on Assets	ROA	Return on assets reflects how a firm effectively and efficiently utilizes its available resources.	ROA as a ratio is the net income divided by average total assets.
	Return on Equity	ROE	ROE means how the company's management is able to generate income from the investment of shareholders through increasing productivity and profits in a sustainable way.	ROE measured as a ratio by dividing the net income by average shareholder's equity.
	Gross Profit Margin	GPM	Gross profit margin ratio is used to evaluate the company's financial position. High gross profit margin ratio indicates is a signal effective and efficient management practices.	Gross profit margin ratio is measured by dividing net income by net sales.
	Current Ratio	CR	Current ratio is a liquidity ratio that indicates the ability of the company to pay its short-term obligations and debts when come due.	Current ratio is calculated by dividing current assets to current liabilities.
	Asset Turnover	AT	Asset turnover ratio is used to show how well the companies effectively using their assets to generate revenue.	Asset turnover ratio is calculated by dividing the net sales revenue by the average total assets.
	Inventory Turnover	IT	Inventory turnover ratio shows how many times the company has sold the entire inventory it have and replaced it again and again during a given period.	Inventory turnover ratio is measured by dividing the cost of goods sold by the average inventory.
Dependent Variable:	Debt to Equity	D/E	Capital structures the balance or the ratio between debt and equity	Debt-to-equity (D/E) ratio is used to calculate the capital structure.

Cost Structure (CS)			that a business depends on in financing its assets, daily operations, and expansion for future growth.	D/E calculated by dividing total debt (current and long-term liabilities) by total equity.
Moderator	Tax Aggressiveness	TA	Tax aggressiveness (tax avoidance) is a part of tax strategic planning. Tax aggressiveness is used to maximize value and wealth of the company shareholders by reducing the taxable income through tax planning by using methods other than tax evasion.	Tax aggressiveness is measured by the effective tax rate (ETR) ETR = $\frac{\text{Income Tax Expense}}{\text{Income before Income Tax}}$
Control Variables	Firm Growth	FG	Growth rate is the company's increase in potential sales revenue through expansion over a set period.	Annual sales revenue growth is indicated by comparing the previous period's sales with the current period's sales.
	Firm Size	FS	The total assets of the company.	Natural logarithm of average total assets.

Statistical Results and Analysis

Linear OLS Panel Regression Model:

Model Structure View:

Typically, data set has a cross sectional observations among different companies and re-sampled at a certain period of time, so a balanced Panel data regression will be most applicable to represent such a linear relationship and the model equation will be written as the following:

$$\hat{y}_{it} = \hat{\beta}_0 + \hat{\beta}_1 x_{1t} + \dots + \hat{\beta}_i x_{it} + \epsilon_{it}$$

Where:

$\hat{\beta}_0$: The estimated constant term.

$\hat{\beta}_i$: The estimated independent parameter coefficient.

y : The dependent variable.

x : The independent variable.

i : The firm number.

t : Referring to the year.

ϵ : Model white noise error.

Steps of constructing a Panel Regression Model:

- Set the time series variable and the cross-section variable in order to identify the panel regression model.
- Run a pooled Panel Regression and show the model significance result.
- Apply F-test to determine which more significant pooled or fixed model is.
- Apply Breusch-Pagan test to determine which is more significant Pooled or Random model is.
- Apply Hausman test to determine which is more significant Fixed or Random model is.

“In the three tests: F-test, Breusch-Pagan test, and Hausman test if the p-value < 0.05, accept the alternative hypothesis”.

- **Pooled OLS:** The simplest estimator for panel data is pooled OLS. In most cases this is unlikely to be adequate, but it provides a baseline for comparison with more complex estimators.
- **Fixed Effects** are constant across individuals, and **random effects** vary. For example, in a growth study, a model with random intercepts a_i and fixed slope b corresponds to parallel lines for different individuals, or the model: $y_{it} = a_i + b_t y_{it} = a_i + b_t$. Kreft and De Leeuw (1998) thus distinguish between fixed and random coefficients.
- Run normality to make sure that Residuals variance is normal within your model.
- **Performing the model diagnostics tests:**
 - **White Stability test for random error variation:**

The regression models and the OLS method are based on several assumptions, including the constancy of homoscedasticity by which the mean should be equal to zero, and if the Heteroscedasticity variation is used, some methods are used to overcome this problem, such as the White test. The null hypothesis is that the model has a problem of random error instability if p-value is greater than 0.05.

- **Normality of residuals:**

The residuals of the forecasting model must follow the normal distribution normal distribution in the long run with mean equals zero and variance equals one, a Chi-square test is used for testing the normality with the criteria that if the p-value is greater than 0.05 this means that the residuals are normally distributed.

- **Ramsey RESET test for model specification:**

This test is used to determine whether the model contains all the appropriate variables and excludes all irrelevant variables to ensure that the model estimated coefficients are not biased. This is done through the Ramsey RESET Test, and the decision criterion is to accept the null hypothesis that the study model includes all the appropriate variables P-value was greater than (0.05).

- **Variance Inflation Factors:**

Minimum possible value = 1.0 and the values > 10.0 may indicate a collinearity problem.

- **Goodness of fit tests:**

There are many measures of accuracy and performance of the forecasts. The most commonly used measures are the mean absolute error (MAE), root mean squared error (RMSE) and mean absolute percentage error (MAPE).

- Show the graphical representation of your forecasted values within the standard error of the model.

The three panel models for estimating the three multiple linear panel regression equations:

After applying the pooled panel regression for the five models and performing the panel models diagnostics it's found that the most fitted linear panel model for estimating Capital Structure (CS) in model (1), (2) and (5) is the Pooled linear regression model, and also the most fitted linear panel model for estimating Tax Aggressiveness (TA) in model (3) and (4) is the Pooled linear regression model.

The five Pooled linear panel models all showed a high level of residuals stability for long run by using white test for Heteroscedasticity and Chi-square test for normality of residuals, Also the three models independent variables and controlling variables have showed a low level of VIF which means that they

don't suffer from multicollinearity, and finally Ramsey Reset test for irrelevant variables showed that all variables are relevant and there is no need for adding or removing variables from any of the three models.

The following five tables (2) (3) (4) (5) and (6) summarize the five linear panel models.

Table (2) shows the statistical results for the first regression model used to examine the relationship between board characteristics and Capital Structure (CS).

Table (2): Pooled Linear Panel Model for Estimating CS

Model	Pooled linear Panel	Dependent variable		CS	VIF Test
		Coefficient	t-ratio	p-value	
constant	79.7419	6.422	<0.0001		
CEOD	3.20354	7.598	<0.0001		1.136
BI	0.387121	2.2470	0.0041		1.016
BS	-3.05822	-5.290	<0.0001		1.109
TQ	-0.861035	-6.317	<0.0001		1.051
FS	-3.25487	-1.178	0.2399	Insignificant	1.034
Adjusted R-squared			52.0841%		
Ramsey RESET overall Test			F-test	P – value	
			25.1537	1.172010	
Overall test of Heteroscedasticity			Chi-square	P – value	
			60.450984	0.000003	
Normality of Residuals			Chi-square	P – value	
			94.521	0.05062	

Source: Prepared by the researchers.

From the previous table it is concluded that:

- The overall Pooled model is significant with adjusted R-squared value of 52.0841% which means that the significant independent variable and the controlling variables explain the change in the CS by 52.0841%.

- All the independent variables and the controlling variables have **significant impact** on CS except FS should be dropped from the equation as its p-value is 0.2399 which is greater than 0.05.
- CEOD and board independence have a positive significant impact on company' capital structure, while board size have a significant negative relationship with capital structure.
- The overall equation for forecasting the CS is:

$$CS_{it} = 79.7419 + 3.20354CEOD_{it} + 0.387121BI_{it} - 3.05822BS_{IT} - 0.861035TQ_{it}$$

Table (3) shows the statistical results for the second regression model used to examine the relationship between financial performance and capital structure.

Table (3): Pooled Linear panel model for estimating CS

Model	<i>Pooled linear Panel</i>	Dependent variable		CS	VIF Test
Independent variables	<i>Coefficient</i>	<i>t-ratio</i>	<i>p-value</i>	Significance	
constant	18.6700	1.498	0.1353	Insignificant	
ROA	-0.766294	-6.506	<0.0001		4.432
ROE	0.252639	7.2649	<0.0001		4.578
GPM	0.906552	0.1177	0.9064	Insignificant	1.145
CR	-0.287798	-3.8867	0.0021		1.019
AT	-2.42314	-3.049	0.0025		1.057
TQ	0.344590	0.002433	0.9981	Insignificant	1.022
FS	-4.35721	-1.487	0.1384	Insignificant	1.048
Adjusted R-squared			52.3571%		
Ramsey RESET overall Test			F-test	P – value	
			1.338054	0.264	
Overall test of Heteroscedasticity			Chi-square	P – value	
			19.156489	0.006387	
Normality of Residuals			Chi-square	P – value	
			170.885	0.05000	

Source: Prepared by the researchers.

From the previous table it is concluded that:

- The overall pooled effect model is significant with adjusted R-squared value of 52.3571% which means that the significant independent variable and the controlling variables explain the change in the *CS* by 52.3571%.
- All the independent variables and the controlling variables have significant impact on *CS* except *GPM*, *TQ* and *FS* should be dropped from the equation as their p-value are 0.9064, 0.9981 and 0.1384 respectively which are greater than 0.05.
- *ROA*, current ratio and asset turn over have a negative significant impact on company' capital structure, while *ROE* have a significant positive relationship with capital structure.
- The overall equation for forecasting the *CS* is:

$$CS_{it} = -0.766294ROA_{it} + 0.252639ROE_{it} - 0.287798CR_{it} - 2.42314AT_{it}$$

Table (4) shows the statistical results for the third regression model used to examine the relationship between board characteristics and tax aggressiveness.

Table (4): Pooled Linear panel model for estimating TA

Model	Pooled linear Panel	Dependent variable		TA	VIF Test
Independent variables	Coefficient	t-ratio	p-value	Significance	
constant	0.192657	11.38	<0.0001		
CEOD	0.4494074	11.808	<0.0001		1.136
BI	-0.1181468	-6.8495	<0.0001		1.016
BS	-0.1317866	-0.4034	0.6870	Insignificant	1.109
TQ	-8.4949106	-4.573	0.0001		1.051
FS	0.0136553	3.626	0.0003	Significant	1.034
Adjusted R-squared			54.6722%		
Ramsey RESET overall Test			F-test	P – value	
			1.8554	0.159	
Overall test of Heteroscedasticity			Chi-square	P – value	
			34.904510	0.014341	
Normality of Residuals			Chi-square	P – value	
			4.748	0.09313	

Source: Prepared by the researchers.

From the previous table it is concluded that:

- The overall Pooled model is significant with adjusted R-squared value of 54.6722% which means that the significant independent variable and the controlling variables explain the change in the *CS* by 54.6722%.
- All the independent variables and the controlling variables have significant impact on *CS* except *BS* should be dropped from the equation as its p-value is 0.6870 which is greater than 0.05.
- *CEOD* and firm size have a positive significant impact on company' tax aggressiveness, while board independence has a significant negative relationship with tax aggressiveness.
- The overall equation for forecasting the *TA* is:

$$TA_{it} = 0.192657 + 0.4494074CEOD_{it} - 0.1181468BI_{it} - 8.4949106TQ_{it} + 0.0136533FS_{it}$$

Table (5) shows the statistical results for the fourth regression model used to examine the relationship between financial performance and tax aggressiveness.

Table (5): Pooled Linear panel model for estimating TA

Model	Pooled linear Panel	Dependent variable		TA	VIF Test
		Coefficient	t-ratio	p-value	
constant	0.180365	11.66	<0.0001		
ROA	0.311487	2.131	0.0341		4.449
ROE	-0.334118	-2.823	0.0051		4.597
GPM	0.746923	0.7811	0.4355	Insignificant	1.150
CR	-5.0800505	-1.264	0.2076	Insignificant	1.019
AT	-0.440561	-4.475	<0.0001		1.057
IT	1.5647205	0.1670	0.8675	Insignificant	1.099
TQ	2.0633905	0.1176	0.9065	Insignificant	1.022
FS	0.0103507	2.851	0.0047		1.048
Adjusted R-squared			62.5866%		
Ramsey RESET overall Test			F-test	P – value	
			6.39077	0.198	
Overall test of Heteroscedasticity			Chi-square	P – value	
			61.736828	0.039836	
Normality of Residuals			Chi-square	P – value	
			14.602	0.05067	

Source: Prepared by the researchers.

From the previous table it is concluded that:

- The overall pooled effect model is significant with adjusted R-squared value of 62.5866% which means that the significant independent variable and the controlling variables explain the change in the TA by 62.5866%.
- All the independent variables and the controlling variables have significant impact on TA except GPM, CR, IT and TQ should be dropped from the equation as their p-value are 0.4355, 0.2076, 0.8675 and 0.9065 respectively which are greater than 0.05.
- ROA and firm size have a positive significant impact on company' tax aggressiveness, while ROE and asset turnover has a significant negative relationship with tax aggressiveness.

- The overall equation for forecasting the *TA* is:

$$TA_{it} = 0.180365 + 0.311487ROA_{it} - 0.334118ROE_{it} - 0.440561AT_{it} + 0.0103507FS_{it}$$

Table (6) shows the statistical results for the fifth regression model used to examine the relationship between tax aggressiveness and capital structure.

Table (6): Pooled Linear panel model for estimating CS

Model	Pooled linear Panel	Dependent variable		CS	VIF Test
		Coefficient	t-ratio		
constant	10.0222	3.091	0.0022		
TA	-0.297240	-2.077	0.0388		1.048
TQ	0.215085	2.8487	0.0469		1.017
FS	0.951962	2.8861	0.0465		1.066
Adjusted R-squared			79.5464%		
Ramsey RESET overall Test			F-test	P – value	
			0.782899	0.458	
Overall test of Heteroscedasticity			Chi-square	P – value	
			5.585352	0.0080593	
Normality of Residuals			Chi-square	P – value	
			187.283	0.05010	

Source: Prepared by the researchers.

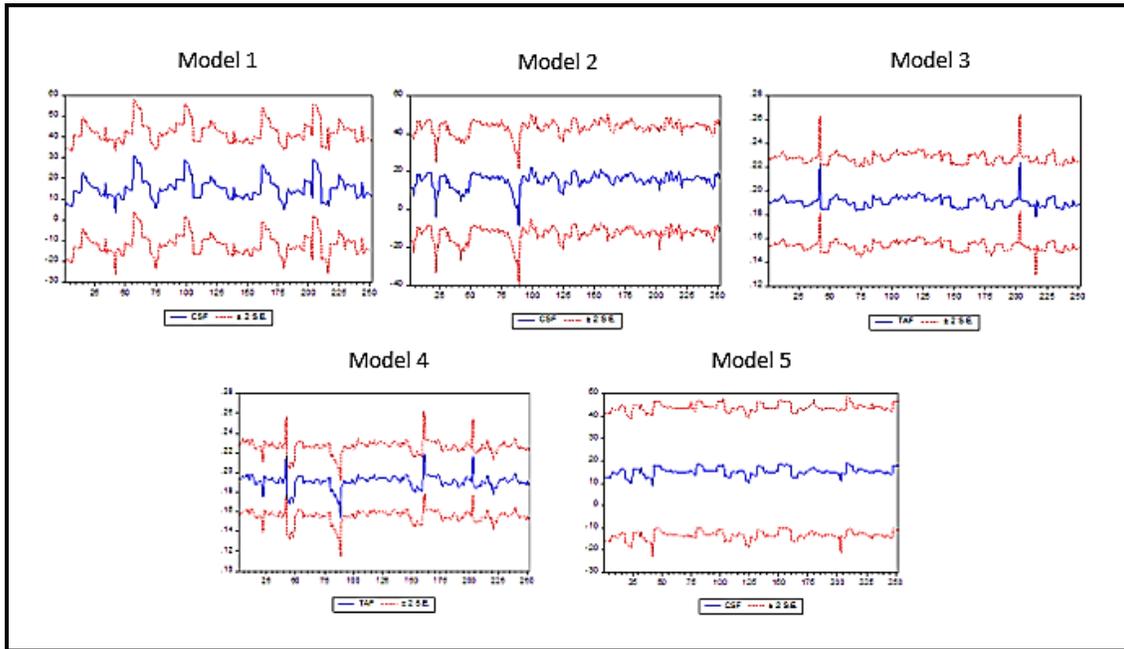
From the previous table it is concluded that:

- The overall Pooled linear model is significant with adjusted R-squared value of 79.5464% which means that the significant independent variable and the controlling variables explain the change in the *CS* by 79.5464%.
- All the independent variables and the controlling variables have significant impact on *CS*.
- There is a negative significant relationship between the company' tax aggressiveness and capital structure.
- The overall equation for forecasting the *CS* is:

$$CS_{it} = 33.0674 - 91.1243TA_{it} + 0.77804TQ_{it} - 1.59420FS_{it}$$

The forecasting charts of the five linear panel models are presented in figure (2).

Figure (2): The Forecasting Charts of the Five Linear Panel Models



Source: E-views software.

The table (7) summarizes the results of the five linear panel regression models and their hypotheses.

Table (7): Summary of the Five Linear Panel Regression Models and their Hypotheses

Model						
Overall Hypothesis	First		Second		Third	
	Type	Significance	Type	Significance	Type	Significance
	Accept the hypothesis		Accept the hypothesis		Accept the hypothesis	
	Significant Relationship exists		Significant Relationship exists		Significant Relationship exists	
Sub Hypothesis	Accept H ₂ : CEO duality has significant impact on capital structure.		Accept H ₄ : Profitability has significant impact on capital structure.		Accept H ₆ : CEO duality has significant impact on tax aggressiveness.	
	Accept H ₂ : Board independence has significant impact on capital structure.		Accept H ₅ : Liquidity has significant impact on capital structure.		Accept H ₇ : Board independence has significant impact on tax aggressiveness.	
	Accept H ₃ : Board size has significant impact on capital structure.				Accept H ₈ : Board size has significant impact on tax aggressiveness.	
Overall Hypothesis	Forth		Fifth			
	Type	Significance	Type	Significance		
	Accept the hypothesis		Accept the hypothesis			
	Significant Relationship exists		Significant Relationship exists			
Sub Hypothesis	Accept H ₉ : Profitability has significant impact on tax aggressiveness.		Accept H ₁₁ : Tax aggressiveness has significant impact on capital structure.			
	Accept H ₁₀ : Liquidity has significant impact on tax aggressiveness.					

Source: Prepared by the researchers.

Conclusion

This research investigates the impact of board characteristics on capital structure using tax aggressiveness as a moderating variable in the Egyptian listed companies. Using a research sample of 58 firms during the period 2015-2019, we run a five multiple regression models to test the impact of CEO duality, board independence, board size, ROA, ROE, current ratio, asset turnover, inventory turnover, gross profit margin and firm size on capital structure using the tax aggressiveness moderator. Consistent with some of previous literature, we found that CEO duality and board independence have a positive significant impact on company' capital structure, while board size have a significant negative relationship with capital structure. Moreover, Findings shows that ROA, current ratio and asset turn over have a negative significant impact on company' capital structure, while ROE have a significant positive relationship with capital structure. In addition, the statistical results show that CEO duality and firm size have a positive significant impact on company' tax aggressiveness, while board independence has a significant negative relationship with tax aggressiveness. Furthermore, ROA and firm size have a positive significant impact on company' tax aggressiveness, while ROE and asset turnover has a significant negative relationship with tax aggressiveness, while, the findings also imply the presence of a negative significant relationship between the companies' tax aggressiveness and capital structure.

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