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A Statistical Analysis of Liquidity's Moderating Role in the Relationship Between Tax Aggressiveness, Debt Financing, and Egyptian Non-Financial Firm Performance

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Abstract: This study examines how debt financing and tax aggressiveness affect firm performance, measured by ROA and ROE. Using OLS regression on data from 41 non-financial EGX 100 firms (2017–2023), results show that firms with high debt financing perform better. However, tax aggressiveness and liquidity have no significant impact on ROA. Similarly, neither tax aggressiveness nor debt financing significantly affect ROE, and no link was found between ROE and liquidity. Liquidity, as a moderating variable, showed no influence on the relationship between firm performance and the independent variables. The study concludes that firm performance is directly linked to debt financing, not tax aggressiveness, and recommends firms rely more on equity to enhance profitability, as aggressive tax strategies do not necessarily increase profits.

Keywords: Tax Aggressiveness, Debt Financing, Firm Performance, Effective Tax Rate, Return on Assets and Current Ratio.

1 Introduction

Debt financing—the process of borrowing funds with an obligation to repay with interest—plays a pivotal role in shaping a firm's financial performance. In an increasingly volatile economic landscape, companies strive to enhance their performance through a range of strategic approaches. Yet, evaluating and improving firm performance remains a significant challenge for both scholars and business managers [27] .

While taking on debt can fuel growth and enable investment, it also introduces financial risks. Excessive reliance on borrowing may lead to financial distress or bankruptcy, and in broader economic contexts, may even contribute to inflationary pressures that further strain company performance. Similarly, tax aggressiveness—firms' efforts to minimize their tax obligations—has been shown to influence performance, often negatively. This is largely due to the increased risks, capital costs, and uncertainty it creates for managers. Aggressive tax strategies may reduce firm value, especially when they result in large future tax liabilities or fines after an audit, which could disrupt cash flow and investor confidence [3].

2 Literature Review and Hypotheses Development:

Tax aggressiveness generally refers to the extent to which a company takes steps to reduce its tax burden. The effective tax rate (ETR) is commonly used to measure this behavior. Research suggests that factors like leverage, firm size, return on assets, and capital intensity all influence how aggressively a firm pursues tax minimization Jaffar & Taha [9]. While some studies show a clear link between tax strategies and firm performance, others find no consistent relationship, leaving room for further exploration across industries and regions. According to [3], both debt financing and tax aggressiveness can help or hinder performance, depending on how they are managed.

2.1 Theoretical Framework

Agency theory provides a useful lens to understand how the interests of managers and shareholders may diverge, particularly when it comes to tax decisions. Managers may take actions that benefit themselves, even if these choices reduce firm value or increase risk. For instance, in self-assessment tax systems like Indonesia's, firms may underreport income to reduce taxes, a practice enabled by information asymmetries [30].

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While the theory is well-established, empirical studies on managerial tax behavior are still developing. Chung et al. [5] found that managerial self-interest often underlies aggressive tax planning, particularly in companies with weak governance structures. Fuadah & Kalsum [8] argue that in the absence of strong oversight, tax evasion can lower shareholder value and incentivize rent-seeking behaviors. Similarly, Neifar & Utz [15] concluded that tax avoidance reduces transparency and allows for managerial opportunism, ultimately affecting stock performance.

Chung et al. [5] also link aggressive tax behavior to increased risk of stock price crashes, due to poor financial disclosure and hidden liabilities. While tax avoidance can reduce tax expenses, it often signals deeper governance issues and may lead to long-term harm.

2.2 Understanding Tax Aggressiveness:

Tax aggressiveness offers management an opportunity to influence reported earnings by reducing tax liabilities. This becomes especially relevant in public companies, where management may use their discretion over accounting policies for personal gain. While some studies, like [26], suggest that tax aggressiveness may not directly affect earnings management, others indicate a positive link between the two.

As Yanti & Hartono [30] explain, a lower ETR is often a sign of tax aggressiveness. While strategies to reduce tax, burdens range from legal tax planning to questionable practices bordering on evasion, public perception plays a critical role. Companies that appear overly aggressive in their tax behavior risk reputational damage and legal consequences. High-profile cases involving firms like Google and Amazon have brought these concerns into public discourse. The fallout from such controversies can outweigh any short-term tax savings, negatively affecting both firm value and stakeholder trust.

Aggressive tax planning can take various forms, including transfer pricing manipulation, earnings stripping through excessive debt, or routing income through low-tax jurisdictions. While such strategies can improve after-tax cash flow—useful for funding investments or paying down debt—they also increase scrutiny and potential regulatory backlash [5]. Furthermore, tax decisions often influence broader corporate policies, including capital structure and dividend payouts [3].

2.3 Debt Financing Overview:

Debt financing remains a widely used and essential tool for businesses to meet funding needs, especially in the early stages or during expansion. It forms a core component of a firm's capital structure, alongside equity. This structure significantly affects how companies perform financially. For many businesses, particularly small and medium enterprises, debt is often the preferred external financing method.

The appeal of debt lies in its benefits: interest payments are tax-deductible, which reduces the overall tax burden, and firms retain ownership control since creditors do not receive equity or decision-making power. Structured debt repayments, such as bonds or term loans, also help firms plan their finances more effectively [2].

However, debt financing is not without its drawbacks. High interest costs can erode profits, and the obligation to make regular repayments can strain cash flow, particularly for firms with volatile earnings. If poorly managed, this can lead to default or damage to the company's credit profile [4]. Consequently, firms must carefully evaluate their capacity to service debt and seek financial advice to ensure their capital structure aligns with their strategic goals [12].

In summary, while both tax aggressiveness and debt financing offer potential benefits to firm performance, they also introduce risks that require careful oversight. Understanding the balance between cost, control, and strategic flexibility is key for firms aiming to sustain long-term value.

2.4 Literature Examined the Relationship between Tax Aggressiveness and Firm Performance

Arora & Gill [3] identified a positive relationship between a firm's cost of debt and tax aggressiveness, as well as between the cost of equity and aggressive tax strategies. They also noted that companies engaging in such practices often experience negative reactions from stock markets, including reductions in market value and a heightened risk of stock price crashes. These outcomes support earlier findings that tax aggressiveness is frequently associated with managerial rent extraction, thereby raising concerns about long-term firm value and investor trust. Moreover, tax-aggressive behavior increases financial uncertainty, especially if firms face audits that lead to substantial future outflows.

Onyali [16] conducted a study on 44 listed Nigerian manufacturing firms (2005–2016) to examine the effect of corporate governance on tax aggressiveness. Using the effective tax rate (ETR) to measure aggressiveness and return on assets (ROA) as a performance indicator, the study found that board size had no significant effect on tax aggressiveness. However, independent directors, the proportion of non-executive directors, and board diversity did have significant influence. The findings suggest that governance quality matters more than board size, emphasizing integrity and oversight capabilities in limiting tax aggression.

Susanto & Adrianne [26] investigated the relationship between tax aggressiveness and earnings management in 132 Indonesian non-financial firms listed on the IDX (2013–2017). Independent variables included firm size, leverage, profitability, inventory intensity, and related-party debt. Using ETR to measure aggressiveness and ROA to assess earnings management, the study found a positive association between tax aggressiveness and earnings management. The authors also observed that higher institutional ownership tends to curb earnings manipulation, suggesting strong governance can mitigate aggressive practices.

Janantoa [10] examined the link between tax aggressiveness, corporate governance, cost of debt, and financial reporting aggression. Based on 260 firm-year observations from 2012–2017, results indicated that tax avoidance is positively associated with aggressive financial reporting, while cost of debt and effective corporate governance exert a negative influence. This supports the argument that sound governance and cautious debt management can reduce the likelihood of aggressive reporting behaviors.

Neifar & Utz [15] studied the impact of tax aggressiveness and earnings management on stock price crash risk (SPCR) and shareholder wealth. The sample included 820 non-financial German firms (2008–2014). Using panel regression models, they found that tax aggressiveness positively affects shareholder value but does not significantly influence stock price crash risk. This suggests that while aggressive tax strategies may benefit shareholders in the short term, they may not directly increase volatility or crash risk.

Firmansyah & Bayuaji [6] focused on the interaction between financial constraints, investment opportunities, and tax aggressiveness. Their study used a sample of 440 non-financial companies listed on the Indonesia Stock Exchange (2011–2015) and applied a multivariate linear regression model. Tax aggressiveness was measured using ETR and tax return data. Results indicated that firms facing financial constraints or seeking investment opportunities often resort to tax aggressive behavior. The study recommends broadening research beyond the manufacturing sector to fully capture industry-specific effects.

Mohanadas [13] analyzed the relationship between corporate social responsibility (CSR) performance and tax aggressiveness in Malaysia. The study assessed 182 listed companies (2010–2012), using OLS and fixed-effects panel regression. Tax aggressiveness was measured via ETR, and CSR performance was evaluated across four themes: environment, community, workplace, and marketplace. Findings suggested a complex relationship, where higher CSR performance does not necessarily deter aggressive tax planning. The study called for broader, multi-year, and national-level research to better understand evolving tax behaviors in emerging economies.

Ortas & Gallego [18] explored how national culture influences the relationship between CSR and tax aggressiveness. Using a large sample of 2,696 firms (2002–2014), they found a positive association between CSR and tax aggressiveness, challenging the assumption that ethical corporate behavior deters tax avoidance. They argued that firms might use CSR strategically to offset reputational risks from aggressive tax planning.

Jaffar et al. [9] investigated tax aggressiveness and firm performance in 105 Malaysian firms listed on the ACE Market (2014–2021). Using ETR and ROA as proxies, they found a significant negative relationship between aggressive tax strategies and firm profitability. Their findings underscore the need for improved transparency and suggest that tax planning may backfire when income is too aggressively minimized.

Sandria [23] examined 27 real estate firms in Indonesia to explore how tax aggressiveness relates to firm value, considering factors such as profitability, leverage, and firm size. Results showed a significant negative relationship, indicating that aggressive tax planning may erode firm value in capital-intensive sectors.

Arora & Gill [3] conducted a broader study of 547 companies in the Indian economy (2009–2019) to address the research gap in emerging markets. Their results aligned with previous findings in developed economies, revealing a significant negative relationship between firm value and tax aggressiveness. They highlighted the need for further cross-country studies in similar contexts.

Reschiwati [22] analyzed the impact of tax aggressiveness on profitability and considered variables such as inventory intensity, asset structure, liquidity (current ratio), and leverage. The study, based on 26 Indonesian firms (2016–2020), introduced the audit committee as a moderating factor. Findings showed that tax aggressiveness positively affects profitability, especially when corporate governance mechanisms are weak.

Empirical findings on the relationship between tax aggressiveness and firm performance are mixed. Studies like [9], [16], and [23] report negative effects, suggesting reduced profitability or firm value. In contrast, others such as [26], [15], and [22] found positive or conditional impacts. Meanwhile, some research (e.g. [30]) revealed both positive and negative influences depending on governance strength, firm characteristics, or industry sector. Based on this review, the following

hypothesis is proposed:

H_1: There is a negative significant relationship between tax aggressiveness and firm performance.

2.5 Literature Examined the Relationship between Debt Financing and Firm Performance

Timbul et al. [28] examined the benefits of debt-related tax incentives and the impact of debt-to-equity capital reforms on corporate financing decisions in Indonesia, highlighting the influence of tax benefits in shaping capital structure.

Pradhan [21] investigated the relationship between debt financing and firm performance using data from 22 commercial banks in Nepal between 2008 and 2016. The study found that both the debt-to-equity ratio and long-term debt-to-assets negatively impacted performance, measured by ROA. Firm size, however, had a significant positive effect.

Forte & Tavares [7] analyzed 48,840 manufacturing firms (2013–2018) to explore the relationship between debt financing and firm performance, along with the role of institutional factors. They found a positive relationship between short-term debt and performance (measured by ROA), but a negative relationship with long-term debt. Debt ratio was used to assess debt financing.

Pandey & Sahu [19] studied 91 Indian manufacturing firms (2009–2016), concluding that debt financing had a significant negative effect on firm performance. They suggested that firms should rely more on external regulatory frameworks and ownership structures than on debt to mitigate agency problems.

Aziz & Abbas [4], using data from 14 Pakistani firms (2006–2014), found a significant negative relationship between debt ratio and ROA. They recommended firms prioritize internal financing due to its lower cost and certainty in the local context.

Arafat [2] evaluated 27 firms (2016–2019) and found that environmental performance had a positive impact on firm performance. Although the study intended to analyze debt financing, the significant findings focused more on environmental variables.

Aamir et al. [1] analyzed 30 non-financial Pakistani firms (2013–2017) and found a significant negative relationship between debt ratio and ROA. The study concluded that higher debt levels reduce firm performance.

Kibunja & Fatoki [12] investigated 23 Kenyan non-financial firms (2013–2017) and reported a significant negative impact of debt financing (measured by debt ratio) on financial performance (measured by ROA), aligning with other studies in developing economies.

Orji & Agubata [17] examined 26 firms (2013–2020) and found a significant positive relationship between debt-equity financing and performance. Debt ratio and ROA were used as key measurement variables.

The literature reveals mixed findings. While studies such as [29], [1], and [12] reported negative effects of debt financing on profitability, others like [17], [19], and [11] found a positive relationship. Forte & Tavares [7] suggested that short-term debt may enhance performance while long-term debt may hinder it, indicating that the type of debt matters.

Based on these prior studies, the following hypothesis is proposed:

H_2: There is a positive significant relationship between debt financing and firm performance

2.6 Literature Examined the moderating variable of liquidation on Debt Financing and Firm Performance

Arafat [2] found that debt financing provides firms with essential liquidity for growth. Reschiwati [22] examined the impact of tax aggressiveness on profitability and analyzed influencing factors such as inventory intensity, fixed asset intensity, leverage, and liquidity. The study concluded that liquidity does not significantly affect tax aggressiveness.

Based on these findings, it is valuable to investigate whether liquidity moderates the relationship between debt financing, tax aggressiveness, and firm performance. Accordingly, the following hypothesis is proposed:

H_3: Liquidity is moderating the impact of both debt financing and tax aggressiveness on firm performance

3 Research Methodology

This study investigates the impact of debt financing and tax aggressiveness on firm performance, with a focus on liquidity as a potential moderating variable. A quantitative approach is adopted, relying on secondary data obtained from annual financial statements of publicly listed firms. A panel data set is compiled and analyzed using regression models, implemented through SPSS, to test the formulated hypotheses.

3.1 Variable Definitions and Measurements

Debt Financing: Debt financing refers to the process by which firms raise funds through borrowing, usually by issuing instruments such as bonds, notes, or loans. Unlike equity financing, which involves giving up ownership, debt must be repaid with interest. This method is particularly important for small and medium-sized enterprises (SMEs) seeking capital for expansion or acquisitions [22]. Debt can be secured or unsecured, and its cost influences firm strategy and performance. The most common performance indicators used in this context are Return on Assets (ROA) and Return on Equity (ROE) [4].

Tax Aggressiveness: Tax aggressiveness reflects a firm's efforts to minimize tax obligations through legal or borderline strategies such as tax avoidance. This behavior often involves exploiting loopholes in tax regulations or adopting flexible accounting standards to reduce taxable income [4]. Measurement of tax aggressiveness is challenging, but proxies such as the Effective Tax Rate (ETR) and reported tax returns are commonly used in empirical studies [22]. Tax aggressiveness may impact financial performance by altering reported earnings and increasing regulatory or reputational risks.

Firm Performance: Firm performance is defined as the ability of a business to generate profits efficiently relative to its resources. It is typically measured using financial ratios such as ROA and ROE, which capture profitability from different perspectives. High-performing firms utilize assets effectively and manage equity returns efficiently. Performance evaluation remains essential for corporate strategy, especially in dynamic economic environments, and is a primary focus for both scholars and practitioners [22].

Liquidity (Moderating Variable): Liquidity represents a firm's ability to meet short-term obligations and reflects its financial flexibility. It is often measured using indicators such as the current ratio or quick ratio. In this study, liquidity is tested as a moderating variable to examine whether it influences the strength or direction of the relationship between debt financing, tax aggressiveness, and firm performance. This consideration is motivated by prior findings (e.g., [22]) suggesting that liquidity may mitigate the adverse effects of aggressive financing or tax strategies.

3.2 Sample and Data Collection

The study's sample consists of 41 non-financial companies listed on the Egyptian Stock Exchange (EGX 100) across four industrial sectors: Real Estate, Food & Beverage, Pharmaceuticals, and Other Resources. The data spans the years 2017 to 2023, yielding 287 firm-year observations. Some companies were excluded due to incomplete data or lack of availability in specific years.

Two regression models are developed; the first model uses ROA as the dependent variable representing firm performance and the second model uses ROE as an alternative performance measure.

Both models examine the effect of debt financing and tax aggressiveness on performance, and assess whether liquidity significantly moderates these relationships. All variables are derived from secondary data sources, primarily company annual reports and audited financial statements. Data analysis is performed using SPSS, employing multiple regression analysis to test the proposed hypotheses.

3.3 Regression Models

First: Measuring The Relationship Between Firm Performance and Both Tax Aggressiveness and Debt Financing using Models 1 &2 :

$$ROA_{i,t} = \alpha + \beta 1\ TAX\_AGG_{i,t} + \beta 2\ DEBT\_FIN_{i,t} + \beta 3\ LIQ_{i,t} + \beta 4\ Size_{i,t} + \beta 5\ Debt\_Eq_{i,t} + e \ldots (1)$$

$$ROE_{i,t} = \alpha + \beta 1\ TAX\_AGG_{i,t} + \beta 2\ DEBT\_FIN_{i,t} + \beta 3\ LIQ_{i,t} + \beta 4\ Size_{i,t} + \beta 5\ Debt\_Eq_{i,t} + e \ldots (2)$$

Where,

$ROA_{i,t}$ = firm performance measured by ROA

$ROE_{i,t}$ = firm performance measured by ROE

α = Model constant

β_1- β_4 = Regression Coefficients

TAX AGG $_{i,t}$ = Tax aggressiveness

DEBT FIN i,t $_{i,t}$ = Debt financing

LIQ $_{i,t}$ = Liquidity

$SIZE_{i,t}$ =Firm size measured by natural logarithm of total asset at the end of year t

$DEBT\_EQ_{i,t}$ =Debt to Equity ratio

e= error

Table 1: Variables & Measurement

Variables	Measurements	References
Dependent variables		
Firm performance	Return On Assets (ROA) = Net Income / Total Assets	[30]; [24]
	Return On Equity (ROE) = Net Income / Total Equity	
Independent variables		
Tax aggressiveness	Effective Tax Return (ETR) = Total Expenses / Net Income	[3]; [15]
Debt financing	Debt Ratio = Total Liabilities / Total Assets	[15]
Control variable		
Liquidity	Current ratio = Total Current Assets / Total Current Liabilities	[30]
SIZE	Firm size measured by natural logarithm of total asset at the end of year t	[24]
DEBT_EQ	Debt to Equity ratio= Total liabilities/ Shareholders' equity	

Table 1 presents the variables and their corresponding measurement methods. Tax aggressiveness, the first independent variable, is measured using the Effective Tax Rate (ETR), calculated as Total Tax Expense divided by Net Income. The second independent variable, debt financing, is measured by the debt ratio (Total Liabilities / Total Assets). The dependent variable, firm profitability, is assessed using two indicators: Return on Assets (ROA) and Return on Equity (ROE).

Control variables include liquidity, measured by the current ratio (Total Current Assets / Total Current Liabilities); Firm size, represented by the natural logarithm of total assets at year-end, and Debt-to-equity ratio, which indicates the firm's capital structure by comparing Total Liabilities to Shareholders' Equity.

3.4 Results for Research Models 1&2:

Table 2: Model 1 and 2 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ROA	287	-.34	7.16	.5876	.92863
ROE	287	-16.09	22.45	.9753	2.91076
Tax_ag	286	-357.81	3669.89	20.1431	224.57082
Debt_fin	287	.00	8.12	.7718	1.21250
Liquid	287	.00	21.52	1.5548	1.87559
Size	287	1.82	5.99	4.7270	1.15410
Debt_Eq	287	-20.19	89.68	1.7330	7.38534
Valid N (listwise)	286				

Descriptive statistics are a set of summary measures used to describe and understand the main features of a data set, whether it represents a sample or an entire population. They are typically categorized into measures of central tendency (such as the mean) and measures of variability (such as standard deviation, minimum, and maximum values).

Table 2 presents the descriptive analysis of 287 observations from 41 Egyptian non-financial companies listed on the EGX, covering the period from 2017 to 2023. The total number of observations was obtained by multiplying the number of firms (41) by the number of years in the study, with valid data totaling 287 cases.

For the dependent variables:

Return on Assets (ROA) ranged from a minimum of -16.09 (East Delta Flour Mills, 2021) to a maximum of 22.45 (Medical

Packaging, 2021), with a mean of 0.5876 and a standard deviation of 0.92863.

Return on Equity (ROE) ranged from -0.34 (Mansourah Poultry, 2022) to 7.16 (Medical Packaging, 2021), with a mean of 0.9753 and a standard deviation of 2.91076.

For the independent variables:

Effective Tax Rate (ETR) showed a wide range, with a minimum of -357.81 (Alexandria New Medical Center, 2022) and a maximum of 3669.89 (Misr Oils & Soap, 2023). The mean was 20.1431 with a standard deviation of 224.57082.

Debt Ratio ranged from 0.0028 (Egyptian International Pharmaceutical Industries, 2018) to 8.1231 (East Delta Flour Mills, 2018), with a mean of 0.7718 and a standard deviation of 1.21250. Figure1 presents the descriptive analysis of 287 observations.

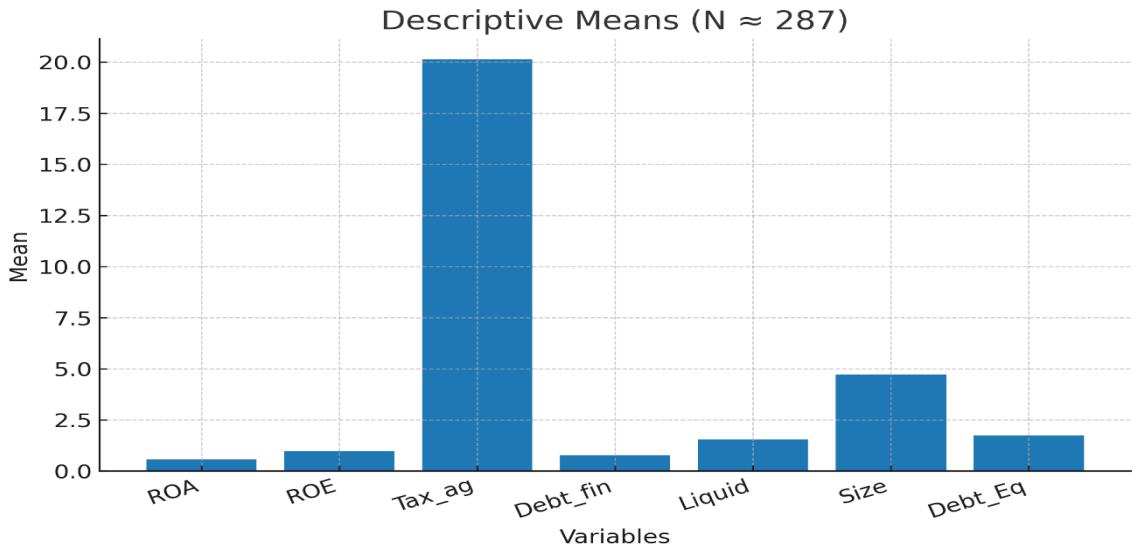

Fig. 1: Descriptive Means (N ≈ 287)

In addition, correlation analysis is employed to explore relationships between variables. The Pearson correlation coefficient is a descriptive statistic that quantifies the strength and direction of a linear relationship between two continuous variables. Correlation types include:

Positive correlation: as one variable increases, the other also tends to increase.

Negative correlation: as one variable increases, the other tends to decrease.

No correlation: changes in one variable are not associated with changes in the other.

Table 3: Pearson Correlations between ROA and dependent variables

		ROA	Tax_ag	Debt_fin	Liquid	size	Debt_Eq
ROA	Pearson Correlation	1					
	Sig. (2-tailed)						
Tax_ag	Pearson Correlation	-.053	1				
	Sig. (2-tailed)	.375					
Debt_fin	Pearson Correlation	.169**	.003	1			
	Sig. (2-tailed)	.004	.961				
Liquid	Pearson Correlation	.042	-.010	-.118*	1		
	Sig. (2-tailed)	.481	.869	.046			
size	Pearson Correlation	.207**	-.131*	.065	-.103	1	
	Sig. (2-tailed)	.000	.027	.271	.080		
Debt_Eq	Pearson Correlation	-.092	.053	-.042	-.021	.076	1
	Sig. (2-tailed)	.119	.370	.477	.726	.196	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 and Fig 2 explains the correlations of the Egyptian companies between Tax aggressiveness and Debt financing and ROA:

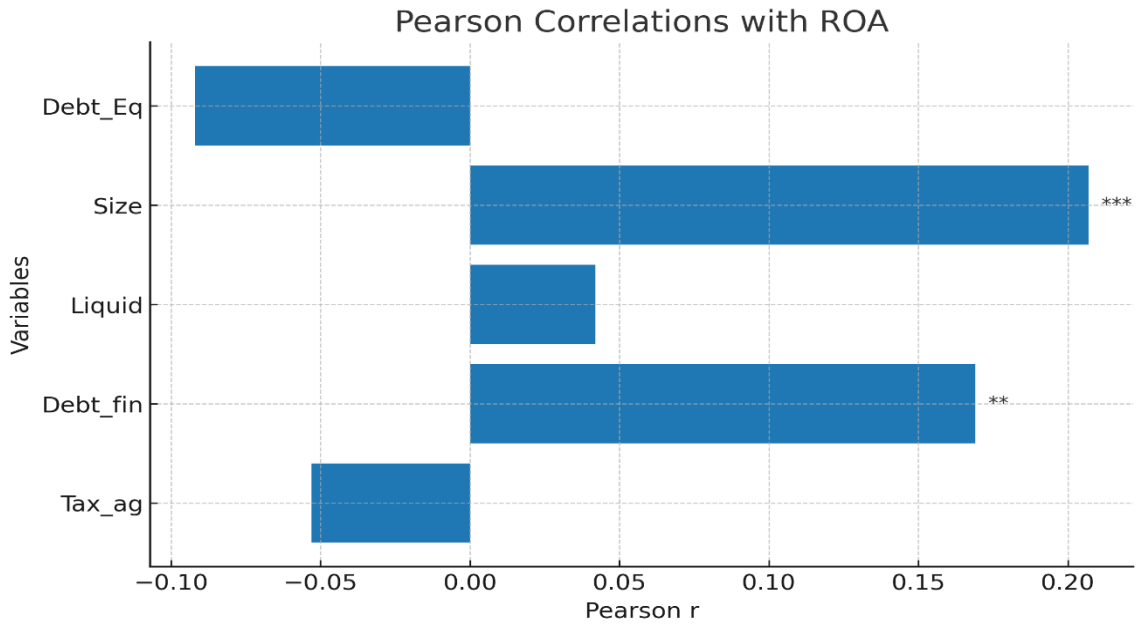

Fig. 2: Pearson Correlations with ROA

There is a highly correlation between Debt financing and ROA =.169 and Size with ROA =.207 which means that there is a positive significant correlation between them.

Table 4: Pearson Correlations between ROE and dependent variables

		ROE	Tax_ag	Debt_fin	Liquid	size	Debt_Eq
ROE	Pearson Correlation	1					
	Sig. (2-tailed)						
Tax_ag	Pearson Correlation	-.028	1				
	Sig. (2-tailed)	.637					
Debt_fin	Pearson Correlation	-.104	.003	1			
	Sig. (2-tailed)	.079	.961				
Liquid	Pearson Correlation	-.018	-.010	-.118*	1		
	Sig. (2-tailed)	.756	.869	.046			
size	Pearson Correlation	.197**	-.131*	.065	-.103	1	
	Sig. (2-tailed)	.001	.027	.271	.080		
Debt_Eq	Pearson Correlation	.410**	.053	-.042	-.021	.076	1
	Sig. (2-tailed)	.000	.370	.477	.726	.196	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 4 explains the correlations of the Egyptian companies between Tax aggressiveness and Debt financing and ROE: There is a highly correlation between Debt-Equity ratio and ROE =.410 and Size with ROE =.197 which means that there is a positive significant correlation between them.

Regression Model 1 Analysis

Table 5: Model 1 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.291[a]	.084	.068	.89756

a. Predictors: (Constant), Debt_Eq, Liquid, Tax_ag, Debt_fin, size

Table 6: Model 1 ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.798	5	4.160	5.163	.000[b]
	Residual	225.572	280	.806		
	Total	246.370	285			

a. Dependent Variable: ROA

b. Predictors: (Constant), Debt_Eq, Liquid, Tax_ag, Debt_fin, size

Tables 5 and 6 shows that the P-value of the test is 0.00 compared to α which is 0.00 < 0.05, that means the regression model fits and affects the model better than the model with no independent variables. The R^2 **is 8.4%** which means that the independent variables (tax aggressiveness, debt financing, Liquidity, firm size and debt- equity ratio) can explain 8.45% of the change in the dependent variable ROA.

Table 7: Model 1 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.344	.238		-1.448	.149
	Tax_ag	-8.073E-5	.000	-.019	-.337	.736
	Debt_fin	.123	.044	.161	2.783	.006***
	Liquid	.039	.029	.079	1.369	.172
	Size	.169	.047	.211	3.613	.000***
	Debt_Eq	-.012	.007	-.099	-1.721	.086

a. Dependent Variable: ROA

The regression analysis is used to test the research hypotheses, where regression model is developed to examine the impact of tax aggressiveness, debt financing on ROA. Table 7 shows that ROA has a high significant positive relationship with debit financing at 0.006 which means that the firms which depends on debit financing heavily; their Performance is improving. In the other hand; neither tax aggressiveness nor liquidity has a significant relationship with ROA. There is a highly significant relationship between ROA and the firm size, as shown in the figure (3).

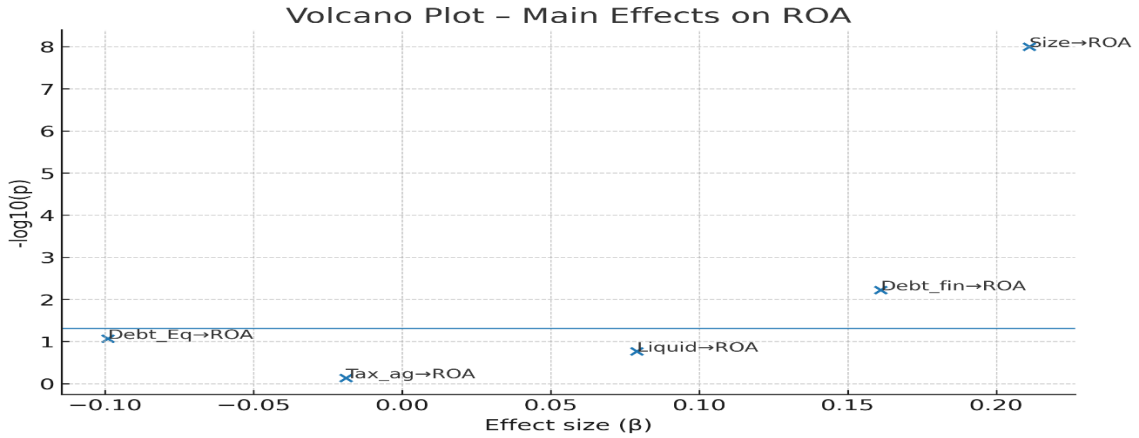

Fig. 3: Volcano – Main Effects on ROA

Regression Model 2 Analysis

Table 8: Model 2 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.454[a]	.206	.192	2.62094

a. Predictors: (Constant), Debt_Eq, Liquid, Tax_ag, Debt_fin, size

Table 9: Model 2 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	499.126	5	99.825	14.532	.000[b]

	Residual	1923.406	280	6.869		
	Total	2422.532	285			

a. Dependent Variable: ROE

b. Predictors: (Constant), Debt_Eq, Liquid, Tax_ag, Debt_fin, size

Tables 8 and 9 shows that the P-value of the test is 0.00 compared to α which is 0.00 < 0.05, that means the regression model fits and affects the model better than the model with no independent variables. The R2 is 20.6% which means that the independent variables (tax aggressiveness, debt financing, Liquidity, firm size and debt- e performance is improving equity ratio) can explain 20.6% of the change in the dependent variable ROE.

Table 10: Model 2 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-1.107	.694		-1.594	.112
	Tax_ag	.000	.001	-.027	-.493	.623
	Debt_fin	-.237	.129	-.099	-1.839	.067
	Liquid	-.008	.084	-.005	-.097	.923
	Size	.427	.137	.169	3.119	.002
	Debt_Eq	.155	.021	.394	7.354	.000

a. Dependent Variable: ROE

The regression analysis is used to test the research hypotheses, where regression model is developed to examine the impact of tax aggressiveness, debt financing on ROE. Table 10 shows that ROE has a high significant positive relationship with the control variables firm size and debt to equity ratio at 0.002 and 0.000 respectively. In the other hand; neither tax aggressiveness nor debit financing has a significant relationship with ROE. There is no significant relationship between ROE and liquidity either. As shown in the figure (4).

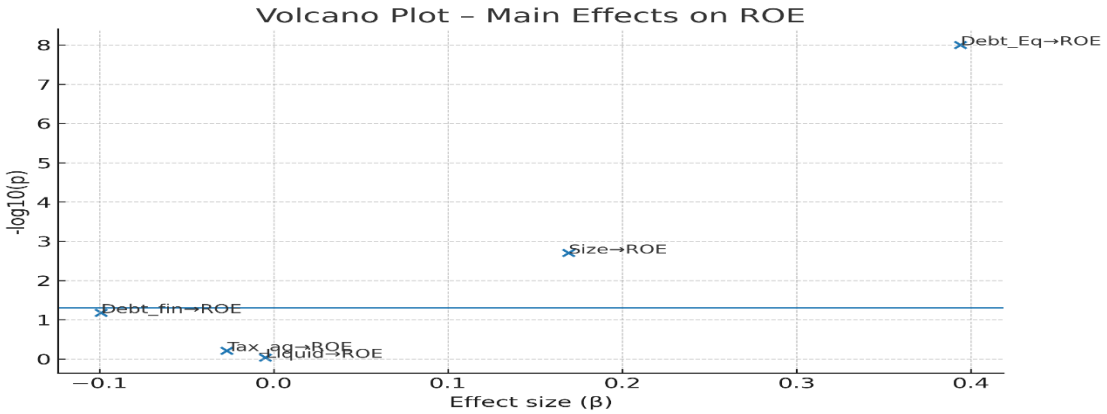

Fig. 4: Volcano – Main Effects on ROE

3.5 Results for Research Models 3 and 4 : Moderating variable liquidity

*ROA i,t= α+ β1 TAX AGG i,t *LIQi,t = β2 DEBT FIN i,t * LIQi,t + β3 SIZE i,t * LIQi,t + β4 DEBT_EQ i,t * LIQi,t +e……(3)*

*ROE i,t= α+ β1 TAX AGG i,t *LIQi,t = β2 DEBT FIN i,t * LIQi,t + β3 SIZE i,t * LIQi,t + β4 DEBT_EQ i,t * LIQi,t +e……(4)*

Where:

TAX AGG $_{i,t}$ *LIQ$_{i,t}$ = The moderating effect between liquidity and Tax aggressiveness of the firm (i) within the time period (t)

DEBT FIN i,t * LIQ$_{i,t}$ = The moderating effect between liquidity and Debit financing of the firm (i) within the time period (t)

SIZE $_{i,t}$ * LIQ$_{i,t}$ = The moderating effect between liquidity and size of the firm (i) within the time period (t)

DEBT_EQ i,t * LIQi,t = The moderating effect between liquidity and debt to Equity ratio of the firm (i) within the time period (t)

Regression Model 3 Analysis

Table 11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.141[a]	.020	.006	.92701

a. Predictors: (Constant), DEBT_EQ_liQ, Tax_ag_liQ, Debt_fin_liQ, SIZE_liQ

Table 12: Model 3 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.893	4	1.223	1.424	.226[b]
	Residual	241.477	281	.859		
	Total	246.370	285			

a. Dependent Variable: ROA

b. Predictors: (Constant), DEBT_EQ_liQ, Tax_ag_liQ, Debt_fin_liQ, SIZE_liQ

Tables 11 and 12 shows that the P-value of the test is insignificant compared to α which is 0.00 < 0.05, that means the regression model does not fit. The R2 is 2% which means that the independent variables (tax aggressiveness, debt financing, firm size and debt- equity ratio) can explain 2% of the change in the dependent variable ROA with taking liquidity as a moderating variable.

Table 13: Model 3 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.515	.074		6.939	.000
	Tax_ag_liQ	.000	.000	-.066	-1.115	.266
	Debt_fin_liQ	.002	.027	.006	.092	.927
	SIZE_liQ	.012	.007	.106	1.668	.096
	DEBT_EQ_liQ	-.004	.003	-.069	-1.168	.244

a. Dependent Variable: ROA

The regression analysis is used to test the research hypotheses, where regression model is developed to examine the impact of tax aggressiveness, debt financing on ROA taking liquidity as a moderating variable for this relationship. Table 13 shows that there is no significant relation between ROA with all the independent variables. The liquidity moderating variable has no effect between ROA and independent variables tax aggressiveness and debt financing. therefore, there is a direct relationship between dependent variable ROA and independent variables tax aggressiveness and debt financing.

Regression Model 4 Analysis

Table 14: Model 3 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.330[a]	.109	.096	2.77165

a. Predictors: (Constant), DEBT_EQ_liQ, Tax_ag_liQ, Debt_fin_liQ, SIZE_liQ

Table 15: Model 3 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	263.880	4	65.970	8.588	.000[b]
	Residual	2158.652	281	7.682		
	Total	2422.532	285			

a. Dependent Variable: ROE

b. Predictors: (Constant), DEBT_EQ_liQ, Tax_ag_liQ, Debt_fin_liQ, SIZE_liQ

According to the results of Model 4, the researchers further move to investigate the moderating effect for liquidity on Model 2. Tables 14 and 15 shows that the P-value of the test is 0.00 compared to α which is 0.00 < 0.05, that means the regression model fits and affects the model better than the model with no independent variables. The R2 is 10.9% which means that the independent variables (tax aggressiveness, debt financing, firm size and debt- equity ratio) can explain 20.6% of the change in the dependent variable ROE with taking liquidity as a moderating variable.

Table 16. Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

1	(Constant)	.839	.222		3.781	.000
	Tax_ag_liQ	.000	.001	-.042	-.742	.459
	Debt_fin_liQ	-.110	.080	-.084	-1.377	.170
	SIZE_liQ	.016	.022	.045	.734	.464
	DEBT_EQ_liQ	.058	.010	.315	5.589	.000

a. Dependent Variable: ROE

The regression analysis is used to test the research hypotheses, where regression model is developed to examine the impact of tax aggressiveness, debt financing on ROE taking liquidity as a moderating variable for this relationship. Table 16 shows that there is a significant relation between ROE and debit financing only. The liquidity moderating variable has no effect between ROE and independent variables tax aggressiveness and debt financing. therefore, there is a direct relationship between dependent variable ROE and independent variables tax aggressiveness and debt financing.

4. Discussion:

The findings related to the first hypothesis (H1) revealed that there is no significant relationship between tax aggressiveness and firm performance. As a result, H1 is rejected.

In contrast, the results for the second hypothesis (H2) indicated a strong and statistically significant positive relationship between debt financing and firm performance. This is supported by a p-value of 0.006, which is well below the commonly accepted significance threshold of 0.05. Therefore, H2 is accepted.

When liquidity was introduced as a moderating variable, the results showed that it had no moderating effect on the relationship between firm performance (measured by either ROA or ROE) and the independent variables—tax aggressiveness and debt financing. This suggests that the relationship between these variables and firm performance remains direct and is not influenced by liquidity levels. As such, H3 is rejected.

These outcomes are clearly summarized in Table 17, which compares the expected and actual signs associated with hypotheses H1 and H2.

Table 17: Research hypotheses and Regression Models Results

Hypotheses	**Excepted sign**	**Sign From the Model**	**P-value**
H1: There is a Negative significant relationship between Tax aggressiveness and firm performance	Negative	insignificant	
H2: There is a positive significant relationship between debt financing and firm performance.	Positive	Positive	0.006***

Table 18 shows the link between the study three hypotheses and the literature trying to fill the research gap and understanding the study result's proponents from previous studies and their results.

Table 18: Linking Results with hypotheses and literature.

Hypotheses	**Accepted or rejected**	**References support the results**	**References Support the oppose results**	**References that found no relation**
H_1: There is a negative significant relationship between tax aggressiveness and firm performance	rejected	• [25]. • [10]. • [13]. • [15].	• [3] • [6] • [9] • [23]	• [31] • [16]
H_2: There is a positive significant relationship between debt financing and firm performance.	Accepted	• [17] • [18] • [30] • [19]	• [21] • [2] • [12] • [29] • [4]	N/A
H_3: Liquidity is moderating the impact of both debt financing and tax aggressiveness on firm performance	Rejected		• [2]	[22]

5. Conclusion

The results are based on a sample of 41 companies and 287 firm-year observations spanning 2017 to 2023, using the OLS regression model. The primary aim is to examine the impact of tax aggressiveness and debt financing on firm performance.

For the first Hypothesis:

H_1: There is a negative significant relationship between tax aggressiveness and firm performance.

The findings do not support the expected negative relationship. This outcome may be attributed to the lack of proper oversight by audit committees in manufacturing firms, which allows management to engage in tax avoidance. Such behavior can undermine the firm's credibility and deter investors. Moreover, if tax authorities detect discrepancies in the reported taxes, companies may face penalties, leading to financial and reputational damage. This also negatively impacts national tax revenues due to underreporting.

For the second Hypothesis:

H_2: There is a positive significant relationship between debt financing and firm performance

The results support this hypothesis, showing a positive relationship between debt financing (measured by the debt ratio and liquidity ratio) and firm performance (measured by ROE). This finding aligns with the theory that debt can improve profitability by mitigating agency conflicts between management and shareholders. The obligation to meet debt repayments encourages managers to act in the firm's best interests, reduce excess cash flow, and maintain efficiency to avoid the risk of liquidation. These dynamics can lead to better governance and improved financial outcomes.

For the third hypothesis:

H_3: Liquidity is moderating the impact of both debt financing and tax aggressiveness on firm performance

When liquidity was tested as a moderating variable, results showed that it did not significantly influence the relationship between firm performance and the two independent variables—tax aggressiveness and debt financing. Therefore, there appears to be a direct relationship between firm performance and both tax aggressiveness and debt financing, and H3 is rejected.

The research results can't be generalized due to the some limitations. The sample is restricted to 287 observations over seven years, the study covers only 41 of the most active non-financial companies listed on the EGX100, profitability was assessed using only ROA and ROE, The impact of external factors like the COVID-19 pandemic was not considered, and tax aggressiveness was measured solely using tax return and ETR.

6. Recommendations

Given the evidence that debt can negatively affect a company's performance, it's advisable for firms to limit their reliance on debt as a primary source of funding. Instead, they should prioritize internal financing, which tends to be more stable and cost-effective. High levels of debt increase the risk of financial distress and potential insolvency, so companies should aim to maintain an optimal capital structure—balancing both debt and equity in a way that supports long-term financial health. Ideally, debt or equity financing should only be used when absolutely necessary and not as a first resort.

The findings of this study suggest that using a mix of debt and equity is more beneficial than relying heavily on either one alone. In fact, companies are encouraged to lean more toward equity financing, as it has been associated with stronger performance outcomes. Equity-intensive firms, according to the data, tend to generate higher profits and perform more efficiently.

The results also highlight a clear link between profitability—measured by return on assets (ROA)—and tax aggressiveness. As companies become more profitable, their effective tax rates (ETR) tend to rise. In an effort to manage this, many firms attempt to lower their reported profits to reduce their tax burden. This behavior indicates that companies often engage in tax planning strategies to keep their ETR low, especially when profits are high, reinforcing the relationship between financial performance and tax strategy.

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