

## **Capital Structure and Firm Performance: Evidence of Egypt During COVID Pandemic**

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### **Abstract:**

Capital structure has gained considerable interest from businesses and academics in the financial management arena in the last decades. It has been realized that capital structure may affect corporate financial performance. Recent research shows that optimal capital structure could improve financial performance in some countries. Yet, the question of “how does capital structure dynamics affect financial performance during the Covid-19 pandemic” has not been thoroughly discussed and studied in Egypt. The empirical data were drawn from a sample of 667 observations for the period 2014-2021 in the Egyptian Stock Exchange. The mixed models are used to test the research hypotheses. The empirical results showed that there is a negative significant relationship between capital structure and financial performance measured by ROA, ROE and stock price. Additionally, there was a significant negative impact for the COVID on the financial performance either using market based or accounting-based measures. The research findings can be supported by the Pecking Order Theory; which suggests that the negative relationship is due to the high cost of borrowing in

developing countries. Since firms are confronting with the default risk due to having higher loans and paying higher interest.

**Keywords: capital structure, financial performance, COVID pandemic; pecking order theory**

### **1. Introduction:**

The COVID-19 pandemic was an unfavorable awakening in 20th century because people weren't prepared for virus's implications. According to WorldOMeter (2021) only 226,322,754 person all over the world had been infected, but 4,656,323 people had died. Although the world has faced numerous pandemics previously such as H1N1 epidemic or swine flu in 2009/2010, and Middle East respiratory syndrome (MERS) in 2012; COVID 19 was the quickly deadly virus among all previous viruses. Since, the only way to destroy the virus, the infected person die and the public develop immune to it. Worldwide governments enforce movement control orders (MCOs) to stop the rapid outspread of COVID-19. As community health declines, this leads to business closures. This has an impact on occupations, cash inflows, supply chain management interruptions, fluctuations in consumer demand. Finally, it reduced revenue and income of a lot of firms. (Donthu & Gustafsson, 2020). MCO prohibits interpersonal interaction, leading to social isolation and the creation of an innovative working and social environment.

When working, or even learning is resumed from houses, the use of information-based technology increases. The increased usage of technology is anticipated to alter consumer demand. People working from home had more time to pursue new interests, talents, or ventures that can open up new markets for new products.

The MCO, which have been in enforced on March 18<sup>th</sup>, 2020, does not protect the listed stocks in the Egyptian stock exchange from a severe decline in the economic growth. The MCO had a negative influence on a variety of industries, such as travel and leisure. Since citizens weren't permitted to travel from one country to another either for pleasure or business to deter the COVID-19 from dispersion until vaccines are developed and available to the public (Becker et al., 2020; Karim et al.,2021; Che Omar et al., 2020).

Since the global recession of 1930, the economic crisis brought on by COVID-19 pandemic was the worst (Shen et al., 2020). The MCO obliged the Egyptian government to quickly block the borders and force people to stay indoors. With the exception of essential businesses like health care and food distribution. The MCO has caused firms to struggle to maintain profitability because the majority of corporate activities were ceased. Therefore, corporations were turning to new indebtedness to fund their operations in order to keep going (IMF, 2020).

Global debt surpassed 230 % of GDP in 2018, due to a rise in debt finance between developing and emerging nations (Koh et al., 2020). China's industrial sector experienced a 13.5 % decline in 2020 first quarter, while governments in Europe are offering debt restructuring to companies to support in avoiding liquidation. Central banks all across the world are supporting banks in lowering borrowing conditions to aid firms keep solvent (Becker et al., 2020). In Egypt, the debt-to-GDP ratio increased to 35% in 2020 from 15% in 2010, which is a significant increase. With this increase in international borrowing, the external debt increased from \$400 to \$900 in 2020. However, companies with more debt levels face additional liquidity risks because they are more vulnerable to economic and financial uncertainties.

Previous studies have tackled empirical evidence of capital structure determinants (Saif-Alyousfi et al., 2020; Kumar et al., 2017; Bevan, & Danbolt 2004), corporate governance and capital structure (Feng et al., 2020; Zaid et al., 2020), capital structure, and firm performance (Ahmed & Afza, 2019; Ali & Faisal, 2020; Ayaz et al., 2021; Islam & Iqbal, 2022; Iqbal, 2022; Mathur et al., 2021; Salim & Yadav, 2012), capital structure during the financial crisis (Andersson & Ekmark, 2021; Danso et al., 2020; Khalfan & Wendt, 2020; Morri & Artegiani, 2015).

Though, plenty of studies only analyses databases gathered in advanced economies and pays little attention to how a global

pandemic would affect developing nations. Due to the lack of studies on the COVID-19 pandemic's effects, empirical research is required to examine whether the capital structures of firms in developing countries, particularly Egypt, dramatically change in response to the pandemic. This study investigates the capital structures of Egyptian non-financial listed firms both before and after the COVID-19 outbreak. Accordingly, this research aims to respond to the following two inquiries: What is the nature of association that exists among capital structure and firm performance for the listed non-financial firms in the Egyptian stock exchange? What effect will the COVID pandemic have on the connection between capital structure and firm performance in March 2020?

This study adds to the understanding of the Egyptian firms' capital structure before and after the COVID-19 crisis. Contrasting these findings by those from the post COVID-19, other scholars might be encouraged to conduct additional studies in the future. This paper aims to offer assistance that might help businesses recover when the pandemic ended. The comparison analysis may offer superior understanding regarding how the COVID-19 pandemic impacted the firms. This research might also aid existing and probable capital providers by presenting information about the Egyptian firms' capital structure, which might be beneficial in selecting the best investment decision. The findings of this research may be generalized to developing

nations with comparable levels of development. The results, however, cannot simply be applied to all nations since, investors from various financial mindsets may reveal different trading attributes styles (Reitan and Sorheim 2000).

The reminder for this research is structured as following; the theoretical and empirical literature are presented in Section 2. In Section 3, the development of the hypotheses is discussed. Section 4 introduces the sample data and the methodology used. The empirical findings are discussed in Section 5. Finally, conclusion and suggestions, are presented.

## **2. Literature Review:**

A substantial number of studies has been published on capital structure; the next section will highlight the theories related with capital structure and the empirical results for the impact of capital structure on firm performance employed by prior research.

### **2.1 Capital Structure and Theory:**

Numerous earlier studies on capital structure have proposed theoretical models. To establish a strong association between the capital structure of a firm and the importance of funding choices, in an attempt of enhancing corporate performance. The MM Theory, which Modigliani and Miller published in 1958, demonstrates that a company's worth is unaffected by the amount of debt that makes up its capital structure. This theory is accepted only if the market was perfect

with no taxes or other costs imposed on the borrowing money. The MM Theory proved to be impracticable when it was applied to the business world, giving rise to a number of theories, including, trade-off theory, pecking order theory and agency theory. These theories differ in justifying how capital structure affects firm value. However, all theories asserts that capital structure had an influence on firm performance. Though, no one theory can adequately provide sufficient clarification for the complicated association between capital structure and firm performance.

For instance, the trade-off theory proposes that a firm's capital structure involves balancing the costs of paying the borrowed fund with the tax benefits of debts (Kraus and Litzenberger, 1973). Each company attempts to establish its own target when using the trade-off theory, aiming to achieve optimal structure, which varies based on the firm's characteristics, with the targeted debt-to-equity ratio (Myers, 1984). The trade-off theory, which maintains a negative correlation between a firm's success and its finance decisions, is replaced by the pecking order idea.

According to the pecking order, there are two rules' firms should follow: using internal resources and issuing safer financial instruments, respectively. In other words, fund generated internally, debt, and equity will be given priority. The motivation for this structure is typically due to the problem of information

asymmetry. The hierarchy is depending on the firm size and the development phase of the company. This is because each stage of growth has a unique level of information asymmetry and financial requirements. Typically called the "financial growth cycle". For instance, Ross et al., (2013) argued that in some situations when the executives plan to start a high-risk venture. The creditors due to inconsistency of data offer the new debt with high price similar to issuing equity. As a result, this creates significant issue since public offering could thus end up being less than a success because of the never-ending cycle of skepticism that occurred among executives and investors.

Agency theory, which was proposed by Jensen, Meckling, and Myers in 1976 and 1977 respectively, analyzes the influence of capital structure from a new perception of corporate governance. The theory generates conclusions that are similar to the trade-off theory because it is developed on earlier models. Managers, stockholders, and creditors are typically the three parties involved in agency issues.

First, there are conflicts of interest between executives and stockholders. This type occurs when executives own less than 10% of the firm's stocks, which leads to a reduced incentive for managers to raise the company's value (Jensen and Meckling, 1976). Thus, if the debt level drops, managers will have more control about using the company's free cash flows. As a result, they will be more focused on increasing their firm's size, which is



supposed to reflect their personal reputation, and are prepared to accept low-return projects and unnecessary physical assets. These variables cause managers to increase agency costs of equity, which lowers the firm's performance. In contrast, if the company is backed by more debt, the managers' capability to access cash flows is limited by the need to pay interest; as a result, they are obligated to make investments with higher efficiency and increase the performance of the company.

The second conflict is between creditors and stockholders. It appears when the risk-taking preferences of two groups of investors differ. Particularly shareholders might be convinced to either take on high-risk or shift to under investing projects (Ross, 2013; Westerfield and Jaffe, 2013). Regarding the first argument, investors who engage in high-risk projects will benefit more in case of success. They also will share losses with their counterparts in case of failure (Jensen and Meckling, 1976). Regarding the second argument, if a company has too much leverage, even if the NPVs are favorable. The high risk of bankruptcy will discourage shareholders from making additional investments. This causes the company to become under invested (Myers, 1977).

In contrast to, the optimal approach, Ross (1977) proposed the signaling theory, which assumes that the choice of debt-to-equity ratio is ascertained by a firm's propensity to send specific messages to investors rather than the optimum concept. Profitable

corporations will occasionally try to increase its stock price. This could be achieved by taking on more debt than necessary, deceiving the market into assuming that future growth prospects are more promising than they actually are. In fact, despite the executives' best efforts to mislead the public, it is believed that greater loan costs will prevent less profitable corporations from using higher leverage than superior-performing companies (Ross et al., 2013).

Moreover, according to Myers and Majluf (1984), managers are willing to issue new stocks only when it is thought to be underpriced. As a result, stockholders interpret the new issuance of shares as a bad sign, proposing that executives only do so when equity is fairly priced or overpriced. In summary, MM, agency and signaling among the five theories advocate for a positive relationship between firm leverage and firm financial performance. However, pecking order agency and trade-off theory propose a negative correlation.

## **2.2. Empirical Results on the Relationship between Capital Structure and Firm Financial Performance:**

The debate about whether capital structure impacts firms' financial performance has been continuing since 1958, when MM theory was originally proposed. In the stock market where the markets are inefficient. It's widely assumed that leverage can affect firm performance. This is theoretically accepted through various theories in previous studies. Though, the empirical analysis on this association offers a variety of findings.

There are several reasons for these contradictory results. Perhaps including the use of data from various countries and different time spans. Consequently, this makes it impossible to compare studies, as well as the tendency of business size to affect the interaction among capital structure and firms' financial performance. Additionally, it can be difficult to determine the relationship's causality in such investigations.

Numerous research had demonstrated that capital structure influences financial performance in developed nations positively (Mills & Mwasambil, 2022; Jouda, 2018; Margaritis and Psillaki, 2010; Berger and Di Patti, 2006). However, other empirical studies have evaluated the correlation in developing nations (Opoku-Asante et al., 2022; Jaisinghani and Kanjilal, 2017; Hamid et al., 2015; Chechet and Olayiwola, 2014), and these studies have demonstrated that the association that occurs between the firm's leverage and firms' performance has a significant negative impact. Table 1 provides summary of prior empirical research that examined the association between capital structure and firms' financial performance.

**Table 1: Summary of Some Related Past Studies:**

Authors	Year	Sample	Time span	Results
Chechet and Olayiwola	2014	Nigeria	2000–2009	-
Hamid et al.,	2015	Malaysia	2009 - 2011	-
Opoku-Asante, K., et al.	2022	Ghana and Nigeria	2014 -2019	-
Jaisinghani and Kanjilal	2017	India	2005–2014	Non-linear relationship
Mills & Mwasambil	2022	Ghanaian	2010- 2017	+

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Jouida	2018	France	2002–2012	+
Margaritis and Psillaki	2010	France	2002–2005	+
Berger and Di Patti	2006	USA	1990– 1995	+

No matter how developed a nation is, firm size can be used to determine how the capital structure can affect firm's financial performance positively. Ibhagui & Olokoyo (2018) revealed a negative influence of capital structure on firm's financial performance based on a sample of 101 small non-financial firms in Nigeria from 2003 to 2007. Though, when firms were quite large, the influence tended to be positive. Additionally, Jaisinghani & Kanjilal (2017) concluded that the manufacturing firms in India with firm size larger than others performed better when their leverage ratio was higher (148 million rupees). Furthermore, Saona & San Martin (2018) findings showed that nation level and firm size matter in the case of Latin American companies.

Firms' growth has an indirect association with capital structure, this is similar to trade-off and pecking order theories assumptions. Firms with high growth prospects tend to favor internal financing since it has relatively low distress costs, and this is aligned with trade-off theory (Chaklader & Chawla, 2016). Consistent with the pecking order theory, rapidly expanding firms had much less leverage as the debt disciplinary function decreases managers with self-interest. Firms' growth affects

capital structure positively (Nguyen and Duong, 2022; Pathak and Chandani, 2021).

Allen et al., (2012) investigated the association between dividend payouts and company debt. Using loan-specific data, the findings revealed that there is a significant negative association between a company's dividend disbursements and the degree of its reliance on bank loan financing. It was recognized that the finance provided by bank loans limits dividend payouts. Additionally, the existence of bank monitoring as a powerful governance tool results in lowering dividend payouts. Corporate governance and bank supervision are complementary approaches to solve agency issues. Since in times of excessive debt, management typically offers fewer payouts.

The OECD (2020) predicts an interruption in macroeconomic policy and economic growth as a consequence of lock down prosecution in many nations subsequent of the COVID-19 pandemic. It was verified that most of nations, particularly Japan and the United States, initiated substantial financial programs to aid in the recovery of their collapsing financial systems. For the first nine months of 2020, Japan and the United States each authorized \$1.7 trillion and \$3 trillion, respectively. Complementary, the Egyptian government has started a 100 billion EGP emergency financial stimulus initiative, in order to prevent dramatic loss and negative social and economic effects.

Most companies, especially with high leverage, may experience monetary difficulties as a consequence of COVID-19 adverse effects on their economic condition (Huang & Ye, 2021). Successful, low-leverage companies are regarded to have greater financial flexibility since loan financing is easier to obtain. Firms will be at more risk as their dependence on borrowed funds increases. Such companies may experience a solvency challenge in terms of the shortage of cash flows. Companies had to change their financial systems as a consequence of the COVID-19 epidemic.

### **3. Development of Hypotheses:**

Trade-off theory predicts that profitable companies will have higher levels of leverage due to the increased ability to maintain debt and tax advantages (Pathak & Chandani, 2021; Khémiri & Noubbigh, 2018). Therefore, although these companies probably have large financial commitments, there is also a positive association between leverage and profitability (Chaklader & Padmapriya, 2021; Dakua, 2018; Frank & Goyal, 2009; Gunardi et al., 2020). The pecking order theory, on the contrary, argues that successful companies will have more retained earnings and fund their activities with internal funds. Debt financing decreases the quantity of cash available for managerial purposes because debt repayment is necessary. Thus, profitability and leverage have a negative association. Previous studies (Kaloudis et al., 2020; Khoa & Thai; Fama & French,

2002) supported these findings empirically. In light of previous studies, the first hypothesis is formulated:

**H1: capital structure has a significant negative impact on firm performance.**

COVID's moderating influence on the association between capital structure and firms' financial performance is not supported by empirical research. However, there is evidence that a COVID pandemic can have a detrimental influence on important financial decisions implemented by firms. Thus, the second hypothesis is formulated:

**H2: COVID pandemic has a significant negative impact on the relationship between capital structure and firm performance.**

#### **4. Methodology:**

##### **4.1 Sample of the Study:**

Collis and Hussey (2013, p. 222) stated that "the population may refer to a body of people or to any other collection of items under consideration for research purpose". Thus, the target population must align with the research objectives. Consequently, the target research population is the listed firms in the Egyptian stock exchange. Eligibility criteria required that all non-financial firms that have been actively operating and listed in the EGX 30 in 2021 to be involved in the sample. A total of 23 active firms were operating and publicly listed in the EGX 30 covering the period from 2014 until 2021 quarterly were selected to test H1 and H2.

This time span was designated for mainly two reasons: first, it is the period during which the Egyptian market had experienced the currency revaluation and had recovered; consequently, this clarifies how firms' capital structure has changed during these periods. Second, to measure the effect of COVID on the Egyptian market and how the Egyptian firms has responded to this challenge.

#### **4.2. Data Collection:**

Two sources provided the secondary data used in this research. First, the annual financial reports of firms from quarter 1 2014 until quarter 1 2021 on quarterly basis. The financial reports were collected from Egypt for Information Dissemination (EGID). Additionally, the quarterly stock prices for the firms have been extracted from the Egyptian Stock Exchange.

#### **4.3. The Variables:**

##### **4.3.1. Firm Performance:**

Performance of the firm serves as the research's dependent variable. The accounting-based measures for the firm performance are the return on assets (ROA) and return on equity (ROE). ROE is calculated by dividing the firm's net income over the firm's total equity. While ROA is calculated by dividing the firm's net income over the firm's total assets. Finally, the stock price per share serves as a benchmark for market-based financial performance. In the literature, these measures are frequently employed (Abor, 2005; Ibhagui & Olokoyo 2018; Jouida, 2018;



Lins et al., 2017; Tong & Green 2005; Gok & Peker, 2017; Kalkan et al.,2014).

#### **4.3.2. Capital Structure:**

The capital structure of a firm is the mixture of debt and equity that is used in financing its firm's assets (Geske et al., 2016). Capital structure as it relates to leverage is the main explanatory factor in this research. The literature used three different indicators to assess capital structure: first, short-run debt to total assets ratio; second, long-run debt to total assets ratio; third, total debt to total assets ratio. According to prior studies (Fosu 2013; Bandyopadhyay & Barua 2016; Ibhagui & Olokoyo 2018; Margaritis & Psillaki, 2010), the leverage is measured in this research by dividing total debt over total assets.

#### **4.3.3. Control Variables:**

The multi regression model, which aims to control for firm characteristics, uses a number of control variables to capture the impact of capital structure decision on firms' financial performance. The three controlling variables are firm size, dividend to price ratio, and growth rate. A dummy variable (0,1) is used to assess how COVID affects the performance of listed non-financial firms on the Egyptian stock exchange. The performance of the company is likely to be significantly influenced by the growth rate, dividend, and firm size (Bandyopadhyay & Barua 2016; Basit & Hassan 2017; Jouida 2018; Le & Phan 2017). Margaritis and Psillaki (2010) stated that

well-managed, larger, more successful firms are more profitable. On the contrary, dividend payments have a positive correlation with firm success (Khan et al., 2016), since they may enhance market perceptions of the company and consequently increase the firm's return. The variables used in the study are listed in Table 2 together with their measurements and calculation.

**Table 2: Descriptions of Variables:**

Variable	Category	Proxy	Description
ROA	Dependent	accounting based financial performance	net income/ total assets
ROE	Dependent	accounting based financial performance	net income/ total equity
Stock price	Dependent	market based financial performance	Price per share in stock market
Capital structure	Explanatory	leverage	Total debt/total assets
Firm growth	Control	sales growth	Log sales revenue
Dividend yield	Control	dividends	Share's dividend/share's market price
Firm size	Control	firm size	log total assets
COVID	Control	COVID pandemic	it takes a value 0 pre COVID (Q1 2014 till Q1 2020); it takes a value 1 post COVID (Q2 2020 till Q1 2021)

#### 4.4. Method:

The statistical analysis techniques used in this research are descriptive statistics which describe the key features of data. Correlation analysis which quantifies the direction and strength between the two variables' linear relationship. Furthermore, to analyze the data and examine the hypotheses in this research, a mixed model is employed. Following prior research, the linear mixed model is applied because it enables a broad range of correlation patterns (Groening et al. 2016; Jayachandran et al. 2013). Moreover, the mixed model's analysis compensates for correlated data that emerge often in statistical studies, thus, delivering a general, flexible approach in these instances. Unlike how a standard linear regression model has only fixed effects, a mixed-effects model includes both random and fixed effects. Linear predictors from conventional Ordinary Least Squares (OLS) are analogous to "fixed" effects. On the other hand, the "random" effects are considered dispersed according to a probability density function developed empirically.

Le and Phan (2017) and Wahba (2014) proposed a linear association between capital structure and firms' financial performance, and this research follows the same model.

$$FP = \beta LEV + \gamma + \varepsilon$$

where  $FP(t)_j$  is the accounting and market based financial performance of firm  $j$  at time span  $t$ ,  $LEV(t)_j$  is the leverage ratio

for firm  $j$  at time  $t$ ,  $\gamma$  represents control variables (firm growth, dividend, firm size and COVID) and  $\epsilon_j$  is the error.

The relationship between capital structure and firms' financial performance is examined based on the following models and the results are then analyzed:

$$ROA(t)_j = \beta_0 + \beta_1 TDR(t)_j + \beta_2 GROW(t)_j + \beta_3 DIV(t)_j + \beta_4 SIZE(t)_j + \beta_5 COVID(t)_j + \beta_6 TDR(t)_j \times COVID(t)_j + \epsilon_j$$

$$ROE(t)_j = \beta_0 + \beta_1 TDR(t)_j + \beta_2 GROW(t)_j + \beta_3 DIV(t)_j + \beta_4 SIZE(t)_j + \beta_5 COVID(t)_j + \beta_6 TDR(t)_j \times COVID(t)_j + \epsilon_j$$

$$STP(t)_j = \beta_0 + \beta_1 TDR(t)_j + \beta_2 GROW(t)_j + \beta_3 DIV(t)_j + \beta_4 SIZE(t)_j + \beta_5 COVID(t)_j + \beta_6 TDR(t)_j \times COVID(t)_j + \epsilon_j$$

where  $ROA(t)_j$  is the return on assets ratio that is used to measure the accounting based financial performance of firm  $j$  in year  $t$ ;  $ROE(t)_j$  is the return on equity ratio that is the second measure of the accounting based financial performance of firm  $j$  in year  $t$ ; whereas  $STP(t)_j$  is the of stock price per share that is used to measure firm  $j$  market performance in year  $t$ ;  $TDR_j$  is total debt to total assets for firm  $j$  at time  $t$ . The;  $GROW(t)_j$  is logarithm of total sales for firm  $j$  at time  $t$ ;  $DIV(t)_j$  is the dividend per share to price per share at the end of the year  $t$  for firm  $j$ ;  $SIZE(t)_j$  is the natural log of the total assets to measure firm size

at the end of the year  $t$  for firm  $j$ ;  $COVID$  is a dummy variable which gives 0 to pre-COVID period and 1 to post-COVID period and takes quarters 2 – 2020 till quarter 1 2021 as the period during which the economy was affected by the crisis;  $TDR(t)j \times COVID$  is an interaction of leverage and COVID, aiming to identify the moderating role of COVID pandemic on the association between capital structure and firms' financial performance and  $\varepsilon_j$  is the random error term.

## 5. Data Analysis and Findings:

### 5.1. Descriptive Statistics:

The descriptive statistics for the indicators used for measuring firm performance, capital structure, and the control variables are summarized in Table 3. The mean, standard deviation, minimum value, maximum value, and other descriptive statistics are helpful for identifying the attributes of the sample. Also, for checking for any violations of the assumptions underlying the mixed models that will be used.

**Table 3: Descriptive Statistics of Firm Performance and Capital Structure**

Pre COVID:				
	Minimum	Maximum	Mean	Std. Deviation
ROA	-.13900024	3.52855340	.1448510058	.28940822206
ROE	-.74933842	3.52855340	.1875205119	.32895192499
STP	.41000000	360.33000000	25.4132816532	58.38690452407
LEV	0.00000000	2.57376622	.3099353491	.44239954885
GROW	2.14612804	7.50395900	6.4883317756	.70283897241
SIZE	5.28380309	8.07149718	6.8395906053	.57288927589

DIV	0.00000000	30.07000000	3.7398707287	4.91549087752
COVID	0	0	0	0
Post COVID				
	Minimum	Maximum	Mean	Std. Deviation
ROA	-.23483191	1.20311086	.1140598710	.23073146750
ROE	-.38818839	1.20311086	.1861585618	.28180791296
STP	1.15000000	217.47000000	20.9909722222	49.56198484016
LEV	0.00000000	1.98403256	.3507392908	.46647415691
GROW	5.78296111	7.56923298	6.7391347090	.47891246834
SIZE	6.06289096	8.14198821	7.0074670630	.53279282463
DIV	0.00000000	14.77000000	3.4647221528	4.42710758198
COVID	1	1	1	0

Based on the COVID pandemic in Q2 2020, the sample has been divided into two sub samples. The mean of the leverage ratio generally explains 0.309 and 0.350 during the periods Q12014-Q1 2020 and Q2 2020-Q1 2021, and extensively disperses from 0 to 2.57 and from 0 to 1.98, respectively. These ratios assert the fact that Egyptian non-financial listed firms are higher leveraged after COVID. The ratios also illustrate that firm leverage increased by an average of 0.0401 post-COVID compared with pre-COVID. This shows that the capital of Egyptian listed firms became more leveraged after COVID pandemic.

The average *ROA*, *ROE* and *stock price* overall clarify 0.144, 0.187 and 25.4 throughout the Pre COVID period from

Q12014- Q1 2020 and extensively diffuses from  $-0.13$  to  $3.52$ , from  $-0.74$  to  $3.52$ , and from  $0.41$  to  $360.33$  respectively. These results show the presence of a significant gap in the accounting-based measures and market based financial performance among Egyptian listed firms in this period. Though, the average of *ROA*,  $0.114$ , to some extent decreased post-COVID period, and was less widely dispersed, from  $-2.34$  to  $1.20$ . Similarly, the average of stock price decreased to  $20.99$  with wide dispersion from  $1.5$  to  $217$ . However, the average of *ROE* reduced by  $0.001$  and was less scattered  $-0.388$  to  $1.20$ . These ratios demonstrate that the mean of firm performance, using the *ROE*, was the same before and after COVID. While the average firm performance based on market measure and based on the accounting- measure *ROA* decreased. The measures of the average control variables sustained to be the same after COVID.

## 5.2 Correlation Matrix:

The correlation matrix, which assesses the association between the variables employed in the regression models, is shown in Table 4. The findings indicate that none of the correlations between the explanatory factors appear to be at a problematic level. The *ROA* and *ROE* have the strongest positive association, with  $0.652$ .

*ROA* is weak and positively correlated with stock price and leverage. However, *ROA* is weak and negatively correlated

with sales growth and firm size. Finally, ROA is moderate and positively correlated with dividends. ROE is weak and negatively correlated with leverage. Additionally, ROA is moderate and negatively correlated with firm size. However, ROE is weak and positively correlated with dividends. Stock price is weak and positively correlated with firm size and sales growth. Leverage is moderate and negatively correlated with sales growth and dividends. Sales growth is weak and positively correlated with dividends and COVID is moderate positive with firm size. Firm size is weak and positively correlated with COVID.

It is essential to realize that the predictor variables are not perfectly associated, and all of the correlation coefficients are moderate. Multiple regression model's explanatory variables cannot be accurately predicted linearly from the others. (Enders, 2008). As a result, there are no multi-collinearity issues with the data, and the predictors from this study can be employed into a single regression model.

**Table 4: Correlation Matrix**

**Correlations**

	ROA	ROE	STP	LEV	GROW	SIZE	DIV	COVID
ROA	1							
ROE	.652**	1						
STP	.275**	.045	1					
LEV	.293**	-.184**	.049	1				
GROW	-.171**	-.049	.232**	-.555**	1			



SIZE	-.339**	-.438**	.358**	.056	.550**	1		
DIV	.414**	.177**	-.075	-.419**	.232**	-.074	1	
COVID	-.039	-.002	-.050	.032	.126**	.102*	-.021	1
** . Correlation is significant at the 0.01 level (2-tailed).								
* . Correlation is significant at the 0.05 level (2-tailed).								

### 5.3. Regression Model:

Following previous related studies (Groening et al., 2016; Jayachandran et al., 2013), a linear mixed model is employed. Linear mixed models which account for correlated data that arise frequently in statistical analyses. Dividing the overall error variance into within-firms and between-firms variance components, linear mixed models take into account dependence within firms and heterogeneity across firms, respectively. Particularly, linear mixed models enable the modelling of fixed effects related to the marginal mean firm response (Fitzmaurice et al., 2012). Finally, the maximum likelihood method for model estimation was used to build the linear mixed model.

**Table 5: Mixed Models:**

Parameter	Model 1		Model 2		Model 3	
	ROA		ROE		STP	
Parameter	Estimate	t	Estimate	t	Estimate	t
LEV	-.143070	-5.391***	-.503266	-6.800***	-.160874	-1.971**
GROW	.066756	4.403***	.146062	3.218***	.797751	11.192***
SIZE	-.054313	-3.109***	-.132304	-2.772***	-.083297	-1.153
DIV	-.000719	-1.179	-.003599	-2.252***	-.007840	-4.372***
COVID	-.045410	-2.666***	-.129653	-3.141***	-.148175	-3.039***
LEV * COVID	.140489	2.067***	.631106	3.782***	.036870	.431

The results of the linear mixed models are shown in Table 5. The findings highlight the negative and significant effects of capital structure based on leverage ratio on accounting and market-based financial performance. According to Model 1's results, the ROA would only slightly fall by 0.14 at the 99 percent confidence level for every unit increase in the overall debt ratio. In a similar vein, Model 2's results show that every one unit rise in debt ratio resulted in a 0.50399 decline in ROE. Additionally, one unit increase in the overall debt ratio would have an effect on the stock price, causing it to fall by around 0.160. As can be shown, the leverage ratio has a more significant impact on ROE than ROA. Therefore, for the period of Q1 2014 to Q1 2021, the capital structure has a negative impact on the financial performance of non-financial firms listed in Egypt.

Sales growth had a significant positive impact on financial performance since one unit increase in sales boost ROA and ROE by 0.066, 0.1460 and the stock price by 0.795, respectively. The accounting-based firm's financial performance is significantly and negatively impacted by the firm's size as determined by the book value of its total assets. This shows that one unit increase in company size results in a drop of 0.0543 in ROA and decline of 0.132 in ROE. The dividend payout ratio has a marginally negative impact on ROE and stock price with -0.00359 and -0.0078, respectively.

Most crucially, in all three models, the COVID dummy variable coefficients are negative at the 1% level of significance, showing that firm performance as assessed by accounting and market-based measures has dropped post-COVID from Q2 2020 to Q2021. This would suggest that the Egyptian non-financial firms performed less as a result of COVID. The three models in this analysis adjusted for the interaction between TDR and COVID to fully understand how COVID affects the relationship between capital structure and firm performance. The findings demonstrate that the interaction terms in ROA and ROE models are significant, indicating that the COVID pandemic significantly influences the impact of capital structure on firm's performance.

#### **5.4. Results:**

The results indicated that there is a negative association between Egyptian non-financial firms' capital structure and financial performance. These findings support the research hypotheses, which anticipated a negative association between capital structure and firms' financial performance. These results are consistent with the pecking order theory, which presumes that profitable firms will have more retained earnings and finance their operations internally. The usage of debt financing will reduce the amount of cash available for managerial purposes because debt repayment is required. Thus, the higher rise of debt to assets will results in maximizing financing costs, and this will reduce net income. Hence, there is a significant negative

relationship between accounting based financial performance and leverage. This relationship is affirmed by (Fama & French, 2002; Kaloudis et al., 2020; Khoa & Thai, 2021; Moradi & Paulet, 2019; Nguyen and Duong, 2022; Saif-Alyousfi et al.,2020). Additionally, there is a significant negative relationship between capital structure and stock price and this could reinforce the idea that Egyptian stock market traders view the market as gambling. (Reilly & Brown, 2011). The results are consistent with previous studies (Adair & Adaskou, 2015; Detthamrong et al., 2017; Jouida, 2018; Margaritis & Psillaki, 2007)

Additionally, the results indicated a decline in firm performance following COVID. In other words, stock prices, ROA, and ROE were greater before COVID than they were after. According to expectations, the Egyptian non-financial listed firms' performance has been negatively impacted by the COVID pandemic. These outcomes are in line with (Abdullah, 2013; Devalle et al.,2010; Li et al.,2017).

The findings revealed that larger firms in Egypt have lower profitability than small firms. These results are in line with Margaritis & Psillaki (2010). The logic beyond this is that the time frame of the research covers two important periods where the Egyptian society suffered from devaluation of currency and COVID. This was a real burden on large firms to behave in socially responsible manner. Since large companies believe that

companies can attain the sustainable success from economic, social and environment perception in the long-run future, only through the continually commitment of implementing the corporate social responsibility pillars, which add more expenses on the firms and in turn lead to less profits.

In contradiction of the results of Khan et al., (2016), results showed that dividend yield has a significant negative influence on firm performance either on ROE and stock price. The logic beyond this is that if the dividend yield is extremely high. It may reveal less possibility a firm will be capable to keep paying such dividend in the long run. This indicates that the firm isn't investing in the growth of the firm with high percentage of its income. Besides since the stock price is indicator of the future cash flows, future dividend payout is incorporated into the share price; Therefore, the stock price will decrease.

## **6. Conclusion and Discussion:**

As a consequence of the COVID-19 pandemic, firms were obliged to modify their business plans in order to become more resilient in an unstable market condition. Due to the difficulty of maintaining their operation, firms lead to finance their operations through more borrowing. One of the most crucial considerations is debt finance, which will affect the long-term stability of the firms. In light of the COVID pandemic, the primary objective is to empirically analyze the relationship between firm performance

and capital structure in Egypt. The results of the empirical study showed a negative relationship between financial performance and capital structure in the non-financial Egyptian listed firms. Results showed that over the period of Q1 2014 to Q1 2021, a one unit rise in total debt ratio causes a fall in ROA, ROE, and stock price of roughly 0.143, 0.503, and 0.160, respectively.

Various arguments could be used to explain the paper's findings. According to one of these viewpoints, a firm with a capital structure that is particularly borrowing must pay out more in interest every year, which lowers net profit. Another indirect effect of capital structure on profitability is its impact on the potential availability of additional capital if it is needed in the future. It may be challenging to secure more funding for a firm with an extremely large debt burden since both lenders and potential shareholders may view the company as risky investment. In turn, limited access to capital investment restricts the company's ability to grow, keeping profit margins lower, especially when inflation is taken into account.

Furthermore, despite the fact that taking on a lot of debt would place a lot of pressure on executives to focus more on successful projects. In order to gain enough cash to pay the interests and prevent probable insolvency. Egyptian firms experienced overstated inflation rates, which restricted their ability to increase profits. Finally, the fact that debt ratio has a negative effect on a firm's success in the market may be a sign

that Egyptian investors favor shares of less risky firms when making investment selections.

Thus, research entails two main limitations. First, this research generally focuses on the non-financial firms regardless of their sectors. Future studies might concentrate on particular industries, depending on how the COVID-19 pandemic affects each sector separately. Second, since this research is only considering Egypt and the influence of COVID pandemic on the association between capital structure and firms' financial performance. In order to compare the effect of COVID on the association between capital structure and firm performance, it is suggested that future studies involve different countries. In that way, the generalization problem could be solved.

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