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# How Do The Environmental Aspects Affect The Oil Drilling And Extraction Sector? Evidence From Firm-Level Data

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# How do the Environmental aspects affect the oil drilling and extraction sector? Evidence from Firm-level Data

A Thesis Submitted by

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## 1. Introduction:

Middle East countries dominate more than 50% of the total global oil reserves. Also, such region is responsible for more than one-third of the oil world's production (Basquill, 2022). Recently in 2022, the World Bank is anticipating an upward trend in the Oil revenues especially for the Middle East and North Africa (MENA) region (Arabnews, 2022). It is expected that such revenues will increase to be up to 5.3% (WorldBank, 2022). This will mainly take place due to the rise in oil revenues and several structural reforms in some of the MENA countries (Arabnews, 2022).Furthermore, there was a remarkable increase in the oil & gas contracts signed in June 2022 which reached 47 contracts. This increase reached more than 62% (Carmen, 2022).

Accordingly, there will be an offset between maintaining the boom in oil revenues and achieving reduction in environmental degradation. The highly dependence on oil production and extraction in the MENA region in the upcoming years will result in a tremendous increase in the $CO_2$ emissions especially after the Covid-19 recovery (Carpenter, 2021). Lately, there have been recognizable efforts adopted to attain decarbonisation and maintain sustainable development (Lienard, 2022). Yet, there are still negative significant impacts of oil firms on the environment (Basquill, 2022).Also, the adverse consequences that the oil firms in the MENA region cause will have long-term negative effects on several global aspects. These effects may include having a rise in temperatures and droughts (IEA, n.d.).

So, the tradeoff that occurred and still occurs till now between sustainability and growth is a crucial topic that needs to be considered. The oil firms especially the companies responsible for the internal process of the oil production such as: refinery, drilling and extraction emit vast emissions. Therefore, it is extremely vital for the researchers and policy makers to put into consideration the effects of the environmental performance on firms' productivity and profitability. Such effects need to be examined in particular in the MENA region due to the existence of the top oil companies and the highly dependence of such countries on oil. Also, this thesis is important to focus on the MENA region due to their high level of environmental degradation and lack of considerable environmental awareness. For example, Morocco usually unfortunately emitted large amount of emissions in 2022 due to forest fires. These emissions were the main reason behind the hot and dry conditions in the country (Abnett, 2022).

The main goal of this thesis is to examine the impact of oil firms' emissions and oil firms' productivity variables on their Market Value in the selected MENA countries such as: Egypt, Gabon, Morocco & Tunisia starting from year 2000 till year 2020. The thesis will

mainly focus on examining such impacts in the top five oil drilling and extraction companies in the region. These companies are: Alexandria Mineral Oils Company & Group for Industrial Commercial and Financial Investment in Egypt, Total Energies EP in Gabon, Ste de Transport des Hydrocarbures par Pipelines SA in Tunisia & Total Energies Marketing Maroc SA in Morcco.Therefore, the main research objectives will include:

1. Examining the impact of the firm's internal variables such as: total Capital expenditure, Employees, Net Sales, Market Capitalization on the Market value of the selected oil firms.
2. Testing the effect of Unemployment rate as a macroeconomic variable on the market value of the selected oil firms in the five countries.
3. Investigating to what extent do the environmental variables like: $CO_2$ emissions metric tons per capita & annual average temperature will have a significant impact on the market value of these firms.
4. Studying the status of these firms by examining the total debt & dividends status.

Extensive literature tested empirically the relationship between the environment and the oil production. Such a crucial topic was examined throughout several papers using macro-economic data. Unfortunately, there are few papers examining the impact of environmental concerns on the oil firms. Furthermore, the papers discussing such topic in the MENA region were limited. Therefore, this thesis extends the literature of the previous studies already established on the impact of Oil production of drilling firms on the economic performance of various countries by developing an econometric model illustrating this.

First of all, the thesis examines the impact of macroeconomic, environmental & firm-level variables on the performance of the selected oil firms in the MENA region. This examination is completely variant than the previous studies. Moreover, the paper encompasses various variables included in the previous papers such as: $CO_2$ emissions, Capital, employees & market capitalization. Additionally, the paper will include several other variables like: Net sales, annual average temperature & unemployment. Also, the thesis will examine the impact on the market value of the selected oil firms. This was not available in the majority of the mentioned previous studies.

The thesis concluded that the increase in the mentioned environmental variables had a negative impact on the market value of the oil firms in the MENA region. The surprising part was that the total capital expenditure adversely affected the market value which did not match with the previous studies. While on the other hand, net sales didn't have a significant impact on the financial performance of other firms in the previous papers yet it did positively affect the market value of oil firms. Also, unemployment rate did negatively

impact the market value but this was incompatible with the previous empirical studies. It is very important to investigate the policies that can be implemented in the MENA region in order to increase the performance of the oil firms without negatively affecting the environmental situation.

Last but not least, the thesis will be divided as follows: background section that deeply describes the situation of the global average temperature in contrast with the selected MENA countries situation. After that, there will be a conceptual model explaining the connection between all the variables included in the thesis while discussing their importance. Then, the literature review will explain all the correlated theories with the thesis' topic and the previous empirical papers similar to the topic discussed. Moving to the data and descriptive statistics which describes the nature and meaning of all the mentioned variables. Also, the following section will be concerned with the methodology and results which deeply explains the regression analysis of the model used in the thesis. Finally, the conclusion will discuss and sum up all the results of the paper following it the recommended policies that can be implemented to develop and improve the market value of the selected oil firms.

## 2. Background:

This section mainly focuses on the analysis of the changes in the environmental variables which is mainly the annual average temperature throughout the previous 20 years in the four selected countries. This will definitely reflect later on the results need to be examined in the following sections.

### 2.1. Annual Average temperature background

### Figure 1: MENA region Annual Average Temperature facts:

The following graph presents the fluctuations that took place in the annual average temperature in the mentioned MENA countries which are: Egypt, Gabon, Morocco & Tunisia. Annual average temperature is defined as the mean of the estimation of the hottest and coldest months throughout the year (How To Calculate Average Annual Temperature, 2021).
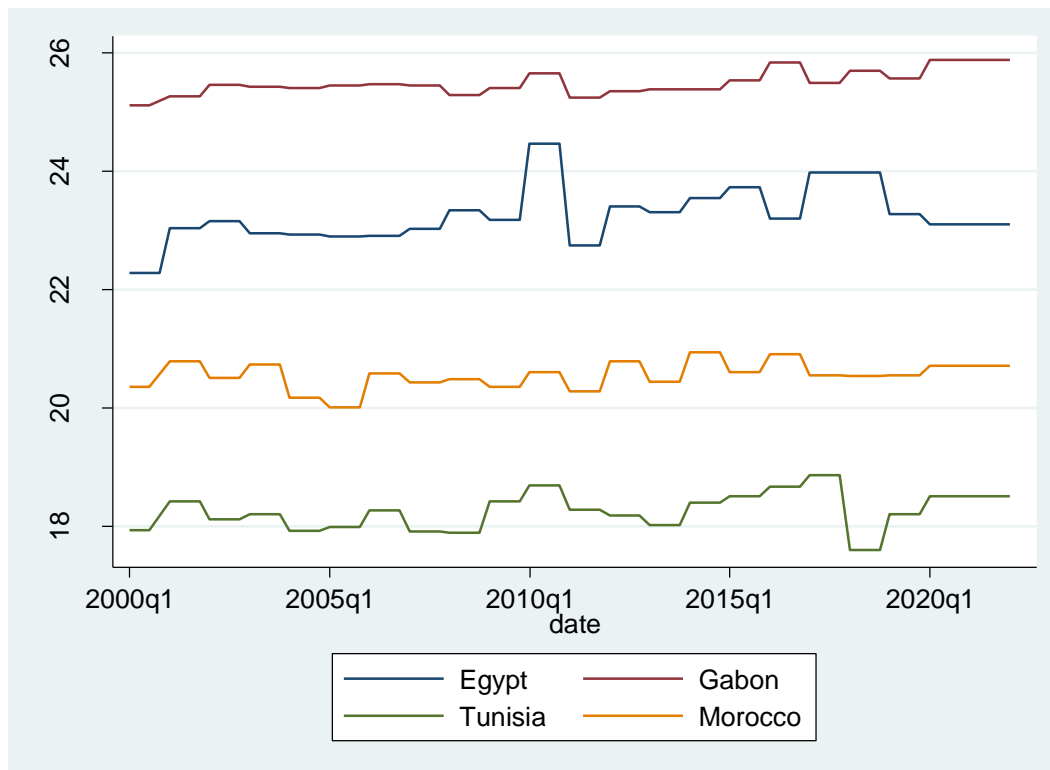


From the above graph, there are some of the selected MENA countries do not have wide variation in their annual average temperature. The first country which is Egypt had a rise

in its annual average temperature as time passed. Usually, Egypt is one of the countries that is known with its noticeable location and its special weather throughout the whole year. One of the main reasons behind the changes in the average temperature is the variability in the flow of the Nile river and the rise in the sea level. This can negatively affect crop production and water security. Also, the changes in average temperature will consecutively cause changes in the precipitation (Ramadan, 2019).

Moving to Gabon, the country is full of hills which cover more than 75% of the country's area. The country is exposed to a moist hot temperature especially in the tropical regions. The hot temperature remains mainly throughout the year (Climate Change Knowledge Portal, 2021). The main reason behind such a constant rise in the temperature is having high carbon emissions. It's expected that the rise in temperatures will remain like this in the upcoming years (GFDRR, 2020).

Concerning the next MENA country which is Morocco that is represented here in this graph was prone to rise in the annual average temperature due to its geographical location. Morocco regions are usually prone to droughts, heat waves, changes in the patterns of rainfall. Also, sometimes the country experienced floods and rise in the sea levels. Also, some of the Moroccan beaches are threatened of erosion and having storms (GIZ, n.d.).

Moreover, the following country which is Tunisia and illustrated here in the graph suffered from a consequent rise in its temperature. Tunisia is considered as one of the top countries that are vulnerable to climate change. Tunisia is located between the most tempered areas of the Northern Hemisphere and inter-tropical regions. Also, the rise in the sea level stands as a major cause for the changes and rise in the annual average temperature of the country (RADHOUANE, 2013).

- Figure 2: Conceptual Model: The following model will demonstrate the main research problem and what are the main concerns from this thesis paper.
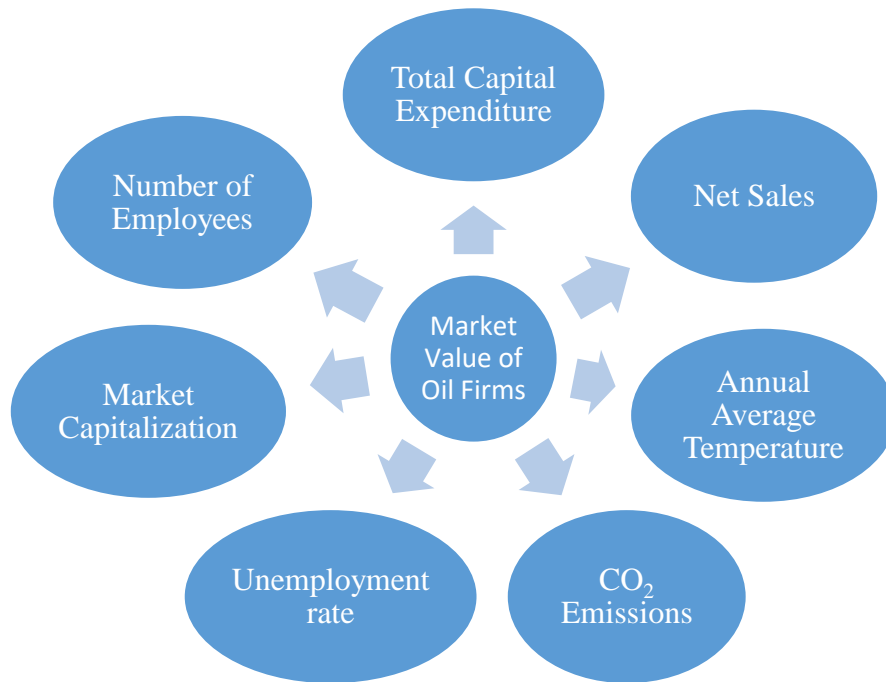


This conceptual framework illustrates the relationship between the market value of the oil firms mentioned before in the MENA region and several variables. These variables are divided into three main subgroups. First subgroup is the internal firm variables group. These variables basically are mainly measuring the internal performance of the oil firms which will have a definite impact on the market value of such firms. These firm variables here mentioned are: Number of employees, Market capitalization, Net sales and Total capital expenditure. The impact of each and every firm variable on the market value will differ based on the previous empirical studies that will be mentioned in the upcoming section.

The second subgroup which is concerned with the macroeconomic variables and its impact on the market value of the oil firms. There are several external macroeconomic variables that can be affecting the performance of such firms. There were many trials for adding some macroeconomic variables such as: inflation rate but due to its insignificance it was removed from the model and thesis. The only macroeconomic variable mentioned was the unemployment rate. Unemployment rate as a macroeconomic indicator reflects the shortage or surplus in the job opportunities that people are seeking for in the MENA region. So, having high unemployment rates may give an indication for the limited job

opportunities available in such oil firms. This may be mainly due to the urgent need for highly skilled and capable employees in such sector.

The last and the most important subgroup is the environmental variables. The mentioned environmental variables included in the thesis are: the carbon dioxide emissions and the annual average temperature. Generally, there and will always be a tradeoff between increasing production and achieving environmental sustainability. Increasing production in any sector means more pollution and more environmental degradation. What some countries and firms are trying to achieve now is to increase production while preserving the usage of the resources needed during the production process. This is very important to be examined and solved as increase in the emissions will therefore affect the temperature and cause fluctuations in the nature conditions. Accordingly, measuring the impact of changes in the environmental variables on the market value will urge policy makers to point out any solutions or recommendations that can be applied to reduce the emissions and changes in temperature that will therefore have a major impact on the market value of the oil firms.

## 3. Theoretical Literature review:

Moving to the literature review, there are various theories that realized the importance of the resources whether human, natural or technological in accumulating and achieving growth and development. Therefore, this section includes several theories about the resources that are needed for increasing the production whether on the macro or micro level. In addition to this, theories related to the environment will be further explained in details.

### 3.1. Theories of Production:

#### Solow Growth Model:

Generally speaking, natural resources are and will always play a dominant role in the economic growth of any country or any economy. One of the main players of any of the economies is the oil. Oil was always the source of the economic growth and development. Therefore, there are several theories that can be categorized as growth theories that help in stimulating growth and development of any economy. One of these growth well-known theories is the "Solow growth model". The Solow growth model which was initiated in 1956 mainly is concerned with the long-term growth achievement. This can take place

through the accumulation of capital, changes in the rates of population and the technological advancement (Aymen Alajly Eshawish, 2020).

There are several assumptions for the Solow growth model to be successfully explained. First of all, the model assumed that there is a constant rate for the increase in the population growth. Another second assumption that was included was that all the consumers save a constant amount of their incomes and consume the rest of it. The third assumption anticipated that all the firms in the economies used the same technologies which used labor and capital as production inputs. Also, the Solow growth model projected that the production function demonstrated constant returns to scale (CFI Team, 2022).

## Endogenous Growth Theory:

This theory is a more financial theory that correlated the economic growth that happens due to internal forces rather than external inputs or resources. Mainly, the theory focused on increasing the productivity through the increase in the skilled labor or the rise in the most advanced updated technology. These internal resources can lead to achieving sustainable growth for the firm (Gordon, 2022).

There are numerous assumptions for such theory to be successfully implemented. First of all, there is an urge for the governmental support towards the private sector whether through subsidies or incentives for such firms. This encourages the private sector firms for investing in the research and development which leads to greater innovation. Unlike the Solow Growth model, this theory exhibits increasing returns to scale. This can be achieved through human capital investment which will consequently improve the skills and the productivity of the labor. Moreover, there should be further investments regarding the improvements in infrastructure and manufacturing which reflects positively on the production and productivity (CFI Team, 2021).

## Hubbert's Peak Oil theory:

This theory was developed by the geologist M. King Hubbert in 1956 which mainly explained the time when the peak rate of the international crude oil production was reached (Holst, 2018). At first, such theory was initiated due to the wide gap between the rate of oil consumption and the discovery of the new reserves. Therefore, Hubbert developed the well-known "Hubbert Curve" which illustrated that the global oil production will be bell shaped symmetric curve. Such theory was mainly focusing on the estimation of the oil production in the lower 48 states in the U.S. Hubbert predicted that the oil production in such states will rise tremendously between 1965 and 1970. The theory can be applied for

the production predictions of other resources rather than oil. These resources may be like: Coal, minerals, biological resources such as whales (Lavacchi, 2009).

Theoretically speaking, such theory was criticized for not having the basis of any economic background such as the oil pricing. Also, the theory was doubted by the OPEC countries which their oil production completely deviated from the estimations of the theory since 1970s (Frédéric Reynès).

## Neo-Malthusian theory:

The basic Malthus theory was correlated with managing the resource allocation due to the constant rise in the population. So, the Neo-Malthusian perspective was concerned more with the mismanagement in the resources and the environmental degradation that can result from the resource waste. It was stated in several books that due to the incremental rise in the population growth, there will be food scarcity along with the deterioration that will be caused in the environment. Such environmental damage can take place through the use of more fertilizers, pesticides, clearing forests, more greenhouse gas effects and many other reasons (Steiguer, 1995).

## Neoclassical school of thought:

The Neoclassicals started to be deeply concerned with the environmental related concepts especially during the 1950s.Also, they categorized the common nature property of many of the resources as the main reason behind the existence of externalities. Officially, the branch of Environmental economics started to flourish during the 1960s (Steiguer, 1995). The development of the economic growth theory has begun with the Solow-Swan model which explained that growth happens due to the exogenous rates of savings. Then, other theories were applicable but were also criticized due to the lack of the environmental concerns. Therefore, there are several theories that arose linking between economy and the environment (Psarianos, 2015).

One of the theories that were environmentally relatable was the Limits theory. This theory explains the damages and the destruction that can occur in the environment due to several reasons. Accordingly, the theory expected that the production will be adversely affected and the economy will start to shrink due to the environmental damage. Another theory which is correlated to the environment is the "Race-to-Bottom" theory. This theory demonstrated that the main reason behind the environmental degradation is the rise in the global competition. This occurred when the developed countries started to reduce the

environmental damage at their countries through exporting their products and services to poorer countries. This caused a rise in the environmental damage in the poorer countries (Psarianos, 2015).

## Adam Smith's Theory of Value:

The classical economists thought about three major concerns regarding the development of the theory of value. They thought of the value in terms of production and wages. So, regarding Adam Smith, he calculated the natural price or value of anything through adding the total costs of production. At that time, the majority of the costs of production came from labor but this wasn't accurate. So, at the end Smith claimed that the real value calculation will be through adding costs of labor plus rent plus profit (Taylor, 1996).

## 3.2. Existent Environmental Theories:

## Environmental Kuznets Curve theory:

Simon Kuznets, the developer of such theory examined the relationship between the income per capita and several measures of environmental degradation. The theory indicated that at the early stages of economic growth, the pollution will increase thus emissions will rise. Accordingly, the environmental degradation will increase. But in some cases where the income per capita is extremely high, the increase in the economic growth will lead to improvements in the environment. This concludes that the curve depicts an inverse U-shaped function of income per capita (Stern, 2015).

## The Neoclassical Economic theory of Environment:

Regarding the environmental perspective of the Neoclassical economic school of thought, it was mainly based on each and everyone's preferences, value of consumer goods and factors of production. These can be measured through the concept of marginal utility. Also the level of usage of natural resources was based on the level of technology and the market mechanism which ensures having an efficient use of the remaining resources. Therefore, the environmental degradation was perceived by them as market failure. This means that the market failed in usage of the environmental capital if there was not an efficient pricing structure available. So, the Neoclassical school of thought analyzed the environment in general through several main steps. First of all, they analyze the environment through certain goods & services, then calculate the demand and supply for each of them. This is needed to examine the value of such goods and services in order to achieve the highest level of environmental protection (N.M.Katsoulakos, 2016).

## Pigouvian Tax theory:

Arthur C. Pigou, the economist who developed this theory focused mainly on the payments or solutions for the externalities. Externalities mean that there is a third agent or party affected whether positively or negatively from activities done by another agent. This mainly happens when there is an exploitation of natural resources. So, Pigou mainly stated that internalizing externalities will eventually reflect the value of the environment properly. But, from Pigou's perspective, externalities usually separate between the private costs from social costs which is contradicting with the concept of achieving well-fare. This gap can be resolved or close by making the polluter pay a tax equal to the marginal cost damage of his activity (MARTIN-AMOUROUX Jean-Marie, 2020).

## 4. Empirical Studies:

First of all, this section will include and discuss several previous empirical studies that are highly similar or correlated to the thesis topic. Also, all of the below mentioned papers include the variables that are included in the thesis and deeply explained their various impacts on the market value whether it had a direct or an indirect impact.

So, the first paper studied the environmental impact on the market value of the firm. The paper used a hand-collected data about carbon emissions of S&P 500 firms in the U.S. The main objective of gathering such data was to examine the impact of emissions of such firms on the firm's market value during the period 2006 till 2008. This study was examined through the balance sheet valuation model. As a result, the study concluded that with each and every extra metric ton per capita of carbon emissions caused, the selected firm's values declined by $212,000. This indicates that the impact of $CO_2$ emissions on firm's value was negative (Ella Mae Matsumura, 2014).

Another study examined the impact of emissions trading schemes (ETS) on the market value of the selected Chinese "A" firms in the Chinese stock market. The emissions trading schemes or the implementation of carbon trading are considered as policies and measures to reduce the emissions in such firms. The study mainly focused on the period from year 2000 till year 2019. This relationship was illustrated through Difference-In-Difference Model. This was the most relevant model to be used as to compare the responses of controlling and treatment groups before and after the implementation of the carbon trading. Accordingly, the study conducted resulted in having a positive impact of applying ETS measures and Carbon trading on the market value of the Chinese companies (Maogang Tang, 2022).

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Moreover, there was another paper demonstrating the impact of carbon emissions on the financial performance of 2323 U.S. firms between the period 2007 till year 2016. The paper examined such impact through using Fixed-effect model. The financial performance of the U.S firms which was the dependent variable was measured through several financial indicators like: return on assets, return on sales & market to book ratio. On the other hand, the main independent variables were the $CO_2$ emissions & agency cost which reflected the assets turnover. There were other controlled variables such as: market capitalization, total capital expenditure and other variables. At the end, the paper determined that firms with higher carbon emissions had a lower financial performance. This means that carbon emissions had a negative significant impact on financial performance of such firms (Muhammad Nurul Houqe, 2022).

Concerning the impact of the human capital and employees on the performance of the firm, there were various studies examining such impact. So, there was a study conducted especially in Greece to observe the impact of having intellectual capital of employees on the market value and financial performance of firms. The study included 96 of the Greek companies registered in the Athens Stock Exchange especially from 2006 till year 2008. Various regression models were implemented to estimate the results of this relationship. The study depicted that there was no strong significant relationship between the intellectual capital and market value (Dimitrios Maditinos.Dimitrios Chatzoudes, 2011).

Also, another paper focusing on the Turkish market investigated the relationship between the market value and Human capital in some of the Industrial traded companies in Turkey between 2000 till year 2014. Human capital was measured through measuring personal expenses of employees and the net sales per employee. The model that was chosen was mainly fixed-effect model. This study indicated that there was a positive significant relationship between the human capital and the firms market value (Gökhan Özer, 2016).

Regarding the effect of the capital expenditure which is considered as a very important indicator for the financial performance of the company, several studies tackled such concept. Hence, there was a study implemented to test the impact of capital expenditure and several other variables on the firm market value. The study was designed on the largest 45 companies listed in the Indonesian Stock exchange from 2013 till 2017. The other independent variables that were included in the model were: total sales, total assets, total debt over total equity which reflected the capital structure. The model that was used to analyze such relationship was Modmed (moderator and mediator) variable analysis model. So, the results indicated that there was not any significant impact of capital expenditure on the firm's market value (Salimah, 2019).

Another study examined the impact of capital expenditure on the firm market value specifically in the UK oil and gas companies. The period during which the study was conducted was specified between 2013 and 2017. The number of companies included in the model were 99 oil and gas companies. The firm's market value was expressed in terms of Tobin's Q ratio. This ratio compares the market value with the replacement costs of the firm's assets. The model that was used in the paper was multivariate regression model. The paper concluded that the total capital expenditure with hedging caused a decline in the firm market value. But, usually Capital expenditure itself without hedging will have a positive impact on the firm's value (Dr Subhan Ullah, 2021).

Moving to the impact of net sales on the value of the firm, there was a paper focusing on the impact of sales growth on the market value of the fifty consumer goods companies listed in Indonesian Stock Exchange. The study mainly was conducted from year 2015 till year 2020. There were other variables included in the model such as the corporate size which was measured through total assets, and return on Assets was also included. The econometric model used was the Multiple Linear Regression model. At the end, the author concluded that there was a positive but insignificant impact of sales growth on the firm market value in such companies (Thomas Sumarsan Goh, 2022).

Furthermore, another study examined the impact of sales growth and several other measurements on the market value of the top thirteen mining companies listed in Indonesia Stock exchange. The period that the study concentrated upon was from 2009 till year 2011. The econometric model that was used to examine such impacts was the Multiple Regression model. From examining such a model, the results obtained showed that there was no significant effect of sales growth on the market value of these mining companies (Vidyanita Hestinoviana, 2013).

In addition to this, the impact of sales growth and profitability on the firm's value was evaluated in the top 13 manufacturing companies registered in Indonesia Stock Exchange. The study included in the paper focused on a 3-year period starting from 2016 till year 2018. Multiple regression analysis was used as the main econometric method. Finally, the author concluded that there was no significant impact of either sales or profitability growth on the firm value (Iskandar, 2021).

Several studies discussed the role of unemployment on the micro level performance of the company. One of these papers written by (Jesús Gonzalo, 2012) stated that there was a positive significant impact of unemployment rates on stock prices in the U.S. This was accomplished through Quantile regression analysis and Granger causality tests. The period that the study focused on was from 1950 till 2009 & it was monthly data. The increase in

unemployment rates will be resolved then by the FED by rising interest rates which therefore rose the stock prices. This is why it was a positive relationship.

Another established paper discussed the long-run causal relationship between unemployment rates and housing prices which are considered as reflection for the market value of real estate. The paper mainly examined such relationship for main eight European countries from year 1991 till year 2016.The econometric method that used throughout the paper was the Granger-Causality test. Results proved that there is only unidirectional impact from the housing prices to the unemployment rates and not vice versa (Irandoust, 2018).

Then going back to the environmental variables impact on the market value, this paper mainly tackled the effects that changes in extreme temperature on the stock market returns especially in China. The study that the paper concentrated on was from 2007 till year 2019.The author examined such impact through the Multivariate Ordinary Least Squares model with fixed effects. The paper has proved that the increase in the extreme temperature causes a decline in the stock returns of each firm (Jingbin He, 2021).

Additionally, another paper explained deeply the temperature shocks and their effects on the cost of equity which is one of the important indicators for any market. The study was made on the top ten industry-size portfolios in France from 1953 till 2014. The author concluded through using OLS regression model that any uncertainties or rise in the temperature shocks caused increase in the cost of equity capital. Accordingly, this adversely affected the wealth of the firms & caused an increase in their costs (Ronald Balvers, 2016).

Last but not least, several empirical existing studies examined the impact of several firm variables on the market capitalization. This was held specifically for studying the Nigerian confectionary industry throughout twenty years. The independent variables that the author examined and used in his model were as follows: turnover, profit after tax, price index & dividends. The econometric model that was implemented was the OLS (Ordinary least squares) model. The results proved a positive and significant impact of dividends, turnover and profits after tax on the valuation of the company's performance (Oluwatoyin, 2009), (Sami & Abdallah, 2021).

Another conducted study was applied in Jordan for the top listed commercial banks between year 2010 and year 2016. The study mainly focused on measuring the effects of market value ratios and market profitability ratios on the market capitalization of such banks. Market value ratios were expressed in terms of Price Earnings ratio, Earnings per

share and Dividend payout ratio. The model that was used throughout the paper was the Multiple regression model. Mainly, the results depicted that there was a significant impact of Dividend payout ratio on market capitalization (Almumani, 2018).

Based on the aforementioned literature review, this thesis suggests the following hypotheses:

**H₁:** Carbon Dioxide Emissions in metric tons per capita & Annual average temperature adversely affect the market value of the five selected oil firms in the selected countries. This was proven in the previous empirical studies written by: (Jingbin He, 2021) & (Muhammad Nurul Houqe, 2022).

**H₂:** Number of Employees, total capital expenditure, market capitalization & unemployment rates will have a positive impact on the market value of the five selected oil firms. These results are expected according to the empirical studies mentioned above: (Gökhan Özer, 2016), (Sami & Eldomiaty, 2020), (Dr Subhan Ullah, 2021), (Almumani, 2018) & (Jesús Gonzalo, 2012), (Sami & Abdallah, 2021).

**H₃:** Net Sales will not have a significant effect on the market value of these oil firms. This was similar to the results concluded by (Iskandar, 2021).

## 5. Data & Descriptive Statistics:

First of all, this thesis is mainly tackling the impact of several firm & environmental variables on the market value of oil firms. The thesis concentrated on the top five selected oil drilling and extraction companies in the MENA region. These countries are as follows: Egypt, Morocco, Tunisia & Gabon. The period that the thesis mainly shed the light on is from 2000 till year 2020. Mainly, the source for the firm variables was Reuters. The firm independent variables that will be examined are the following: Market capitalization, Number of employees, Net Sales & Total Capital expenditure. While the dependent variable which is the Market Value was also from Reuters. Also, the unemployment rate of the country will be included in the model. On the other hand, the environmental variables which are: Carbon Dioxide emissions metric tons per capita & annual average temperature were from other external sources. Carbon dioxide emissions were from 2 main sources: "World Bank" & "The Country Economy". While the annual average temperature for all the four selected countries was mainly from "Climate Knowledge Portal".

So, moving on to the variables that will be included in the econometric model, the definition and the measurement of each will be deeply explained. Starting with the

dependent variable which is the Market Value, it represents the worth of the company based on the wealth of it for shareholders (Kumar, 2016). The market value is basically the market value of the total outstanding securities which include common shares, preferred shares and debt. Such measurement is reached through comparison between the market value of capital and the adjusted value of the capital (Kumar, 2016).Concerning the thesis, it is crucial to understand and evaluate the effects of internal and external factors on the performance and the valuation of the oil firms. This is why the market value was taken as the dependent variable.

Going to the main seven independent variables, they are mainly divided into three main sectors: Firm variables, Macroeconomic variables and environmental variables. One of the firm variables that is included is the total capital expenditure. Capital expenditure refers to the sum of all the funds needed to update and improve the physical assets in the firm. Physical assets like: plants, buildings or equipment (FERNANDO, 2022). In order to examine the internal variables that can affect the value of the oil firms, capital expenditure plays a vital role in affecting the firm's value. Capital expenditure for oil firms can mean the funds needed for extracting the oil and the drilling equipment (Krieg, 2019).

Another important firm variable included is the number of employees. Number of employees inside the firm include only the full-time employees who work regularly (Statistics Finland, n.d.). Since the employees play a recognized role in developing and improving the performance of the enterprise, such variable is very important to be considered. Specifically, skilled employees inside the firm are considered as human capital for the company thus engaging in boosting the firm's valuation.

Moreover, the third firm variable to be examined is the Net Sales. Net sales revenue can be defined as the total sales of the firm subtracted from it all the returns, allowances and discounts. Such measurement definitely has a direct impact on the profitability of the firm (KENTON, 2022). In addition to this variable, Market capitalization of the firm is one of the most important indicators of the firm's value. Market capitalization reflects the worth of the company by the stock market. It is mainly measured by the total of all the outstanding shares. Usually, companies with higher market capitalization are much safer to invest in than other companies. High market capitalization reflects the long history of the firm in the field (FERNANDO, Market Capitalization: How Is It Calculated and What Does It Tell Investors?, 2022).

After that, talking about the main macroeconomic variable that is included in the model which is the Unemployment rate. The unemployment rate depicts the percentage of the people who are without work but can work and did effort to have one. So, the rate is

calculated by dividing the unemployed people by the labor force. The labor force which is the sum of employed and the unemployed people (THE INVESTOPEDIA TEAM, 2022).It is very imperative to examine the impact of the most significant macroeconomic variables on the performance of micro-level firms.

Concerning the environmental variables, carbon dioxide emissions is one of the most well-known measures of it. Carbon emissions which is measured in metric tons' per capita measure the carbon emission that can result from any human activities in a country divided by the total population of this country (World bank, 2022). As mentioned above, the most polluting countries globally are the countries that produce oil. This means that it is of great importance to investigate the consequences of having huge amount of emissions especially on the oil firms. The second environmental indicator considered in the model is the Annual average temperature. Annual average temperature is measured through taking the average of the hottest and the coldest temperatures annually (Gartneer, 2018). According to the literature, having huge fluctuations in the temperature throughout the year will accordingly lead to decline in the market value or returns of the firm.

## 5.1. Descriptive Statistics:

The main objective of the descriptive statistics is to demonstrate the nature of the data and observations of each and every variable included in the model. The following table will show all the minimum value, maximum value, mean, the standard deviation and the number of observations of each:

## Figure 3: Descriptive Statistics table:

| Variable | Observation | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Log Market value | 442 | 6.299 | 2.221 | 2.534 | 9.657 |
| Log Total Capital expenditure | 439 | 0.018 | 0.029 | 0.000 | 0.100 |
| Market Capitalization | 382 | 0.257 | 0.301 | 0.002 | 1.514 |
| Employees | 350 | 0.001 | 0.0005 | 0.098 | 0.001 |
| Net Sales | 390 | 0.0001 | 0.0002 | 0.084 | 0.001 |
| Unemployment rate | 440 | 13.164 | 3.851 | 8.52 | 22.3 |
| Carbon Dioxide Emissions | 440 | 2.329 | 0.521 | 1.16 | 3.8 |
| Annual Average Temperature | 440 | 22.169 | 2.530 | 17.6 | 25.89 |

As it is shown from the above table, some of the variables had some missing observations like the number of employees, net sales and market capitalization. The Market value which can be referred to as the total stocks and shares invested in the firm had a mean of 6.229 while the standard deviation was 2.221 which means that there is a gap between them. This reflects the changes and fluctuations in the total amount of stocks which is the proxy for the market value of these five selected oil firms. The same variation happened in the unemployment rate and annual average temperature since the average deviated from the standard deviation. The rest of the variables did not depict major variabilities.

## 5.2. Correlation Analysis:

The main aim of the correlation analysis is to portray whether there is a strong relation between two variables or not. The following table will demonstrate this correlation between all of the variables selected:

## Figure 4: Correlation Analysis table:

| | Log Capital Expenditure | Market Capitalization | Log EMP | Log Net Sales | Unemployment rate | $CO_2$ Emissions | Annual Average Temperature |
|---|---|---|---|---|---|---|---|
| Log Capital Expenditure | 1.000 | | | | | | |
| Market Capitalization | 0.305 | 1.000 | | | | | |
| Log Employees | 0.757 | 0.600 | 1.000 | | | | |
| Log Net Sales | 0.951 | 0.431 | 0.761 | 1.000 | | | |
| Unemployment rate | -0.569 | -0.600 | -0.653 | -0.651 | 1.000 | | |
| $CO_2$ Emissions | -0.635 | -0.483 | -0.650 | -0.696 | 0.675 | 1.000 | |
| Annual Average Temperature | -0.613 | -0.212 | -0.432 | -0.690 | 0.671 | 0.814 | 1.000 |

The correlation analysis that is shown from the table above depicted a very high correlation between number of employees and capital expenditure. This is logical since the physical assets of the company all the employees will use it so they are highly related to each other. Also, there was a high correlation between the net sales and capital expenditure. Net sales measures the profitability of the company after deducting the expenses which includes in it the capital expenses. Also, there was a strong correlation between the number of

employees and net sales. Also, this can be due to the fact that the main asset inside the company to become profitable is the human capital.

## Figure 5: Total Debt relative to Market Value:

The upcoming graph demonstrates the status of the total debt throughout the five selected oil firms relative to the total amount of stocks and shares (Proxy for market value). The two extreme cases that were considered were if the total debt greater than 75% or less than 25%.
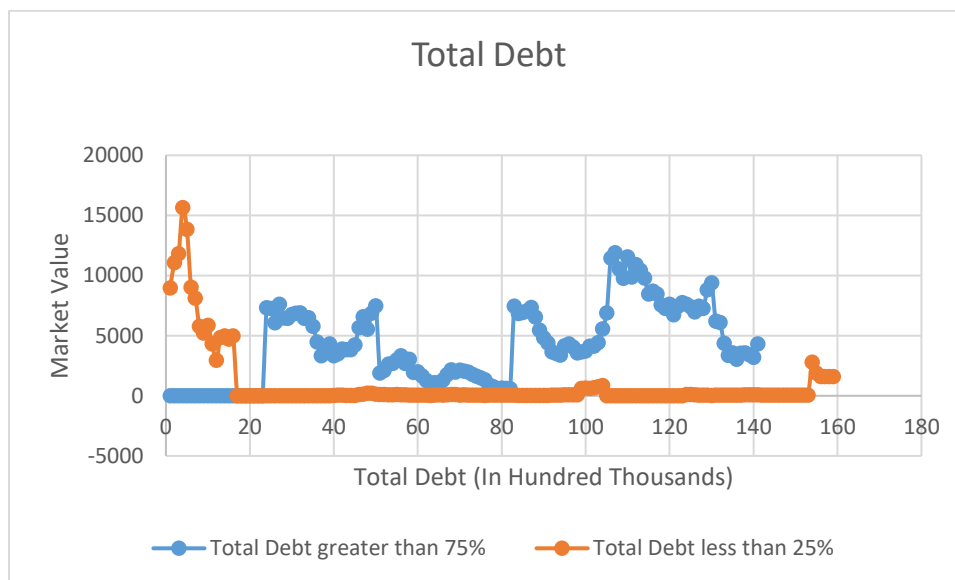


From this graph, it was shown that the higher the debt in some of the oil selected firms, the lower the lower the market value in the majority of the cases. On the contrary, the higher the debt status, the higher the market value and the stronger the financial performance of the oil firms. This can be due to the fact that more debt means more investments in the drilling and extraction equipment which therefore positively affects the strength of the firm.

## 6. Methodology & Results:

The data that was gathered was panel data & the econometric model that will be developed to examine the impacts of firm, macroeconomic & environmental variables on the market value of oil firms will be Fixed effect model. Hausman test was done to ensure that fixed effect model is more suitable for the model than random effect model. Also, panel data is better than time series analysis due to the fact that panel data helps in having strong correlation results and helps in predicting long-term consequences (Indeed Editorial Team, 2021).

The model will focus on the period between 2000 till year 2020 in the top five selected oil companies in the MENA region. These firms are in the below mentioned countries: Egypt, Gabon, Morocco & Tunisia. The Software that will be used in order to run all the statistical analysis will be Stata.

The model will be as follows:

$$MV_{it} = \beta_0 + \beta_1 MCAP_{it} + \beta_2 TCAP_{it} + \beta_3 EMP_{it} + \beta_4 NSales_{it} + \beta_5 Unemp_{it} + \beta_6 CO_{2it} + \beta_7 AAT_{it} + \mu_{it}$$

Where MV= Market Value (Dependent Variable)

$\beta_0$= Intercept

MCAP= Market Capitalization measured in Dollar amount

TCAP= Total Capital Expenditure measured in Dollar amount

EMP= Number of employees

NSales = Net sales measured in Dollar amount

Unemp= Unemployment rate measured in percentage

$CO_2$ = Carbon Dioxide emissions in metric tons per capita

AAT= Annual Average Temperature in Degrees Celsius

$\mu_{it}$= Error term

## 6.1. Regression results for panel data:

The following table presents the results of the fixed effect model implemented. There were 3 separate trials done for the model to ensure its significance. Also, it was very important to be applied to see the impact of inserting the environmental variables on the market value of the firms. So, the first trial included only from the environmental variables the $CO_2$ emissions. The second trial included the other environmental variable which was the Annual average temperature. The last trial was done without any environmental variables. Also, due to the large value of the majority of the firm variables, log was taken for each and every firm variable. These firm variables are: total amount of stocks & shares as proxy for market value (Dependent variable), employees, total capital expenditure and net sales. While the market capitalization was divided by $10^3$ to ensure having small values in the results.

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## Figure 6: Fixed Effect Model

| Dependent variable=<br>Log (Market Value) | Regression (1) | Regression (2) | Regression (3) |
|---|---|---|---|
| Log (Total capital expenditure) | -18.86***<br>(2.60) | -17.014***<br>(2.629) | -18.403***<br>(2.598) |
| Market Capitalization | 1.318***<br>(0.127) | 1.429***<br>(0.1275) | 1.391***<br>(0.128) |
| Log (Employees) | 343.98***<br>(112.34) | 326.84***<br>(115.550) | 390.649***<br>(113.960) |
| Log (Net Sales) | 2607.79***<br>(594.69) | 1929.13***<br>(579.339) | 2002.299***<br>(584.034) |
| Unemployment rate | -0.0505***<br>(.0139) | -0.0345**<br>(.0138) | -0.039***<br>(0.014) |
| $CO_2$ emissions | -0.3522***<br>(0.0943) | | |
| Annual Average Temperature | | -0.187***<br>(0.072) | |
| R-Squared | 0.5750 | 0.5653 | 0.5557 |
| Observations | 317 | 317 | 317 |
| Constant | 8.017 | 11.166 | 7.113 |

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10% Robust standard errors are reported in brackets.

From the above figure, it displays three models for examining the impact of the selected variables on the market value of the Oil firms. Regression (1) demonstrates the impact of the firm variables, macroeconomic variable which is the unemployment rate & $CO_2$ emissions. The Annual average temperature wasn't included in Regression (1) as including it resulted in the insignificance of the model. It is obvious from Regression (1) that all the variables are significant at 1% including the Carbon dioxide emissions. This means that all these variables had a strong impact on the log market value of the selected oil firms. The only two variables that had a negative significant impact on the market vale were: the unemployment rate and the total capital expenditure. Concerning the R-squared, it displays that 57.5% of the variation in the Log Market value is explained by the mentioned variables in Regression (1).

In the other model named Regression (2), the Carbon dioxide emissions was omitted and instead the annual average temperature was included with the rest of the variables. It is

clear from the above table that all of the independent variables had a significant impact on the market value of such oil firms in the MENA region. The significance of all of the variables was 1% except for the unemployment rate which was significant at 5% only. Also, there were three variables that had a negative significant impact on the market value of the firms which were: total capital expenditure, unemployment rate & the annual average temperature. Here in Regression (2), the R-squared was a little bit lower meaning that 56.5% of these mentioned variables explained the changes in the market value of these oil firms.

Moving on to the third model called Regression (3), this model eliminated the two environmental variables. This was needed for the sake of comparison between the models with and without the environmental variables to see whether the environmental variables alter the impact of the other variables on the total amount of stocks and shares of the firms or not. Regression (3) ensured the significance at 1% of all of the firm variables and the unemployment rate. Regarding the variables, as mentioned in Regression (1), the only variables that had an adverse impact on the market value were the total capital expenditure and the unemployment rate. In Regression (3), the R-squared was 55.57% of these selected variables explained the fluctuations in the market value.

## 6.2. Regression Results by Debt Status:

In this section, the fixed effect model will be examined while taking into consideration the total debt status. The total debt is a very important indicator for the performance of these firms in the market. So, taking the total debt as a condition to see the impact of the selected variables in the model on the market value will definitely make a difference. Total debt always reflects the financial health of the company so it is crucial to be tackled. The following table presents the total debt of the oil firms. Also, the table shows the different percentages of the total debt with its debt value of the firms. The thesis will mainly concentrate on examining the fixed effect model while taking into consideration the total debt of these firms when it was greater than 75% and lower than 25%.

### Figure 7: Sum of the Total Debt

| Variable | Observations | Mean | Standard Deviation | Minimum | Maximum |
|----------|-------------|------|--------------------|---------|---------|
| Total Debt | 439 | 287417.5 | 682065.4 | 0 | 2315400 |

The upcoming section will demonstrate the results of the model if the Total Debt was put into consideration:

### Figure 8: Regression Results if the Total Debt was less than 25%:

| Log Market Value | Regression (1) | Regression (2) | Regression (3) |
|------------------|----------------|----------------|----------------|
| Log Total Capital Expenditure | 5939.92** (2372.67) | 5762.116** (2800.936) | 5495.712* (2704.615) |
| Market Capitalization | -32.405** (13.040) | -31.263 * (15.413) | - 29.751* (14.861) |
| Log Employees | Omitted | Omitted | Omitted |
| Log Net Sales | -426743.2** (173939.7) | -413895.7* (205703) | -393594.7* (198264) |

| | | | |
|---|---|---|---|
| Unemployment rate | -0.225*** (0.056) | -0.195*** (0.068) | -0.184*** (0.063) |
| $CO_2$ Emissions | -1.424*** (0.418) | | |
| Annual Average temperature | | 0.131 (0.294) | |
| R-Squared | 0.5115 | 0.5144 | 0.5115 |
| Constant | 1.868 | -1.027459 | 1.868345 |

*** Significant at 1%, ** Significant at 5%, * Significant at 10% Robust standard errors are reported in brackets.

From the above figure, it was clear that the impact of the variables on the amount of stocks and shares (proxy for market value) altered when the total debt was considered. These results are taken if the oil firms had total debt with less than 25% which equals to 0.6. Regression (1) depicted that the unemployment rate and carbon dioxide emissions were the only variables significant at 1% while the other variables were significant at 5%. On the contrary, the net sales, unemployment rate, total capital expenditure and the carbon dioxide emissions had a negative impact on the market value of the oil firms. Concerning the R-squared, 51.15% of these variables including the carbon dioxide emissions explained the variability in the market value of the oil companies.

Going to Regression (2), the significance of the net sales and market capitalization was lower which was at 10% only. The total capital expenditure was significant at 5% while the unemployment rate was significant at 1%. The R-squared here was almost the same in explaining the changes in the market value examined by the mentioned variables. Last but not least, Regression (3) which removed all the environmental variables proved that all the firm variables had a significance at 10% only when the total debt was lower than 25%. The only variable that was negatively significant at 1% was the unemployment rate. The R-squared here was almost the same like in Regression (1) & (2).

## Figure 9: Regression Results if the Total Debt was greater than 75%:

| Log Market Value | Regression (1) | Regression (2) | Regression (3) |
|---|---|---|---|
| Log Total Capital expenditure | -9.841*** (3.223) | -16.463*** (3.424) | -16.528*** (3.372) |
| Market Capitalization | 1.365*** (0.253) | 1.428 *** (0.301) | 1.417 *** (0.290) |
| Log Employees | 315.6237 (1139.856) | -316.690 (1411.18) | -392.678 (1298.257) |
| Log Net Sales | 3255.46*** (780.617) | 2210.875** (928.602 ) | 2256.319** (866.584) |
| Unemployment rate | -0.082*** (0.028) | -0.0507 (0.032) | -0.051 (0.031) |
| $CO_2$ Emissions | -2.058*** (0.408) | | |
| Annual Average Temperature | | -0.017 (0.121) | |
| R-Squared | 0.8816 | 0.8420 | 0.8420 |
| Constant | 10.96216 | 9.078354 | 8.847429 |

\*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10% Robust standard errors are reported in brackets.

This table shows the impact of these selected variables on the market value of the firms if the total debt exceeded the 75%. As the total debt increased, the effect of the firm, environmental and macroeconomic variables became more robust and significant. Regression (1) which considered only the carbon dioxide emissions as the only environmental variable showed that all the variables were highly significant at 1%. This indicates that the financial health of these oil firms was extremely beneficial to be examined as it affected the performance of the other mentioned variables. The only variable that had no significant impact on the market value of the firms was the number of employees. As it

is portrayed from the above table, the R-squared increased when the large amounts of debt these firms have were measured. In Regression (1), 88.16% of these variables explained the changes that took place in the market value of the selected oil firms.

Moreover, Regression (2) considered the annual average temperature as a replacement for the carbon dioxide emissions. In this model, the total capital expenditure and market capitalization were the only variables strongly significant at 1%. On the contrary, the net sales were significant at 5%. Once the carbon dioxide emissions were replaced with the annual average temperature, the R-squared somehow declined to be 84.2%. Moving to Regression (3) that was without any of the environmental variables, still the total capital expenditure and market capitalization showed significance at 1%. The results of Regression (3) was somehow similar to that of Regression (2). Also, the R-squared here remained the same like in Regression (2).

## 6.3.  Regression Results by Dividends status:

Dividends is the distribution of any cash or earnings to the shareholders. Such distribution is agreed upon by the Firm Board of Directors. It is mainly distributed quarterly (HAYES, 2022).Therefore, since Dividends play a vital role in reflecting the performance of the company, it must be considered while developing the model. Dividends may lead to fluctuations in the impact of the variables mentioned before on the market value of the oil companies. The following tables depict the Dividends status of the five selected oil firms with their different percentiles. The thesis will mainly concentrate to see the impact of the variables on the amount of stocks and shares of the oil firms as proxy for market value if Dividends were less than 25% and greater than 75%.

### Figure 10: Sum of the Dividends

| Variable | Observations | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Dividends | 442 | 5.61086 | 7.606543 | 0 | 47.58 |

After seeing the details of the Dividends status, the following section will examine the three models while taking into consideration the dividends status.

## Figure 11: Regression Results if Dividends was less than 25%:

| Log Market Value | Regression (1) | Regression (2) | Regression (3) |
|---|---|---|---|
| Log Total Capital Expenditure | -26.122 (23.422) | -29.964 (24.912) | -24.613 (24.448) |
| Market Capitalization | - 0.720 (1.714) | -0.816 (1.806) | -0.509 (1.786) |
| Log Employees | 412.961 (710.240) | 1280.48** (527.433) | 1360.544** (523.127) |
| Log Net Sales | 2547.485 (4427.26) | 526.564 (4716.078) | 1679.91 (4598.675) |
| Unemployment rate | -0.045 (0.133) | -0.111 (0.143) | -0.071 (0.138) |
| $CO_2$ Emissions | -1.352* (0.718) | | |
| Annual Average Temperature | | -0.379 (0.358) | |
| R-squared | 0.5663 | 0.5289 | 0.5094 |
| Constant | 10.935 | 16.439 | 7.669 |

*** Significant at 1%, ** Significant at 5%, * Significant at 10% Robust standard errors are reported in brackets.

Concerning the figure above, considering the effect of dividends on the model as a whole did affect the significance level. So, regarding Regression (1), the dividends made all the variables to be not effective for the market value of the firms. The only variable that was significant at 10% was the carbon dioxide emissions. Also, the R-squared did decline when considered the dividends of these firms to be 56.63%. Moving to Regression (2), tackling the dividends as an important indicator made the number of employees only to be positively significant at 5%. The other independent variables included did not have a strong significant impact on the market value of the firms when dividends were considered as a condition. Also, when the annual average temperature was included in Regression (2), the R-squared was still low since 52.89% of the included variables explained the variations in the market value. The same results were for Regression (3) since the only positive significant impact that a variable had was the number of employees. The R-squared even declined more when the environmental variables were eliminated from the model.

## Figure 12: Regression Results if Dividends was greater than 75%:

| Log Market Value | Regression (1) | Regression (2) | Regression (3) |
|---|---|---|---|
| Log Total Capital Expenditure | -39.048* (20.294) | -7.117 (19.026) | -9.849 (17.833) |
| Market Capitalization | 1.127 *** (0.250) | 1.072 *** (0.264) | 1.094 *** (0.258) |
| Log Employees | 248.067* (132.866) | 253.789* (141.665) | 268.235* (136.956) |
| Log Net Sales | 6017.9*** (1936.532) | 3800.208** (1830.1) | 3828.806** (1821.279) |
| Unemployment rate | -0.0003 (0.025) | 0.013 (0.026) | 0.014 (0.025) |
| $CO_2$ Emissions | -0.531*** (0.194) | | |
| Annual Average Temperature | | -0.042 (0.099) | |
| R-squared | 0.3531 | 0.3048 | 0.3035 |
| Constant | 8.464 | 7.655 | 6.669 |

*** Significant at 1%, ** Significant at 5%, * Significant at 10% Robust standard errors are reported in brackets.

Looking at the previous table, if the Dividends were greater than 75% in    Regression (1), the market capitalization, net sales and carbon dioxide emissions will be significantly impacting the market value of the firms at 1%. While on the other hand, the capital expenditure and the number of employees will be significant at 10%. R-squared was low here at only 35.31% which means that these variables while considering the dividends status explained minor changes in the market value of the oil firms. Regarding Regression (2), when considering the annual average temperature as the only environmental variable, the only variable that was significant at 1% was the market capitalization. On the contrary, the net sales were significant at 5% and the number of employees were positively significant at 10%. While in Regression (3) when there weren't any environmental variables considered, the same results were like in Regression (2). Also, the R-squared maintained to be low in the three scenarios.

## 7. Conclusion:

Finally, after running the fixed effect model, the main findings of the thesis can be highlighted as follows: The environmental variables which are: Carbon dioxide emissions in metric tons per capita and the annual average temperature did cause a negative significant impact on the market value of the selected oil firms. Also, when the total debt or dividends were considered as a condition for seeing the impact on market value, carbon dioxide emissions still had a negative significant impact on market value of these firms. This was concurrent with the results of the previous mentioned papers in the thesis. Increase in carbon emissions and changes in annual temperature cause a decline in the productivity of oil firms in the long term thus adversely affecting the financial valuation of these firms. This was mainly due to the fact that MENA countries such like Egypt started applying the Clean Development Mechanism (CDM) which was under the Kyoto Protocol. This was one of the important initiatives to develop and improve the usage of renewable energy in the MENA countries. Egypt was and remained the CDM regional leader since it undertook more than twelve sustainability projects with the aid of UNFCCC.Recently, there were many CDM projects implemented by the firms inside the following countries: Egypt, Morocco, Jordan and Tunisia (Zafar, 2022). Therefore, applying a carbon emission market in such countries meant that these firms sell excess or buy the excess of carbon traded by other firms. But at the end, the carbon emissions market is a cost that needs to be paid by the firms to help in the reduction of environmental degradation (Enterprise Press, 2022).

Total capital expenditure did not match the hypothesis and the results of previous studies. This is due to the fact the Capital expenditure in the developed model caused a decline in the market value of the firms. The significance of the capital expenditure varied when the total debt and dividends were tackled.   On the contrary, previous studies showed completely the opposite. Usually, since the capital expenditure requires huge amount of funds, it also requires the firm to have the ability to generate money effectively in order to cover these expenses (The Investopedia Team, 2022). So, having a negative effect on the market value of the oil firms means that these firms were not able to recover all the costs spent on the capital or assets.

Market capitalization had a positive significant impact on the market value of the oil firms. This was compatible with the results of the previous studies. Since market capitalization reflects the value of the total stocks of the company, this reflects the financial performance and strength of the company. Accordingly, market capitalization has a direct relation and impact on the market value of the company.

Number of employees according to the developed model positively affected the market value of oil firms in the MENA region. These results were similar to the previous studies

mentioned in the literature. This is due to the fact that employees present the human capital of the company whom will have a direct impact on the productivity thus the financial performance of the firm. The higher their skills, the higher their productivity and the higher the market value of the firm will be.

Unemployment rates adversely affected the market value of the oil firms. This was incompatible with the previous studies mentioned in the literature. The rise in the unemployment rates will cause decline in the number of skilled people available for the jobs. This means that the productivity of the oil firms will decline causing a parallel decline in their market value.

Net sales which reflects the profitability and the financial strength of the companies had a positive significant impact on the market value of the oil firms. This was different from what the previous mentioned as net sales had no direct effect. These results mean that these oil firms had the capability to achieve profits throughout the years.

## 8. Policy Recommendations:

The results of this thesis depicted the importance of improving and developing the performance of the oil firms. This will be essential in order to ensure having a constant rise in the market value of the oil companies in the MENA region. There are many suggestions that can be implemented in such oil firms to improve their market value. These recommendations are as follows:

One of the top implications that needs to be considered is cost cutting. Since the global economies suffer from high inflation rates, then the expenditure per barrel rose tremendously. This was even reflected in the costs of extraction of each barrel which more than doubled between 2010 and 2013. Nowadays, operators are trying to minimize the costs and be more efficient by improving production. This can be done by using more advanced horizontal drilling techniques and longer wells along with using improved technologies (Giorgio Bresciani, 2016).

Vertical integration is one of the solutions for improving the performance of the oil firm. This is due to the fact that it reduces costs and makes management of the contractor easier. Also, having several providers for the equipment and services offered cause having a complicated supplier base. Recently, several oil companies already applied vertical integration which succeeded in saving up more than 30% of the costs. Apart from vertical integration, companies can merge with each other to offer a wider expansion of the services provided (Giorgio Bresciani, 2016).

There must be an effective system of local authorities to ensure having the permits and licenses needed for the oil and gas companies. The government must ensure avoidance of any postponements in applying the projects since delaying them will increase the cost of doing business. Legislation is required during the operations and launching to monitor the environmental impacts. Also, the government needs that local authorities make sure of preserving and protecting the resources and the environment from any pollution (Akram Hassan, 2018).

Reducing emissions during the production process of the oil and gas companies is very crucial to be considered. This can be done through several methods or ways such as: using enclosed tanks in order to cause less air pollution. Also, in order to reduce the amount of waste caused, there must be an installation of a plunger lift system which helps in removing the liquid from wells. Another way to reduce emissions can be to transfer to low-emitting engines. Moreover, the oil drilling companies must ensure having proper usage of the seal and valves to reduce the air emissions caused. Another way in order to have better oil management which enhances the performance of the firm is to reduce the usage of toxic materials. This can be done through the substitution of organic additives or polymers for oil-based mud. Also, the purchasing of less liquid chemicals in huge amount will help in reducing the toxicity (Divver, 2022).

Concerning the firm internal variables that can be enhanced to improve the financial performance of the oil companies, there are several recommendations for this to happen. One of these recommendations is to apply new revenue models such as having performance-based contracts that include the expenses of capital and equipment in project financing. By using such model, it can be easier for the oil firms to reduce the cost base and the need for investment during the crucial times. This will ensure having a stability in the sales flow of the firm (Giorgio Bresciani, 2016).Another aspect that needs to be taken into consideration is the increase in the unemployment rates in the selected countries which negatively affected the performance of the oil drilling and extraction companies. In order to solve this issue, there must be vocational training towards the skills required for working in the oil and gas sector. This can be done through the rise in the public spending spent on education, improving the quality of education to meet the demand that will be further needed by the private sector. Another macroeconomic solution for this is to ensure having an unemployment insurance which secures a minimal level of income for the unemployed while giving him several incentives to look further for job opportunities (IMF, 2016).

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