



**UNIVERSITY OF PIRAEUS**

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MSc in Energy: Strategy, Law and Economics

**MASTER THESIS**

**The impact of Covid-19 in the Greek Energy Market: Valuation of the stocks of Mytilineos, Motor Oil, and Hellenic Petroleum**

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## **Table of Contents**

### **1. Introduction.....9**

- 1.1 Aim of the thesis.....9
- 1.2 Methodology of the thesis.....9
- 1.3 Structure of the thesis.....9
- 1.4 Contribution of the thesis.....9

### **2. The Global Environment.....10-17**

- 2.1 Introduction.....10-11
- 2.2 Commodities.....11-17
  - 2.2.1 WTI Crude.....11-13
  - 2.2.2 Brent Blend.....13-15
  - 2.2.3 Natural Gas.....15-17
- 2.3 Chapter Conclusion.....17

### **3. Global Indices.....17-21**

- 3.1 Introduction.....17
- 3.2 S&P Global Oil Index.....17-18
  - 3.2.1. Calendar Year Performance.....18-19
- 3.3 S&P GSCI Natural Gas.....19
  - 3.3.1 Calendar Year Performance.....19
- 3.4 STOXX Europe 600 Oil & Gas.....19-21
- 3.5 Chapter Conclusion.....21

### **4. Greece.....21-23**

- 4.1 Introduction.....21
- 4.2 Situation in Greece.....21-23

|                                                             |              |
|-------------------------------------------------------------|--------------|
| 4.2.1 Oil Market.....                                       | 22           |
| 4.2.2 Natural Gas Market.....                               | 22-23        |
| 4.3 Chapter Conclusion.....                                 | 23           |
| <b>5. Valuation Exercise.....</b>                           | <b>23-50</b> |
| 5.1 Introduction.....                                       | 23-24        |
| 5.2 General Information on Groups.....                      | 24-25        |
| 5.3 Background Information.....                             | 25-27        |
| 5.3.1 Global Environment.....                               | 25-26        |
| 5.3.2 External Environment.....                             | 26           |
| 5.3.3 Industry Environment.....                             | 26-27        |
| 5.4 Theoretical Framework.....                              | 27-34        |
| 5.4.1 Data.....                                             | 27-33        |
| 5.4.1.1 Revenues.....                                       | 27-28        |
| 5.4.1.2 EBIT.....                                           | 28           |
| 5.4.1.3 Change in Net Working Capital ( $\Delta$ NWC) ..... | 28           |
| 5.4.1.4 Inventories.....                                    | 28           |
| 5.4.1.5 Accounts Payable.....                               | 28           |
| 5.4.1.6 Free Cash Flow to Firm (FCFF) .....                 | 28-29        |
| 5.4.1.7 Depreciation & Amortization.....                    | 29           |
| 5.4.1.8 Capital Expenditures (CapEx) .....                  | 29           |
| 5.4.1.9 Tax (t) .....                                       | 29           |
| 5.4.1.10 Weighted Average Cost of Capital (WACC) .....      | 29-30        |
| 5.4.1.11 Debt.....                                          | 30           |
| 5.4.1.12 Equity.....                                        | 30           |

|          |                                                |       |
|----------|------------------------------------------------|-------|
| 5.4.1.13 | Cost of Debt.....                              | 30    |
| 5.4.1.14 | Cost of Equity.....                            | 30    |
| 5.4.1.15 | Equity Risk Premium.....                       | 30-31 |
| 5.4.1.16 | Risk-free Rate.....                            | 31    |
| 5.4.1.17 | Spread.....                                    | 31    |
| 5.4.1.18 | Relative Volatility.....                       | 31    |
| 5.4.1.19 | Terminal Value (TV) .....                      | 31    |
| 5.4.1.20 | Growth Rate.....                               | 32    |
| 5.4.1.21 | Equity Value.....                              | 32    |
| 5.4.1.22 | Enterprise Value.....                          | 32    |
| 5.4.1.23 | Net Debt.....                                  | 32    |
| 5.4.1.24 | Minority Interest.....                         | 33    |
| 5.4.1.25 | Cash and Cash Equivalentents.....              | 33    |
| 5.4.1.26 | Number of Shares Outstanding.....              | 33    |
| 5.4.1.27 | Target Share Price.....                        | 33    |
| 5.5      | Internal Analysis.....                         | 35-42 |
| 5.5.1    | Historical Financial Data.....                 | 35-42 |
| 5.5.1.1  | Revenues.....                                  | 35-36 |
| 5.5.1.2  | Earnings Before Profits and Taxes (EBIT) ..... | 36-37 |
| 5.5.1.3  | Free Cash Flow to Firm (FCFF) .....            | 38-39 |
| 5.5.1.4  | Enterprise Value.....                          | 39-40 |
| 5.5.1.5  | Equity Value.....                              | 40-41 |
| 5.5.2    | Stocks Comparison.....                         | 41-42 |
| 5.6      | Valuation Results.....                         | 42-44 |

|                                                      |              |
|------------------------------------------------------|--------------|
| 5.6.1 Forecasting Cash Flows.....                    | 42-43        |
| 5.6.2 Estimated Free Cash Flows to Firm (FCFF) ..... | 43-44        |
| 5.7 Sensitivity Analysis.....                        | 44-48        |
| 5.8 Scenario Analysis.....                           | 48-50        |
| 5.8.1 Bull Market Scenario.....                      | 48-50        |
| 5.8.2 Bear Market Scenario.....                      | 50           |
| <b>6. Conclusion.....</b>                            | <b>51-52</b> |
| <b>7. References.....</b>                            | <b>53-58</b> |

## **List of Figures**

- Figure 1:** WTI Crude Spot Price.....12
- Figure 2:** Brent Blend Spot Price.....14
- Figure 3:** Henry Hub Natural Gas Price.....16
- Figure 4:** Revenues.....35
- Figure 5:** Earnings Before Interest and Taxes (EBIT) .....36
- Figure 6:** Free Cash Flows to Firm (FCFF) .....38
- Figure 7:** Enterprise Value.....39
- Figure 8:** Equity Value.....40
- Figure 9:** Stocks Comparison.....41
- Figure 10:** Estimated Free Cash Flows to Firm (FCFF) .....43

## **List of Tables**

- Table 1:** Ten of the largest participants on S&P Global Oil Index.....18
- Table 2:** Participating firms on STOXX Europe 600 Oil & Gas.....20
- Table 3:** Valuation Exercise Data.....34
- Table 4:** Mytilineos Change in Growth Rate.....45
- Table 5:** Motor Oil Change in Growth Rate.....46
- Table 6:** Hellenic Petroleum Change in Growth Rate.....46
- Table 7:** Mytilineos Change in WACC.....47
- Table 8:** Motor Oil Change in WACC.....47
- Table 9:** Hellenic Petroleum Change in WACC.....48



## **1. Introduction**

In this part is analyzed the aim, the methodology, the structure, and the contribution of this thesis.

### *1.1 Aim of the thesis*

The aim of this thesis is to provide a thorough analysis on the impact of Covid-19 pandemic on the global and Greek energy market. Furthermore, to assess how the pandemic influenced the stocks of the three of the largest energy groups in Greece. Lastly, using intrinsic valuation, to value and provide an investment recommendation for the three stocks based on the DCF valuation model.

### *1.2 Methodology of the thesis*

In this thesis, all the available sources are utilized, from academic papers to articles from well-known internet sites. It should also be mentioned the capitalization of the valuable tools that are provided by Professor Aswath Damodaran of NYU on valuation.

### *1.3 Structure of the thesis*

In the first part of the thesis, a presentation of the main commodities is provided, and an analysis on the impact of the pandemic on their prices is presented. In the second part of the thesis, the main commodity indices are presented and an analysis on the influence from the pandemic on the prices of the indices is given. In the third part of the thesis there is a thorough analysis on the three energy groups and on the movement of their financial data during the period under review. This sections includes the valuation exercise with the painstaking analysis using DCF valuation, and the investment recommendation at the end.

### *1.4 Contribution of the thesis*

This thesis is aimed at contributing on the analysis of the impact of the pandemic on the world and the Greek energy market by researching the performance of the prices of the main commodities and of the main indices. Finally, by analyzing the stocks of the three largest energy groups of Greece, to open the Greek stock market to global audiences.

## **2. The Global Environment**

### *2.1 Introduction*

In December 2019, the Chinese Government announced that a new virus was identified. From that time, the virus started to spread around the country and the number of new cases increased rapidly. The Chinese government could not understand the type, the origin, but most importantly the threat that this virus would pose to the world. By the start of the new year, 2020, and before the number of cases go out of control, the Chinese government took the decision to impose a lockdown, meaning that all the citizens of the country were not allowed to leave their houses for any purpose and only one member of each family once a week could, so as to purchase food supplies. This status was subsequently transferred to the rest of the world when other countries started to identify cases of the newly-emerged virus. As the situation started to unfold and the first data from China about the virus started to come into light, governments around the world began to understand that they were facing an unprecedented threat.

By the end of March 2020, the World Health Organization (WHO) characterized the new virus as a pandemic and urged governments around the world to take immediate preventive measures in order to protect their citizens. As a result of this guideline by the WHO, governments started announcing the imposition of strict lockdowns as, at that time, this was the single measure that they could utilize in order to combat the unknown threat. This situation dug up a sense of fear, anxiety, and uncertainty about how everyday life could be impacted and what would be the implications of the pandemic to all the aspects of social and economic activity. This unforeseeable event, except for the tragic results that produced in terms of global health, it also induced major disturbances in the global energy demand. In the next chapters, this thesis will try to thoroughly analyze the impact that the pandemic had on the energy sector as a whole and on every part the sector such as energy commodities, indices, and individual groups.

After the powerful first wave that lasted from March until May of 2020, the pandemic showed signs of enfeeblement and by November the situation started to stabilize. Also, the start of numerous research projects from pharmaceuticals companies on a vaccine against the virus was a very promising event but with no certain results. Despite the positive events, in November 2020 the world faced a second powerful wave and the governments around the world, because of the previous positive results that

lockdowns had in the handling of the pandemic, introduced a new series of preventive measures that again impacted energy demand, but this time not in the same volume as in the first wave. The successful creation of safe vaccines against the virus in such a brief period of time and the gradual vaccination of citizens lead, from the Summer of 2021, to a relative comeback to normality in terms of energy demand but of course not in the pre-pandemic levels.

## 2.2 Commodities

### 2.2.1 WTI Crude

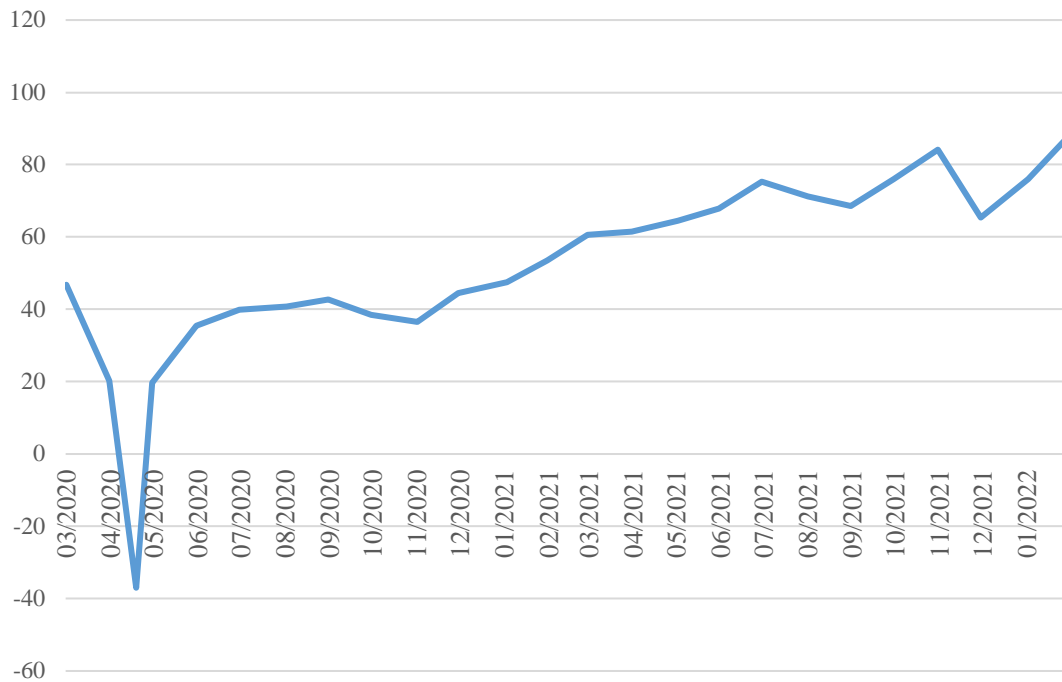
Together with Brent and Dubai Crude, West Texas Intermediate (WTI) crude oil is a particular grade of crude oil and one of the three major benchmarks for oil price. Because of its low density (low specific gravity) and sulfur content of about 0.34%, WTI is referred to as a light sweet oil. WTI, which is regarded as a high-quality and easily refined oil, serves as the basis for the oil futures contract on the New York Mercantile Exchange (NYMEX). (Chen, 2022a)

WTI is the primary benchmark for North America because of the location of its source which predominantly is the Permian Basin and specifically Texas. The principal delivery point for physical exchange and pricing settlement is Cushing, Oklahoma. WTI is also the underlying commodity for the NYMEX's oil futures contracts. The main way of transportation is through pipelines in the Midwest of the US and the Gulf of Mexico.

According to Chen in Investopedia, Cushing Hub can store up to 90 million barrels which accounts for 13% of the total of US oil storage. The inbound and outbound capacity is 6.5 barrels a day. It is recognized as "The Pipeline Crossroads of the World". Even though WTI and the other main oil commodity, Brent, are the two most widely known benchmarks, their prices often diverge. This differentiation is called Brent-WTI spread.

Due to its composition, with lower levels of sulfur (0.34%) than that of Brent, WTI is ideal for gasoline production (Brent is for diesel). Normally, because of its quality, WTI should trade at premium but the variation in volumes of supply and demand influences the price and mirrors its individual market fundamentals. It must be mentioned that the rapid increase of production of shale oil resulted in the decrease of WTI price.

**Figure 1**  
WTI Crude Spot Price



Notes: The source of the data is U.S. Energy Information Administration, 2022  
In Dollars per Barrel

From the start of March 2020, when the situation started to unfold in the rest of the world, and the first information on Covid-19 from China became known, the price of WTI began to fall daily. As *Figure 1* shows, on 20th of April 2020, WTI recorded a year low, priced at \$-36.98. This negative price was the result of the announcement of restrictive measures on the movement of the citizens from the majority of the governments around the world. The day after the record low, the market corrected and the price closed positive at \$11.17. After the first shock, WTI price managed to surpass the \$20-level after two weeks, the \$30-level on the 18th of May and the \$40-level on June 23rd. For a six-month period (June 2020-Januray 2021) the price levels of WTI fluctuated between \$35 and \$50 depicting the temporary stability from the reduction in the number of cases.

From the start of the year 2021 and due to the promising news on the successful creation of safe vaccines against Covid-19, the price of WTI started an incremental course, which included the break of the \$60-level on the end of February, and a modest

fluctuation between \$60 and \$65 during Spring (March-May 2021). In June, the price went over \$70. However, during the summer, and more specifically from July until late August the price fell from \$75 to \$62 as a result of supply concerns and the rising cases due to the emergence of the highly contagious Delta variant. After the small turbulence during Summer, price levels rose to over \$80 in mid-October. Again, another major event influenced price levels. From the end of October until December, price levels dropped about \$14, from \$83 to \$70. The concerns about U.S. supply growth competed with the speculation on the then ongoing talks between Iran and the other countries on a possible revival of the 2015 nuclear agreement and an ease of the harsh sanctions that were implemented on the Iranian Oil from the Trump Administration in 2018, that would allow Iranian Oil to be traded again on international markets. (Guardian, 2021a) The talks did not have positive results and were suspended (Guardian, 2021b), so from December until late February 2022, the price of WTI peaked at \$88.

In this point, it must be mentioned that the research on the prices of the commodities stops, because the start of the war in Ukraine, such an unforeseen event, triggered enormous price shocks which are unrelated to the effect of Covid-19 on the commodity prices.

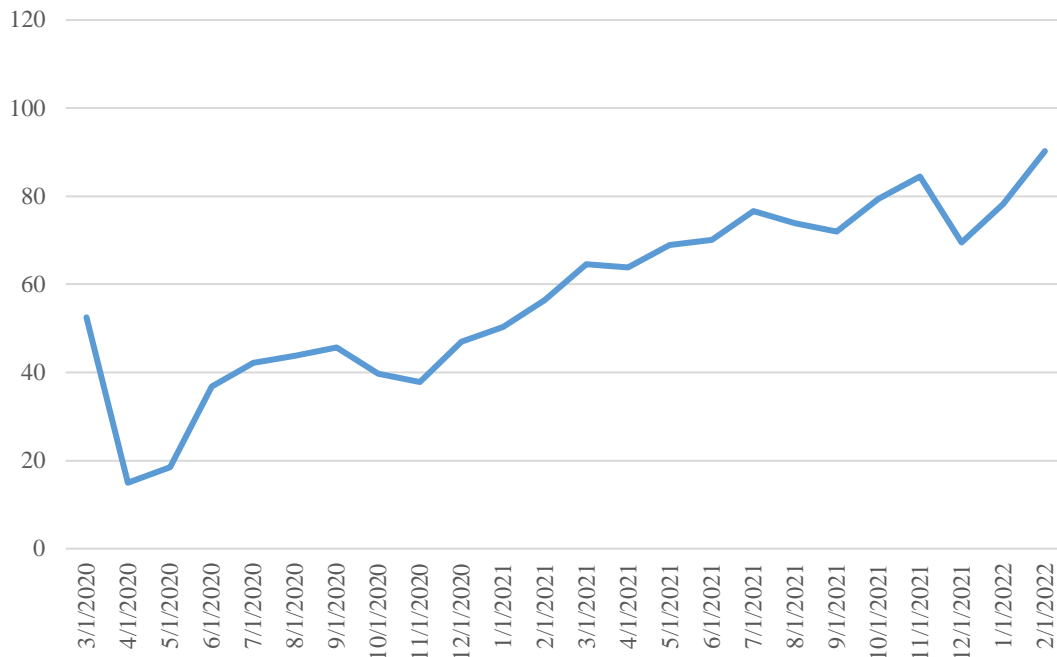
### 2.2.2 Brent Blend

One of the two internationally recognized crude oil kinds that serve as benchmarks for crude oil pricing is known by the name Brent Blend. The North Sea-produced Brent Blend is regarded as a light, sweet crude oil. As Brent mix makes up more than half of all crude oil traded internationally, it makes sense for it to serve as the standard for pricing crude oil. Brent blend, commonly known as Brent oil or London Brent, is the same as North Sea Brent Crude. (Chen, 2022b)

According to Chen in Investopedia, this type of crude oil is extracted from oilfields around North Sea between the UK and Norway. The dominant position that holds in the crude oil market could be at risk, because of the continued lowering levels of reserves in the North Sea and the increasing crude output in the US since the Shale Oil boom in 2015. Brent is not traded directly in real time. Its futures are traded on the International Exchange (ICE), as well as on the New York Mercantile Exchange (NYMEX). The available delivery dates are for all the 12 months of the year. Brent-

related commodity contracts are traded and used by investors and portfolio managers either as a hedge or a speculative basis.

**Figure 2**  
Brent Blent Spot Price



Notes: The source of the data is U.S. Energy Information Administration, 2022  
In Dollars per Barrel

As can be seen from *Figure 2*, the price of Brent followed the same pattern as that of WTI. More specifically, on the 20th of April Brent price recorded a low of \$19.7. After that low point and until early December, the price of Brent fluctuated between \$20 and \$30 (April until mid-May), \$30 and \$40 (mid-May early June), and \$40 to \$50. Furthermore, during an 11-month period from December to October 2021, Brent price gradually increased from \$50 in mid-December to over \$80 in September. The steps included the break of the \$60-level in February, reaching pre-pandemic levels, of the \$70-level in June, and of the \$80-level in September. On mid-October Brent price scored a 3-year high exceeding \$85. However, in late November this increase was followed by the largest drop in price since the start of the pandemic, closing at under \$71. This sharp drop was a result of the emergence of the highly transmissible omicron

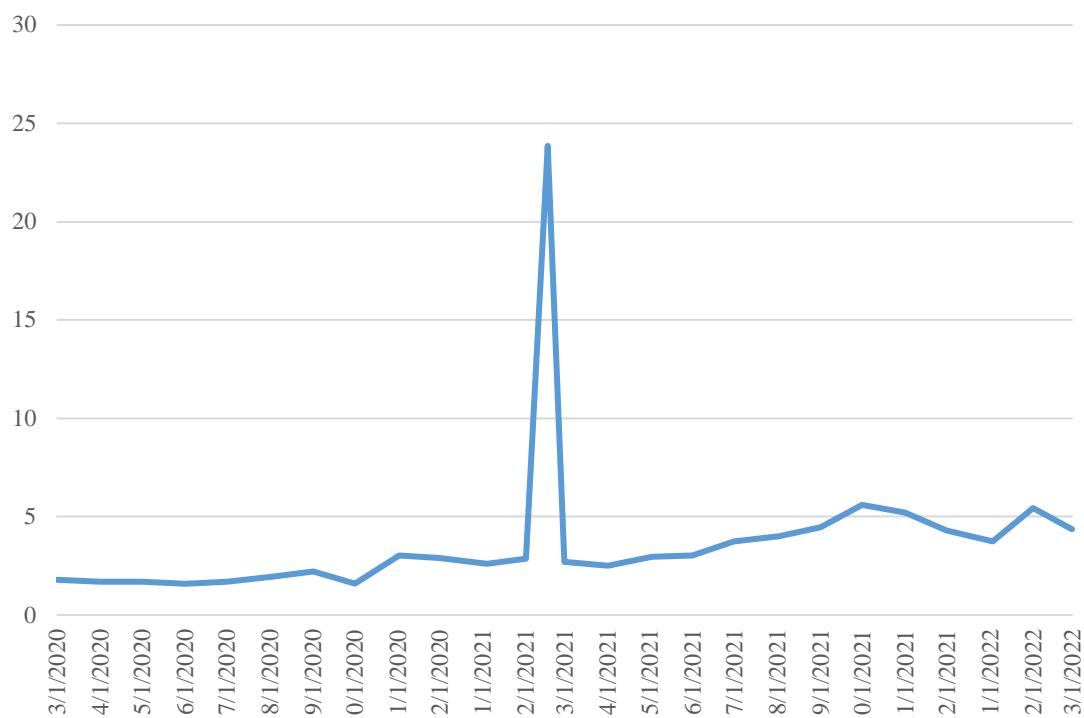
variant and the uncertainty that rose on the efficacy of vaccines against this variant. After the drop, the price rebounded reaching \$97 at the end of February.

### 2.2.3 Natural Gas

Natural gas has a particularly important role in the energy industry. It is not only the cleanest burning fossil fuel, but also economically friendly. The dominant factor that affects demand levels is temperature. Its main uses are as heating in the winter and as power to air-condition and other cooling machines in Summer. As can be understood these are the seasons when demand is reaching a peak, and especially during winter. According to the U.S. Energy Information Administration, the three sectors which are the largest users are Industrial, Domestic, and Power Generation. In Industries and in Domestic, the main use of natural gas is for heating. In Power Generation, plants are becoming the fastest-growing users of natural gas. This trend is explained since this type of plant is more environmentally friendly compared to coal and oil-based plants. The main way of transportation is through pipelines due to its low level of energy per volume and the supplementary cost containers would add. Another transportation alternative is LNG. "Liquefied natural gas (LNG) is natural gas that has been transformed into a liquid state for the convenience and security of transporting natural gas. When natural gas is cooled to about -260 F, it transforms into a clear, colorless, and non-toxic liquid that may be delivered from regions with a lot of natural gas supply to regions that need more. Natural gas is 600 times smaller when it is liquid, making it considerably easier to handle and store when pipeline delivery is not an option. In its liquid state, natural gas occupies 1/600th of the space. Experts predict that the LNG trade will become more significant as global energy consumption rises. (Hayes, 2022a)

The official delivery location of Natural Gas futures contracts in the NYMEX is the Henry Hub which is situated in Erath, Louisiana. The hub is linked with four intrastate and nine interstate pipelines, including the Transcontinental, Acadian, and Sabine pipelines. The fact that differentiates the Henry Hub and makes it an important market clearing pricing concept is the fact that the price is based on the actual supply and demand of natural gas as a stand-alone commodity. Other natural gas markets like Europe have fragmented hub pricing points because most of the time the price of the natural gas is tied to the price of oil which has quite different factors that affect its price.

**Figure 3**  
Henry Hub Natural Gas Price



Notes: The source of the data is U.S. Energy Information Administration, 2022  
In Dollars per Million Btu

As *Figure 3* shows, the price of natural gas was not affected significantly from the restrictive measures that were implemented by governments around the globe. This can be explained by several facts. First of all, Natural Gas demand was less sensitive to Covid-19 compared to that of Oil, due to its reduced exposure to the transportation sector. Also, Natural Gas comprises an important percentage of the power mix in many countries, which is relevant for heating homes and powering industries, even during the pandemic.

From the start of the pandemic until the start of August 2020, the price fluctuated between \$1.5 and \$2, recording a low at just under \$1.5 on the 25th of June. Then, for a 10-month period from August 2020 until mid-May 2021, the price remained relatively stable, ranging from \$2 to \$3, passing only three times the \$3-level. The only exception to this period was on the 17<sup>th</sup> of February of 2021, when according to the “February 2021 Winter Storm: Impact on Futures Markets” report from the U.S. commodity futures trading commission, gas price skyrocketed due to extreme weather conditions



(severe winter storm which affected many states in the US), which led to increased energy demand and disrupted energy supply. After only 3.5 months, the price passed \$4. The relatively stable period was followed by a very volatile 4-month period, from the end of August until the start of December. On the 9th of September, the price broke the \$5 level and after passing the \$6 level twice, it sharply dropped to under \$4 at the start of the New Year, 2022. Finally, until the end of February and with the exception of a day in February in which it went over \$5, the price moved within the \$3.5-\$5 price range.

### 2.3 Chapter Conclusion

The spread of the pandemic produced a major shock on the commodities markets. The restraint of people movement and of almost all the business activity due to lockdowns, produced a major impact on the commodities prices. After the initial shock, the gradual return to normality drove the prices to pre-pandemic levels.

## **3. Global Indices**

### 3.1 Introduction

Indices are a trusted indicator of how a specific sector is doing, as they usually include the major companies of this sector. In this chapter, a closer look on the three main energy indices is taken on how they responded to the effects of the pandemic.

### 3.2 S&P Global Oil Index

This index measures the performance of 120 of the largest, publicly-traded companies engaged in oil & gas exploration and extraction & production from around the world. It provides global institutional investors exposure to stocks drawn from constituents of the S&P Global BMI. (spglobal.com, no date)

The participating companies in order to be eligible to participate in the index must fulfill specific technical requirements which are the following:

- A. Liquidity: Have a three-month average daily value traded (ADVT) at least US\$ 5 million (US\$ 3 million for current constituents).
- B. Listing Venues: Trade on a developed market exchange, as defined by S&P Dow Jones Indices. For a company domiciled in an emerging market, the company's ADR or GDR is eligible, provided the liquidity requirement is satisfied.
- C. Multiple Share Classes and Dual Listed Companies: Each company is represented once by the Designated Listing. (spglobal.com, no date)

Also, S&P Dow Jones Indices calculate multiple return types which vary based on the treatment of regular cash dividends. The classification of regular cash dividends is determined by S&P Dow Jones Indices.

- Price Return (PR) versions are calculated without adjustments for regular cash dividends.
- Gross Total Return (TR) versions reinvest regular cash dividends at the close on the ex-date without consideration for withholding taxes.
- Net Total Return (NTR) versions, if available, reinvest regular cash dividends at the close on the ex-date after the deduction of applicable withholding taxes. (spglobal.com, no date)

### 3.2.1. Calendar Year Performance

After a positive performance in 2019 with a 15-percent growth, the index suffered a -29% heavy decline in 2020 which was a result of the preventive measures. The emergence of the vaccines against Covid-19 and the gradual stabilization of the situation were the vehicles that helped the index to record a remarkable 40.42% return in 2021.

**Table 1**

Ten largest participants on S&P Global Oil index

| <b>Firm</b>         | <b>Symbol</b> |
|---------------------|---------------|
| Exxon Mobil         | XOM           |
| Chevron             | CVX           |
| Reliance Industries | RIGD          |
| TotalEnergies       | TTE           |
| Conoco Phillips     | COP           |
| Equinor             | EQNR          |
| Shell               | SHEL          |
| BP                  | BP.           |
| Enbridge            | ENB           |
| EOG Resources       | EOG           |

Notes: The source of the data is S&P Global, 2022

*Table 1* includes the ten largest firms of the index. Of them, two of the top four and four of the total ten are from the United States. Canada, France, Norway, India, the UK, and the Netherlands all have a participant. In terms of regions, half of the participants are located in North America, 40% in Europe, and the last 10% from Asia. Also, 9 out of 10 companies represent developed markets and only Reliance Industries represent an emerging market and more specifically that of India.

### *3.3 S&P GSCI Natural Gas*

The S&P GSCI Natural Gas Index provides investors with a reliable and publicly available benchmark for investment performance in the natural gas market. The index is part of the S&P GSCI index. The S&P GSCI is weighted by world production and comprises the physical commodities that have active, liquid futures markets. There is no limit on the number of commodities that may be included in the S&P GSCI; any commodity whose contract satisfies the eligibility criteria and the other conditions specified in this methodology are included. The S&P GSCI is designed to reflect the relative significance of each of the constituent commodities to the world economy, while preserving the tradability of the index by limiting eligible contracts to those with adequate liquidity. The calculation of the relative weights of commodities in the index involves a four-step process based on world production levels. (Hayes, 2022b).

#### *3.3.1 Calendar Year Performance*

As a result of the volatility that the pandemic brought in 2020, the index followed a downward trend, declining sharply by more than 45% (-45.89%). A negative 2020 was followed by a positive 2021, when the invention on vaccines helped to bring a relatively balance in natural gas demand. In 2021, the total return of the index was 35.11%. (spglobal.com, no date)

### *3.4 STOXX Europe 600 Oil & Gas*

The STOXX Europe 600 Oil & Gas index is a version of STOXX Europe 600, specified in the Oil and Gas sector. The index is a major benchmark for the related commodity markets in Europe. It is composed of 18 of the largest firms of the industry in the region.

**Table 2**  
Participating Firms on STOXX Europe 600 Oil & Gas

|                     |                |                |
|---------------------|----------------|----------------|
| Shell               | Repsol         | Tenaris        |
| TotalEnergies       | Neste          | Galp Energia   |
| BP                  | Snam Rete Gas  | Enagas         |
| Equinor             | Siemens Energy | Aker BP        |
| ENI                 | Lundin Energy  | Pkn Orlen      |
| Vestas Wind Systems | OMV            | Siemens Gamesa |

Notes: The source of the data is Qontigo, 2022

As *Table 2* pictures, of the 18 participating companies, more than 1/3 of them are from Mediterranean countries. More specifically, Italy and Spain each have three, whereas Portugal and France have one. Moving north, four companies have Scandinavian origin, as two are from Norway, one is from Sweden and one from Finland. Also, a company comes from neighboring Denmark. The rest three firms are located in Central Europe, one in Germany, one in Austria, and one in Poland.

Shell holds the largest weight in the index, accounting for more than 30% (30.72%). Together with BP (14.11%) and TotalEnergies (13.63%) have almost 60% of the total weight of the index (58.46%). As it can be understood, the course of the index is highly correlated with that of the three companies. (Qontigo, no date).

During the specific research period, the index experienced a low of 150 basis points on the 18<sup>th</sup> of March 2020. After that point, the index followed an upward trend, reaching a high at 240 basis points on the 5<sup>th</sup> of June, when the first wave of the pandemic in Europe was tamed. After the end of August 2020, the start of the second wave forced the index below 200 basis points, at a low of 170 basis points at the end of October. In the end of the year, the promising news regarding vaccines, boosted the index which followed a development path rising to a high at 268 basis points in mid-March. Furthermore, during a six-month period, the index fluctuated near 250 basis points, continuing with a sharp increase, and stopping at 255 basis points in mid-October. The surge of the highly transmissible omicron variant in Winter 2021 negatively affected the index but not for a long period of time, as it managed to hold

between 270 and 280 basis points. In advent of the New Year 2022, the index followed a third upward trend which peaked on the 11<sup>th</sup> of February at 314 basis points. (Qontigo, no date).

### 3.5 *Chapter Conclusion*

The three major indices that include the largest energy firms of the industry that are related to oil and gas in Europe and globally, were heavily influenced by the emergence of the pandemic. Despite the volatility in 2020 and 2021, the three indices successfully balanced back in 2022 as the situation regarding the pandemic started to normalize.

## 4. Greece

### 4.1 *Introduction*

Demand for oil and oil-related products decreased worldwide in 2020. Greece was not an exemption. There was a decrease in demand for oil-related products due to the restriction of movement. The only exception was heating oil. The demand for natural gas also increased in 2020.

### 4.2 *Situation in Greece*

The first confirmed cases of Covid-19 were detected on the 26<sup>th</sup> of February. The first cases were people who had travelled in Italy, Egypt, or Israel. The Greek Government, in order to avoid an uncontrollable pandemic wave, announced on the 23<sup>rd</sup> of March a total lockdown, restraining the movement of people, with ultimate target to halt the spread of the virus in the community. The first lockdown ended on the 4<sup>th</sup> of May. The confinement of movement and the ceasing of the majority of the activities led to a sharp drop in domestic fuels' demand and sales. According to a news report from Skai, the two most affected sectors were aviation and shipping in which demand halved in 2020, compared to that in 2019. Regarding oil-based products, demand for gasoline and diesel oil decreased by almost 17% and 9.5% respectively. (Hellenic Petroleum Annual Report, 2020). This was a result of the transition from on-site work to remote work for the majority of the people, and the fact that companies started to operate with the minimum possible staff in essential sectors such as the food industry.

On the other hand, this situation led households to increase the amount of oil and natural gas for heating purposes. These two products, due to the sharp drop in their prices became attractive, and consumers tried to capitalize on this drop so as to acquire large amounts for the next season. According to Andriosopoulos, K., Kosmidou, K.,

Ioannidis, F. (2020) Impact of the Coronavirus on the Greek Energy Market, in 2020, the price of heating oil dropped from 1.07 euro/liter to 0.815 euro/liter, a 24% decrease, almost in the same level of the domestic VAT.

#### *4.2.1 Oil Market*

The restriction of movement translated to a reduction in total domestic consumption. According to a press release from the Greek Statistics authority, oil-related products consumption declined by 8.1% from 7.2 metric tons to 6.8 metric tons compared to that of 2019. According to the annual report of Hellenic Petroleum for 2020, the lower usage of cars was depicted to the reduction of unleaded gasoline demand by 16.7% and to that of diesel oil by 9.4%. The overall decrease in the auto-fuels demand was 13%. However, in terms of heating oil, there was a 15.3% increase due to poor weather conditions and the imposition of the lockdown. Aviation and shipping fuels markets were those that was hit hardest, as consumption fell by -50%. This result was highly correlated with the sharp decrease in the number of tourists that visited the country in 2020. The number of tourists decreased dramatically, from 31.3 million in 2019 to almost 7.4 million in 2020, a 76% decrease. (Business Daily, 2021)

In 2021, oil-related products' market experienced a mild correction. The revocation of the preventive measures by the government and the gradual improvement in the mobility of citizens drove the consumption of car fuels up by 6.6%. On the contrary, the relatively mild winter and the better weather conditions in general had as a result the lowering of heating oil consumption by -17%. (Hellenic Petroleum, 2022). The market segment that is directly and highly correlated with tourism, aviation, was the most benefited by the gradual return to normality. In 2021, the number of tourists in Greece surpassed 14 million, double the number of 2020. (Naftemporiki, 2022) This positive development helped aviation fuels' consumption to experience a remarkable 90% rise. Shipping, which is also correlated with tourism, benefited from the surge in the footfall, marking a 7.2% growth. (Hellenic Petroleum, 2022)

#### *4.2.2 Natural Gas Market*

Regarding Natural Gas, according to DESFA's press release for Natural Gas in 2020, there was a 9.58% increase in domestic consumption and a 3.8% in gasification compared to 2019. LNG held a major position in type of natural gas compared to gas through the pipelines due to its lower cost of transportation. Electricity producers

accounted for 65% of this demand whereas the percentage for households and other users was 35%. Total consumption grew by 5.7 MWh from 57.4 MWh in 2019 to 63.1 MWh in 2020. Of this, 46.8% came from LNG. In terms of importing countries, the United States dominated this category, having almost half of the total share (48%). The remaining percentage was covered by Qatar (22%), Nigeria and Algeria (9% each), and Norway, Egypt, France, and Netherlands (3% each).

The three entrance spots of natural gas in Greece were Kipoi in the Greek-Turkish borders, Sidirokastro in the Greek-Bulgarian borders and Revythousa (LNG Terminal). At the end of 2020, a fourth place started to operate in Nea Mesimvria. This new entrance point was very important because it connected Greece with TAP pipeline. This connection crucially upgraded the role of the country in the regional energy landscape, as it connected the domestic energy system with one of the largest natural gas markets in Europe, that of Italy. The Italian natural gas market is also connected with Northern Europe through Switzerland and Germany. (Desfa, 2020)

According to DESFA's press release for Natural Gas in 2021, the upward trend continued, as consumption rose by 10.87% besides that of 2020. The main entrance point continued to be Sidirokastro with a total share of 45.5%. Also, the new entrance point in Nea Mesimvria also had a significant proportion due to the connection with TAP pipeline. Power Producers increased their share by 17%, to 68%. The share of LNG imports from the United States decreased in 2021 but remained in high levels with over 50%. (Desfa, 2021)

#### *4.3 Chapter Conclusion*

The restriction on the movement of people inevitably lowered the demand for gasoline and diesel oil, the main fuels that cars use. On the other hand, the continuous stay at home forced heating oil demand up by 15%. Natural gas demand was not affected by the pandemic as it was mainly used for electricity production and heating.

### **5. Valuation Exercise**

#### *5.1 Introduction*

Mytilineos, Motor Oil, and Hellenic Petroleum are three of the biggest energy groups in Greece, operating in many sectors such as Utilities (all three), Oil (Motor Oil, and Hellenic Petroleum), Construction, (Mytilineos), and Metallurgy (Mytilineos). In this chapter, a thorough analysis on the performance of the stocks of the above-mentioned

groups is provided, and by using DCF valuation, a target price and an investment recommendation based on this analysis is given.

## 5.2 General information on Groups

*Mytilineos is a leading global industrial and energy company with a strong presence on all five continents. The company operates Four Business Units, the Power & Gas BU, the Metallurgy BU, the Renewables & Storage Development BU, and the Sustainable Engineering Solutions BU. Company's strong international presence in all five continents establishes itself as a global leader, as its exports foreign markets account for more than 2% of total Greek exports, significantly benefiting the national economy and conveying a strong message for its commitment to continuous growth. (Mytilineos corporate site, no date).*

Mytilineos operates in many industries such as electricity, where its subsidiary company “Protergia” is a market leader in the Greek energy market, and metallurgy with “Aluminum of Greece”, also a market leader. The group is also undertaking infrastructure projects mainly through partnerships. Renewables is another sector that the group operates. Mytilineos has almost 5 thousands employees and operates in 32 countries around the globe.

*Motor Oil is an energy group based in Greece. It was founded in 1970 and its refinery, one of the top refineries in Europe (11.5 Nelson Complexity Index) started operating in the region of Corinth in 1972. It plays a leading role in the sectors of crude oil refining and marketing of petroleum products in Greece, as well as the greater eastern Mediterranean region, supplying its customers with a wide range of high-quality products. It exports in more than 45 countries and has about 2500 employees. Since 2001 the Company shares have been listed on the Athens Exchange. It is also a constituent of the ATHEX Composite Share Price Index, the FTSE/ATHEX LARGE CAP index, the MSCI Greece Small Cap Index and the FTSE4Good Index Series. (Motor Oil corporate site, no date).*

Like the other energy groups, Motor Oil has many subsidiary companies, with “NRG” being the most known, operating in the electricity market. The group recently purchased 30% of Ellaktor, a construction and energy group, and 75% of its renewables energy portfolio with a total capacity of 493 MW and many under-construction projects



of over 1.6 GW total capacity. This late purchase divulges the aim of the group to increase its portfolio levels in the renewables energy market.

*Hellenic Petroleum is one the leading energy groups in Greece and more broadly in Southeastern Europe. The group operates with more than 300 petrol stations in many countries in the Balkans mainly through the EKO brand, such as in Bulgaria, Serbia, Montenegro, and in North Macedonia. The group also operates in Cyprus and holds the OKTA installations in Skopje (North Macedonia).* (Hellenic Petroleum corporate site, no date).

The group have many domestic subsidiary companies which operate in many sectors, with “Elpedison” being the most known, operating in the electricity market. Elpedison is partly-owned by Edison, the oldest energy company in Europe with presence in Africa, the Middle East, and many countries in Europe. Hellenic Petroleum also has as a strategic plan to diversify its portfolio away from fossil fuels to renewable energy, and that is why in April it launched a photovoltaic park in Kozani, the largest renewable energy project in Greece. The total installed capacity of the project is 204.3 MW. Total production estimation is at 350 GWh of energy per year, while it will cover the needs of 75,000 households, with zero emissions energy. Finally, the level of total investment was 130 million euros, producing 350 new jobs during construction, and holding many direct and indirect jobs during its operation.

### 5.3 Background Information

#### 5.3.1 Global Environment

Two years after the emergence of Covid-19 pandemic, the situation has started to normalize as countries have all the available tools in order to combat any possible resurgence of cases. Vaccines also have been proven effective against any new mutation. It must be mentioned that there is always a possibility of a rise of a new mutation that could invade the protection that vaccines produce to human organisms. However, this scenario does not have many chances of occurrence until now. Inflationary pressures are another problem that firms around the world face, especially after the stimulus packages that were introduced by the governments around the world and the constantly increasing living costs.

Furthermore, the invasion of Russia in Ukraine and the consequent start of the war, has brought much volatility to an already volatile world. The sanctions of EU on

Russian gas and oil have led gas prices to high levels, which as a result have an impact on the energy costs of all firms.

### 5.3.2 External Environment

As the Greek government enters its last year of its governance, there is continuous concern that, due to the numerous problems that the country face, such as the rising cost of living, the rising energy costs and the intertemporal tensions with Türkiye, the Greek government will try to hold national elections earlier than expected so as to win a fresh mandate. Also, the current government intends to cancel, with consecutive elections, the electoral system that the previous government voted and makes the target of absolute majority of the winning party impossible. This situation entails a political risk because there is possibility that the governor party, a supporter of the free-market politics, could not win the absolute majority even after the second elections. This possible instability is enhanced by the possibility that there would be no majority even after the second elections due to the hostile political environment, the lack of the current government to find potential allies and of the impossibility of the opposition parties to provide an alternative government formation. As a consequence of this, there is a growing possibility that the country could enter a period of political instability from the successive elections which would threaten the economic stability of the country.

### 5.3.3 Industry Environment

Mytilineos operates in many industries such as metallurgy, electricity production, construction, and renewables. The latter is following a growth path and has a very promising future not only in Greece but also in the world. Countries strive to change the energy mix and replace fossil fuels, especially gas, with clean energy. Their aim is to curb CO<sub>2</sub> emissions and help build a more sustainable future. Mytilineos has invested large amounts of money in projects concerning renewables around the world and intends to continue this hub. The war in Ukraine seems to act as an accelerator in this transition especially in the E.U., which has already started to search for ways to lower or even eliminate its dependency on Russian oil and gas.

Motor Oil and Hellenic Petroleum operate mainly in the commodities sector. Their functions span from oil distills, wholesale and retail sales of oil-based products through the groups' gas stations (Shell licensee, Avin, Cyclon and BP licensee, EKO respectively), to electricity production and distribution through their retail brands (NRG

and Elpedison correspondingly). The price of oil and that of oil-based has stabilized after a turbulent six-month period (Spring to Summer) with prices reaching high levels.

In terms of electricity production, the war in Ukraine skyrocketed the already inflated gas prices to record high. The rising cost of electricity passed-through to customer bills as a result of the lack of regulatory measures from the E.U. and the government, which tried to alleviate this problem by subsidizing 90% of the cost of the bills. This situation helped electricity producers to maintain their profits and not get affected by the rising costs of production. Recently, the two groups started to focus more on the renewables market. Motor Oil purchased 75% of the renewables energy portfolio of Ellaktor, with a total capacity of 493MW and many under-construction projects of over 1.6GW total capacity. On the other side, Hellenic Petroleum launched in April a photovoltaic park in Kozani, the largest renewable energy project in Greece. The total installed capacity of the project is 204.3 MW.

#### 5.4 Theoretical Framework

This thesis has as its aim to provide a target share price for the stocks of Mytilineos, Motor Oil, and Hellenic Petroleum. This will be achieved by using intrinsic valuation and more specifically the Discounted Cash Flow (DCF) model.

##### 5.4.1 Data

The valuation approach that is used to find the target price for the three stocks is intrinsic valuation, and more specifically the discounted cash flow (DCF) model, where future cash flows are discounted to the current year, 2022, to obtain the total present value of the firm. The time span used is 10 years from 2022 to 2031. The historical financial data of the companies are analyzed so as to build a foundation for the forecast. This section addresses the use of the financial data and addresses their assessment. The formulas for the Valuation can be found on the Lecture Note Packet 1 on Intrinsic Valuation from the course Valuation that Professor Aswath Damodaran teaches in NYU. Also, some of the formulas can be found on the personal website and blog of Professor Aswath Damodaran “Musings on Markets”.

##### 5.4.1.1 Revenues

*“Revenue is the money generated from normal business operations, calculated as the average sales price times the number of units sold. It is the top line (or gross income)*

figure from which costs are subtracted to determine net income. Revenue is also known as sales on the income statement.” (Hayes, 2022c)

#### 5.4.1.2 EBIT

“EBIT (earnings before interest and taxes) is a company's net income before income tax expense and interest expenses are deducted. It is used to analyze the performance of a company's core operations without the costs of the capital structure and tax expenses impacting profit.” (Murphy, 2022a)

#### 5.4.1.3 Change in Net Working Capital ( $\Delta$ NWC)

The net working capital metric is a measure of liquidity that helps determine whether a company can pay off its current liabilities with its current assets on hand. The change in NWC is measured using this equation:

$$\Delta\text{NWC} = \Delta \text{ Trade Receivables} + \Delta \text{ Inventories} - \Delta \text{ Trade Payable}$$

Accounts receivables is defined as payments owed to a company by its customers for products and/or services already delivered to them.

#### 5.4.1.4 Inventories

“The term inventory refers to the raw materials used in production as well as the goods produced that are available for sale. A company's inventory represents one of the most important assets it has because the turnover of inventory represents one of the primary sources of revenue generation and subsequent earnings for the company's shareholders. There are three types of inventory, including raw materials, work-in-progress, and finished goods. It is categorized as a current asset on a company's balance sheet.” (Kenton, 2022a)

#### 5.4.1.5 Accounts Payable

“Accounts payable (AP), or "payables," refer to a company's short-term obligations owed to its creditors or suppliers, which have not yet been paid. Payables appear on a company's balance sheet as a current liability.” (Tuovila, 2022a)

#### 5.4.1.6 Free Cash Flow to Firm (FCFF)

“Free cash flow to the firm (FCFF) represents the amount of cash flow from operations available for distribution after accounting for depreciation expenses, taxes, working

capital, and investments. FCFE is a measurement of a company's profitability after all expenses and reinvestments. It is one of the many benchmarks used to compare and analyze a firm's financial health.” (Hayes, 2022d)

#### 5.4.1.7 Depreciation and Amortization (D&A)

“Depreciation, and amortization (D&A) is an accounting technique that enables companies to gradually expense various different resources of economic value over time in order to match costs to revenues. Depreciation spreads out the cost of a tangible asset over its useful life, and amortization is the deduction of intangible assets over a specified time period; typically, the life of an asset.” (Liberto, 2022a)

#### 5.4.1.8 Capital Expenditures (CapEx)

“Capital expenditures (CapEx) are funds used by a company to acquire, upgrade, and maintain physical assets such as property, plants, buildings, technology, or equipment. CapEx is often used to undertake new projects or investments by a company. Making capital expenditures on fixed assets can include repairing a roof (if the useful life of the roof is extended), purchasing a piece of equipment, or building a new factory. This type of financial outlay is made by companies to increase the scope of their operations or add some future economic benefit to the operation.” (Fernando, 2022a)

#### 5.4.1.9 Tax (t)

The effective corporate tax rate of the country. The effective corporate tax rate in Greece is 22%

#### 5.4.1.10 Weighted Average Cost of Capital (WACC)

“The weighted average cost of capital (WACC) represents a firm's average after-tax cost of capital from all sources, including common stock, preferred stock, bonds, and other forms of debt. WACC is the average rate a company expects to pay to finance its assets. The weighted average cost of capital is a common way to determine required rate of return because it expresses, in a single number, the return that both bondholders and shareholders demand in order to provide the company with capital. A firm's WACC is likely to be higher if its stock is relatively volatile or if its debt is seen as risky because investors will require greater returns.” (Hargrave, 2022a)

The formula with which the WACC is calculated is the following:  $[D / (D+E) * \text{Cost of Debt}] + [E / (D+E) * \text{Cost of Equity}]$ , where D is Debt and E is Equity.

#### 5.4.1.11 Debt

*“The sum of the liabilities of the company. Usually, liabilities include loans, accounts payable, mortgages, deferred revenues, bonds, warranties, and accrued expenses.”* (Hayes, 2022e)

#### 5.4.1.12 Equity

*“Equity, typically referred to as shareholders' equity (or owners' equity for privately held companies), represents the amount of money that would be returned to a company's shareholders if all of the assets were liquidated and all of the company's debt was paid off in the case of liquidation. In the case of acquisition, it is the value of company sales minus any liabilities owed by the company not transferred with the sale.”* (Fernando, 2022b)

#### 5.4.1.13 Cost of Debt

*“The cost of debt is the effective interest rate that a company pays on its debts, such as bonds and loans. The cost of debt can refer to the before-tax cost of debt, which is the company's cost of debt before taking taxes into account, or the after-tax cost of debt. The key difference in the cost of debt before and after taxes lies in the fact that interest expenses are tax-deductible.”* (Hayes, 2022f)

$$\text{Cost of Debt} = (\text{risk-free rate} + \text{spread}) \times (1-t)$$

#### 5.4.1.14 Cost of Equity

The cost of equity is the level or return an investor demands from an equity investment, so as to consider it worth investing, also bearing the risk associated with the investment. The cost of equity is computed as the sum of the risk-free rate and of the product of the equity risk premium with the relative risk measure.

$$\text{Cost of Equity} = \text{risk-free rate} + (\text{adjusted relative risk} \times \text{equity risk premium})$$

#### 5.4.1.15 Equity Risk Premium

*“Equity risk premium refers to an excess return that investing in the stock market provides over a risk-free rate. This excess return compensates investors for taking on*

*the relatively higher risk of equity investing. The size of the premium varies and depends on the level of risk in a particular portfolio. It also changes over time as market risk fluctuates.*” (Chen, 2022c).

The equity risk premium in January 2022 for the Greek market was computed by Professor Aswath Damodaran to be 7.8%. We assume that, due to the war in Ukraine and the continuous volatility in the global market, the equity risk premium has reached 8.5%.

#### 5.4.1.16 Risk-Free Rate

*“The risk-free rate of return is the theoretical rate of return of an investment with zero risk. The risk-free rate represents the interest an investor would expect from an absolutely risk-free investment over a specified period of time.”* (Hayes, 2022g)

In this case the risk-free rate is the yield of the 10-year government bond of Germany which is 2.124%.

#### 5.4.1.17 Spread

Spread is the difference between the interest rate of the risk-free bond with that of the riskier. In this case, the difference of the interest rate of 10-year Greek bond and that of the 10-year German bond. The spread is 2.63%.

#### 5.4.1.18 Relative Volatility

The relative volatility reflects the volatility of stocks of different companies that operate in the same sector. The relative volatility is adjusted to reflect the revenue mix and the relative risk of every group.

#### 5.4.1.19 Terminal Value

*“Terminal value (TV) is the value of an asset, business, or project beyond the forecasted period when future cash flows can be estimated. Terminal value assumes a business will grow at a set growth rate forever after the forecast period. Terminal value often comprises a large percentage of the total assessed value.”* (Ganti, 2022)

The formula for the Terminal Value is:  $TV = FCFF_{2031} \times (1+g)/r_{wacc-g}$

#### 5.4.1.20 Growth Rate

The estimated growth of the company or of the domestic economy which is used as a proxy in the DCF.

#### 5.4.1.21 Equity Value

*“Equity value constitutes the value of the company's shares and loans that the shareholders have made available to the business. The calculation for equity value adds enterprise value to redundant assets (non-operating assets) and then subtracts the debt net of cash available. Total equity value can then be further broken down into the value of shareholders' loans and (both common and preferred) shares outstanding.”* (Investopedia Team, 2022a)

#### 5.4.1.22 Enterprise Value

*“Enterprise value constitutes more than just outstanding equity. It theoretically reveals how much a business is worth, which is useful in comparing firms with different capital structures since the capital structure doesn't affect the value of a firm. In the purchase of a company, an acquirer would have to assume the acquired company's debt, along with the company's cash. Acquiring the debt increases the cost to buy the company, but acquiring the cash reduces the cost of acquiring the company. Businesses calculate enterprise value by adding up the market capitalization, or market cap, plus all of the debts in the company. Debts may include interest due to shareholders, preferred shares, and other such things that the company owes. Subtract any cash or cash equivalents that the business currently holds, and you get the enterprise value. Think of enterprise value as a business' balance sheet, accounting for all of its current stocks, debt, and cash.”* (Investopedia Team, 2022b)

#### 5.4.1.23 Net Debt

*“Net debt is a liquidity metric used to determine how well a company can pay all of its debts if they were due immediately. Net debt shows how much debt a company has on its balance sheet compared to its liquid assets. Net debt shows how much cash would remain if all debts were paid off and if a company has enough liquidity to meet its debt obligations.”* (Murphy, 2022b)



#### 5.4.1.24 Minority Interest

*“A minority interest refers to a stake in a company that is otherwise controlled by a parent company. This usually occurs in subsidiaries where the parent company owns more than 50% of the voting shares. Minority interests generally come with some rights for the stakeholder such as participation in sales and certain audit rights. Minority interests are also referred to as non-controlling interests. Under U.S. GAAP, non-controlling interests are listed on the equity section of the parent company's consolidated balance sheet, but separate from the parent company's equity. This represents the proportion of the subsidiary owned by minority shareholders.” (Kenton, 2022b)*

#### 5.4.1.25 Cash and Cash Equivalents

*“Cash and cash equivalents refers to the line item on the balance sheet that reports the value of a company's assets that are cash or can be converted into cash immediately. Cash equivalents include bank accounts and marketable securities, which are debt securities with maturities of less than 90 days. However, oftentimes cash equivalents do not include equity or stock holdings because they can fluctuate in value. Examples of cash equivalents include commercial paper, Treasury bills, and short-term government bonds with a maturity date of three months or less. Marketable securities and money market holdings are considered cash equivalents because they are liquid and not subject to material fluctuations in value.” (Tuovila, 2022b)*

#### 5.4.1.26 Number of Shares Outstanding

*“Shares outstanding refer to a company's stock currently held by all its shareholders, including share blocks held by institutional investors and restricted shares owned by the company's officers and insiders. Outstanding shares are shown on a company's balance sheet under the heading “Capital Stock.” (Chen, 2022d)*

#### 5.4.1.27 Target Share Price

The target share price for a stock is the estimated price that is provided through the valuation exercise.

The formula for the Target Share Price is:  $\text{Equity Value} / \text{Number of Shares Outstanding}$ .

**Table 3**  
Valuation Exercise Data

| <b>Data</b>            | <b>Mytilineos</b> | <b>Motor Oil</b> | <b>Hellenic<br/>Petroleum</b> |
|------------------------|-------------------|------------------|-------------------------------|
| WACC                   | 9.03%             | 7.56%            | 8.3%                          |
| Cost of Debt           | 3.71%             | 3.71%            | 3.71%                         |
| Cost of Equity         | 13.7%             | 14.4%            | 14.39%                        |
| Equity Risk<br>Premium | 9.94%             | 9.97%            | 9.97%                         |
| Adjusted               | 1.16              | 1.23             | 1.23                          |
| Relative Risk          |                   |                  |                               |
| Growth Rate            | 15.69%            | 19.95%           | 8.91%                         |
| Reinvestment<br>Rate   | 112.3%            | 126.8%           | 83%                           |
| ROIC                   | 13.97%            | 15.73%           | 10.78%                        |
| Invested<br>Capital    | 1.998*            | 1.971*           | 3.713*                        |

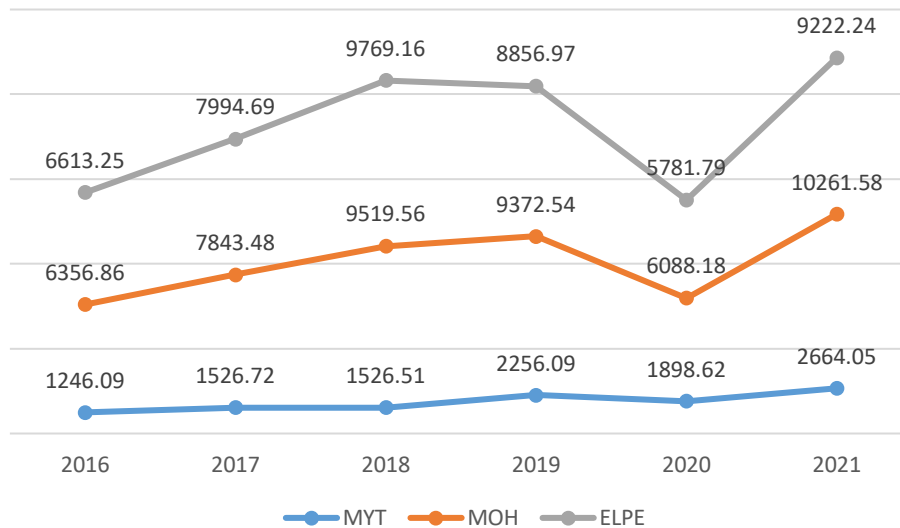
Notes: \* in Billion euros

## 5.5 Internal Analysis

### 5.5.1 Historical Financial Data

#### 5.5.1.1 Revenues

**Figure 4**  
Revenues



Notes: In Million Euro

As *Figure 4* pictures, Mytilineos successfully doubled its revenues, an important accomplishment for the group. The revenues moved from 1.2 billion euro in 2016 to more than 2.6 billion in 2021, despite having its core business in a country that was implementing a 3rd package with structural measures for its economy and after the 6-month period at the start of 2015, which had negative consequences for the Greek economy and as a result for all the businesses operating within.

Motor Oil managed to increase its revenues by almost 4 billion euro, from 6.3 billion in 2016 to 10.2 billion in 2021. This accounts for a 67% increase, a major achievement for the group. From 2016 until 2018, Motor Oil experienced a very successful period as it managed to augment its revenues from 6.3 billion to 9.5 at the end of the period, an annual increase of about 1.5 billion euro. In 2019, the revenues went down about 200 million euro. The start of the pandemic produced a major hit for the group, as the majority of its revenues comes from oil-related activities. As a result

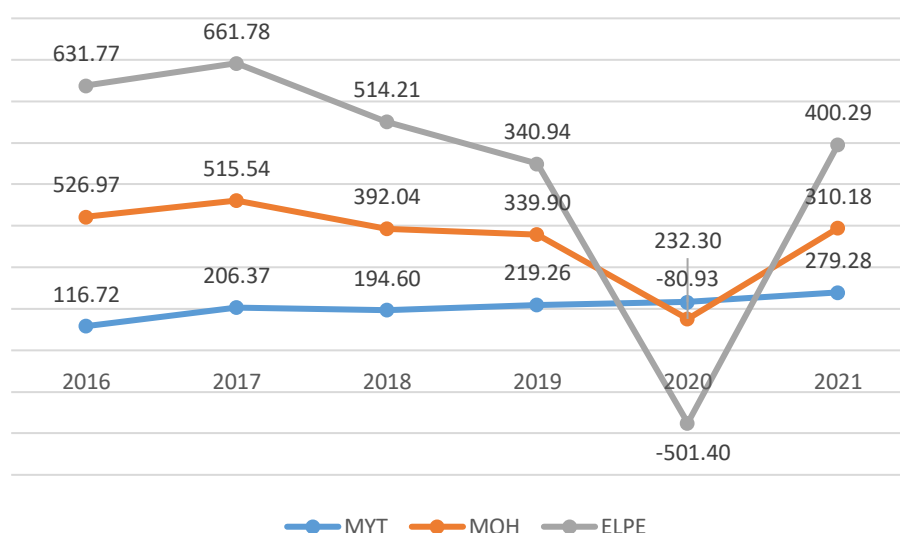
of the minimization of transportation and the prohibition on human movement, the group lost around 3.3 billion euro, a 35% decrease. In 2021, when the situation regarding the pandemic started gradually to stabilize, Motor Oil not only managed to regain the lost revenues and match those of 2019, but also to gain another 1.2 billion euro reaching 10.2 billion in 2021.

From 2016 to 2018, Hellenic Petroleum successfully managed to increase in revenues by a total of 3.1 billion euro, from 6.6 billion to 9.7 billion respectively. However, even before the start of the pandemic, the group saw decreased revenues the next year by almost 900 million euro. As it happened with Motor Oil, Hellenic Petroleum was hardly hit by the dramatic decrease in people movement and the widespread cease of business activity. This was pictured in the group's revenues, which closed just under 5.8 billion in 2020, a 3.1 billion reduction compared to the previous year, and about 900 million lower than those in 2016. The initial impact of the pandemic on revenues was followed by a V-shape recovery, which led the revenues to the highest levels since 2018, at 9.2 billion euro.

5.5.1.2 Earnings Before Interests and Taxes (EBIT)

**Figure 5**

Earnings Before Interests and Taxes



Notes: In Million Euro

Analyzing past years results in terms of EBIT using *Figure 5*, Mytilineos gradually increased its earnings from 116 million in 2016 to 280 million in 2021. Also, despite the pandemic Mytilineos managed not only to hold its profits but to increase them by almost 40 million euro. Except for a small downturn in 2018, for the rest of the period EBIT were improving, with an average rate of 28% from 2017 to 2019 and 13% from 2020 to 2021 during the pandemic. This stable and strong performance of the group can be explained by the well-diversified portfolio that has established throughout the years, with projects in many sectors around the world which have given Mytilineos the opportunity to mitigate most of the risks associated with the pandemic and the war in Ukraine.

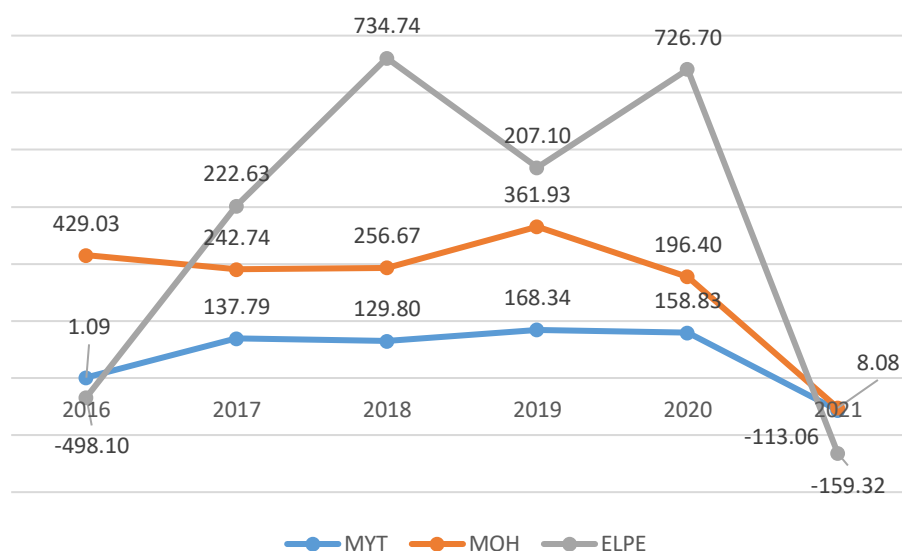
Despite the increased revenues, the EBIT of Motor Oil decreased during the 6-year period. For two years, 2016 and 2017, the level of EBIT was more than half a billion, 527 million euro and 515 million, respectively. However, the next year, Motor Oil saw its EBIT substantially decreasing, about 125 million euro, of which accounted for almost a quarter. More specifically, as *Figure 5* pictures, in 2018 the level of EBIT reached 392 million euro. This downward trend continued for the rest of the period, when in 2021 the number closed at 310 million euro.

Regarding Hellenic Petroleum, after a 30-million rise from 2016 to 2017, earnings followed a sharp downturn during the 3-year period from 2018 to 2020. More specifically, in 2018 earnings were down 150 million euro compared to 2017. A further decrease of about 173 million euro took place in 2019 and the unavoidable consequences of the pandemic in 2020 shrunk earnings to a negative result of half a billion euro. Finally, the same pattern of V-shape recovery happened also for the earnings which close at 400 million in 2021.

### 5.5.1.3 Free Cash Flow to Firm (FCFF)

**Figure 6**

Free Cash Flow to Firm (FCFF)



Notes: In Million Euro

\* The FCFF of Motor Oil and of Hellenic Petroleum for the year 2020 were not available on Bloomberg Terminal. They were manually calculated, and their prices may differ from the actual numbers.

Another important figure, maybe the most important, in stock valuation is the FCFF, which describes the amount of cash that is available to a firm after expenses and is an indicator of the financial health of the firm.

As it can be seen from *Figure 6*, Mytilineos managed to increase its FCFF from 1 million euro in 2016 to 168 million in 2019 and to 158 in 2020. 2021 was the only year that the free cash flows were negative. However, this result can be explained by the impact of the pandemic on the economic activity around the globe and also the rising energy costs.

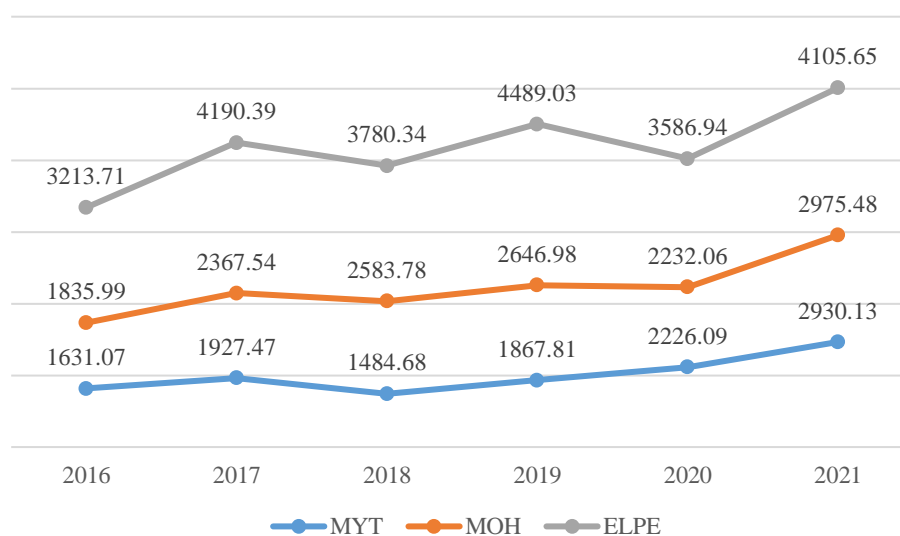
As happened in EBIT, the free cash flows of Motor Oil followed the same downward trend. In 2016 the level of the free cash flows was at 429 million euro, but the next two years it started to shrink, closing at 256 million in 2018, a 14-million increase compared to 2017. This trend was reversed in 2019, when the group saw its

free cash flows rising by more than 100 million euro, to 362 million. However, the start of the pandemic had a major effect on the business of the group, an effect that was depicted in the level of the cash flows in 2021, when it reached just over zero to 8 million euro.

The course of the free cash flows of Hellenic Petroleum during the period of attention is characterized by major fluctuations in their amount. After a negative result of almost half a billion euro in 2016, the amount of free cash flows returned to positive results the next year at 222 million euro. A second-but much more sharp- increase happened in 2018. From that year and onwards, free cash flows start again to decrease, and the impact of the pandemic is depicted at the end of 2021, with negative levels of - 160 million euro.

#### 5.5.1.4 Enterprise Value

**Figure 7**  
Enterprise Value



Notes: In Billion Euro

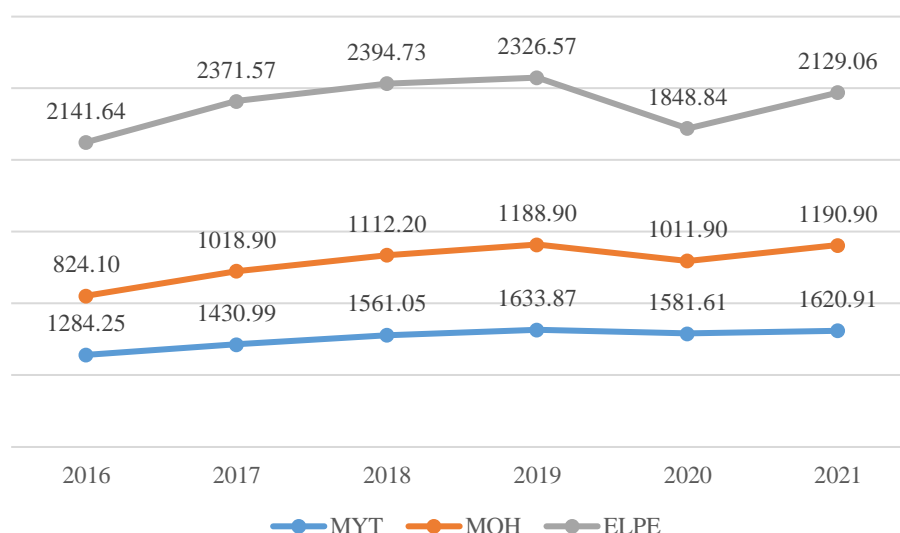
As Figure 7 shows, the enterprise value of Mytilineos also followed an upward trend throughout the given period, in which reached 2.9 billion euro from 1.6 billion euro in 2016, a more than 80% increase.

Contrastingly to the other financial results, the enterprise value of Motor Oil grew strongly throughout the period, with the only exception again the year 2020. In particular, from 2016 which was at 1.8 billion, Motor Oil managed to augment its enterprise value by 1.1 billion to just under 3 billion euros in 2021.

The enterprise value of Hellenic Petroleum fluctuated between 3.2 billion and 4.5 billion euros during the same time period with consecutive ups and downs.

#### 5.5.1.5 Equity Value

**Figure 8**  
Equity Value



Notes: In Billion Euro

In *Figure 8*, it can be seen that the equity value of Mytilineos also followed an upward trend in the given period, starting from 1.2 billion euro in 2016 and reaching 1.6 billion in 2021. This constitutes an average increase of 4% yearly.

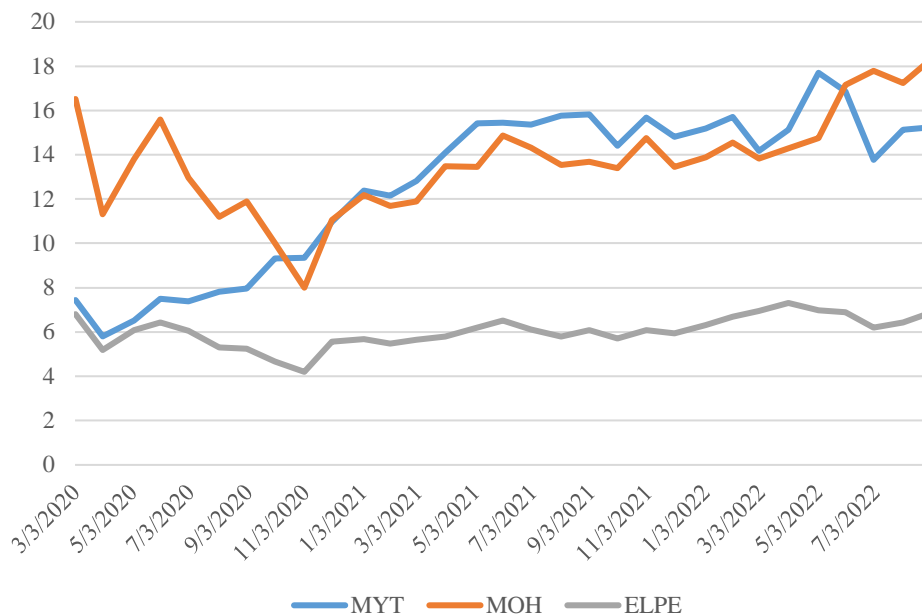
The equity value of Motor Oil experienced an increase from 2016 to 2017, when it increased by 23.5% from 824 million to just over 1 billion euro. For the rest of the period, with the exception of 2020, the equity value grew steadily, arriving at 1.2 billion euros in 2021.



The equity value of Hellenic Petroleum was relatively stable throughout the period with its levels ranging from 2.1 to approximately 2.4 billion euro, with the only exception being the 2020 level in which it fell under 2 billion, closing at 1.8 billion euro.

5.5.2 Stocks Comparison

**Figure 9**  
Stocks Comparison



Notes: In Euro

In *Figure 9* is pictured the movement that the shares of the three groups followed during the pandemic. As it can be seen, the three groups suffered a heavy shock due to the imposition of the first lockdown in Greece until the lifting of the measure at the start of May 2020. Taking a closer look to the chart, after May the stock of Mytilineos started to follow an upward trend which, despite some fluctuations during the three-year period, led the stock to a 200% increase from under 6 euros to over 15 euro.

The stock of Motor Oil, after a negative 9-month period from March until November 2020, during which it lost half of its value (from 16 euro to 8 euro), successfully managed to overturn this trend and follow a growth path. The result of this growth was a 10-euro rise, from 8 euro to 18 euro in September of 2022.

The stock of Hellenic Petroleum followed the same trend during the same 9-month period as that of Motor Oil did. However, the stock of Hellenic Petroleum did not experience strong growth as those of the two other firms and only grew by 50% or 2.5 euro until the end of the period.

The sharp decrease for Motor Oil and Hellenic Petroleum can be explained by the nature oil the portfolios of the firms.

## 5.6 Valuation Results

### 5.6.1 Forecasting Cash Flows

Before starting forecasting cash flows, the model was separated into three different periods, the short-term, the medium-term, and the long-term. The short-term period consists of two years, 2022 and 2023. The medium-term consists of five years from 2024 to 2028. Lastly, the long-term consists of the last three years, 2029 until 2031. This categorization was used as a tool for a comprehensive approach on the development of the key financial figures of the groups.

Every time period has its own growth rate so as to project, in the best possible way, the change in the free cash flows.

In the short-term, the growth in operating income is computed and used as a growth rate for the free cash flows. This rate is the sum of two other rates that of the reinvestment rate and of the return on invested capital.

The Reinvestment Rate measures the percentage of a company's after-tax operating income (i.e., NOPAT) that is allocated to capital expenditures (Capex) and net working capital (NWC). (Wall Street Prep, no date).

Return on Invested Capital (ROIC) measures the percentage return of profitability earned by a company using the capital invested by equity and debt providers. It is the sum of the division between EBIT and Invested Capital. (Hayes, 2022h).

Invested capital is the total amount of money raised by a company by issuing securities to equity shareholders and debt to bondholders, where the total debt and capital lease obligations are added to the amount of equity issued to investors. Invested capital is not a line item in the company's financial statement because debt, capital

leases, and stockholder’s equity are each listed separately in the balance sheet. (Hayes, 2022i)

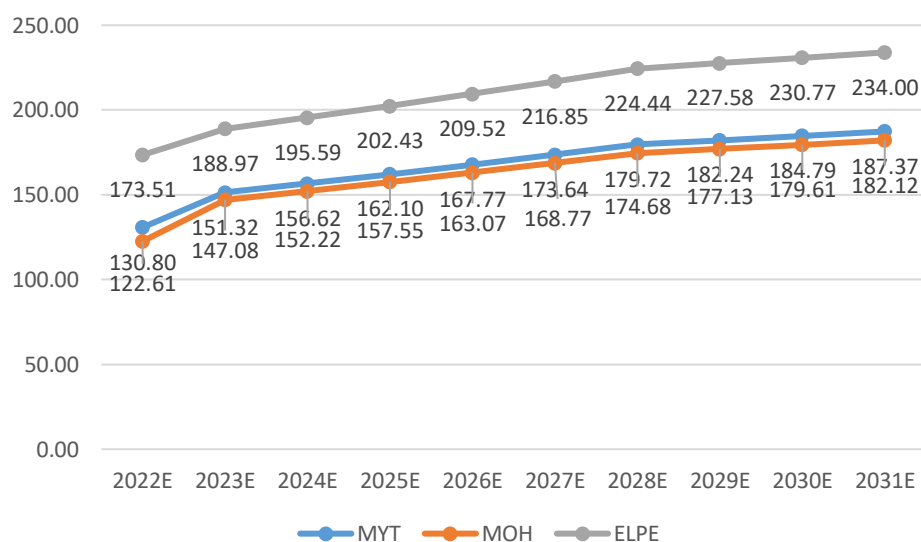
In the medium-term period, the groups will reach a stable growth rate which it is assumed to be the same as that of the Greek Economy. The IMF projects that the growth rate of the Greek Economy for 2022 will be 5.2% and 1.8% for 2023. We use the average of the two projections as the growth rate for this specific period which is 3.5%, normalizing the high levels of 2022 which is mainly attributed to tourism which operated without measures for the first time after 2019 and the low levels of 2023 which can be explained by the impact of the war in Ukraine on the world economy.

In the long-term, the group continues to grow at a constant rate which in this case will be the same as the projected growth rate of the Greek GDP. The projected growth rate of the Greek Economy by the IMF is 1.4%.

### 5.6.2 Estimated Free Cash Flows to Firm (FCFF)

**Figure 10**

Estimated Free Cash Flows to Firm



Notes: In Million Euro

As *Figure 10* shows, after the negative effect of the pandemic on them in 2021, a year when they were negative (-113 million euro), the free cash flows of Mytilineos is projected that will rebound in 2022 reaching 130.8 million euro and 151.3 million euro

in 2023. In the medium-term period free cash flows are expected to grow at a steady rhythm, reaching almost 180 million euro at the end of 2028. Finally, in the long-term period their level will surpass the 180 million in 2029 and will peak at the end of 2031 at 187.4 million.

Concerning Motor Oil, after the marginally positive free cash flows of 2021, which were 8 million euro, it is expected that in 2022 there will be a rebound in the level of the cash flows and will reach 122 million euro. The short-term period will end in 2023 with cash flows of just under 150 million euro, 147 million. During the medium-term period, the cash flows will follow a stable-growth path reaching 174.68 million euro in 2028, a 24.5-million increase compared to 2024 and the 152.2 million euros. The annual growth rate of the free cash flows during this period will be about 5.5 million. The growth trend continues in the long-term period, but the rate is halved to 2.5 million euro. Consequently, the free cash flows are projected to be 177 million in 2029, 179.6 in 2030, and 182.1 in 2031.

As for Hellenic Petroleum, the free cash flows are expected to rebound to positive levels in 2022, closing at 173.5 million euro in 2022. The short-term period will end with a 15-million increase at which the free cash flows will reach 189 million euro. The expected annual growth for the medium-term period is estimated at around 7 million euro. Following that gradual increase, the level of the free cash flows will be just under 225 million by 2028. Finally, the growth rate is halved during the long-term period which as a result will slow the growth of the free cash flows. The result of this change will lead the level of the free cash flows at 234 million euro by the end of 2031.

### 5.7 Sensitivity Analysis

The estimation of the performance of stocks in the future using the DCF valuation model is based on market-related assumptions such as the growth rate in FCFF and the weighted average cost of capital (WACC). As is reflected in the tables below, a change in these rates can have a significant effect on the target share prices of the model.

**Table 4**

Mytilineos Change in growth rate

| <b>Change (in %)</b> | <b>Medium Term<br/>Target Price (in euro)</b> | <b>Long Term<br/>Target Price (in euro)</b> |
|----------------------|-----------------------------------------------|---------------------------------------------|
| -2%                  | 19,81                                         | 14,57                                       |
| -1,50%               | 20,51                                         | 14,87                                       |
| -1%                  | 21,23                                         | 18,64                                       |
| -0,50%               | 21,97                                         | 20,55                                       |
| 0,50%                | 23,48                                         | 25,19                                       |
| 1%                   | 24,25                                         | 28,05                                       |
| 1,50%                | 25,04                                         | 31,38                                       |
| 2%                   | 25,85                                         | 35,31                                       |

As *Table 4* shows, the change in the growth rate was separated into two sub-categories, so as to analytically examine how a change in different time periods can affect the target price. For the medium-term, a negative change of -2% can lead the target price to 19.81 euro, a decrease of about 3 euro. On the other hand, a positive increase of +2% will increase the target price by more than 3 euro. The price divergence between the two extreme cases is 6 euro.

In the long-term, a change in the growth rate seems to have a higher weight in the target price, as on the negative side will lead to negative growth rate and on the positive side will lead to a doubling of the rate. More specifically, a 2% decrease will set the target price at 14.57 euro, a 36% decrease or 8.14 euro. A 2% increase will drive the target price up to 35.31 euro.

**Table 5**

Motor Oil Change in growth rate

| <b>Change (in %)</b> | <b>Medium Term</b>            | <b>Long Term</b>              |
|----------------------|-------------------------------|-------------------------------|
|                      | <b>Target Price (in euro)</b> | <b>Target Price (in euro)</b> |
| -2%                  | 18,77                         | 10,77                         |
| -1,50%               | 19,8                          | 13,22                         |
| -1%                  | 20,85                         | 16,02                         |
| -0,50%               | 21,93                         | 19,25                         |
| 0,50%                | 24,13                         | 27,45                         |
| 1%                   | 25,26                         | 32,76                         |
| 1,50%                | 26,42                         | 35,31                         |
| 2%                   | 27,6                          | 39,21                         |

As *Table 5* pictures, for the stock of Motor Oil, in the medium-term period, a negative change of -2% in growth rate will drive the price down to 18.77 euro. On the other hand, a positive increase of +2% will lead the price to 27.6 euro, a 4 euro increase.

**Table 6**

Hellenic Petroleum Change in growth rate

| <b>Change (in %)</b> | <b>Medium Term</b>            | <b>Long Term</b>              |
|----------------------|-------------------------------|-------------------------------|
|                      | <b>Target Price (in euro)</b> | <b>Target Price (in euro)</b> |
| -2%                  | 6,97                          | 3,98                          |
| -1,50%               | 7,38                          | 4,93                          |
| -1%                  | 7,79                          | 6,01                          |
| -0,50%               | 8,21                          | 7,24                          |
| 0,50%                | 9,08                          | 10,27                         |
| 1%                   | 9,53                          | 12,29                         |
| 1,50%                | 9,98                          | 14,46                         |
| 2%                   | 10,45                         | 17,2                          |

From *Table 6*, it can be concluded that during the medium-term, a 2% decrease in the growth rate will negatively affect the target price, leading it to 6.97 euro, almost 2 euro lower than in the base case scenario. Contrastingly, a 2% will drive the price over the 10-euro level, to 10.45 euro.

In the long-term, the effect of the same-level change in the growth rate will have larger effect on both cases. On the negative case, the target price will go at 3.98 euro. On the positive case, it will sharply increase to 17.2 euro.

**Table 7**  
Mytilineos Change in WACC

| <b>Change (in %)</b> | <b>Target Price (in euro)</b> |
|----------------------|-------------------------------|
| -2%                  | 25,14                         |
| -1,50%               | 24,99                         |
| -1%                  | 23,87                         |
| -0,50%               | 23,28                         |
| 0,50%                | 22,18                         |
| 1%                   | 21,66                         |
| 1,50%                | 21,17                         |
| 2%                   | 20,7                          |

Regarding the changes in the weighted average cost of capital of Mytilineos, *Table 7* illustrates that a change of -2% will increase the target price to 25.14 euro. On the contrary, a +2% change will decrease the target price by 2 euro to 20.7 euro. As it can be understood the target price and the WACC are reversely correlated. A decrease in the WACC leads to lower borrowing costs for the group and higher profit margins.

**Table 8**  
Motor Oil Change in WACC

| <b>Change (in %)</b> | <b>Target Price (in euro)</b> |
|----------------------|-------------------------------|
| -2%                  | 26,74                         |
| -1,50%               | 25,75                         |
| -1%                  | 24,79                         |
| -0,50%               | 23,89                         |
| 0,50%                | 22,2                          |
| 1%                   | 21,41                         |
| 1,50%                | 20,66                         |
| 2%                   | 19,94                         |

For Motor Oil, *Table 8* shows that a negative change of -2% in the cost of capital will drive the price up by about 3.7 euro to 26.74 euro. However, an increase of +2% will raise the cost of capital and as a result will lower the target price to just under 20 euro, to 19.94 euro.

**Table 9**

Hellenic Petroleum Change in WACC

| <b>Change (in %)</b> | <b>Target Price (in euro)</b> |
|----------------------|-------------------------------|
| -2%                  | 9,68                          |
| -1,50%               | 9,4                           |
| -1%                  | 9,13                          |
| -0,50%               | 8,88                          |
| 0,50%                | 8,41                          |
| 1%                   | 8,2                           |
| 1,50%                | 7,99                          |
| 2%                   | 7,79                          |

*Table 9* portrays the change in WACC for Hellenic Petroleum. A reduction of the cost of capital by 2%, will have a positive effect on the target price, which will be at 9.68 euro. On the other hand, an increase in the cost of capital by 2% will reduce the target price to 7.79 euro.

### 5.8 Scenario Analysis

#### 5.8.1 Bull Market Scenario

There are many aspects that may affect the course of the three stocks. The two main are the economic aspect and the political aspect. In terms of the economic aspect there are also two sub-aspects, the global and country environment, and the internal/group environment.

The course of the war in Ukraine and the duration of it, as it can be understood, plays a crucial role in the stabilization of the global economic environment. The prolongation of the war will continue to produce negative effects in terms of economic



stability and rising energy prices which play an important role in the operational costs of the groups. A possible end of the war in Ukraine will bring stability, reduce uncertainty and push energy and commodity prices down.

In terms of the domestic political climate in Greece, the upcoming elections will probably produce political instability to the country. This is due to the enhanced possibility of a prolonged election period and the scenario of second, or even third, elections as a result of the hostile political environment. The best-case scenario would be the formation of a stable government, even from the first elections which will minimize the period of instability. However, the political climate between the parties, and the will of the current government to force second elections so as to win an absolute majority, remove the possibility of formation of a coalition government. This political stability can lead to the long-awaited target of the Greek Economy, the investment grade rate. The successful award of the investment grade rate will have major economic benefits for the country, as it will lower the borrowing costs by reducing interest rates and set the stage for the attraction of additional foreign investments. This situation will also benefit the firms that operate in Greece, as it will also help them reduce their borrowing costs and attract foreign investors. This positive economic environment and the possible attraction of foreign investments will also have a positive impact on the growth of the economy in terms of wages and creation of new jobs.

In terms of the internal environment, the thoughts of a potential entrance of Mytilineos in a foreign stock exchange will inevitably have a positive influence on the group, as it will allow it to attract additional foreign funds more easily. This easy access to foreign funds will allow the group to invest more in specific areas that will boost its revenues and produce a growth cycle in terms of cash flows. This stable growth trend will also allow the group to build a healthy financial profile, which it will allow it to lower its borrowing costs.

Motor Oil is also dependent on the outcome of the political events globally and domestically that were previously explained. As for the business parameters, the lower price of crude oil and of gas will keep refinery margins higher and will positively contribute to the enhancement of group earnings. Another key aspect in this direction will be the successful expansion of the portfolio of renewables of the group, an action that seems to be a strategic decision by the group, as was seen from the acquisition of

the portfolio of renewables of Ellaktor. The positive outcome of this act will help the group not only to diversify its portfolio from fossil fuels but also to set it as a leading figure in a very promising business sector of the country.

Hellenic Petroleum shares the same business parameters with Motor Oil, as the vast majority of its revenues comes from the same streams. The group has set a strategic goal to diversify its portfolio, focusing more on renewables. This initiative is supported by the construction of a solar power plant in Kozani, which is one of the largest solar parks in Europe and has a total installed capacity of 204MW. The positive outcome of this strategic approach of the group, will have the same positive results as that of Motor Oil will produce.

#### 5.8.2 Bear Case Scenario

In the bear case scenario, in terms of the global political and economic environment, a prolonged war in Ukraine will fuel the uncertainty, by keeping energy prices, commodity prices, and inflation high. The central banks, despite their efforts will not only be unsuccessful in curbing inflation but the continuous rate hikes will lead to recession in an already vulnerable, due to Covid-19, global economy. Also, the inability of the E.U. to find alternatives in order to minimize its gas imports from Russia, such as a focus in developing renewable energy resources, will also contribute to the continuity of the instability.

Regarding the domestic political and economic environment, if there is no possibility for a stable government even after the second elections, instability will prevail and will put into risk the possibility of gaining the valuable investment grade. The country will be exposed to economic and security threats, a parameter that cannot be forgotten due to Greece's position in an area with many particularities.

As can be understood all these external circumstances will have a negative effect on the three groups, as it will raise their production costs due to higher energy costs and will inflate their borrowing costs.

## **6. Conclusion**

Despite the uncertainty and the volatility that the pandemic brought on the global and the Greek economy, Mytilineos successfully managed not only to overcome this situation but also to get on track again for future growth. It is a leader in the aluminum industry and one of the leading companies in construction and in electricity production. The war in Ukraine inevitably had an impact on the operational costs of the group, as it is a large gas consumer. After the first shock, Mytilineos not only has mitigated the consequences of the war, but has built the potential for a strong growth in the future.

The developments regarding the domestic political environment and the outcome of those will also play a key role in the potentials of the group. Furthermore, the possibility of the group entering a foreign stock market will act as an accelerator on its growth. As of 1st of September, Mytilineos was trading at 15.25 euros. The analysis that was performed shows that Mytilineos was trading at a 32.8% discount compared to the target share price of the model which is 22.71 euros. Taking into consideration all the elements of the analysis, Mytilineos (MYT) stock is considered a strong buy.

The advent of the pandemic and its unfolding produced a major effect on Motor Oil, as it hit its major business operations. The gradual stabilization of the situation of the pandemic and the return to normality, helped the group to offset the negative consequences and return to profits. Motor Oil also decided to diversify its portfolio and to enter the renewables market. This was done by the acquisition of the 75% portfolio of renewables of Ellaktor, estimated at 772 MW. This action pictures the will of the group to expand and diversify its portfolio and try to become a leader in this promising sector, which can help enhance its revenues. Furthermore, a positive outcome of the political events, will also help the revenues grow and lower the production costs. As of 1st of September, Motor Oil was trading at 18.35 euros. The analysis that was performed shows that Motor Oil was trading at a 25.5% discount compared to the target share price of the model which is 23.02 euros. Taking into consideration all the elements of the analysis, Motor Oil (MOH) stock is considered a strong buy.

The advent of the pandemic and its unfolding had a major impact also on Hellenic Petroleum, as it hit its major business operations, the same as that of Motor Oil. The gradual stabilization of the situation of the pandemic and the return to normality, helped the group to offset the negative consequences and return to profits.

Hellenic Petroleum also started implementing the long-expressed strategic decision to enhance its renewable energy portfolio by constructing a solar energy plant in Kozani with the aim to reduce the group's energy footprint. A positive outcome of the political events will also help the revenues grow and lower the production costs. As of 1st of September, Hellenic Petroleum was trading at 6.88 euros. The analysis that was performed shows that Hellenic Petroleum was trading at a 25.5% discount compared to the target share price of the model, which is 8.64 euros. Taking into consideration all the elements of the analysis, Hellenic Petroleum (ELPE) stock is considered a buy.

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