IN-DEPTH REPORT ON

Exxon Mobil

THE INDUSTRIAL GIANT DESERVES TO BE BOUGHT

Team: Rich Five

S&P CORPORATE VALUATION CHALLENGE

In-depth Valuation Report on ExxonMobil

—— the Industrial Giant Deserves to be Bought

Executive Summary

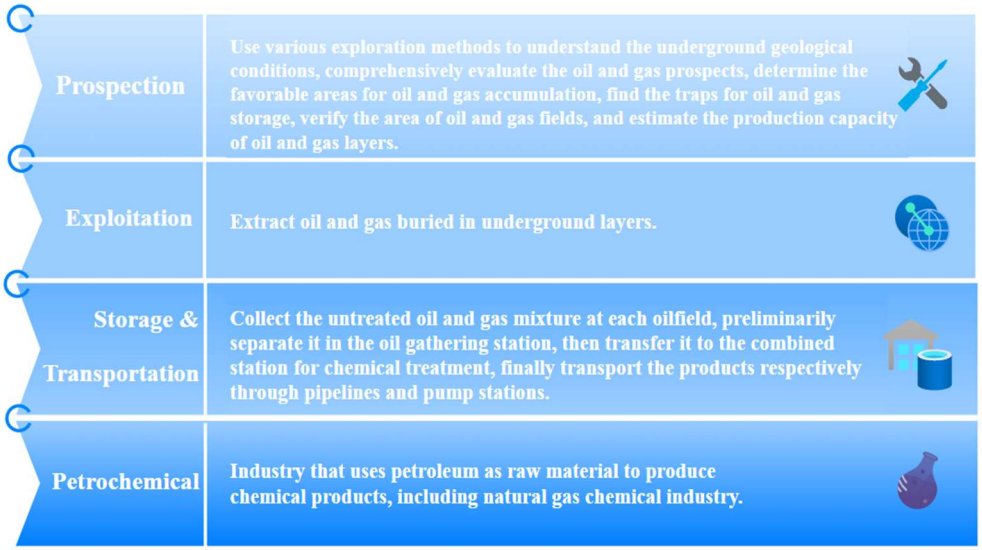
This report first uses **Porter's Five Forces Model** and **SWOT Analysis** to put forward in-depth and unique views on the oil industry and ExxonMobil. The relatively **optimistic results** of the analysis also set the tone for the full text. In the financial forecast part, this report not only distinguishes the three scenarios of good, medium and bad and gives the **corresponding probability of occurrence**, but also creatively forecasts various key financial data through a series of mathematical models with economic connotation, such as **linear regression** and **EWMA** model. When using the relative valuation method, this report uses the **industrial multiplier** to calculate the result of **USD 441647.8 million**, which is significantly higher than that of the enterprise value multiplier, proving that the excellent fundamental indicators of **oil reserves** are a major growth point of ExxonMobil's performance. When using the absolute valuation method, this report also applies the **full probability formula** and **sensitivity analysis** to obtain the expected value range as **(USD 560769.1 million, USD 733714.8 million)**, which is significantly higher than the result of the relative valuation method. Based on the above analysis, this report objectively proposes to **buy** ExxonMobil shares.

Table of Content

1 Industry Analysis

1.1 Overview of the Oil Industry

According to the global industry classification standards proposed by S&P, ExxonMobil belongs to the “Comprehensive Oil and Gas Enterprise" under the Energy industry sector. In this report we will refer to it as the **oil industry** for short. The oil industry covers 4 important stages of the production of fossil fuels, the detail of which is shown as follows.

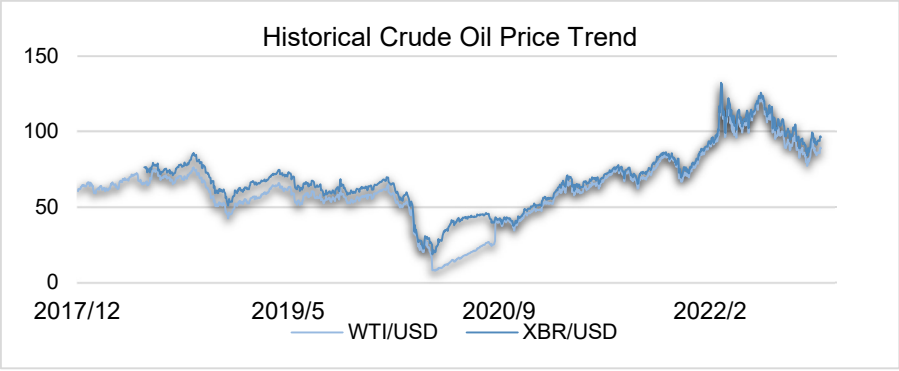


1.2 Recent Major Events

Supply side: the conflict between Russia and Ukraine is intensifying. The tense geopolitical situation and decreasing oil production under the promotion of OPEC tend to maintain the scarcity of oil supply, thus forcing the oil price to remain a high level in the medium term;

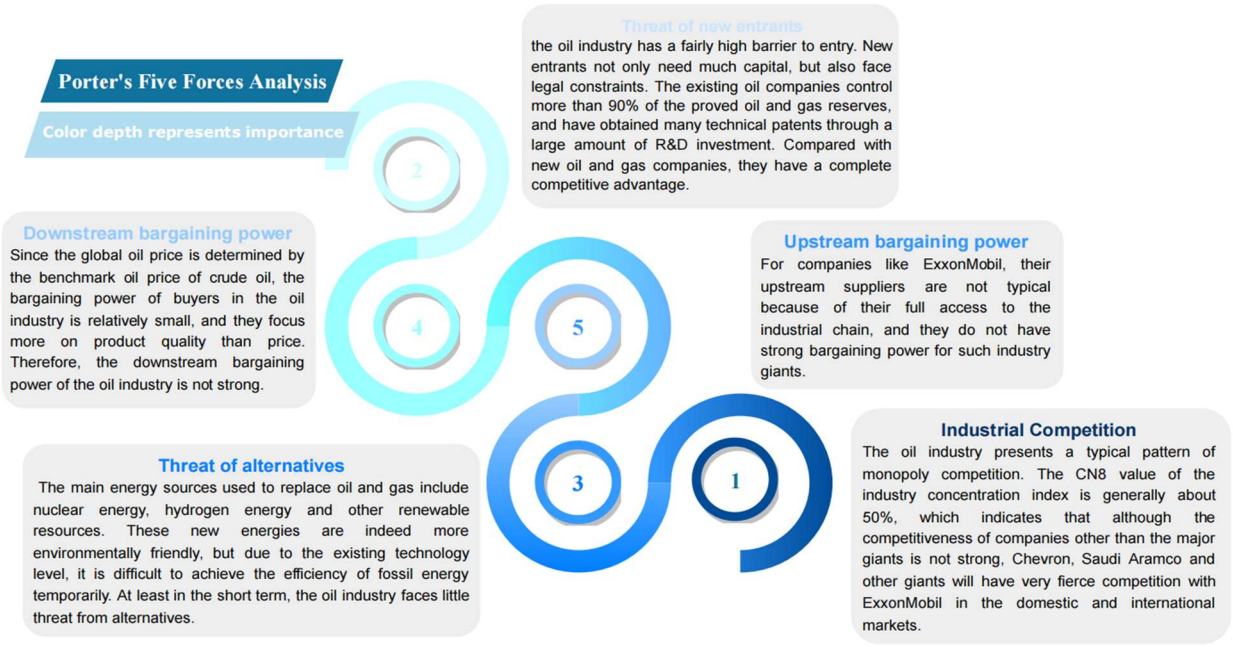
Demand side: The continuous interest rate increase of the Federal Reserve has a restraining effect on the economy and inflation, and the oil demand has also been affected and declined. Therefore, the oil price should decline in the short term.

The trend of crude oil price in the past five years is shown in the figure below, which is indeed consistent with the tendency we have analyzed.



1.3 Porter's Five Forces Analysis

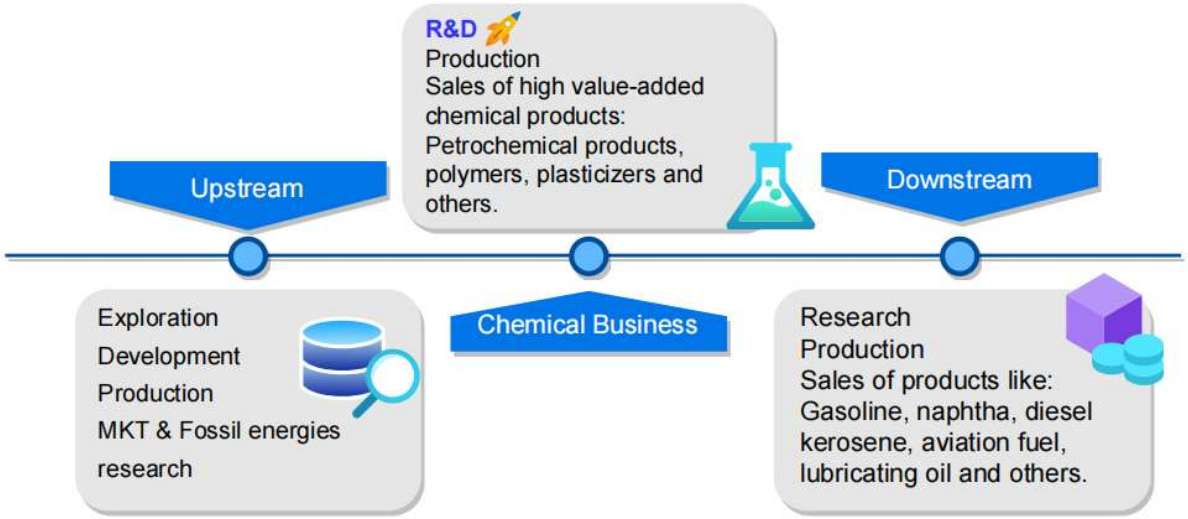
Porter's five forces model is an important tool for in-depth analysis of the industry. The analysis results of the oil industry are shown in the following figure, where the depth of color shows the relative strength of the forces. For example, industrial competition exhibits the strongest force, thus is described in the deepest color.



2 Company Analysis

2.1 Business Overview

As one of the largest monopoly oil companies in the world, ExxonMobil has been exerting great efforts in **getting through the industrial chain**. Specifically, Its huge business can be divided into three sectors, which are upstream, downstream and chemical respectively.

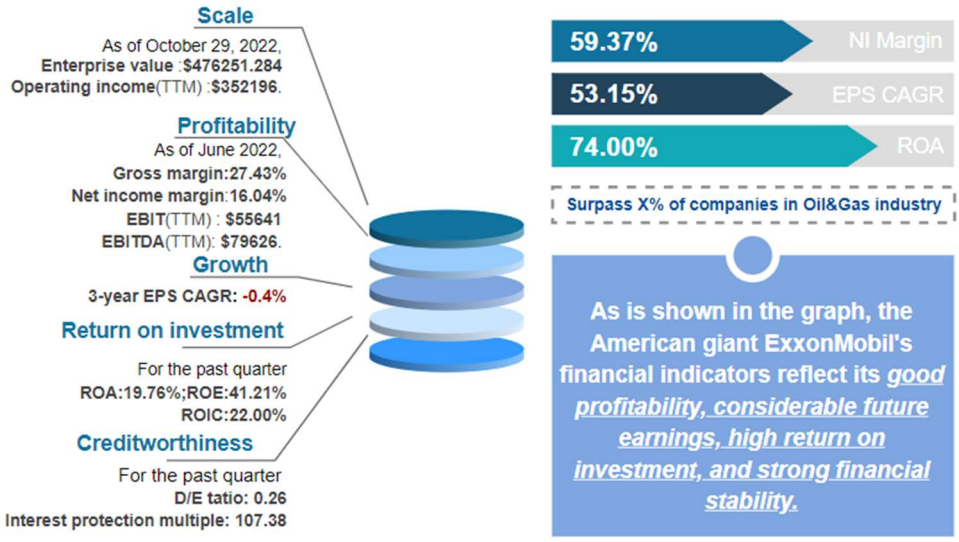


It is worth mentioning that ExxonMobil's **huge investment in R&D** is an important feature that distinguishes it from other major oil giants. Combined with the advantages of resource integration, fruitful results from R&D successfully promoted its **lower costs and higher efficiency** during production.

2.2 Financial Analysis

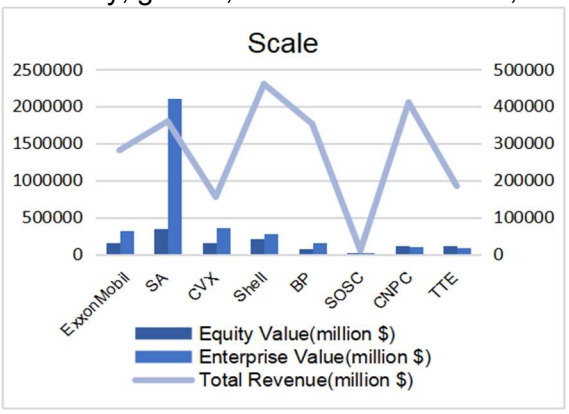
2.2.1 Important indicators

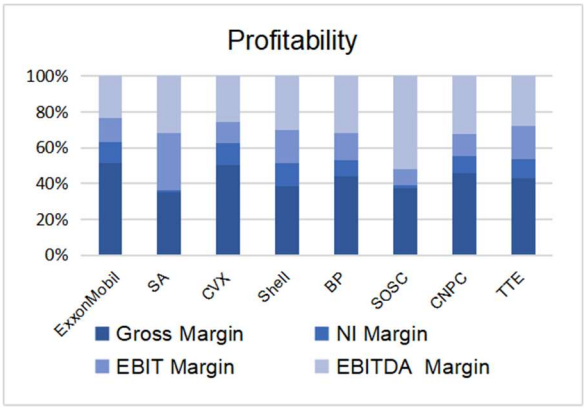
As is shown in the graph, the American giant ExxonMobil's financial indicators reflect its good profitability, considerable future earnings, high return on investment, and strong financial stability.



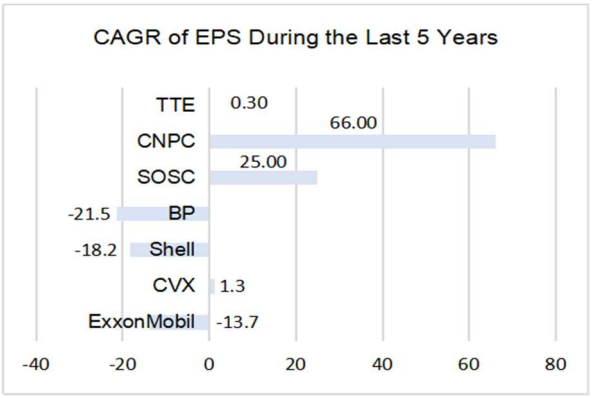
2.2.2 Comparable company analysis

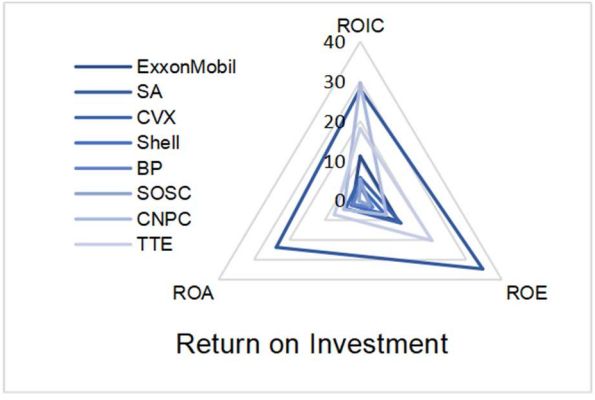
To further understand ExxonMobil's finances, we selected seven comparable companies: Saudi Aramco, Chevron, Shell, BP, Sinopec Oilfield Service Corporation, China National Petroleum Corporation and Total Energy. The 2021 annual report is the main data source. These companies are analyzed from 5 aspects: scale, profitability, growth, return on investment, and creditworthiness.



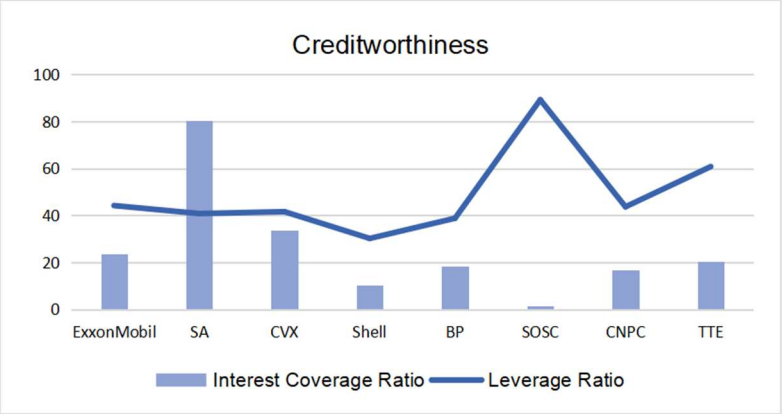


ExxonMobil is a large company with mid-to-high profitability compared to companies of its size. While negative EPS growth rates reflect a less optimistic earnings outlook, ExxonMobil is doing well compared to the two most similar companies: CVX and Shell.





In terms of return on investment, ExxonMobil, although not as impressive as Saudi Aramco, also performs well among the seven comparable companies and is competitive to some extent. Finally, ExxonMobil's performance on creditworthiness is somewhat delusional, as a high interest coverage ratio and a moderate leverage ratio cannot conceal its long-standing negative net working capital, which forms a disadvantage too important to neglect.



2.3 SWOT Analysis

SWOT analysis is an important method to evaluate the performance of a company in depth. And the results are shown as follows:

3 Financial Forecast

3.1 Key Assumptions

For this part, six major assumptions will be explained. The corresponding two assumptions, H_{1a} and H_{2a}, for example, form a scenario and the three scenarios are mutually exclusive to each other. The estimated probabilities of the three scenarios, marked as a, b and c are 50%, 20% and 30% respectively, which is consistent with the relatively **optimistic future** of Exxon shown in the above analysis.

H1: Assumptions about the oil industry

H1-a Industrial prosperity: In the medium and long term, it is still difficult to achieve revolutionary breakthroughs in new energy technologies; The tense political environment has also made countries including the United States and Europe realize the irreplaceable status of traditional fossil energy. In the foreseeable future, the oil industry will still achieve steady growth beyond certain fluctuations with the economic cycle.

H1-b Industrial recession: In the face of increasingly serious environmental problems, the United Nations strongly urges countries to reduce the use of fossil energy. At the same time, new energy technologies have made great progress after huge R&D investment, rapidly squeezing out the market share occupied by traditional fossil energy, and the oil industry is facing recession.

H1-c Status quo maintaining: The scarcity of oil supply caused by the geopolitical crisis and the impact of new energy technology breakthroughs on the oil industry offset each other to a certain extent, and the industry's development prospects are basically the same as the historical situation in recent years.

H2: Assumptions about ExxonMobil

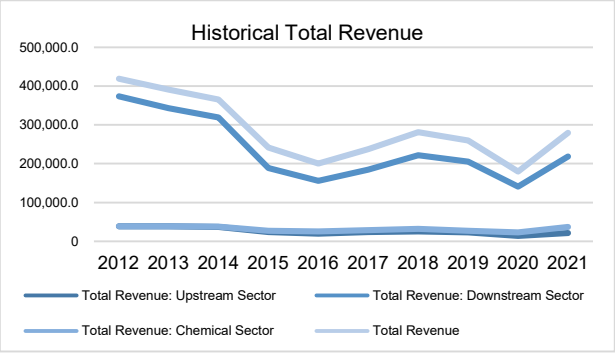
H2-a International monopoly: Due to the huge investment in industrial chain expansion and R&D expenditure for a long time, and the efforts to respond to the call to improve the ESG rating, ExxonMobil's monopoly position in the industry will not only continue in China, but also usher in new breakthroughs in the international market.

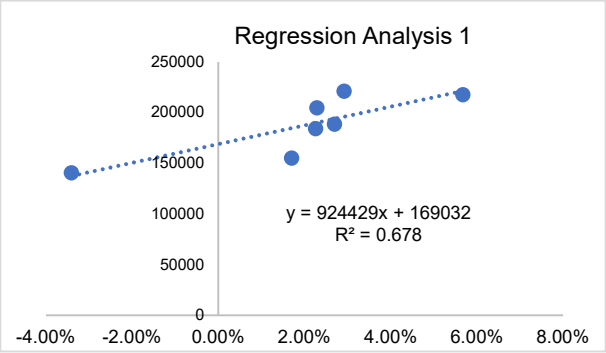
H2-b Company recession: although it has maintained a monopoly position for more than 200 years, ExxonMobil, which focuses too much on the fossil energy industry, has failed to complete the transformation in time at the moment of rapid development of new energy technology, and its poor short-term debt paying ability further drives its business situation to decline.

H2-c Monopolistic competition: Although ExxonMobil's position in the domestic market is unshakable, giants in the industry such as Saudi Aramco and BP are not willing to be outdone, forming a monopolistic competition pattern with ExxonMobil in the international market.

3.2 Total Revenue Forecasting

The forecast of the company's total revenue is the basis of almost all other financial data forecasts. According to the previous company analysis, we split the total revenue of ExxonMobil into three main businesses, and then make reasonable predictions. From the historical data, the downstream business income of ExxonMobil has accounted for more than 70% of the total income all year round, and its trend is consistent with the total income. As a member of a typical cyclical industry, the revenue of ExxonMobil's downstream business has been highly positively correlated with the U.S. GDP growth rate since the financial crisis in 2015. It can be seen from **regression analysis** that the goodness of fit obtained by linear function is close to 0.7, so the expected growth rate of U.S. GDP from 2022 to 2027 obtained from the Statista website can be used as an independent variable to realize the forecast of downstream business income of ExxonMobil.





For the income of upstream and chemical businesses, as their values are relatively stable and their contributions to the total income are relatively small, we creatively use the **EWMA model**, which is usually used to predict the volatility of assets such as stocks, proposing a recession ratio of $\lambda_1 = 0.9$, and using the data of the past ten years to forecast. If the data of the nth period to be predicted is X_n(n>10), the predicted

value can be obtained by the following formula:

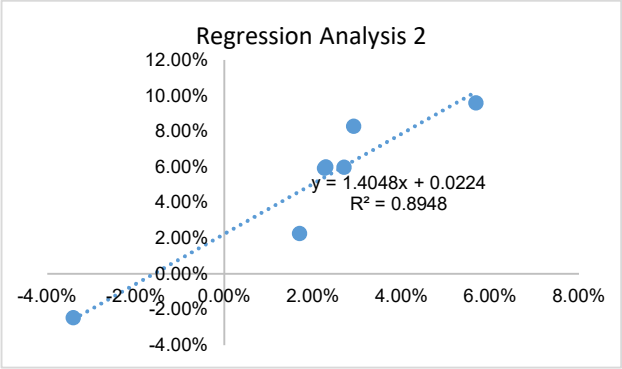
$$X_n = \alpha(\lambda X_{n-1} + \lambda^2 X_{n-2} + \cdots + \lambda^{10} X_{n-10})$$

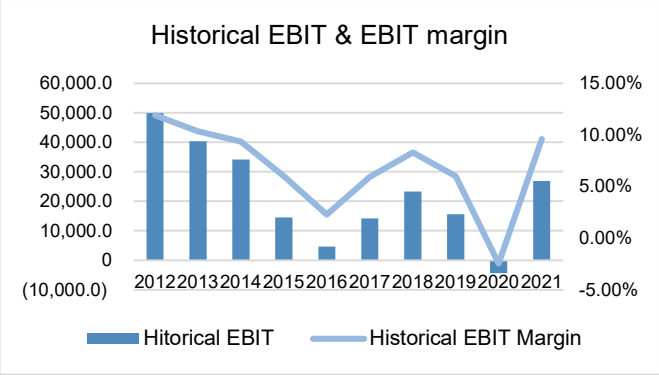
To ensure that the cumulative weight of each item is 1, it can be obtained through the calculation formula of the proportional series that $\alpha = \frac{1-\lambda}{\lambda(1-\lambda^{10})}$.

In addition, in scenario a, both the petrochemical industry and ExxonMobil will welcome a brighter future, so we have reason to multiply its total income by the **"growth coefficient" a=1.1** on the basis of the above calculation; On the contrary, in scenario b, both the industry and the company will encounter a certain degree of recession, so it is also reasonable to multiply the **"declining coefficient" b=0.9** on the basis of the above calculation. In scenario c, ExxonMobil will basically maintain the status quo, so there is no need to adjust the total revenue forecast based on historical data.

3.3 Prediction of EBIT

Considering the strong periodicity of the petrochemical industry, we will observe that the EBIT margin after 2015 is also highly positively correlated with the U.S. GDP growth rate. The second regression analysis shows that the goodness of fit of this linear function is close to 0.9, which means that the growth rate of U.S. GDP after 2015 has almost achieved a perfect explanation of EBIT margin! Therefore, we can safely continue to use the GDP forecast data provided on the Statista website to achieve the EBIT forecast.





3.4 Prediction of Depreciation and Amortization

It can be seen from the historical data that the D&A margin tends to fluctuate through the years, and the values between adjacent years exhibit apparent relativity. Therefore, we can still use the EWMA model to achieve prediction, and we can also increase the recession coefficient to $\lambda_2 = 0.92$ to highlight such correlation.

3.5 Forecast of Capital Expenditure

Similarly, historical capital expenditure margin tends to fluctuate between 8% and 9%. Therefore, it is reasonable to use EWMA model again to predict this data. Because we lack enough theory to support the inevitability of the correlation between adjacent years, we chose to adjust the recession coefficient back to $\lambda_1 = 0.90$.

3.6 Forecast of net working capital increment

In the previous SWOT analysis, we have found out what disadvantages the negative value of net working capital will bring to the company. Further observation of historical data shows that from 2012 to 2021, the current assets and current liabilities of ExxonMobil show a slight downward trend, while the decline rate of the former is slightly slower than that of the latter. Therefore, in the prediction, we assume that the former

decreases at a rate of 2% per year, while the latter decreases at a rate of 3%. Through the calculation of current assets and current liabilities, we can also easily complete the prediction of net working capital increment.

So far, we have finally completed the prediction of each component of the company's free cash flow. They are combined according to the following formula to form the free cash flow for absolute valuation:

$$\mathrm{FCFF} = \mathrm{EBIT}(1-\mathrm{t}) + \mathrm{D\&A} - \mathrm{Capex} - \Delta\mathrm{NWC}$$

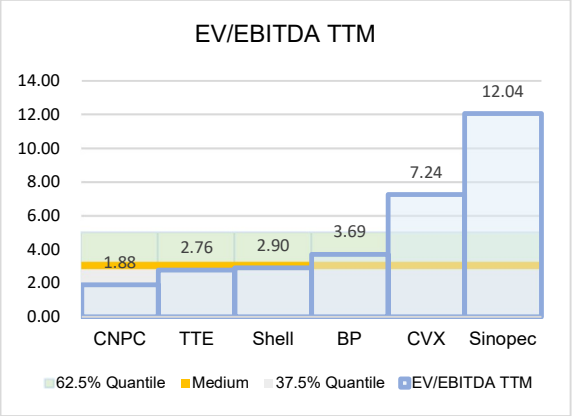
4 Valuation Model

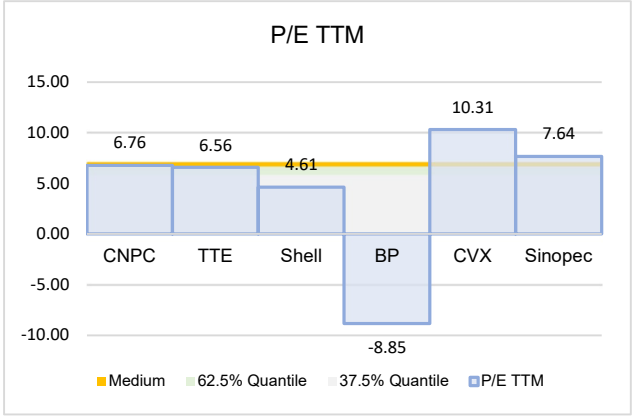
4.1 Relative valuation method

In the part of company analysis, through the analysis of the fundamentals of the giants in the fossil energy industry, we can find that, in addition to Saudi Aramco, which is a world beating company, the other seven companies have their own strengths in various indicators. In order to make a relative valuation of ExxonMobil, we may determine the **comparable company series** composed of Chevron, Shell, BP, Sinopec, PetroChina and Total. Under different scenarios in the financial forecast, we have reason to select **different quantiles** of the transaction multipliers of the comparable company series. In scenarios a, b and c, we respectively select 62.5%, 37.5% and 50% quantiles to calculate the reasonable valuation of ExxonMobil.

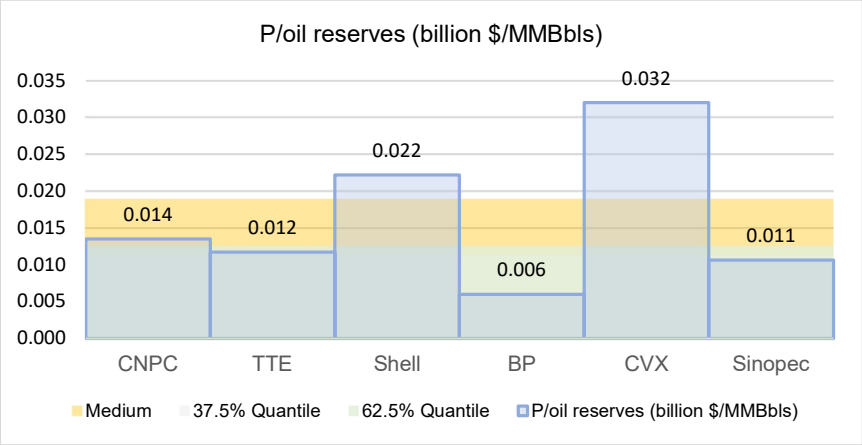
First, we'll use the TTM enterprise value multiplier, EV/EBITDA. As is shown in the figure below, it can be seen that the enterprise value multipliers used under three scenarios a, b and c are 5.02, 2.85 and 3.30 respectively. Since the TTM EBITDA of ExxonMobil is $79626 million, the enterprise value of ExxonMobil is $226934, 399723 and 262766 million respectively. Therefore, the expected enterprise value of ExxonMobil is **USD 324078.1 million** by using the **full probability formula.**

Next, TTM P/E ratio is used for prediction. Since the TTM net profit of ExxonMobil is $19755 million, we can find out that the expected equity value of ExxonMobil is $132536.3 million after applying the data as above and the full probability formula. Combined with the net debt of USD 146702 million disclosed in the latest quarter, the implied enterprise value is **USD 279238.3 million**, with a deviation of no more than 20% from the expected value above.





Finally, the total market value is taken as the numerator, and the company's oil reserves, a key fundamental element, is taken as the denominator to build a unique **industrial multiplier** for the oil industry. As ExxonMobil's oil reserves are about 19000 million barrels, it can be seen that the expected equity value of ExxonMobil is 294945.8 million dollars. Combined with the net debt of 146702 million dollars, the implied enterprise value is **USD 441647.8 million**, significantly greater than the expected value. This shows that although ExxonMobil's financial indicators such as EBITDA and net profit are comparable to those of other giants, its oil reserves are significantly better, which is a major growth point of its future valuation.



4.2 Absolute Valuation Method

4.2.1 Determination of WACC

The WACC of a company can be obtained through the following equation:

$$\mathrm{WACC} = \frac{\mathrm{D}}{\mathrm{D}+\mathrm{E}} * \mathrm{r_d} * (1-\mathrm{t}) + \frac{\mathrm{E}}{\mathrm{D}+\mathrm{E}} * \mathrm{r_e}$$

4.2.1.1 Determine the target capital structure

ExxonMobil's existing D/E is 0.92. We find that Exxon Company's existing capital structure is stable and within the range of comparable companies, so we take its existing capital structure as the target capital structure and assume that it will remain unchanged during the whole forecast period.

4.2.1.2 Cost of debt

Cost of debt, or r_d for short is the percentage of total debt that should be paid each year. We observe that cost of debt tends to be at a premium of about 200 basis points over US Treasuries, so we set the cost of debt at approximately 4.5%.

4.2.1.3 Cost of equity

Cost of equity is the necessary annual return that should be paid to equity investors of the company. We use the CAPM theorem to calculate the cost of equity, or r_e for short as follows: $r_e = r_f + \beta_L * (r_m - r_f)$.

Specifically, we assume the yield on the 20-year U.S. Treasury bond, which is 4.22% to be the risk-free rate. As for the market risk premium, we take the annualized return of S&P 500 over the risk-free rate, which is 4.28% approximately.

Unlevered beta - βu						
	Levered beta	Equity value	Debt value	D/E	Tax rate	Unlevered beta
ExxonMobil Corporation	1.05	$177,109	$193,043	0.92	21%	0.61
Shell plc	0.67	$247,120	$190,238	1.30	21%	0.33
BP plc	0.63	$217,570	$81,563	2.67	21%	0.20
CVS	1.26	$103,374	$154,562	0.67	21%	0.82
Sinopec Oilfield Service Corporation	0.85	¥1,125,905	¥924,614	1.22	21%	0.43
China National Petroleum Corporation	0.65	¥1,280,591	¥1,512,725	0.85	21%	0.39
Average						**0.46**

Levered beta - βL				
ExxonMobil Corporation	Average unlevered beta	Target D/E	Tax rate	Relevered beta - βL
	0.46	0.92	21%	0.80

WACC - Calculation	
Target capital structure	
D/A	0.48
E/A	0.52
D/E	**0.92**
Cost of debt	
Cost of debt before tax	4.50%
Tax rate	21%
Cost of debt after tax	**3.56%**
Cost of equity	
Risk-free rate	4.22%
Market risk premium	4.28%
Levered beta - βL	0.80
Cost of equity	**7.65%**
WACC	5.69%

To determine the levered beta of Exxon, we would go through two stages, including **deleveraging** and **releveraging**, according to the two formulas shown as follows: $\beta_u = \beta_L / (1 + D/E * (1 - t))$; $\beta_L = \beta_u * (1 + D/E * (1 - t))$, where the two leverage ratios belong to the comparable companies and Exxon itself respectively. Thus, we can get the implied value of the levered beta of Exxon, which is 0.80.

Thus, we can calculate that Exxon Company's cost of equity is 7.65%, and **WACC** is therefore **5.69%**.

Finally, we may implement a **sensitivity analysis** on WACC. In the chart shown as follows, two variables, which are target capital structure and cost of debt before tax, are fluctuated in the neighborhood to determine their impact on WACC. While the latter one exerts greater influence, WACC generally exhibits relative stability within the range restricted by **5.5% and 5.75%**.

WACC - Sensitivity analysis						
WACC		Cost of debt before tax				
	5.69%	3.5%	4.0%	4.5%	5.0%	5.5%
Target capital structure - D/E	0.82	5.38%	5.56%	5.74%	5.92%	6.10%
	0.87	5.35%	5.53%	5.71%	5.90%	6.08%
	0.92	5.31%	5.50%	5.69%	5.88%	6.07%
	0.97	5.28%	5.47%	5.67%	5.86%	6.06%
	1.02	5.25%	5.45%	5.65%	5.84%	6.04%

4.2.2 Determination of the terminal value

Although the calculation of the free cash flow of the company in the financial forecast part is very complex, the present value of the final value often accounts for a greater proportion in the company's valuation. To be cautious, we will use the **perpetual growth method** to calculate the terminal value, as well as the exit multiplier method in the appendix for testing.

The assumption of the sustainable growth method is that the free cash flow of the company in the final forecast period will always increase at a fixed rate, which is called the perpetual growth rate. According to different scenarios, the **perpetual growth rate** will also show obvious differences. In the three scenarios, which are marked as a, b and c, its value is set as 4.8%, -1% and 3% respectively. So the terminal value can be obtained through the following formula: $\text{terminal value} = \frac{FCF_n * (1+g)}{WACC - g}$.

By applying the specific data, we can get the **terminal values** in different scenarios are **USD 667769.3, 112324.5 and 256781.7 million** respectively.

4.2.3 Valuation determination and sensitivity analysis

Considering the time cost of money, we can use the following formula to determine the enterprise value at the end of September, 2022, on the premise of **mid-year discount**:

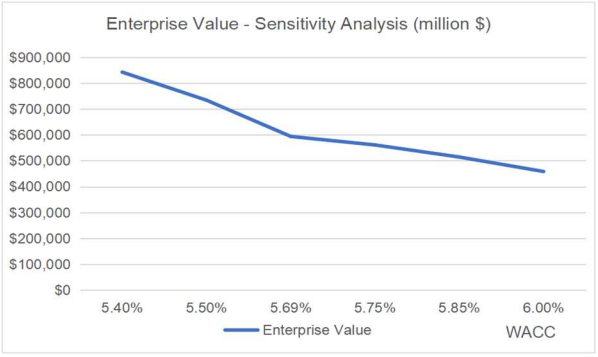
$$\text{enterprise value} = \sum_{i=1}^{5} \frac{FCF_i}{(1 + WACC)^{i-0.25}} + \frac{\text{terminal value}}{(1 + WACC)^{4.75}}$$

Therefore, we can get that the enterprise value of Exxon under different scenarios is USD 999196.4, 120057.1 and 230308 million respectively. After applying the full probability method, we can find out the expected EV of Exxon, which is **USD 592702.0 million**.

Last but not least, we may continue to impose a sensitivity analysis on the enterprise value. As is shown in the charts as follows, the fluctuation of WACC does have a great influence on the enterprise value. Thankfully, we have made careful calculations to determine the exact range of WACC, thus concluding that the enterprise value will not be out of the range restricted by **USD 560769.1 and 733714.8 million**.

Sensitivity Analysis

WACC	Enterprise Value
5.40%	$842,141.70
5.50%	$733,714.80
5.69%	$593,640.10
5.75%	$560,769.10
5.85%	$514,087.00
6.00%	$458,185.00



After comparing the relative and absolute valuation method, we can find out that the result of the former is significantly lower than that of the latter, even though the fluctuation of WACC is taken into account. This is consistent with the optimistic attitude that we hold on Exxon. Thus, our investment suggestion is to **buy the stock** definitely.

5 Risk Analysis

When analyzing the risk factors, **scenario analysis** is used. By analyzing the impact of different scenarios on ExxonMobil's business, we can roughly get to know the gravity of each risk factor. As is shown in the figure below, the depth of color represents the gravity of the corresponding risk factor. For example, the fluctuation of crude oil market will have the most influence on the value of Exxon.

	Risk Factor	Scenario Analysis
1	Fluctuation of Crude Oil Market	Some of ExxonMobil's crude oil is imported, so it will be affected by oil price fluctuations. Although the impact of oil price fluctuation can be reduced through reserves and hedging, the annual change percentage of crude oil price can reach more than 30%, which will have a great impact on production costs.
2	Geopolitics	The Russian-Ukrainian war and the resulting sanctions against Russia forced many oil giants to withdraw from the Russian oil and gas industry. Although it may boost the development of shale oil in the United States, it has a great impact on ExxonMobil's international business.
3	COVID-19	The COVID-19 has a serious impact on oil prices, and the impact is persistent. The epidemic also led to a short-term decline in oil production, but the impact was relatively small. The global blockade caused by the epidemic and the subsequent sharp drop in prices had a huge impact on production. At present, the middle and downstream markets are relatively stable, and the demand for chemicals is growing steadily.
4	Environmental Protection Policy	The Paris Agreement has led to a sharp decline in the demand for oil exploration and hindered the financing of oil and gas companies. Although ExxonMobil actively introduced the carbon pricing mechanism, the upstream investment decreased significantly, the operating costs of overseas projects increased, and the environmental protection policies of various countries had a negative impact on the pricing and sales of its products.
5	New Energy Industry	Although there are many new technological breakthroughs, the new energy industry is still facing technological problems. As a chemical raw material, oil is not yet replaceable. The International Monetary Fund (IMF) said in its 2020 report on the future of oil that global oil demand will peak around 2040, which means the demand won't decrease in the near future.
6	US Economic Policy	The decrease in OPEC supply led to the rise in oil prices, but the Federal Reserve hoped that OPEC would increase its production to reduce oil prices in order to curb inflation. Therefore, ExxonMobil and the Federal Reserve have certain conflicts of interest, which may result in loss of profits due to macroeconomic policies.
7	Oil Resource Depletion	According to BP World Energy Statistical Yearbook (2018), the global oil resources can be used for at least 50 years. As a substitute for oil, shale oil has proved reserves of more than 11 trillion tons, which will hardly be exhausted. ExxonMobil attaches importance to shale oil exploration technology and has a leading industrial process, so it is not vulnerable to the threat of oil resource depletion.

Appendix 1 Exxon in Great Competition

A1.1 World landscape: Changing and Challenging

At the global market level, the oil and energy industry is extremely competitive due to the multiple influences of political, economic, geographical and other factors.

First in first, **the COVID-19 outbreak has had an adverse impact on the global base oil market**. The complete lockdown imposed by various governments worldwide during the COVID-19 outbreak resulted in supply chain disruptions that significantly hampered the sourcing of feedstocks (additives). Additionally, factors such as the temporary shutdown of production facilities, the decline in labor force participation, and investment withdrawals, followed by norms of social distancing, have adversely affected the industry.

More importantly, the price of crude oil on the international market has risen steadily this year, rising from an average of $30 a barrel last year to more than $40 in the first half of this year. Oil prices peaked at $42 in early June, the highest level since 1983. High oil prices are influenced by a number of factors. **One is repeated production adjustments by the Organization of the Petroleum Exporting Countries (OPEC)**. OPEC decided to reduce its crude oil ceiling by 1 million barrels per day starting in April. This sent shock waves through the market, causing oil prices to soar. The Organization of Petroleum Exporting Countries (OPEC) had to agree on June 3rd to pump more crude to meet demand, and to pump an extra 500,000 barrels a day starting in August to combat the slump in energy prices, before oil prices edged back down to $38 a barrel. But the Center for Global Energy Studies expects the overall level of oil prices to remain high next year.

The second is geopolitical risk. **The situation in the Middle East has remained unstable this year**. Iraq has the largest oil reserves in the world, but the war in Iraq is still going on, and the market worries that the internal political situation will be difficult to stabilize after the transfer of power. The hardline stance of Israel's Sharon government and the ruling Likud Party has raised concerns about the future of the Palestinian situation. A series of terrorist attacks targeting foreigners and government agencies in Saudi Arabia, a major oil producer, has also revealed the potential risks in the Middle East oil supply to the world. Estimates of the risk premium on oil due to instability in the Middle East range from $5 to $10. Third, as the world economy heats up, major countries' demand for crude oil increases. The International Energy Organization predicts that global oil demand will hit a 16-year high this year. In terms of energy consumption, the United States leads the industrialized world, with the traditional peak season between May and June. In Asia, the growth rate of oil demand is very high because of the extremely high economic growth rate and the high energy consumption characteristic of the economy. China has become the world's second-largest oil importer, consuming 5.5m barrels a day last year, more than Japan. This year the IEA revised up China's daily oil demand growth. India's demand for oil is also growing at an annual rate of 10%. Asia accounted for 90% of the growth in global oil demand.

A1.2 Oil Industry Ⅰ: Huge Size & Great Competition

In total, Global Crude Oil market size is estimated to be worth US$ 2875.7 million in 2022 and is forecast to a readjusted size of US$ 3289.9 million by 2028 with a CAGR of 2.3%.

Rising Transportation Sector is the Key Driving Factor for Crude Oil. Global crude oil market is primarily driven by rising transportation sector and increasing export activities. Growing adoption of gasoline, diesel, jet fuel and others in transportation sector is fueling up the demand for crude oil in global crude oil market. **Rising automobile sales globally is expected to be a key driver for global crude oil market by gasoline application segment since gasoline acts as one of the primary fuels for the automobiles**. The growing automobile sales is expected to boost the global gasoline market. However, emergence of electric vehicle is the largest restraint for use of gasoline in automobile segment. Gasoline dominates the application segment

of global crude oil market by capturing largest market share of over 33.8% in 2021 and anticipated to grow at a CAGR of 4.9% during forecast period.

Light crude oil dominates the type segment of global crude oil market by capturing largest market share of over 84% in 2021.High demand of diesel and gasoline for the production of energy is the key driver for the growth of light crude oil market as oil is the primary source for energy globally. Light crude oil market is anticipated to grow at a CAGR of 4.9% during forecast period.

Geographically, **Asia Pacific accounts the largest share in crude oil market by capturing largest market share in terms of revenue of around 37.30% in 2021.**Crude oil demand in Asia Pacific is primarily driven by increasing plastic industry, refineries, transportation industry and others.

The demand for base oil products is highly dependent on the consumption of industrial lubricants, including hydraulic oils, metalworking fluids, industrial gear oils, turbine oils, and compressor lubricants. These lubricants are used across various industries, such as construction, power, railways, metals and mining, iron and steel, chemicals, cement, oil and gas, and general manufacturing. During the COVID-19 outbreak, these industries were severely impacted due to the temporary halt in production, the slowdown in logistics, low labor force participation, and a decline in demand.

The base oil market is competitive with the presence of well-diversified global and regional manufacturers. Industry participants continuously focus on various operational strategies that are likely to gain an edge in the global industry. Here are some recent developments:

- In September 2019, Repsol made a joint venture with United Global Limited after purchasing a 40% stake in its Singapore-based lubricant manufacturer, United Oil Company. This agreement would allow Repsol to expand its presence across Southeast Asia.
- In October 2021, Lehvoss Group, a producer and distributor of raw materials for lubricant additives and base oils, announced the acquisition of French lubricant additive distributor GP2C.
- In October 2021, Chevron Global Energy Inc, a wholly-owned subsidiary of U.S.-based Chevron Corporation, announced the acquisition of Neste global base oil business.

The key players have undertaken various growth strategies in the base oil industry. Strategies such as joint ventures, mergers & acquisitions, and others to expand and further reach their customers to fulfill requirements. Some major players are Exxon Mobil Corporation (US), Chevron Corporation (US), Petro-Canada Lubricants (Canada), Saudi Aramco (Saudi Arabia), Phillips 66 (US), Asian Oil Company (India), Avista Oil Deutschland Gmbh (Germany), HollyFrontier Corporation (US) and GS Caltex Corporation (South Korea). These players have adopted strategies such as innovations, mergers & acquisitions, joint ventures, and others to increase their revenues in the base oil market.

A1.3 Oil Industry Ⅱ：Segments and Production

To facilitate the study of this large and competitive market, we have divided the market into three segments: **Group, End-user, Geography**.

By Group, **group II is expected to be the largest segment in the base oil market**. Group II base oils are more refined base oil than group I. These oils have clear color and better antioxidant properties than group I base oil owing to the saturated nature of their hydrocarbon molecules. However, group II base oils are more expensive than Group I. These base oils are primarily used in the textile industry, cutting oils, in the formulation of lubricants for turbines, heat pumps, exchangers, and engines owing to their impressive properties of wear & tear resistance, low friction, and better load-bearing capacity.

By End-user, **automotive or engine oil is the largest segment amongst others in the base oil market**. The main function of automotive oil is to reduce friction and wear & tear of the automotive engine and to clean the engine from sludge and detergents. Earlier, group 1 base oil was used in automotive oil. Presently, group II and group III base oil are highly preferred for manufacturing base oil driven by the emission regulation

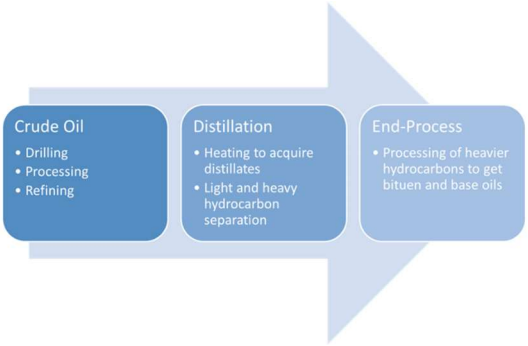
standard, increasing demand for low viscosity, low volatility lubricants, and increasing demand for better fuel economy is fueling the demand for premium base oil. There is a growing demand for automotive oil in Europe, APAC, and North America, driving the demand for base oil. At the same time, APAC is also experiencing an escalating demand.

By Geography, **APAC was the largest market for base oil during the forecast period**. Owing to the rapid urbanization, rising disposable income, and growing industrialization in the field of automotive, food processing, cosmetics, textile, and other manufacturing sectors are creating a demand for base oil in APAC. China is leading in APAC during the forecast period. This can be attributed to the increasing demand from the automotive & transportation sector, increasing mining activities, manufacturing & machinery sector is also supporting the strong growth of the base oil market in the country. Additionally, the availability of low-cost labor and the raw material is further fueling the industry.

Major properties of base oil stock

A general understanding of oil production and processing is necessary to gain an in-depth understanding of the oil industry. Base oils are refined crude oil base stocks used to manufacture automotive and industrial lubricants, greases, rubber products, and white and paraffin oil. Base oils are relatively more polar in nature than paraffinic oils and, therefore, have exceptional cooling and low-temperature properties. Lubricants are used to minimize friction and wear and tear between surfaces. Most lubricants consist of 70% lubricant oil and up to 30% chemical compounds known as additives.

Production Process of Base oil



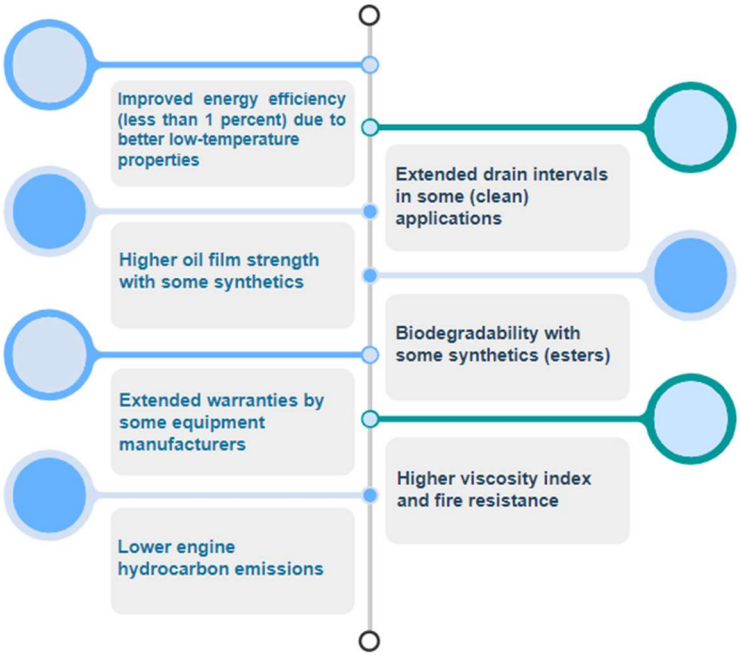
Base oils are produced by extracting and processing heavy and high-viscosity crude oil acquired through narrow distillation. Producing base oil is normally profitable for a refinery because it enables the

lowest valued part of crude oil to be traded as a high-value specialty product. However, base oil production facilities have a relatively high capital cost per barrel." We have observed some obvious trends and changes in the production of the oil industry：

- Digitization of the industry through the incorporation of AI, robotics, virtual and augmented reality programs, and others
- Energy transition through increased focus on sustainability and investment in green energy solutions, such as carbon capture, utilization, and storage.
- Infrastructural changes in terms of supply and logistics, up-gradation of oil platforms and refineries to be more energy-efficient, and new fracking and scanning technologies.
- Growth in the use of natural gas amounts to rising by 60% by 2030.
- Global consumption of petroleum and liquid fuels is estimated to average 100.6 million b/d in 2022, and consumption to increase by 1.9 million b/d in 2023, according to EIA.

A1.4 Industry Observation：Risks & Opportunities

We believe that as an indispensable part of the energy market, base oil companies must have their own unique advantages as a foundation. Here are also opportunities:



Oil and oil products are expected to remain instrumental commodities in coming years as the majority of transportation fuels are crude oil-based, and it is also a major raw material source for the chemicals industry. The US was the largest oil producer in 2020, with around 16 million barrels per day produced on average. Saudi Arabia and Russia are the second and third-largest producers and also are the top countries with the highest oil exports.

Base stocks are the most important product of the oil & gas industry. These base stocks are used to produce lubricants, which are further used in equipment and machines for their smooth and efficient functioning. Few companies are engaged in base oil production due to their high demand in the automotive and manufacturing sectors.

A1.5 Corporation：Surging ahead，Exxon

Although the industry market competition is extremely fierce, but the brutal competition must be able to pull out the leader. Based on a number of pieces of evidence and analysis, we believe that Exxon has the extraordinary potential to be a competitive outperformer.

According to the data of US stocks, from the perspective of operating income, the concentration ratio of the oil industry (CR8) is between 40% and 60%, so it is believed that the competition pattern of the oil industry is an oligopoly, and the concentration of monopoly is low; From a market capitalization perspective, CR8 is higher, but it still concludes that the oil industry is oligopolish. So within the US stock market, **we believe the oil industry is an oligopoly with little external competitive pressure**; But there is competition between oligarchs, means competitive pressure within the industry exists.

Due to the high market entry threshold in the oil industry, there is less pressure from outsiders. However, the degree of differentiation of petroleum products is not high, and the competitiveness of enterprises is mainly reflected by oil price, technology and raw material acquisition. The quantity and quality of oil resources owned can significantly affect the competitiveness of enterprises. XOM has more production sites in the United States and abroad, and has mastered leading extraction technology. **Therefore, we believe that XOM is the most competitive leader in the oil industry.**

billion$	Total Revenue	billion$	EnterpriseValue
XOM	352	XOM	441
SHEL	330	CVX	339
RDS.B	262	RDS.B	194
SNP	247	SHEL	189
TTE	239	COP	158
CVX	206	TTE	133
BP	204	EQNR	109
MPC	160	PBR.A	100
VLO	156	PBR	99.3
PSX	148	BP	96.5

Appendix 2 Relative Valuation Method Supplements

	SA	CVX	XOM	Shell	BP	Sinopec	CNPC	TTE
P/E TTM	14.25	10.31	8.79	4.61	-8.85	7.64	6.76	6.56
P/B MRQ	5.93	2.29	2.45	1.07	1.51	0.66	0.69	1.19
EV/EBITDA TTM	10.41	7.24	6.26	2.90	3.69	12.04	1.88	2.76
oil reserves (MMBbls)	196871	11000	19000	9000	17000	6338	9025	12000
market value (billion $)	2030.00	352.29	461.35	200.03	101.64	67.44	121.99	140.41
P/oil reserves (billion $/MMBbls)	0.010	0.032	0.024	0.022	0.006	0.011	0.014	0.012

	CNPC	TTE	Shell	BP	CVX	Sinopec	37.5% Quantile	62.5% Quantile	Medium
P/E TTM	6.76	6.56	4.61	-8.85	10.31	7.64	5.83	7.09	6.66
P/B MRQ	0.69	1.19	1.07	1.51	2.29	0.66	0.93	1.31	1.13
P/oil reserves (billion $/MMBbls)	0.014	0.012	0.022	0.006	0.032	0.011	0.011	0.019	0.013

Appendix 3 Absolute Valuation Method Supplements

A3.1 Some Relevant Chart of the perpetual growth method

The following three charts shows the estimate of enterprise value under three different industry development scenarios:

a - Industrial prosperity

DCF Analysis										
Scenario a, g=4.8%	Historical Data					Forecast Data				
Millions $	2018	2019	2020	2021	2022	2023E	2024E	2025E	2026E	2027E
Total Revenue	281060.0	259497.0	179784.0	278981.0	285004.2	268913.8	259313.5	260460.3	260733.7	261152.7
yoy	18.51%	-7.67%	-30.72%	55.18%	2.16%	-5.65%	-3.57%	0.44%	0.10%	0.16%
EBIT	23267.0	15545.0	(4432.0)	26780.0	21198.9	14490.6	11024.6	11950.9	12036.7	12056.0
D&A	18044.9	18897.9	20997.7	19407.0	20818.0	20223.2	19997.9	20561.6	20650.1	20457.9
EBITDA	**41311.9**	**34442.9**	**16565.7**	**46187.0**	**42016.9**	**34713.7**	**31022.5**	**32512.5**	**32686.8**	**32513.9**
Less:										
Taxes	4886.1	3264.5	-930.7	5623.8	4451.8	3043.0	2315.2	2509.7	2527.7	2531.8
Capex	19573.9	22127.7	14509.0	11364.2	21604.6	20298.9	19424.4	19295.2	18817.8	18730.8
Change in NWC	1472	-4772	2467	13981	516.2	488.9	462.6	437.4	413.1	389.8
FCFF	**15379.9**	**13822.7**	**520.5**	**15218.1**	**15444.3**	**10882.9**	**8820.3**	**10270.2**	**10928.2**	**10861.6**
Discount Factor						0.946	0.895	0.847	0.801	0.758
Discounted FCFF					45116.2					
Terminal Value					1276673.1					
PV of Terminal Value					968004.0					
Enterprise Value					**1013120.2**					

b - Industrial recession

DCF Analysis										
Scenario b, g=-2%	Historical Data					Forecast Data				
Millions $	2018	2019	2020	2021	2022	2023E	2024E	2025E	2026E	2027E
Total Revenue	281060.0	259497.0	179784.0	278981.0	233185.3	220020.4	212165.6	213103.9	213327.6	213670.4
yoy	18.51%	-7.67%	-30.72%	55.18%	-16.42%	-5.65%	-3.57%	0.44%	0.10%	0.16%
EBIT	23267.0	15545.0	(4432.0)	26780.0	17344.5	11855.9	9020.2	9778.0	9848.2	9864.0
D&A	18044.9	18897.9	20997.7	19407.0	17032.9	16546.2	16361.9	16823.1	16895.6	16738.3
EBITDA	**41311.9**	**34442.9**	**16565.7**	**46187.0**	**42016.9**	**34713.7**	**31022.5**	**32512.5**	**32686.8**	**32513.9**
Less:										
Taxes	4886.1	3264.5	-930.7	5623.8	3642.4	2489.7	1894.2	2053.4	2068.1	2071.4
Capex	19573.9	22127.7	14509.0	11364.2	17676.5	16608.2	15892.7	15787.0	15396.4	15325.2
Change in NWC	1472	-4772	2467	13981	516.2	488.9	462.6	437.4	413.1	389.8
FCFF	**15379.9**	**13822.7**	**520.5**	**15218.1**	**12542.4**	**8815.3**	**7132.5**	**8323.4**	**8866.1**	**8815.9**
Discount Factor						0.946	0.895	0.847	0.801	0.758
Discounted FCFF					36563.0					
Terminal Value					112324.5					
PV of Terminal Value					85167.1					
Enterprise Value					**121730.1**					

c - Status quo maintaining

DCF Analysis										
Scenario c, g=2%	Historical Data					Forecast Data				
Millions $	2018	2019	2020	2021	2022	2023E	2024E	2025E	2026E	2027E
Total Revenue	281060.0	259497.0	179784.0	278981.0	259094.7	244467.1	235739.6	236782.1	237030.7	237411.6
yoy	18.51%	-7.67%	-30.72%	55.18%	-7.13%	-5.65%	-3.57%	0.44%	0.10%	0.16%
EBIT	23267.0	15545.0	(4432.0)	26780.0	19271.7	13173.2	10022.4	10864.5	10942.4	10960.0
D&A	18044.9	18045.9	18046.9	18047.9	18048.9	18049.9	18050.9	18051.9	18052.9	18052.9
EBITDA	**41311.9**	**33590.9**	**13614.9**	**44827.9**	**37320.6**	**31223.1**	**28073.3**	**28916.4**	**28995.3**	**29012.9**
Less:										
Taxes	4886.1	3264.5	-930.7	5623.8	4047.1	2766.4	2104.7	2281.5	2297.9	2301.6
Capex	19573.9	22127.7	14509.0	11364.2	19640.5	18453.6	17658.6	17541.1	17107.1	17028.0
Change in NWC	1472	-4772	2467	13981	516.21	488.9	462.6	437.4	413.1	389.8
FCFF	**15379.9**	**12970.7**	**-2430.3**	**13858.9**	**13116.8**	**9514.3**	**7847.4**	**8656.4**	**9177.2**	**9293.5**
Discount Factor						0.946	0.895	0.847	0.801	0.758
Discounted FCFF					38819.4					
Terminal Value					256781.7					
PV of Terminal Value					194698.0					
Enterprise Value					**233517.4**					

A3.2 Another Determination of the Terminal Value

The exit multiplier method is essentially a relative valuation method, which calculates the multiplier valuation based on the company's EBITDA in the last forecast year, and is also the residual value generated by the company's free cash flow after the end of the forecast period. The multiplier used here is called exit

multiplier, which is usually the enterprise value multiplier of comparable companies in the past 12 months. Specifically, if n is the final year of the forecast period, the formula for calculating the final value using the exit multiplier method is as follows:

$$\text{terminal value} = \text{EBITDA}_n * \text{exit multiplier}$$

DCF Analysis										
Scenario a, g=4.8%	Historical Data					Forecast Data				
Millions $	2018	2019	2020	2021	2022	2023E	2024E	2025E	2026E	2027E
Total Revenue	281060.0	259497.0	179784.0	278981.0	285004.2	268913.8	259313.5	260460.3	260733.7	261152.7
yoy	18.51%	-7.67%	-30.72%	55.18%	2.16%	-5.65%	-3.57%	0.44%	0.10%	0.16%
EBIT	23267.0	15545.0	(4432.0)	26780.0	21198.9	14490.6	11024.6	11950.9	12036.7	12056.0
D&A	18044.9	18897.9	20997.7	19407.0	20818.0	20223.2	19997.9	20561.6	20650.1	20457.9
EBITDA	**41311.9**	**34442.9**	**16565.7**	**46187.0**	**42016.9**	**34713.7**	**31022.5**	**32512.5**	**32686.8**	**32513.9**
Less:										
Taxes	4886.1	3264.5	-930.7	5623.8	4451.8	3043.0	2315.2	2509.7	2527.7	2531.8
Capex	19573.9	22127.7	14509.0	11364.2	21604.6	20298.9	19424.4	19295.2	18817.8	18730.8
Change in NWC	1472	-4772	2467	13981	516.2	488.9	462.6	437.4	413.1	389.8
FCFF	**15379.9**	**13822.7**	**520.5**	**15218.1**	**15444.3**	**10882.9**	**8820.3**	**10270.2**	**10928.2**	**10861.6**
Discount Factor						0.946	0.895	0.847	0.801	0.758
Discounted FCFF					44496.2					
Terminal Value					203537.3					
PV of Terminal Value					152205.8					
Enterprise Value					**196702.0**					

According to the data in the financial forecast and relative valuation method shown above, the forecast value of ExxonMobil's EBITDA in 2027 at the end of the forecast period is 203537.3 million dollars, while **the exit multiplier is 6.26**, so we can get the terminal value of 200285.9 million dollars. Finally, we can get **the valuation of 196702.0 million dollars** by the exit multiplier method.

A3.3 The comparison and test of two valuation methods

In the **exit multiplier method**, under the assumption of mid year discount, the implied sustainable growth rate obtained by the exit multiplier method can be obtained by the following formula:

$$\text{implied perpetual growth rate} = \frac{(\text{terminal value} * \text{WACC}) - \text{FCF}_n * \sqrt{1 + \text{WACC}}}{\text{terminal value} + \text{FCF}_n * \sqrt{1 + \text{WACC}}}$$

Using the information above,we can calculate that the implied sustainable growth rate is at about 0.195%, which **significantly lower than** the the perpetual growth rate of 2% we set in the **perpetual growth method**. As the exit multiplier method is essentially a kind of relative valuation method, this implied growth is also consistent with the conclusion that shares of Exxon on the market is **undervalued** and **deserves to be bought**.

A3.4 Sensitivity Analysis

We may also implement a **sensitivity analysis** on WACC and the Exit Multiplier. The result is shown in the chart below.

Enterprise Value - Sensitivity Analysis						
Enterprise Value		Exit Multiplier				
	$196,702.0	6.06	6.16	6.26	6.36	6.46
WACC	5.40%	$194,322.5	$196,789.4	$199,256.4	$201,723.3	$204,190.2
	5.50%	$193,466.3	$195,920.9	$198,375.6	$200,830.3	$203,285.0
	5.69%	$191,852.8	$194,284.4	$196,716.0	$199,147.6	$201,579.2
	5.75%	$191,346.9	$193,771.2	$196,195.6	$198,620.0	$201,044.3
	5.85%	$190,507.5	$192,919.9	$195,332.2	$197,744.6	$200,157.0
	6.00%	$189,257.4	$191,651.9	$194,046.4	$196,440.9	$198,835.4

As is shown on the chart above, the fluctuation of the above two variables will cause the fluctuation of the enterprise value, and **the fluctuation range is about 189257.4 to 204190.2 million dollars**.

Appendix 4 Summary of Financial Statements

Income Statement - Annual										
Millions $	2018	2019	2020	2021	2022E	2023E	2024E	2025E	2026E	2027E
Total Revenue	**281060.0**	**259497.0**	**179784.0**	**278981.0**	**285004.2**	**268913.8**	**259313.5**	**260460.3**	**260733.7**	**261152.7**
Sales y/y Growth	18.51%	-7.67%	-30.72%	55.18%	2.16%	-5.65%	-3.57%	0.44%	0.10%	0.16%
EBITDA	**41311.9**	**34442.9**	**16565.7**	**46187.0**	**42016.9**	**34713.7**	**31022.5**	**32512.5**	**32686.8**	**32513.9**
D&A	18044.9	18897.9	20997.7	19407.0	20818.0	20223.2	19997.9	20561.6	20650.1	20457.9
EBIT	23267.0	15545.0	(4432.0)	26780.0	21198.9	14490.6	11024.6	11950.9	12036.7	12056.0
Less:										
Taxes	4886.1	3264.5	-930.7	5623.8	4451.8	3043.0	2315.2	2509.7	2527.7	2531.8
Net Income	**18,380.93**	**12,280.55**	**(3,501.28)**	**21,156.2**	**16,747.1**	**11,447.5**	**8,709.5**	**9,441.2**	**9,509.0**	**9,524.2**
Diluted EPS	**4.88**	**3.36**	**-5.25**	**5.39**	**5.39**	**5.39**	**5.39**	**5.39**	**5.39**	**5.39**

Free cash flow to firm										
Millions $	2018	2019	2020	2021	2022E	2023E	2024E	2025E	2026E	2027E
EBIT	23267.0	15545.0	(4432.0)	26780.0	21198.9	14490.6	11024.6	11950.9	12036.7	12056.0
Less:										
Taxes	4886.1	3264.5	-930.7	5623.8	4451.8	3043.0	2315.2	2509.7	2527.7	2531.8
Capex	**19,573.9**	**22,127.7**	**14,509.0**	**11,364.2**	**21,604.6**	**20,298.9**	**19,424.4**	**19,295.2**	**18,817.8**	**18,730.8**
Current assets	47,973.0	50,052.0	44,893.0	59,154.0	57,970.9	56,811.5	55,675.3	54,561.8	53,470.5	52,401.1
Current liabilities	57,138.0	63,989.0	56,363.0	56,643.0	54,943.7	53,295.4	51,696.5	50,145.6	48,641.3	47,182.0
NWC	(9,165.0)	(13,937.0)	(11,470.0)	2,511.0	3,027.2	3,516.1	3,978.7	4,416.1	4,829.3	5,219.1
Increase of NWC	**1,472.0**	**(4,772.0)**	**2,467.0**	**13,981.0**	**516.2**	**488.9**	**462.6**	**437.4**	**413.1**	**389.8**
FCFF	**15379.9**	**13822.7**	**520.5**	**15218.1**	**15444.3**	**10882.9**	**8820.3**	**10270.2**	**10928.2**	**10861.6**

Ratio Analysis										
	2018	2019	2020	2021	2022E	2023E	2024E	2025E	2026E	2027E
EBIT Margin	8.28%	5.99%	-2.47%	9.60%	7.44%	5.39%	4.25%	4.59%	4.62%	4.62%
D&A Margin	6.42%	7.28%	11.68%	6.96%	7.30%	7.52%	7.71%	7.89%	7.92%	7.83%
Capex Margin	6.96%	8.53%	8.07%	4.07%	7.58%	7.55%	7.49%	7.41%	7.22%	7.17%
Net Profit Margin	6.54%	4.73%	-1.95%	7.58%	5.88%	4.26%	3.36%	3.62%	3.65%	3.65%

Ratio Analysis					
	2018	2019	2020	2021	2022E
ROA	4.19%	2.74%	-0.80%	4.98%	11.22%
ROE	10.90%	7.43%	-12.81%	13.89%	29.73%
Debt/Equity	19.04%	26.52%	44.44%	30.18%	23.53%
Debt/Capital	15.99%	20.96%	30.77%	23.19%	19.05%
P/E					**7.99x**
EV/EBITDA					**4.24x**
EPS	**4.88**	**3.36**	**-5.25**	**5.39**	**5.39**

Appendix 5 Discounted Cash Flow Analysis

Discounted Cash Flow Analysis of ExxonMobil In Millions of the trading currency, except per share items.

Hypothetical Scenario	λ1	λ2	tax rate	reasing rate of	decreasing rate of CL	decreasing rate of dilu	decreasing rate of diluted EPS									
a	0.9	0.92	21%	2%	3%	5%	5%									
	Historical Statistics									Forecast Data						
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Total Revenue: Upstream Sector	38,736.0	39,082.0	37,180.0	23,695.0	19,851.0	23,892.0	25,555.0	23,184.0	14,587.0	21,827.0	24,867.5	24,125.1	23,324.4	22,582.6	22,523.1	22,666.1
Total Revenue: Downstream Sector	374,047.0	342,706.0	318,747.0	188,756.0	155,386.0	184,576.0	221,334.0	204,983.0	140,896.0	218,007.0	203,220.6	189,748.6	182,274.4	184,489.0	184,673.6	184,673.6
Total Revenue: Chemical Sector	38,726.0	39,048.0	38,178.0	27,403.0	25,391.0	28,694.0	32,443.0	27,416.0	23,091.0	36,858.0	31,006.6	30,593.4	30,140.7	29,710.5	29,834.0	30,071.9
Total Revenue	**419,100.0**	**390,247.0**	**364,763.0**	**241,406.0**	**200,628.0**	**237,162.0**	**281,060.0**	**259,497.0**	**179,784.0**	**278,981.0**	**285,004.2**	**268,913.8**	**259,313.5**	**260,460.3**	**260,733.7**	**261,152.7**
GDP Growth Rate	2.30%	1.80%	2.30%	2.70%	1.70%	2.26%	2.92%	2.29%	-3.41%	5.68%	3.71%	2.25%	1.44%	1.68%	1.70%	1.70%
EBIT	**49,881.0**	**40,301.0**	**34,082.0**	**14,435.0**	**4,536.0**	**14,074.0**	**23,267.0**	**15,545.0**	**(4,432.0)**	**26,780.0**	**21,198.9**	**14,490.6**	**11,024.6**	**11,950.9**	**12,036.7**	**12,056.0**
EBIT Margin	11.90%	10.33%	9.34%	5.98%	2.26%	5.93%	8.28%	5.99%	-2.47%	9.60%	7.44%	5.39%	4.25%	4.59%	4.62%	4.62%
D&A	**15,888.1**	**17,182.2**	**17,296.7**	**18,048.0**	**18,708.0**	**17,892.9**	**18,044.9**	**18,897.9**	**20,997.7**	**19,407.0**	20,818.0	20,223.2	19,997.9	20,561.6	20,650.1	20,457.9
D&A Margin	3.79%	4.40%	4.74%	7.48%	9.32%	7.54%	6.42%	7.28%	11.68%	6.96%	7.30%	7.52%	7.71%	7.89%	7.92%	7.83%
EBITDA	65,769.1	57,483.2	51,378.7	32,483.0	23,244.0	31,966.9	41,311.9	34,442.9	16,565.7	46,187.0	42,016.9	34,713.7	31,022.5	32,512.5	32,686.8	32,513.9
Capex	**34,271.0**	**33,669.0**	**32,951.8**	**26,489.9**	**16,163.0**	**15,401.9**	**19,573.9**	**22,127.7**	**14,509.0**	**11,364.2**	**21,604.6**	**20,298.9**	**19,424.4**	**19,295.2**	**18,817.8**	**18,730.8**
Capex Margin	8.18%	8.63%	9.03%	10.97%	8.06%	6.49%	6.96%	8.53%	8.07%	4.07%	7.58%	7.55%	7.49%	7.41%	7.22%	7.17%
current assets	64,460.0	59,308.0	52,910.0	42,623.0	41,416.0	47,134.0	47,973.0	50,052.0	44,893.0	59,154.0	57,970.9	56,811.5	55,675.3	54,561.8	53,470.5	52,401.1
current liabilities	64,139.0	71,724.0	64,633.0	53,976.0	47,638.0	57,771.0	57,138.0	63,989.0	56,363.0	56,643.0	54,943.7	53,295.4	51,696.5	50,145.6	48,641.3	47,182.0
NWC	321.0	(12,416.0)	(11,723.0)	(11,353.0)	(6,222.0)	(10,637.0)	(9,165.0)	(13,937.0)	(11,470.0)	2,511.0	3,027.2	3,516.1	3,978.7	4,416.1	4,829.3	5,219.1
Increase of NWC	**4,863.0**	**(12,737.0)**	**693.0**	**370.0**	**5,131.0**	**(4,415.0)**	**1,472.0**	**(4,772.0)**	**2,467.0**	**13,981.0**	**516.2**	**488.9**	**462.6**	**437.4**	**413.1**	**389.8**
FCFF	**25,637.5**	**35,745.1**	**17,052.3**	**5,334.4**	**1,859.3**	**20,698.5**	**19,800.6**	**16,776.3**	**(321.6)**	**20,306.3**	**15,444.3**	**10,882.9**	**8,820.3**	**10,270.2**	**10,928.2**	**10,861.6**
diluted EPS	**9.7**	**7.37**	**7.59**	**3.85**	**1.88**	**4.63**	**4.88**	**3.36**	**(5.25)**	**5.39**	**5.1**	**4.9**	**4.6**	**4.4**	**4.2**	**4.0**

Discounted Cash Flow Analysis of ExxonMobil In Millions of the trading currency, except per share items.

Hypothetical Scenario	λ1	λ2	tax rate	reasing rate of	decreasing rate of CL	decreasing rate of dilu	decreasing rate of diluted EPS									
b	0.9	0.92	21%	2%	3%	5%	5%									
	Historical Statistics									Forecast Data						
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Total Revenue: Upstream Sector	38,736.0	39,082.0	37,180.0	23,695.0	19,851.0	23,892.0	25,555.0	23,184.0	14,587.0	21,827.0	24,867.5	24,125.1	23,324.4	22,582.6	22,523.1	22,666.1
Total Revenue: Downstream Sector	374,047.0	342,706.0	318,747.0	188,756.0	155,386.0	184,576.0	221,334.0	204,983.0	140,896.0	218,007.0	203,220.6	189,748.6	182,274.4	184,489.0	184,673.6	184,673.6
Total Revenue: Chemical Sector	38,726.0	39,048.0	38,178.0	27,403.0	25,391.0	28,694.0	32,443.0	27,416.0	23,091.0	36,858.0	31,006.6	30,593.4	30,140.7	29,710.5	29,834.0	30,071.9
Total Revenue	**419,100.0**	**390,247.0**	**364,763.0**	**241,406.0**	**200,628.0**	**237,162.0**	**281,060.0**	**259,497.0**	**179,784.0**	**278,981.0**	**233,185.3**	**220,020.4**	**212,165.6**	**213,103.9**	**213,327.6**	**213,670.4**
GDP Growth Rate	2.30%	1.80%	2.30%	2.70%	1.70%	2.26%	2.92%	2.29%	-3.41%	5.68%	3.71%	2.25%	1.44%	1.68%	1.70%	1.70%
EBIT	**49,881.0**	**40,301.0**	**34,082.0**	**14,435.0**	**4,536.0**	**14,074.0**	**23,267.0**	**15,545.0**	**(4,432.0)**	**26,780.0**	**17,344.5**	**11,855.9**	**9,020.2**	**9,778.0**	**9,848.2**	**9,864.0**
EBIT Margin	11.90%	10.33%	9.34%	5.98%	2.26%	5.93%	8.28%	5.99%	-2.47%	9.60%	7.44%	5.39%	4.25%	4.59%	4.62%	4.62%
D&A	**15,888.1**	**17,182.2**	**17,296.7**	**18,048.0**	**18,708.0**	**17,892.9**	**18,044.9**	**18,897.9**	**20,997.7**	**19,407.0**	17,032.9	16,546.2	16,361.9	16,823.1	16,895.6	16,738.3
D&A Margin	3.79%	4.40%	4.74%	7.48%	9.32%	7.54%	6.42%	7.28%	11.68%	6.96%	7.30%	7.52%	7.71%	7.89%	7.92%	7.83%
EBITDA	65,769.1	57,483.2	51,378.7	32,483.0	23,244.0	31,966.9	41,311.9	34,442.9	16,565.7	46,187.0	34,377.4	28,402.1	25,382.0	26,601.1	26,743.7	26,602.3
Capex	**34,271.0**	**33,669.0**	**32,951.8**	**26,489.9**	**16,163.0**	**15,401.9**	**19,573.9**	**22,127.7**	**14,509.0**	**11,364.2**	**17,676.5**	**16,608.2**	**15,892.7**	**15,787.0**	**15,396.4**	**15,325.2**
Capex Margin	8.18%	8.63%	9.03%	10.97%	8.06%	6.49%	6.96%	8.53%	8.07%	4.07%	7.58%	7.55%	7.49%	7.41%	7.22%	7.17%
current assets	64,460.0	59,308.0	52,910.0	42,623.0	41,416.0	47,134.0	47,973.0	50,052.0	44,893.0	59,154.0	57,970.9	56,811.5	55,675.3	54,561.8	53,470.5	52,401.1
current liabilities	64,139.0	71,724.0	64,633.0	53,976.0	47,638.0	57,771.0	57,138.0	63,989.0	56,363.0	56,643.0	54,943.7	53,295.4	51,696.5	50,145.6	48,641.3	47,182.0
NWC	321.0	(12,416.0)	(11,723.0)	(11,353.0)	(6,222.0)	(10,637.0)	(9,165.0)	(13,937.0)	(11,470.0)	2,511.0	3,027.2	3,516.1	3,978.7	4,416.1	4,829.3	5,219.1
Increase of NWC	**4,863.0**	**(12,737.0)**	**693.0**	**370.0**	**5,131.0**	**(4,415.0)**	**1,472.0**	**(4,772.0)**	**2,467.0**	**13,981.0**	**516.2**	**488.9**	**462.6**	**437.4**	**413.1**	**389.8**
FCFF	**25,637.5**	**35,745.1**	**17,052.3**	**5,334.4**	**1,859.3**	**20,698.5**	**19,800.6**	**16,776.3**	**(321.6)**	**20,306.3**	**12,542.4**	**8,815.3**	**7,132.5**	**8,323.4**	**8,866.1**	**8,815.9**
diluted EPS	**9.7**	**7.37**	**7.59**	**3.85**	**1.88**	**4.63**	**4.88**	**3.36**	**(5.25)**	**5.39**	**5.1**	**4.9**	**4.6**	**4.4**	**4.2**	**4.0**

Discounted Cash Flow Analysis of ExxonMobil In Millions of the trading currency, except per share items.

Hypothetical Scenario	λ1	λ2	tax rate	reasing rate of	decreasing rate of CL	decreasing rate of dilu	decreasing rate of diluted EPS									
c	0.9	0.92	21%	2%	3%	5%	5%									
	Historical Statistics									Forecast Data						
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Total Revenue: Upstream Sector	38,736.0	39,082.0	37,180.0	23,695.0	19,851.0	23,892.0	25,555.0	23,184.0	14,587.0	21,827.0	24,867.5	24,125.1	23,324.4	22,582.6	22,523.1	22,666.1
Total Revenue: Downstream Sector	374,047.0	342,706.0	318,747.0	188,756.0	155,386.0	184,576.0	221,334.0	204,983.0	140,896.0	218,007.0	203,220.6	189,748.6	182,274.4	184,489.0	184,673.6	184,673.6
Total Revenue: Chemical Sector	38,726.0	39,048.0	38,178.0	27,403.0	25,391.0	28,694.0	32,443.0	27,416.0	23,091.0	36,858.0	31,006.6	30,593.4	30,140.7	29,710.5	29,834.0	30,071.9
Total Revenue	**419,100.0**	**390,247.0**	**364,763.0**	**241,406.0**	**200,628.0**	**237,162.0**	**281,060.0**	**259,497.0**	**179,784.0**	**278,981.0**	**259,094.7**	**244,467.1**	**235,739.6**	**236,782.1**	**237,030.7**	**237,411.6**
GDP Growth Rate	2.30%	1.80%	2.30%	2.70%	1.70%	2.26%	2.92%	2.29%	-3.41%	5.68%	3.71%	2.25%	1.44%	1.68%	1.70%	1.70%
EBIT	**49,881.0**	**40,301.0**	**34,082.0**	**14,435.0**	**4,536.0**	**14,074.0**	**23,267.0**	**15,545.0**	**(4,432.0)**	**26,780.0**	**19,271.7**	**13,173.2**	**10,022.4**	**10,864.5**	**10,942.4**	**10,960.0**
EBIT Margin	11.90%	10.33%	9.34%	5.98%	2.26%	5.93%	8.28%	5.99%	-2.47%	9.60%	7.44%	5.39%	4.25%	4.59%	4.62%	4.62%
D&A	**15,888.1**	**17,182.2**	**17,296.7**	**18,048.0**	**18,708.0**	**17,892.9**	**18,044.9**	**18,897.9**	**20,997.7**	**19,407.0**	18,925.4	18,384.7	18,179.9	18,692.3	18,772.8	18,598.1
D&A Margin	3.79%	4.40%	4.74%	7.48%	9.32%	7.54%	6.42%	7.28%	11.68%	6.96%	7.30%	7.52%	7.71%	7.89%	7.92%	7.83%
EBITDA	65,769.1	57,483.2	51,378.7	32,483.0	23,244.0	31,966.9	41,311.9	34,442.9	16,565.7	46,187.0	38,197.2	31,557.9	28,202.3	29,556.8	29,715.3	29,558.1
Capex	**34,271.0**	**33,669.0**	**32,951.8**	**26,489.9**	**16,163.0**	**15,401.9**	**19,573.9**	**22,127.7**	**14,509.0**	**11,364.2**	**19,640.5**	**18,453.6**	**17,658.6**	**17,541.1**	**17,107.1**	**17,028.0**
Capex Margin	8.18%	8.63%	9.03%	10.97%	8.06%	6.49%	6.96%	8.53%	8.07%	4.07%	7.58%	7.55%	7.49%	7.41%	7.22%	7.17%
current assets	64,460.0	59,308.0	52,910.0	42,623.0	41,416.0	47,134.0	47,973.0	50,052.0	44,893.0	59,154.0	57,970.9	56,811.5	55,675.3	54,561.8	53,470.5	52,401.1
current liabilities	64,139.0	71,724.0	64,633.0	53,976.0	47,638.0	57,771.0	57,138.0	63,989.0	56,363.0	56,643.0	54,943.7	53,295.4	51,696.5	50,145.6	48,641.3	47,182.0
NWC	321.0	(12,416.0)	(11,723.0)	(11,353.0)	(6,222.0)	(10,637.0)	(9,165.0)	(13,937.0)	(11,470.0)	2,511.0	3,027.2	3,516.1	3,978.7	4,416.1	4,829.3	5,219.1
Increase of NWC	**4,863.0**	**(12,737.0)**	**693.0**	**370.0**	**5,131.0**	**(4,415.0)**	**1,472.0**	**(4,772.0)**	**2,467.0**	**13,981.0**	**516.2**	**488.9**	**462.6**	**437.4**	**413.1**	**389.8**
FCFF	**25,637.5**	**35,745.1**	**17,052.3**	**5,334.4**	**1,859.3**	**20,698.5**	**19,800.6**	**16,776.3**	**(321.6)**	**20,306.3**	**13,993.4**	**9,849.1**	**7,976.4**	**9,296.8**	**9,897.1**	**9,838.7**
diluted EPS	**9.7**	**7.37**	**7.59**	**3.85**	**1.88**	**4.63**	**4.88**	**3.36**	**(5.25)**	**5.39**	**5.1**	**4.9**	**4.6**	**4.4**	**4.2**	**4.0**

Appendix 6 Risk Factor Analysis

Figure 1: WTI price fluctuate violently (1950~2022)

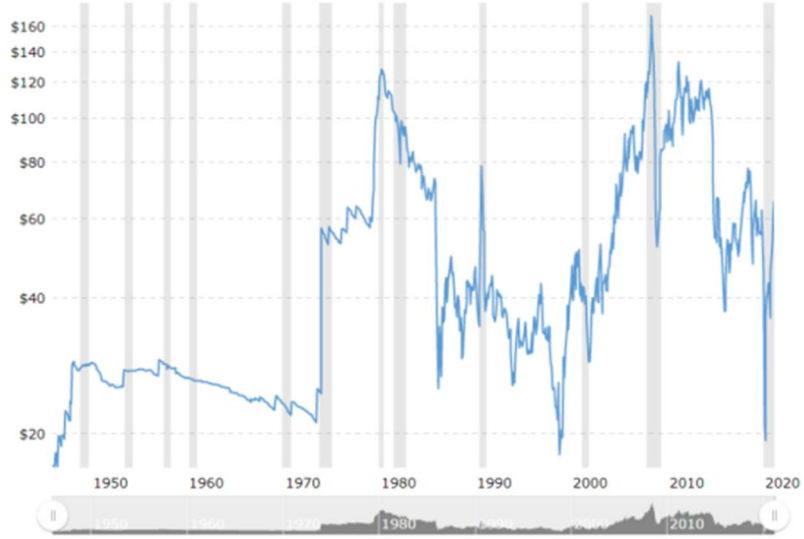


Figure 2: WTI price impacted by COVID-19

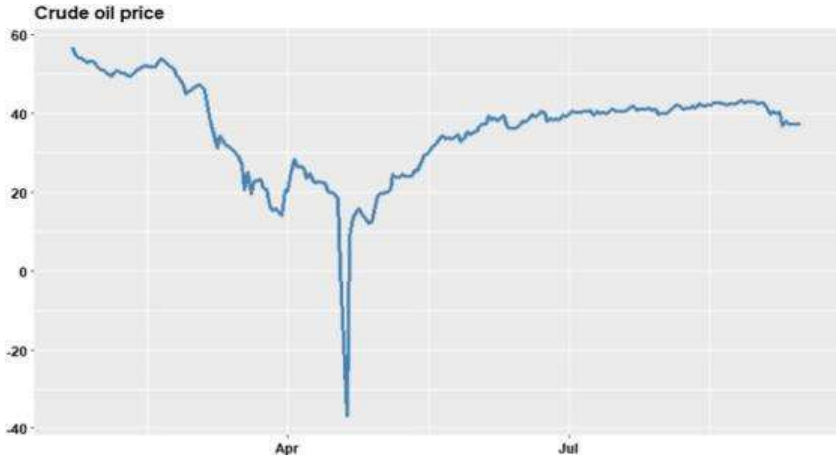


Figure 3: Oil and Gas production impacted by COVID-19