

Strategic and Financial Analysis of Petrobras

Master's Thesis

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Abstract

The objective of the thesis *Strategic and financial analysis of Petrobras* is to examine how an external investor can access whether the current market value of Petrobras reflects the real company's potential to create long-term value for its stakeholders. The reason for the study relies on the challenging oil and gas industry and the recent dramatic events inside Brazil related to political instability, corruption and recession.

Based on the nature of the thesis both a qualitative and quantitative research approach has been selected. This approach, along with the selected sources, creates the fundament for the analysis. The sources consist of both internal (i.e. customer data, annual reports, budgets, business plans, website.) and external data (i.e. expert assessments, articles from newspapers, reports, previous studies of the issue).

In order to analyze the collected data, different analytic frameworks have been created. The first framework consists of three models: *PESTEL*, *Porter's Five Forces* and *Porter's Value Chain* and is used to analyse the non-financial value drivers. In the second part of the analysis a selection of important value drivers is projected on the basis of historical financial performance and future expectations. Lastly the DCF model is applied to value the share price of the company.

The analysis has shown that both non-financial value drivers and historical financial parameters play a role in the valuation of Petrobras' stock. Some of the key factors for the non-financial value drivers are found within the role of governments, the advantages of the right expertise and technology, green policies, the Brazilian recession and the OECD recovery. In the case of the historical financial parameters results have shown that Petrobras has outperformed the peer group in terms of EBITDA margin and short-term liquidity, but performed poorly considering long-term leverage and return on equity. The DCF model indicated that the stock of Petrobras was undervalued by the end of 2015, while the sensitivity check indicated the impact in the share price from changes in input assumptions. In addition, a multiples approach confirmed that the company could perform at the industry levels based on future expectations.

Overall, the thesis shows how a full valuation conducted by an external analyst can be completed by using the models and method presented. However, one should be aware that the results would always be sensitive to the input applied.

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1 INTRODUCTARY

1.1 Introduction

The once booming South American country, *Brazil*, was recently found in a political chaos and recession that it had never seen before. Its former president, Dilma Rousseff, has been forced to step down along with fellow politicians due to their involvement in the country's biggest corruption scandal to date; *the Lava Jato case*, which investigation was rolled out in the beginning of 2014. This is a case that does not only involves top politicians, but also the majority state owned oil and gas company *Petrobras*, and several of the company's, now former, top management due to bribery. The corruption scandal has left not only the country, but also Brazil's corporate world in chaos, with the biggest victim being Petrobras (Kamm, 2015).

In April 2015 a team of its newly selected managers announced that the company had lost \$17 billion to mismanagement. Furthermore, the new management team revealed that the company would have to sell almost the same amount in assets and postpone investment plans to recuperate its financial position. Petrobras's market value was reduced by half and burdened by a \$100 billion debt (Sotero, 2015). Subsequently, Petrobras has published its 2015-2019 Business and Management plan, which provides details on how the company will cut investment 37% over the next five years (Petrobras, 2015). This is without a doubt a company with a very different course, which key objective is to generate value for its shareholders. Another significant consequence of the scandal is Petrobras' plan to reduce, by almost a third of the number of production units by 2020. However, the company did also state that projects that lost priority in this new plan might be brought back into the schedule from 2020. Thus, developments will now focus on one of Petrobras' principal basins, the Santos basin pre-salt area, while investment for the other business segments will be limited to maintaining operations (Petrobras, 2015). But the reduction does not stop here, as the target for Petrobras' domestic production for 2020 has been reduced to 2,8 million barrels of oil from a previous target of 4,2 million barrels (McKenna, 2015).

But not only the Lava Jato case has left Petrobras in a very vulnerable situation. In the same period the country's local currency, the real, was strongly devaluated against the US dollar, and the world witnessed very low oil prices, which on its lowest (January 2016) was below \$ 30 per barrel, to comparison when at its peak in 2008 it was \$ 147 per barrel. However, the International Energy Agency (IEA) has announced that it expects the oil prices to have bottomed (Zhdannikov, 2016). At the same time the OECD countries are recovering from the 2008 financial crisis, which is good news for the oil rich countries, as this will likely create more demand for energy sources (Pettinger, 2016).

All these circumstances show that Petrobras is part of a very dynamic industry. Within the industry we have also seen a change in the supply of crude oil from non-OPEC countries, where production rose by 1,23 mmbbl/d in 2015 compared to 2014. Although some non-OPEC countries have increased their supply, there has been a drastic decline in growth of production during 2015, particularly in the United States, where crude oil production rose by less than 800 mbbl/d in the last quarter of 2015, after reaching 1,6 mmbbl/d during the first half of 2015. Meanwhile, the OPEC countries - particularly Iraq and Saudi Arabia - substantially boosted production by the end of 2015 to 32,18 mmbbl/d, which is 1,18 mmbbl/d higher than the average volume they produced in 2014, which an oversupplied oil marked and thus low prices (AR 2015).

In such a complex scenario, it is uncertain if the company's plans on cost reduction and divestment will be enough to provide long-term value to impatient shareholders, and if the company can keep up its competitive advantage within deep and ultra-deep water exploration and production. Therefor, this paper will attempt to conduct a strategic and financial analysis of Petrobras to unveil the company's value generation potential in the long-run. The need for this type of analytical study comes as a result of the different factors that have affected the oil industry and the company, but also due to the company-specific events that caused significant decline in its stock price.

1.2 Problem statement

The oil and gas industry has a complex business model that combines political relationships, high demand for technology and environmental protection in the high-risk pursuit of a vital commodity that moves the world. This model demands important challenges on profitability of companies in the industry.

Petrobras share price experienced a serious drop in the recent years. The main reason can easily be linked to the corruption scandal that involved the company in a corruption scheme with top Brazilian politicians.

As a consequence, the purpose of this thesis is to determine Petrobras capability for value creation and profitability, arriving at the company's stock fair value by the end of 2015. The overall research question can be synthesized into:

"How can an external investor assess whether the current market value of Petrobras reflects the real company's potential to create long-term value for its shareholders?"

1.3 Research questions

In order to answer the problem statement and calculate the fair stock price, a throughout assessment of the oil and gas industry and Petrobras competitive environment, along with the financial drivers of value will be carried out. In this context, the development of the thesis will intend to provide answers to other sub questions that will ultimately collect the details for answering the research question. The following questions are:

- Which are the external and internal non-financial value drivers that affect Petrobras value creation?
- What is Petrobras competitive advantage?
- What do Petrobras' key financial ratios tell about Petrobras historic performance?

1.4 Delimitation

Although Petrobras has both oil and gas exploration and production, this thesis will mainly focus on oil, as this product is the far most dominant product in the company. However, the thesis will also briefly describe the gas section when relevant, thus it does not treat the two as separate industries. In line, the thesis will also mainly focus on Petrobras' domestic market, as this counts for the majority of its exploration, production and sale. Though, Petrobras' foreign markets will also be presented in the thesis, to give a fully overview over its scoop.

A last delimitation is related to the data available for the external analysis, as these are only to be found within public accessible documents, though the ideal scenario would be to have access to all relevant data and documents that could define the market value of Petrobras.

2 Method

In this chapter the method along with the choice of analytic models and data collection will be presented. The structure of the thesis is presented in below figure:



Figure 1 Thesis Structure

Based on the nature of this thesis both qualitative and quantitative research will be conducted. Thus, the Strategic Analysis will consist of a qualitative approach, while the Financial Analysis will entail a quantitative approach.

2.1 Strategic Analysis and choice of models

In a changing world it is not only necessary to examine a firm's financial value drivers, as its non-financial value drivers also contribute to the actual valuation of its stock. Hence, it is necessary to supplement the financial analysis with a strategic analysis that examines those aspects of the firm's external and internal environment that influence the price of the stock. Only then, it is possible to define the impact that these value drivers have on the actual stock valuation. Unlike the financial value drivers, that measure business performances for a specified period of time, the non-financial value drivers have a present and future oriented function, which make them excellent tools for forecast (Read & Scheuermann, 2003). Thus, the objective of the strategic analysis is

to examine how the non-financial value drivers impact the financial value drivers, both on an external and internal level.

In the following chapters, I will introduce the different levels of the strategic analysis and their corresponding models, which will be used when conducting an analysis of Petrobras' non-financial value drivers.

2.1.1 The External Level

The external level consists of two sublevels; *the macro environment and the industry*. These will be introduced separately below.

2.1.1.1 The Macro Environment – PESTEL Model

The aim of this level is to analyze all the external factors that can affect the valuation of Petrobras. In order to carry out a systematic analysis, I will use the well-known and often used PESTEL model. The name of the model reflects six factors of the macro environment that will be examined: *political, economic, socio-cultural, technological, environment and legal* (Mcmanners, 2014). All of these factors are crucial when analyzing the macro environment of an oil and gas firm. When conducting this analysis it is important to be aware of all the different types of factors that may have a potential to impact Petrobras, both negatives and positives. At the same time, in order not to end up with too much data, it is equal important to limit the analysis to those areas that have the greatest influence on the financial value drivers.

The reason for choosing this model is to have a reliable tool in order to organize factors within the macro environment and to identify how these factors influence Petrobras' macro environment. The model will not be explained further, as it is assumed that anyone reading this thesis is well informed about its use and content.

2.1.1.2 Industry Level – Porter's Five Forces

The aim of this second sub-level is to analyze the industry to which Petrobras belong. In order to carry out such an analysis, I will use the well-known model; *Porter's Five Forces.* The objective of using the Porter's Five Forces' model is to determine the level of competition in the oil and gas industry, as a company's potential profitability is deeply interrelated with the profitability of its industry. According to the model an industry is

influenced by five competitive forces; *threat of entrants, threat of substitutes, power of suppliers, power of buyers* and *rivalry among the firms in the industry*. The weaker the impact is from each of these five forces, the more value it adds to the industry, and thus the potential for each company in the industry (Dess, Lumpkin, & Eisner, 2008).

As for the Porters' Five Forces model, it is also assumed that anyone reading this thesis is well informed about its use and content, and therefore this model will not be explained further. However, where needed, some relevant points from the model will be addressed along with the analysis.

2.1.2 The Internal Level - Porters' Value Chain Model

After completing the analysis of the external level, the company's internal level will be examined. One model that serves for this matter is Porter's Value Chain from 1985. The objective of the value chain analysis is to understand the building blocks of competitive advantages, where value is the amount that buyers are willing to pay for what a company has to offer (Dess, Lumpkin, & Eisner, 2008). A value chain describes both primary and supportive activities of a company. The identification and understanding of the primary activities are crucial when determining the competitive advantages of the company (Petersen & Plenborg, 2012). The primary activities contribute to the physical creation of a product, its sale and transfer to the buyer. An understanding of how efficient a company is managing its support activities and how well they support the primary activities is equally important (Petersen & Plenborg, 2012). The supportive activities involve, among others, procurement, technology development and human resource management.

From the above description, it is clear that it is difficult to conduct an analysis of a company's value chain as an external analyst, as the external analyst will not have access to all needed data. Nevertheless, only by conducting an internal analysis, we are able to identify relevant internal features within the company that might be significant for the final stock valuation.

2.1.3 SWOT

The aim of the SWOT analysis is to divide the non-financial value drivers from the

external and internal analysis of Petrobras' environment in strengths (S), weaknesses (W), opportunities (O) and threats (T). In that way, the SWOT analysis offers an overview and helps to identify the effects that Petrobras' external and internal environment has in relation to the actual valuation of its stock. While strengths and weaknesses describe the internal factors, the opportunities and threats describe the external (Fleisher, 2015). Thus, the results from the external and internal analysis will be listed in a SWOT model before a final conclusion is given on the impact from the non-financial value drivers.

2.1.4 Discussion of the Strategic Analysis Framework

All analytic models have advantages and disadvantages. This issue will be briefly discussed in this chapter in order to create an awareness frame when analyzing Petrobras external and internal environment.

The first model introduced is the PESTEL model. Some of its disadvantages are related to its potential of oversimplifying the information that is used for making decisions, and its way of gathering too much irrelevant data. Both elements should be taking into account when using the model. However, the model also has its advantages, as it offers a simple framework that includes both a national and a global approach and, at the same time, is able to define potential threats and possibilities, both aspects needed when analyzing Petrobras.

The second model introduced is Porter's Five Forces. When using this model it is important to keep in mind that it was created in the 1980s, where the pace of change was much slower than now and where the market structures were seen as relatively static. Furthermore, one should be aware that the model only provides a glimpse of the company's environment, thus it can be difficult to define the industry entirely. However, Porter's Five Forces also enable us to get a comprehension of a certain industry's current situation in a structured and easy-to-understand way, which is a crucial advantage when analyzing complex data.

The third model selected is Porter's Value Chain, which also has its disadvantages and advantages. One disadvantage is the fact that it can take a lot of work to finish a full value chain analysis for a company in order to identify and understand

the key differences and strategy drivers. Nevertheless, it also provides an needed understanding of the company's internal strengths and weaknesses.

The last model selected for the Strategic Analysis is the SWOT. As already mentioned, the model's objective in this thesis is to create an overview over Petrobras' internal and external non-financial value drivers. One of this model's key limitations is related to its static nature. This means that the model tempt to focus too much on one moment in time. However, this should not affect the outcome of the thesis, as the SWOT is working as a part of an analysis and not an analysis by itself. What should be taking into account, when using the SWOT as an overview, is the fact that the model will only show results related to Strengths, Weaknesses, Opportunities and Threats.

2.2 Valuation Methods Framework

The financial analysis is of great importance for the development of the thesis. A long with the non-financial drivers provided by the strategic analysis, they will aim to measure the past, current and future business performance of Petrobras. The different methods applied for the assessment of the financial performance of the firm will be summarized in this chapter.

The analysis will be structured in three main sections. First, a reorganization of the reported income statement and balance sheet will take place, with the purpose of isolating the operating from the financing elements of the company. Historical data from the last five fiscal years will be extracted from the company's annual reports and the reformulation of the financial statements will bring two concepts: Net operating profit after tax (NOPAT) and Invested capital. Both terms represent important key performance measurements, which will provide an understanding of where the real value creation is generated. Subsequently, an overview of the historic performance of the company will be conducted by looking at key financial ratios. The profitability ratios will analyze the ability of the company to generate earnings, whereas the liquidity and leverage ratios will assess the company's financial strength and its ability to pay-off short and long term debt.

The second part of the analysis will consist in the development of the forecast for the later valuation. The findings from the strategic and financial analysis will be considered to make projections of future financial statements. To do so, a selection of important value drivers will be projected on the basis of historical financial performance. The forecasting of financial performance will entail the perspective of changes in margins over time, along with developments in working capital and depreciation.

The last part of the thesis consists on the valuation of Petrobras taking into consideration the input from the forecast. There are several techniques towards valuing a company; however, much emphasis is put on only two of these approaches. These are the discounted economic profit and the discounted cash flow. In this regard, no focus will be directed on techniques such as capital cash flow and equity cash flow since they are notorious for mixing operational performance with capital structure in the cash flow. The discounted cash flow model has been selected, as it is valued to be the most appropriate method for this kind of valuation. The model gives the value of the company through calculating the present value of all future cash flows. Another advantage of the method remains in the fact that FCFF are generally recognized as more accurate than FCFE because, as stated previously, they do not include financial items, which mislead the real profitability of the company.

In addition, even though the discounted cash flow model can be considered slightly unreliable due to the fact that it relies on the analyst's individual opinion and assumptions, which might not be accurate (Koller, Goedhart, & Wessels, 2005) argues that the relative valuation approach can be extremely volatile and does not provide details of what drives value for the company.

For the calculation of cost of equity, the Capital Asset Pricing Model (CAPM) will be used. The model is basically standard, despite relying on a number of unfulfilled assumptions. However, in lack of a perfect model, the CAPM is widely accepted.

Once the valuation is conducted, a sensitivity analysis will be used to measure how much a given input assumption affects the share value. To determine the model sensitivity, key drivers such as cost of capital and EBITDA will be tested. Furthermore, the valuation will be supported by a multiples valuation in order to function as a cross check for the DCF valuation with the current pricing of similar companies in the market. The model is often used by practitioners as the main valuation tool. However, as it was referred before, the model carries a series of shortcomings if not used along with other valuation methods. In this sense, it seems like a handful complementary option to analyze the multiples that brings the opinions of many investors with the DCF model that relies heavily in the analyst's individual assumptions.

2.3 Data Collection

The first step in conducting an analysis is to collect the necessary empirical data. As this thesis is written from the perspective of an external analyst, the entire data is based on data available to the public. As already mentioned the analysis will contain both a qualitative and quantitative approach, and will be further divided into internal and external sources, which is described below (Rasmussin, Østergaard, & Beckmann, 2006):

- Internal sources: this data consists of sources within Petrobras. I.e. customer data, annual reports, budgets, organizational diagrams, business plans and strategy, website.
- *External sources*: this data consist of sources outside Petrobras. I.e. expert assessments, articles from newspapers, reports, previous studies of the issue, statistics from official sources.

The advantages of using secondary data are among others to avoid undertaking tasks already completed. Furthermore, compared to primary data, this method is inexpensive and requires less time in a world where most data could be collected on the Internet. Besides this, it also offers a possibility to conduct an analysis over historical development, which is needed in order to understand Petrobras past, present and future. However, using secondary data also involves difficulties. I.e. the data might not be updated; the author unknown or the subject might not cover the topic needed. However, as long as the different sources, internal and external, are leading the study in the same direction, the overall validity and reliability of the data is considered good.

3 COMPANY PROFILE

Petrobras is a Brazilian energy company with its headquarters based in Rio de Janeiro. The company was founded in 1953 as an exclusively agent to conduct Brazil's hydrocarbon activities. Since 1954 it has been carrying out crude oil and natural gas along with refining activities in Brazil on behalf of the Brazilian government. Since its origins and until today the company has undergone a huge transformation from being a state-run monopoly to a semi-public company, allowing competition with other oil companies in Brazil. In 2000 the company sold one third of its share to the public, and later the government reduced its holdings further, which was positive received by Brazilians and investors. (Petrobras homepage). Today (2016) Petrobras is the main oil and gas player on the Brazilian market with a total of 78.470 employees in the Petrobras Group and 56.874 in the Parent Company and it is the world leader in deepwater exploration (AR 2015).

3.1 Business Segments

In 2015 Petrobras changed its business segments from six to five in order to reflect the reallocation of its international activities (AR 2015). Each business segment describes Petrobras' current activities and will be briefly introduced in below chapters.

3.1.1 Exploration and Production:

This segment contains exploration, development and production of crude oil, NGL (natural gas liquid) and natural gas in- and outside of Brazil. Its primary purpose is to supply its domestic refineries and sell its surplus of crude oil and oil products to its domestic and foreign markets (AR 2015). Petrobras has been the world leader in the development of breakthrough technology for ultra-deep water oil exploration and production, surpassing big players such as BP and Chevron. This has enabled the company to explore and discover high oil quality fields in the coast of Brazil in the recent years.

3.1.2 Refining, Transportation and Marketing:

This business segment contains refining, logistics, transportation and trading of crude oil and oil products in Brazil driven by the firm's strategy of boosting the efficiency of its own assets with the aim of meeting domestic demand. Furthermore it covers exportation of ethanol, extraction and processing of shale, as well as holding equity interest in petrochemical companies in Brazil (AR 2015). Last fiscal year the company produced a record quantity of diesel oil in Brazil, which was 40% higher than the previous year output and a turnaround for the segment.

3.1.3 Gas and Power:

This business segment contains transportation and trading of natural gas produced inand outside Brazil. Furthermore, it covers imported natural gas, transportation and trading of LNG (liquid natural gas), generation and trading of electricity, as well as holding its equity interest in transporters and distributors of natural gas and power plants in Brazil (AR 2015). The segment works jointly with E&P in Brazil in order to match supply and demand for gas, along with domestic consumption for the downstream.

3.1.4 Distribution:

This business segment contains activities of *Petrobras Distribuidora S.A.*, which operates through its own retail network and wholesale channels to sell oil products, ethanol and vehicle natural gas in Brazil to retail, commercial and industrial customers, as well as other fuel wholesalers. This segment also includes distribution of oil products operations outside Brazil, mainly in South America (AR 2015).

3.1.5 Biofuel:

This business segment particularly works on developing green energies, such as biodiesel and its co-products, as well as it covers ethanol-related activities such as equity investments, production and trading of ethanol, sugar and surplus electric power generated from sugarcane bagasse (AR 2015). The opportunity for ethanol is increasing, since Brazil is one of the biggest producers of ethanol worldwide. Regardless of this, the segment accounts for a small share of Petrobras income and is not expected grow further in the upcoming years

3.2 Products and Distribution

3.2.1 Products:

Petrobras' products are to be found within oil, gas and power. Though, the majority of its revenue comes from sales of crude oil and oil products within Brazil, and to a lesser

extent, natural gas. This is reflected in below table (AR 2015).

	2015	2014	2013
Diesel	923	1,001	984
Gasoline	553	620	590
uel oil	104	119	98
laphtha	133	163	17:
PG	232	235	23
et fuel	110	110	10
Others	179	210	203
Total oil products	2,234	2,458	2,38
thanol, nitrogen fertilizers, renewables and other			
roducts	123	99	9
atural gas	432	446	40
Total domestic market	2,789	3,003	2,88
ports	510	393	39
Total domestic market and exports	3,299	3,396	3,27

Figure 2 Overview over Petrobras' oil and gas products (AR 2015, p. 53)

Furthermore Petrobras' Annual Report (2015) explains that the domestic growth rate in consumption of oil products, mainly diesel, have decreased since 2013 due to a 3,8% reduction in the Brazilian GDP, an increase in imports of diesel and gasoline from other participants in the Brazilian market, a reduction in the consumption of gasoline as a result of greater ethanol use, and a decrease in the sale of fuel oil due to decreased thermoelectric consumption.

3.2.2 Distribution:

Petrobras Distribuidora accounts for 35,1% of the total Brazilian retail and wholesale distribution market. As previously described, it distributes oil products, ethanol, biodiesel and natural gas to retail, commercial and industrial customers. While *Petrobras Distribuidora* is managing the distribution of oil products; ethanol, biodiesel and natural gas, *Liquigas Distribuidoras* is managing the distribution of LPG. In 2015 *Liquigas Distribuidoras* held 22,7% of the marked share and ranked second in LPG sales in Brazil (AR 2015).

Petrobras has worked on developing its infrastructure, which has resulted in an integrated system centered around two main interlinked pipeline networks; a gas pipeline connection with Bolivia and an isolated pipeline in the northern region of Brazil. This network allows Petrobras to deliver natural gas processed in their own gas

facilities arriving from their onshore and offshore natural gas producing fields, mainly Santos, Campos and Espírito Santo Basins, as well as the natural gas from its LNG terminals, and from Bolivia (AR 2015).

3.3 Geographical Markets

Today Petrobras is one of the world's largest integrated oil and gas companies with an increasing participation in the global energy sector. Thus, Petrobras is, besides Brazil, operating in 18 countries around the world. These countries are mainly based in the Latin American region (Argentina, Bolivia, Chile, Colombia, Mexico Paraguay, Uruguay, Venezuela), but the company also operates in Africa (Angola, Gabon, Nigeria, Tanzania), Europe (Netherlands and UK), Asia (China, Japan, Singapore) and the United States. Petrobras operates in these countries through units, subsidiaries, trade and financial representation offices. Below table (figure) shows Petrobras' average production per region outside Brazil from 2013 to 2015.

International Production	0	Oil (mbbl/d)			Gas (mmcf/d)			Total (mboe/d)		
	2015	2014	2013	2015	2014	2013	2015	2014	2013	
South America (excluding Brazil)	38.6	57.3	70.9	474.9	545.9	532.0	117.8	148.3	159.6	
North America	30.6	27.3	11.8	67.2	12.8	12.1	41.8	29.5	13.9	
Africa	0.0	0.0	26.4	-	-	-	0.0	0.0	26.4	
Total International	69.2	84.7	109.1	542.1	558.7	544.1	159.6	177.8	199.9	
Equity and non-consolidated affiliates:										
South America (excluding Brazil)	3.4	4.6	5.5	0.9	1.6	1.7	3.5	4.9	5.7	
Africa	26.6	26.6	13.9	0.0	0.0	0.0	26.6	26.6	13.9	
Worldwide production (except Brazil)	99.2	115.9	128.5	543.0	560.3	545.8	189.7	209.3	219.5	

Figure 3 Average production per region outside Brazil (AR 2015, p. 47)

Based on the table it is clear that Petrobras's global production is predominant in the Latin American region. However, its biggest production is still to be found within Brazil. This is demonstrated in below table, which reflects the principal basins in Brazil.

Production	Oil (mbbl/d)			Gas (mmcf/d)			Total (mboe/d)			Stationary production units		
Brazil	2015 2,128	2014 2,034	2013 1,931	2015 1,544	2014 1,500	2013 1,406	2015 2,386	2014 2,284	2013 2,166	2015 120	2014 122	2013 126
Campos Basin	1,488	1,526	1,531	577	548	554	1,584	1,617	1,623	56	56	56
Santos Basin	395	247	137	487	413	281	477	316	184	12	11	11
Other Basins	245	262	263	479	539	571	325	352	359	52	55	59

Figure 4 Production in the principal basins in Brazil (AR 2015, p. 43)

The numbers posted bring an understanding of how important the local market is to Petrobras. In 2015 alone Petrobras' domestic production surpassed for more than 15 times the numbers for its production in its global market, only counting the principal basins.

3.4 Ownership

The Brazilian federal government is the leading shareholder of Petrobras with 28,67% of the total shares. The governance structure represents a key element to understand the company's performance and business strategies throughout the past and looking into the future. The government privatized the company, mainly with the objective to raise capital to finance its investments but it did not want to release control of the firm to the stakeholders who acquired the shares. To prevent this, the government has created two classes of shares, one with voting rights and one without, only offering the shares with no voting rights to the new shareholders. By using this control structure, the government has benefited by keeping control of the company to protect the government's interests.

3.5 Strategy

The overall vision of Petrobras is to be *"An integrated energy company focused on oil and gas that evolves with society, creating high value, with a unique technical capability"* (Business and Management Plan , 2016). Along with this vision the company has stated its values:

- Respect for life, people and environment
- Ethics and transparently
- Market driven
- Overcoming and confidence
- Result oriented

Furthermore Petrobras has set two main metrics as their guideline for its strategy:

- Safety: Petrobras wants to reduce the recordable injury frequency rate by 36% (TRIFR)¹ or from 2,2 (2015) to 1,4 (2018)
- **Financial:** Petrobras plans to create a reduction in leverage net debt/EBITDA from 5,3 (2015) to 2,5 (2018).

The vision, the values and the two main metrics are all based on Petrobras past obstacles and how to overcome them in the future. The main past obstacles are briefly described below (Business and Management Plan , 2016):

- **Uncertainties in the global economy:** such as stagnation in Europe and Japan, slowdown in China, Middle East scenario, U.S. selections and Brexit
- **Uncertainty in the oil industry:** changing in the competitive scenario(shale oil/gas), adjustment to the workforce, etc.
- **Brazilian context:** such as Lava Jato, challenging economic scenario, political transition.
- **Petrobras context:** high level of debt, judicial disputes, etc.

In order to overcome these past obstacles and complete with its vision, Petrobras has created several strategies. For a full overview see appendix 12.1. Below you will find the overall themes of the strategies (Business and Management Plan, 2016):

- Strengthening of the safety culture
- Reinforcing prevention against corruption
- Merit-based performance management
- Streamlining decision making
- Implantation of Zero based budgeting
- Strengthening of internal controls
- Improvement of risk management

¹ TRIFR = no. of reportable injuries per million man hours.

We have already seen a huge change in the management based on the Lava Jato case, and the company has been working hard to clean up the political turbulence that it has been entangled in. At the same time the company is facing serious debt problems, which it is facing at the same time as a heave recession in Brazil is taking place, and the oil prices has been going down.

4 Description of the oil and gas industry

Oil is an important source of energy for the world's economies and it will likely remain for many decades to come. Virtually, all economic activities worldwide are based on oil as the primary source of energy, accounting for around 35% of global energy needs (BP, 2015). All issues related to it, from the fluctuation of international oil prices to the discovery of new reserves and the resource availability, have an impact in the global economy and influences nations around the world. The importance of this industry is indisputable.

This chapter is intended, first to provide an international overview of the oil industry, highlighting their reserves levels, production and demand. A similar overview will be conducted but this time by focusing only in the Brazilian oil and gas market.

4.1 International Outlook

In the following an international outlook of the oil industry will be given, focusing on *reserves and production and demand*.

4.1.1 Reserves

According to the Society of Petroleum Engineers (SPE), reserves are the quantities of crude oil estimated to be commercially recoverable by application of development efforts to discovered accumulations. However, due to different factors, only the fraction of oil, which can be brought to the surface, should be considered as reserves.

In 2014, the proven oil reserves in total reached about 1,65 trillion barrels, remaining in the same level as the previous year with a slight increase. The Middle East is the region that concentrates most of the world oil reserves with an estimated total of

808 billion barrels for 2015. Latin America follows with a total of 329 billion barrels (showing a positive trend of 325% increase since 2005 (EIA, 2015).

The reserves of the members of the Organization of the Petroleum Exporting Countries (OPEC) have increased during the last year up to 1,21 trillion barrels, which represents around 80% of the world total reserves (IEA, 2015 and OPEC, 2015). Due to the strong presence of the members of the OPEC among the countries with most proven reserves, it is important to note the role that this organization plays in coordinating and unifying the petroleum policies for its members aiming to stabilize the oil markets, therefore constituting a powerful cartel.

In figure 5, we can observe the distribution of proved oil reserves around the world for the last decade, showing the top ten countries with the largest proved oil reserves. Furthermore, one can also observe the presence of Brazil, which is listed in the 15th position (EIA, 2015).



Figure 5 Distribution of Crude Oil Proved Reserves

It is observed through the graph that there was a large increase in reserves in Venezuela, particularly from 2010 to 2013, raising this country from the sixth to the first position with a total of 298,35 billion barrels for 2015. This can be explained by the discovery of new reserves in Falcon and the Orinoco region in the center of the country (PDVS Website).

The world volume of the oil reserves has varied slightly compared to the last two years. Saudi Arabia and Canada complete the top 3 ranking with a rather stable development. Canada, which along with Russia represent a minor decrease since 2007, but still great potential with its 172,48 billion barrels for 2015 (EIA, 2015).

4.1.2 Production and Demand

Once a country has discovered oil reserves, the oil production activity requires great development and application of technology, for which huge investments are necessary during this stage.

In 2014, the volume of oil produced in the world reached a maximum of about 93,20 million of barrels per day, showing a 2,40% increase from the previous year. The Middle East is once again the region that produces most of the oil volume with an estimated of 27,83 million barrels/day representing almost 30% of the world total. The region comprising North America comes next with an average of 21,21 million barrels/day. Both the United States and Canada contribute with most of the production up to a total of 18,40 million barrels/day (87% of the regions production).

In figure 6, one can see the world's ten largest oil producers in 2014, following the evolution of its production for the last decade (EIA, 2015).



Figure 6 Distribution of Oil Production

Based on the graph, we can distinguish two separate groups within the top ten largest oil producers. On one side, the United States, Saudi Arabia and Russia produced about 36,50 million barrels/day for 2014, (almost 60% of the total top ten producers). Far from this group, China, Canada, UAE, Iran, Iraq, Brazil and Mexico contribute all together with the remaining 40% of the total top ten oil supply.

The United States has remained the largest oil producer since it surpassed Saudi Arabia in 2013. It is also the country that shows the grater increase in production during the last five years with a 53,56% increase since 2009. The OPEC members, as it has been noted with the reserves, have a great share of the oil production with a total of 36,32 million barrels/day, although in a much lower percentage (39% of the world total) compared to the amount of its reserves (71%). This might be explained by the high exploration costs and the huge exploration and production investments by non-OPEC countries such as the United States, Russia, Canada and China.

Economic growth is strongly related to the levels of oil consumption. Even though this might not be the only factor, current and expected levels of economic growth heavily influence global oil demand (EIA, 2015). During 2014, world oil consumption totaled 92,08 millions barrels/day, with a slightly increase of 0,80% compared to the previous year. In figure 6, one can see the distribution of oil consumption by country for 2014 (BP, 2015).

The United States comes first with a total of 19,03 million barrels/day, accounting for almost 20% of total consumption. China comes second showing the highest consumption increase for the last five years compared to other major consumers. Japan, completing the top three has shown a decline in consumption for the periods (2005-2009) and once again in the recent years (2012-2014) but still has a 4,7% stake of total oil consumption. On the other side, India plays a promising role as China's competitor with an increase in oil consumption up to 180,70 million barrels/day, becoming the country with the second highest increase in the last decade.



Figure 7 World Oil Consumption by Country

The top ten in completed by Russia, Brazil, Saudi Arabia, Germany, South Korea and Canada. It is worth to mention that from the countries included in the list, and the previous reference of the relationship between economic growth and oil consumption, one can distinguish that almost all of them are part of the G8 and BRIC. The G8 refers to the group of eight highly industrialized nations and economically developed that meets in yearly basis to foster consensus in global issues (Laub, 2014). Its small membership, excludes emerging powers, which have come together as part of the BRIC, an agreement between countries which have been developing rapidly in recent years and, which have an important impact in the global economy.

4.2 Brazilian Outlook

In the following a domestic outlook of the oil industry will be giving follow the structure: *reserves and production and demand*. The areas will be presented in mentioned order.

4.2.1 Reserves

In the analysis of the Brazilian reserves, one shall distinguish between the onshore and offshore proved reserves. Clearly, the onshore-proved reserves have little significance compared to the offshore, which contributes with 95% of the total reserves. The Rio de

Janeiro region contributes with the largest amount of offshore reserves, followed by the Espiritu Santo and Sao Paulo area (ANP, 2015).

According to the National Agency of Petroleum of Brazil (ANP, 2015) at the end of 2014, Brazil total oil reserves were accounted for 16,18 billion barrels (a slight difference compared to the 15,05 calculated by EIA for the same year). The country has relative presence (15th in the world), representing the second country with the largest oil reserves in Latin America after Venezuela. However, it is still far from the larger oil reserves holders.

In below table, one can see the evolution of the oil reserves for the last decade (2005-2014) both on land and in the sea.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Onshore	882,7	904,9	886,4	895,8	938,6	916,3	915,2	920,4	885,6	832,2
Offshore	10.890	11.276,8	11.737,5	11.905,6	11.937,1	13.330	14.134,7	14.393,9	14.658,9	15.351,9
Total	11.772,6	12.181,6	12.623,8	12.801,4	12.875,7	14.246,3	15.049,9	15.314,2	15.544,4	16.184,1

Figure 8 Evolution of the oil reserves Brazil. 2005-2014 (ANP, 2015)

While there was a reduction of 5,7 % of the reserves on land during the period analyzed, the growth of offshore reserves during the same period has reached almost 41% high.

4.2.2 Production and Demand

According to IEA's outlook for the Brazilian oil and biofuels (2016) the domestic demand is expected to keep falling to 3,1 million barrel per day (mb/d) in 2017, while production growth will increase from 2,5 mb/d the year before to 3,4 mb/d in 2021 (IEA iiii, 2016).

The IEA outlook also states that the oil production in Brazil will gather strength despite logistical problems and other issues, and that the contraction in demand that began in 2015 is expected to reverse in the future. Besides the economic slowdown, a drop in gasoline demand growth from 4% in the previous IEA five-year outlook *to 1% in the* Medium-Term Oil Market Report 2016 (IEA iiii, 2016).

The outlook report furthermore highlights the country's record biofuels output of 516 000 barrels per day (516 kb/d) in 2015, which is achieved due to a combination

of a good sugar cane crop and optimal harvest conditions. In line Brazil's *Intended Nationally Determined Contribution (INDC)* prepared for the UN climate talks last year, the IEA is foreseeing ethanol production to further increase to around 675 kb/d in 2021 (IEA iiii, 2016).

5 Strategic Analysis: Petrobras

As stated in the introductory framework of the Strategic Analysis, the objective of this part of the thesis is to examine how the non-financial value drivers impact the financial value drivers, both on an external and internal level. In order to conduct the Strategic Analysis, the external environment will be analyzed first, followed by an analysis of the internal environment thereafter. Each level of the analysis will be conducted by using the respectively models as described in the introductory framework. All the results will be gathered in a SWOT analysis, before a final conclusion of the Strategic Analysis is given. To conclude each analysis, a summary of the most important results will be giving in partial conclusions.

5.1 External Environment Analysis

As mentioned above, this initial chapter will analyze the external environment, which is divided into two sub-levels. I will start conducting an analysis of the first sub-level, *the macro environment*, followed by an analysis of the second sub-level, *the industry*.

5.1.1 The Macro Environmental Analysis – PESTEL

In this chapter the following dimensions will be analyzed: *political, economic, sociocultural, technological, environmental and legal.*

5.1.2 Political factors

Political factors have a significant impact on the petroleum industry's way of doing business. Within this subject, it is relevant to note that approximately 90% of the world's oil and gas reserves and approximately 75% of the production is controlled by national oil companies (NOCs) (Tordo, Trasy, & Asfa, 2011). The consequence of having NOCs controlling the industry is that they might activate preferences to the goals of the

government rather than maximizing performance. For instance, they may favor national oil and national oil companies and exclude foreign oil and foreign oil companies, which could lower the level of investment and new technological knowledge – both aspects are significant for the oil and gas industry. In the case of Petrobras, the government has had an important role on market conditions and prices of Brazilian securities. This aspect includes tax policy and regulatory policy for the oil and gas industry, including pricing policies (AR 2015). One issue that Petrobras is stressing in its annual report (2015) is that the internal prices of crude oil, oil products and natural gas affect them differently than their competitors as Petrobras might have to adjust their prices for products sold in Brazil when the international prices increase or when the Brazilian real depreciates in relation to the US dollar, which was the case in 2015 (AR 2015). This is an important aspect to have in mind when valuating Petrobras' stock as it could have a negative impact on the company's results of operations and financial condition.

Other political risks that may restrain investment and cause discouragement in oil rich countries are related to political instability, such as terrorism, war, changes in the controlling environment, expropriation or nationalization of property, strikes, etc. An increasing number of oil rich countries are currently facing different types of political instability (IEA, 2016). In the case of Brazil the country is facing seriously political instability due to a deep recession and heavy corruption. The Lava Jato case is one key example on how serious the political situation is in Brazil, as the President, Dilma Rousseff, has been suspended because of her involvement in the case, a case that has deep roots in Petrobras. The Lava Jato case will be discussed in a separate chapter due to its significant impact on Petrobras (see chapter 5.4). At the same time oil rich countries in the Middle East are also facing seriously instability with war and terrorism, which have had negative consequences for their supply. According to IEA, the list of political instability affecting oil rich countries might include Venezuela in near future, where the political situation seems to be worsening, which could affect the country's oil operations. In addition to these unplanned shut-ins, IEA is expecting production falls due to lower oil prices remains intact (IEA ii, 2016).

Another political factor that has a huge impact on how oil and gas companies do business is related to the spread of green policies among the world's leaders due to climate changes. This can be costly for oil and gas companies around the world, as the industry is known for being one of the most polluted (EPA, 2016). But it is not only a matter of cost, but also on how to keep up with the development of new cleaner energy sources, and meet the requirements for new market trends. It is expected that renewable energy slowly, will increase its market share (Klare, 2015). Therefor the threat from alternative energy sources should not be underestimated. This can be witnessed by several initiatives to international agreement on climate change such as *the Kyoto protocol* (United Nations , 2016) and the *Paris Agreement from COP21* climate conference that took place in 2015 (European Commission, 2016).

5.1.3 Economic factors

The oil industry is deeply interconnected with the world's economy. First of all, because crude oil is one of the most needed products worldwide. This means that the least changeability in crude oil prices can have both direct and indirect influence on the countries' and companies' economies around the world. As a result of this interconnection between the world economy and the oil industry, economists are regularly and closely monitoring the prices (Amadeo, 2016).

The oil prices hit the lowest in January 2016 (since 2003), below US\$ 30 per barrel. One reason for these low oil prices is due to the decision made by the OPEC countries to raise supply and fight for market share against higher-cost producers. However, IEA expect that the oil prices have bottomed as non-OPEC producers have cut output. It is already seen that the prices have recovered to US\$ 40 as result of the OPEC's leader, Saudi Arabia, and Russia, a non-OPEC producer, assumed they could freeze output (Zhdannikov, 2016).

As the world economy, mostly the OECD countries, is recovering from the 2008 recession, the demand for energy is rising, which again stresses how interrelated the oil industry is with the world economy (Pettinger, 2016). This is due to the fact that most industries and transportation run on oil. In that way it is positive for the oil industry that the recession is over, and that the OECD countries are now seeing growth, which is likely to create more demand from energy sources. At the same time, Brazil is experiencing an economic downturn, and the real has been devaluated heavily against the dollar, creating a big negative impact in its profit. Therefore, the recent changes in the global and in the Brazilian macroeconomic environment, such as the substantial

decrease in Brent crude oil prices and the devaluation of the real against the U.S. dollar could reflect a switching strategy for Petrobras by carrying out a reduction of Petrobras' capital expenditures in the upcoming years (AR 2015).

5.1.4 Socio-cultural factors

Socio-cultural factors include factors such as customs, lifestyles and values that characterize a society (Mcmanners, 2014). While oil exploitation and the use of oil products is generally accepted and seen as a necessarily product for development and welfare worldwide, there may be segments of the population who see the oil industry as an important factor of pollution and one of the reason for global warming. This segment, whose objective is to protect the natural environment, is often located in developed countries, with governments that impose pollution fees and pollution reduction laws and norms to the petroleum industry, and complementary industries. On the other hand, in the developing countries, populations usually find the need for development and growing rate of welfare more important than environment protection. As a result, they accept pollution like a cost for economic growth. The petroleum industry has a great impact on social welfare, because it fuels the transports and electricity production, activities that have a great impact on human development, production of goods and services and communication.

As we have already seen, green policies are gaining more and more power. Based on this trend, firms within the oil industry have a social responsibility, which they must make part of their DNA and communicate through their image in order to create value. Petrobras expresses it by not only concentrating in crude oil research, but also in renewable energy research such as natural gas and biofuels. Hence, Petrobras' research has led them to develop a unique technology in the world to manufacture biodiesel and new techniques to produce ethanol. Furthermore, Petrobras is developing techniques to collect energy from wind and rivers (Petrobras, 2016). In the future *green friendly actions* taken by oil and gas companies can be a positive asset, as it is expected that green energy resources will take over the industry.

5.1.5 Technological factors

Technological factors may influence a company by making the need to acquire the latest

technologies, techniques and methods (Mcmanners, 2014). In the oil industry it is crucial to have the ultimate technologies in order to have a competitive advantage in the market. Furthermore, technologies and techniques are important to environment protection, worker's protection, improving the efficiency of the management by using of new software and hardware, improving the maintaining and repairing activities. These are all factors that could differentiate a company from the others. Acquiring the most efficient technologies, techniques and methods will eventually drive companies towards a greater share from the downstream and upstream market and to acquire more oil reserves or to impose the price. On the other hand, this technological development has also been very hard on the oil reserves that, as a consequence, are now half depleted (Miller & Sorrell, 2014).

Exploration and production of oil involves a risk that is increased when carried out offshore, which is where the majority of Petrobras' exploration and production activities are carried out, more precisely in deep and ultra-deep waters (AR 2015). Furthermore, the company has stated in their annual report from 2015 that the proportion of their deep-water activities will remain increase due to recent discoveries of the pre-salt reservoirs, which provide higher value oil.

5.1.6 Environmental factors

The environmental factors represent an increasingly important role in company's strategic considerations due to lack of natural resources, pollution of the environment and socio-cultural trends. Today companies must follow polluter pay principle, where they are forced to include environmental consequences in their strategic decisions and strive for sustainable growth (Mcmanners, 2014).

One industry that has great impact on the environment is the oil and gas industry. This is seen in the entire value chain from exploration to final use, as all the different links affect people and the nature. Oil and gas exploration, processing, and transportation have the potential to significantly impact the environment through disturbance of ecosystems, groundwater contamination, gas emissions, spills, etc. The mentioned factors are all challenges to the industry's social responsibility to operate safely with a minimum environmental impact and maximum economic benefits (Mcmanners, 2014).

As mentioned, Petrobras is extra valuable to the environmental risks that exist within exploration and production of oil, as the majority of its exploration and production is taking place in deep- and ultra-deep waters. The occurrence of any accident could result in severe environmental damage with clean-up, repair expenses and image damage (AR 2015).

The environmental factors are more than ever a significant subject for oil and gas companies, which goes hand in hand with global warming and green policies trends worldwide.

5.1.7 Legal factors

The last external factors to analyze within the macro environment are the legal factors. As the other factors, already analyzed, the legal factors also play a significant role in shaping the oil and gas industry. The oil and gas industry is subject to strict legal regulations, such as environmental, health and safety protection (AR 2015).

In Brazil particularly the oil and gas business is subject to extensive regulation by several governmental agencies. If the company fails to observe or comply with these laws and regulations it could result in penalties that could negatively affect the operations. The Brazilian Institute of the Environment and Renewable Natural Resources, among others, routinely inspect facilities, and may impose fines, restrictions on operations, or other sanctions, including temporary shutdowns. In addition, as already mentioned, oil companies are furthermore subject to environmental laws that require significant costs to cover damage that a project may cause to the environment. These additional costs may have a negative impact on the profitability of the projects that oil companies intend to implement.

As environmental, health and safety regulations have become more strict and new laws and regulations relating to climate change keep appearing, it is possible that capital expenditures and investments for compliance with such laws and regulations will increase substantially in the future (AR 2015). These laws and regulations are to be found all over the world. As a whole, these legal activities have a significant effect on the production, sale and profitability of many oil companies. Petrobras mentions in its annual report (2015) that it has already been subject to numerous of environmental, health and safety regulations (AR 2015).

5.1.8 Partial conclusion of the macro environment

From the above analysis it is clear that several important factors from the macro environment can potentially affect Petrobras' performance and ultimately the price of the stock. The most significant ones are listed below:

Dimensions	
Political:	 Consequences of the dominance of NOCs, e.g. governmental goals over business objectives. I.e. in the case of Petrobras, the company might have to adjust prices for products sold in Brazil when international prices increase or if the Real is depreciated against the U.S. dollar. Political instability in oil rich countries, incl. Brazil especially due to recession and the Lava Jato corruption case. Incensement of green policies worldwide.
Economic:	 Deep interconnection with the world economy. Monitored oil prices. Low oil prices. OECD recovery from the recession = demand for energy rise. Recession in Brazil. The real devaluated against the US\$.
Socio-Cultural:	 Controversy between different perceptions of the oil industry: polluter vs. need for development. Green trends gaining power worldwide. Oil companies have a social responsibility.
Technological:	 Right technology is crucial → environment and worker protection, software, etc. Right technology = competitive advantage, greater share, etc. Downside of technology → hard on oil reserves. Petrobras' expertise in ultra deep-water activities is a plus.
Environmental:	 Significant influence on the environment > one of the most polluting industries. High level of safety risks: incl. people and nature disasters.
Legal:	 Strict legal regulations and control within the areas: environmental, health and safety protection > has a significant cost. Negative influence on profitability.

5.2 Industry analysis of Petrobras - Porter's Five Forces

As mentioned in the introductory framework I will use Porter's Five Forces model to conduct an analysis of the oil and gas industry. The objective of using the Porter's Five

Forces' model is to determine the level of competition in the oil and gas industry, as a company's potential profitability is deeply interrelated with the profitability of its industry.

In the following I will analyse each of Porter's Five Forces: *threat of new entrants, threat of substitutes, power of suppliers, power of buyers and rivalry among the firms in the industry*, and summarize the results in a partial conclusion.

5.2.1 Threat of New Entrants

According to Porter (2008), new entrants bring new capacity and a desire to gain market share. But they also put pressure on costs, prices and the rate of the necessary investment in order to compete. New competitors in a market will in effect reduce the existing corporate earnings. Therefore a company's competitive strength position is closely linked to how easy it is for new companies to establish themselves in the market. Porter (2008) indicates that the threat of new entrants depends on two factors; the height of entry barriers and the incumbents' reaction to new entrants (Porter, 2008).

In the case of the oil and gas industry, the threat from new entrants is low due to several barriers. One barrier is the need for a high start-up capital. This means that very few companies attempt to enter the sector, which lower potential competition. Another barrier is economies of scale, due to the increased unit costs in the exploration and production of oil. A third barrier is the distribution channel, which usually is only possessed by major oil companies. Such distribution channel is both costly and requires time to build. A forth barrier is the proprietary technology, which forces even those with a high start-up capital to face immediate operating disadvantage upon entering the sector. In the case of Brazil, one would need specialized drilling technologies in their offshore oil fields, where Petrobras has acquired huge experience (AR 2015). Another barrier is the environmental regulations. As we already saw in the previous chapter, companies within the oil and gas industry are forced to closely comply with environmental regulations. These regulations often keep smaller companies out of the sector. Furthermore, new entrants are often met by; government policies that favor national companies, high fixed cost level for both upstream and downstream and high levels of industry expertise to be competitive in the areas of exploitation and extraction. As a result, it is very difficult for new players to enter the industry (Calixto, 2012 and Investopedia, 2015). With high entry barriers come high exit barriers, which keep firms within the industry fighting despite negative rates of return.

5.2.2 Threat of Substitutes

The aim of this part of the analysis is to examine *how* vulnerable the oil and gas industry is, when facing potential threat from new products that could obsolete existing technologies. The existence of substitute products affects the industry through limiting its anticipated profit by placing a ceiling on price. Customers may choose to substitute a firm's product or service for another. The more substituted products, the higher the chances are that customers will be drawn to an alternative product (Porter, 2008).

In the case of oil and gas products, the main threat comes from alternative energy sources such as nuclear energy, coal, natural gas and renewable energy (hydro power, wind, solar, biofuels, etc.). These alternative energy sources can replace a high amount of hydrocarbons, which are used in the global energy. Though this is a serious threat, energy experts state that the chances for these alternative energy sources to dominate the global energy market in the near future are very small. This is due to the big amount of investment required in research and development and producing procedures that such an entrance from new substitutes requires (Fahey, 2010). Nevertheless, it is already seen, how major oil and gas companies are looking for alternative sources of energy as possible substitutes, which includes Petrobras (Macalister, 2016). Furthermore, we saw in the PESTEL analysis that governments and citizens around the world are starting to change their attitude towards fossils fuels and the harm they cause the earth.

One thing holding the green energy sources' development down is the relatively high production costs that are not yet able to compete with fossil fuels. Porter (2008) indicates that a substitute's threat is high when it offers an attractive price trade-off to the industry's products or when the buyer's cost of switching to substitute is low. If biofuels offer an attractive price trade-off, it would provide competitive substitutes, thus threatening crude oil products to a higher degree. Though the existence of alternative, and greener energy sources is a reality, they are still very expensive compared to oil prices, and oil is expected to keep being one of the cheapest energy sources in the following years. This also means that the substituted product will be a
bigger threat if crude oil prices increase significantly. It is already seen how different governments aim to higher its use of biofuels. One example is the Chinese government who aims to have biofuels account for 15% of its total transportation fuel consumption by 2020, and in comparison, the European Union has set a target of 20% for the same period (Commission, 2016). Furthermore, it is expected that natural gas will have a higher growth than oil. Petrobras has already prepared itself for this future scenario by also producing gas and renewable energy along with oil (Petrobras website).

5.2.3 Power of suppliers

All industries need suppliers. In the oil and gas industry these suppliers range from suppliers of oil fields and engineering, field development management, pipeline installations, specific equipment and materials and engineers and scientific researchers. Porter (2008) clarifies that powerful suppliers affect the market through charging higher prices, limiting production, and/or integration. Any move by a competitor to influence prices will be followed by changes in competitors' strategies.

In the oil and gas industry we find international and national oil companies, who are active in the whole value chain; from exploration to consumption, Petrobras being one example. Thus, these huge companies' capability to affect the oil prices and the industry is high, and so is their bargaining power. Furthermore, we have the OPEC nations who together own at least 80% or the world's oil proven reserves that on top have one of the lowest cost producing prices compared to the oil produced from e.g. deep-water oil fields that has a high production cost (OPEC, 2015 and IEA iii, 2016). Thus, the OPEC has a significant bargaining power in the industry.

This means that, despite the fact that there exist many oil companies around the world, a few, but very powerful players dominate a big part of the industry. Consequently, these have a significant power over the small drilling and support companies.

5.2.4 Power of buyers

Lately the world has experienced very low oil prices, which means more oil is produced then consumed. This gives a high bargaining power to the buyers, since there is a relatively large supply versus demand. The result is that the demanding side is able to lower the price, as they are able to choose between several providers that are willing to undercut.

The main buyers of oil and gas products are refineries, national oil companies, international oil and gas companies, distribution companies, traders and countries, first of all the United States, China, Japan and the EU. The bargaining power of buyers in oil and gas industry is relatively small due to the nature of the industry. Furthermore, as mentioned, global oil benchmarks determine the oil price. High bargaining power has only those who consume enormous amounts of oil and gas such as the above-mentioned countries (Kristopher, 2016). Nevertheless, until the consumers can use an alternative energy source instead of oil, the bargaining power of the buyers will be significant low.

5.2.5 Rivalry among the firms in the industry

As we have seen throughout this thesis, there are many players in the oil and gas industry around the world. Despite this, we also saw that oil prices are traded as world market prices. Hence, the competition is about finding new oil and gas sources, keeping costs per barrel of oil at a low level and maintain and expand production.

Competitive rivalry is a key factor in competitive intensity. In the case of Petrobras, its main competitors are within the National oil companies (NOCs) and International oil companies (IOCs). The NOCs include: Saudi Aramco (Saudi Arabia), Pemex (Mexico), the China National Petroleum Corporation (CNPC), and Petróleos de Venezuela S.A. (PdVSA) (IEA i, 2016). Within the IOCs you will find companies such as ExxonMobil, BP, and Royal Dutch Shell. These three are entirely investor owned and primarily seek to increase their shareholder value. As a result, IOCs tend to make investment decisions based on economic factors. These companies usually move quickly to develop and produce the oil resources available to them and sell their output in the global market (IEA i, 2016). Another important entity to have in mind, when examining players in the oil and gas industry, is, as already mentioned, the OPEC. The OPEC consists today of a total of 14 countries (Algeria, Angola, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela) (OPEC, 2015). The OPEC-countries work as a single entity, which means that the competition around the companies belonging to the OPEC is limited. As mentioned, the OPEC-countries control approximately 80% of the world's total proved oil reserved

in 2015, and they produce about 42% of the world's crude oil, and more than 20% of the world's natural gas. Additionally, the OPEC nations own more than four-fifths of world's crude oil reserves, and more than 47% of the world's natural gas reserves (Statista). All of the OPEC countries have at least one NOC, and most of them also allow international companies to operate within their borders (IEA i, 2016).

Another aspect, when analyzing the intensity of the competition in the industry, is related to growth rates. IEA states in its report from 2016 (IEA ii, 2016), that the demand for oil is growing and that the growth rate is expected to continue in 2017. The report also states that the non-OECD nations will provide most of the expected increases in both years. This slightly growth is mostly due to relatively low crude oil prices (IEA ii, 2016). However, in other statements IEA reveals that the demand is not growing as fast as expected. According to IEA this is due to the ongoing economic inactivity in Europe and China (Plumer, 2016). At the same time IEA also declares that some developing countries have started to cut back fuel subsidies in order to improve their budgets, while others, as we have already seen, are trying to cut back on oil for environmental reasons (Plumer, 2016).

5.2.5.1 Partial conclusion on the industry

From the analyses we can conclude that the threat of new entrants is relatively low due to huge capital requirements and government policies that favor state-owned oil companies. We also concluded that oil will still be the main source of energy in the near future, though renewable energies might represent a threat on the long-run. Regarding the power of suppliers we saw that oil-producing countries' bargaining power is significant compared to the smaller players in the industry. The analysis also showed that the only buyers who might have some bargaining power are the big consumer countries such as the United States, EU, China and Japan. Finally, we discovered that the rivalry among the companies in the industry is, especially in the upstream sector, significantly intensive based on finding new oil and gas sources, keeping costs per barrel of oil at a low level and maintain and expand production.

5.3 Internal Company Analysis – Porters' Value Chain

Petrobras' core competencies are reflected through the activities in the value chain that creates a special value for the company's customers. As mentioned in the introductory framework, this analysis will follow Porter's value chain model, by looking at Petrobras' value chain's primary and supportive activities. Petrobras' value chain goes from discovery and exploration to development of the fields, production, transportation, refining, distribution and marketing before it ends as consumption. Along with these primary activities oilfield services also involve different supportive activities such as procurement, technology development, human resource management and infrastructure (Hollensen, 2010).

One of the difficulties conducting an analysis of the internal environment as an external analyst is that not all necessary data will be accessible. Thus, the following analysis is based on public accessible data, mainly from Petrobras' 2015 annual report. In the following, I will analyze each step of Petrobras' value chain in order to define how Petrobras creates value. After the analysis the most significant results will be summed up in a partial conclusion.

5.3.1 Petrobras' Value Chain

The value chain can be divided into three main parts: upstream, midstream and downstream activities – each of which requires different competences (Hollensen, 2010). Below is a possible value chain for Petrobras (figure 9).



Figure 9 Own creation of value chain for Petrobras

From the figure it is seen how Petrobras is involved in every step from exploration to consumption, which means Petrobras forms an integrated energy company. Furthermore, the company mentions in its annual report (2015) that it is part of their strategy to operate in an integrated manner with the other businesses of Petrobras,

preferably through partnerships with other companies to share expertise and reduce risks and costs.

5.3.2 Upstream

As the upstream activities are linked to the discovery and exploration, these are limited by the size of a company's domestic market and/or the ability to export goods and services. In this part of the value chain a high level of technology, specialized know-how, expensive equipment and investment is required. Furthermore, the oil and gas exploration is characterized by a large degree of uncertainty as only few explorations can be used commercially (Oil, 2013).

In this segment we find the largest components of Petrobras' investment portfolio. In its annual report it is stated that in 2015, within Brazil, the activities were concentrated in deep water oil reservoirs and that Petrobras' domestic activities represented 93% of its worldwide production in 2015. Moreover, in 2015 the company installed two additional offshore units, and connected 73 new wells in their production systems. As already mentioned, Brazil's richest oil fields are located offshore, and most of them in deep water. Thus Petrobras' has been conducting offshore exploration and production activities since 1971, when they first started the exploration in the Campos Basin. This also means that Petrobras' major discoveries are made in deep and ultradeep waters. Consequently, Petrobras' technology and expertise have created a competitive advantage within this area. In 2015, offshore production accounted for 91% of their production in Brazil (AR 2015). According to PFC Energy, Petrobras is now the company in the world that operates most in deep and ultra-deep water (Pennenergy, 2015). Petrobras has also brought this expertise to its other markets in South America, Gulf of Mexico and West Africa. Here the company focus on opportunities to leverage the deep-water expertise developed in Brazil. Thus, Petrobras is deeply committed to research and development as a means to extend its reach to new production frontiers and achieve continuous improvement in operations, which it has been doing especially within developing and implementing innovative technologies, including the methods to drill, complete and produce wells in deep water. The company spends a significant percentage of its revenues in research and development, which makes it one of the biggest development and research investors among oil companies (AR 2015).

Furthermore, Brazilian oil and gas concession requires Petrobras to invest at least 1% of its gross revenues originating from high productivity oil fields on research and development, of which up to half is invested in its research facilities in Brazil and the remaining is invested in Brazilian universities and institutions (AR 2015).

5.3.3 Midstream

In the midstream of the value chain we find transportation and refining. Infrastructure such as pipelines, access to roads, rail and ports are critical at several points in the value chain. One point is the links between production and processing facilities, and another is the one between processing and final customer. From the production site, crude oil and gas need to be transported to the processing facilities, and from there and forwards to the distribution or marketed (The World Bank, 2009). For the transportation of oil products and crude oil to Petrobras' domestic and export markets, the company operates a complex infrastructure of pipelines, terminals and a shipping fleet.

For crude oil refinement is almost always needed prior to consumption. For this segment, Petrobras owns one of the world's largest refineries, operating 13 refineries in Brazil with a total net crude refinement capacity of 2,176 mbbl/d, and in 2015 these operated Brazil's entire refining capacity. Most of its refineries are located near the crude oil pipelines, storage facilities, refined product pipelines and major petrochemical facilities, which facilitates the access to the crude oil supplies and end-users. Besides refining for own production, Petrobras also supplied almost all of the refined product needs of third-party wholesalers, exporters and petrochemical companies (AR 2015).

In addition, Petrobras has, over the past ten years, built new refineries, made substantial investments and modernized its existing to increase its capacity, improve the quality of its oil products to meet stricter regulatory standards and to reduce the environmental impact of its refining operations (AR 2015).

5.3.4 Downstream

While we have seen that the midstream activities include transportation and refining, the downstream activities include the distribution and sale of the processed product.

As already mentioned, Petrobras is Brazil's leading oil products distributor, operating through its own retail network, wholesale channels, and by supplying other

fuel wholesalers and retailers. It is from these channels that Petrobras distributes and sells its products that are primarily produced by its own refining and transportation infrastructure (AR 2015).

In its annual report from 2015, Petrobras states that its primary focus of its distribution segment is to be the benchmark in the distribution of oil products and biofuels in Brazil. The company's vision on this point is to be innovative and provide value to its business, while promoting safe operations and environmental and social responsibility. This last point must be seen in the light of Petrobras' marketing, as this could strengthen its brand and creates values for the costumers.

Besides developing the oil infrastructure, Petrobras has also worked on the facilities for its gas distribution. This has resulted in an integrated system centered around two main interlinked pipeline networks; a gas pipeline connection with Bolivia and an isolated pipeline in the northern region of Brazil. This network allows Petrobras to deliver natural gas processed in their own gas facilities arriving from their onshore and offshore natural gas producing fields, mainly Santos, Campos and Espírito Santo Basins, as well as the natural gas from its LNG terminals, and from Bolivia (AR 2015).

Alongside its activities on its domestic markets, Petrobras also participate to a miner degree in the retail sector in other South American countries.

5.3.4.1 Partial conclusion Value-Chain

In this part of the analysis we have seen how Petrobras is the leading global expert in the industry when it comes to complex technology and know-how for exploring and producing in deep and ultra-deep waters, where most of its production takes place. Furthermore we saw that Petrobras works as an integrated energy company, managing all the steps along its value chain; from exploration to consumption. In order to develop its business, Petrobras has invested in infrastructure, and is also required to invest at least 1% of its gross revenue in research and development. As a primary focus on its distribution segment, Petrobras strives to be the benchmark for distribution of energy products in Brazil, while promoting safe operations and environmental and social responsibility.

5.4 Lavo Jato Case

During the macro environmental analysis we saw how political instability may restrain investment and cause discouragement in oil rich countries. We also saw that Brazil is facing complex political instability due to a deep recession and heavy corruption. Furthermore, we mentioned the Lava Jato case as one key example of how serious the political situation is in Brazil, and we revealed that this case have had a significant influences on Petrobras. In this chapter, we will look deeper into Lava Jato case to understand what it is about, and how it is influenced Petrobras.

Since March 2014, the Lava Jato or the *Car Wash* case, has affected Brazil and particularly Petrobras. It is the largest corruption scandal ever reported in the country and includes several top politicians. It began as a local investigation regarding money laundering at gas stations and laundries (hence – Car Wash case), and ended up being the biggest corruption scandal ever revealed in Brazil's history. Furthermore it has shown that Petrobras together with more than 50 politicians are deeply involved in the corruption scheme (Kamm, 2015).

Investigations have shown that the starting point for the scheme took place in 2004, when large construction firms organized an illegal cartel with the aim of landing overpriced contracts with Petrobras for private benefits, which caused serious damage to Petrobras' bottom line. To maintain the cartel and guarantee that only member companies could sign on to Petrobras' contracts, the operatives bribed Petrobras' employees. Most employees who were offered bribes had important positions in the company or served on its board of directors. The corruption entered the political sphere through the involvement of public office holders who got favored individuals' jobs in Petrobras and received money in return. The bribe money was not paid directly, but channeled through financial operators on the black market. This complex scheme involved transactions inside and outside Brazil (Council on Hemispheric Affairs, COHA).

By April 2015, investigators had identified illegal transactions of a total of 2,1 billion Reals, which based on the amount, alone makes this the biggest corruption scandal in Brazilian history, and the amount might be even higher. The corruption scandal has left Brazil's corporate world in chaos, with the biggest victim of the scandal being Petrobras, which value was reduced by half and burdened by a \$100 billion debt (Sotero, 2015), being the most indebted oil company in the world (Kamm, 2015). As a

result of the ongoing Lava Jato investigations, Petrobras has taking procedural steps to seek compensation for damages suffered from the improper payments scheme, including those related to its reputation (AR 2015). The case is far from ending yet and the development of the case will certainly affect the performance of the company. As a matter of fact, a number of investors have already sent lawsuits against the company based on the alleged corruption scheme and the role of top management failing to comply with their responsibilities.

5.5 SWOT

In below figure, the results from the strategic analysis are gathered in the SWOT model.

Strengths	Weaknesses					
 Integrated structure Specialized know-how within deep water and ultra-deep exploration Significant reserve base Domestic leadership and total market share Diversified portfolio of products Strategic partnerships to reduce risks and costs R&D in green energies 	 High exploration costs in deep-water production Higher difficulties exploring in deep-water, which could create more accidents and environmental damage The government is the controlling shareholder – could favor government goals over business goals 					
Opportunities	Threats					
 OECD recovery from recession represents rises in demand for energy Delivering deep-water expertise internationally (Africa and Gulf of Mexico) Strong barriers to enter the market, therefore less competition Oil still main source of energy and consumption Natural gas infrastructure connection and expansion Renewable energy sources to prepare for future needs and requirements 	 Intensive rivalry in the upstream Recession and political instability in Brazil Lava Jato case; corruption and image damage Incensement of green policies worldwide Strict legal regulation (environmental, health and safety) Brazilian real devaluation Perception of the industry as a "Polluter" Technology hard on oil reserves Low oil prices 					

Figure 10 SWOT

From above overview, we first observed that Petrobras has a huge advantage when it comes to technology and expertise within the area of drilling in deep and ultra-deep water. Within this area Petrobras is the world leader and the company with the biggest production worldwide. This is a know-how that the company has developed within its domestic market since 1971, and that it has now brought to other markets in South America, Gulf of Mexico and West Africa. However, we also saw in the analysis, that this type of drilling is very expensive and difficult to conduct, thus creating high production cost and high risk for human and/or natural disasters. The company's strategy for the future is to partner with other leaders in the industry in order to reduce operational costs and risks.

Another advantage that creates value for Petrobras is the fact that it works as an integrated energy company, while dominating its domestic market; a market placed in one of the biggest countries in the world. Its domestic dominance has to be found in its long history and relation to the Brazilian federal government that still today function as its leading shareholder. Although, having the government as a leading shareholder could also have a negative impact on Petrobras' way of doing business. For instance, as it was mentioned in the analysis, Petrobras, unlike other oil companies, might have to adjust its prices for products sold in Brazil, when international prices raises or if the real is devaluated against the U.S. dollar. Government interference in decision making by setting fuel prices too low is clearly damaging the company's performance.

On the external analysis we also outlined advantages and disadvantages that affect Petrobras' non-financial value drivers in a positive and negative direction, thus creating opportunities and threats. One positive point is related to the recovering of the OECD from the 2008 financial crisis. This represents good news for all oil companies, as the world economy is heavily interrelated with the oil industry, thus growth in demands is expected for the upcoming years. However, while the OECD countries are recovering from the financial crisis, Brazil is facing a deep recession and political instability. The political instability is closely related to the Lava Jato case, the biggest corruption scandal in Brazil's history, which has left the Brazilian corporate scene in chaos with Petrobras being the overall victim. From this point of view, we have seen how the company has lost value, dismissed bribed top management and publishing a brand new strategic plan on how to move forward. On top of this, the company also had to face low oil prices and currency depreciation.

Other results state that even though renewables energies are gaining market share in the energy industry, driven by green policies around the world, oil is still the main driver for consumption in the following years to come. These green energy tendencies are already reflected in trends around the world from citizens and politicians, who has already begun to set future goals on reducing the usage of oil and should be considered by the company in terms of adapting the segments dynamics. Finally, the analysis showed that it is hard for new players to enter the industry, and when in, one must expect an intensive rivalry, especially in the upstream segment, mainly based on finding new oil and gas sources, keeping costs per barrel of oil at a low level and maintain and expand production.

6 Financial Analysis

After a detailed analysis of the international and national outlook of the oil industry and Petrobras strategy and business environment, the focus will now be directed to the financial aspects. The expected future performance of the company is a key element when performing a valuation. It is therefore important to examine the historical financial performance to identify what drives the value of Petrobras. A set of financial ratios will provide insight to measure the company's current performance in comparison to past periods, against competitors and the overall industry. To do this, it is important to reformulate the financial statements in order to better identify the operational elements, which create value.

As a starting point, an outline of the historic share price of Petrobras will be introduced in order to better understand the events that contributed to the value fluctuations in the last years. In addition, the correlation between oil and the stock price will be briefly mentioned.

6.1 Historic Development of PBR Stock Price

The company was established in the early fifties to undertake oil sector activities in Brazil but it was only before the beginning of the new century that Petrobras was listed as a public company on the Sao Paolo exchange (Bovespa) and on the New York Stock Exchange (NYSE) soon after. The company is also listed on the Buenos Aires and Madrid stock exchanges. The shares listed on both the NYSE and the Bovespa represent a good indicator to show the fluctuations on the company's value throughout the years. The dollar share price will be used as reference since the same currency will be used for the financial statements and DCF analysis based on the NYSE.





From the graph above, it is evident that the share price signals a continuous decrease from a promising \$40 in early 2011 down to its lowest value of \$4, 50 by the end of 2015. In between, a series of events have shaped the development of the stock.

Boosted by the largest share sale in history, when a total of US\$ 72,8 billion worth of shares in the firm were sold on the Bovespa stock exchange by the end of 2010 (Businessweek, 2010), Petrobras stock started with a good performance on the first quarter of 2011. The firm became the fifth largest company in the world, in terms of market capitalization. However, the picture changes significantly since April, when in less than a year, the price of the stock decreases almost 50% becoming the first big drop down since the international world crisis in 2008. The five-year investment budget approval after a numerous rejections from Brazil's ministry of Finance (chairman) and the board gained criticism, based on the heavy investment focused on building local refining capacity, which did not generate high-enough returns for the company (EPC,2011).

During 2012, the stock continued trading down from a share price of US\$ 31 in February to as low as US\$ 18 by mid-June. The main difficulty has been political interference and pressure to keep petrol prices down to combat inflation. In order to meet rising demand, Petrobras has been pushed to top up its production with imports, which it must then be sold at a loss (Reuters, 2012). In August 2012, the firm posted its first quarterly loss in 13 years. The world's largest corporate investment program presented by the firm in June, committing the company to US\$ 236 billion of spending by the end of 2016 (Petrobras, 2012), pushed the stock up. While Petrobras in controlled by the Brazilian Government, most of its stock is owned by non- government investors, and clearly, the fuel price freeze represents a critical reason why Petrobras stock is worth less by the end of 2012 than when investors bought the stock during the firm's share issue in 2010.

During 2013, the stock had its ups and downs. The worst annual result in many years up to then, led the company to cut the common-share dividend as it aimed to save cash in order to maintain investment levels (upstreamonline, 2013). The losses in the refining segment contributed to the post of its lowest net income since 2004. During the beginning of the third quarter there is small progress, as the second quarter profit estimates are beating due to production increase in the pre-salt fields with a record high (Petrobras, 2013). This can be linked also with increases in consumption and temporary improvements in the economic activity of the country. Closer to the end of the year the stock started to plunge from \$17, 50 in November to as low as \$10, 30 in March 2014 partially driven by a sell-off in emerging markets (Bloomberg, 2014). Yet the company continued its road towards high leverage and never ending government interference to keep fuel prices down.

Quarter two and three in 2014 experienced a recovery of the stock, basically based on the re-election of Brazil's president Dilma Rouseoff and the news of selecting candidates for her finance minister, which are considered to be more market friendly (Wallst, 2014). Thereafter, the stock experienced a sharp decline mainly driven by the decrease in oil prices, posts of negative earnings and the undergoing investigation regarding the corruption scandal involving not only Petrobras top executives but also the country's most important politicians, including its president and former president Lula Da Silva. Due to the significant fluctuations of the share price, uncertainty arises on whether the market share price of Petroleo Brasilero was fairly valued or whether the stock may have actually been undervalued. With the construction of the DCF analysis I will try to uncover the fair value of Petrobras stock by the end of 2015.

6.2 Petrobras correlation to Oil Prices

To analyze the correlation between Petrobras stock price and the development of the oil prices it is imperative to understand the concept of the correlation coefficient, which demonstrates how strongly two variables are related between each other. The value of the coefficient varies from negative one to positive one. A positive correlation is



indicated by a value between cero and one. A value of cero shows no correlation between the variables and a negative value states a negative correlation. The relationship during the last ten years analyzed is of a continuous changing

one. Petrobras is insulated to a certain degree from the oil price volatility due to its integrated model. However, the firm is not immune to changes in the oil prices. This can be clearly identified during 2015, where the correlation coefficient of Petrobras vs the Brent index stands in a high 0, 87. This implies that on average during 2015, 87% of the movement in Petrobras's stock price can be explained by movements in the oil prices. However, if one looks at the time range mid-2013 to mid-2014 the correlations between both have been negative. This could be explained based on internal company issues that hit Petrobras with the unveil of the corruption scheme regardless of the development of the oil price. A one year rolling correlation between Petrobras and the Brent index will further explain the relationship between them.

6.3 Quality of the Financial Statements

The quality of reported accounting numbers of a company is important to validate the financial statements, since businesses may have reasons for manipulating their

Figure 12 Petrobras and Brent index

numbers. Good accounting quality is built by financial statements that provide an objective view of the firm's financial position and it is free of manipulation (Petersen & Plenborg, 2012).

The holding independent auditor is PricewaterhouseCoopers. It is stated in the auditor's report that "*in our opinion, the accompanying consolidated statement of financial position and the related consolidated statement of income present fairly, in all material respects, the financial position of Petroleo Brasilero S.A and its subsidiaries at December 31st, 2015 in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board". These findings reveal that the financial statements are in accordance to the laws and regulations and provide and objective picture of Petrobras accounting numbers.*

Nevertheless, it is important to mention that as disclosed in a previous section of this thesis and supported on a note to the financial statements, former executives of Petrobras were arrested and charged for corruption based on the "Lava Jato" investigation conducted by the Brazilian authorities. As a result, the amounts paid by Petrobras related to contracts and contractors involved in the corruption scheme where incorrectly included in costs under PPE. Therefore there has been a correction to the financial statements in the last quarter of 2014 due to the improper payments, which represent additional expenses.

6.4 Reformulation of the Financial Statements

Like many other companies Petrobras activities consist of operating, investing and financing activities. When calculating financial ratios, it is important to separate operational items and investments in operations from financial items in order to detect the company's ability to create value from their core businesses. The definition of what is considered part of operations and what is financial is not always straight forward since it varies in terms of the characteristics of the company and the business model adopted (Petersen & Plenborg, 2012). Furthermore, the notes which supplement the financial statements are not always sufficiently informative. Therefore, it is important to make an arbitrary decision while reorganizing the reported financial statements into new statements that separate operating and financial items.

This reorganization of the financial statements will provide two new terms: invested capital and net operating profit after taxes (NOPAT). Invested capital represents the total amount of money raised from investors required to fund operations, without differentiating how the capital is financed (Koller et all, 2012). This is not a line item showed in the financial statements because different sources of debt, capital leases and equity are each listed separately in the balance sheet. NOPAT represents an important key performance measurement for businesses since it shows the total after tax operating earnings originated by the firm's invested capital.

6.4.1 Analytical Income Statement

For analytical purposes the reported Statement of Income has been classified in transactions concerning operations and financing. This will add alternative after tax measures, such as NOPAT, compared to EBIT. The value of NOPAT is that provides a better understanding of the real value creation in comparison with net income, which includes noise generated by non-recurrent events, special items and financial activities. The reformulated income statement for the last five fiscal years can be seen below.

Analytical income statement	2011	2012	2013	2014	2015
Reported net revenue	145915	144103	141462	143657	97314
Cost of sales	-89060	-97157	-95646	-96454	-55894
Gross profit	56855	46946	45816	47203	41420
Selling expenses	-5346	-4927	-4904	-6827	-4627
General and administrative expenses	-5161	-5034	-4982	-4756	-3351
Exploration costs	-2630	-3994	-2959	-3058	-1911
Research and development expenses	-1454	-1143	-1132	-1099	-630
Other taxes	-460	-386	-780	-760	-2796
Other operationl expenses	-3615	-3306	-1113	-5293	-5345
Share of earnings (losses) in equity-accounted investments	230	43	507	218	-177
Profit sharing	-867	-524	-520	-444	0
EBITDA	37552	27675	29933	25184	22583
Impairment of assets	-369	-137	-544	-16823	-12299
Write-off - overpayments incorrectly capitalized	0	0	0	-2527	0
Depreciation, depletion and Amortization	-10535	-11119	-13188	-13023	-11591
EBIT	26648	16419	16201	-7189	-1307
Corporation tax	-4627	-2679	-2176	-1724	-906
Deffered taxes	-2105,5	-883	-402	3045	2043
Tax on EBIT	-6732	-3562	-2578	1321	1137

Tax shield on net financial expenses	-19	473	537	245	985
NOPAT	19897	13330	14160	-5623	815
Financial income	3943	3659	1815	1949	1412
Financial expenses	-1424	-2016	-2673	-3923	-6437
Foreign exchange and inflation indexation charges	-2443	-3569	-1933	339	-3416
Net financial expenses before tax	76	-1926	-2791	-1635	-8441
Tax on net financials	19	-473	-537	-245	-985
Net financial expenses after tax	95	-2399	-3328	-1880	-9426
Pre Tax Profit	26724	14493	13410	-8824	-9748
Net Income	19992	10931	10832	-7503	-8611

Figure 13 Analytical income statement

In the section below, comments to the reclassification of the different items in the Analytical Income Statement will be discussed.

Net revenues: the totality of sales revenues are directly linked to Petrobras core operations. The company's reported sales arise from the commercialization of different oil related products such as diesel, automotive gasoline, jet fuel, fuel oil and other natural gas products both from the domestic and foreign market.

Impairment of Assets: impairment expenses are considered as part of oil and gas normal operations, affecting Petrobras on the day to day operations since the current value of the firm's oil and gas properties, for any technical or economic reason, can no longer be recovered. It is hard to imagine that Petrobras would not have to revise the value of its assets based on changes in market conditions such as new oil price scenarios and increase/decrease in estimates of proved and probable reserves.

Write-off-overpayments incorrectly capitalized: this item refers to the amounts paid by Petrobras under the "Lava Jato" investigation related to contracts with contractors and suppliers involved in the payment scheme. Since it is not possible to specifically identify the amounts and periods affected, the company developed a method to estimate the amount, which is explained in the notes to the financial statements. In the third quarter of 2014 the company wrote off US\$ 2,527 of capitalized costs that represent amounts overpaid for the acquisition of property, plant and equipment in previous years (Petrobras, 2015). As per December 2015, this is an ongoing investigation and the company monitors the progress of the investigation but no new facts that materially

affect the company adjustments done in the year 2014 have been discovered. This post is therefore treated as a special item and removed from the operating activities in the analytical income statement.

Other expenses: the majority of Petrobras expenses are systematically linked to the firm core operations. Some items however have to be discussed further. Following a plea agreement with the authorities from Brazil, the company received back funds repatriated from a former executive manager as compensation for damages. This has been stated as amounts recovered –overpayments incorrectly capitalized- and it is not expected to happen in the future. This item is therefore treated as special item and deducted from other operational expenses.

Share of earnings/loses in equity accounted investments: according to Petersen & Plenborg (2012), if investments in associates are regarding the firm's core business, the related income and expenses should be considered under operating income. This may be the case of the loses resulted in 2015 due to the worsening financial condition of the company's investment in Sete Brasil, FIP Sondas and Petrobras oil and gas B.V. During the previous year however the company has received earnings regarding this item.

6.4.2 Analytical Balance Sheet

Following the same procedure as the analytical income statement, the purpose of preparing the analytical balance sheet is to separate net operating assets form financing assets. There should be a consistency with the reclassification previously done on the income statement. The invested capital represents the investment in a company's operating activities and equals the sum of operating assets minus operating liabilities (Petersen & Plenborg, 2012).

Analytical balance sheet					
Invested capital	2011	2012	2013	2014	2015
Non-current operational assets					
Trade and other receivables	3253	4441	4532	4832	3669
Deferred income taxes	4287	1277	1130	1006	6016
Other tax assets	4912	5223	5380	4008	2821
Advances to suppliers	3141	3156	3230	2409	1638

Othors	1725	1997	1975	2917	2446
	102010	204001	227001	219720	161207
FFE	102910	204901	15410	210730	3002
	43412	59759	10419	4309	3092
	2020	0100	2504	0700	3027
	2060	2090	2504	2002	2499
l otal non-current asset	252258	269426	268637	24//46	18/005
Current operational assets					
Trade and other receivables	11756	11099	9670	7969	5803
Inventories	15165	14552	14225	11466	7441
Roverable income taxes	6848	1462	1060	1063	983
Other recoverble taxes	0	4110	3911	2748	1765
Advances to suppliers	740	927	683	423	108
Other current assets	2065	1550	946	1180	1338
Total current assets	36574	33700	30495	24849	17438
Non-interest-bearing debt					
Trade payables	11863	12124	11919	9760	6380
Income taxes payable	5847	345	281	247	105
Other taxes payable	0	5783	4669	4064	3365
Payroll, profit shareing, etc	2528	2163	2052	2066	1302
Others	4418	3131	3153	3289	2494
Deferred income taxes	17715	11976	9906	3031	232
Provisions for decommisioning costs	4712	9441	7133	8267	9150
Pension and medical benfits	9639	20224	12573	17287	12850
Provisions for legal proceedings	1088	1265	1246	1540	2247
Dividens Payable	2067	3011	3970	0	0
Total non-interest bearing debt	59877	69463	56902	49551	38125
Invested capital (net operating assets)	228955	233663	242230	223044	166318
Total equity	177110	161866	149123	116978	66055
Interest-bearing debt					
Finance debt	82785	95963	114236	132086	126165
Finance lease obligations	142	104	89	72	51
Liabilities on assets classified as held for sale	0	0	1073	0	125
Total interest bearing dabt	82027	06067	445209	420459	400044
Total interest-bearing debt	62927	96067	115396	132150	120341
Interest-bearing assets					
Cash and cash equivalents	19057	13520	15868	16655	25058
Marketable securities	12025	10607	4016	9432	868
Assets held for sale	0_0_0	1/13	2407	5	152
	24.000	04070	2407	0	00070
i otai interest-bearing assets	31082	24270	22291	26092	26078
Not-interest-bearing debt	E191F	71707	02107	106066	100262
Net-interest-bearing debt	51045	11131	93107	100000	100203
Invested canital	228955	223663	242230	223044	166319
Figure 14 Analytical balance sheet		200000	272200	-20074	

The classification of the different items in the balance sheet is discussed below:

Cash and cash equivalents: includes both cash at the bank and short term financial investments in Brazil and abroad, mainly time deposits, interest checking accounts and other short term fixed income highly liquid. This item usually consists of operating cash and excess cash. Since it is not distinguished in the financial statements and as Petersen and Plenborg (2012) argues that in most of the cases the consequences of reclassifying operational cash, as excess cash is relatively modest, it seems correct to treat this item as a financial activity.

Tax receivable/payable: this item arises because Petrobras pays too little in tax on account during the fiscal year and vice versa for recoverable income taxes. There is no further specification if the items relate to either operations or financing activities and since it has been assumed that there is no charge of interest in relation to these items, they have been classified as operational.

Investments: it is stated in the annual report (2015) that the company invests in joint ventures and associates, whose activities are associated to the core business of Petrobras, mainly petrochemical companies, gas distributors, biofuels, refineries and other activities. This item therefore is classified as operational.

Marketable securities: they consist mainly of investments in Brazil Federal Government bonds and time deposits with top-rated financial institutions abroad. They have maturities of more than 90 days and are considered as interest bearing assets.

Provision: is made up of two line items under the balance sheet. Provision for decommissioning costs refers to annually revisions of estimated costs regarding abandonment of oil and gas producing properties, all related to operations. During the last three fiscal years there has been an increase in the provision mainly due to the acceleration of abandonment based on a shorter economic life of the oil and gas fields (Petrobras, 2015). This item is classified as operational liabilities.

The provision for legal proceedings relates to potential financial risks that the company recognizes due to pending litigations in accordance to labor claims, tax claims

for alleged failure to pay VAT and environmental claims regarding an oil spill in Brazil, all of which are related to operational liabilities.

Assets classified as held for sale: includes production fields in different areas of Brazil. Since the sale of these assets will reduce the interest bearing debt of the company, the item has been classified under financing.

6.5 Overview of Financial Parameters

By carefully analyzing the past, it can be identified if a company has created real value to its shareholders, whether if it has grown and how it is performing compared with its competitors. Koller et al (2005) states that a good analysis will focus on the different key drivers of value. For doing so, the financial condition of Petrobras will be analyzed by looking at key financial ratios, which will provide a better understanding of the firm's financial performance in the past. The profitability ratios will assess the ability of Petrobras to generate earnings, the liquidity ratios will measure how liquid the company is in the short term and the leverage ratios will disclose information regarding Petrobras financing strategy. But first, an overall description of three main figures will be described: historical revenue, operating margin and net income.

Petrobras has been characterized for accomplishing incremental revenues from 22.62 billion in 2002, up to 137,35 billion in 2012, and surpassed Exxon Mobil as the largest producer of oil worldwide. Only over the course of seven years, the company has grown its revenues by more than 150% from 2005 and until the end of 2011. Since 2012 this positive trend has been reversed upon the same time the corruption scandal started to unveil (Reuters, 2015).

The operating margin provides a different picture compared to the company's revenue figures. Indeed, even though the margin has remained relatively stable showing an average of 22% in the period 2005-2010, it dropped dramatically in the following years. Net income has fluctuated throughout the last ten years analyzed. Profits show an increase between 2007 and 2010, but thereafter profit margins have dropped dramatically. For the last two fiscal years, 2014 and 2015, the company encountered a negative net income. Apart from the corruption scandal, the Brazilian government, which owns a majority of Petrobras stock, has its part to blame, due to the strong

pressure to unofficially have been subsidizing the cost of fuel since 2011. The government involvement passed the bill to the company for the difference between market prices and the subsidized price, a policy that has cost the company great losses.

6.5.1 Profitability ratios

The profitability ratios can be used to assess Petrobras ability to generate earnings compared to the expenses occurred. A higher ratio than competitors and the industry



signals that the company is performing well. Some profitability ratios are for instance, return on equity (ROE) and EBITDA margin. Based on historical data back from 2010, Petrobras has been one of the leaders in terms of

Figure 15 profitability ratios

EBITDA (earnings before interest tax depreciation and amortization), with an average of 22, 6%, outperformed only by Norwegian Statoil, and with a significantly higher margin than the other major players in the industry (more than double than BP and surpassing Exxon and Chevron). This indicates that Petrobras has been more profitable than most of its peers. However, the absolute leader has been Statoil with an EBITDA more than twice than the industry average.

Another ratio that describes the company's profitability is return on equity, which reveals how much profit the company generates with the money invested by their shareholders. The calculation brings a ROE with an average of 5, 50% for the period 2010-2015. Petrobras, in this case, has the lowest ROE among its peers, with a declining trend from an original 14, 30% in 2010, down to negative returns (-13, 04%) in 2015. Exxon Mobil is the leading firm based on ROE. This shows the inability of Petrobras to generate returns driven by a high level of financial expenses. However, the highest EBITDA margin indicates better cost management.

6.5.2 Liquidity ratios

The liquidity ratios measure Petrobras ability to pay short-term debt obligations. The higher the ratio, the better the company's liquidity position. The most common ratios are the cash ratio (total cash and cash equivalents/current liabilities), quick ratio (current assets - inventories/current liabilities) and the current ratio (current assets/ current liabilities). The quick ratio signals how liquid and flexible the available working capital is. In this case, Petrobras performs better than most of its peers (at the same level as Chevron) and better than the industry. Its quick ratio shows that Petrobras has \$1, 30 of liquid assets available to cover each \$1 of current liabilities. The current ratio confirms Petrobras strong liquidity position compared to its peers with an average of 1, 67 for the period 2010-15. Johnson (1992) mentions that healthy oil companies should have current ratios of about 1, 2 and quick ratios of only slightly less. Finally, the cash ratio puts Petrobras once again on top with an average of 0, 56. This is a positive sign in terms of liquidity even though that the main reason for which Petrobras shows stronger cash, quick and current ratio is because most its liabilities are long term.

	Petrobras	Chevron	Exxon	BP	Statoil	Repsol	Total S.A
Quick ratio	1,30	1,20	0,70	0,90	1,20	1,00	1,10
Current ratio	1,67	1,51	0,89	1,22	1,34	1,36	1,39

Figure 16 Liquidity ratios (Thomson Reuters, 2016)

6.5.3 Leverage ratios

Companies rely in a combination of debt and equity to finance their operations. A leverage ratio is a financial measurement that assesses the ability of the company to meet financial obligations. There are several different leverage ratios. For instance, Moody's and S&P represent two credit rating agencies, which have historically ranked Petrobras according to the company's credit risk.

By early 2016, the company had the lowest credit rating compared to its peers, classified as speculative and very close to substantial risk (S&P, 2016), meaning that the adverse economic and financial condition would likely affect the capacity to meet its financial commitments.

Moreover, the total debt to equity ratio evidences that Petrobras is the firm that uses the greatest amount of debt to finance its assets in relation to the stockholder's equity. The graph shows the tremendous difference between Petrobras and its peers, more predominant from 2013. Judging from its financial statements, Petrobras has been facing tough times with high leverage increasing every year. It's net debt has risen from \$72, 6 billion in 2012 to \$101 billion in 2015. The impairment of assets due to a low crude oil price environment has played an important role during the last two fiscal years. Total debt to EBITDA is another bad indicator that places Petrobras in an uncomfortable financial position in relation to its peers. It is clear that it is important for Petrobras to reduce its debts levels to improve its financials strengths.



Figure 17 Debt to equity ratio. Source Thomson Reuters, 2016

7 Forecast

The work conducted in the strategic and financial analysis serves as a foundation for the forecasts of Petrobras future performance. The strategic analysis has contributed with insight regarding the external factors that affect the value creation of Petrobras and compared the firm in relation to its competitors. The financial analysis has examined the historical financial and operational performance of the company taking into consideration the different value drivers. All the information aligned together sets the basis of the forecasted budget that will be developed in the following section.

The first step to follow before entering the forecasting of line items is to decide the length of the forecast. There are pros and cons in both short and long horizon forecasts. The decision of which time horizon to use for the explicit forecast period is important due to the effects that will bring to the valuation of the company. For instance, using a short explicit forecast period could result in undervaluation of the company. On the other side, long term forecasts tend to be less precise due to the fact that is quite difficult to be precise when calculating 15 years ahead. Koller et al., 2005, recommends that in order to avoid the error of false precision, the explicit forecast must be divided into two periods:

- 1. A detailed five to seven year forecast, which develops complete balance sheets and income statements with as many links to real variables as possible
- 2. A simplified forecast for the remaining years, focusing on a few important variables

Based on above arguments I have chosen to elaborate a 6-year explicit forecasting period, followed by a more simplified forecast. By doing so, I will better distribute the weight of the total forecast and not relying in such a big percentage of the value by the Terminal period without having control of the margin assumption. A graph of the forecast horizon distribution is shown in appendix 12.3.

Even though forecasting represents a key tool for calculating Petrobras expected performance, there are a series of points that must be considered. First, the forecast assumptions and numbers are always subject to my personal opinion and therefore not truly objective. Moreover, even though the forecasted assumptions are a result of an in depth research of the market, the company and other key factors that shape the calculations, it is not possible to predict the future. All said, it is assumed that the assumptions considered for the forecast of Petrobras will lead to a reliable estimate of the company's share price.

7.1 Projection of value drivers

The following section will introduce the forecast assumptions and the underlying basis under which these assumptions were made.

7.1.1 Revenues

When forecasting the upcoming six years of Petrobras' revenue, the historical performance will be considered as reference combined with the company's business plans for the future, which has already been discussed before. A description of the contribution of the different business segments to total revenue growth will provide insight of how the segment dynamics might redirect from the past in order to better prepare the company for the changing environment.

The Exploration and Production segment has been the main engine for Petrobras revenue in the past years and is expected to continue with a positive trend in the years to come. A key driver of this growth comes from the expertise in deep and ultra-deep water exploration and production, where Petrobras is the world's leader for being at the forefront in introducing new technologies. Even though there might be some concern regarding the decline rates in mature fields, I think that the focus should be put on the pre-salt fields, which represent the real driver of value for upstream. The pre-salt producing for over five years shows little signs of declining as described as described by ANP (2016). This trend is expected to continue on the upside due to different reasons: First, many pilot projects carried out between Petrobras and its partners are still in



Figure 18 Brent Prices

their early stages and its effectiveness has not been revealed at its most. For instance, Petrobras has been assessing the effectiveness of secondary recovery mechanisms such as water injection (epmag, 2015), which is believed to optimize the reserve levels and increase the recovery rates in the medium to long term. Also, going forward, the company has planned 16 new start-up projects for starting production in the period 2017-21, which are expected to contribute with high levels of liquids. Therefore with a competitive portfolio I believe that Petrobras will witness growth in its upstream segment earnings.

It is also important to include the projections of oil prices and the impact that will have in the estimation of future revenue growth. Petrobras has projected a stable increase in the price of oil showed in below graph. With a combination of a strong upstream portfolio for the years to come, supported by a scenario of rising oil prices the upstream operations will benefit even further.

The refining, transport and marketing segment has not been profitable in the recent years mainly due to the interference of the Brazilian Government in setting low fuel prices with the aim of controlling inflation. Since most of Petrobras operations come from the local market, the company has been hit strongly in this segment. There has been much uncertainty regarding if the same price policy will be carried on in the future and the imminent effects of keeping fuel prices low for the segment and ultimately for the company. My projections reflect a positive scenario in terms of increasing earnings from the refining segment for the upcoming years, mainly due to the appointment of a new CEO by early 2016, which set the condition of having full autonomy of fuel prices as a prerequisite to take the position. Furthermore, the company outlined the commitment to promote a market parity price policy taking into consideration the international market prices in contrast to the current model, which is highly subject to political interference. Therefore, it is assumed that the refining segment will experience higher growth in the following years.

The gas and power segment has experienced incremental increases in revenues for the period 2009-2014. Due to its jointly operations with the E&P segment in Brazil to match supply and demand for gas and domestic consumption it is expected that revenues for this segment will experience a stable growth in the future. Also a sharp strategy from management in maximizing the value creation in the gas chain, by optimizing the participation of natural gas as a fuel of transition to the long term will positively affect the segment's earnings in the future. As the domestic oil production is expected to grow, so is expected the supply of gas. This will lead to increase revenues in the years to come.

The biofuel segment represents a relatively small share of Petrobras revenues and it has shown negative profits in the past. As part of Petrobras strategy of optimizing its business portfolio by withdrawing entirely from biofuel production in order to preserve technical competencies in other profitable areas, I expect that the segment will continue its negative growth trend in the future.

The figures for 2016 will show a decrease in revenues compared to the previous year but the growth rate will stay relative stable in the following years.

Total forecasted Revenue for Petrobras can be found in below table:

Forecast	2015	2016E	2017E	2018E	2019E	2020E	2021E
Revenue	97314	87616	89369	93837	97591	100518	102529
Revenue arowth	-32%	-10%	2%	5%	4%	3%	2%

Figure 19 The total forecast revenue for Petrobras

7.1.2 EBITDA margin

It is expected that the company's strategy in cost reduction will have a positive effect and eventually improve the EBITDA margin compared to previous years. The cost reduction will most likely come from the E&P and refining segments. Deep and ultradeep water exploration demands high cost, and Petrobras has planned to cut down the manageable costs through the reduction of lifting costs. Therefore, in order to control those costs, an increase focused has been given to the development of the pre-salt fields. Oil coming from pre-salt is relatively new (only six years) and progress on the learning curve from Petrobras expertise in the area has much more potential in producing cost savings in the years to come by a higher efficiency and the development of breakthrough technology. Apart from reducing costs in the E&P segment, the company has planned to reduce the refining expenses, which amount a significant part of the total operating cost. The strategies consist in integrating the common and interdependent activities among Petrobras refineries, and somehow, optimize the consumption of power and chemicals helping to bring costs down. In addition, a focused on reduction of labor costs will also contribute to the improvement of the EBITDA margin. The company announced in early 2016 a massive job cutoff that may affect around 12.000 workers in the next five years, through the introduction of a voluntary layoff program open to all employees.

Forecast	2015	2016E	2017E	2018E	2019E	2020E	2021E
EBITDA	22583	22780	23593	25148	26545	27743	28708
EBITDA	23.2%	26%	26.4%	26.8%	27.2%	27.6%	28%
Figure 20 EBITDA	20,270	2070	20,470	20,070	21,270	27,070	2070

7.1.3 Impairment of Assets

The company has experienced massive impairment losses in the last two fiscal years, which do not reflect the behavior from previous years. The average for the period 2011-2015 brings 3,1%, therefore based on the projections of rising oil prices discussed before I have estimated a lower impairment cost of 3%.

Forecast	2011	2012	2013	2014	2015	2016E	2017E	2018E	2019E	2020E	2021E
Impairment of assets	-369	-137	-544	-16823	-12299	-3505	-3575	-3753	-3904	-4021	-4101
Impairments	0,2%	0,1%	0,2%	7,5%	7,5%	3%	3%	3%	3%	3%	3%
Figure 21 Impairment of assets											

7.1.4 Depreciation rate

There are different methods to forecast depreciation. It can be forecasted as a percentage of sales or as a percentage of property, plant and equipment (Koller et al., 2005). Since capital expenditures are smooth I have decided to forecast depreciation as a percentage of sales. If we look at the previous five years, the depreciation rate has been fairly stable relative to revenue and it is not expected to change materially from the historical rates. Therefore I decided to apply the average for the last five years, which is 9%.

7.1.5 Tax rate

The Brazilian government has made some efforts to reduce corporate taxes; however some tax cuts are usually offset by the settlement of new taxes. Such at the beginning of 2015 Brazil has enacted a reform on corporate tax. By analyzing the historical data, we see a fluctuation which is the effective tax rate caused by a combination of different factors. The average of the last 5 years brings a tax rate of 20%, therefore I have decided to set a slightly higher rate of 23% for the forecasting period.

Forecast	2011	2012	2013	2014	2015	2016E	2017E	2018E	2019E	2020E	2021E
Effective tax											
rate	-25%	-25%	-19%	-15%	-12%	-23%	-23%	-23%	-23%	-23%	-23%
Figure 22 Effecti	ve tax rate										

7.1.6 Net borrowing cost

Historical data shows that financial expenses have been increasing year after year during the last five years. As it was previously mentioned on the financial analysis, the company has struggled in the past with high levels of debt, which deeply affected the company financially. The financial expenses are calculated as a percentage of Net interest-bearing debt and based on the cost of debt calculated is been applied for the forecast.

Assumptions	2011	2012	2013	2014	2015	2016E	2017E	2018E	2019E	2020E	2021E
Net borrowing											
cost	-0,1%	2,7%	3,0%	1,5%	8,4%	7,9%	5%	4,2%	4,2%	4,2%	4,2%
Figure 23 Net borrowing co	ost										

7.1.7 Capital Expenditures

This item captures the expenses incurred by Petrobras in upgrading physical assets, such as PPE. This item will certainly be affected in the future due to the company's promoted program for divestment. In order to reduce the high leverage the firm has announced the intention to divest assets worth \$15 billion in 2016 (Petrobras,2016). The E&P segment will remain the main beneficiary, with a high reduction in other less competitive segments. In addition, a plan of establishing partnerships will not only share the risk but ultimately reduce investments in capital expenditures. Therefore CAPEX as a percentage of net revenue will be progresibly decrease along the forecasting period

Forecast	2015	2016	2017	2018	2019	2020	2021
CAPEX as % of							
revenues	-22%	-20%	-19%	-17%	-17%	-17%	-17%
Figure 24 CAPEX							

7.1.8 Current Assets and liabilities

Both current assets and liabilities are related to Petrobras activity level and thus to its revenue. The historical level has been relatively stable throughout the last five years and therefore it is assumed that it will develop in the same direction during the forecasting period.

8 Valuation

Throughout the previous chapters a foundation for the upcoming section has been built. In the following chapter, the valuation of Petrobras will be performed in order to estimate the share price of the company given the indicators provided by the forecasted budget. First, the cost of capital will be calculated, followed by the DCF valuation model. As a complement to the DCF valuation, a relative valuation based on the market consensus will be conducted. Lastly, a sensitivity analysis will provide an understanding of the valuation consequences by changes in key drivers of value.

8.1 Cost of Capital

The cost of capital is a very important concept in the financial decision making. Since stakeholders of a firm are risk averse, cost of capital serves as a measurement of the sacrifice made by investors with the objective of getting a fair return in the future as a reward for bearing the risk of running a business. There are different methods to measure the cost of capital. Since the DCF model has been chosen to determine Petrobras share price, the weighted average cost of capital method (WACC) will be used to estimate the cost of capital, which includes the opportunity cost of capital for both debt and equity holders. The general formula for WACC is expressed below:

$$WACC = \frac{NIBD}{NIBD + MVE} \ge r_d \ge (1 - t) + \frac{MVE}{NIBD + MVE} \ge r_e$$

where: NIBD = market value of net interest bearing debt MVE= market value of equity r_d = required rate of return on NIBD r_e= shareholder's required rate of return

t= corporate tax rate

8.1.1 Capital Structure

There are three different approaches to calculate the capital structure of a firm:

- Estimating the current market-value-based capital structure
- Review business management's implicit or explicit approach to financing the business and its implications for the target capital structure
- Review the capital structure of comparable companies

If the company is publicly traded, the market value of equity can be calculated easily as the number of shares outstanding multiplied by the price close on balance sheet day. The table below shows the results for the last four financial years.

Capital Structure (US\$ bill)	2012	2013	2014	2015	
Market value of equity	130.440	91.308	44.025	28.045	
Net interest bearing Debt	<u>92.078</u>	<u>106.941</u>	<u>123.302</u>	<u>113.101</u>	
Company Value	222518	198.249	167.327	141.145	
Equity ratio	0,59	0,47	0,27	0,20	0,31
Debt ratio	0,41	0,53	0,73	0,80	0,69

Figure 25 Estimating market-value-based capital structure

Due to its diminishing profitability, Petrobras has seen a sharp decline in its shareholders' equity. This has resulted in a continuous increase in the company's debt to total capital ratio, especially in the last years primarily because of the fact that the balance sheet has already a huge amount of debt and the firm is unable to raise additional debt at attractive rates. The average for the last four years provide a debt ratio of 0, 31 and an equity ratio of 0, 69

Since the final WACC is highly dependent on Petrobras capital structure due to the weights of cost of debt and cost of equity, Koller et al (2005) emphasizes that the cost of capital should reflect the target weights, rather than the current weights. The main reason is that the current capital structure may not reflect the levels that are expected to prevail in the future. During the presentation of Petrobras 2015-2019 Strategic Plan (Petrobras, 2015), the company made clear statements regarding a business and management plan based in a reduction in net leverage below 40% by 2018 and 35% by 2020. The adjustments of the business plan at the end of 2015 reinforced the targets of reducing leverage (Net Debt/EBITDA) from 5,3 in 2015 to 2,5 by 2018. Whether or not Petrobras will be able to succeed in achieving the projected numbers is questionable, nevertheless an imminent decrease in the leverage ratio is highly probable due to different reasons such as the promising company's disinvestment policy for the upcoming years.

Lastly, when looking at a few comparable firms within the oil and gas industry, the average cost of debt to total capital ratio is around 28% taking into consideration the last four financial years. This makes sense since the oil industry is represented by heavy requirements in investments. The results from the different companies are displayed in below table:

Company	2012	2013	2014	2015	
Chevron Corporation	0,12	0,13	0,18	0,14	
BP	0,23	0,28	0,31	0,27	
Statoil ASA	0,31	0,33	0,41	0,35	
Repsol SA	0,31	0,22	0,25	0,26	
Ecopetrol	0,23	0,38	0,50	0,37	
Total SA	0,24	0,31	0,28	0,27	
Average per year	0,24	0,27	0,32	0,28	

Figure 26 Cost of debt to total capital (Thomson Reuters, 2016)

It is evident that Petrobras capital structure has become skewed in the last two years compared to other companies in the industry. However, based on the company's business plan and its projections to correct this issue over the next years it is expected that the company will reduce its debts levels significantly and therefore I have chosen a more conservative long-term capital structure of 30 percent debt and 70 percent equity.

8.1.2 Cost of Debt

In order to estimate the required rate of return on debt after tax the following formula is applied:

 $r_d = \left(r_f + r_s\right) x \left(1 - t\right)$

where:r_d = required rate of return on net interest bearing debt (NIBD)

r_f = risk-free interest rate

r_s = credit spread (risk premium on debt)

t= corporate tax rate

The question of what tax rate to use can be a difficult decision since the effective tax rate can be much different from the statutory tax rate. The marginal tax rate for Brazil is 34% and the average effective tax rate for Petrobras for the last five financial years has been around 20%. Since interest expenses are tax-deductible, the effective tax rate of 23% will be applied.

The risk-free interest rate defines how much an investor can earn without incurring in any risk. In theory, the best estimate for a risk-free rate would be the expected return on a zero beta portfolio (Petersen and Plenborg, 2012). However, since this method had been proven not to be useful in practice, a proxy for this rate is usually government default free bonds. A time horizon of a 10 or 30-year bond is usually used for valuation purposes. Since the 30-year bond might suffer from illiquidity affecting the yields, the 10-year bond is less sensitive to changes in inflation than the 30-year bond. Hence, for the calculation of the cost of debt, the 10 Year US treasury bonds will be used. The average rate for this bond for 2015 was 2, 09 which is lower than the previous two years, but it is higher than in 2012. Due to these considerations a risk-free interest rate of 2 % will be applied.

The credit spread is also known as the risk premium on debt. There are different credit agencies like Standard and Poor's and Moody's, which are well-respected and use rating models that measure different financial ratios in order to provide the most suitable grade to companies and countries. Early this year, Moody's (2016) downgraded Petrobras rating to B3 from Ba3, considering that the company is a government-related issuer and believing that the government current fiscal situation could prevent it from supporting Petrobras sufficiently to avoid a default. Also, refinancing risk represents an increasing concern, with high amounts of debt maturing in the next two years and negative free cash flows. Even though this represents a negative outlook for the

company, Moody's states in its report that potential upgrade could be achieved if the company raises sufficient sums through asset sales or other means to strengthen its liquidity profile. Standard and Poor's (2016) follows the same direction by downgrading Petrobras grade from BB+ to BB as an indication of the company's debts.

In order to select a suitable credit spread for Petrobras I decided to link the rating provided by S&P and Moody's to a credit rating matrix developed by Aswath Damodaran (2013). Based on the interest coverage ratio he links the credit ratings to an assigned credit spread. Therefore it sounds reasonable to select a risk premium of 3, 5 %.

The final calculation provides the following cost of debt:

$$r_{debt} = [(2\% + 3,5\%) \times (1-25\%)] = 4,27$$

8.1.3 Cost of Equity

The Capital Asset Pricing Model (CAPM) is used for calculating the cost of equity, which suggests that the expected return of a security equals the risk-free rate plus the security's beta multiplied by the market risk premium (Koller, et al., 2010). The underlying assumption of the CAPM relies on the fact that by holding a sufficiently broad portfolio of shares, investors will only pay for the risk that cannot be diversified away, and only the systematic risk, beta, is priced (Petersen and Plenborg, 2012).

Hence, the CAPM formula results to be the following:

 $r_e = r_f + \beta_e \left(r_m - r_f \right)$

where:

 r_e = investor's required rate of return r_f = risk-free interest rate β = systematic risk on equity (levered beta) r_m = return on market portfolio The risk-free interest rate has already been explained when calculating the cost of debt and it has been set at 2%.

The market portfolio risk premium represents the difference between market returns and the returns from risk-free investments. It signals the return that an investor requires in order to be willing to invest in the market portfolio instead of a risk-free portfolio. There are mainly two ways to estimate the risk premium: calculations can be either based on historical events (ex-post approach) taking into consideration the co-variability between market portfolio returns and returns on risk free investments, or based on current situation and expectations of the future (ex-ante approach). Neither method accurately estimate the market risk premium, and therefore a collection of different data will be considered as a fundamental for the selection of the market risk premium. A survey of risk premiums used in 71 countries conducted by the University of Navarra for the year 2015 estates an average risk premium of 7,5% for Brazil (Fernandez, et al., 2016).

Furthermore, professor Damodaran (2015) describes the process by which he estimates the equity risk premium for countries. Briefly, the calculation of a "mature market premium" in this case the S&P 500 index is added to the country risk premium for riskier countries. For the country risk premium he applies either the sovereign rating or CDS spread as the measure for country risk. According to Moody's (2016), Brazil's government bond rating has been downgraded to Ba2 from Baa3 by the end of 2015. Damodaran also adds the standard deviations of the Bovespa and the Brazilian government bond to scale up the default spread. However, I will not consider it to yield the final equity risk premium supported by a study from Camacho and Lemme (2004), where by comparing a set of 22 Brazilian companies, which had investments abroad they concluded that the cost of equity capital of Brazilian companies employed on international investment did not show any signals of being greater than that used on national investments, assuming an integrated market, such as the case of Petrobras. Also it is important to consider that CAPM is based on the market and the price of the stocks, which are part of the market, regardless of the operations of the firm. Since the stock trades in the New York Stock Exchange, the standard deviation of the Bovespa and the Brazilian government bond is therefore disregarded.
Based on these indications the estimate for the S&P500 for 2015 of 5, 8% added to the equity risk premium of Brazil of 1, 9% (based on Damodaran country risk premium matrix) sums up to a market risk premium of 7, 7%. The estimate aligns with the survey conducted by the University of Navarra and therefore the market risk premium is set at 7, 4%.

Finally, according to the model applied, the expected return of the stock relies heavily on the beta. The beta measures how much a stock and the entire market correlate (Koller, et al., 2010). A beta of 1 indicates an equity investment with the same systematic risk as the market portfolio, whereas a higher beta represents that the company's stock price varies more than the market. The higher the systematic risk, the more the investors will require as return for investing in the company.

Beta is usually calculated by using regression analysis of the specific return of the stock. In this method, Petrobras shares for a selected period of time, is regressed against the return on a market portfolio. A common model for doing so is the market model. When applying this model, different factors must be taken into consideration. Even though there is no standard for considering the appropriate measurement period, Koller et al., 2010 states that researcher confirmed that a five-year period serves as an appropriate measurement period. Another factor to consider is the return interval. This refers to whether weekly or monthly returns must be applied for the analysis. The main difference is that weekly returns will provide the highest number of observations but will expose the data to systematic biases in relation to non-trading days (Koller et al., 2010). Monthly return will therefore provide a more precise estimate of beta. The choice of the market index is also a factor to consider before conducting the regression. The most suitable choice would be that the beta should be estimated against the index of which the stock is traded. In the case of Petrobras, this would be the New York Stock Exchange. When Petrobras stock return is regressed against the market return (NYSE), over a five-year period the result brings a beta of 1, 58 (Thomson Reuters, 2016). A beta of 1, 58 points out that an investment in Petrobras has a higher systematic risk than the market portfolio. In other words, the stock is highly volatile. Since the analysis is based on historical data, the result is subject to a grade of uncertainty. This might reflect, to some extent, that the estimated beta may not capture the underlying risk of the firm.

In order to improve the precision in estimating the value of beta, an analysis of the beta of the integrated oil and gas industry will be carried on. Koller et all., 2010, mentions that as long as estimation errors accorss firms are not correlated, overestimates and underestimates of companies individual betas will cancel out and the average for the industry will therefore bring a more accurate estimate. Damodaran (2016) has analyzed 49 companies within the oil and gas industry and has concluded that the value of the unlevered beta is 1, 23. When applying the industry beta into the formula for levered beta the result is the following:

$$\beta$$
 levered = β unlevered x (1 + D/E) = 1,76

The result shows that the series of assumptions made in the calculation of the beta clearly affect the value. The reason for the beta being lower than the one previously calculated can be explained based on the target capital structure with a reduced long-term debt strategy. Compared to its peers such as Chevron (β =1, 17) and Exxon (β =1, 01), Petrobras stock has been more volatile during the last five years. Petrobras has also achieved highly fluctuating results throughout the last years, which have affected the share price. Since the upcoming years seem to bring more uncertainty to the industry due to the exposure to the oil prices and other external factors the β value, which will be assigned for the calculation of the cost of equity will be 1,70.

Finally, the required rate of return on equity is found to be = 14,58 %.

8.1.4 Calculation of WACC

As it has been mentioned, the calculation of the cost of capital represents an important concept in the decision making of a firm. On the basis of the different inputs collected along this section the weight average cost of capital for Petrobras is 11, 2 %.

8.2 Discounted Cash Flow

In this thesis, the valuation approach that I have chosen is based on discounting future cash flows. This model is commonly known as present value approaches (Petersen & Plenborg, 2012). In this case I have chosen the Discounted Cash Flow model (DCF). According to theory, present value of future free cash flows determines the value of a

company. The DCF method is popular because of its forward looking approach. It is based in expectations of the future for estimating value, rather than pure historical data. The model is also rather flexible in terms of not being influenced by the applied accounting practice and it relies on the expectations of the company.

The disadvantage of the model relies in the fact that is purely driven by assumed assumptions of future performance from the forecasted period. This might evidence that small deviations from the established assumptions can lead to large impact in the share value.

The formula for the DCF in case of infinite cash flows follows below:

Enterprise Value₀ =
$$\sum_{t=1}^{n} \frac{FCFF_t}{(1+WACC)^t} + \frac{FCFF_{n+1}}{(WACC-g)} * \frac{1}{(1+WACC)^n}$$

where: $FCFF_t = Free Cash flow to the firm in time period t$

WACC= Weighted Average Cost of Capital

g= terminal period growth rate

The total period selected to develop de DCF valuation has a duration of 30 years in order to better distribute the weight of the valuation by not having a big impact based on the terminal period.

The results from the DCF model are shown below:

DCF Valuation	
NPV FCFF	142562,70
Net Interest Bearing Debt	-100263,0
Market value of associates	3527,0
Market value of minorities	-819,0
Enterprice value	45007,7
DCF value per share	6,90
Figure 27 DCF Valuation	

Net interest-bearing debt is subtracted from the Net Present Value of FCFF. Furthermore, the value of minorities and associates is subtracted to reach the value attributable to the shareholders of the parent company only. With an enterprise value of 45007,70 bill U\$S and 6522 outstanding shares, the share price of Petrobras by the end of 2015 is 6,90 U\$S. This states that the stock is undervalued since the share price in the NYSE on the 30th of December 2015 was U\$S 4,30.

8.3 Sensitivity Analysis

Since the value provided by the valuation model holds a certain degree of uncertainty, a sensitivity analysis will be useful to provide an overview of how sensitive the model is to changes in assumptions of key value drivers. For instance, in the table below we can see the changes in the price of the stock by changes in the cost of capital and the EBIT margin. Clearly, the stock price is highly sensitive to changes on the cost of capital. A one percent change of WACC from 11, 2% to 12,2% hits the share price hard causing a decrease from 6,9 to 4,1. The higher the cost of capital, greater the impact. The same applies if the cost of capital is reduced by a percentage, but in this case in a lower percentage.

		WACC				
		9,2%	10,2%	11,2%	12,2%	13,2%
	+2%	17,8	12,7	8,8	5,7	3,2
gin	+1,%	16,4	11,5	7,8	4,9	2,6
nar	0	14,9	10,4	6,9	4,1	1,9
Ē	-1%	13,5	9,2	6,0	3,4	1,3
EB	-2%	12,1	8,1	5,0	2,6	0,6
Ξ	-2%	12,1	8,1	5,0	2,6	0,6

Figure 28 WACC

Changes of the EBIT margin also have an impact in the share price. As we can see form the table, a percentage change in EBIT either up or down impacts the share price with an increment/decrease of around 13%. This is important since we have projected an improvement on the EBIT margin for the forecast based on the company's intentions of reducing operational cost to lower the levels of debt. The outcome of the sensitivity analysis underlines the risks of using the DCF model for the valuation of a company, since the model is highly dependent on the assumptions and opinions of the analyst.

8.4 Multiples

In addition to the Discounted Cash Flow model, a relative valuation approach will be used to compare Petrobras with its peers within the oil and gas industry. This method is popular since we can evaluate Petrobras using metrics of other similar companies. In the case of Petrobras, it is possible to find a large number of firms involved within the oil and gas industry, so it should not be difficult to run a peer group analysis as a cross check for the DCF model with the current pricing of similar companies. An important advantage of this model is that it relies on the opinions of many investors, whereas the DCF model relies sonly on the investor's own expectations (Petersen & Plenborg, 2012). Additionally the model is relatively simple.

The peer group has been selected based on companies with similar commodity and risk exposure but it should be noted that there might be different company specific factors that might affect the individual valuations, such as the corruption scandal for Petrobras or the case of the oil spilled by BP years ago. Also, multiples requires the compared firms to have identical depreciation and tax rate (Petersen & Plenborg, 2012:227), which might not align for instance, since countries have different tax rates. Regardless of the shortcomings, the multiples will be used to have an overview based on consensus estimates. The data has been extracted from Thomson One Banker (2016) and the projected values for 2016-18 will be used.

There are different metrics to compare companies. For operational metrics, I believe that EV/EBITDA and EV/EBIT reflect operating performance better by giving a fairer picture of performance relative to competitors due to the fact that they are not affected by the unusual high financial expenses and write-offs that the company has experienced recently. Also they are independent from taxes, which might change from country to country.

I have calculated the overall mean for the EV/revenue, EV/EBITDA and EV/EBIT metrics considering 19 companies within the oil and gas industry for the years 2016-18. It can be observed that there is a significant discount on the key metrics compared to the peers' average. This might be caused by the high degree of uncertainty regarding the corruption scandal that involves Petrobras and Brazilian top politicians. Other company specific risks such as the high level of debt increasing year after year and the lack of

support from the Brazilian government which is experiencing economics and institutional drawback might also affect the consensus of analysts.

I believe that if the company survives the current crisis that is experiencing and delivers results according to the forecast that was projected before, it is possible for the share to trade up to peer group averages, which gives a stock price in the range of 6,88 considering EV/EBIT.

9 Conclusion

The objective of this paper was to examine how an external investor can access whether the current market value of Petrobras reflects the real company's potential to create long-term value for its stakeholders. For this purpose the paper developed three research questions as a guideline throughout the thesis in order to answer the problem statement. The reason for the study relies on the challenging environment recently experienced by the oil and gas industry and by the dramatic events inside Brazil related to political instability, the Lava Jato case and the recession.

The approach selected to uncover the potential of Petrobras to generate longterm value involved four different sections; *analysis of its non-financial value drivers, an analysis over the historical financial parameter, a forecast and valuation models to reveal the value of the share.* Thus, these sections cannot stand alone and were therefor analyzed collectively.

In the first part of the analysis, the non-financial value drivers, it was shown how macro level factors appear to have an effect in shaping the development of the industry and influencing the performance of firms operating in it. In the case of Petrobras, the government had an important role on establishing market conditions, such as strict tax and regulatory policies. Even though global oil prices are traded in dollars, Petrobras revenue provides mostly from its local market. Advanced technologies in the industry signals high development costs, but generates a competitive advantage for Petrobras due to its expertise in the exploration and production deep- and ultra-deep water. Even though in the current times, oil and gas is the main source of energy, its consumption is projected to decrease in the long run. It is expected that alternative sources of energy will eventually overtake part of the market share. This aspect is also reflected in Petrobras's DNA and the company has already changed dynamics in its segment distribution adding products such as biofuel and power from wind and rivers. Furthermore, the analysis of the non-financial value drivers showed that while Brazil is fighting the worst recession in its history, the OECD countries are recovering from the 2008 financial crisis, why a growth in oil demands is expected for the upcoming years.

In the second part of the analysis, an overview of the historical financial parameters was used to identify if the company had created real value to its stakeholders, and whether it had grown and performed compared to its competitors. The focus was given to profitability ratios, which sent mixed signals. On one side, the company outperformed the peer group in terms of EBITDA, indicating that Petrobras has been more profitable than most of its competitors in the industry. However, when the company was measured in terms of return on equity, results revealed opposite outcome. This shows the inability of the firm in generating returns driven by a high level of financial expenses. Furthermore, when analyzing short-term liquidity, the company responded positively showing good levels of short-term liquidity through the current and quick ratio. The explanation is to be found in the fact that the company has most of its leverage from long-term debt. The leverage ratios confirm that the company is dealing with high levels of debt. Credit agencies such as Standard and Poor's and Moody's have downgraded the credit grade of the company in the recent times, arguing that the company has lost support from the Brazilian government, and it appears possible that the government would not be able to support the oil company in case of default. In addition, the company is dealing with debt maturing in the next two years. Moreover, the total debt to equity ratio evidences that Petrobras is the firm that uses the greatest amount of debt to finance its assets in relation to the stockholder's equity. The impairment of assets due to a low crude oil price environment has played an important role during the last two fiscal years. Total debt to EBITDA is another negative indicator that places Petrobras in an uncomfortable financial position in relation to its peers.

In the third part of the analysis a forecast was built based on the two previous analyses, the non-financial value drivers and the overview over the historical financial parameters and recent business plan released with updated targets. On this basis a targeted strategy of cost reduction and a substantial reduction of the debt to EBITDA ratio, together with a divestment plan and expectations in increase of oil prices for the upcoming years provide a positive outlook for the oil giant. The company will benefit with a reduction of debt and higher operating margins.

The final valuation stated that the share was undervalued by the end of 2015. Finally, the results from the valuation were tested against a sensitivity analysis and operational metrics from a relative valuation approach to cross check the valuation. The results outline a high degree of sensitivity in the share price by changes in key metrics such as cost of capital and ebit. This can be explained by the fact that the DCF model relies heavily in individual expectations in comparison with a multiples approach, which is based on the market consensus. The stock price was discounted to the industry average and proved that based on future expectations if the company recovers it could trade at the industry levels.

Summing up, this thesis shows how a full valuation conducted by an external analyst can be completed by, using the models and method presented throughout the thesis. However, one should be aware that the results will always be sensitive to the input applied.

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12 Appendices

12.1 Full overview over Petrobras' new strategies



12.2 One year rolling correlation for oil price and Petrobras stock





12.3 Valuation Distribution

12.4 Reported Balance Sheet

Balance sheet					
Assets	2011	2012	2013	2014	2015
Cash and cash equivalents	19057	13520	15868	16655	25058
Marketable securities	8961	10431	3885	9323	780
Trade and other receivables	11756	11099	9670	7969	5803
Inventories	15165	14552	14225	11466	7441
Roverable income taxes	6848	1462	1060	1063	983
Other recoverble taxes	0	4110	3911	2748	1765
Advances to suppliers	740	927	683	423	108
Other current assets	2065	1550	946	1180	1338
Total long term receivables	64592	57651	50248	50827	43276
Assets held for sale	0	143	2407	5	152
Total current assets	64592	57794	52655	50832	43428
Non-curren assets					
Long term receivables					
Trade and other receivables	3253	4441	4532	4832	3669
Marketable securities	3064	176	131	109	88
Judicial deposits	2080	2696	2504	2682	2499
Deferred income taxes	4287	1277	1130	1006	6016
Other tax assets	4912	5223	5380	4008	2821
Advances to suppliers	3141	3156	3230	2409	1638
Others	1725	1887	1875	3817	2446
Total	22462	18856	18782	18863	19177
Investments	6530	6106	6666	5753	3527
PPE	182918	204901	227901	218730	161297
Intangible assets	43412	39739	15419	4509	3092
Total non current assets	255322	269602	268768	247855	187093
Total assets	319914	327396	321423	298687	230521

Liabilities	2011	2012	2013	2014	2015
Current liabilities					
Trade payables	11863	12124	11919	9760	6380
Finance debt	10067	7479	8001	11868	14683
Finance lease obligations	44	18	16	16	12
Income taxes payable	5847	345	281	247	105
Other taxes payable	0	5783	4669	4064	3365
Dividens Payable	2067	3011	3970	0	0
Payroll, profit shareing, etc	2528	2163	2052	2066	1302
Pension and medical benfits	761	788	816	796	655
Others	3187	2359	2429	2301	1946
Total	36364	34070	34153	31118	28448
Liabilities on assets classified as held for sale	0	0	1073	0	125
Total current liabilities	36364	34070	35226	31118	28573
Non-current liabilities					
Finance debt	72718	88484	106235	120218	111482
Finance lease obligations	98	86	73	56	39
Deferred income taxes	17715	11976	9906	3031	232
Pension and medical benefits	8878	19436	11757	16491	12195
Provisions for legal proceedings	1088	1265	1246	1540	2247
Provisions for decommisioning costs	4712	9441	7133	8267	9150
Others	1231	772	724	988	548
Total non-current liabilities	106440	131460	137074	150591	135893
Total liabilities	142804	165530	172300	181709	164466
Equity	2011	2012	2013	2014	2015
Share capital	107355	107362	107092	107101	107101
Change in interest in subs	316	349	674	148	321
Profit reserves	60224	67238	73795	66423	57977
Acc. Other comprehensive (deficit)	7943	-14235	-33034	-57400	-100163
Attributable to shareholders	175838	160714	148527	116272	65236
Non-controling interests	1272	1152	596	706	819
Total equtity	177110	161866	149123	116978	66055
Total equity and liabilities	319914	327396	321423	298687	230521

12.5 Reported Income Statement

Income statement	2011	2012	2013	2014	2015
Sales revenues	145915	144103	141462	143657	97314
Cost of sales	-99595	-108276	-108834	-109477	-67485
Gross profit	46320	35827	32628	34180	29829
Income (expenses)					
Selling expenses	-5346	-4927	-4904	-6827	-4627
General and administrative expenses	-5161	-5034	-4982	-4756	-3351
Exploration costs	-2630	-3994	-2959	-3058	-1911
Research and development expenses	-1454	-1143	-1132	-1099	-630
Other taxes	-460	-386	-780	-760	-2796
Impairment of assets	-369	-137	-544	-16823	-12299

Write-off - overpayments incorrectly capitalized	0	0	0	-2527	0						
Other expenses, net	-3615	-3306	-1113	-5293	-5345						
	-19035	-18927	-16414	-41143	-30959						
Income (loss) before finance income (expense), share of earnings in equity-accounted											
investments, profit sharing and income taxes	27285	16900	16214	-6963	-1130						
Finance income	3943	3659	1815	1949	1412						
Finance expenses	-1424	-2016	-2673	-3923	-6437						
Foreign exchange and inflation indexation											
charges	-2443	-3569	-1933	339	-3416						
Net finance income (expense)	76	-1926	-2791	-1635	-8441						
Share of earnings (losses) in equity-accounted investments	230	43	507	218	-177						
Profit sharing	-867	-524	-520	-444	0						
Income (loss) before income taxes	26724	14493	13410	-8824	-9748						
Income taxes	-6732	-3562	-2578	1321	1137						
Net income (loss)	19992	10931	10832	-7503	-8611						
Net income (loss) attributable to:											
Shareholders of Petrobras	20121	11034	11094	-7367	-8450						
Non-controlling interests	-129	-103	-262	-136	-161						
Net income (loss)	19992	10931	10832	-7503	-8611						

12.6 Reported Cash Flow

Cash flow statement	2011	2012	2013	2014	2015
Net income (loss)	19992	10931	10832	-7.503	-8.611
(+) Adjustments for:					
Depreciation, depletion and amortization	10535	11119	13188	13.023	11.591
Foreign exchange and inflation indexation and finance charges	3799	4308	3167	3.571	9.172
Share of earnings in equity-accounted investments	-230	-43	-507	-218	177
Write Off- overpayments incorrectly capitalized	0	0	0	2527	0
Allowance for impairment of trade receivables		39	73	2.378	941
(Gains) / losses on disposal / write-offs of non-current assets,				101	750
returned areas and cancelled projects	527	2	-1745	401	756
Deferred income taxes, net	3599	1266	402	-3.045	-2.043
Exploration expenditures writen-off	1480	2847	1892	2.178	1.441
Impairment	1056	137	544	16.823	12.299
Inventory write-downs to net realizable value (market value)	0	742	580	1.015	431
Pension and medical benefits (actuarial expense)	1730	2091	2566	2.022	1.960
Inventories	-5035	-1864	-2128	570	291
Trade and other receivables, net	-2326	-1522	-1142	-2.507	-396
Judicial deposits	0	0	-131	-506	-789
Trade payables	2455	1039	1108	-1.211	-1.226
Pension and medical benefits	-837	-735	-796	-834	-709
Taxes payable	-1991	-151	-1517	-1.245	1.061
Income tax and social contribution paid					
Other assets	-2537	-2028	-172	-2.297	-819
Other liabilities	1481	-290	75	1.410	384
(=) Net cash provided by (used in) operating activities	33.698	27.888	26.289	26.632	25.913
(-) Net cash provided by (used in) investing activities					
Capital expenditures and investments in operating segments	-41377	-40802	-45110	-34.808	-21.653
Proceeds from disposal of assets (divestment)	0	276	3820	3.744	727

Investments in marketable securities	6683	2051	5718	-5.469	7.982
Investments in Investees	-336	-146	-199	-329	-108
Dividends Received	411	241	146	387	259
(=) Net cash flow used in investment activities	-34.619	-38.380	-35.625	-36.475	-12.793
(-) Net cash provided by (used in) financing activities					
Proceeds from long-term financing	23978	25460	39542	31.050	17.420
Repayment of principal	-8750	-11347	-18455	-10.031	-14.809
Repayment of interest	-4574	-4772	-5066	-5.995	-6.305
Dividends paid	-6422	-3272	-2656	-3.918	0
(-) Net cash provided by (used in) financing activities	4.232	6.069	13.365	11.106	-3.694
Effect of exchange rate changes on cash and cash equivalents	-1909	-1115	-1611	-378	-1.123
(=) Net increase (decrease) in cash and cash equivalents in the				707	0 400
period	1402	-5537	2348	101	0.403
Cash and cash equivalents at the beginning of period	17655	19057	13520	15868	16665
Cash and cash equivalents at the end of period	19057	13520	15868	16655	25058

12.7 Forecasted Assumptions

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	-1,2%	-1,8%	1,6%	-32,3%	-10,0%	2,0%	5,0%	4,0%	3,0%	2,0%
0,2%	0,1%	0,2%	7,5%	7,5%	3%	3%	3%	3%	3%	3%
-25%	-25%	-19%	-15%	-12%	-23%	-23%	-23%	-23%	-23%	-23%
0,1%	-2,7%	-3,0%	-1,5%	-8,4%	-7,9%	-5%	4%	4%	4%	4%
-28%	-28%	-32%	-24%	-22%	-20%	-19%	-17%	-17%	-17%	-17%
7,2%	7,7%	9,3%	9,1%	11,9%	9,0%	9,0%	9,0%	9,0%	9,0%	9,0%
39,0%	32,6%	32,4%	32,9%	42,6%	44,6%	46,6%	48,6%	50,6%	52,6%	54,6%
25,7%	19,2%	21,2%	17,5%	23,2%	26,0%	26,4%	26,8%	27,2%	27,6%	28,0%
	2011 0,2% -25% 0,1% -28% 7,2% 39,0% 25,7%	2011 2012 -1,2% 0,1% 0,2% 0,1% -25% -25% 0,1% -2,7% -28% -28% 7,2% 7,7% 39,0% 32,6% 25,7% 19,2%	2011 2012 2013 -1,2% -1,8% 0,2% 0,1% 0,2% -25% -25% -19% 0,1% -2,7% -3,0% -28% -28% -32% 7,2% 7,7% 9,3% 39,0% 32,6% 32,4% 25,7% 19,2% 21,2%	2011 2012 2013 2014 -1,2% -1,8% 1,6% 0,2% 0,1% 0,2% 7,5% -25% -25% -19% -15% 0,1% -2,7% -3,0% -1,5% -28% -28% -32% -24% 7,2% 7,7% 9,3% 9,1% 39,0% 32,6% 32,4% 32,9% 25,7% 19,2% 21,2% 17,5%	2011 2012 2013 2014 2015 -1,2% -1,8% 1,6% -32,3% 0,2% 0,1% 0,2% 7,5% 7,5% -25% -25% -19% -15% -12% 0,1% -2,7% -3,0% -1,5% -8,4% -28% -28% -32% -24% -22% 7,2% 7,7% 9,3% 9,1% 11,9% 39,0% 32,6% 32,4% 32,9% 42,6% 25,7% 19,2% 21,2% 17,5% 23,2%	2011 2012 2013 2014 2015 2016 -1,2% -1,8% 1,6% -32,3% -10,0% 0,2% 0,1% 0,2% 7,5% 7,5% 3% -25% -25% -19% -15% -12% -23% 0,1% -2,7% -3,0% -1,5% -8,4% -7,9% -28% -28% -32% -24% -22% -20% 7,2% 7,7% 9,3% 9,1% 11,9% 9,0% 39,0% 32,6% 32,4% 32,9% 42,6% 44,6% 25,7% 19,2% 21,2% 17,5% 23,2% 26,0%	2011 2012 2013 2014 2015 2016 2017 -1,2% -1,8% 1,6% -32,3% -10,0% 2,0% 0,2% 0,1% 0,2% 7,5% 7,5% 3% 3% -25% -25% -19% -15% -12% -23% -23% 0,1% -2,7% -3,0% -1,5% -8,4% -7,9% -5% -28% -28% -32% -24% -22% -20% -19% 7,2% 7,7% 9,3% 9,1% 11,9% 9,0% 9,0% 39,0% 32,6% 32,4% 32,9% 42,6% 44,6% 46,6% 25,7% 19,2% 21,2% 17,5% 23,2% 26,0% 26,4%	2011 2012 2013 2014 2015 2016 2017 2018 -1,2% -1,8% 1,6% -32,3% -10,0% 2,0% 5,0% 0,2% 0,1% 0,2% 7,5% 7,5% 3% 3% -25% -25% -19% -15% -12% -23% -23% -23% 0,1% -2,7% -3,0% -1,5% -8,4% -7,9% -5% 4% -28% -28% -32% -24% -22% -20% -19% -17% 7,2% 7,7% 9,3% 9,1% 11,9% 9,0% 9,0% 9,0% 39,0% 32,6% 32,4% 32,9% 42,6% 44,6% 46,6% 48,6% 25,7% 19,2% 21,2% 17,5% 23,2% 26,0% 26,4% 26,8%	2011 2012 2013 2014 2015 2016 2017 2018 2019 -1,2% -1,8% 1,6% -32,3% -10,0% 2,0% 5,0% 4,0% 0,2% 0,1% 0,2% 7,5% 3% 3% 3% 3% -25% -25% -19% -15% -12% -23% -23% -23% 0,1% -2,7% -3,0% -1,5% -8,4% -7,9% -5% 4% 4% -28% -28% -32% -22% -20% -19% -17% -17% 7,2% 7,7% 9,3% 9,1% 11,9% 9,0% 9,0% 9,0% 9,0% 39,0% 32,6% 32,4% 32,9% 42,6% 44,6% 46,6% 48,6% 50,6% 25,7% 19,2% 21,2% 17,5% 23,2% 26,0% 26,4% 26,8% 27,2%	2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 -1,2% -1,8% 1,6% -32,3% -10,0% 2,0% 5,0% 4,0% 3,0% 0,2% 0,1% 0,2% 7,5% 7,5% 3% 3% 3% 3% -25% -25% -19% -15% -12% -23%

12.8 Forecasted Income Statement

Forecast	2015	2016E	2017E	2018E	2019E	2020E	2021E
Reported net revenue	97314	87616	89369	93837	97591	100518	102529
Cost of sales	-55894	-48572	-47756	-48267	-48246	-47683	-46586
Gross profit	41420	39045	41613	45570	49345	52836	55943
Gross margin	42,6%	44,6%	46,6%	48,6%	50,6%	52,6%	54,6%
Selling expenses	-4627	-4687	-5192	-5885	-6570	-7230	-7848
General and administrative expenses	-3351	-3836	-4250	-4817	-5378	-5918	-6423
Exploration costs	-1911	-2313	-2563	-2904	-3242	-3568	-3873
Research and development expenses	-630	-838	-929	-1053	-1175	-1293	-1404
Other taxes	-2796	-1258	-1394	-1580	-1764	-1941	-2107
Other operationI expenses	-5345	-3221	-3569	-4045	-4516	-4970	-5394
Share of earnings (losses) in equity-accounted investments	-177	176	195	221	246	271	294
Profit sharing	0	-287	-318	-360	-402	-442	-480
EBITDA	22583	22780	23593	25148	26545	27743	28708
EBITDA margin	23,2%	26,0%	26,4%	26,8%	27,2%	27,6%	28,0%
Depreciation, depletion and Amortization	-11591	-7885	-8043	-8445	-8783	-9047	-9228
Impairment of assets	-12299	-2628	-2681	-2815	-2928	-3016	-3076
Write-off - overpayments incorrectly capitalized	0	0	0	0	0	0	0
EBIT	-1307	12266	12869	13888	14834	15681	16405

EBIT margin	-1,3%	14,0%	14,4%	14,8%	15,2%	15,6%	16,0%
Corporation tax	-906	-1602	-1411	-1306	-1440	-1386	-1377
Deffered taxes	2043	1219	1549	1888	1972	2221	2396
Tax on EBIT	1137	-2821	-2960	-3194	-3412	-3607	-3773
Tax shield on net financial expenses	985	-1960	-1235	-1020	-992	-972	-935
NOPAT	815	7485	8675	9674	10430	11103	11697
Financial income	1412	1107	1571	1571	1571	1571	1571
Financial expenses	-6437	-7189	-6939	-6006	-5884	-5795	-5635
Foreign exchange and inflation indexation charges	-3416	-2439	0	0	0	0	0
Net financial expenses before tax	-8441	-8521	-5368	-4435	-4314	-4224	-4065
Tax on net financials	-985	-1960	-1235	-1020	-992	-972	-935
Net financial expenses after tax	-9426	-10481	-6603	-5455	-5306	-5196	-5000
Pre Tax Profit	-9748	1785	6266	8433	9528	10485	11405
Net Income	-8611	-2996	2072	4218	5124	5907	6697

12.9 Forecasted Cash flows

DCF	2016	2017	2018	2019	2020	2021
Revenue	87616	89369	93837	97591	100518	102529
Revenue growth	-10%	2%	5%	4%	3%	2%
EBIT	12266	12869	13888	14834	15681	16405
EBIT-margin	14%	14%	15%	15%	16%	16%
Taxes on EBIT	-2411	-1519	-1255	-1220	-1195	-1150
Depreciation, Amortizations, Impairments & Write-downs	10514	10724	11260	11711	12062	12303
Change in net working capital	1057	-53	-134	-113	917	-40
Capex	-17523	-16980	-15952	-16590	-17088	-17430
Other Investments and Divestments, net	0	6000	3500	2000	2000	0
Free Cash Flow to Firm	3903	11042	11307	10621	12377	10088

12.10 DCF long term assumptions

DCF long-term assumptions	2016-21	2022-26	2027-31	2032-36	2037-41	Terminal
Sales growth, CAGR	3%	4%	5%	4%	4%	
EBIT-margin, excluding associates	15%	18%	20%	20%	18%	
Capex/depreciation (x)	148%	110%	110%	110%	110%	
Capex/sales	18%	17%	17%	17%	17%	
NWC/sales	3%	3%	3%	3%	3%	
FCFF, CAGR	20,9%	8,6%	7,1%	4,3%	1,5%	2,5%

12.11 Multiples

Company name	EV/SALES		EV/EBITDA			EV/EBIT			
	2016E	2017E	2018E	2016E	2017E	2018E	2016E	2017E	2018E
Petroleo Brasileiro SA Sponsored ADR	1,6x	1,5x	1,5x	6,1x	5,9x	6,1x	8,1x	7,9x	5,5x
Chevron Corporation	1,9x	1,5x	1,2x	10,8x	6,8x	5,7x	150,1x	15,9x	12,1x
Exxon Mobil Corporation	1,7x	1,3x	1,1x	11,4x	8,0x	7,7x	24,8x	12,7x	12,6x
ConocoPhillips	2,9x	2,1x	1,9x	11,1x	6,3x	5,1x	-	30,0x	15,5x

Occidental Petroleum Corporation	5,8x	4,6x	4,2x	15,7x	9,7x	8,2x	-	29,1x	18,0x
Devon Energy Corporation	3,0x	2,6x	3,0x	12,8x	8,4x	6,7x	-	19,9x	12,4x
Anadarko Petroleum Corporation	5,1x	4,0x	3,5x	11,2x	7,3x	6,0x	-	50,2x	21,5x
Marathon Oil Corporation	3,9x	3,1x	2,4x	10,9x	6,5x	5,0x	-	-	26,4x
DONG Energy A/S	1,9x	1,9x	1,9x	6,2x	6,2x	5,9x	9,3x	9,8x	9,1x
Det Norske Oljeselskap ASA	4,4x	2,1x	1,8x	6,7x	3,0x	2,4x	22,4x	5,9x	4,2x
Lundin Petroleum AB	8,4x	5,0x	4,5x	11,8x	6,2x	5,5x	32,8x	11,1x	8,6x
Oil company LUKOIL PJSC	0,5x	0,5x	0,4x	3,7x	3,2x	2,7x	6,7x	5,4x	4,1x
BP p.l.c.	0,7x	0,6x	0,5x	7,0x	4,8x	4,4x	30,0x	11,2x	8,9x
Royal Dutch Shell Plc Class B	1,2x	1,0x	0,8x	8,5x	5,9x	4,9x	25,4x	11,8x	8,7x
BHP Billiton Limited	3,2x	3,0x	2,7x	8,4x	7,3x	6,2x	32,6x	19,4x	14,0x
Statoil ASA	1,4x	1,2x	1,1x	4,4x	3,2x	2,7x	11,9x	6,0x	4,6x
Repsol SA	0,8x	0,7x	0,6x	6,3x	5,2x	4,4x	15,6x	11,0x	8,3x
Ecopetrol SA	2,0x	1,6x	1,5x	5,9x	4,1x	3,4x	10,4x	6,0x	4,9x
Total SA	1,1x	0,9x	0,8x	7,0x	5,5x	4,6x	17,0x	10,6x	8,3x
Eni S.p.A.	1,0x	0,9x	0,8x	5,7x	4,0x	3,3x	23,1x	9,0x	6,2x
Overall mean	2,6x	2,0x	1,8x	8,6x	5,9x	5,0x	28,0x	14,9x	10,7x
Discount to mean (%)	-40,0%	-22,5%	-17,9%	-29,2%	0,0%	20,5%	-70,9%	-46,9%	-48,6%

Petrobras	2016E	2017E	2018E
Sales	87.616	89.369	93.837
EBITDA	22.780	23.593	22.780
EBIT	17.003	17.522	25.148
Net income	652	5.283	9.757
Free cash flow	-2.167	5.958	7.107
Dividend	0	0	0
Net debt	107.363	105.600	102.708