Eurasian Journal of Business and Management, 6(1), 2018, 23-41
DOI: 10.15604/ejbm.2018.06.01.003

EURASIAN JOURNAL OF BUSINESS AND MANAGEMENT

www.eurasianpublications.com

ECONOMIC CONSEQUENCES OF PEAK OIL FOR THE MAJOR MULTINATIONAL OIL AND GAS COMPANIES

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Abstract

The main goal of this work is to analyze the financial statements of the five major multinational oil and gas companies, for the 2011-2015 period, in the framework of the peak oil phenomenon. Peak oil can affect key financial indicators (e.g., earnings volatility, leverage) that are used by managers, investors, and stockholders and which may potentially lead to changes in the decision making by management. Our results show that the decline in oil production affects the decisions about investment in new oil wells, leverage, dividends paid, shares purchased and net income involving the five major companies. In addition, we study the evolution of oil prices, and its influence in several items of the financial statements. Even though oil prices were at high levels during 2011-2014, however, the net income of the five companies actually declined due to the impact of peak oil. Finally, data for the last year studied (2015) indicate a general deterioration in return ratios and other accounting variables. Although the new investments should have been profitable, they have been influenced by peak oil, compromising the economic position of the companies. The advice to these companies would be to relax their investments, especially during a period of falling oil prices. Company managers need to recognize the prolonged duration of peak oil and price trends to promote profitability recovery decisions.

Keywords: Brent, Earnings, Financial Statement Analysis, Oil and Gas Industry, Peak Oil, Production

1. Introduction

The main goal of this work is to analyze the financial statements of the five major multinational oil and gas companies, in the 2011-2015 period. Nowadays, there is a debate on the decrease

in oil production after reaching its peak, known as "peak oil." We will analyze the mentioned financial statements in this framework, that is, taking into account the peak oil phenomenon. The peak oil can affect key financial indicators (e.g., earnings volatility, leverage) that are used by management, investors, and stockholders and which potentially lead to changes in activities undertaken by CEO. Such changes in production, investments and financing decisions, as a result of the peak oil, can affect the firm value.

The peak oil phenomenon is certain. Several scientific kinds of research present the problem of peak oil (Curtis 2009; Greene *et al.* 2006; Kerschner *et al.* 2013). Although the literature finds that the peak oil exists, it does not describe what kind of impact this circumstance has on the accounting numbers and key financial ratios used by financial analysts, investors, and other financial institutions as key performance indicators

The purpose of the present work is to fill this gap by measuring the impact of peak oil on the key financial ratios of the five major multinational oil and gas companies[1]. To investigate the issue, we use a two-step approach. First, we create a comprehensive database of financial statement information prepared by the five major companies selected. Second, by using the database created, we investigate whether peak oil changes key financial ratios by considering the trends in financial rates from 2011 to 2015.

We take data from the five major multinational oil and gas companies for three main reasons. First, the reporting of the five major multinational entities is more extensive compared to that of other oil and gas companies, thus providing the necessary data. Second, they use comparable accounting standard systems. Therefore, the five major multinational is an excellent example of the global industry. Third, these companies have a reliable method of law enforcement and high-quality reporting. Therefore, we assume that the five major corporations provide high-quality reporting and that the reporting is reliable.

The methods carried out are vertical analysis, horizontal analysis, and financial ratios, as a part of financial statement analysis. The financial statements used in this work are the balance sheet, the group income statement and the cash flow statement.

Our results show that the decline in oil production affects the decisions of investments in new oil wells, leverage, dividends paid, shares purchases, and net income of the five major companies. Besides, we will study the evolution of oil prices, regarding items of the financial statements in many variables with consequences in the decision making processes. Even though oil prices were at high levels, however, the net income of the five companies declined due to the impact of peak oil. Finally, data on the last year studied (2015) indicate a general deterioration in return ratios and significant other accounting variables.

The remainder of this paper is structured as follows. The next section reviews the theoretical background regarding oil and gas industry to study fundamental issues. In the third part, we describe the method used. The results of this research are presented in section fourth. Finally, we conclude with the discussion and conclusions.

2. Literature Review

The studies about the oil and gas industry are numerous, but for our interest, we are going to focus on the research about the peak oil. The peak oil is a phenomenon that energy professionals and academics are studying during the last three decades (Robison and DuffyDeno, 1996). As an approximation, the concept of peak oil was shaped by an American geologist, (Hubbert 1956), who showed that petroleum production in a given reserve resembles a bell curve. This model implies that peak extraction is eventually followed by an exponential decline.

Since the development of current civilization, as we know it, is impossible without the energy provided from oil and gas resources, the phenomenon of peak oil is also an important economic issue.

In the first studies, the peak oil was not known in the oil and gas industry. One of the early visions of this problem was the peak oil of the demand. The theory indicates that the peak

[1] ExxonMobil (USA), Chevron (USA), Shell (Netherlands), BP (United Kingdom), Total Fina (France).

oil will happen in the future because the oil demand was going to decline (Asif and Muneer, 2007; Greene *et al.* 2004). However, nowadays, the main problem is the oil supply peak. The majority of the researchers that we have reviewed support that the principal oil fields are decreasing during the last few years (Brecha, 2013; Greene *et al.* 2004; Owen *et al.* 2010). A few studies defend that the world oil production is decreasing because the leading producers are cutting the oil production of its oil fields, like the Middle East or Venezuela (Pirog, 2007). This issue is an interesting point of view for our study, but many researchers do not consider the above would be the main problem. The conventional oil production, over the last years, is decreasing because the conventional oil fields are running out (Bentley, 2002; Curtis 2009). One of the reasons of this depletion is the increase in the oil demand in developing countries like China, India and the Middle East (Xu *et al.* 2011; Yetiv and Lu, 2007). The Energy International Agency (EIA) forecasts that world liquid fuel demand will be 95 Mbpd (million barrels per day) within one decade, a growth rate that approximately doubles that of last year (Brecha, 2013).

The current situation of these countries is not the same situation than that reflected in the first studies. These studies supported that the renewable energy was enough to produce the energy equivalent to the oil consumption in the world in future years. But, this is not feasible yet. The problem of the peak oil is that the oil proved reserves are decreasing over the years. On the other hand, the current cost of investigation and extraction of these reserves is higher than it was ten years ago (Kerschner *et al.* 2013: 1424-1433; Owen *et al.* 2010: 4743-4749). Nowadays the unconventional oil reserves are referred to as commercial reserves, as long as oil prices are rising, and extraction technology improvements are increasing (Owen *et al.* 2010: 4743-4749).

Global conventional oil supply will be soon a political risk because of the production from all countries, except the Middle East fields, is close to the maximum level given by the physical limits of resources (Bentley, 2002: 189-205). An indicator related to this limit is the reserve-production (R/P) ratio. The numerator of the ratio is the amount of a resource existing in a known area, and its extraction is energetic and economically feasible (proven reserves). The production portion of the ratio is the amount of resource produced in one year at the current rate. This rate indicates that current oil reserves are enough to provide 40 years of supply at present prices (Bentley, 2002: 189-205).

The unconventional oil is a pervasive topic. In general, many researchers deal with the problem of this sources and how changes could be made. One of the aspects of this issue is the type of oil that it is profitable for the companies (Greene *et al.* 2006: 515-531; Meyer and Attannasi, 2003: USGS Fact Sheet). According to some ratios, the energy can have different power. One energy unit of conventional oil has more power than one energy unit of bitumen, for example. This type of conclusion is typical in scientific studies related to geology (Brecha, 2012: 586-597; Murray and Hansen, 2013: 245-252). But our interest is focused on the consequences of this problem. For that, we focus on the profitability of each type of unconventional oil like tar sands or bitumen. Besides, the distribution system of the unconventional oil is not sufficiently profitable, because oil proved reserves of this type of oil are located in very few countries in the world like Venezuela or Canada (Meyer and Attannasi, 2003: USGS Pact Sheet). The central location of oil demand in the future is in Asia. That is why the problem of the distribution is so essential if unconventional oil were to be extracted. The costs of production and transportation of unconventional oil like oil sands or tight oil are higher than conventional oil (Meyer and Attannasi, 2003: USGS Pact Sheet).

The development of Canadian oil sands and Venezuelan heavy oil suggest that the transition to unconventional oil is underway (Greene *et al.* 2006: 515-531). Regarding Canada, it is a country that produces a significant amount of oil (3% global share), only from Athalasca tar sands, now producing 60 million barrels per year of bitumen more or less (Ng and Donker, 2013: 167-181; Sarant, 2016: 6-7). There is a debate over whether Canadian oil sands could be conventional oil or not. Some researchers argued that Canadian oil sand should be classified as a conventional oil. But on the other hand, Greene *et al.* (2004: 1-9) argue that Canadian oil sands are unconventional oil because of the high costs of extraction and the complexity of the current operations. Greene *et al.* (2006) indicate that in Alberta, Canada, the bitumen deposits

comprise at least 85% of the world total bitumen in the tar sand. This source of energy has a high extraction cost because the process is costlier than for other sources, like conventional oil (Greene *et al.* 2006). For example, Canada increased its exports of crude oil to China by 225% up to 440,000 tons in 2010 (Ng and Donker, 2013: 167-181). A few important companies, like Shell, have most of the oil fields in Canada, but it is not sufficiently profitable. And this is the big problem of the unconventional oil: This type of oil is not beneficial for the companies (Murray and Hansen 2013: 245-252; Rogner, 1997: 217-262). In fact, the estimated extraction costs, in oil sands, range from 35$ per barrel to 65$ per barrel (Brecha, 2012: 586-597).

On the other hand, we find the hard oil of Venezuela as one of the most prominent places in the oil sector. The Orinoco Belt is a territory in the southern strip of the eastern Orinoco River Basin in Venezuela which overlies the world's most significant deposits of petroleum. The Venezuela Orinoco heavy-oil belt contains 90% of the world's extra-heavy oil (Meyer and Attannasi, 2003). But the extraction has high costs, and for that reason, there is not a lot of activity in this area. The expenses of diluents for reservoir injection and transport stay high (Meyer and Attannasi, 2003: USGS Fact Sheet).

One of the most critical unconventional oil is the shale oil. Most of these resources are in the US. The United States Geological Survey (USGS) estimates that in the U.S. there are 2.6 trillion barrels of shale oil. Rogner (1997: 217-262) states that, only in the United States, there are two-thirds of the unconventional oil. The oil sands from Canada are the most prominent source of unconventional oil supply in the world, but this source contributes less than 3% of world liquid oil (Greene *et al.* 2006: 515-531; Hirsch, 2007: 1263).

Furthermore, a few large deposits of petroleum in the world are irregular because the geopolitical situation in some places is complicated. Nowadays, and maybe in the future, the Venezuelan government will cut the oil supplies for zones like Latin America, United States or Canada. For that and other reasons, the United States and Canada are exploiting the unconventional oil reserves (tar sand and oil shale, mostly).

The geopolitical aspect is not only a problem in Venezuela or China. Also, in the Middle East, the geopolitical situation is a disaster for wars and poverty. In this place, the issue is more critical than in Latin America, because the most significant conventional oil fields are in the Middle East, so that the oil supply may be affected by this situation (Kilian, 2008: 216-240).

Russia is also an important country for the natural gas. All natural gas extracted in the Middle East passes through Russia to Europe. When a conflict or another geopolitical problem occurs, the natural gas supply is reduced, and the prices increase. This rise makes the oil more expensive for the companies, and there may be a crisis in specific industries (Guseo *et al.* 2007: 452-469).

But, it is not only the places where there is unconventional oil. It is essential to know the positions of the countries when there is conventional oil like the countries belonging to the Organization of Petroleum Exporter Countries (OPEC). These countries will be able to maintain a dominant position in world oil markets for the next 50 years (Greene *et al.* 2006: 515-531). The geopolitical issue in the Middle East is crucial to know its effects on the oil price. Many types of research indicate that the conflicts in the Middle East are an exogenous political event (Barsky and Kilian. 2004: 115-134). To see the magnitude of the Middle Eastern producers, if they chose increase production at a faster timing, thereby postponing the first peak oil (Greene *et al.* 2004: 1-9). Furthermore, the OPEC fields displays lower declines rates than the non-OPEC fields. In this sense, the OPEC's countries will have more potent in the future than the non-OPEC's countries (Höök *et al.* 2009: 2262-2272).

The oil price is another very influential factor in the oil and gas industry. For example, Brecha (2012: 586-597) supports that when oil prices are low, there is a disincentive for producers to develop more high resource bases. During the years, the oil price has suffered major falls and rises. The World Energy Outlook 2008 forecasts an oil price of US $200 per barrel by 2030 (Greene *et al.* 2006: 515-531). The price in the financial market is irregular because the geopolitical situation in the world is changeable. The oil price instabilities are shown to have influenced management strategies and policies (Ng and Donker, 2013: 167-181). But the geopolitical is not only the only factor that affects oil price situation. The rate of

extraction and production of oil and its consequences on oil companies make the oil price go up or down.

The price of oil and other factors are very influential in the decisions of the CEO of oil companies. For example, the firms respond to energy prices and their changes when making a takeover deal. The energy prices are a motivating factor to buy a new company (Ng and Donker, 2013: 167-181). If the oil price increases, the managers of the oil companies could take advantage of the high valuation of their companies' stock price and because the CEO perceive higher cash flows and investment returns (Ng and Donker, 2013: 167-181).

Finally, we refer to the problem of the de timing of the peak oil. There exist two points of view in the literature. One of them is more optimistic than the other. The optimist point of view is based on the data about the unconventional oil like tar sand in Canada or the heavy oil in Venezuela, for example. Unconventional oil is chosen because production from Venezuela heavy oil field and the oil fields of Alberta in Canada is already underway on a significant scale and unconventional oil is most consistent with the existing infrastructure (Greene *et al.* 2006: 515-531).

The estimated year of the peak oil that this type of opinion defends is situated before 2025. This research indicates that conventional oil production outside the Middle East peaks in 2020 at 3.6 Gtoe (Gigatons of Oil Equivalent). Besides, the decline in the Rest of World (not counting the Middle East) after the peak is slow, about – 0.75% per year, during the next 20 years (Greene *et al.* 2006: 515-531).

Supporting an optimistic approach to the problem of the peak oil, we find organizations like EIA, OPEC or CERA. In fact, the EIA indicates that the peak oil will be closer to the middle of the 21st century. Others associations like the United States Geology Services (USGS) and the International Institute for Applied Systems Analysis (IIASA) support that conventional oil production in the non-OPEC's countries will probably reach a peak sometime between 2010-2030 at 3.6 Gtoe (Greene *et al.* 2004: 1-9).

On the other hand, we have the pessimistic point of view. According to this approach, the oil production peak outside of the Middle East and Africa may occur before 2030 (Greene *et al.* 2006: 515-531). There are many calculations and models to calculate the timing of the peak oil production. In fact, the Campbell/Laherrère models are probably the most accurate to date in predicting future of conventional oil supplies (Bentley, 2002: 189-205). This pessimistic approach is older than the optimistic view. The ''pessimists'', such as Aleklett and Campbell (2003: 153-191), Campbell and Laherrère (1998: 78-83), Bentley (2002: 189-205) have further developed Hubbert's methods (Bardi, 2009: 323-326; Greene *et al.* 2004: 1-9). These studies have applied them to the whole world and concluded that the conventional and unconventional oil would reach its peak by 2010.

3. Method

We are going to work with the financial statements of the five major multinational oil and gas companies in the western world: British Petroleum (UK), Total Fina (France), Chevron (USA), ExxonMobil (USA) and Shell (Netherlands). We study the period between 2011 and 2015. We have chosen this period because in which is estimated that peak oil would start, and we aim to study if this event is reflected somehow in the financial statements of the companies analyzed. The main limitation of past research is that they study the peak oil effect without analyzing the data of the financial statements. Many researchers focus on geology, for example.

The financial statements used are the following: balance sheet, group income statement and cash flow statement. One of the methods used in this work is the vertical and horizontal analysis of the financial statements. Vertical analysis reports each amount on a financial statement as a percentage of another item. The horizontal analysis calculates the variations of each element of the financial statements over time. These techniques allow us to study how each item has changed in relationship to the changes in other items. Horizontal analysis is also referred to as trend analysis. Vertical analysis, horizontal analysis, and financial ratios are part of financial statement analysis.

Regarding the ratios, we are going to use the return and the solvency ratios. These rates are based on the data in the financial statements. They are essential in this analysis because they give us a precise information on such important aspects of economic and commercial viability, indebtedness, etc.

The second source of data is the oil and gas industry data. Maybe the most used sources are the outlook of the prominent oil organizations like Energy International Agency (EIA) (International Energy Administration, 2016) or the Organization of the Petroleum Exporting Countries (OPEC) (Organization of the Petroleum Exporting Countries, 2016). But, the primary source that we have used to investigate the oil situation, in general, is the BP Statistical Review 2016 (British Petroleum, 2016). We decided that the most influential aspect in the oil and gas industry is the Oil price. The financial market has a lot of influence on the oil and gas industry because oil prices are listed on the financial market. The most important price on the oil and gas industry is Brent, and we used it as the price of reference.

4. Results of the Five Major Multinational Oil and Gas Companies and their Relationship with the Situation of the Oil and Gas Industry

4.1. Decline in Oil Production and Oil Price

During the analyzed period, there is a general decrease in several fundamental economic indicators of the five major multinational oil and gas companies. Many researchers show how the most significant oil and gas companies in the western world are presenting bad results (Murphy and Hall 2011: 52-72; Angelo, Steve ST., 2016). Their financial statements are influenced by other data, like oil production and global oil price (Brent) (Alvarez-Ramirez *et al.* 2012: 47-58; (Barsky and Kilian. 2004: 115-134). In this work, we explore a few relationships between the accounting and the global data.

Firstly, the production of the top five oil and gas companies decreased between 2011 and 2015 (see Figure 1). The reason for this oil production reduction is explained by the abandonment of the less profitable oil wells to reach the old returns, along with the drop in global oil demand. The greater the sale of their assets, the higher the returns on investment achieved. However, the above circumstance carries a tendency to a decrease in the productive capacity of companies.

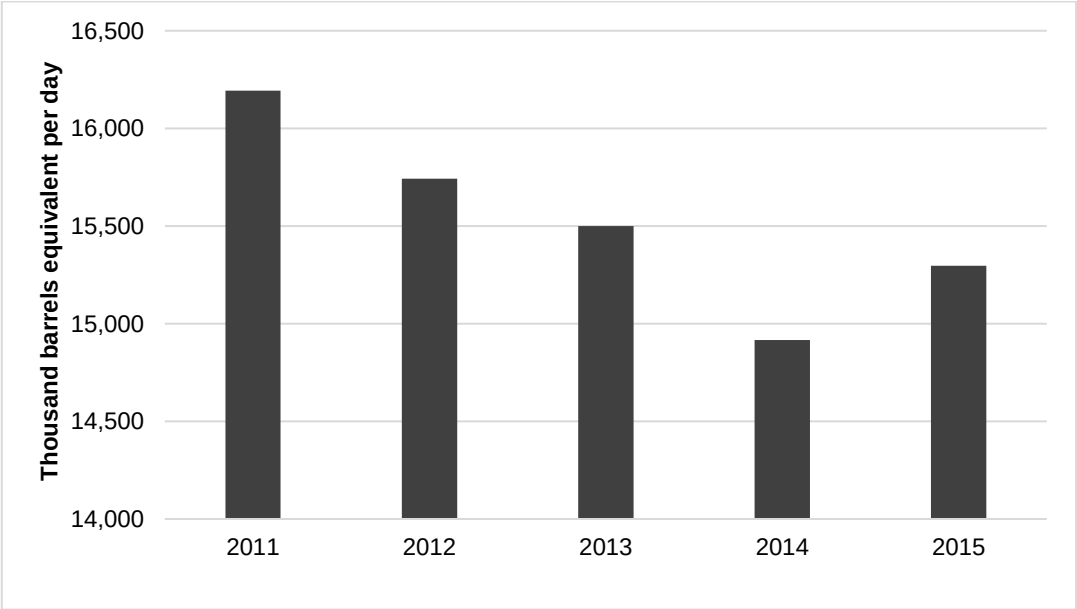

Figure 1. Total Hydrocarbons Production

Due to the global crisis, there was a decrease in demand, so the companies reduced their production (see Table 1). At the same time, the peak oil led to a higher exploration and exploitation costs in unprofitable wells, neither economically nor energetically (Brecha 2012: 586-597; Rogner, 1997: 217-262). Also, the leading oil companies invested in unconventional oil like tar sands in Canada or shale oil in the USA (Greene *et al.* 2004: 1-9; Greene *et al*. 2006: 515-531; Kjärstad and Johnsson 2009: 441-464; Meyer and Attannasi, 2003: USGS Fact Sheet).

Table 1. Five Major Oil & Gas Companies' Production

	2011	2012	2013	2014	2015
Production	16,194	15,742	15,500	14,917	15,297
%Horizontal		–3%	–2%	–4%	3%

Source: This information is based on data from the firms' Financial Statements

Nevertheless, unconventional types of oil need more investment than conventional crude because it is more difficult to extract the oil. Furthermore, the quality of the energy coming from the unconventional oil is worse. This investment policy was the way for the major oil companies to project a right image for its shareholders. Yet it did not happen that way. The return ratios according to our data deteriorated during the analyzed five-year period.

The investment in unconventional oil may happen because conventional oil proved reserves are decreasing. However, according to the BP Statistical Report (British Petroleum, 2016), oil proved reserves are steadily increasing in the years of study. Most of these reserves are in the Middle East and South America and their owners are national companies, like Aramco in Saudi Arabia or PDVSA in Venezuela. Also, this is why private companies should extract unconventional oil more expensively and with more difficulties than conventional oil (Pirog, 2007: Report for Congress).

Secondly, an interesting relationship between global oil price and net income of the five major multinational firms is pointed out. So, while the net income of the five major companies decreased in the period 2011 to 2013 (see Figure 2), the average oil price hit a record high during that time.

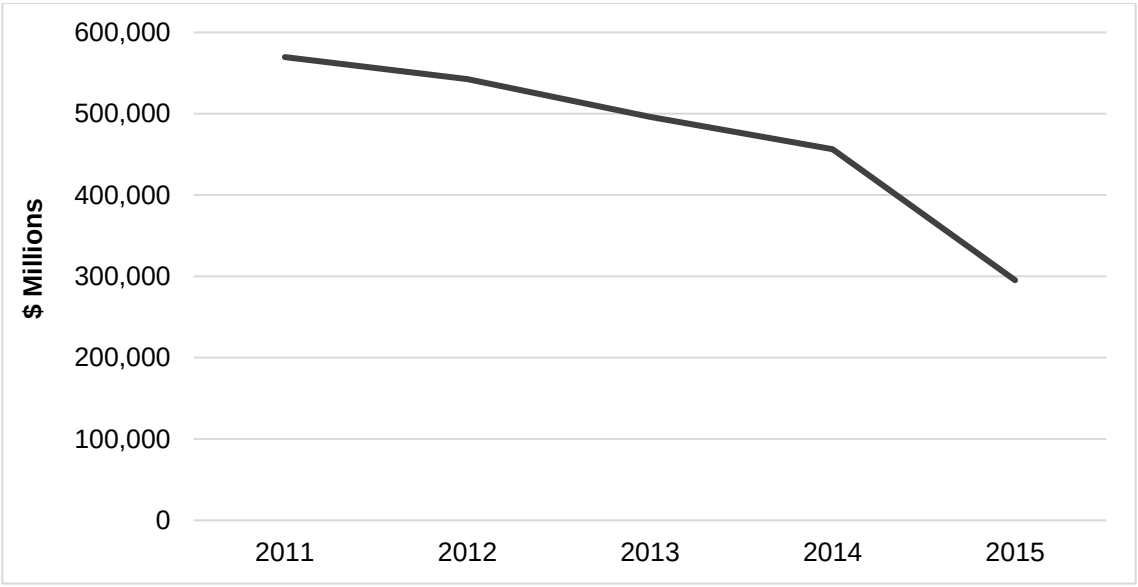

Figure 2. Net Income of the Five Major Oil and Gas Companies

Therefore, although during 2011 to 2014 the price remained at high levels, however, the net income of the five major companies during that period was decreasing. The explanation comes from the production side, that is, peak oil was impacting the profits of the corporations.

As mentioned above, an essential variable in the oil industry is the oil price, in particular, Brent price. The price remained stable during the last few years (see Table 2), but in 2015 the price of Brent barrel halved from almost $100 per barrel to $50 per barrel. Therefore, the highest level of deterioration in net income observed in 2015 is due to the fall in the price of oil as production in 2015 recovered slightly.

Table 2. Global Oil Price vs. Net Income

	2011	2012	2013	2014	2015
Net income	594,883	553,469	519,555	459,979	288,815
%Horizontal		–7%	–6%	–11%	–37%
Brent price	111.26	111.67	108.66	98.95	52.39
%Horizontal		0%	–3%	–9%	–47%

Source: This information is based on data from the firms' Financial Statements and from BP Statistical Review 2016

This circumstance could be one of the causes of the substantial drop in net income in 2014 and 2015 because during the period 2011 to 2013 the Brent price presented values around $100. Therefore, the other cause of net income decreases during 2011-2013 is the decline of oil production. The last one, in the event of peak oil, is not a cyclical situation.

4.2. Additional Cash Needs, Dividend Payment, and Debt

Large investment and pension funds build their portfolio in the oil and gas industry. Because of the size of their investments and their ability to sink or raise the stock price of any company, these funds can influence the decision-making of the groups of which they are stockholders. These funds require companies to pay annual dividends of at least a specific value because the profitability of their portfolios depends on their dividends. That is why they are committed to values traditionally considered safe, such as oil and gas companies.

Capital expenditures (CAPEX) of the top five increased during the period 2011-2013, as can be seen in Figure 3. The CAPEX is the cash used by the company to investment property, plant, and equipment for exploration and exploitation oil activities. Nowadays, many companies are spending a lot of money in upstream activities, but they are not profitable because the costs of extraction are increasing and the oil price is decreasing. In the studied period, there is a peak of capital expenditures in 2013 ($170,502 million). After that, the CAPEX went down to $126,512 million in 2015. The disinvestment plans of the top five companies are evident in this 25% drop of CAPEX during the year 2014 and 2015 (see Figure 3). So, in 2013 companies may be aware of peak oil on the one hand, and they needed to increase the returns offered to their shareholders, on the other hand. Therefore, they began to decrease CAPEX from 2014 looking for their impact on returns, while their dividend distribution policy continued to rise.

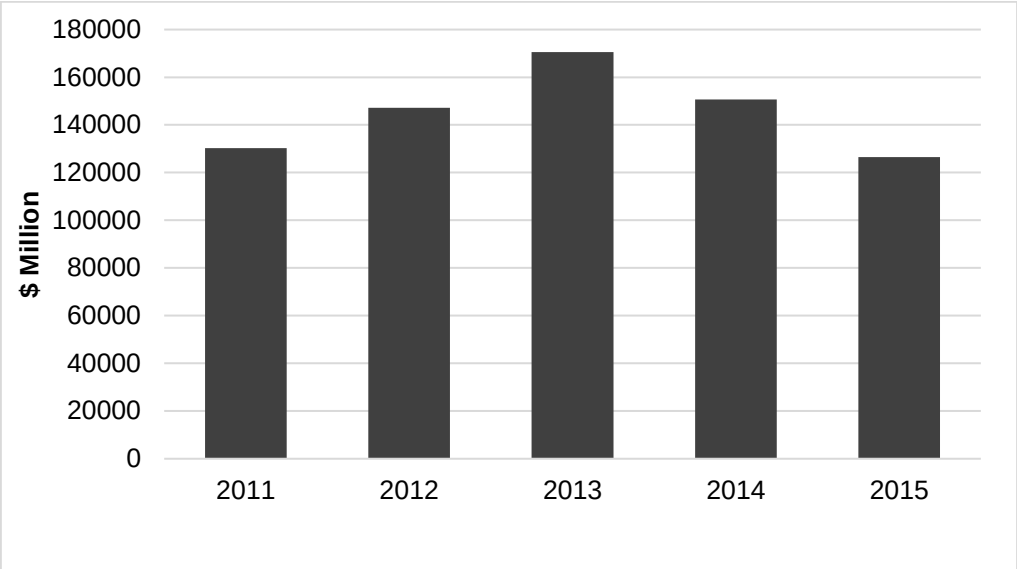

Figure 3. Total Five Major Capital Expenditures

Pressure to pay dividends is leading firms to a situation of severe accounting gap. CAPEX discipline is now a vital issue for oil major companies due to a substantial deterioration in the forecasts made from 2013.

One of the most important financial reports to know the real situation of the companies is the statement of cash flow. In the first place, we are going to analyze the free-cash-flow line item. This item is so important for the companies because it is the money that the companies should spend in other activities. That is why it is a good indicator of company's status of liquidity. The free cash-flows of the five major companies between 2011 and 2015 present an interesting evolution (see Figure 4). The first couple of years the free-cash-flow remained stable around $60,000 million and $70,000 million. Yet in 2013, it collapses to $18,744 million. After that, the free-cash-flow recovers and increases to $56,383 million, but in 2015 it decreases again (less than $8,000 million).

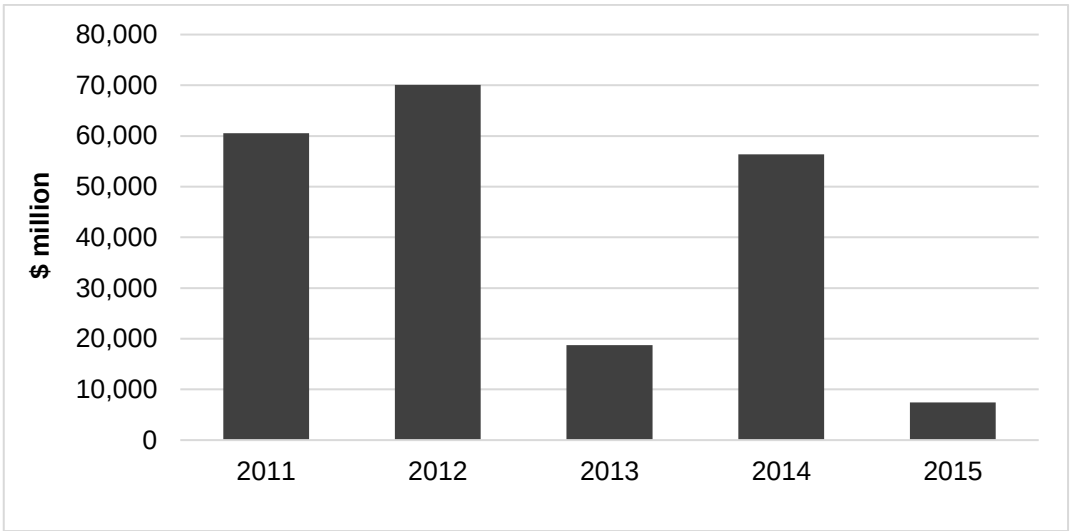

Figure 4. Total Five Major Free Cash Flows

The reason for the rapidly falling free cash flow is due to skyrocketing capital expenditures and falling oil prices. However, this is only part of the picture. Many researchers analyze how the companies spent their free cash flow. Most of them indicate that a few companies spent their free cash flows in the dividend paid. This pay could be seen in the financial statements of the top five companies. The dividends paid remained stable around $35,000 million and $43,000 million. Figure 5 shows the comparison between the expenses in the dividend paid and the free cash flow. In this sense, we see how in a couple of years (2013 and 2015) the costs of dividends paid were higher than the amount of free cash flow.

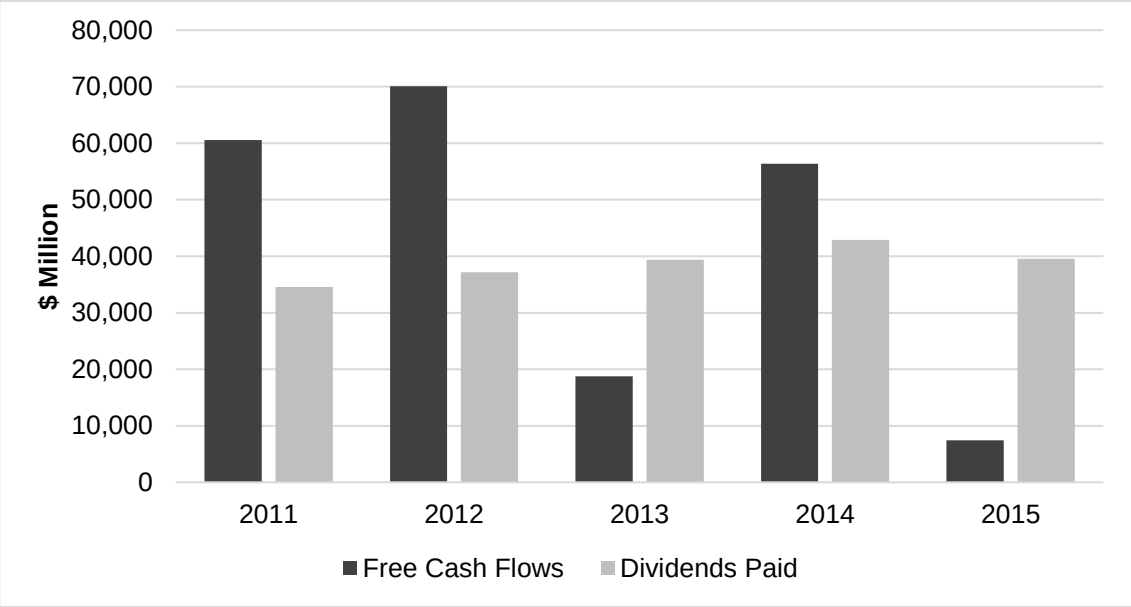

Figure 5. Total Five Major Free Cash Flows vs. Dividends Paid

If we include dividend payouts, the five major's financial situation drops down another notch. While free cash flow does not cover dividend payouts, the money with which the five major companies pay their shareholders must come from its available cash. By including dividend payouts, the company was $ 39,259 million in the hole in 2015 (see Figure 5).

Now, even though the five major companies stated a $542,452 million net income for 2012, its free cash flow minus dividends was only $16,451 million. Moreover, the five major companies did not make any money in 2013 or 2015 after dividends were paid to their shareholders. Thus, deducting dividends from the equation provides a more realistic picture.

If we pay attention, the most significant drivers of cash inflow and cash outflow are summarized in Table 3 below.

Table 3. Sources and Uses of Cash

Sources of cash	Uses of cash
Cash from operations: the amount of money a company generates from operations.	Capital expenditures: purchases of property, plant, and equipment.
Proceeds from sales of property, plant, and equipment.	Dividends provided to shareholders.
Changes in debt: involves both new debt obligations and existing debt reductions. When new debt obligations exceed existing debt reductions, it is considered a source of cash; otherwise, it is a use of cash.	
Share repurchases: both issuing stock (sales) and purchasing common.	

Based on data compiled from annual reports and shown in Table 4, for the year ending December 31, 2015, cash from operations for the five major oil and gas companies totaled

$114,569 million, and major uses of cash totaled $156,016 million, a difference of almost $42,000 million. This shortfall was filled through a $45,007 million net increase in debt. In the analyzed period the negative difference between sources and uses of cash has increased from $3,461 million in 2011 to $41,447 million in 2015, and had a maximum difference of $51,722 million, corresponding to the year 2013.

Table 4. Five Major Oil and Gas Companies Cash Items

	2011	2012	2013	2014	2015
Cash from operations	179,818	184,140	164,762	176,975	114,569
(-) Uses of cash	183,279	186,623	216,484	190,529	156,016
Contractual financial obligations	38,657	46,235	39,396	44,933	44,871
Cash from investment	119,267	114,050	146,018	120,592	107,124
Net share repurchases	25,355	26,338	31,070	25,004	4,021
Differences	–3,461	–2,483	–51,722	–13,554	–41,447
+ Contributions from lenders (source of cash)	335	12,268	30,270	34,903	45,007

Source: This information is based on data from the firms' Financial Statements

Uses of cash are the sum of three cash outflows:

- Contractual financial obligations: this variable is formed by dividends paid, debt reductions and interest paid.
- Cash flow for investing activities: where CAPEX is the more important item.
- Net share repurchases: involves the net purchase of common stock.

In addition to dividends payouts, the reason for the considerable decline in the five major companies' surplus cash was due to two factors: higher capital expenditures, and higher purchase of shares.

Although increases in dividend payments put more emphasis on the financial situation of the company, the real problem is the massive increase in Cash flow for investment. Very few investors realize the devastating effects of rising investment flows on the five major companies' financial return.

For example, in 2011, the five major companies paid $119,267 million in investment flows, while oil production by the five firms reached 16,194 thousand barrels per day. However, their Cash flows for investment increased by about 22 percentage points to 146,018 million dollars in 2013, while its oil production fell. That is, the five major companies paid 22% more in investment projects to produce 694,000 barrels per day less than in 2011.

When the five companies realized, in late 2013, that the market did not pay $120/barrel (the cost of new investment projects), they began to cut back on their investment payments. Total oil production has declined since 2011 to 15,297 thousand barrels in 2015, which shows that new investments in non-conventional oil (challenging to extract) have not been successful.

The five companies had to increase their payments in new investment projects (new oil fields) by 22% to keep production low. At the same time, the price of oil fell from $100 to $50 per barrel, which severely undermined the decisions of new investments in non-conventional oil taken by the five major companies.

It seems as if the five major companies early realized that peak oil had finally arrived (privately, of course), so they decided not to waste too much money on future oil projects. Instead, the companies spent an unusual amount of money on stock purchases.

We can observe that the net total free cash flow for the five major companies were $182,086 million from 2011 to 2015. According to the annual reports, the five major companies spent the staggering amount of $111,788 million on stock purchases since 2011 to 2015, which means, the five major oil companies preferred to purchase new shares of low-value firms than use their surplus cash to fund new oil projects. The purchase of shares declined from 25,355 million in 2011 to 4,021 million in 2015. This drop is indeed an interesting way for the five major companies to use its surplus cash. Now that we know the lower production and oil price were gutting the entire oil industry, the five major companies decided to stop buying new shares.

If we include shares buying, CAPEX spending, and dividend payouts, the five companies broke even in 2012 and had to start tapping into cash reserves or borrowing money to fund their deficits. In just five years (2011-2015), the five major companies spent $112,667 million more than they received from operating cash (see Table 6). This gap has had a profound impact on the five major companies' long-term debt.

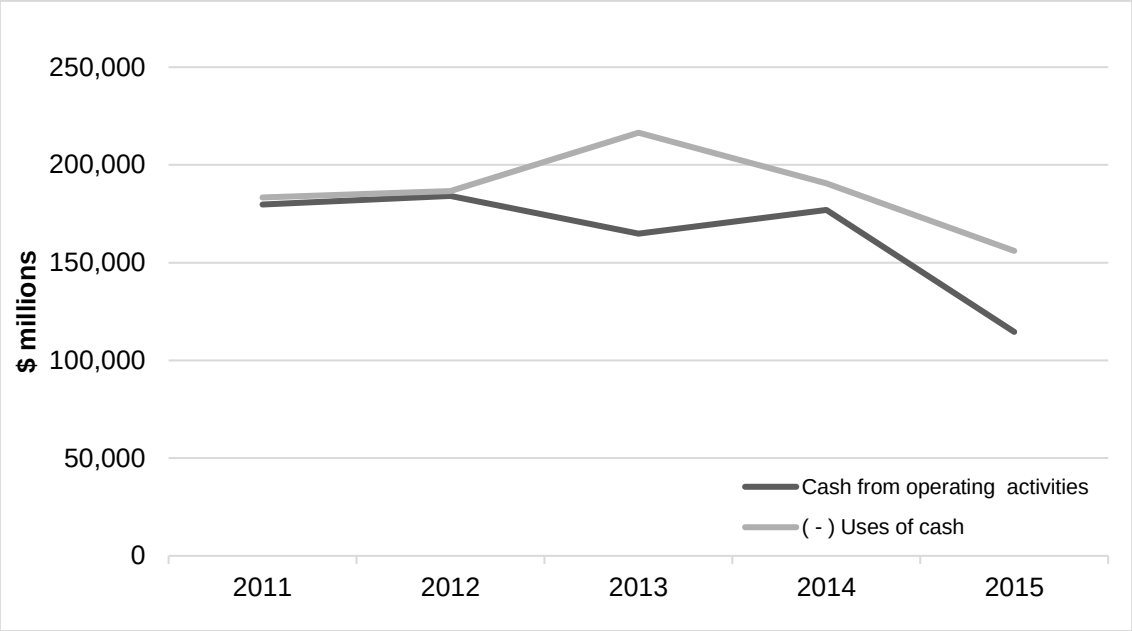

Figure 6. Five Major Oil and Gas Companies' Cash from Operation and Uses of Cash

The five major companies may close the gap between Cash from operating activities and Uses of cash by incurring debt. To meet spending with relatively flat growth in cash from operations, the liabilities of the companies massively increased in the period from 2012 to 2015 (see Figure 7).

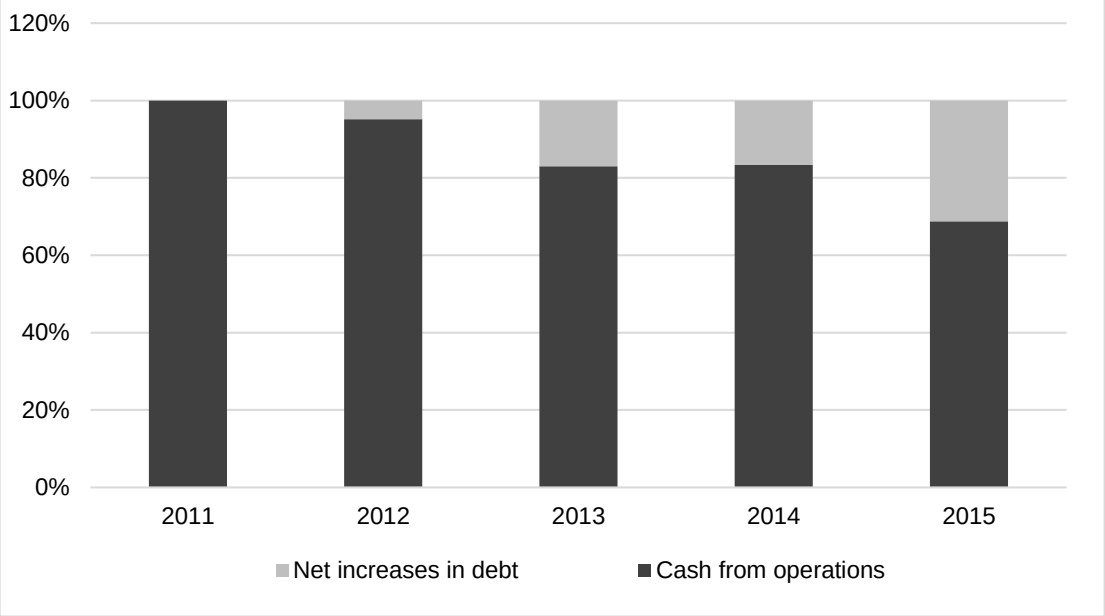

Figure 7. Sources of Cash for Top Five Oil and Gas Companies

Also, long-term debt of the five major companies from their balance sheet gives us a lot of information about the situation of the oil companies (see Figure 8). Between 2011 and 2013, long-term debt remained stable. Yet from 2013 to 2015, it grew up from $598.933 million to $720.315 million. This increase means that the five major companies are more indebted at the end of the analyzed period due to the greater needs of uses of cash.

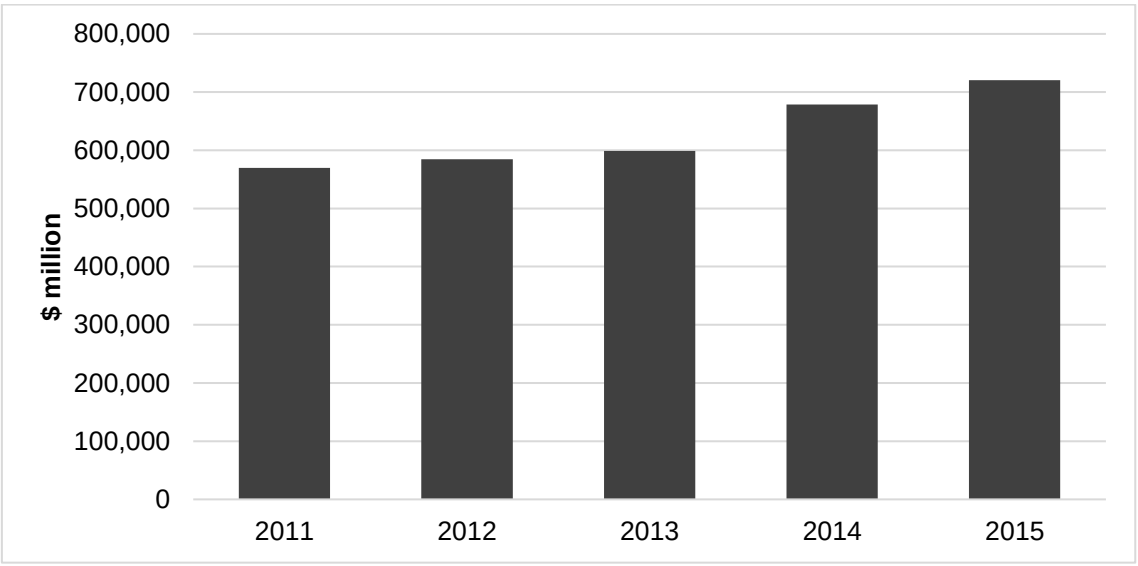

Figure 8. Total Major Long-Term Debt

Regarding the operating cash of the five major companies, the graphic has a similar tendency between the years 2011 and 2014 (see Figure 9). The amount of operating cash moves around $35,000 million and $21,000 million. This trend was broken between 2014 and 2015, and it decreased from $35,000 million to $21,000 million (a decrease of 35%). This issue could be related to the oil production. We can see an indirect relationship between them. While

oil production increased in 2015, the operating cash of the five major companies decreased. Therefore, the drop in Brent price is a variable that influences the evolution of cash from operations.

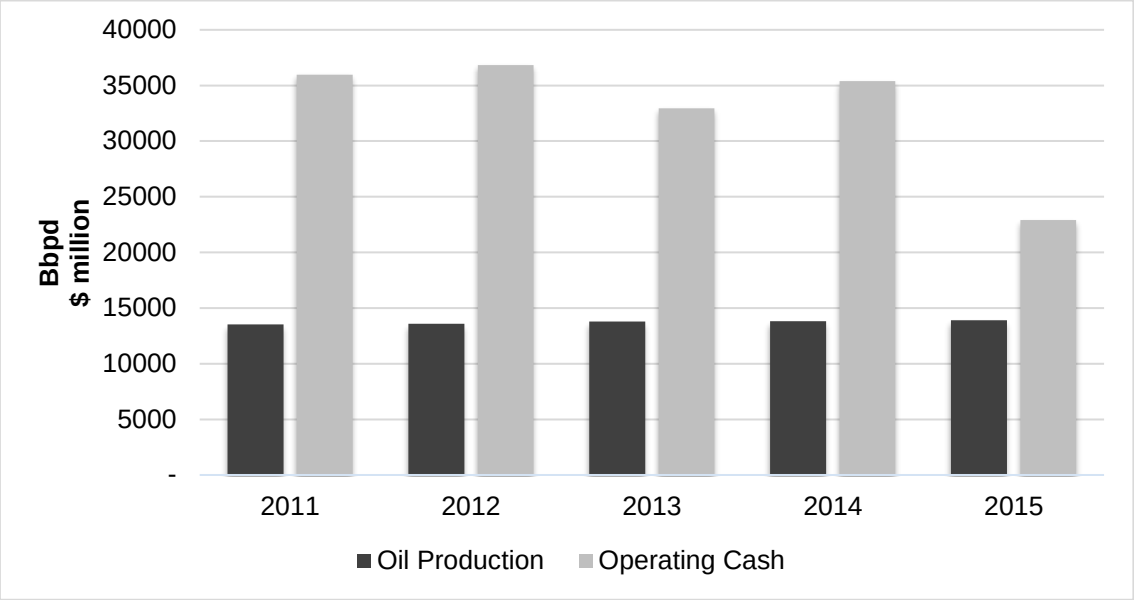

Figure 9. Global Oil Production vs. Operating Cash

4.3. Economic and Financial Return and Risk

In this section, two of the most important ratios about the performance of companies are analyzed. One of them is the Return on Equity (ROE) before taxation. The ROE before tax of the five major oil and gas companies has a downtrend. The rate decreases from 58% in 2011 to 24% in 2015 (see Figure 10). This decrease is because the oil and gas companies have several non-profitable projects because of aspects like high costs or reductions in oil prices. Therefore, if a company invests in a few upstream activities, but these activities are not profitable, the ROE of this company will be low.

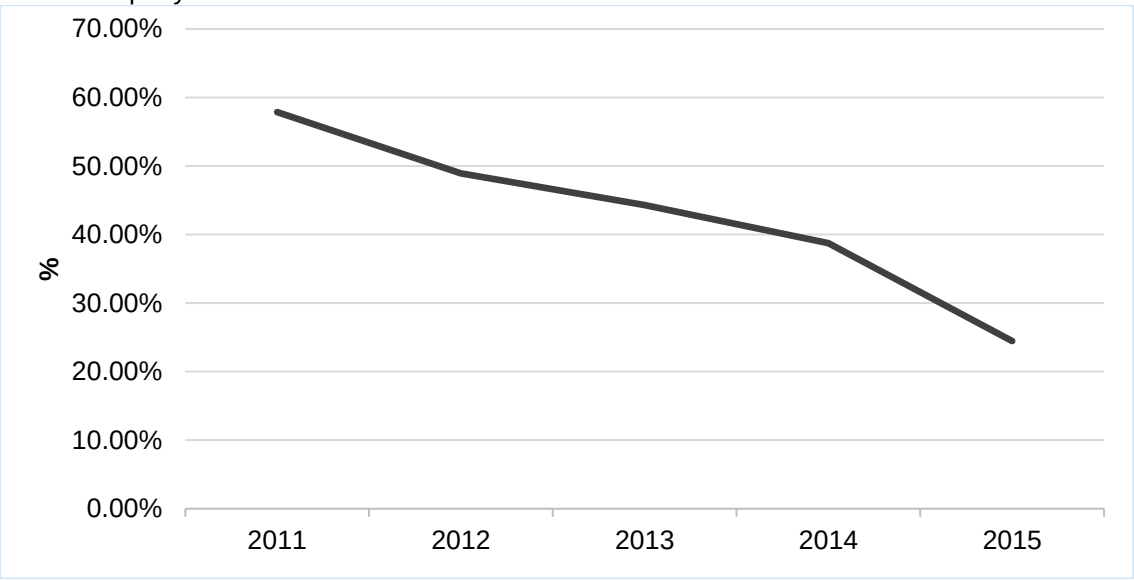

Figure 10. ROEbt (EBIT/Equity)

The ROEbt is decreasing stronger during 2011-2014 than during the rest of the period. This drop happens because over the year 2014 and 2015 the Brent price suffered the highest fall in the last few years. The fall keeps over the years decreasing by 35% although in the previous two years the drop is more prominent by the effect of the Brent price.

Table 5. ROEbt

	2011	2012	2013	2014	2015
ROEbt (EBIT/Equity)	58%	49%	44%	39%	24%
fm (EBIT/Sales)	37%	35%	34%	31%	29%
r (Sales/Investment capital)	0.92	0.85	0.80	0.73	0.48
e2 (Investment capital/Equity)	1.70	1.64	1.65	1.71	1.77
e (Debt with cost/Equity)	0.70	0.64	0.65	0.71	0.77

Source: This information is based on data from the firms' Financial Statements

Top five oil and gas companies achieve their ROE through the margins rather than through the rotation (see Figure 10 and Table 5). Concerning rotation, this decrease in all the years of the analyzed period is about 40%. Yet between 2014 and 2015 the rotation decreased by 20%. This drop happened because the rotation is related to the decline of the Brent oil (British Petroleum, 2016), while the margin is around 30%-40%. Namely, the oil and gas companies have more profitability by the margin than by rotation. The oil and gas industry is a sector where the companies sell expensive so that the margin is much more significant than the rotation.

In 2015, all these variables presented a bad behavior more than in the previous years. This practice happened because the Oil price suffered a significant drop between 2014 and 2015. The five major oil and gas companies are low in debt because its debt rate is less than one. So, the own resources are more prominent than total liabilities. As we shall see below the low indebtedness may be due to the fact that the debt is very cheap for these companies.

Also the other ratio, return on investment capital (ROIC), has the similar pattern than the ROEbT. In 2011, there is an ROIC of 34%. However, over the years, the rate falls to less than 15% (see Figure 11).

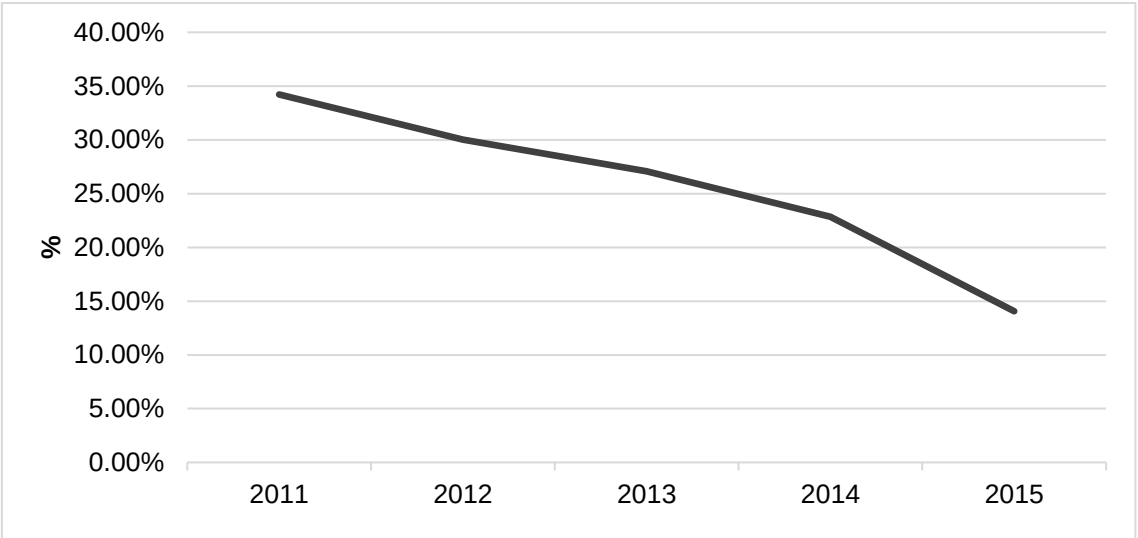

Figure 11. ROIC (EBIT + Finance Cost)/Investment Capital

The rate ROIC decrease during the period 2011-2015 because of the deterioration of margin and rotation over this time (see Figure 11 and Table 6). These data are the same than the data for ROEbt.

Table 6. ROIC and Weight Average Cost of Capital

	2011	2012	2013	2014	2015
ROIC (EBIT + Financial cost)/Investment capital	34%	30%	27%	23%	14%
em (EBIT + Financial cost)/Sales	37%	35%	34%	31%	29%
r (Sales/Investment capital	0.92	0.85	0.80	0.73	0.48
ke	5%	5%	5%	5%	3%
ki'	0.3%	0.4%	0.3%	0.3%	0.5%
WACC	3%	3%	3%	3%	2%

Source: This information is based on data from the firms' Financial Statements

The five major oil and gas companies are profitable because ROIC is bigger than the WACC (Weighted Average Cost of Capital). As we can see in Table 5, the differences between the ROIC and the WACC is considerable, even in 2015 when the ROIC declined to 14%. The WACC remains stable during the whole period, and it just decreases 1% in every year. This difference is big for the oil and gas companies because their profitability is bigger than the cost of their capital. Probably, this situation can be maintained for the finance cost of its loans with the financial institutions. Thus, it is advisable to use more debt. The ROIC is bigger than ki' (financial cost of the debt with cost). At the same time, ki' is less than ke (cost of own capital). This fact can be seen in Table 5. During the period under analysis, ke is much greater than ki'. For instance, in 2015 the cost of own capital is 3%, while the financial cost of the debt is 0.55%.

Now, we are going to focus on the leverage phenomenon. Leverage exists when the ROE is bigger than the ROIC. Namely, to greater credit, more leverage and lower investment in own resources. In this case, the major oil and gas companies present leverage because the ROE is bigger than the ROIC. This financial situation of the companies could be a disaster if the leverage will increase over time. In fact, this does not happen. One of the reasons that explain this is the cheap credits obtained by oil and gas companies get. But theoretically, a company that has much leverage, may also have a substantial risk.

Finally, we are going to highlight some data about the debt. In Table 5, we can see that the ratio e (Debt with cost/Equity) increases during the period, from 0.70 in 2011 to 0.77 in 2015. The indebtedness is less high than the own equity. Notwithstanding, the debt is growing in the five years so that the five major oil and gas companies are more indebted through time. In theory, a greater use of debt could result in an improvement of ROE. But in fact, this does not happen in the five major oil and gas companies. This particular situation is because the oil production is decreasing (see Figure 1), and this is why ROE of the oil and gas companies is going down. Also, ROE is down because of the Brent oil crash between 2014 and 2015 (see Table 2).

5. Discussion and Conclusions

Empirical results show how the peak oil has effects on the economic position of the five major oil and gas multinational companies analyzed. Moreover, these empirical results support the consideration of this issue in the companies' decision making. It appears that managers are influenced by the decrease in oil reserves when formulating their production, investment, and financing policies. The results suggest that when oil production and oil prices are both low, the uses of cash are higher than the cash flow from operating activities. The effects of peak production and oil prices seem to be additive and dependent, and therefore they interact.

Although there were significant main effects for the investment decisions and dividends policy, the size of these effects suggests that the new investments and the dividends paid

appeared to have a stronger impact on managers when they evaluated the return on investment and the return on equity, respectively.

These findings are intuitively appealing because CEOs decisions are probably more closely associated with the financial market and the peak oil is more closely linked with the real economy.

These results imply that stockholders may focus on the return on equity to determine how they perceive the company. In turn, the impact of the peak oil, even if highly credible, will not be as important as the return on equity of the company when stockholders assess their future shares in the company. Therefore, whereas managers may want to be aware of the impact that the peak oil can have on the economic position when it comes to making decisions, the dividends paid by the corporation appear to play a more significant role.

This study also indicates that the dividend policy of oil and gas companies is significantly more important than the purchasing decisions regarding other companies' shares. Perhaps a reason why purchasing decisions were not significant for managers is that the purchase of new enterprises of unconventional oil was not profitable, due to both peak and oil prices.

Future research should attempt to replicate these results for further samples of oil and gas companies (e.g., companies from OPEC), as well as to investigate the impact and direction of both peak production and oil prices on the decision-making process. It might be appropriate for future research to evaluate the relationship between investment, purchasing decisions and dividend policy in the context of peak oil and to assess the impact of high and low oil prices.

The present study has certain limitations, and the recognition of these should help refine future research efforts. Addressing generalization is important. The findings are limited to the five major multinational oil and gas companies analyzed. Future research with other companies could shed light on the limits of these results. The companies of our sample have similar characteristics, so any generalization to other oil companies should be made with caution.

Despite the above limitations, the research findings demonstrate that the peak oil has an impact on the economic position of the companies as well as on oil price. By assessing the effect that both issues have on the decision-making process, decision makers can gain a complete understanding of the impact that many of these phenomena have on managers decisions and thus may be able to develop more effective strategies.

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