

**WHAT DRIVES ASSET TRANSACTIONS ON THE  
NORWEGIAN CONTINENTAL SHELF?**

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## **Abstract**

What drives asset transactions on the Norwegian Continental Shelf? This study evaluates the influence of commodity prices, as well as energy reserves, on the number of asset transactions per year on the Norwegian Continental Shelf (NCS). The empirical data collected from the NCS from 2000 to 2014 seems to suggest that merger and acquisition transactions are influenced by oil reserves; the data also shows that gas reserves are an upside for the acquirer involved in merger and acquisition transactions. Surprisingly, changes in oil prices and acquisitions show causality in both directions. However, although causality is found, the correlation between the change in oil price and mergers and acquisitions transactions is weak and with low significance; the reasons for this behavior will be discussed in detail. Furthermore, by use of a triangulation method, a description and classification of the possible strategic drivers related to the asset transactions on the Norwegian Continental Shelf during the last 14 years is also presented. This study is based mainly on the publicly available data from the Norwegian Petroleum Directorate.

## Abbreviations

SDFI	State Direct Financial Interest
NCS	Norwegian Continental Shelf
USD	US Dollars
NOK	Norwegian Krone
Mill	Million
Sm <sup>3</sup>	Standard cubic meters
oe	Oil equivalent
Bbl	Barrel
ft <sup>3</sup>	Cubic feet
M&A	Mergers and Acquisitions
NPD	Norwegian Petroleum Directorate

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## 1. Introduction

Many arguments about the reasons for mergers and acquisitions can be found in the literature, although these types of transactions in the oil and gas industry have not received as much focus as they require. Ng and Donker (2013) studied the effects of different factors behind the management decisions for mergers and acquisitions in Canada by using data from the oil and gas industry. However, they did not focus on the traditional economic and environmental factors, but evaluated the reasons for mergers and acquisitions from a novel perspective; that of energy reserves and commodity prices.

Asset transactions in Norway can be an interesting topic. Norway, with an average oil production of 1.9 million barrels of oil per day, has a global position in the oil and gas industry; it was ranked 15<sup>th</sup> by national oil production in 2014, and third by oil exports for 2013.<sup>1</sup> And it seems that Norway has still an active portfolio for future developments; at the end of 2013, thirteen fields were under development, forecasting a total future investment for 2014 and 2015 of approximately 120 billion krone.<sup>2</sup>

Mohn and Misund (2011) mentioned that oil and gas investments have focused on increasing the ownership of scarce oil and gas reserves during recent years, and Ferguson and Popkin (1982) proposed that the only reason for a company in the oil and gas industry to purchase reserves is to increase the amount of resources owned by that company; however, they did not empirically demonstrate this. They also mentioned that the market price of the target must be equal to the market price of its resources. They gave the explanation that behind the premium value of an asset is the depreciation tax shield, which gives added value to the company.

This study will be divided into five main parts. The first section provides a general background for the first decades of the history of oil production and the initial years of the industry in Norway. The second part will give a detailed explanation of the main parameters considered for an asset evaluation and the model used for it; after

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<sup>1</sup>U.S. Energy Information Administration (<http://www.eia.gov/beta/international/>).

<sup>2</sup>Norwegian Petroleum Directorate (<http://npd.no/en/Publications/Resource-Reports/2014/Chapter-3/>).



this the reader will possess the basic general knowledge required to understand some of the concepts and theories discussed later on, after the findings. Third, the hypotheses for this study will be presented. The hypotheses developed are based on the results obtained by Ng and Donker (2013); they showed that energy reserves and prices influenced the corporate decision making for mergers and acquisitions in Canada, and similar hypotheses will be tested based on data available for the Norwegian Continental Shelf. In the fourth part, a discussion of how commodity prices and energy reserves influence decisions in mergers and acquisitions will be presented, and also a description and classification of the possible strategic drivers behind the transactions in the NCS during the last 14 years.

The fifth and final part will consist of a set of conclusions and recommendations based on the results of this study.

## **2. Definition of Terms**

In this chapter, some of the concepts that are used during the data acquisition, analysis, results and discussion will be defined.

### ***2.1 Asset***

For this study, the definition of “asset” will be related to the participation interest of a company in a Norwegian Continental Shelf (NCS) production license. The production license can be linked to a production field or an exploration area; in this study, both active and inactive production licenses will be included. The reason for this decision is that although currently a production license may be classified as inactive in the Norwegian Petroleum Directorate database, during the period of interest that transaction may have been active and valid.

### ***2.2 Transaction***

The definition of “transaction” in this study will be closely related to a partial or total change in a company’s participation in an asset. The reasons behind the different possibilities determining the companies’ changes in participation will be discussed in detail when the strategic drivers are defined and listed.

### ***2.3 Divestitures and acquisitions***

Divestiture will be the general term used to describe a transaction from the seller’s point of view. Conversely, acquisition will be the general term use to describe a transaction from the acquirer’s or buyer’s perspective.

### ***2.4 Mergers***

Mergers will be the general term used in this study to refer to mergers and takeovers; they will describe the merging of assets from a company’s and not from an assets perspective.

### 3. Introduction to the oil and gas industry

#### 3.1 Oil and gas industry

The first phase of the modern oil industry is generally associated with Colonel Edwin Drake, in the United States in 1859. A later event in the history of the oil industry occurred in 1882, when the Standard Oil Trust was created by John D. Rockefeller, from the union of Standard Oil and 39 affiliated companies. These companies controlled 90% of the kerosene market at that time (Inkpen and Moffett, 2011).

The second important phase began in 1901, when the Spindletop oil field was discovered in East Texas. After this event, petroleum was used as a major fuel for future inventions, among them the airplane and automobile. The age of oil and gas as among the most important sources of energy had started (Inkpen and Moffett, 2011).

In 1911, the monopoly of power created by Rockefeller was forced to dissolve, and this event gave birth to the oil companies known as the “Seven Sisters” (Inkpen and Moffett, 2011). There was also another important player, the Compagnie Française de Petroles (CFP), which in some cases was known as the “Eighth Sister”. To gain a perspective of the power of these companies, in 1971 the Seven Sisters and CFP accounted for about 81 percent of the global crude oil production; in 2006 the same companies accounted about 12 percent (Davis, 2006). The transformation over time of the Seven Sisters can be observed in Table 3.1.

Table 3.1 Transformation over time of the Seven Sisters and Total. (Table based on that presented by Davis, 2006, p. 3)

1971	2000	2014
Esso	Exxon/Mobil	ExxonMobil
Royal Dutch Shell	Royal Dutch Shell	Royal Dutch Shell
British Petroleum	BP-Amoco-Arco	BP
Chevron	Chevron Texaco	Chevron
Texaco		
Gulf Oil		
Mobil		
CFP	TotalFinaElf	Total

Since 1971, many acquisitions of small companies by big ones and other mergers have occurred; some say these mergers were vital due to the heavy capital

investments required in new oil provinces, and also as a way to reduce risk exposure (Davis, 2006).

### 3.2 General Strategy in the Oil Industry

To understand better the main strategies in the oil industry, it is necessary to start discussing the value chain; value refers to what the customers are willing to pay, and the value chain includes each one of the specific actors that create value during the process (Inkpen and Moffett, 2011).

There are three main segments in the oil and gas industry value chain; see Figure 3.1. A short description of each of them is given below (Inkpen and Moffett, 2011):

- a. Upstream: related to exploration and production
- b. Midstream: related to transportation and trading
- c. Downstream: related to refining and marketing

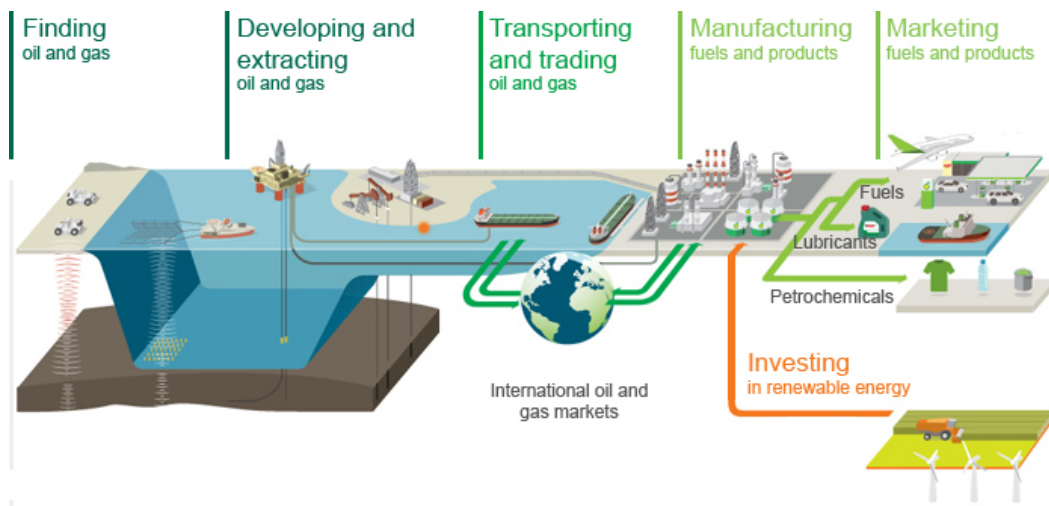


Figure 3.1 Value chain the in oil and gas industry. Image taken from BP's website. <http://www.bp.com/content/dam/bp/images/large-images/our-business-model-700x490.jp>

Although some of the oil companies discussed in this study have integrated operations in the three segments mentioned above, the focus of this study will be on the upstream component.

The creation of the Organization of the Petroleum Exporting Countries (OPEC) in 1960 had the objective of shifting the bargaining power between oil-producing

nations and oil companies (Inkpen and Moffett, 2011). Before the OPEC nationalization in the early 1970s, the oil companies had ownership of the oil and gas reserves, as well as the refining capacity and marketing, in what is known as vertical integration (Davis, 2006). When the verticality was broken by the OPEC nationalization, the major oil companies tried to keep their vertical integration by signing long-term supply contracts with the new owners of the crude oil reserves and focusing on developing new oil provinces outside OPEC, among them the North Sea (Davis, 2006).

Although the oil companies could ensure crude oil supply by the use of contracts, the volatility of the oil price could not be controlled. The stronger influence in the oil price will be on hands of the OPEC countries. The common picture was the existence of different oil prices between producers, and also over time. This was changed by the emergence of markets where there were contracts for specific types of crudes; namely, the Brent and the West Texas Intermediate, the former in the North Sea and the latter in the United States of America. These contracts could be traded in organized future markets. The advantage was clear; the oil production from the upstream sector could be sold to any buyer, not just the downstream part of the same company. Meanwhile, the refineries could ensure future supply with a more stable range of future prices (Davis, 2006).

### ***3.3 The North Sea and the oil industry***

It is important, in case the reader is not familiar with the region, to start by mentioning that the Norwegian Continental Shelf is divided currently into three regions (see Appendix A). They are, from south to north: 1) The North Sea, 2) the Norwegian Sea, and 3) The Barents Sea.

Although the stories of the British and Norwegian continental shelves were developing at the same time, the main focus here will be on the latter.

In the northern coastal region of the Netherlands in 1959, there was the discovery of the Groningen gas field; this was the first event that gained the attention of the oil companies in the North Sea (Nelsen, 1991).

In September 1962, representatives of the Phillips Petroleum Company evaluated the possibility of oil in the Norwegian Continental Shelf; later that year they approached the former Secretary-General of the United Nations, Trygve Lie, the only Norwegian they had in mind, and delivered a draft proposal for exploration purposes in the Norwegian Continental Shelf (Nelsen, 1991).

In 1962 the oil industry did not yet exist in the North Sea. Norway, as well as the UK, was not ready to let foreign companies explore for oil and gas. The Norwegian Continental Shelf was not even divided, and legislation about how to regulate these activities was nonexistent (Noreng, 1980). Within three years, all of this had changed.

The government was currently researching the best way to open areas for exploration, and several models were studied. The royal decree was promulgated on April 9, 1965; thus the Norwegian licensing system was born, and it was created to uphold the tradition that the nation would regulate foreign investment. There were two types of licenses created; reconnaissance licenses and production licenses (Nelsen, 1991).

The first areas given for exploration were of about 500 square kilometers, larger than in the UK, with the purpose of attracting more attention from the oil companies. The first oil discovery was made in 1967 by Esso, but the field was considered not to be economical at that time; 32 years later it was brought into production as the Balder field<sup>3</sup>. Another discovery, this time in 1968 by Phillips Petroleum, was the Cod field; a gas condensate field, which was also considered too small to be profitable. It seemed there had been relatively little success in the first round, and due to this the government announced a second round of licensing. This time, participation was limited to the companies that had been assigned with production licenses in the first round (Nelsen, 1991).

On December 23, 1969, after drilling 33 dry holes and close to giving up, thanks to government pressure Phillips Petroleum decided to drill the last well, 1000 feet away from the last one. Thus they struck an oil and gas giant, which they called Ekofisk;

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<sup>3</sup> Source NPD (<http://npd.no/en/Publications/Norwegian-Continental-Shelf/No1-2015/>)

and this is how the oil boom was born on the Norwegian Continental Shelf (Nelsen, 1991).

As stated earlier, the oil companies were looking to develop new oil provinces outside of OPEC, due to all the political intervention in the oil companies' activities, Norway included. In 1971 the government decided to review their policies, emphasizing state participation in the oil activities (Noreng, 1980). It cannot be denied that Norway had been waiting for favorable conditions upon which they could revise their policies (Nelsen, 1991).

The last step of the state's intervention was the birth of its own national oil company, Statoil; a national oil company was seen as a tool that allowed the government to directly influence decisions about development and investment in diverse oil activities (Nelsen, 1991).

In the decades to come, offshore activity would increase considerably, and policies, regulations, and tax reforms would evolve as well. Some of the most relevant changes in tax regulations made during the last 14 years will be mentioned here. The first was in April 2001, which created the possibility of deducting onshore losses against offshore tax. The rules regarding deductibility and financing costs were tightened, and the allocation of financing costs was based on written down declared asset tax value, but there were no changes to the uplift and depreciations rules. The second reform occurred during June 2003; the main change was that all abandonment costs became tax-deductible in the same year that expenses are paid. The third change happened during May 2004, in which the total amount of uplift applied to capital expenditure rose to 30% over four years (starting on January 1, 2005). The government decided to pay back exploration expenditure in the same tax year as expenses incurred, finally guaranteeing that the full value of any losses due to operating in the NCS could be realized. The last change was in May 2013; this involved new legislation on the treatment of uplift. The rate was reduced to from 30% to 22%.

### ***3.4 Classification of the oil companies***

Shuen et al. (2014) commented on the increase of the strategic complexity for managers, due to the increase in different competitors who are not homogeneous: for

example, National Oil Companies (NOCs), International Oil Companies (IOCs), and independents. It is possible to observe how many company types exist in the oil and gas industry. What will differentiate the oil companies is not just the assets that they own, but the way they operate and the procedures they follow (Garcia et al., 2014). For the purposes of this study, the companies that are in the upstream part of the value chain of the oil and gas industry will be the main focus.

A proposed classification of the different oil companies in the industry, based on the clarification given by Davis (Davis, 2006), will be used. Seven types of oil companies are identified in the table below:

Table 3.2 Classification of oil companies according to type of activity and size

<b>Type</b>	<b>Characteristics</b>	<b>Example</b>
Integrated oil company (IOC)	<ul style="list-style-type: none"> <li>• Upstream, midstream and downstream</li> <li>• Large and medium size</li> </ul>	<ul style="list-style-type: none"> <li>➤ Chevron</li> <li>➤ ExxonMobil</li> <li>➤ Shell</li> <li>➤ Eni</li> <li>➤ Marathon</li> </ul>
International oil company (IOC)	<ul style="list-style-type: none"> <li>• Upstream, midstream and downstream</li> <li>• Compete internationally</li> <li>• Partnership with National oil companies</li> </ul>	<ul style="list-style-type: none"> <li>➤ Chevron</li> <li>➤ ExxonMobil</li> <li>➤ Shell</li> </ul>
Supermajor	<ul style="list-style-type: none"> <li>• Upstream, midstream and downstream</li> <li>• The *5 largest oil companies</li> </ul>	<ul style="list-style-type: none"> <li>➤ BP</li> <li>➤ Chevron</li> <li>➤ ExxonMobil</li> <li>➤ Shell</li> <li>➤ Total</li> </ul>
National oil company (NOC)	<ul style="list-style-type: none"> <li>• Upstream, midstream and downstream</li> <li>• Controlled by national government</li> </ul>	<ul style="list-style-type: none"> <li>➤ Statoil</li> <li>➤ Gazprom</li> <li>➤ Petrobras</li> <li>➤ Pemex</li> </ul>
Independent	<ul style="list-style-type: none"> <li>• A nonintegrated company</li> <li>• Generate revenue from upstream or downstream activities</li> </ul>	<ul style="list-style-type: none"> <li>➤ ConocoPhillips</li> </ul>
Junior	<ul style="list-style-type: none"> <li>• Small firms</li> <li>• Production between 500 and 10,000 barrels of oil equivalent per day</li> </ul>	<ul style="list-style-type: none"> <li>➤ Noreco</li> </ul>



#### 4. Market value of an asset in relation to mergers and acquisitions

Ng and Donker (2013) presented a short illustration of how reserves and commodity prices can influence mergers. The model of synergy and wealth they presented to explain merger and acquisitions between two companies is expressed as follows:

$$Acquirer_{value} + Target_{value} = combined\ wealth$$

There will be synergy if the combined wealth is larger than the Acquirer + Target.

The wealth in a natural resource firm is the difference between the sales of the resource, less the costs of the extraction, plus the remaining resources (Ng and Donker, 2013). In the equation below, the sales and cost overtime are discounted to the present value.

$$(Sales - Costs + Reserves)_{Acquirer} + (Sales - Costs + Reserves)_{Target} = Sales - Costs + (Reserves)_{Combined}$$

To gain a better understanding of each of the components in the equation above, they will now be discussed in more detail.

##### 4.1 Sales

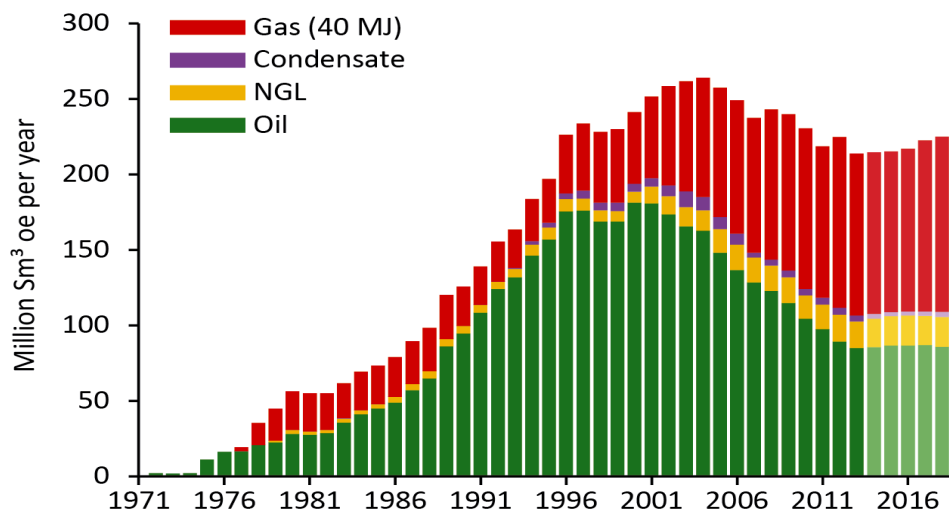


Figure 4.1 Historical and forecasted total production for the NCS (source: NPD)

The element evaluated in the sales part of the equation for a project in the oil industry is the production profile; the production volumes times the oil price will give the revenue of the asset (Wood, 2013). This can be gross, for the total value for the whole asset, or net, if the working interest of the company in that asset is less than 100%; for example, if working in a joint venture. Joint ventures had already become common; Aramco and CalTex were familiar models. The objective was to share risk in exploration, because of the increased costs and risk in the volatility of oil prices (Olien, 2002). An interesting finding worth mentioning was made by Boyer and Fillion (2007); they found that increasing oil and gas production caused a lower return in the market (their study was focused on the Canadian market).

Although oil is the main product the companies are interested in, gas also forms an important part of the volumes and reserves evaluated. The units that will be used in this study are  $\text{sm}^3$  for oil volumes,  $\text{sm}^3$  for gas, and finally  $\text{sm}^3$  of oil equivalent (oil and gas).

There are four phases that can define the life of an asset; the definitions given by Nelsen (1991) will be used. These are:

- *Exploration*: This phase is related to understanding the geology of the area. Seismic data is an important part of the exploration and gives a better picture of the possible prospect. Some characteristics, such as source rock, reservoir rock, trap, and migration, must be evaluated for the prospect to be considered interesting enough to merit drilling a well to confirm the presence of hydrocarbons.
- *Development*: This phase will start as soon as the evaluation of the prospect is implemented, regarding the volume and the confirmation that it is economically profitable to plan to develop the field. Sometimes more data is required if there are high uncertainties in volumes, so the drilling of appraisal wells may be necessary.

In offshore developments, the acquisition of platforms equipped to drill wells may be necessary (the number of wells depends on the development strategy

and the size of the prospect), as well as facilities to process fluids (oil, gas, and water).

The development of an offshore asset requires a similarly high capital investment to that of a manned space mission or an advanced weapon system (Nelsen, 1991).

- **Production:** It can be said that this phase starts as soon as hydrocarbons begin to flow; in some cases this can be even before the development phase is finished. The production of the asset will start gradually increasing to the new wells as they come into stream; in some cases a plateau of a constant production period will be reached, followed by a decline in production. Extra investment is required in this period to try to boost the production, such as by keeping the energy in the reservoir by injecting fluids, or, for example, by infill drilling.

Non-operated assets amount to 22 – 59% of the Supermajors' production. 23% of equity production worldwide is delivered by non-operated ventures. In most cases, non-operated ventures are not as well-managed as the operated ones, making the exposure to risk higher and preventing the realization of the full potential of the venture (Shuen et al., 2014)

- **Abandonment:** when the production in the field has reached the economical limit, the rate of production is too low and the cost to produce the oil is very close to the price of selling it. In this case, ceasing production is agreed, and the removal of the structures must start.

The oil price has been shown to be highly volatile (Figure 4.2), and that is the reason why companies can be quite conservative at the moment of forecast oil prices; however, the volatility of oil prices is also one of the factors that motivate investment (Mohn and Misund, 2009). The best practice among the oil companies is to generate different scenarios to evaluate the impact of the oil price on the value of an asset and on the economy of a project (Inkpen, 2011).

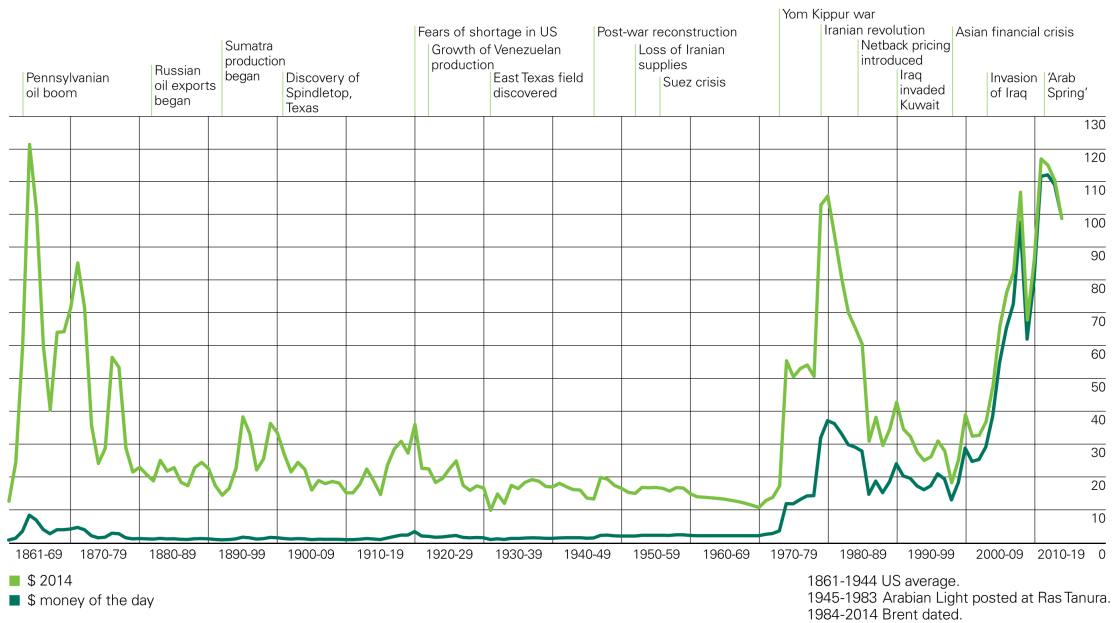


Figure 4.2. Crude oil prices 1861-2014 (US\$/barrel, world events). Source: Annual average prices in US\$ per barrel. Based on “BP Statistical Review of World energy”, June 2015.

#### 4.2 Costs

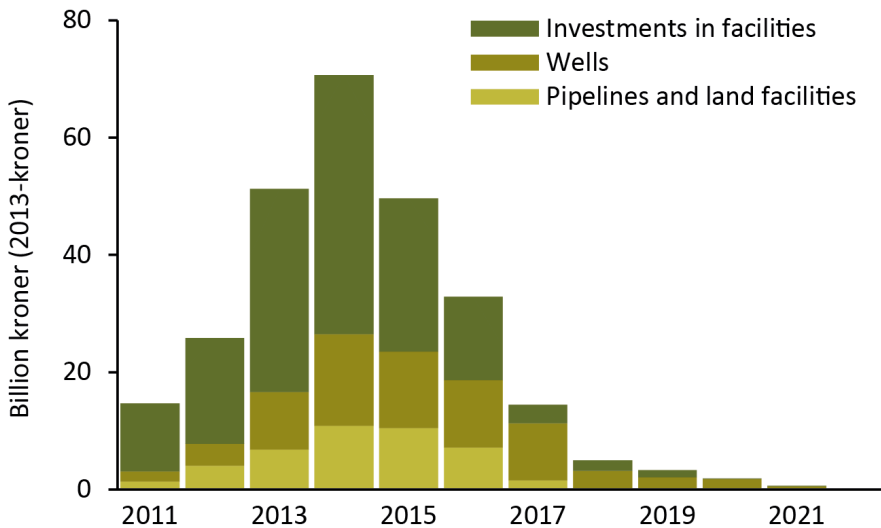


Figure 4.3 Investment forecasts for fields under development by project type. (Source: NPD)

The cost term definitions and way companies group them vary from firm to firm, but in general, costs, investments or expenses of the asset can be classified in six groups:

- **Capex:** Capital expenditure; this is the cost related to building infrastructure (platforms, pipelines, subsea facilities and other) necessary to produce the field.
- **Drillex:** Drilling expenditure; this is the cost related to drilling. Some companies classify this cost together with capex.
- **Opex:** Operational expenditure, usually related to the operational cost to keep the facilities running in acceptable condition. The cost for personal and administrative expenses can be placed within this classification.
- **P&A:** Plug and Abandonment costs; the expenses related to plugging wells or removing facilities and equipment at the end of production.
- **Taxes:**
  - **Income Taxes:** A percentage of the difference between the revenue and the expenses will be paid to the government.
  - **Environmental taxes:** In the oil industry, this is related to the carbon and nitrogen emissions that the production of hydrocarbons can generate; these are proportional to the quantity of the contaminants produced.
- **Tariffs:** The use of oil or gas pipelines to transport the hydrocarbons has a cost related to it. This will be proportional to the volume of hydrocarbons.

#### **4.3 Reserves**

The volume of oil in a reservoir is denominated oil-in-place (OIP), in the same way that gas receives the name of gas-in-place (GIP). These are the total volumes of hydrocarbons present in the reservoir, and just a fraction will be produced. How much can be produced will depend on the complexity of the reservoir, the technology required and existent at the moment, the location of the asset, and the economic limit of the asset. The last factor usually means that the investment required to produce a barrel of oil after taxes must be lower than the price in the market for that barrel.

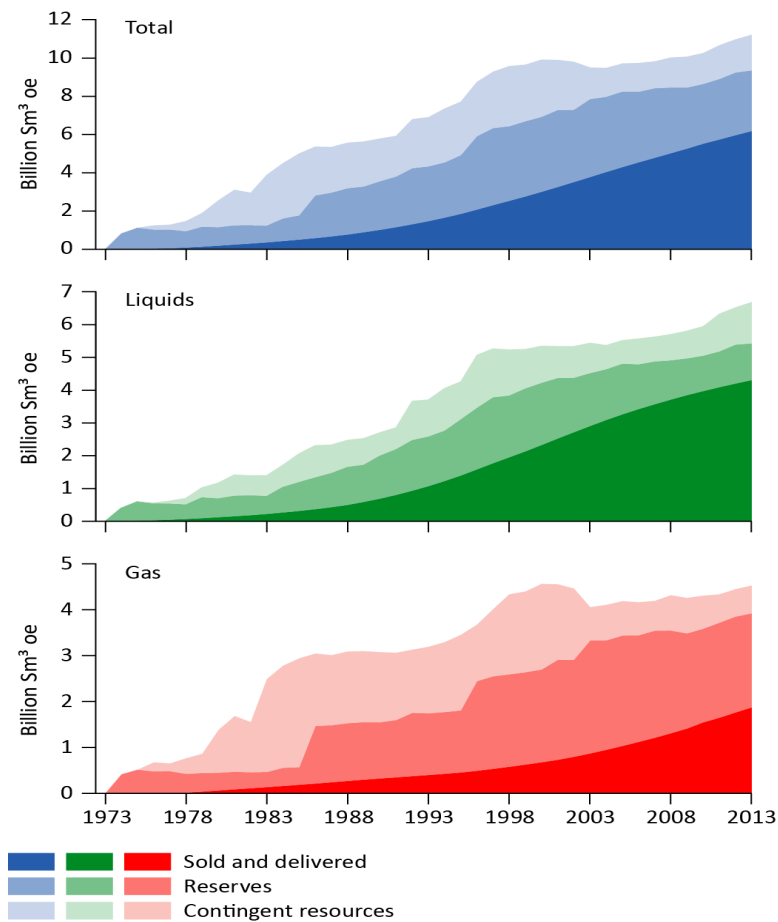


Figure 4.4 Proven resources over time (source: NPD)

Although many authors relate production to reserves, “reserve” can be a wide term, and it is important to understand the different type of reserves. Inkpen (2011) presents the classification of reserves according to the Securities and Exchange Commission (SEC) guidelines, as follows:

- **Proved Developed:** it can be produced with the existent infrastructure; the additional investment required is low.
- **Proved Undeveloped:** it requires additional investment; for example, extra investment in drilling.
- **Unproved possible:** it has a 50 percent probability of being recovered, and there is enough evidence to prove this.

- **Unproved probable:** There is a less than 10 percent probability of its being recovered, and there is not much evidence of hydrocarbon presence other than logs and geological interpretation.

#### 4.4 Financial metrics

After defining the sales and cost profile, it is possible to obtain a net cash flow profile (the difference between them). In order to understand the value of an asset, several financial metrics can be used, but the most common are the net present value (NPV), and the internal rate of return (IRR) (Inkpen, 2011):

- **Net present value (NPV):** The principle behind the NPV is that the value of money in the future is less than the value of money today. To obtain the NPV, each of the yearly net cash flow values is discounted to the current year; after that all the values are added and this will produce the net present value of that asset.

$$NPV = \sum_{t=0}^n \frac{FV_t}{(1+i)^t}$$

Where:

$NPV$	=	Net present value
$FV_t$	=	Future value at time t
$i$	=	Discount rate
$t$	=	Time step

The discount rate used in the calculation of the NPV refers usually to the “risk-adjusted cost of capital”.

In reality, most companies expect that an investment will create value above the weighted average cost of capital (WACC); this is known as the corporate hurdle rate, and additionally some companies impose a risk premium that is specific to the investment (Inkpen, 2011).

$$i = WACC + \text{required return over cost of capital} + \text{risk premium}$$

- **Internal rate of return (IRR):** This is the value of the discount rate at which the net present value is equal to zero. Usually a project or asset that has an IRR higher than discount rate ( $i$ ) is preferred.



## 5. Literature Review

In general, an asset transaction can be viewed as a set of strategies that a company uses as a means to increase the value of the company itself. To better understand the concept, a basic definition of strategy will be presented, and finally a summary of previous literature on mergers and acquisitions will be presented.

### ***5.1 Basic concept of strategy***

The origin of the word strategy derives from *strategos*, an ancient Athenian position responsible for representing each of the ten tribal divisions instituted by Kleisthenes. *Strategos* was related to the group of *stratos* (army); after this term was born, the complexity of decision making in the military arena also increased (Cummings, as cited in De Wit, 2010).

#### ***5.1.1 Strategy framework***

It is possible to assume that strategy is related very closely to the activities of a company, giving a sense of unity, purpose and direction. Six dimensions of strategy can be identified (Hax, 1994):

- a) Integrative pattern of decisions
- b) Defining the organization's purpose
- c) Defining competitive domain
- d) Response to external opportunities and threats (competitive advantage)
- e) Logical system for differentiating managerial tasks at different levels
- f) Economic and non-economic contributions by the company to its stakeholders.

A more complete definition of strategy is the framework a company uses to manage its resources and adapt to changes to gain competitive advantage, keeping as its ultimate objective the benefit of its stakeholders (Hax, 1994). An additional feature that can give value to the concept of strategy is that strategy can also be analyzed as a pattern: "A consistency in behavior whether or not intended" (Mintzberg, 2003).

With these concepts in mind, it is possible to observe strategy in the oil industry, and how this has changed in response to threats or opportunities.

### ***5.1.2 Change in strategy, adaptation by the oil companies***

As discussed before, this study will concentrate on the upstream segment of the oil industry. To understand the main strategy of oil companies, in this study the focus will be on two terms that have been explained previously: reserves and production.

The reserves can change due to changes in oil price; this means that in scenarios with low oil prices, the proven reserves of a field can be reduced mainly due to the reduction in the economic life of the field. The opposite could happen too: in high oil price scenarios, the economic field life can be extended, increasing the proven reserves in that field.

The production of an oil company will sooner or later decline if new findings or improvements for accelerating production are not made. If a company could produce all its reserves, it would cease trading as an upstream player, so it is necessary to replace the production volumes by increasing the reserves. The increase in reserves can occur in two ways: 1) by successful exploration; and/or 2) by the acquisition of new assets. Acquisition rather than exploration is a defensive strategic reaction (Casertano, 2013).

### ***5.2 Mergers and acquisitions strategy***

Many authors have studied mergers and acquisition activities from different perspectives. One of the earliest authors is Reid (1973), who studied economic diversification and integration in multinational investments, by evaluating corporate mergers in the American petroleum industry; he also evaluated the response of the stock value of companies in relation to divestiture. Later, Jensen and Meckling (1976) developed the theory of the ownership structure of the firm, and demonstrated how managers can increase their welfare by reducing shareholder value. Ferguson and Popkin (1982) theorized about the reasons for mergers and acquisitions. In addition to increasing the proven reserves of the acquirer, the increase in depreciation by using tax deduction means that the acquirer gets direct benefit from the government; they analyzed a merger case to support this theory. Regan (1984) highlighted the

responsibility of management in takeover activities. He also commented on the “mergermania” during the early 1980s; he described the period of 1983-1984 as an unusual set of circumstances combining to be ideal for merger activity. Cooper and Richards (1988) presented the Sohio experience as a case study of oil takeover. They mentioned as well that corporate managers may not only be looking to maximize the value of the firm, but selfless interest could also be one of the basic concerns during takeovers. Mitchel and Mulherin (1996) showed that volatile oil prices contributed to the takeover wave of the 1980s, and studying merger and acquisition waves at industry level could help to achieve a better understanding of merger and acquisition behavior. Weston (1999) described mergers and acquisitions in the petroleum industry as a reflection of the accelerating rate of merger and acquisition activity worldwide. He proposed that the triggers for mergers and acquisitions are the instability of prices, and other increased risks in the oil industry. Olien (2002) mentioned that every major swing in the price of oil, gas, and refined products drove mergers and acquisitions, as well as the restructuring and reconfiguration of major firms, implementation of new cost-saving technologies, and cuts in workforces. Harford (2005) found evidence supporting the neoclassical model as an explanation of merger waves. Mergers can be understood as a response to shock by the industry, creating clusters of merger activity, and he also proposed that the merger activity observed has a dependency on the existence of capital liquidity. Rhodes–Kropf et al. (2005) empirically tested the two proposed theories about the overvaluing of targets during merger and acquisition activities. The first of these, proposed by Rhodes-Kropf and Viswanathan in 2004, is a rational theory based on misinformation causing errors in the potential value of synergies. The second theory, proposed by Shleifer and Vishny in 2003, is based on an irrational stock market and self-interested target managers interested in producing cash quickly. Boyer and Fillion (2007) showed that the price of the oil and gas commodities is what drives the value of the oil and gas firms, but no individual firm has an impact on the commodity price. Verde (2008) studied European mergers and acquisitions from January 2000 to November 2006, and found that some companies were now interested in managing gas activities together with electricity activities. He identified two different dynamics: 1) a trend towards the creation of pan-European players, and 2) a trend towards the establishment of “national champions”; he confirmed these dynamics by a simple statistical analysis of M&As among companies in the natural gas or electricity industries. Granier and Podesta (2010) proposed a

model for competition and another for mergers. They found that mergers enable firms to bundle, which causes energy markets to create incentives to form multi-markets; however, they also found that that this type of merger can be negative for social welfare. Ng and Donker (2013) found empirical evidence of the effect of reserves and oil prices on merger and acquisition activities, as well as on the market performance, based on sample data for 18 years of transaction history in Canada. Garcia et al. (2014) studied and demonstrated the competitive advantage of a company resulting from the combination of assets owned by that company and the capabilities that the firm possesses. Shuen et al. (2014) showed that acquisitions are one of the two possible options for a company to increase its reserves; the other is through organic strategies, such as joint ventures, to support the discovery of new resources.

As has been shown above, there appear to be more reasons for mergers and acquisitions than conventional managerial decisions, and some interesting proposals have suggested that commodity prices and reserves act as motivating factors for asset transactions. These observations will be the basis for the formation of the following hypotheses, to which we now turn.

## 6. Hypotheses development

### *6.1 Reserve potential as motivation for mergers and acquisitions*

Ferguson and Popkin (1982) proposed that the main reason behind mergers and acquisitions is to increase the number of reserves for the acquirer. They suggested that acquiring reserves targets is a risk-free investment. Later, Ng and Donker (2013) further developed this theory: they presented a context in which a high demand for energy from countries such as China and India, and a finite supply of energy reserves, could explain the reason for the development of the trend for high oil prices observed until 2014.<sup>4</sup> Shuen et al. (2014) commented on the two options for a company to increase their reserves: 1) through acquisitions of proven reserves, and 2) organic strategies, such as joint ventures, to support the discovery of new resources. The concept of finite reserves gives a high value to the existing reserves of a company; this can be a reason for the high need for acquiring reserves and the low number of assets (reserves targets) in the market. Mohn and Misund (2011) also commented on how the oil and gas investments have focused on increasing the ownership of scarce oil and gas reserves. This scenario also presents another situation, where the reduction in reserves, as well as the risk-free nature of the assets, motivates acquirers to pay high premiums for these targets. Given the reasons above, causality between the energy reserves and the amount of mergers and acquisitions will be tested. In addition, the strength of this relationship will be investigated.

**Hypothesis 1:** The NCS energy reserves affect the number of mergers and acquisition transactions.

### *6.2 Commodity price as motivation for mergers and acquisitions*

Boyer and Fillion (2007) observed that the price of the commodities that oil and gas companies produce is what drives the value of the firms; but no single firm has an impact on the commodity price. The changes in the stock market affect the acquisition power, as well as the advantages of companies at the time of buying or selling; thus it is important to observe that changes in the stock prices of oil and

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<sup>4</sup> The dramatic fall in prices during 2015 is outside the time frame of this study, and for that reason it will not be included in the discussion.

gas companies are closely related to the commodity prices of oil and gas (Donker and Ng, 2013). Shleifer and Vishny (2003) presented the stock market price as the reason for the high number of mergers in recent decades. Some authors, among them Rhodes-Kropf et al. (2005), performed studies to empirically test the stock-driven acquisitions. Henriques and Sardosky (2011) also evaluated the relationship between the volatility in oil prices and the investment strategy of companies, finding that during times of high uncertainty, the best strategy is to wait until the uncertainty is resolved before investing. However, it was also observed that at some point the growth in uncertainty leads to an increase in investment. Mohn (2008) concluded that during periods of low oil prices, the management of oil companies tends to shift the focus from long-term field developments and reserve replacement to short-term accounting returns. This shift in investment strategy pushes oil prices up; during this environment of low investment the companies gained profitability, but also, due to the investment discipline shared by managers, the probability of takeovers increased as well.

This study agrees with the suggestion made by Ng and Donker (2013) that commodity prices can influence managers' decisions on timing mergers and acquisitions in the oil and gas industry. Shleifer and Vishny (2003) theorized that higher stock prices will also be a motivation for managers to make takeovers. The managers of overvalued energy companies could take advantage by acquiring undervalued companies (Ng and Donker, 2013). The same could be translated to the asset level. This study proposes to evaluate the numbers of transactions as a response to changes in the commodity prices of oil and gas, this being an extension of the work done by Ng and Donker (2013).

**Hypothesis 2:** Oil and gas prices affect the number of merger and acquisition transactions.

## 7. Research design and methodology

### 7.1 Research design

The two existing research approaches in the social research field are the qualitative and the quantitative. The quantitative research alternative follows the same path as research in the natural sciences. Conversely, the qualitative approach has been used by social scientists as a better way for the researcher to study human interactions (Porta and Keatin, 2008).

After discussing the research approach, it is also important to mention the norms and assumptions for both research approaches, from the epistemological and ontological standpoints.

Epistemologically, the quantitative approach is usually related to movements seeking for objectivity (Positivism, Realism), while the qualitative approach is associated with the movements defending the idea that everything concerning humans must be subject to interpretation (Interpretivism) (Porta and Keatin, 2008).

The ontological difference between the quantitative and qualitative approach is that the former looks for objective knowledge based on facts and hypotheses that can be tested, whereas the latter assumes that knowledge can be created and recreated depending on the understanding of the world (Porta and Keatin, 2008).

Although there is a general belief in the incompatibility of a multiple strategy combining qualitative and quantitative approaches (Robson, 2011), nevertheless many authors believe and support the use of a mixed approach. “There are important senses in which quantitative and qualitative methods are inseparable” (Howe, 1988, as cited by Robson, 2011).

This research consists of three parts and it will use mixed methods. The first part will be a causality test between the commodity prices and transactions in the NCS, and also the causality between energy reserves and transactions in the NCS.<sup>5</sup> The second part will focus on measuring the strength of the correlation between the parameters, to

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<sup>5</sup> In this part of the study, only the acquisitions and mergers will be studied.

establish if a causality is found between them. A non-parametric ranked Spearman's correlation coefficient will be used as a tool to measure the strength of the relationship. These two parts will follow a quantitative approach. The relevant characteristics identified with a quantitative approach are mentioned below (Robson, 2011):

- a. The information and data obtained was expressed in numerical form.
- b. The behavior of the transactions was focused on.
- c. Deductive logic was adopted.
- d. Reliability and validity of measurements were described.
- e. Statistical analysis of the data was presented.
- f. Generalization of the findings was sought.
- g. Objectivity was sought.

For the final part of this study, a triangulation method will be used as a way to identify and define the possible strategic drivers behind the asset transactions in the NCS during the last 14 years. This part will use a mixed approach, combining the qualitative and quantitative methods. After obtaining a list of transactions in the Norwegian Continental Shelf, the strategic driver behind each of the transactions will be identified and a list will be presented; the description of the strategic drivers will then be given. As mentioned before, the reasons behind the transactions must be understood from a behavioral context (qualitative approach).

## ***7.2 Methodology***

The first part of the analysis will be to verify that the time series used in this analysis are stationary; this can be done by conducting an augmented Dickey-Fuller test<sup>6</sup>, based on the hypothesis of the unit root solution against the autoregressive alternative. If some of the time series are shown to be non-stationary, the series can be changed to

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<sup>6</sup> Augmented Dickey-Fuller test:  
<http://se.mathworks.com/help/econ/adftest.html?searchHighlight=dickey%20fuller>.



stationary data by using one of the common known methods<sup>7</sup> (the log transformation will be chosen here for its simplicity).

After it has been confirmed that the time series or the transformed data is stationary, a Granger causality test will be run to test the hypothesis of causality; the code used for this purpose can be found in the Mathworks library<sup>8</sup>. If required by the reader, more details about the Granger causality test can be found in the original paper published by Granger (1969).

Finally, to investigate more in detail the strength of the relationship between the variables, the non-parametric Spearman correlation test is used. This correlation factor works by ranking each of the variables, and then it correlates them

#### *7.2.1 Reserve potential as motivation for mergers and acquisitions*

The data used for this analysis consists of four time series. The first two time series are the annual oil<sup>9</sup> and gas reserves estimates made by December 31 of each year. The last two correspond; one to the number of merger transactions and the other to acquisition transactions, and they are given in the number of deals per year. All the data have been obtained from the Norwegian Petroleum Directorate public database and the resource report published in 2014; both of them can be accessed in the NPD website.

#### *7.2.2 Commodity price as motivation for mergers and acquisitions*

In this analysis, six time series will be used. The first two time series are the average annual Brent spot price and the average annual UK gas price (Heren NBP Index) from the “BP Statistical Review of World energy”, 2015. The changes in the oil price and gas price will also be evaluated; it has been decided to evaluate the change as the value of the commodity price from the year when the transaction occurs, minus the

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<sup>7</sup> Common transformation methods: <http://se.mathworks.com/help/econ/data-transformations.html?refresh=true>

<sup>8</sup> Granger causality test code:

<http://www.mathworks.com/matlabcentral/fileexchange/25467-granger-causality-test>.

<sup>9</sup> Although in this study we will talk about oil reserves, it must be observed that the reserves presented contain a small fraction of other liquids, such as NGL and condensate.

commodity price from the previous year. Finally, the last two time series correspond; one to the number of merger transactions and the other to the number of acquisition transactions.

### *7.2.3 Strategic drivers behind asset transactions in the NCS during the last 14 years*

For this section, the triangulation method will be used. To present an introduction to triangulation, in the words of Denzin and Lincoln (2011): "Triangulation is not a tool or a strategy of validation but an alternative to validation." In other words, the triangulation method works as a means of validating information by cross-verification of the results (Stene, 2014). Denzin (2009) proposed four types of triangulation: data triangulation, investigator triangulation, theory triangulation, and methodological triangulation. This study will apply the first method, where different types of data sources will be used to achieve a better understanding of the reasons for the transactions, rather than an objective answer; after all, according to Denzin and Lincoln (2011), "Objective reality never can be captured." The sources for our analysis will be:

- a. Norwegian Petroleum Directorate historical transaction database.
- b. Bloomberg reports
- c. Public company information published in the company's own website.
- d. Business experts in the industry

The process used for the classification of the data is described below:

- a. All the historical transactions published in the NPD database relating to production licenses were gathered.
- b. Items related to company name changes were removed.
- c. The data was reviewed transaction per transaction, to verify the quality of the data and to ensure that no "company name change" items remained.
- d. The remaining transactions were divided into the categories of "From" (indicating the seller) and "To" (indicating the acquirer).
- e. The author verified the data transaction by transaction, evaluating the seller's perspective with the information available about the production license (participation interest before and after the transaction), as well as

finance reports that indicated the activity and mission of the company. In some cases when the information was insufficient, feedback was received by business experts about the history of that particular company and the possible reasons for the transaction. After this, the transaction was classified from the seller's perspective.

- f. The process described previously was repeated, but this time from the buyer's perspective.
- g. The main reason for the transaction was given the name of the strategic driver for that respective transaction.
- h. When all the transactions were classified, the strategic drivers were grouped according to parameters in common, and finally the structure in Figure 8.6 was obtained as a qualitative guideline for the classification of transactions. The detailed reasons for a transaction being included in that strategic driver can be found in Appendix C.
- i. Finally, the strategic drivers were converted into quantitative data; this will show the top five common strategic drivers for acquisitions and divestitures in the NCS during the last 14 years.

The list of strategic drivers for NCS during the last 14 years is considered as an additional contribution of this research.

## ***7.2 Sources of Data***

Public databases will be the preferred source of information. The sources of data used in this study are listed below:

- 1) Norwegian Petroleum Directorate historical transaction database.
- 2) Reserve data reported by the Norwegian Petroleum Directorate.
- 3) Bloomberg reports
- 4) Feedback and discussion from business experts
- 5) Public company information published in the company's own website
- 6) Commodity prices; the average annual Brent crude oil and the average annual UK gas price (Heren NBP Index) are chosen for this study

## ***7.3 Sampling procedure***

This study will use two main methods of data collection. The first, secondary data analysis, will be used by working on data previously collected by the Norwegian

Petroleum Directorate (NPD); this database is open to the public on its website (<http://factpages.npd.no/factpages/Default.aspx?culture=no>). This data contains the history of the transactions made in the Norwegian continental shelf. The data of interest for this study will be figures listed between January 1, 2000 and December 31, 2014. Many of the transactions specified in the database are not of interest for this study (for example, transactions relating to a change in the name of a company). The second method is the content analysis of digital summaries made available to the public by Bloomberg, Nordnet or Yahoo; the websites of these companies will be used also as a means of gaining information about the strategic drivers behind the transaction and the main strategy of the company.

#### ***7.4 Limitations***

The Granger causality test must be understood as a probabilistic approach; it is used here based on the experience of Ng and Donker (2013) in their study. This will allow the results to be comparative, although the period of their research (1990-2008) is a little longer than that of this study (2000-2014).

In addition, the use of the augmented Dickey-Fuller test presents three main limitations (Sjö, 2008):

1. Choosing the number of lags in the augmentation is a critical factor
2. The test is based on the assumption of one cointegrating vector.
3. The test assumes a common factor in the dynamics of the system. If this common factor does not hold, the results of the test are not reliable.

The data sources can contain errors in the date of the transaction; and, as was observed in some of the transactions, the date could reflect the exact time when the transaction was approved by the government and was registered in the database. However, the transaction may have been agreed between the companies months in advance, so a delay could exist. Some of the transactions during the quality check part of the process were found to provide wrong information: for example, items described as transactions were found to be merely updates about changes of name in the company.

Some improvements, such as a longer sample period, and including transaction value information, could have given more robustness to the results from this study, but due to the limited time, it was decided not to modify the scope of the current study.

Finally, although an objective perspective has been the goal, it cannot be denied that a certain interpretivism of the results may be present in the results of the data.

## 8. Results

The number of transactions found in the NPD database for transactions made between January 1, 2000 and December 31, 2014 is in total 4578 (see Figure 8.1). The transactions are classified as follows: changes in name, transfers (acquisitions and divestitures), mergers or takeovers, state direct financial interest (SDFI), and six transactions classified as unknown (it was not possible to find information about the company involved in the transactions).

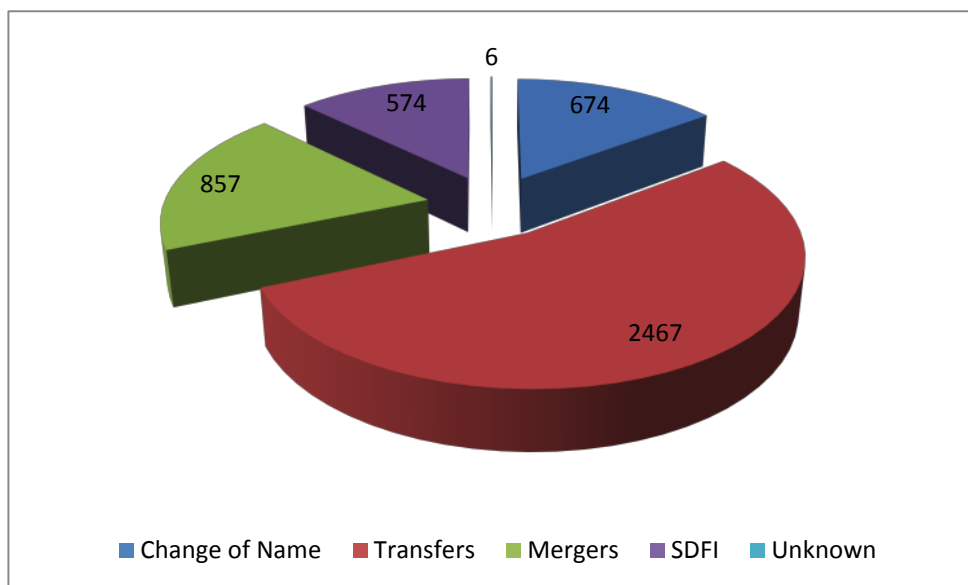


Figure 8.1 Transactions found in the NPD database, after classification.

A list of the mergers and takeovers between 2000 and 2014 can be observed in Table 8.1. The privatization of the Norwegian National Oil Company that resulted in the formation of Statoil and Petoro in 2001 has not been included in the list.

Table 8.1 Mergers during 2000-2014 observed in the study

Company 1	Company 2	Year of Merge or acquisition
Saga	Norsk Hydro	1999
Total	Elf	2000
Fortum	Enig	2002
Conoco	Phillip	2002
Enterprise	Shell	2002
Agip	Eni	2003
Ruhrgas	E.ON	2003
Paladin	Talisman	2005
Statoil	Norsk Hydro	2006
Dana	Ener	2007
Revus	Wintershall	2008
Petro Canada	Suncor	2009
VNG	Endevour	2009
Aker Exploration	DNO	2009
Spike Exploration	Bridge energy	2013
Tullow	Wintershall	2014

As discussed in Section 7.2, the results for the augmented Dickey-Fuller test for the time series used in the analysis are shown below:

Table 8.2 Results from the augmented Dickey-Fuller test: the non-stationary data hypothesis is tested

Variable	p	Hypothesis
Acquisitions	0.77790	Accept
Mergers	0.00600	Reject
Oil price	0.82270	Accept
Gas price	0.55310	Accept
Change in oil price	0.00001	Reject
Change in gas price	0.00001	Reject
Oil reserves	0.00330	Reject
Gas reserves	0.61470	Accept
Acquisitions*	0.00001	Reject
Oil price*	0.00490	Reject
Gas price*	0.00001	Reject
Gas reserves*	0.00001	Reject

\*After log transformation

First, the results for the causality test between reserves and merger and acquisition transactions will be presented and described. Second, the results for the causality test between commodity prices and merger and acquisition transactions will be presented

and described. Finally, an interpretation of the strategic drivers found in the NCS will be presented and discussed.

### ***8.1 Reserve potential as motivation for mergers and acquisitions***

Based on the previous discussion, the main aim behind acquisitions and mergers is to increase the reserves for a given company; as long as the reserves decrease, the number of acquisitions and mergers will increase as a means of compensating for this, and ensuring ownership of the reserves available. In Figures 8.2 and 8.3 it is possible to observe how the oil and gas reserves<sup>10</sup> have been decreasing during the last 13 years; however, the number of transactions related to acquisitions shows an increasing trend. It is difficult to observe a trend in the number of transactions related to mergers. Donker and Ng (2013) observed a similar trend in the merger and acquisition activities in Canada. There are two important findings of Donker and Ng (2013) that can enhance our understanding of asset transactions in the NCS, as follows: 1) there is an inverse relationship between the number of acquisition transactions and the amount of energy reserves (limited supply will increase the need of ownership of the remaining supply); and 2) the value of the reserves seems to increase over time.

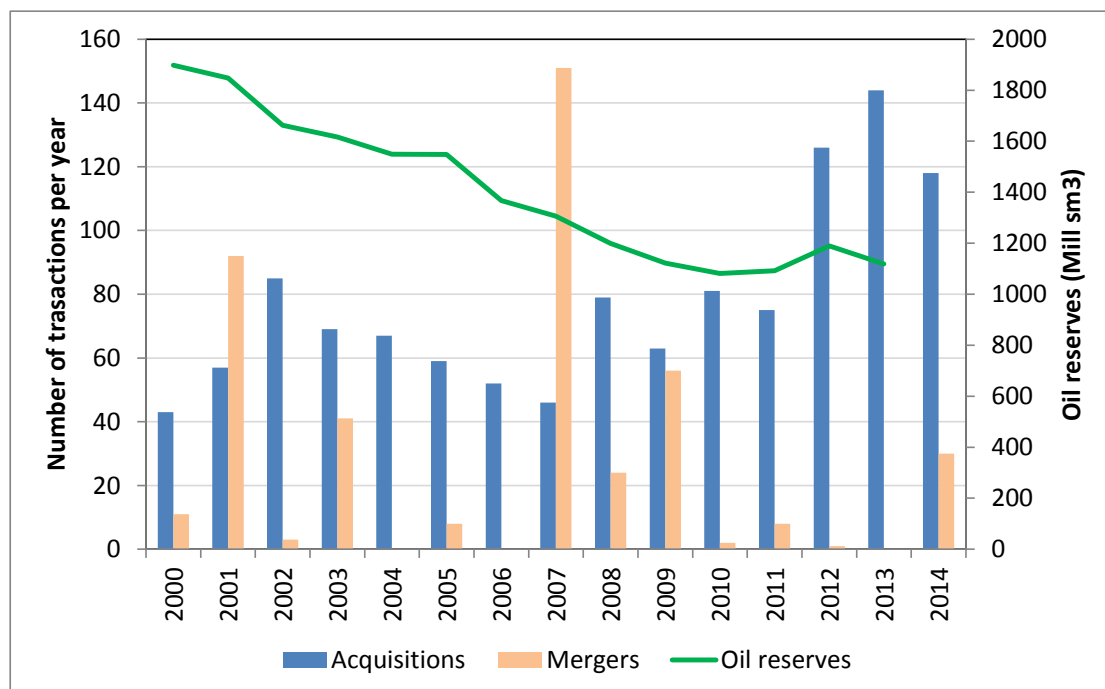


Figure 8.2 Oil reserves, mergers and acquisitions in the NCS between 2000 and 2014.

<sup>10</sup> The delivered production, as the contingent resources are not included in the reserves shown in this study.



A Granger causality test will be used to examine the hypothesis that oil reserves cause acquisitions, and oil reserves cause mergers. The exercise will be repeated for oil reserves causing acquisitions, as well as for gas reserves causing mergers. The results for the Granger causality test can be observed in Table 8.3. The results seem to be consistent for a 10% and 5% significance level. The oil reserves affect the number of acquisitions and mergers; this relationship is negative and moderate between oil reserves and acquisitions, and positive and weak between oil reserves and mergers (see Table 8.4), according to the Spearman's coefficient results. However, it seems that the acquisitions and mergers do not cause changes in oil reserves. The reverse seems to be the case for gas reserves: the gas reserves do not cause mergers and acquisitions, but instead the mergers and acquisitions cause changes in the gas reserves. By evaluating the Spearman's coefficient, it is possible to notice that the relationship between gas reserves and number of transactions related to acquisitions seems to be negative, but in relation with mergers seems to be positive.

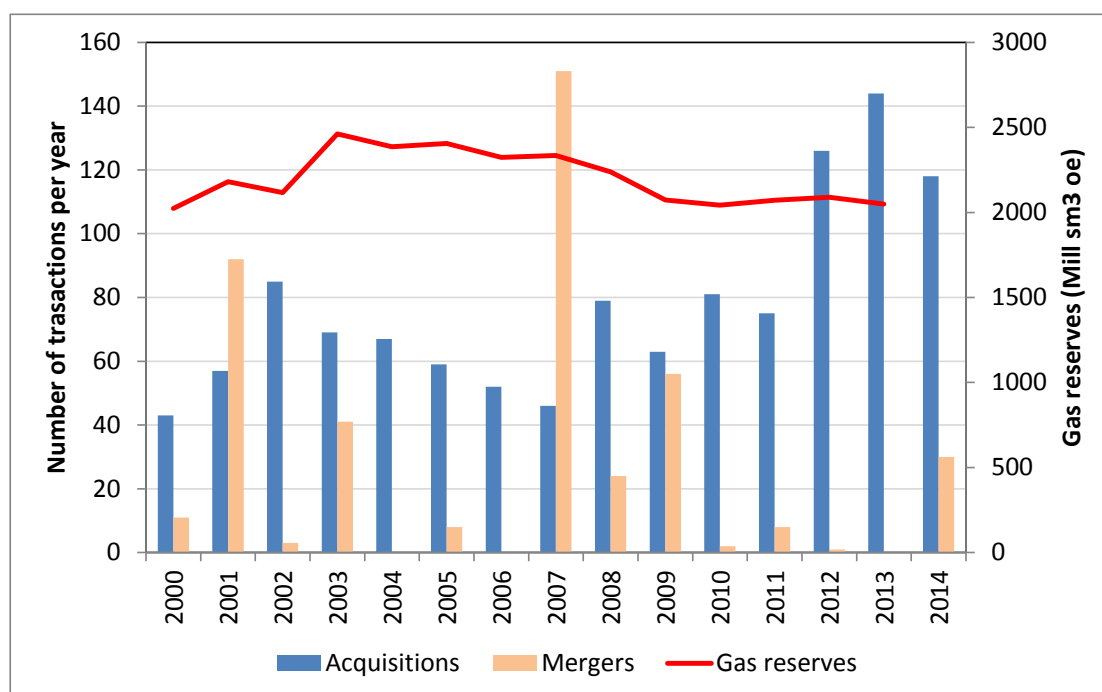


Figure 8.3 Gas reserves, mergers and acquisitions in the NCS between 2000 and 2014.

The results conclude that the hypothesis of mergers and acquisitions being a way to increase ownership in the existing oil reserves is valid; and it also seems that changes in gas reserves are a consequence of the merger and acquisition activities.

Table 8.3. Granger causality test results between the energy reserves and mergers and acquisitions

Null hypothesis	5% significance level			10% significance level		
	F-Statistic	Critical_Value	A/R	F-Statistic	Critical_Value	A/R
Oil reserves does not Granger cause Acquisitions	6.648	4.103	Reject	6.648	2.9245	Reject
Oil reserves does not Granger cause Mergers	8.305	4.257	Reject	8.305	3.007	Reject
Acquisitions does not Granger cause Oil reserves	1.151	4.965	Accept	1.151	3.285	Accept
Mergers does not Granger cause Oil reserves	2.273	4.965	Accept	2.273	3.285	Accept
Gas reserves does not Granger cause Acquisitions	1.252	4.965	Accept	1.252	3.285	Accept
Gas reserves does not Granger cause Mergers	1.679	4.965	Accept	1.679	3.285	Accept
Acquisitions does not Granger cause Gas reserves	17.512	4.257	Reject	17.512	3.007	Reject
Mergers does not Granger cause Gas reserves	23.890	4.257	Reject	23.890	3.007	Reject

Table 8.4 Spearman correlation results for energy reserves with relation to mergers and acquisitions

Var 1	Var 2	r	P
Oil reserves	Acquisition	-0.51	0.06
Oil reserves	Mergers	0.25	0.39
Gas Reserves	Acquisition	-0.26	0.37
Gas Reserves	Mergers	0.16	0.58

## 8.2 Commodity price as motivation for mergers and acquisitions

In this section, the causality between commodity prices and the number of acquisitions and merger transactions will be evaluated, as well as the changes in the commodity prices set against the number of transactions. A Granger causality test will be used to evaluate the causality. The changes in the commodity prices will be understood as the difference between the price during the year of the transactions and the one of the previous year, to assess the change in oil and gas price.

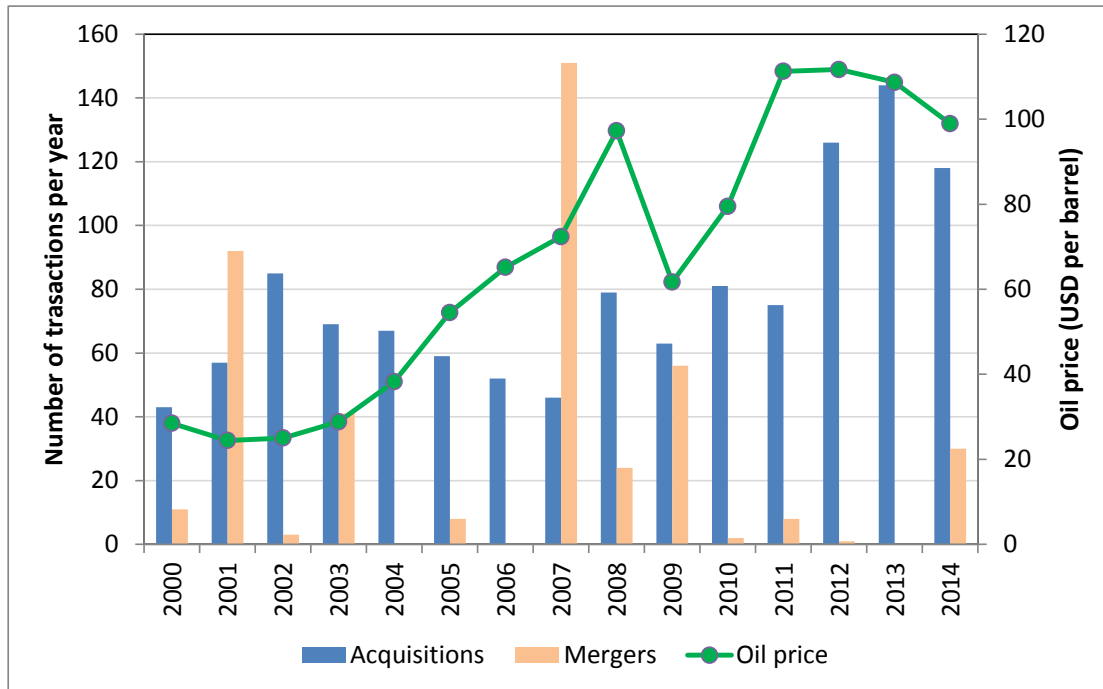


Figure 8.4 Oil prices, mergers and acquisitions in the NCS between 2000 and 2014.

The results for the Granger causality test can be observed in Table 8.4. The results found for the sample of transactions show some differences with the findings of Donker and Ng (2013) for the Canadian region. It seems that neither the oil or gas prices cause acquisition or merger transactions, nor do the acquisitions or merger transactions cause oil or gas prices: most of the results are consistent at the 5% and 10% significance level<sup>11</sup>. In the contrary, the results show that changes in oil prices can cause acquisitions, and that mergers and acquisitions cause changes in oil prices: the results are consistent at the 5% and 10% significance level<sup>12</sup>. From these results one can deduce that decisions regarding acquisition transactions are influenced by the change in oil price, and at a certain level, the acquisitions and merger transactions can influence the change in oil prices. Mohn (2008) mentioned in his conclusions that during periods of low oil price, the management of oil companies tends to shift the focus from long-term field developments and reserve replacement to short-term accounting returns. This shift in investment strategy pushes oil prices up; during this environment of low investment the companies gain profitability, but also due to the

<sup>11</sup> Mergers Granger causes oil prices at the 10% significance level, but not at the 5% significance level.

<sup>12</sup> Gas prices Granger causes mergers at the 10% significance level, but not at the 5% significance level

investment discipline shared by managers, the probability of takeovers increases as well. Based on the fact that the oil production from Norway in 2014 was about 3.3%<sup>13</sup> of the global Non-OPEC production during 2014, the expectation is that acquisition and merger transactions in the NCS will have a small effect or influence in changes in the oil price; although here the results show a different situation: that acquisitions and merger transactions could potentially lead to changes in oil prices.

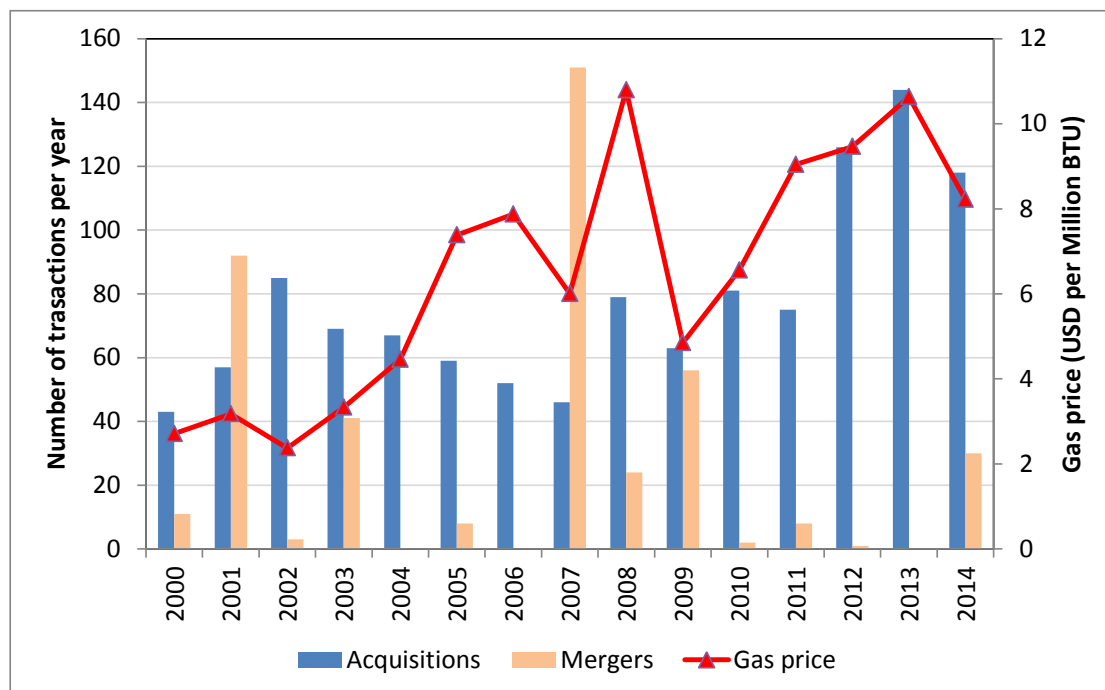


Figure 8.5 Gas prices, mergers and acquisitions in the NCS between 2000 and 2014.

The results for Spearman's correlation coefficient are presented in Table 8.5. Evaluating the strength of the relationship between oil price changes and acquisition and merger transactions, for both cases the coefficient shows a weak negative correlation. The significance of the correlation is more than 46% for acquisitions and more than 32% for mergers. One can argue that although causality has been proved, the strength of the relationship between the variables is weak and moderately significant.

<sup>13</sup> Source: EIA: [http://www.eia.gov/forecasts/steo/report/global\\_oil.cfm](http://www.eia.gov/forecasts/steo/report/global_oil.cfm)

Table 8.4 Granger causality test results between the oil and gas prices and mergers and acquisitions

Null hypothesis	5% significance level			10% significance level		
	F-Statistic	Critical_Value	A/R	F-Statistic	Critical_Value	A/R
Oil price does not Granger cause Acquisitions	1.496	4.844	Accept	1.496	3.225	Accept
Oil price does not Granger cause Mergers	0.518	4.965	Accept	0.518	3.285	Accept
Acquisitions does not Granger cause Oil price	4.103	5.840	Accept	2.925	5.840	Accept
Mergers does not Granger cause Oil price	3.676	4.844	Accept	3.676	3.225	Reject
Gas price does not Granger cause Acquisitions	2.186	4.844	Accept	2.186	3.225	Accept
Gas price does not Granger cause Mergers	2.740	4.257	Accept	2.740	3.007	Accept
Acquisitions does not Granger cause Gas price	2.384	4.103	Accept	2.384	2.925	Accept
Mergers does not Granger cause Gas price	3.149	4.844	Accept	3.149	3.225	Accept
Oil price changes does not Granger cause Acquisitions	4.789	4.103	Reject	4.789	2.925	Reject
Oil price changes does not Granger cause Mergers	0.155	4.965	Accept	0.155	3.285	Accept
Acquisitions does not Granger cause Oil price changes	5.076	4.257	Reject	5.076	3.007	Reject
Mergers does not Granger cause Oil price changes	23.474	4.257	Reject	23.474	3.007	Reject
Gas price changes does not Granger cause Acquisitions	2.949	4.103	Accept	2.949	2.925	Reject
Gas price changes does not Granger cause Mergers	0.077	4.965	Accept	0.077	3.285	Accept
Acquisitions does not Granger cause Gas price changes	0.482	4.844	Accept	0.482	3.225	Accept
Mergers does not Granger cause Gas price changes	2.556	4.103	Accept	2.556	2.925	Accept

Table 8.5 Spearman correlation results for oil and gas prices with relation to mergers and acquisitions

Var 1	Var 2	r	P
Oil price	Acquisition	0.57	0.03
Oil price	Mergers	-0.28	0.31
Gas price	Acquisition	0.50	0.06
Gas price	Mergers	-0.30	0.27
Oil price change	Acquisition	-0.21	0.46
Oil price change	Mergers	-0.28	0.32
Gas price change	Acquisition	0.04	0.88
Gas price change	Mergers	-0.36	0.19

### 8.3 Strategic drivers behind asset transactions in the NCS during the last 14 years

“Strategic driver” will be the term given to the reason for a transaction. To identify the existing strategic drivers, a list of different strategic drivers has been obtained, based on the possible strategies for a company in the Norwegian Continental Shelf with respect to asset transactions. Four possible strategies were identified: a) to buy, b) to sell, c) to merge or take over, and d) to swap. Some clarification may be required concerning the merging and takeover strategy: although to merge and to take over are different possibilities, the outcome is almost the same, in that two or more portfolios of assets are merged into one.

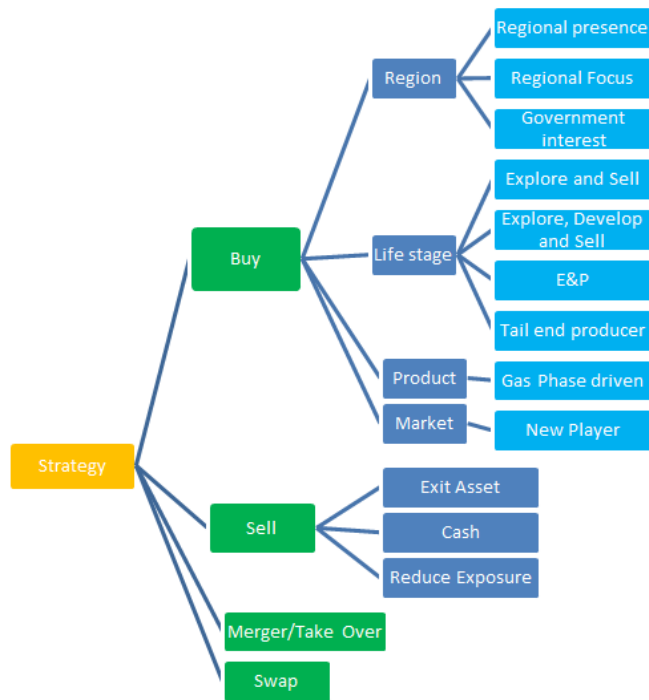


Figure 8.6. Proposed classification for the strategic drivers defined in this study.

After the classification transaction by transaction<sup>14</sup> had been made, the different strategic drivers were grouped in different categories. The result can be observed in the figure above (Figure 8.6). A more detailed account of transactions can be found in Appendix B, and a more detailed description of each of the strategic drivers is presented in Appendix C.

In the case of divestitures, three main strategic drivers were found, and the number of transactions was plotted per category and by NCS region. The most common reason for the divestitures transactions is the “exit asset”, in which the seller completely disposes of the asset. It is possible to observe that although the “exit asset” is the primary reason for divestitures of assets in the North Sea region, nevertheless “cash” is the main driver for the Norwegian and the Barents Sea regions.

<sup>14</sup> This is described in more detail in the methodology section

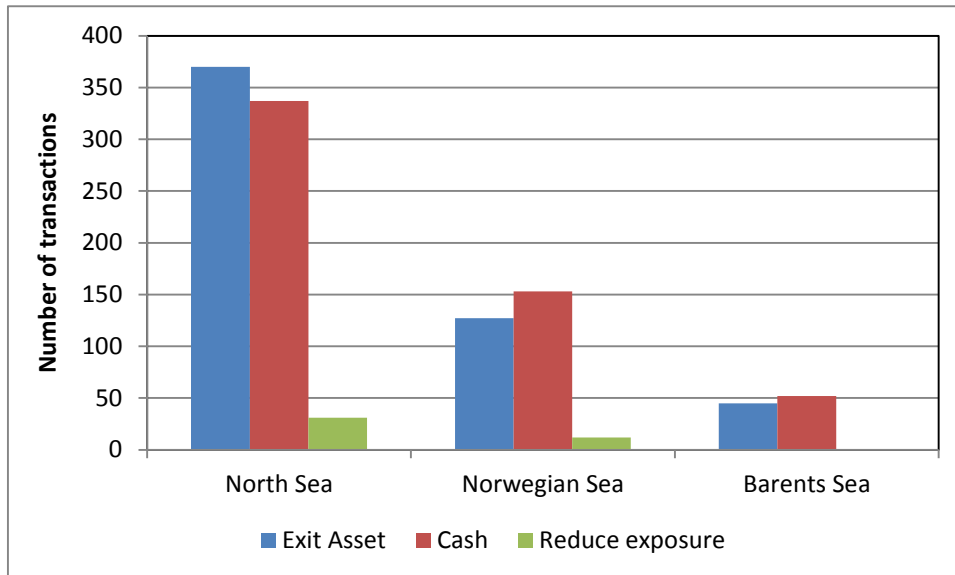


Figure 8.7. Total number of divestiture transactions per NCS region for the period from January 1, 2000 to December 31, 2014

The acquisitions transactions were then plotted by strategic driver and by region of the NCS, and the results can be observed in the figure below (Figure 8.8). The top five strategic drivers identified in the NCS (1 being the most common) are as follows:

1. Explore, develop and produce
2. Explore, develop, produce and obtain operatorship
3. New player
4. Explore and sell
5. Gas driven

It seems that after the modifications in tax regulations (mentioned previously at the end of Section 3.3), it is not surprising to observe that exploration is one of the second-highest activities within the strategic drivers. Development and production are also among the most common activities in the whole NCS.

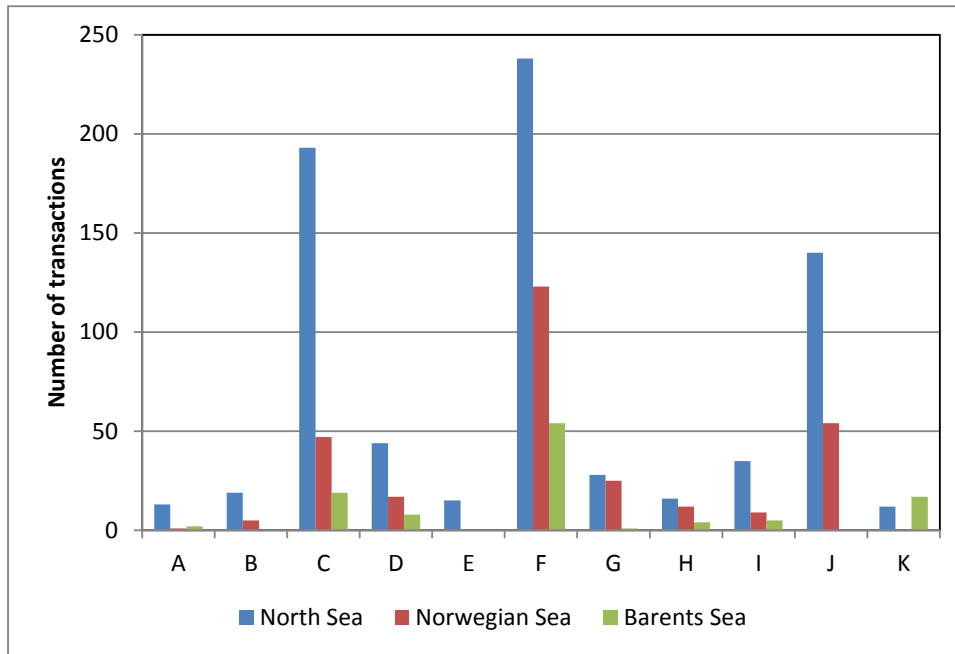


Figure 8.8. Total number of acquisition transactions per NCS region for the period from January 1, 2000 to December 31, 2014

Table 8.6. List of the strategic drivers and the nomenclature used for the acquisition transactions.

Letter	Strategic Driver
A	Active regional presence
B	Energy portfolio
C	Explore, produce, develop and obtain operatorship
D	Explore and sell
E	Explore, develop and sell
F	Explore, develop and produce
G	Gas driven
H	Government interest
I	Regional focus
J	New player
K	Tail-end producer



## 9. Discussion

Ferguson and Popkin (1982) were the first researchers to propose that energy reserves are one of the reasons for mergers and acquisitions. Later, Ng and Donker (2013) proposed novel motivations for mergers and acquisitions, related to commodity prices and increase in proven reserves; they supported their theory with empirical evidence from the oil and energy sector in Canada. The first part of this study extends their work to the Norwegian Continental Shelf, evaluating it in terms of the asset level. It was found that oil reserves are linked to the merger and acquisition transactions on the Norwegian Continental Shelf, and the motivation to increase the proven oil reserves by merging or acquiring assets from other companies is thus a valid theory. The idea that the oil reserves will become valuable over time seems to fit perfectly with the behavior of mergers and acquisitions on the NCS. However, it also seems that merger and acquisition transactions are causing changes in gas reserves, meaning that the gas reserves are an upside consequence from the mergers and acquisitions, but it seems not to be the main reason for transactions activities.

Ng and Donker (2013) found that in Canada the commodity prices were related to mergers and acquisitions, in that oil prices caused these activities, and mergers and acquisitions caused changes in gas prices. At the time of evaluating this behavior on the NCS, the results were quite different: the oil prices seemed not to be related to the merger and acquisition transactions, but at the time of evaluating these changes (a one-year window), it was possible to observe that oil price changes tend to influence acquisitions, and that merger and acquisitions activities tend to influence changes in the oil price. Although it may be expected that the transactions would not have any influence on the changes in the oil price, nevertheless an explanation presented by Mohn (2008) should be considered. This theory states that during periods of low oil price, the focus of management decisions will change from long-term field developments and reserve replacement to short-term accounting returns, and that this shift in investment strategy pushes oil prices higher. According to this possibility, companies' strategy is focused on mergers and acquisitions, rather than on long-term development that would cause changes in the oil prices. Consequently, the NCS results could be a downscale image of a global trend for the period studied. In any case, studying a longer period of transaction history could help to confirm the results

and make the explanation more robust. Surprisingly, the gas price, or changes to it, seems not to have any effect on the merger and acquisition transactions.

During the qualitative evaluation of the strategic drivers behind the transactions, a classification of them was made. It is possible that the classification could give different results from another observer perspective, but if the triangulation method is followed and the classification rules presented here are used as guidelines, it is expected that the results of the classifications will be close to those presented here. Three main reasons for divestitures were found, and among them the “exit asset” seems to be the principal one. In the case of acquisitions, “Explore and produce”, the traditional strategic driver for major oil companies, seems to be at the top of list. Mergers and takeovers are evaluated as a strategy as well as swapping assets, but although the latter was presented (based on the rules defined for its classification), it is quite difficult to evaluate without real and strong evidence of a commercial agreement between the involved parties. It should be mentioned that there are certain differences between the three different regions of the Norwegian Continental Shelf (North Sea, Norwegian Sea and Barents Sea). Some strategic drivers that seem similar in the North and Norwegian Sea regions seem not to exist in the Barents Sea region. One example could be the “New player” strategic driver, which indicates that new companies deciding to invest in the NCS will not regard investing in the Barents Sea region as a primary option (at least during the first year).

Finally, the main contribution of this study has been to show that oil reserves and changes in oil prices have been identified as parameters driving asset transactions on the Norwegian Continental Shelf, giving support to the empirical findings made by Ng and Donker (2013). In addition, a qualitative approach was used to obtain a better understanding of the strategic drivers on the NCS during the last 14 years. This study could be considered as a starting point for more detailed studies and evaluations in the field of mergers and acquisitions. With the NCS energy reserves diminishing, according to existing reports, and a forecast of high capital investments in the near future, it is clear that this is a valuable field for study.

## 10. Conclusions and Recommendations

What drives asset transactions on the Norwegian continental shelf? Although some authors will argue about the variety of managerial reasons behind the asset transactions, in this study the novel reasons proposed by Ng and Donker (2013) were tested, and having evaluated a sample of asset transactions between 2000 and 2014, it can be concluded that both oil reserves and changes in the oil price seem to influence asset transactions on the Norwegian continental shelf. Increase in gas reserves seems to be a beneficial consequence of merger and acquisition transactions, rather than a reason for asset transactions.

This study did not evaluate the relationship or causality between the performance of the acquirers and the number of mergers and acquisition transactions, but research in this area is recommended as a possible way forward to gain a better understanding of the Norwegian Continental Shelf asset transactions. The value of the transactions was not evaluated in the current study, and it must be observed that sometimes the value of the transaction could also provide extra information about the asset transactions. The information about the values of the different transactions was not easily accessible, and because of the limitation of time, it was decided to omit it from the scope of the study. It is also important to evaluate how other parameters, such as the exchange rate, could also influence the transactions.

A list of the strategic drivers for the period evaluated was presented. Each of the strategic drivers was defined, and a triangulation method was used to analyze different sources of data, to provide as objective a result as possible. The classification of strategic drivers presented here is merely a starting point: it aims to provide a guide for a better understanding of the strategic reasons behind asset transactions, and it could be improved considerably by future research and information gathered in this area.

This study supports previous findings by Ng and Donker (2013) regarding the influence that energy reserves and commodity prices appear to have on the

managerial decisions taken concerning merger and acquisition transactions, by analyzing empirical asset transaction data from the Norwegian Continental Shelf.

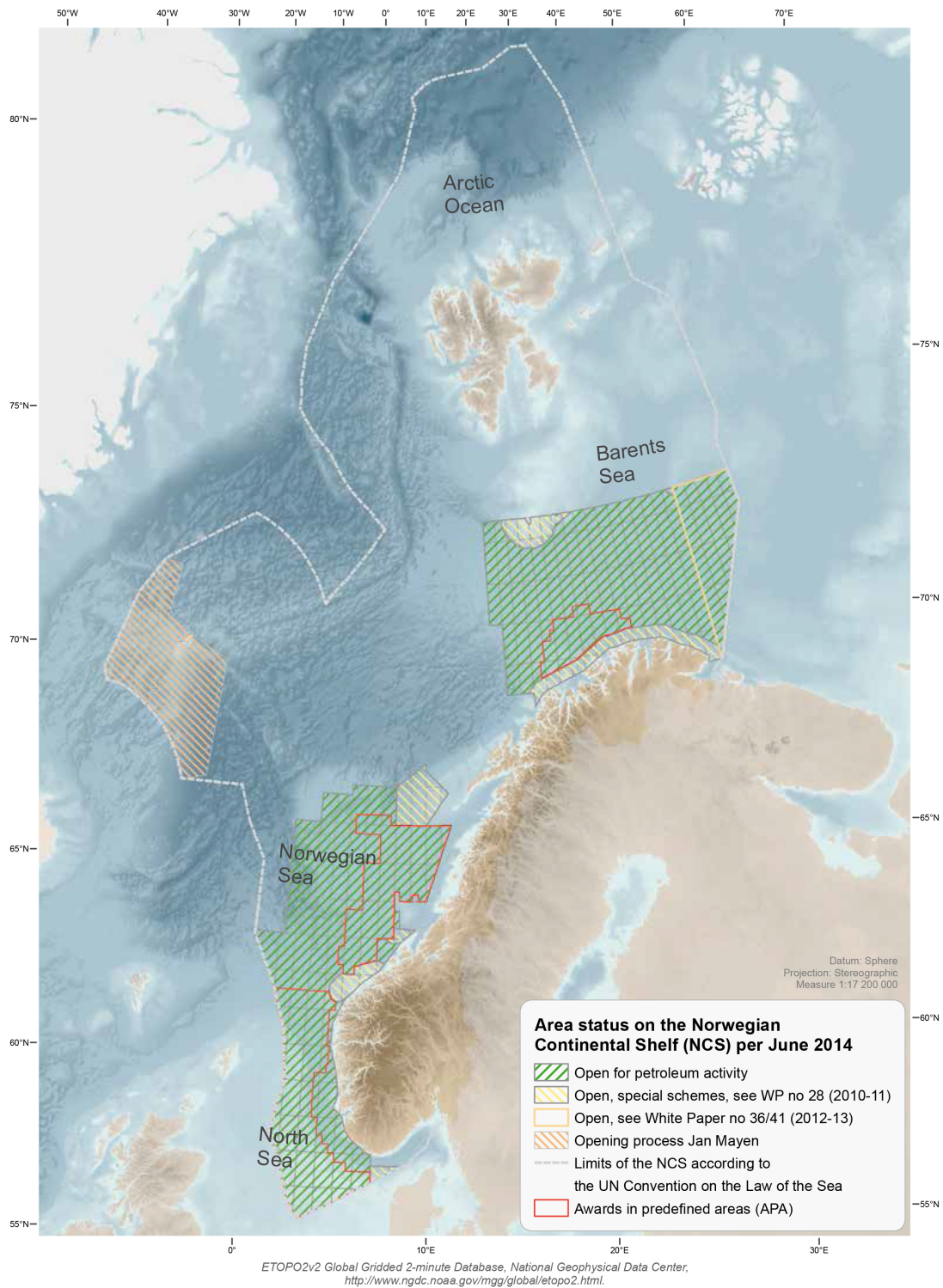
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## Appendix A

### Area status of the Norwegian Continental Shelf (NCS) per June 2014



Source: Norwegian Petroleum Directorate

<http://www.npd.no/Global/Norsk/4-Kart/Sokkelkart2014/Arealstatuskart.jpg>

## Appendix B

Table B.1 Summary of the divestiture transactions in the NCS, 2000-2014

Divestiture transactions				
Year	Exit Asset	Transaction	Reduce exposure	Total
2000	19	19	2	40
2001	31	27	1	59
2002	34	45	0	79
2003	46	16	1	63
2004	47	20	6	73
2005	38	22	5	65
2006	18	29	4	51
2007	22	22	2	46
2008	34	33	8	75
2009	23	37	5	65
2010	35	41	2	78
2011	53	22	1	76
2012	68	52	1	121
2013	41	92	2	135
2014	42	68	4	114



Table B.2 Summary of the acquisition transactions in the NCS, 2000-2014

Acquisition transactions												
Year	A	B	C	D	E	F	G	H	I	J	K	Total
2000	0	1	0	0	0	20	0	10	0	12	0	43
2001	0	0	3	0	0	39	0	1	0	14	0	57
2002	1	13	16	1	0	42	0	1	0	11	0	85
2003	0	7	14	2	0	34	4	1	0	5	2	69
2004	0	0	9	1	0	35	1	0	0	21	0	67
2005	0	0	20	0	2	27	1	3	0	6	0	59
2006	3	0	8	0	4	18	2	0	0	16	1	52
2007	2	1	1	0	0	12	0	0	0	30	0	46
2008	3	1	8	8	3	25	5	1	0	25	0	79
2009	2	0	22	6	3	13	7	0	6	3	1	63
2010	0	0	22	14	0	34	4	3	1	3	0	81
2011	1	0	13	2	1	26	6	2	14	10	0	75
2012	0	0	28	5	2	56	3	4	6	22	0	126
2013	1	2	60	17	0	19	8	1	10	23	3	144
2014	3	0	36	14	0	25	15	0	12	10	3	118

Table B.3 Summary of the mergers and swapping transactions in the NCS, 2000-2014

<b>Other Strategic drivers</b>		
<b>Year</b>	<b>Mergers/Take overs</b>	<b>Swappings</b>
2000	11	16
2001	92	4
2002	3	9
2003	41	2
2004	0	0
2005	8	6
2006	0	8
2007	151	4
2008	24	6
2009	56	5
2010	2	10
2011	8	12
2012	1	16
2013	0	21
2014	30	9

## Appendix C Strategic drivers definition

### *Buying assets*

All the transactions relating to acquisitions of assets will be in this main group. Some sublevels have been identified and will be defined.

- *Regional interest*
  - Regional focus: The company has identified the NCS as a strategic region for its operations.
  - Regional presence: The NCS has not been established as a strategic region for the company, but as an option to diversify its portfolio. The company is interested in to show its presence by participating in sharing risk exploration and small investments in the region.
  - Government Interest: Mainly these transactions will be linked to Petoro; any transaction into acquisition of assets will be perceived as a way to represent the interests of the government. It is important to notice that Statoil after 2001 is observed as another major oil company with its main strategy in exploration and production.
- *Life Stage*
  - Explore and sell: This is the strategy followed by some companies, who are interested in the first phase of a field (exploration). Investments are focused into acquiring licenses with potential, obtaining seismic and interpreting results; some of them will even participate in the investment of the first exploration well. After a finding is made, the participation in the production license will be sold to other companies interested in the appraisal or development of the asset.
  - Explore, develop and sell: Similarly to the previous strategy, the company will explore and invest in the first state of the development. It is assumed these companies are not interested in long commitments, and they will try to sell their participation in the asset during the early production stage.
  - Explore and produce: This is a general strategy that is linked to the major oil companies in the region, due to their interest in both production and reserves. They are interested as much in exploration as they are in the development and production phase.
  - Explore, produce, develop and obtain operatorship: This strategy is used by some companies that have less capital than the oil majors, but have shown a strong interest in not just exploring, developing, and producing, but they are also willing

to pay a premium price to become an operator in assets in the region, and to establish a real commitment in the area.

- Tail-end producer: This strategy is followed by some companies interested in the last production stage of some of old fields; the production rates are relatively low for medium and large oil companies, but some of the companies have created a competitive advantage from assets at the end of their lives.
- *Product*
  - Gas phase driven: The strategy of gas phase driven was selected mainly to reflect the well-known strategy of GDF, which is interested mainly in fields where gas is produced, or there is a high probability of increasing the gas production into certain assets for the future. There are some other companies that can also be classified in this category, but GDF is the best example.
- *Market*
  - New player: This strategy was established as a way to reduce the noise created by the acquisition of assets by new companies entering the NCS. The new player strategy is the classification given to all the transactions made by a company during the first year after a valid permission to operate or acquire assets has been given by the Norwegian authorities.
  - Energy portfolio: This strategic driver is related to companies that are investing in oil and gas assets as a strategy for diversifying their current portfolio.

### ***Selling assets***

All the transactions relating to divestiture of assets will be in this main group. Some sublevels have been identified and will be defined.

- Exit asset: The exit asset strategy will be identified when a company has decided to sell its entire participation in that asset to another company.
- Cash: any transaction that involves partial reduction in the participation of the asset will be assumed to be due to the cash behind the transaction. This could be due to a higher value offered by the buyer, or by at the same time reducing future investments that the seller has identified beforehand.
- Reduce exposure: All the transactions in which a company holding a 100 percent interest in a production license wants to reduce its participation will belong to this class. The main reason assumed to be behind this strategy is reducing the exposure to high investment costs or preventing high risk in the planned operations.

### ***Merging assets/Takeovers***

Many merging or takeover operations took place during the period evaluated; although the reasons why the companies merged can differ, it was decided to observe these transactions as part of a single strategy.

### ***Swapping assets***

It must be observed that swapping will be classified as any interchange of assets between two companies in which there is at least one month between transactions, as well as a ratio of 1 to 3 (for 1 asset given, at least 3 will be received), for it to be classified as an assets swap.