The impact from oil price changes on share values of different oil companies

-an empirical analysis

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Preface

This master's dissertation marks the accumulation of my studies. Through financial, technical and empirical analyses, I have studied how oil price changes affect different oil and gas corporations, related to their financial structure.

I would like to give recognition and my sincere thanks to Ole Gjølberg for guiding me through the process and for good advice.

Ås, 18th of May 2010

John-Rune Storvik

Executive Summary

This study provides a thorough analysis of oil price effect on share values of different oil and gas operators. The purpose of this study is to reveal patterns through conceptual examination of ten different oil and gas companies related to their financial structures by using simple statistical and financial analyses, and not through elaborate econometric analysis of oil price changes. Methods applied include empirical, technical and financial analyses.

Findings have discovered that some operators are highly intercorrelated, exhibit similar financial characteristics and have share values that reacted almost identically to oil price changes. Furthermore, dollar change in oil price is a far better predictor for explaining share price, than relative oil price change has been for explaining share returns.

Oil price changes explain share return for operators but the degree of impact varies. Considering oil price change as the only explanatory factor for share return, operators displayed similar levels of impact, with the exception of a ConocoPhillips, Exxon and Hess. Constructing a multifactor model by adding a one-month lagged oil price variable in addition to contemporary price changes, revealed that smaller operators (by market capital) are to a larger degree impacted by lagged oil price changes; i.e. it takes time for returns to absorb prices. Lagged effects did not alter level of oil price impact from contemporary prices, but revealed that for smaller operators, oil price changes going back one month are significant factors for determining current share returns. This is contrary to the idea that contemporary price change of oil affects smaller more than larger corporations. Larger operators, such as Exxon, BP and Shell stand out as being unaffected by lagged price of oil.

Liquidity and access to capital are not significant factors when it comes to sensitivity to oil price changes of an individual share. Debt structure and operating leverage however, correlates with level of impact and higher levels of equity to debt confirms that debt makes operators less agile; reduce capacity to alter production profile and diminish fixed cost. Operators are able to influence their production profile and do so actively. The study found large operators to create higher returns on their assets, and smaller operators more cost-efficient.

The largest operators appear to be generating higher replacement rates on average, but the most volatile and in-line with oil price movement operator had the highest replacement rates of the sample. Replacement rate is undoubtedly connected to return, but not to volatility.

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1. Background for studying relationships between oil and share prices

The purpose of this paper is to study the impact of oil price on the pricing of shares for a selected group of oil and gas companies. The sample is made up of ten corporations registered on exchanges around the world of different market capital, leverage, exploration, geographical presence, level of vertical integration and reserves.

Intuitively, it seems reasonable to believe that changing share values impact the shares values of vertically integrated oil and gas companies. However, studies show that the relationship between stock markets and oil price change is far from easily explained. For example, fuel cost makes up a substantial part of airliners expenses, and thus airliners are prone to fluctuation effects on their bottom line due to changing oil prices. That might lead one to believe that high oil prices are ambiguously a negative factor for the transportation industry, which is not entirely true since oil prices often rise in line with economic growth, although Hamilton (1983) discovered that rise in oil prices has a direct negative impact on future GDP growth. Guo and Kliesen (2005) used Hamilton's (2003) data to investigate significance of oil price volatility. They concluded that an increase in oil price from $40 to $50 per barrel matters less than increased uncertainty about future volatility; oil shocks create uncertainty about the future development of oil prices, consequently delaying investments and causing resources to be reallocated. A number of factors explain the rise and fall of stock markets (interest rate, exchange rate, consumer confidence, global events etc.) and it is extremely hard to filter out the specific impact of oil prices. This is also the case of integrated oil and gas companies and a concern for research conducted on the relationship between oil price change and share return, and the results yielded from such research. Previous studies of effects generated by oil price changes on share values of different oil and gas operators have been inconclusive. These studies mainly occupy themselves by trying to confirm or disconfirm a link between oil and share return and not the strength or characteristics of individual relationships. Little research has been undertaken on understanding the underlying characteristics of individual corporations and why operators react differently to oil price changes and energy spikes.

Investors calculate expected share value, or fair share value based on a set of criteria, such as future expectations on energy prices. Therefore, it would be beneficial for investors to understand why some operators are sensitive to oil price changes while others are seemingly not, beyond that of speculation. This study aims to discover the systematic oil price effect on share prices of different oil companies, where oil prices are viewed in the light of factors such as geographical region, reserves, leverage, financial performance and extraction.

2. What determines the share values of oil companies? A simple theoretical framework

Measured in dollars the extraction, production and distribution of oil and oil products constitute the world's largest industry, crucial for the prosperity and development of modern civilization. ExxonMobil, a publicly traded company with roots stemming back to Colonel Drake (said to be the founder of oil), is today the world's largest firm in terms of market value. Both former Exxon and Mobile spun out of Rockefellers famous Standard Oil Company, which in 1911were divided into 34 smaller companies by the U.S Congress. Motivated by deflating oil prices and economics of scale, oil and gas companies consolidated during the late 1990s and *big oil* was born; six of the largest non-state owned energy companies and considered to be ExxonMobil, Royal Dutch Shell, BP, Chevron, ConocoPhillips and Total S.A, also popularly referred to as the "super-majors". Despite the existence of "super-majors", the industry continues to consist of a vast amount of smaller oil and gas corporations and many corporations have diversified into specific geographical regions and industry specializations, in accordance with political and national interests, not to mention joint ventures.

There are several ways to estimate share values. One of the most used and most recognized methods is through cash flow estimates. The value of a company derives from its ability to generate cash flow until depletion of resources (consequent dismantling of the company), divided by the cost of capital for the company; the return investors demand for risk taken. These cash flows should be after tax, prior to debt obligations and after investment needs. Another way of understanding share price is directly through the Discounted Dividend Model (DDM): dividends paid out plus capital gain, divided by cost of capital:

$$\text{Share Price (NPV): } Pt = \frac{\sum_{\sigma}^{N} E(Div_t)}{(1+r)^t}$$

$\sum_{\sigma}^{N} E(Div_t)$ = The sum of expected dividends paid and capital gain until (N) time of depletion of resources, r = risk adjusted rate of return.

Long-term growth of the economy and long-term sales growth are important components in any Net Present Value model and reflect market sentiment (bull or bear economy) and industry sentiment (shrinking or expanding industry). In addition, investors look at company specifics such as performance, expenses, new products, new contracts, splits, dividends and upgrades/downgrades. Summarized, when all these factors come together, a DDM will seldom give the current share value found on exchanges, due to firm specific risk and investor sentiment. Costs of capital, denoted by *r*, constitute the interest requirement investors expect given the risk undertaken. DDM undervalued (per share) assets might be indications of a good investment opportunity.

It is important to distinguish between changes in share value and changes in oil price. Oil prices change is a product of supply and demand in the present market, while changes in share values often occurs due to changes in expectations about future cash flows.

In the following sections, I will relate the pricing of stocks of oil and gas companies to effects created on factors in the dividend-pricing model from oil price changes.

Oil price effect on the bottom line (i.e. DIV)

For oil and gas companies heavily vested in upstream activities the price of oil has a direct impact on revenue and the bottom line, which affects the present value of cash flows. Oil and gas companies have few ways to distinguish themselves by product development (oil is a homogenous product). Therefore, to some extent, oil prices determine revenue and as such the share value in the DDM model. In addition, the oil and gas industry is capital intense and associated with high fixed costs, which implies that an oil price of $40 compared to $80 will significantly alter revenue.

Oil price effect on the production profile

We understand production profile as size of dividend paid out over time. The cash flow model disregards the short-term impact of oil fluctuations on production profile, due to the operator's ability and desire not to deplete oil reserves in a market characterized by low oil prices.

When calculating cash flows, decisions to explore, expand or further invest are included in the model with the accompanied probability of development using the same discount rate. This does not take into consideration the operator's ability to change its production profile under different environments. Using a real option based approach the flexibility of each firm becomes evident: if the company can change its exposure to market risk by adjusting its production profile in line with the price effect of oil, using the same discount rate (cost of capital) is incorrect. Companies might pursue different strategies and plan for contingencies depending on the oil price. The individual flexibility of each operator depends on level of fixed cost associated with extracting oil. For operators facing high fixed costs (such as associated with off-shore and heavy crude oil operations), one scenario would not necessary be to produce less oil in times characterized by low oil prices, but increase production to in order to cover fixed cost.

Oil price effects on the discount rate

Discount rates are set by the Capital Asset Pricing Model:

$$Rx = \beta_f (Rm - Rf)$$

Where *Rx* is the expected return on the asset, *βf* the company Beta (sensitivity), *Rm* the expected market return and *Rf* risk free rate of return.

β:

$$\beta = \left(\frac{Cov(r_a, r_p)}{Var(r_p)} \right)$$

Where ra is the return of the asset, rp return of an index, *Cov* the covariance and *Var* the variance.

Betas measures risk of the company in question compared to that of the industry, and higher betas demand higher discount rates (CAPM). Individual betas might be affected differently across companies from oil price changes

The 15th of December *New York Times* featured an article describing the impact of falling oil prices[1]. High cost production projects were halted and Statoil, the Norwegian operator chose to pull out of a $12 billion heavy oil project in Canada. The article goes on to quote that some operators needed as much as $90 a barrel to turn a profit on investment projects. Several other operators such as Shell, ConocoPhillips and Total SA halted investments on similar grounds. The profile adjustment implies a relationship between oil companies and price of oil.

Oil price effect influenced by capital structure

If share prices are volatile because of oil price changes it could be explained by debt leverage (Debt to Equity), insufficient access to capital, exposure to greater risk due to large fixed costs and little opportunity to adjust production profile. Companies that are able to take a long-term stance on oil price development (reduce or increase production) beta should not be significantly tied to the price change of oil as oil prices will fluctuate by nature. Operators that are inflexible and need to keep up production (sales) in order to maintain debt obligations should display this risk in their betas. Short-term oil prices are a concern for operators that do not have sufficient access to internal or external capital to reduce production.

This study examines if there is a causal relationship between oil price changes and future cash flows generated in DDM. If that is the case, what the characteristics of such firms are.

[1] http://www.nytimes.com/2008/12/16/business/16oil.html?_r=1&partner=permalink&exprod=permalink

3. Limitation and range of the study

Although the members of the selected corporations supply the global market with a homogenous product (oil) their structure and individual risk associated with exploration and manufacturing vary greatly, often described as *firm specific risk*. In general, risk is observable in the level of variation (variance) each individual company's stock experiences over time. In comparison to an index such as the S&P 500, risk is described through the beta coefficient (ß); calculated by performing a regression between individual companies and an Index, such as the S&P 500. Perfect level of variance with the S&P 500 equals one, and so the index functions as a benchmark to compare volatility. Numbers above or less than one indicates corresponding higher or lower associated risk. Finally, - 1 indicates an inverse relationship with the stock market, also known as perfect negative correlation with the S&P 500, which of course is highly unlikely. Therefore, despite displaying many similar traits oil corporations are not identical assets, operate under different environments and are subjected to firm specific risk. This study looks at how each company behaves to the change in oil price, where the oil price functions as an index, and to what degree oil price changes can explain the individual stock's performance. Analysis of the firms' structure and performance aims to reveal what components might stand out in light of oil price changes.

However, observations and results may be firm specific, especially considering the small sample. Generalizations should be considered thoroughly.

Data used for the study range between '02 and '09. Screening and selection has limited the data sample in order to include historical prices from the entire group (as mentioned earlier the super-majors came into being in the late 90s) and I am limited to using data ranging back to '02. I have chosen to include financials until the end of '08 despite the nature of the financial crisis and its overall potential impact on ratios. However, for my regression analysis the traded values are both included and excluded for late '08 due to the serious compromise on normality. In my opinion, the financial crisis is not representative going forwards the coming years but I have chosen to include its impact where it seems appropriate and does not diminish reliability. The financial crises of '08-09 confirm that bust cycles are not a thing of the past, but cyclical phenomena. Based on observations we know that bust and boom cycles will continue to be characteristic of a global economy going forwards. However, the events of '08 were unprecedented and only comparable to that of the great depression. In light of the short timeframe of my study, the results will be dominated by the crisis. That being said, I believe the crisis will shed light on oil price effect on share value, and I have calculated descriptive statistics with and without 08 data.

4. Previous studies of the relationship between share prices and oil prices

There is no consensus among economists when it comes to the impact of oil prices on share values.

Roll and Ross (1984) did not find the price of oil to be a significant macroeconomic factor for asset pricing, but identified inflation, production, changes in risk premium and changes in the slope of term structure of interest rates to be significant factors for asset pricing oil stocks.

Jones and Kaul (1996) looked at impact of oil price volatility on rates of return to assets listed on the NYSE over 1949-1984 using annual data. They performed regressions on stock values on expected and unexpected inflation, industry production growth and oil price volatility. Expected and unexpected inflation did not have any significant impact but production growth had a positive coefficient, while the oil price variable had a negative coefficient.

The relationship between London based oil companies stocks' and the oil price has been researched by Manning (1991) who concludes that there is not a cointegrated relationship between the oil price and oil companies' stock value. His research concluded that short-term positive oil price changes effects share return (positively), and that the effect is larger for firms mainly involved in exploration and production than downstream-integrated firms.

Huang, Masulis and Stoll (1996) studied oil shock effects on financial markets in the U.S. economy. They found that stock market returns are not correlated with oil future returns, even contemporaneously, except in the case of oil companies. The authors concluded that for three selected oil companies, oil future returns were leading oil stock returns by one day.

Sadorsky (2001) found that (by using a multifactor model) oil companies' stock prices are sensitive to returns on *market index, oil price, interest rate* and the *exchange rate*. The stocks had a positive relationship between returns on market index and the price of oil, and a negative relationship between interest rates and exchange rate returns.

Lanza, Manero, Grasso and Giovanni, (2005) conducted a study were they looked at the relationship between oil stocks and the price of oil. They established that an increase between spot and future prices corresponds to an increase in market value for the individual oil company; that there is a tangible relationship between the long-term price of crude oil and market value. They also contested that the spread would intuitively benefit a company whose core business revolves around downstream activities, and reversely penalizes a company whose business is mainly upstream. Since all the selected companies were vertically integrated oil companies, the theory could not be tested.

Hamilton has conducted several studies that statistically prove that the incline in the price of crude oil might significantly spur a recession (e.g. Hamilton 1983). In later studies, Hamilton has acknowledged that some third factor might be the cause of the high oil price, that there is something in the late stage of economic expansion that causes the spike in oil prices (Hamilton 2005).

Granli (2009) studied share price changes between 1990 and 2007 on a set of companies, including U.S. based oil and gas operators in comparison to different commodities of oil. He concluded that oil prices particularly affect returns of oil and gas operators, and that oil prices explained returns for some other selected firms as well. Granli also studied the nature of oil spikes were he discovered that share return for firms that produce, sell and distribute oil are best explained by oil price spikes.

5. Data on stock prices, returns, oil prices and company data

Annual reports, daily and monthly traded values of oil and share prices make up the background material. Data collected range between ‘02 and ‘09.

Annual reports are easily accessible through each operator’s webpage, found under the section titled “investor relations”. Publicly traded operators prioritize efficient communication with its investors and the oil and gas industry is subjected to strict legislation that demands full disclosure. Financial information is considered public information.

Historical traded values of shares and prices derive from Datastream, adjusted for dividend return, splits and emissions for the following operators:

4TABLE 1 - ENERGY COMPANIES RANKED BY MARKET CAP ($) AND PROVEN RESERVES[2]

Company	Symbol	Market Cap (Billion $)	Proven Reserves**
Exxon Mobil Corp.	XOM	338.46	23,306
Royal Dutch Shell plc.	RDS.A	185.28	10,903
BP plc	BP	179.84	10,353
Chevron Corp.	CVX	152.98	11,196
Total SA	TOT	144.36	10,458
Eni SpA	E	98.53	6,600
StatoilHydro ASA	STO	76.68	5,584
ConocoPhillips	COP	76.00	2,723
Repsol YPF SA	REP	32.54	2,210
Hess	HES	18.39	1,432

* From Forbes 2000 largest company list

**Net proved developed and undeveloped reserves (mboe)

Companies selected for the study are based in the energy sector, and notably in the oil and gas industry. They are of various sizes, ranging from a market cap of USD 338.46B (Exxon) to USD 18.39B (Hess) as of '09. Operators are registered on different stock exchanges, operate in different geographical regions and have different levels of production, exploration and reserves.

Share value data was retrieved from Datastream, adjusted for splits, emissions and dividend payments.

I have used continuously compounded rates to calculate return for this research. The main advantage of logarithmic return is that it is symmetric and used to avoid or reduce the impact of non-stationary time series. Share-returns are naturally non-stationary and variance is not the same as the time series progress. One such violation would be cyclical trends (bust and boom).

[2] Source: marketwatch.com

Compounded rates:

$$R = \ln\left(\frac{V_t}{V_{t-1}}\right)$$

Where *Vt* is day 1's return and *Vt-1* day 2's return.

5.1. Oil prices

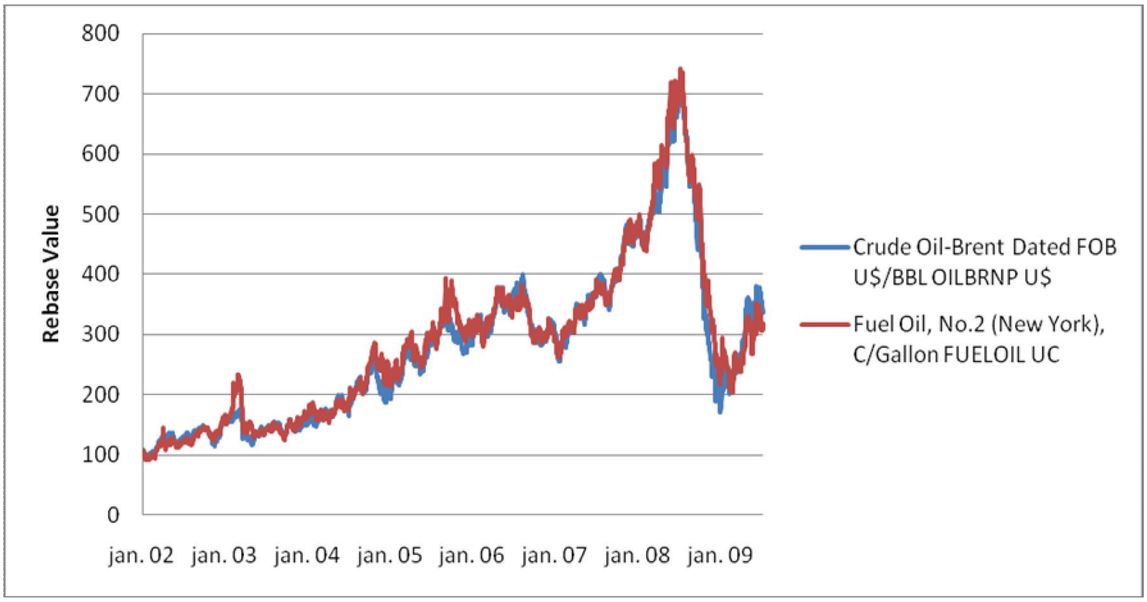
Brent Crude oil is a combination of 15 different oil fields in the Brent and Ninian region in the North-Sea. Brent is ideal for making gasoline and middle distillates and is mostly sold and refined in Europe. Brent Crude is sold per barrel (USD) on the ICE (Intercontinental Exchange) usually at a 4-dollar premium to the OPEC-basket. [3]

Fuel Oil No.2 is a distillate of diesel used to heat homes or produce diesel fuel for trucks and some car types. Prices of No. 2 Fuel Oil and other distillates are sold as future contracts on ICE and NYMEX (New York Mercantile Exchange) in cent per gallon. Fuel oil number two is a distilled product of crude oil. The decision to include Fuel Oil No.2 in this study was heavily influenced by the fact that Fuel Oil is sold directly to markets, while crude usually takes 3-6 months before it is distilled and sold. Crude oil demand derives from petroleum product demand, such as fuel oil. Short-term misalignments occur because stock change needs to meet seasonal demand.[4]

In this study, No.2 Fuel Oil prices are given in USD per barrel. Data provided from Datastream.

[3] http://tonto.eia.doe.gov/ask/crude_types1.html
[4] http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/demand_text.htm

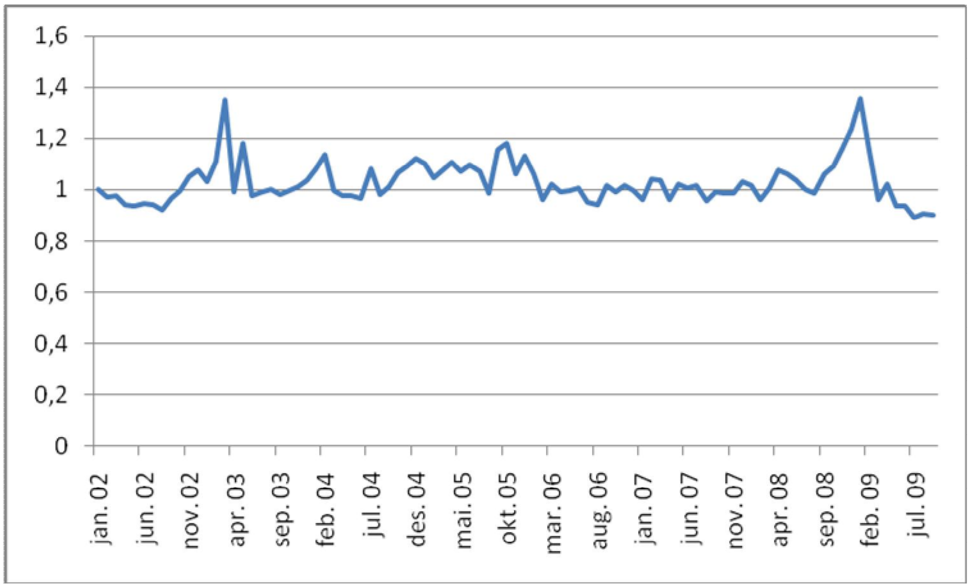
Chart 1 – USD Rebased Trend lines for Crude Oil Brent and Fuel Oil, No.2 (01.01.2002- 03.07.2009)



Stipulated above are trend lines for Crude Oil-Brent (blue) and Fuel Oil, No.2. (Red). The chart indicates that both commodities seem to move similarly and from ‘02 until ‘05 prices have experienced weak but steady growth. A significant spike in ‘03 is most likely explained by the invasion of Iraq. Commodity prices of oil and petroluem are sensitive to unexpected supply and demand and events such as conflicts, wars, accidents and natural disasters will cause misalignment between the demand and supply of oil, causing the prices to soar. Crude oil and fuel oil continue to rise between ‘05 and ‘07, although in a more volatile fashion. From ‘07 prices soar dramatically followed by a complete crash the autumn of ‘08. Early ‘09 prices started to pick up again.

The soaring prices of ‘08 can be explained by the world’s expected future demand for oil. In early ‘08 tremendous expectations for demand of oil were feuled by global economic growth from developing countries such as China, but following the housing market failure in the U.S oil prices plumitted rapidly; suggestive and strong evidence of a global and integrated economy. As the largest economy in the world the United States is a stimulate for growth in developing nations but has also been crucial for access to capital. Financial chaos and depressed consumer confidence following the mortgage backed security crisis played a big part, if not the main part of a rapidly decreasing oil price the fall of ‘08.

Chart 2 –Fuel Oil No.2/ Brent Crude metric (01.01.2002- 03.07.2009)



The metric above illustrates the link between crude oil and fuel oil, moving between 0,9 and 1,4. Over time, fuel.oil has at intervals been more expensive than crude oil as indicated by the spikes. The average for the period was 1,03, which means that fuel oil was on average 3% more expensive.

5.2. Accountring data for companies in the sample

ExxonMobil

ExxonMobil is the world's largest publicly traded company. It is the largest integrated petroleum and natural gas corporation, and the largest explorer of oil and natural gas. ExxonMobil is involved in the production, manufacturing, transportation and sale of crude oil, natural gas and petroleum products. Upstream the company has explorations and production in 38 countries and product oriented operations in 23 countries. Downstream ExxonMobil is involved in fuels and lubes marketing activities, and is the largest global refiner, manufacturer and seller of petroleum products. At the end of '08 ExxonMobil employed almost 80.000 people and has significant presence and reserves in the Middle East, United States, Africa and Canada. Upstream activities account for almost 70% of the revenue.

The company also has interests in electric power generation facilities.

On November 30th 1999 Exxon and Mobile merged into a new entity, becoming the largest publicly traded petroleum and natural gas company, and spearhead of the “super-majors”. [5] ExxonMobil is publicly traded on the NYSE (New York Stock Exchange). Institutions and mutual funds hold 49% of the float.

The company has been included in the sample because it is the biggest publicly traded petroleum and natural gas company. The stock’s performance expected to be affected by the price of oil.

Royal Dutch Shell

Royal Dutch Shell is the second largest petroleum and natural gas company according to Forbes and one of the “Super-majors”.[6] Its main business is the exploration, manufacturing and transportation of petroleum and natural gas products. Shell is a vertically integrated oil company but draws a substantial part (1/3) of its revenues from downstream activities, which also includes chemicals. Shell has a history of failed attempts to diversify into other energy sectors and is currently exploring alternatives within the areas of renewable energy, which is still under scrutiny from investors.

Shell operates in 140 countries and is primarily listed on the London Stock Exchange and the Euronext Amsterdam (Only “A” Shares). The stock’s performance is expected to have a relationship with the price of oil.

BP plc.

BP is UK’s largest corporation and the third largest vertically integrated petroleum and natural gas company. The corporation’s core business is the exploration, transportation and manufacturing of petroleum and natural gas products. BP operates in Algeria, Angola, Egypt, China, Indonesia, Vietnam and Pakistan, have chemicals manufacturing in China, South Korea and Malaysia. BP also operates in Australia and New Zealand, the North Sea and Russia. Throughout Europe, BP owns or has stakes in seven refineries. BP has exploration and production in Colombia and Venezuela, and lubricant production in Brazil.

[5] http://money.cnn.com/1999/11/30/deals/exxonmobil/
[6] http://www.forbes.com/lists/2009/18/global-09_The-Global-2000_Rank.html

In December of 1998 British Petroleum and Amco merged into today's BP following the late 90s consolidation trend, securing the company as one of the "super-majors".

BP is publicly traded on the London Stock Exchange. Like its competitors, the oil price is expected to influence BP's stock.

Chevron Corp.

In 2001 Chevron acquired Texaco and is today one of the six "super-majors". The company is involved within the business of exploration, manufacturing, processing, transportation, marketing and sale of oil and gas. The company operates in North America, Europe, Caspian, Middle-East, Asia, South-America, Australia and Africa.

Chevron has also interests in 13 joint venture power-generating facilities in the United States and Asia. Combined cycle and natural gas fired cogeneration plants use waste-heat to produce electricity. Chevron is also the world's leading producer of geothermal energy.

The company is registered on the New York Stock Exchange and is believed to be sensitive to the change in oil price.

TABLE 2 – 2008 USD FINANCIAL RATIOS FOR EXXONMOBILE, SHELL, BP AND CHEVRON

	XOM	RDS.A	BP	CVX
Current Ratio	1,47	1,10	0,95	1,14
Quick Ratio	1,033	0,921	0,463	0,794
Operating Cash Flow Ratio	1,17	0,38	0,46	1,05
Debt Ratio (to assets)	0,50	0,55	0,60	0,46
Debt to Equity Ratio	6,22 %	10,82 %	19,13 %	7,02 %
Long-term debt to Equity	3,08 %	4,88 %	7,65 %	3,56 %
Return on Assets (ROA)	19,83 %	9,30 %	9,27 %	14,85 %
EBITDA to Sales Ratio	16,48 %	12,50 %	11,53 %	16,31 %
CF Return on Invest.	26,53 %	-0,80 %	4,72 %	4,99 %
Return Capital Employed	46,98 %	29,40 %	22,61 %	33,34 %
Asset Turnover	2,09	1,62	1,60	1,69
Degree of Operating Lev.	0,91	0,06	0,35	1,38
Earnings per share	8,78	8,54	6,76	11,74
Payout Ratio	0,18	0,37	0,49	0,22
Return on stock 2008	-15,21 %	-18,72 %	-15,27 %	-22,49 %

Source: 2008 annual reports

In depth analysis of key financials in chapter 6

Total SA

A French petroleum and natural gas company and one of the “super-majors”, Total SA is also involved with every aspect of oil exploration, manufacturing, processing, transportation and sales. The company has interests in power generation and is a large producer of chemicals. Established as an independent French company following the First World War after the French prime minister refused to enter a cooperative with what was to be Shell.

Total SA is registered on the NYSE (New York Stock Exchange) and the Euronext.

Statoil ASA

StatoilHydro is a temporary name following the merger between Statoil and Hydro in '07. In the later part of '09 the name was changed to Statoil ASA. The company is the largest offshore oil and gas company in the world and ranked as the 13th largest oil company.

Statoil is a vertically integrated petroleum and natural gas firm with operations in 13 countries and retail operations in eight. Spurred out of the offshore deposits in the Barents Sea, Statoil is one of the industry leaders when it comes to offshore and deepwater technology. The company has also made substantial advances within the areas of carbon capture and storage.

Statoil ASA is registered on both the Oslo Stock Exchange and the New York Stock Exchange, and the is expected to be impacted by oil price changes

ConocoPhillips

Conoco Inc. and Phillips Petroleum Company merged on August 30th of 2002, creating ConocoPhillips, a global vertically integrated oil company. The company employs approximately 33.800 people and has operations in nearly 40 countries. It is the second largest refiner in the United States and operates 19 refineries around the world.

Through a 50 percent ownership in the joint venture company Chevron Phillips Chemical Company LLC, ConocoPhillips has interests in chemical and plastics production worldwide.

ConocoPhillips is registered on the New York Stock Exchange and as a vertically integrated oil company expected to be affected by the change in oil price.

TABLE 3 – USD 2008 FINANCIAL RATIOS FOR TOTAL, STATOILHYDRO AND CONOCOPHILLIPS

	TOT	STL	COP
Current Ratio	1,37	0,91	0,96
Quick Ratio	0,804	0,499	0,585
Operating Cash Flow Ratio	0,50	0,54	-0,37
Debt Ratio (to assets)	0,59	0,63	0,61
Debt to Equity Ratio	33,05 %	25,51 %	49,10 %
Long-term debt to Equity	13,69 %	9,44 %	18,96 %
Return on Assets (ROA)	9,26 %	7,48 %	-11,90 %
EBITDA to Sales Ratio	18,54 %	36,25 %	14,69 %
CF Return on Invest.	1,30 %	-2,23 %	0,85 %
Return Capital Employed	30,64 %	43,10 %	-2,14 %
Asset Turnover	1,36	1,13	1,72
Degree of Operating Lev.	-1,32	2,38	-3,88
Earnings per share	6,59	7,35	-11,16
Payout Ratio	0,47	0,63	-0,17
Return on stock 2008	-35,56 %	-38,00 %	-50,84 %

Source: 2008 annual reports

In depth analysis of key financials in chapter 6

Eni Spa

Eni Spa is an Italian petroleum and natural gas company with presence in 70 countries and is currently the largest industrial company in the country. The Italian government owns 30% of Eni's shares and the firm operates with exploration and production of oil in Italy, North Africa, West Africa, the North Sea, the Gulf of Mexico and Australia.

Eni Spa is registered on The Milano Stock Exchange and The New York Stock Exchange, whit respective Market Cap of € 68.9B/$37B on the different exchanges, which is most likely due to the volume offered.

Repsol YPF

Repsol YPF, a product of mergers between national oil companies from Argentina and Spain is a vertically integrated oil and gas company with core operations in South America. Like its peers the firm explores, manufactures, processes and distributes petroleum products. Repsol YPF operates three chemical plants and nine refineries: five in Spain, three in Argentina and one in Peru.

The company is registered on The Madrid Stock Exchange, The New York Stock Exchange and the Buenos Aries Stock Exchange, and is perceived to be impacted by change in the price of oil.

Hess Corporation

The Hess Corporation is engaged in the exploration, manufacturing, refining and marketing of natural gas and petroleum products. The corporation is also involved in electricity production. Hess has exploration and production in various countries outside the U.S such as Norway, U.K, Denmark, Russia, Thailand, Algeria, Indonesia and many more. Downstream Hess has stakes in 1,360 branded gas stations along the east coast of the U.S. Hess employs around 11.600 individuals and has headquarters in New York City.

TABLE 4 – USD 2008 FINANCIAL RATIOS FOR ENI, REPSOL AND HESS

	E	REP	HES
Current Ratio	1,05	1,35	0,95
Quick Ratio	0,775	0,644	0,673
Operating Cash Flow Ratio	0,51	0,54	0,57
Debt Ratio (to assets)	0,62	0,59	0,57
Debt to Equity Ratio	31,34 %	49,75 %	30,97 %
Long-term debt to Equity	11,95 %	20,23 %	13,33 %
Return on Assets (ROA)	8,20 %	5,74 %	8,25 %
EBITDA to Sales Ratio	24,86 %	13,63 %	17,17 %
CF Return on Invest.	-2,52 %	8,81 %	-0,63 %
Return Capital Employed	32,88 %	15,00 %	23,81 %
Asset Turnover	0,93	1,23	1,44
Degree of Operating Lev.	0,16	-1,20	0,85
Earnings per share	6,76	3,1	7,35
Payout Ratio	0,54	0,00	0,06
Return on stock 2008	-41,72 %	-47,32 %	-58,79 %

Source: 2008 annual reports

In depth analysis of key financials in chapter 6

6. A brief comparative financial Analysis of the oil and gas companies in the sample

Chapter 6 seeks to compare, through financial analysis, different liquidity, leverage and performance among the companies through financial ratios. All derived from publicly available financial information from *marketwatch.com*, which is based on SEC filings.

6.1. Key financial findings

Annual reports filed with the SEC constitute the background material for the financial analysis. Findings rely on the validity and real representation given by the annual reports. Strict rules and legislation do not give companies, especially oil and gas operators, significant leeway when it comes to book keeping. Therefore, the information provided in annual reports is considered reliable.

Considering liquidity for the operators, each individual operator’s ability to meet short-term debt obligations, results vary. Larger firms are in general more equipped to handle short-term liabilities, while smaller firms display a more distributed ability to meet short-term debt obligations. Quick ratios and operating cash flow ratios, which take a more conservative stand on liquidity requirements, show that ExxonMobil and Chevron stand out from the rest of the sample as being more fit to meet short-term debt obligations. BP, the third largest publicly traded operator, display some of the poorest ratios of the group, and both quick ratios and operating cash flow ratios are consistently among the lowest. Shell, the second largest publicly traded operator can be said to display similar properties as that of BP; quick ratios vary over a four year period and operating cash flow ratios are significantly lower than the average. For the rest of the sample it is hard to draw any conclusions but ConocoPhillips has a negative operating cash flow ratio for ‘08, abnormal for the period and suggesting that the firm has trouble securing capital. Summarized, liquidity issues do not appear to be a small operator concern, as one might expect.

Debt structures are similar for the industry sample, ranging between 50-60 %. Debt to equity and long-term debt to equity ratios on the other hand, vary greatly with operator size; the larger the firm, the smaller the debt ratio. ExxonMobil and Chevron have the lowest ratios. Shell and BP have low ratios, although BP’s debt to equity ratio has risen over the four-year period. Small operators rely more on outside financing and use a larger portion of debt to finance its assets. ConocoPhillips and Repsol stand out in the sample as the most debt financed firms.

Findings from the profitability and efficiency ratios are inconclusive. Larger firms appear to be creating a higher return on their assets, while smaller operators are more cost-efficient. Cash flow generated compared to investments for the period reveal that ExxonMobil and

Chevron are outperforming the group in their ability to generate higher returns on their assets and investments. Looking at a three-year average, replacement rates are substantially higher for larger operators with the exception of Hess, which has a replacement rate of a 190%. The high replacement rate might explain the high share-returns generated by Hess. ConocoPhillips distinguish itself by drastically being more sensitive to sales effect on revenue. Statoil and Chevron also display some small evidence of being slightly more sensitive to changes in sales than the average.

Earnings per share unveil that Repsol and ConocoPhillips have been performing poorly, although ConocoPhillips return has been heavily impacted by the events of ‘08.

6.2. Liquidity

Liquidity ratios determine a company’s ability to meet its short-term financial obligations. A company’s inability to turn short-term assets into cash might render it insolvent, and therefore analysts use liquidity ratios to understand the relationship between liabilities and assets. The most common used liquidity ratios are quick ratio, current ratio and operating cash flow ratio. The higher the value of these ratios, the better equipped the company is to handle its short-term debts. SEC annual report filings retrieved from *marketwatch.com*

Current ratio, defined as current liabilities over current assets, is used to assess the firm’s ability to meet short-term debt obligations. Where a ratio under one is interpreted as: the company cannot meet its financial obligations if called back at this time. A current ratio under one is not a good sign, but this is extremely dependent on industry.

TABLE 5 – Current Ratios (2005-2008)

	2008	2007	2006	2005
ExxonMobile	1,472	1,474	1,552	1,584
Shell	1,10	1,22	1,20	1,15
BP	0,951	1,024	0,986	1,046
Chevron	1,139	1,165	1,278	1,373
Total	1,371	1,353	1,276	1,309
Statoil	0,907	1,003	1,084	1,003
ConocoPhillips	0,957	0,920	0,948	0,918
Eni	1,050	1,118	1,264	1,122
Repsol	1,348	1,369	1,381	1,265
Hess	0,949	0,863	0,868	0,821

From the table above we see that there have not been any significant changes for the companies during the period. In ‘08, ExxonMobile had the highest current ratio, followed by Total. The lowest ratio was that of Statoil, Hess and BP. Compared to ‘05, only ConocoPhillip and Hess have values under one. SEC annual report filings retrieved from *marketwatch.com*

Quick Ratio, calculated as cash and equivalents plus marketable securities, plus accounts receivable, divided by current liabilities; excludes inventories because some companies have a hard time selling off inventory to meet short-term obligations. It does not seem unrealistic to consider oil an inventory, which for a vertically integrated company, would take substantial time to turn into cash. SEC annual report filings retrieved from *marketwatch.com*

TABLE 6 – Quick Ratios (2005-2008)

	2008	2007	2006	2005
ExxonMobile	1,033	1,119	1,092	1,213
Shell	0,921	0,551	0,521	0,919
BP	0,463	0,491	0,468	0,507
Chevron	0,794	0,904	1,023	1,133
Total	0,804	0,704	0,710	0,716
Statoil	0,499	0,621	0,693	0,730
ConocoPhillips	0,585	0,663	0,565	0,663
Eni	0,775	0,682	0,850	0,747
Repsol	0,644	0,911	0,930	0,839
Hess	0,673	0,662	0,632	0,616

In 2008, only ExxonMobile had a number above one. BP came out worst with a number of 0,463, followed by Statoil at 0,499. Looking at the progression from ‘05 to ‘07 we notice that bigger firms seem to have higher values except BP, while smaller firms have lower values, although somewhat sporadic and hard to draw any conclusions.

Operating Cash Flow Ratio, measured by dividing cash flow over current liabilities, gives an even more conservative approach to evaluating a company’s ability to meet its short-term financial obligations. SEC annual report filings retrieved from *marketwatch.com*

TABLE 7 – Operating Cash Flow Ratios (2005-2008)

	2008	2007	2006	2005
ExxonMobile	1,173	0,907	1,043	1,002
Shell	0,378	0,472	0,496	0,439
BP	0,461	0,408	0,418	0,428
Chevron	1,045	0,811	0,867	0,800
Total	0,500	0,536	0,517	0,536
Statoil	0,540	0,645	1,130	0,668
ConocoPhillips	-0,367	0,751	0,864	0,837
Eni	0,509	0,563	0,647	0,636
Repsol	0,538	0,557	0,617	0,493
Hess	0,568	0,425	0,460	0,342

We note that ExxonMobile comes out on top with Chevron. Shell and BP have numbers reaching below the 0,5 marker and ConocoPhillips have negative cash flow from operations for ‘08. Comparing ratios for the period ‘05-07, it is hard to see any distinct patterns.

6.3. Leverage

A leverage ratio gives insight into the company’s debt structure. Fixed cost and variable cost make up the cost structure of companies and leverage ratios are used to distinguish how much is vested in each bulk. For oil and gas companies the larger parts of costs are considered fixed costs, as facilities, exploration and investments are usually long-term commitments.

TABLE 8 –Debt Ratios (2005-2008)

	2008	2007	2006	2005
ExxonMobile	50,5 %	49,7 %	48,0 %	46,6 %
Shell	54,9 %	54,0 %	55,1 %	58,6 %
BP	60,0 %	60,3 %	61,1 %	61,5 %
Chevron	46,2 %	48,2 %	48,0 %	50,2 %
Total	58,6 %	60,5 %	61,7 %	61,7 %
Statoil	63,0 %	63,3 %	61,0 %	63,1 %
ConocoPhillips	61,4 %	49,9 %	49,8 %	50,7 %
Eni	61,9 %	60,2 %	55,8 %	56,0 %
Repsol	59,3 %	60,8 %	61,4 %	64,5 %
Hess	57,0 %	62,6 %	63,7 %	67,1 %

Debt Ratio, calculated as total liabilities divided by total assets, measures the portion of debt compared to assets and gives us an idea of the company's leverage and ability to meet financial obligations. A ratio above one means that the company has more debt than assets, and a ratio below one means the company has more assets than debt. Debt ratio helps investors understand the risk and general financial health of the company. SEC annual report filings retrieved from *marketwatch.com*

Table 8 shows that oil and gas companies have a debt levels ranging from about 40-60%. In '08, StatoilHydro was the most debt-financed entity, while Chevron was the least. Over the period ExxonMobile, ConocoPhillips and Eni have had their levels adjusted towards more debt. Hess has reduced its debt ratio by 10% and ConocoPhillips increased by 10%, but besides these events, there does not seem to be significant moves in terms of leverage. Historically, bigger companies have maintained a lower debt ratio.

TABLE 9 –Debt to Equity Ratios (2005-2008)

	2008	2007	2006	2005
ExxonMobile	6,20 %	5,90 %	5,80 %	5,60 %
Shell	10,80 %	10,00 %	9,20 %	8,30 %
BP	19,10 %	16,70 %	13,10 %	12,80 %
Chevron	7,00 %	7,90 %	11,10 %	19,40 %
Total	33,00 %	33,20 %	35,20 %	33,90 %
Statoil	25,50 %	25,00 %	24,00 %	30,50 %
ConocoPhillips	49,10 %	22,80 %	27,90 %	20,40 %
Eni	31,30 %	28,00 %	19,00 %	20,80 %
Repsol	49,80 %	35,90 %	40,40 %	38,30 %
Hess	31,00 %	40,10 %	46,00 %	59,90 %

Debt to Equity Ratio, measured as total liabilities divided by shareholders equity indicates how much debt and equity the company is using to finance its assets. That is, how much outside debt is used to finance growth. High values are associated with higher levels of debt financing and in capital-intensive industries, such as the oil and gas industry. It is common to expect levels above 20%. SEC annual report filings retrieved from *marketwatch.com*

From the table above, Exxon consistently has the smallest ratios. The other big firms such as Shell, BP and Chevron also have moderate amounts of outside financing compared to the smaller firms. Hess has significantly reduced its dependence on capital markets and ConocoPhillips has increased its leverage by 30%.

TABLE 10 –Long-Term Debt to Equity Ratios (2005-2008)

	2008	2007	2006	2005
ExxonMobile	3,10 %	3,00 %	2,90 %	3,00 %
Shell	4,90 %	4,60 %	2,40 %	3,50 %
BP	7,70 %	6,40 %	4,70 %	4,60 %
Chevron	3,60 %	3,80 %	5,60 %	9,40 %
Total	13,70 %	13,10 %	13,50 %	13,00 %
Statoil	9,40 %	9,20 %	9,40 %	11,30 %
ConocoPhillips	19,00 %	11,40 %	14,00 %	10,10 %
Eni	11,90 %	11,20 %	8,40 %	9,10 %
Repsol	20,20 %	14,10 %	15,60 %	13,60 %
Hess	13,30 %	15,00 %	16,70 %	19,70 %

Long-Term Debt to equity Ratio is a sterner ratio (long-term debt divided by shareholders equity) as it only concerns itself with long-term debt obligations. SEC annual report filings retrieved from *marketwatch.com*

Table 10 gives insight into capital financing; more in-house financing of bigger companies versus the bigger dependency on long-term financing among the smaller entities.

6.4. Profitability

Profitability ratios compare a company's earnings relative to its costs or assets. Having higher ratios than comparable firms is a sign that the company is outperforming its competitors.

TABLE 11 –Return on Assets Ratios (2005-2008)

	2008	2007	2006	2005	2005-2008
ExxonMobile	19,80 %	16,80 %	18,00 %	17,30 %	18,00 %
Shell	9,30 %	11,60 %	10,80 %	11,50 %	10,80 %
BP	9,30 %	8,80 %	10,30 %	10,60 %	9,70 %
Chevron	14,80 %	12,60 %	12,90 %	11,20 %	12,90 %
Total	9,30 %	11,60 %	11,20 %	11,60 %	10,90 %
Statoil	7,50 %	9,10 %	16,00 %	10,60 %	10,80 %
ConocoPhillips	-11,90 %	6,70 %	9,40 %	12,60 %	4,20 %
Eni	8,20 %	9,90 %	10,40 %	10,50 %	9,70 %
Repsol	5,70 %	6,80 %	6,90 %	6,80 %	6,60 %
Hess	8,30 %	7,00 %	8,60 %	6,40 %	7,60 %

Return on Assets, net income over total assets gives us an indication how much revenue a company’s assets generate. Assets are compromised of debt and equity, and a higher ability to get more revenue on fewer assets is an indication of efficiency. SEC annual report filings retrieved from *marketwatch.com*

On average, ExxonMobil outperforms the rest of the group and Eni is the only relative small company with a high ROA. It appears that there is a tangible relationship between company size and Return on assets.

TABLE 12 –EBITDA to Sales Ratios (2005-2008)

	2008	2007	2006	2005	2005-2008
ExxonMobile	16,50 %	17,30 %	18,10 %	16,00 %	17,00 %
Shell	12,50 %	15,20 %	15,80 %	16,10 %	14,90 %
BP	11,50 %	13,00 %	13,40 %	15,50 %	13,40 %
Chevron	16,30 %	15,50 %	16,60 %	13,70 %	15,50 %
Total	18,50 %	22,70 %	22,20 %	25,30 %	22,20 %
Statoil	36,20 %	33,60 %	38,90 %	30,00 %	34,70 %
ConocoPhillips	14,70 %	16,00 %	17,40 %	13,50 %	15,40 %
Eni	24,90 %	28,50 %	28,40 %	28,90 %	27,70 %
Repsol	13,60 %	9,80 %	28,40 %	29,10 %	20,20 %
Hess	17,20 %	16,60 %	17,20 %	13,00 %	16,00 %

EBITDA to Sales Ratio compares a firm's revenue to its earnings. This metric is useful because it indicates generated earnings compared to expenses. SEC annual report filings retrieved from *marketwatch.com*

The chart above shows that on average smaller entities are more cost efficient. StaoilHydro comes out on top with an average of 34,7% followed by Eni at 27,7%. Total and Repsol both have numbers above 20%. Shell and Bp have the lowest numbers, respectively 14,9% and 13,4 %. After operating expenses, smaller operators retain more of their earnings.

TABLE 13 – Cash Flow Return on Investment (2005-2008)

	2008	2007	2006	2005	2005-2008
ExxonMobile	26,50 %	22,20 %	20,60 %	20,00 %	22,30 %
Shell	-0,80 %	0,70 %	0,50 %	1,70 %	0,50 %
BP	4,70 %	66,10 %	6,00 %	7,90 %	21,20 %
Chevron	5,00 %	4,20 %	8,00 %	2,20 %	4,80 %
Total	1,30 %	4,80 %	4,10 %	2,60 %	3,20 %
Statoil	-2,20 %	-1,00 %	7,90 %	-0,40 %	1,10 %
ConocoPhillips	0,80 %	11,60 %	-12,50 %	8,30 %	2,00 %
Eni	-2,50 %	-8,10 %	9,00 %	5,10 %	0,90 %
Repsol	8,80 %	0,70 %	-1,30 %	7,90 %	4,00 %
Hess	-0,60 %	-1,50 %	-4,50 %	-7,90 %	-3,60 %

Cash Flow Return on Investments, cash flow divided by working capital plus net fixed assets, is a metric that measures the cash flow generated compared to investments. SEC annual report filings retrieved from *marketwatch.com*

Again, there appears that there is a divide between the large and small corporations, but ExxonMobil clearly stands out with the highest ROI

TABLE 14 – Return on Capital Employed(2005-2008)

	2008	2007	2006	2005	2005-2008
ExxonMobile	47,00 %	39,10 %	40,60 %	37,50 %	41,00 %
Shell	29,40 %	29,20 %	29,00 %	33,90 %	30,40 %
BP	22,60 %	20,60 %	25,20 %	23,80 %	23,00 %
Chevron	33,30 %	28,20 %	31,20 %	25,60 %	29,60 %
Total	30,60 %	37,10 %	38,50 %	35,00 %	35,30 %
Statoil	43,10 %	42,30 %	72,70 %	43,60 %	50,40 %
ConocoPhillips	-2,10 %	16,30 %	21,30 %	28,10 %	15,90 %
Eni	32,90 %	34,70 %	32,30 %	29,00 %	32,20 %
Repsol	15,00 %	17,70 %	17,70 %	18,20 %	17,20 %
Hess	23,80 %	21,90 %	27,00 %	19,10 %	23,00 %

Return on Capital Employed, EBIT over total assets minus current liabilities, shows generated returns from of assets. Higher ratios are signs of a company that is doing well, a metric used to assess the profitability and efficiency. SEC annual report filings retrieved from *marketwatch.com*

Clearly, some companies seem to be performing better than other ones, such as ExxonMobile, Statoil, Eni, Shell and Total, but hard to draw any concrete conclusions from the observation.

6.5. Efficiency

Efficiency ratios evaluate the financial structure of a firm in order to assess generated earnings compared to assets, and the sensitivity of earnings to fixed costs.

TABLE 15 –Replacement Rate Ratio (2005-2008)

	2008	2007	2006	3-year average
ExxonMobile	110 %	132 %	122 %	121 %
Shell	95 %	124 %	150 %	123 %
BP	121 %	112 %	113 %	115 %
Chevron	146 %	N/A	N/A	146 %
Total	N/A	N/A	N/A	
Eni	135 %	38 %	38 %	70 %
Statoil	34 %	86 %	61 %	60 %
ConocoPhillips	31 %	159 %	256%a	95 %
Repsol	N/A	N/A	N/A	
Hess	171 %	167 %	232 %	190 %

*a - including Burlinghton Resource Acquisition and investmens in LUKEOIL

Replacement rate, a measurement of exploration and production efficiency, gives insights into the relationship between reserves added and production levels. An oil company that has dwindling reserves compared to production is a deteriorating asset and will eventually run out of oil. Consistent rates lower than a 100 % will eventually deplete reserves. SEC annual report filings retrieved from *marketwatch.com*

Due to the infrequency of exploration, projects may take longer to mature and become classified as proven reserves. Some years, drilling might be very successful and replacement rates high while other years might prove fruitless. Above, is a three year table from 06'-08.

According to SEC regulations, adding reserves must be a cost-efficient endeavor under the current oil price and so published ratios are based on 31st of December oil prices. The higher the oil price, the more reserves are added. Volatile oil prices will give a distorted picture of reserves, and '08 is a good example; Statoil, Shell and ConocoPhillips proven reserves ratios dropped significantly in '08. Statoil is a major operator in offshore exploration and production. Drilling in the seabed is more costly than on solid ground. Consequently, under a low oil price Statoil's replacement rate drops more drastically than its peers do.

On a three-year average, with the exception of Hess, smaller companies in the sample have been showing lower replacement rates. SEC annual report filings retrieved from *marketwatch.com.*

TABLE 16 – Asset Turnover (2005-2008)

	2008	2007	2006	2005
ExxonMobile	2,093	1,671	1,724	1,779
Shell	1,623	1,32	1,355	1,397
BP	1,602	1,224	1,244	1,179
Chevron	1,694	1,485	1,584	1,575
Total	1,355	1,205	1,261	1,103
Statoil	1,134	1,082	1,63	1,341
ConocoPhillips	1,723	1,094	1,144	1,714
Eni	0,934	0,868	0,984	0,889
Repsol	1,234	1,105	1,136	1,049
Hess	1,44	1,211	1,251	1,19

Asset Turnover, revenue divided by assets is a metric showing the amount of revenue generated from the assets. Higher values indicate an efficient firm. SEC annual report filings retrieved from *marketwatch.com*

Again, there seems to be a divide between ratios depending on operator size, were the smaller companies have somewhat smaller ratios.

TABLE 17 – Degree of Operating Leverage (2005-2008)

	2008-2007	2007-2006	2006-2005
ExxonMobile	0,915	0,572	-2,075
Shell	0,058	0,981	0,16
BP	0,352	-1,261	1,071
Chevron	1,377	-0,039	2,415
Total	-1,318	1,126	0,79
Statoil	2,376	-0,099	2,33
ConocoPhillips	-3,879	-8,03	9,598
Eni	0,155	2,565	1,016
Repsol	-1,2	1,06	0,548
Hess	0,846	-0,53	3,213

Degree of Operating Leverage, calculated by dividing the change in EBIT over the change in revenue, measures how sensitive earnings are to changes in sales. SEC annual report filings retrieved from *marketwatch.com*

High values are signs of greater sensitivity on EBIT to the percent change in sales. Degree of operating leverage tells us something about the amount of fixed cost and variable cost, and higher values can be indications of large fixed costs.

From the chart above it is evident that many of the companies have very different values depending on period, but one company that stands out is ConocoPhillips, which seems to be extremely vulnerable to shifts in revenue on EBIT. Considering poor debt ratios and the poor performance in ‘08, degree of operating leverage further verify ConocoPhillips to be more sensitive to reduction in sales due to greater fixed costs.

6.6. Market

Market ratios are used to assess earnings or dividend payments

TABLE 18 – Earnings Per Share(2005-2008)

	2008	2007	2006	2005	2005-2008
ExxonMobile	8,78	7,36	6,68	5,76	6,6
Shell	8,54	10	7,94	7,48	8,49
BP	6,76	6,53	6,68	6,26	6,56
Chevron	11,74	8,83	7,84	6,58	8,75
Total	6,59	8,53	6,77	6,19	7,02
Statoil	7,35	5,86	6,75	4,32	6,07
ConocoPhillips	-11,16	7,32	9,8	9,71	3,92
Eni	6,76	7,97	6,57	5,54	6,71
Repsol	3,1	3,81	3,38	3,03	3,33
Hess	7,35	5,86	6,75	4,32	6,07

Earnings Per Share, Net income minus dividends paid divided over shares outstanding, shows how much of the income is allocated to each share. It is a useful metric to understand companies' profitability. However, EPS ignores the utilization of investments in order to produce earnings, and a corporation is more efficient if it generates the same EPS with less assets. SEC annual report filings retrieved from *marketwatch.com*

Repsol stand out with an average EPS of 3.

TABLE 19 – Payout Ratio (2005-2008)

	2008	2007	2006	2005	2005-2008
ExxonMobile	0,18	0,19	0,2	0,21	0,19
Shell	0,37	0,29	0,32	0,49	0,37
BP	0,49	0,39	0,34	0,33	0,39
Chevron	0,22	0,26	0,26	0,27	0,25
Total	0,47	0,34	0,34	0,31	0,36
Statoil	0,63	0,58	0,35	0,4	0,49
ConocoPhillips	-0,17	0,22	0,15	0,12	0,08
Eni	0,54	0,46	0,5	0,06	0,39
Repsol	0	0,3	0,26	0,22	0,2
Hess	0,06	0,07	0,08	0,13	0,08

Payout Ratios, dividends paid out divided by earnings, is a metric that show how much earnings are retained within the company and how much is paid out to investors. The oil industry has a history of not paying out dividends and spending excess cash on projects with an NPV lower than cost of capital, or diversifying into other businesses that are not necessarily justified from an investors view (Jensen 1986). SEC annual report filings retrieved from *marketwatch.com*

With the exception of Hess most firms have paid out quite substantial parts of their earnings as dividends. Hess, which is the smallest company might have good motivation for retaining earnings to fuel growth and access capital

7. Descriptive Statistics for share and oil prices/returns

Descriptive statistics describes the characteristics of the sample and checks variables for violations of underlying assumptions used in statistical techniques, such as regression. Statistics are presented in tables for comparison, with and without the effects of the financial crisis of ‘08/09.

Data presented by daily observations, adjusted for dividend return, splits and emissions.

TABLE 20 – Annual Share return and price to book ratio (2009)

	Price to Book Ratio	Return on Equity
ExxonMobile	2,85	17,40 %
Shell	1,28	5,70 %
BP	1,75	9 %
Chevron	1,62	11,40 %
Total	1,87	11,10 %
Statoil	2,25	3,10 %
ConocoPhillips	1,21	7,80 %
Eni	2,18	18,70 %
Repsol	1	11,10 %
Hess	1,48	5,50 %
Average	1,749	10,08 %

Price to book ratio gives insight into the stock market compared to book market value. A low price to book value might be an indication of an undervalued firm, but could also be evidence of an underperforming asset or that something is fundamentally wrong with the company. Generally, we expect high price-to-book ratio compensation by higher ROEs.

According to the PBV ratio, no company is undervalued, but Repsol has a Price to book value of 1, neither under- nor overvalued.

Not taking into account the valuation effects caused by standard deviation (risk) it appears to be a connection between high price to book ratios and high ROEs. Many of the operators have poor ROEs compared to book value, as demonstrated by Statoil. ROEs are from ‘09, post ’08 crisis.

TABLE 21 – Annual Share return and Standard deviation (2002-2008)

	Mean µ * 250	Std σ *sqrt(250)	Maximum	Minimum
Exxon ($)	9,70 %	27,91 %	15,86 %	-15,03 %
Shell "A" ($)	-8,40 %	27,09 %	13,10 %	-10,32 %
Shell "B" ($)	1,36 %	27,97 %	13,21 %	-9,81 %
BP. ($)	-0,42 %	27,05 %	10,58 %	-8,47 %
Chevron ($)	6,86 %	28,35 %	18,94 %	-13,34 %
Total ($)	-0,34 %	27,48 %	12,79 %	-9,64 %
Eni ($)	8,99 %	28,50 %	13,91 %	-12,94 %
StatoilHydro ($)	8,43 %	33,03 %	12,74 %	-11,56 %
ConocoPhillips ($)	7,41 %	31,67 %	15,36 %	-14,87 %
Repsol ($)	-1,63 %	29,02 %	11,25 %	-17,14 %
Hess ($)	12,94 %	43,09 %	15,44 %	-21,27 %

All returns are in USD. Converted from EUR and GBP[7]

There is a good spread between returns. On top, we find Hess with a 12.94% annual return followed by Exxon at 9,70% annual return. Worst performer is Shell “A” with -8.40 % for the period. Repsol, Total and BP have negative returns for the period. The impact of the financial crisis could explain the big spread between returns. However, many companies can boast a positive return for the whole period despite havoc of the financial crisis. Standard deviation measures volatility and associated risk for each stock. Hess is also the most volatile stock with a standard deviation of 43.09%. ExxonMobil does better than many of the lower performing shares considering volatility. Chevron has the highest maximum gain for one day, 18,94 % followed by Exxon at 15,86 %. Hess has the largest one-day depreciation for the period (-21,27 %). In general, big corporations seem to be less volatile. Hess, which is the smallest operator by market capitalization, has the largest standard deviation and return.

Looking at both return and standard deviation in a comparable view, Exxon is the best *return for risk* investment for the period ‘02-08 (Sharp ratio p.39)

[7] Exchange rate 01.01.08, EUR-USD: 1,47, GBP-USD: 1,99

TABLE 22 – Annual Share return, Standard deviation and Sharp Ratio (2002-2007)

	Mean	St.dev	Sharpe
Hess ($)	25,50 %	30,64 %	0,73
ConocoPhillips ($)	17,30 %	24,54 %	0,58
Eni ($)	17,20 %	21,32 %	0,67
Statoil ($)	16,00 %	28,09 %	0,46
ExxonMobile ($)	13,90 %	22,14 %	0,49
Chevron ($)	11,80 %	21,32 %	0,41
Repsol ($)	8,32 %	24,37 %	0,22
Shell-B ($)	7,84 %	23,22 %	0,21
Total ($)	7,53 %	22,64 %	0,2
BP ($)	4,70 %	22,94 %	0,07
Shell-A ($)	0,40 %	22,32 %	-0,12

All returns are in USD. Converted from EUR and GBP[8]

$$ShapeRatio = \frac{r - r_r}{std}$$

Where r is return on the stock, r_f the risk free rate of return and *std* standard deviation of the stock returns.

Excluding the financial turmoil of '08 dramatically increases the mean and reduces standard deviation for the sample. *Sharp ratio* is a risk to return measure calculated by subtracting risk free rate of return (approx. 3%) from stock return; calculated by using the average U.S. Treasury bond rates for the period[9] divided by standard deviation. Sharp ratio is considered to be a *most value for risk-taken* ratio and Hess has been the most attractive investment at 0,73, but also the most risky, followed by Eni and ConocoPhillips. The most unattractive investments according to the sharp ratio were BP and Shell. In this scenario, the larger firms are less attractive investments, based on Sharp ratios.

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[8] Exchange rate 01.01.08, EUR-USD: 1,47, GBP-USD: 1,99

[9] http://pages.stern.nyu.edu/~adamodar/

TABLE 23 – Annual Commodity Return and Standard deviation (02-07/08)

		Mean μ * 250	Std σ *sqrt(250)	Maximum	Minimum
Crude Oil-Brent	08'	8,65 %	35,30 %	10,98 %	-12,31 %
	07'	25,30 %	32,64 %	11,89 %	-18,83 %
Fuel Oil No.2	08'	12,83 %	40,78 %	11,89 %	-18,83 %
	07'	25,30 %	39,47 %	10,98 %	-8,72 %

Looking at the two commodities up until 08', fuel oil had greater returns but was more volatile, with a standard deviation of 40.78 %. Fuel oil had the highest extreme values including '08, but lower than crude oil for '07. Excluding the financial crisis, the '07 mean is significantly higher for fuel oil and crude oil. Both crude oil and fuel oil have the exact same return, although fuel oil is somewhat more volatile.

Whereas share return is forward looking due to valuation, as discussed earlier in chapter 2 this tends to smooth out volatility, oil commodities sold on spot markets are prone to volatility dictated by change in supply and demand.

7.1. Correlation between companies and commodity prices of oil

TABLE 24 – Correlation on daily returns between operators (2002-2008)

	STL	E	COP	BP	CVX	SHELLA	HES	XOM	SHELLB	REP	FP
StatoilHydro	1										
Eni	.260**	1									
ConocoPhillips	.278**	.580**	1								
BP	.456**	.438**	.372**	1							
Chevron	.262**	.605**	.773**	.427**	1						
Shell "A"	.405**	.438**	.344**	.776**	.405**	1					
Hess	.265**	.488**	.702**	.323**	.668**	.296**	1				
Exxon	.240**	.605**	.754**	.427**	.827**	.422**	.649**	1	**		
Shell "B"	.410**	.449**	.331**	.818**	.396**	.910**	.283**	.412**	1		
Repsol	.345**	.400**	.272**	.564**	.300**	.584**	.236**	.295**	.559**	1	**
Total	.451**	.511**	.360**	.778**	.405**	.828**	.299**	.419**	.779**	.619**	1

All the stock returns are to some degree correlated with each other but this is expected. The correlations are significant at the 1% level (two tailed). Choen (1988) suggest that the strength of correlation relationships can be divided into *small* (.10 to .29), *medium* (.30 to .49) and *large* (.50 to 1.0). I will use Choen (1988) suggestions as a guideline for determining the strength of the relationships:

From the table above; Eni, ConocoPhillips, Chevron, Hess and Exxon are highly correlated with each other. Eni is the only non-U.S. firm, but registered on the NYSE and the Milano Stock Exchange (traded values are from the NYSE). BP, Shell, Repsol and Total, which are European based companies, are highly intercorrelated.

Statoil is not highly correlated with any of the other firms but exhibit medium correlation with BP, Shell, Repsol and Total.

It is important to point out that correlation does not mean causality, but it appears that firms display high level of correlation when registered on the same stock exchange, which could be due to domestic events or traits displayed by the individual exchange. Considering that the correlations are based on daily values, this phenomena could be due to time-zone differences, as the NYSE opens when the European Stock Exchange is about to close. Using monthly instead of daily return should dilute any correlations due to time-zone differences. See correlation matrix below.

TABLE 25 – Correlation on monthly returns between operators (2002-2008)

	STL	E	COP	BP	CVX	SHELLA	HES	XOM	REP	FP
StatoilHydro	1									
Eni	,640	1								
ConocoPhillips	,553	,718	1							
BP	,682	,755	,713	1						
Chevron	,562	,673	,814	,731	1					
Shell "A"	,653	,647	,665	,830	,718	1				
Hess	,574	,619	,708	,573	,640	,555	1			
Exxon	,529	,639	,767	,676	,856	,681	,564	1		
Repsol	,386	,541	,625	,552	,557	,505	,421	,458	1	
Total	,709	,803	,696	,859	,736	,880	,596	,697	,538	1

Monthly values increase overall correlation. Shell and BP remain highly intercorrelated, as well as Exxon and Chevron. The strongest correlation observed between Shell and Total. Applying monthly data has reduced the spread between same stock exchange registered companies, but there is still a trend to support the hypothesis, as there is a tendency for same exchange stocks to correlate more.

Looking at patterns between correlation and financials yielded in the financial analysis chapter might reveal similarities between correlation and financial characteristics. Ratios might explain why some firms correlate while other firms do not.

BP and Shell are highly correlated with each other and display almost identical financial traits in liquidity, efficiency and performance ratios. Shell is outperforming BP slightly in efficiency and performance, and has consistently somewhat better debt and liquidity ratios. Total and Shell have the highest correlation and considering financial ratios, the two operators display similar results in liquidity and performance, but not in leverage and efficiency. Exxon and Chevron, the second largest correlation (0,827) show a distinct pattern of similar results in liquidity, leverage and performance. ConocoPhillips and Eni are highly correlated with both Chevron and Exxon, although somewhat smaller, but there is no pattern in the financial ratios that can explain the correlations and when looking at the monthly correlation, the distinction becomes much smaller.

The results are ambiguous. In the extremes, correlation reveals a pattern of similarities between the operators' financials, but general high levels of correlation do not necessarily imply corresponding financial characteristics.

TABLE 26 – Correlation between daily returns of selected oil companies and oil prices (2002-2008)

	STL	E	COP	BP	CVX	SHELLA	HES	XOM	SHELLB	REP	FP
OILBRNP	.254**	.133**	.242**	.185**	.179**	.115**	.249**	.155**	.134**	.065*	.142**
FUELOIL	.102**	.137**	.280**	.097**	.223**	,048	.306**	.194**	.067**	,008	.060*

** Correlation is significant at the 0.01 level (2 -tailed)

* Correlation is significant at the 0.05 level (2 -tailed)

From the correlation matrix in Table 26 we see that crude oil is not strongly correlated with any of the companies on a daily basis. StatoilHydro, ConocoPhillips and Hess have the highest correlations with crude oil.

Concerning fuel oil, Hess is the only company that achieves a medium correlation coefficient of .0306. Repsol, BP and Shell are not correlated, while StatoilHydro is barely correlated with fuel oil. Conocophillips, Chevron and Exxon are correlated, but on a small level. ConocoPhillips, Chervron, Hess and Exxon display higher levels of correlation with fuel oil than crude oil; possible indication of sensitivity towards downstream activities.

TABLE 27 – Correlation between monthly returns of selected oil companies and oil price change (2002-2008)

	STL	E	COP	BP	CVX	SHELLA	HES	XOM	REP	FP
OILBRNP	,457	,434	,540	,422	,397	,334	,547	,263	,352	,435
FUELOIL	,413	,457	,525	,396	,442	,336	,468	,331	,420	,447

Correlation is significant at the 0.01 level (2 -tailed)

Using monthly return increases the overall correlation between operators and oil prices. ConocoPhillips, Hess and Statoil have the highest correlation, while Exxon stands out as having significantly lower correlation with crude oil than the rest of the sample.

Eni, Chevron, Exxon, Repsol and Total have higher correlation to fuel oil than crude oil; possible indication of sensitivity towards downstream activities, such as refining of crude oil, selling and distribution of petroleum and natural gas products.

TABLE 28 – Correlation on return between commodity prices of oil (2002-2008)

	OIL Daily	OIL Monthly
FUEL Daily	.574	
FUEL Monthly		.794

Correlation is significant at the 0.01 level (2 -tailed)

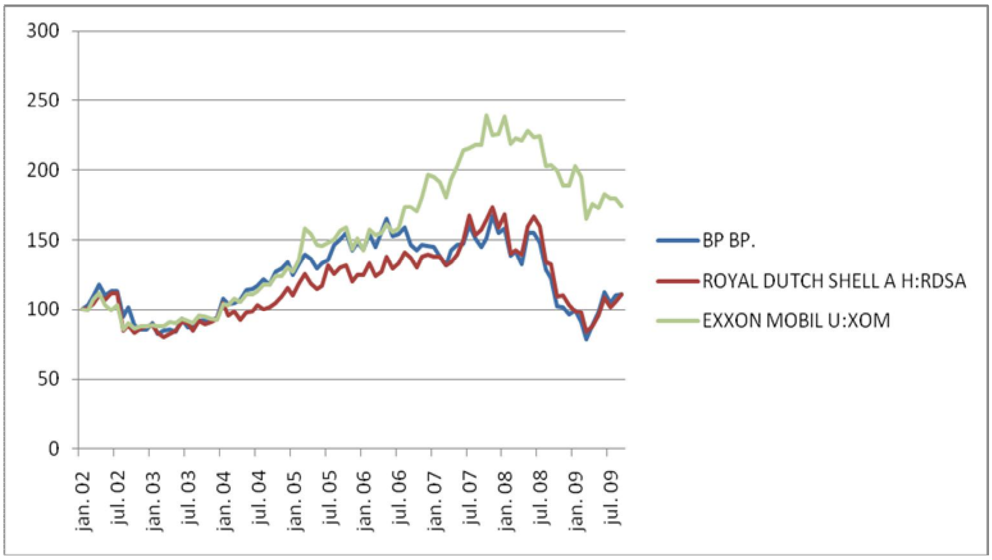
Fuel oil and crude oil exhibit a daily low correlation with each other. To put it another way, there is not a strong positive relationship between fuel oil and crude oil on a daily basis. This could have an effect on share price and downstream integration. On a monthly basis, intercorrelation is quite high but the gap still indicates an effect on share price and downstream integration.

8. Technical Analysis of Share and Oil price changes

The purpose of this chapter is to give insight into the historical development of operator share price in contrast to crude oil. Companies are visually presented and arranged according to market capital, based on monthly rebased share values in U.S. dollars. This is done to get a better understanding of the stock movements visually, and to compare stock behavior over the period studied. Tehcnical analysis is an important tool used by analysts. It is often used to measure resistance levels and moving averages, to determine if a stock is appreciating or depreciating. Companies have been divided into graphs according to market capital size.

8.1. Exxon, Shell and BP

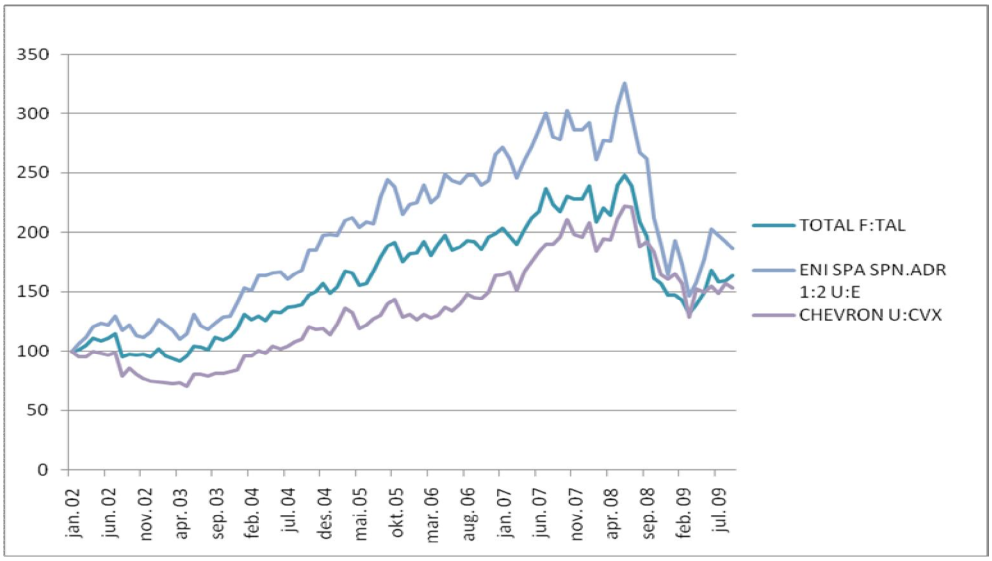
Chart 3 - Trend line: Monthly rebased and USD adjusted share prices (01.01.2002-15.09.2009)



Exxon, Royal Dutch Shell and BP are the largest publicly traded operators. Shell A stock is traded in Euros and BP in pounds, both have been converted into USD in the chart above. Since early '02, crude oil has appreciated drastically and steadily until the oil plunge in '08-09. In mid '09, share values start to pick up slowly. The operators seem to be following the crude oil trend although in a less volatile fashion. There are however clear breaks with crude oil shifts and looking at the developments, there are indications of sporadic lagging effects on share values. BP and Shell move similarly, but even more so during '08-09. Exxon distinguishes itself from July of '07, outperforming Shell and BP. Looking at trend lines, BP, Shell and Exxon's shares show signs of hitting resistance levels months prior to the crude oil plunge. As the recession sets in share values depreciate, but not necessarily due to crude oil, as a multitude of other factors characterize the stock market

8.2. Chevron, Eni and Total

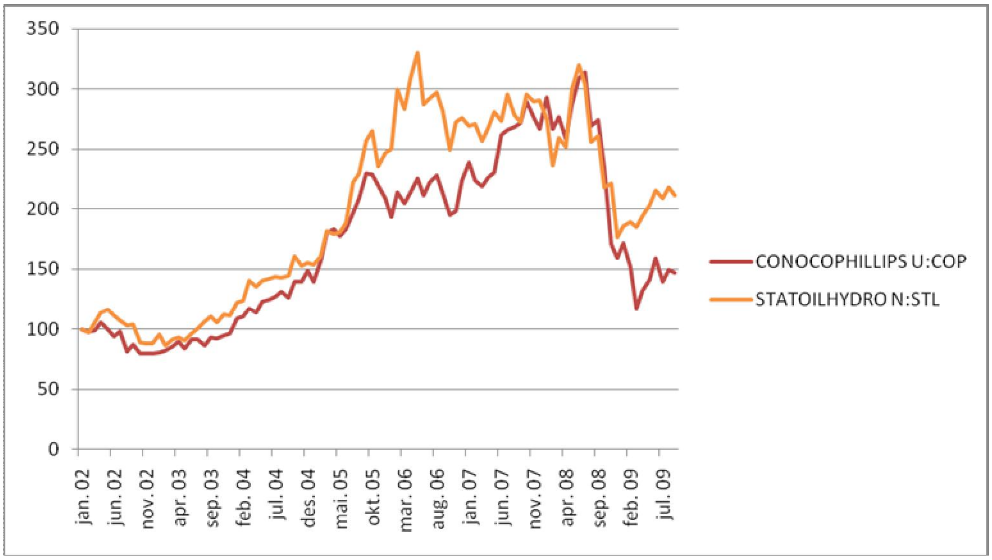
Chart 4 - Trend line: Monthly rebased and USD adjusted share prices (01.01.2002-15.09.2009)



Visually, it looks like Chevron, Eni and Total follow trend lines more in-sync with crude oil. Eni in particular appreciates more than its counter parts and reacts proportionally more to the oil plunge. As in chart 3, the operators develop in unison with each other and the depreciation of oil, but significantly more with each other.

8.3. ConocoPhillips and Statoil

Chart 5 - Trend line: Monthly rebased and USD adjusted share prices (01.01.2002-15.09.2009)



StatoilHydro distiguishes itself by breaching the 300 line in ‘06, hitting restiance levels around 300 until the oil price plunge. Like Eni, Chevron and Total, StatoilHydro’s share value surges as the price of oil drops, but shows an almost equal to crude oil recovery in mid ‘09. ConocoPhilips follows Statoil until mid ‘05, deviates with lower growth rate and meets up during the oilspike, breaching the 300 level. Very similar to that of Eni, ConocoPhillips continue to drop in line with StatoilHydro during the crisis, and more so by feb.’09, when Statoil made a comeback as prices picked up.

8.4. Repsol and Hess

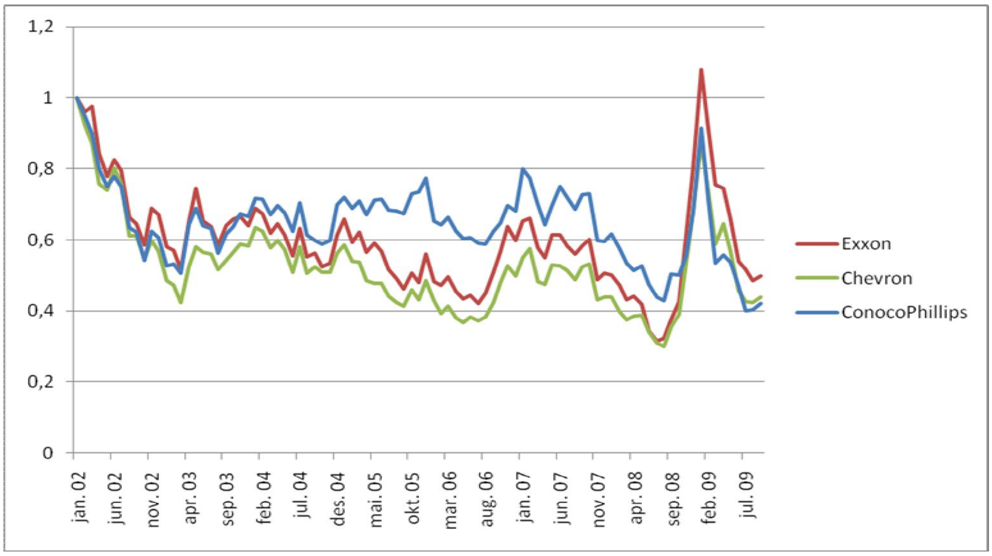
Chart 6 - Trend line: Monthly rebased and USD adjusted share prices (01.01.2002-15.09.2009)

Hess, the smallest firm by market capital moves in the general trend line displayed by crude oil, breaching the 600 level during the oil spike in '08, a potential return of 600%. Then the stock plunges in harmony with crude oil, but recovers before crude oil in early '09. In mid '09 Hess was facing a negative trend line outlook. Repsol seems to be following in line with ConocoPhillips, slowly progressing towards the 300 level in 2008, followed by a drop and consequent recover.

8.5. Metric comparison between share and oil prices

Below are individual metric values comparing crude oil and stock prices. The graphs have been divided based on level of correlation, where 1 is equal to the price of oil. Oil price appreciate relative to share price for all operators over the period. In '08, oil price relative to share price drop faster and further than share values, causing share values to stretch up towards one. Hess, Eni and Statoil follow the price of oil the best over the period, with Eni on top with 78% of the oil price trend on average.

Chart 7 – Development metric between crude oil and share prices (01.01.2002-15.09.2009)



The chart reveals that Exxon and Chevron has had almost identical metric ratios to the development of oil prices. ConocoPhillips have followed in the same progression, but in des. 04 the stock deviates from that of the other two, appreciating more until the collapse in 08.

Chart 8 – Development metric between crude oil and share prices (01.01.2002-15.09.2009)

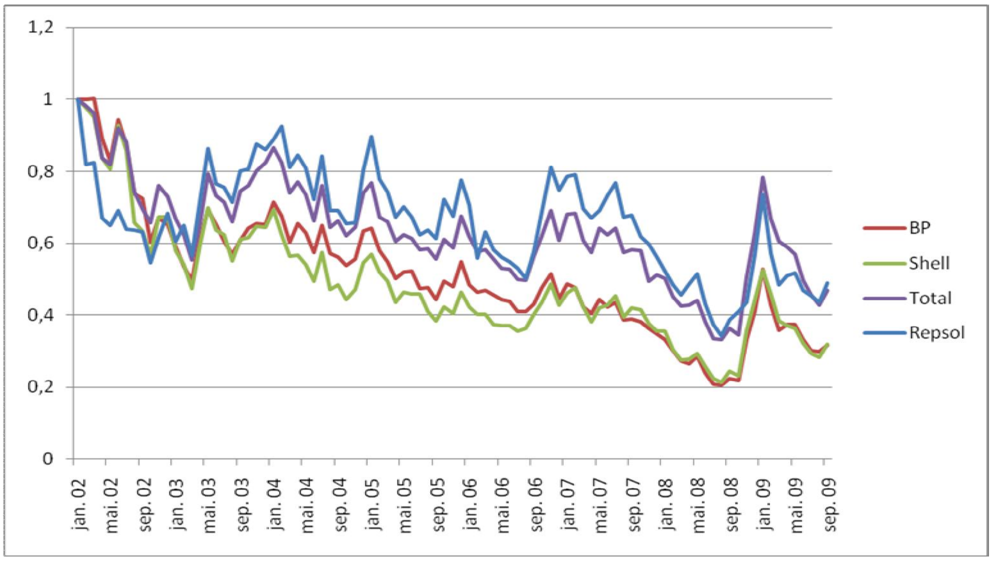


Chart 8 gives insight into the relationship between oil and share prices for BP, Shell, Total and Repsol. Shell and BP progress similarly compared to the price of oil, and they have almost identical ratios for the whole period, with the exception of BP, doing somewhat better at intervals. Repsol and Total display similar metrics compared to oil price but wider gaps considering the advance of BP and Shell.

Chart 9 – Development metric between crude oil and share prices (01.01.2002-15.09.2009)

From chart 9 we have the relationship between Statoil, Hess and Eni relative to the development of oil price. The operators display individual advancement with oil, but Eni and Statoil became in-sync during the oil rise of '07.

9. Oil price as an explanatory variable on share price & return: a simple econometric analysis

This chapter estimates some simple linear relationships between share values and price change in oil prices. The purpose is to examine through regression analysis if changes in oil price can explain share return /value. The chapter investigates the explanatory power of return ($\ln(p_t/p_{t-1})$) and Δ-change (p_t-p_{t-1}), and one month lagged returns.

The following model is used to explore if stock prices and returns can be explained by changes in crude oil and fuel oil:

$$r_{at} = \alpha + \beta r_{pt} + \varepsilon$$

Where r_{at} is the monthly return/price of company *a*'s stock, whereas r_{pt} is the monthly price changes in oil prices.

In order to reduce uncertainty caused by deviation from normality, *monthly values* from 2002-2009 have been applied in the regressions.

9.1. Crude oil price as an explanatory variable on share price

TABLE 29 – Share price as a function of crude oil, $\Delta = p_t - p_{t-1}$ price change (2002-2009)

	β	Std.Error	t-value	Adj. R^2
ExxonMobile	0,30	1,9	15,9	73,4 %
Shell	0,15	1,1	12,9	64,1 %
BP	0,13	1,5	8,7	44,8 %
Chevron	0,28	1,5	19,0	79,7 %
Total	0,30	1,6	18,4	78,5 %
Statoil	0,48	3,2	14,9	70,5 %
ConocoPhillips	0,47	2,2	21,1	82,8 %
Eni	0,41	2,3	17,6	77,1 %
Repsol	0,37	2,5	14,8	70,4 %
Hess	0,88	3,2	28,1	89,5 %

The crude oil beta is significant at the 1% level for all operators. BP and Shell have the smallest betas, suggesting that the share price to a small degree moves in unison with change in the price of crude oil. Hess however, with a beta of 0,88 moves close to unison. Other operators find themselves in the mid-spread of 0,30-0,50; less volatile than the crude oil beta. Looking at to what degree the model (with crude oil as the independent variable) explains the overall variance; the general result is quite high, with Hess and ConocoPhillips displaying ratios over 80%. BP and Shell stand out with the lowest ratios of 44,8% and 64,1%, associated with higher firm specific risk, or being more sensitive to other variables besides oil.

9.2. Fuel oil No.2 price as an explanatory variable on share price

TABLE 30 – Share price as a function of Fuel Oil No.2, $\Delta = p_t - p_{t-1}$ price change (2002-2009)

	β	Std.Error	t-value	Adj. R^2
ExxonMobile	0,30	1,9 %	15,8	73,0 %
Shell	0,14	1,2 %	12,3	62,1 %
BP	0,12	1,5 %	8,4	43,2 %
Chevron	0,27	1,4 %	18,9	79,4 %
Total	0,29	1,6 %	17,7	77,1 %
Statoil	0,46	3,3 %	14,2	68,4 %
ConocoPhillips	0,47	2,2 %	21,6	83,4 %
Eni	0,40	2,3 %	17,3	76,5 %
Repsol	0,36	2,5 %	14,7	70,1 %
Hess	0,87	3,3 %	26,4	88,3 %

The fuel oil beta is significant at the 1% level for all the operators. With fuel oil as the independent variable, results are extremely similar to the crude oil beta above, only slightly smaller. Using monthly values greatly increases correlation between the two commodities, with a correlation coefficient of approx. 0,794. (table 28).

Looking at to what degree the model (with fuel oil as the independent variable) explains the overall variance; the general result is quite high, again with Hess and ConocoPhillips displaying ratios over 80%. BP and Shell stand out with the lowest ratios; corresponding to higher firm specific risk, or impact from some other unknown variable, compared to the the rest of the sample.

9.3. Crude oil return as an explanatory variable on share return

TABLE 31 – Share return as a function of crude oil price return (2002-2009)

	βr_{pt}	Std.Error	t-value	R^2
ExxonMobile	0,13	4,9 %	2,59	6,9 %
Shell	0,22	6,4 %	3,36	11,1 %
BP	0,26	5,9 %	4,42	17,8 %
Chevron	0,23	5,7 %	4,10	15,8 %
Total	0,23	5,0 %	4,59	19,0 %
Statoil	0,31	6,4 %	4,88	20,9 %
ConocoPhillips	0,40	6,6 %	6,08	29,1 %
Eni	0,27	5,9 %	4,57	18,8 %
Repsol	0,26	7,2 %	3,57	12,4 %
Hess	0,57	9,2 %	6,19	29,9 %

The brent crude beta is significant for all operators at the 1% level. Looking at crude oil as an independent variable on *share return*, the results are weaker but still significant. Crude oil returns explain 0,13 of ExxonMobil returns, the lowest impact of the sample. Hess (0,57) and ConocoPhillips (0,40) stand out with exhibiting significant relationships between share return and crude oil returns. In general, crude oil returns does explain share return for corporations, although to a varied degree depending on operator. The explanation power of the models varies from less than 10% up to 30%.

When oil *returns* are used in the function in order to explain share returns rather than share value, the sample beta drops to lower levels, but the difference is not staggering compared to that of the change in R-square. The overall low R-square reveals that the predictive power of the model is significantly lower for return compared to share value.

9.4. Fuel oil No.2 return as an explanatory variable on share return

TABLE 32 – Share return as a function of Fuel Oil No.2 price return (2002-2009)

	βr_{pt}	Std.Error	t-value	R^2
ExxonMobile	0,15	4,6 %	3,32	10,9 %
Shell	0,21	6,1 %	3,39	11,3 %
BP	0,24	5,8 %	4,10	15,7 %
Chevron	0,25	5,3 %	4,67	19,5 %
Total	0,23	4,8 %	4,74	20,0 %
Statoil	0,27	6,2 %	4,30	17,1 %
ConocoPhillips	0,37	6,4 %	5,86	27,6 %
Eni	0,27	5,6 %	4,87	20,9 %
Repsol	0,29	6,7 %	4,39	17,7 %
Hess	0,47	9,3 %	5,03	21,9 %

In the case of fuel oil, results are somewhat weaker but similar to that of the crude oil regression. Repsol, Chevron and ExxonMobil have slightly higher fuel oil betas and R-squares, suggesting that for these operators, contemporary fuel oil had a stronger impact on share returns than that of crude oil returns.

As in the crude oil regression, the sample return beta is lower for the entire sample compared to price change beta. R-square ranges from 10% to 22%, considered low model predictability.

9.5. One month lagged return as an explanatory variable on share return

Change in oil prices from earlier periods might affect share values, expressed as:

$$r_t = \alpha + \beta r_{pt-x} + \varepsilon$$

Where βr_{pt-x} is the oil price beta from previous period x.

A significant beta for an operator indicates that it takes time for the company to absorb the effects of oil price changes.

TABLE 33 – Share price return as a function of lagged crude and fuel oil changes (2002-2009)

	Crude Oil		Fuel Oil No.2	
	βr_{pt} -1	R^2	βr_{pt} -1	R^2
ExxonMobile	0,02**	0,2 %	0,00	0,0 %
Shell	0,13*	4,3 %	0,07	1,5 %
BP	0,14*	5,1 %	0,10	2,7 %
Chevron	0,06	1,0 %	0,03	0,2 %
Total	0,15**	9,2 %	0,11*	4,4 %
Statoil	0,20**	9,0 %	0,11	2,6 %
ConocoPhillips	0,14*	3,7 %	0,10	2,1 %
Eni	0,23**	14,2 %	0,17*	2,1 %
Repsol	0,28**	15,0 %	0,21**	8,8 %
Hess	0,36**	12,4 %	0,17	2,9 %

** significant at the 0.01 level

* significant at the 0.05 level

Adjusted for a one-month price lag in crude oil return, majority of the sample have significant betas. Chevron is the only company that does not have a significant beta and a one-month lag in crude oil return does not explain share returns for the company. Using one month lagged returns of crude oil as the independent variable, yielded low model prediction for the entire segment, but most notably for Chevron and Exxon. Hess, Respol and Eni had the largest explained variance values at 12,4%, 15% and 14,%.

For fuel oil one-month lag results are weaker. Majority of the segment do not have significant betas, with the exception of Eni, Repsol and Total. Repsol had the largest explained variance at 8,8%. When applying lagged values of crude and fuel oil the R-square collaborate that there is a weak relationship between the two studied variables; current returns and lagged changes of fuel price changes.

9.6. Present and lagged return as an explanatory variables on share return

Another way of understanding relative oil price changes as a function of operator share return is through multiple time intervals, built into one model.

Where r_{at} is share return, βr_{pt} beta for present crude oil price and βr_{pt-1} equal to one-month lag:

$$r_{at} = \alpha + \beta 1 r_{pt} + \beta 2 r_{pt-1} + \varepsilon_t$$

TABLE 34 – Share price return as a function of lagged crude oil changes for present month and one month back (2002-2009)

	$\beta 1$	$\beta 2$	$\beta 1+\beta 2$	R^2
ExxonMobile	0,13 **	-0,01		6,70 %
Shell	0,12 ***	0,09		13,40 %
BP	0,24 ***	0,08		19,70 %
Chevron	0,23 ***	0,01		15,60 %
Total	0,21 ***	0,11 **	0,32	23,70 %
Statoil	0,28 ***	0,14 **	0,42	24,70 %
ConocoPhillips	0,39 ***	0,05		29,60 %
Eni	0,23 ***	0,18 ***	0,41	26,80 %
Repsol	0,21 ***	0,23 ***	0,44	22,60 %
Hess	0,50 ***	0,25 ***	0,75	59,10 %

*** significant at the 0.01 level

** significant at the 0.05 level

* significant at the 0.10 level

From the table above, every operator had significant crude oil betas for the current month ($\beta 1$). ExxonMobil stands out with a significance level at the 0,05-level, while the rest of the sample is significant on the 0,01-level. Pushing back one month ($\beta 2$), Hess, Repsol and Eni meet significance requirements at the 0,01-level while Statoil and Total meet the 0,05 significance requirement. For these operators, a positive crude oil price change the previous month had an impact on share return. None of the firms had significant crude oil betas going back two months.

Variance explained by the multifactor model is stronger than when only current oil price return were used as an independent variable. A high R-square means that the stocks return pattern has been in line with oil returns. ExxonMobil had an R-square of 6,7 %, so low that the beta can be disregarded. In the case of Hess, 59,1 % of share return was explained by the model, which I believe to be a solid figure for the predictive ability of the regression. It takes considerable time before the change in oil price is absorbed in the returns of Eni, Repsol and Hess. It is also interesting to note that for Repsol, the one month lagged beta was larger than the current beta. Indicating that price change going back one month is a more important variable than current price change for Repsol. From table 30 Repsol had a higher beta with contemporary fuel oil price change than crude oil change. Since fuel oil is a derivative of crude oil, this could be an indication of impact on downstream activities, such as refining. Repsol might have greater refining capacity than upstream activities and has to buy crude oil to supplement their own production.

10. Concluding remarks

There are several layers to this study. As mentioned in the introduction, the purpose of undertaking this project was not to perform advanced econometric analyses on the impact from on oil and gas companies. Several studies have already confirmed a link between oil price and share value for entities operating in the petroleum industry. My objective was to investigate a sample of traded operator shares, with a view to relate findings of oil price impacts on share values for each individual firm, and relate findings to the financial structure of the company. My desire was to examine if operators react differently to oil price changes and if there existed patterns explaining any such differences.

This study has revealed a set of highly interesting patterns and relationships between share price return and oil price changes. In the subsequent paragraph I shall summarize my main findings.

1. Oil more volatilile than shares

Calculating volatility must be viewed in the timeframe for which it is calculated (i.e. sensitive to impacts from boom and bust cycles). If we compare operator volatility to the S&P 500, return for oil companies have not been more volatile than the S&P index. Excluding the impact of ’08standard deviations have been approx. 20%-25 % for operator shares (p.48). Hess and Statoil distinguish themselves by being more volatile than the average. Including ’08 data drastically increases the standard deviation for ConocoPhillips from 24% to 31%, which can be explained by the exceptionally high operating leverage (i.e. the firms inability to reduce fixed cost and alter production profile (p.43)). Crude oil and fuel oil had standard deviations of approx. 30%-39%, more volatile than shares returns. Fuel oil was more volatile than crude oil with and without ’08 data (table 23), which could be due to a time lag effect experienced by crude oil. Many operators have their own refineries and manufacture, distribute and sell fuel oil directly to the market, which is a derived product of crude oil and prone to daily changes in supply in demand from consumers.

2. Dollar change exhibit stronger influence than relative change

The regressions performed in chapter 9 revealed that changes in oil price as measured in USD have been a far better predictor of oil stock returns than relative (percent) oil price change . R-square values were substantially higher when using price changes and not relative oil price change. There is no doubt that share values are dictated by dollar price change of oil. The strong relationship between dollar values of oil and share value could be a product of investor mentality; oil prices are usually monitored based on dollar change, not percentage change. Investors’ future expectation concerning the dollar price (not return) is one of the underlying factors for valuating share value.

3. Production profile and impact of oil price change

In chapter 2 (p. 9) the theoretical framework of different oil price effects were presented. One major component was oil price effect on production profile; how changing oil prices dictate production and expenses for each operator. Although the sample was limited to only 10 operators, Conocophillips was significantly affected by the crisis of ’08, compared to other operators.

TABLE 35 – Share return as a function of crude oil price return

	β 2007	β 2009
ConcoPhillips	0,34	0,40
Exxon	0,17	0,12
Chevron	0,25	0,23

Above is a simple table illustrating the impact suffered by ConocoPhillips compared to that of Exxon and Chevron (highly correlated firms). Excluding the financial turmoil of '08 increases the oil price beta for Exxon and Chevron. In the case of ConocoPhillips the oil price beta increases as the '08 recession sets in. Can be explained by ConocoPhillips exceptionally high operating leverage and negative change in debt to equity for '08 (p.43). It also reveals that Exxon and Chevron's relationship with price change of oil weakened, explained by the different stress put on the companies. It would therefore be interesting to perform further studies comparing recession effects. According to Granli (2009) oil spikes explain return better for Exxon, Chevron and ConocoPhillips. This evidence suggests that oil price plunges explains returns less for some operators, and more for others. Compared to the rest of the sample, smaller companies showed evidence of being slightly more explained by the oil price plunge of '08, while larger companies were slightly less explained. However, ConocoPhillips stands out with the largest shift in beta.

4. Liquidity and leverage

A commonly held notion is that larger operators are less volatile to oil price influence because of better liquidity. In the case of ExxonMobil and Chevron, this seems to be the case. Considering that Shell and BP have some of the lowest liquidity ratios, but are still not proportionally volatile to oil price changes, liquidity cannot play a significant part when determining the relationship between oil price change and share value returns. Looking at debt structure however, BP and Shell have some of the lowest ratios alongside that of ExxonMobil and Chevron, which suggest that debt structure is significantly more important than liquidity.

5. High intercorrelation and financial characteristics

Returns for some companies have been highly intercorrelatd (p50-53). Correlations between daily returns (table 24) suggest that there was a strong relationship between operators based on stock-exchange registration. When using monthly returns to adjust for any problems that might arise due to time zone differences (table 25), the results were less convincing but still present. Investors should consider stock exchange registration as a vehicle for diversification, and consider the possibility that one exchange might be leading the development. By comparing intercorrelation and metric ratios from the technical analysis chapter (ch.8), I found that intercorrelated operators have had matching shifts to oil price in the light of rebased values. In cases of extreme intercorrelation, companies had comparable financial ratios in liquidity, leverage and performance. Investors should consider financial similarities and high levels of intercorrelation when constructing a portfolio, given that some firms react very similar to the change in oil price.

6. Higher intercorrelation with fuel oil

ConocoPhillips, Chevron, Hess and Exxon display higher daily correlation with fuel oil than that with crude oil. Eni, Chevron, Exxon, Repsol and Total have higher monthly correlation with fuel oil compared to crude oil. This is a possible indication of sensitivity towards downstream activities, such as refining of crude oil, selling and distribution of petroleum and natural gas products.

7. Fuel oil return as a better explanatory variable

During the investigated period, Repsol, Chevron and ExxonMobil have had higher monthly fuel oil betas and R-squares. For these operators, contemporary fuel oil explained share returns better than contemporary crude oil changes. The three operators also displayed higher monthly correlation with fuel oil. Investors should be aware that some firms explain share return better by derived products of crude oil, than crude oil itself.

8. Lagged crude oil returns more significant than lagged fuel oil returns

One month lagged relative crude oil change explains share return better than one month lagged relative fuel oil changes, for all operators. Eni, Total and Repsol are the only companies that had significant betas on one-month lagged returns of fuel oil. While it takes time for some operators to absorb the price effect of crude oil, fuel oil shows no signs of lagged impact.

9. Share return as a function of contemporary and one month lagged crude oil return

Considering share return as a function of contemporary and one month lagged crude oil returns (table 34) , the contemporary effect is significant for all the operators at the .01 level, indicating as Huang, Masulis and Stoll (1996) and Granli (2009) found in their studies that oil price returns do explain share return for oil and gas operators. Significant one-month lagging effects were found to influence share returns for Hess, Eni, Repsol, Statoil and Total, although for Total and Statoil at a 0.05 significance level. Factoring in one-month lagging effects for crude oil does not enable me to draw the conclusion that companies exhibiting similar financial characteristics and similar betas. Firms that are extremely intercorrelated are not equally impacted by price change of oil. While there is no such divide, one clear pattern becomes apparent: There is a clear distinction between market capital and impact from oil price changes. The four largest firms are less impacted by changes in oil price and have no statistical significant betas for lagged oil price changes. With the exception of Statoil and ConocoPhillips, the oil price change impact is proportional to market capital size, Exxon mobile having the lowest beta of 0,13 and Hess the highest beta of 0,75. For Exxon, the beta and R-square are so low, that oil price impacts can be said to be minimal in explaining share returns, but for Hess (0,75) Repsol (0,44,), Statoil (0,42) and Eni (0,41) oil price changes affect share value. One common belief is that oil and gas operators of smaller size are more sensitive to price changes of oil. This is not entirely accurate. Contemporary price changes of oil does not reveal a clear pattern between companies based on market capital, but when factoring in lagged prices of crude oil a pattern becomes evident: For investors, it is crucial to not only consider current oil price changes as an explanatory factor for returns, but also to examine lagged price changes. In the case of Repsol, lagged prices changes of crude oil explain share return better than contemporary price changes in crude oil. Some operators have greater refining capacity than upstream activities and buy crude oil to supplement their own production.

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Corporations

Exxon mobile: www.exxonmobile.com

BP plc: www.bp.com

Statoil ASA: www.statoil.com

Hess Corporation: www.hess.com

Total: www.total.com

Eni spa: www.eni.com

Royal Dutch Shell: www.shell.com

Chevron Corporation: www.chevron.com

ConocoPhillips: www.conocophillips.com

Repsol ypf: repsol.com